

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8710020162 DOC. DATE: 87/09/25 NOTARIZED: NO DOCKET #
 FACIL: STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Public 05000528
 AUTH. NAME AUTHOR AFFILIATION
 BRADISH, T. R. Arizona Nuclear Power Project (formerly Arizona Public Serv
 HAYNES, J. G. Arizona Nuclear Power Project (formerly Arizona Public Serv
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-018-00: on 870827, reactor trip occurred during
 shutdown to check RCS pressure boundary leak. Caused by use
 of deficient procedure to control axial shape index at end
 of core life. Procedural enhancements made. W/870925 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 5
 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: Standardized plant.

05000528

	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR ENCL
	PD5 LA	1 1	PD5 PD	1 1
	LICITRA, E	1 1	DAVIS, M	1 1
INTERNAL:	ACRS MICHELSON	1 1	ACRS MOELLER	2 2
	AEOD/DOA	1 1	AEOD/DSP/NAS	1 1
	AEOD/DSP/ROAB	2 2	AEOD/DSP/TPAB	1 1
	DEDRO	1 1	NRR/DEST/ADS	1 0
	NRR/DEST/CEB	1 1	NRR/DEST/ELB	1 1
	NRR/DEST/ICSB	1 1	NRR/DEST/MEB	1 1
	NRR/DEST/MTB	1 1	NRR/DEST/PSB	1 1
	NRR/DEST/RSB	1 1	NRR/DEST/SGB	1 1
	NRR/DLPQ/HFB	1 1	NRR/DLPQ/QAB	1 1
	NRR/DOEA/EAB	1 1	NRR/DREP/RAB	1 1
	NRR/DREP/RPB	2 2	NRR/DRIS/SIB	1 1
	NRR/PMAS/ILRB	1 1	REG FILE 02	1 1
	RES DEPY GI	1 1	RES TELFORD, J	1 1
	RES/DE/EIB	1 1	RGN5 FILE 01	1 1
EXTERNAL:	EG&G GROH, M	5 5	H ST LOBBY WARD	1 1
	LPDR	1 1	NRC PDR	1 1
	NSIC HARRIS, J	1 1	NSIC MAYS, G	1 1

NOTES: 1 1

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Palo Verde Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 5 2 8										PAGE (3) 1 OF 0 4																													
TITLE (4) Reactor Trip Occurs During Shutdown Due to Pressure Boundary Leakage																																																	
EVENT DATE (5) MONTH DAY YEAR 0 8 2 7 8 7 8 7										LER NUMBER (6) YEAR SEQUENTIAL NUMBER REVISION NUMBER 0 1 8 0 0										REPORT DATE (7) MONTH DAY YEAR 0 9 2 5 8 7										OTHER FACILITIES INVOLVED (8) FACILITY NAMES N/A DOCKET NUMBER(S) 0 5 0 0 0																			
OPERATING MODE (9) 1										THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																																							
POWER LEVEL (10) 0 1 0 8										20.402(b) 20.406(a)(1)(i) 20.406(a)(1)(ii) 20.406(a)(1)(iii) 20.406(a)(1)(iv) 20.406(a)(1)(v)										20.405(e) 60.36(a)(1) 60.36(c)(2) 60.73(a)(2)(i) 60.73(a)(2)(ii) 60.73(a)(2)(iii)										X 60.73(a)(2)(iv) 60.73(a)(2)(v) 60.73(a)(2)(vi) 60.73(a)(2)(vii)(A) 60.73(a)(2)(vii)(B) 60.73(a)(2)(ix)										73.71(b) 73.71(c) OTHER (Specify in Abstract below and in Text, NRC Form 366A)									
LICENSEE CONTACT FOR THIS LER (12)																																																	
NAME Thomas R. Bradish, Compliance Supervisor															TELEPHONE NUMBER AREA CODE 6 0 2 3 9 3 - 1 3 5 3 1																																		
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																																	
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC																					
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SUPPLEMENTAL REPORT EXPECTED (14) X YES (If yes, complete EXPECTED SUBMISSION DATE) NO															EXPECTED SUBMISSION DATE (15) MONTH DAY YEAR 1 2 3 1 8 7																																		

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

At approximately 2037 on August 27, 1987 Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) at approximately 8 percent reactor power when a reactor trip occurred due to the Axial Shape Index of the reactor core. The trip occurred as the unit was shutting down to evaluate a possible Reactor Coolant System (RCS) pressure boundary leak. The presence of a pressure boundary leak was confirmed after the Unit was stabilized in Mode 3 (HOT STANDBY).

The root cause of the reactor trip was a deficient procedure. To prevent recurrence procedural enhancements have been implemented.

The cause of the leak was a cracked weld on the upstream side of the isolation valve for the flanged refueling water level indication. The root cause for the cracked weld appears to be a fatigue failure, however further analysis is still being conducted.

As corrective action the valve was cut out and replaced. Further corrective actions will depend on the results of the root cause evaluation and will be addressed in a supplement to this report.

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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) 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 7	- 0 1 8	- 0 0	0 2	OF	0 4

TEXT (If more space is required, use additional NRC Form 306A's) (17)

At approximately 2037 on August 27, 1987 Palo Verde Unit 1 was in Mode 1 (POWER OPERATION) at approximately 8% reactor (AC) power when a core protection calculator (CPC)(JC) generated reactor trip occurred due to the Axial Shape Index (ASI) of the reactor core. The trip occurred as the unit was shutting down to evaluate a possible Reactor Coolant System (RCS) (AB) pressure boundary leak. The leak had been identified when a Chemistry technician and a Radiation Protection technician made a containment (NH) entry to investigate the source of an increasing trend in containment atmosphere radiation levels. Due to high radiation levels in the area near the leak the technicians could not determine the exact source of the leak. As a prudent measure a plant management decision was made to shutdown the unit to determine the exact location of the leak for evaluation and repair.

At 1750 the unit was at 100 percent power when Control Room Operators (utility-licensed) commenced boration to decrease reactor power. The power decrease from the boron addition was enhanced by the large negative reactivity insertion from xenon build-up. In addition the Part Length Control Element Assemblies (CEAs)(AA) and the Regulating Group 5 CEAs were inserted to the core midplane to control the ASI. ASI was monitored continuously using the Core Operating Limit Supervisory System (IG) since the control room operators (utility-licensed) noted that ASI was quickly becoming more negative (power top peaked).

Reactor Power was at approximately 10% with ASI near -0.331 when the control room operators drove the Regulating group 5 CEAs further into the core. Insertion of the group 5 CEAs would then allow insertion of the Group 4 CEAs without entering the transient Insertion Limit Action Statement. Before the insertion of Regulating Group 4 could substantially affect the strongly negative ASI, Channel "A" CPC calculated an ASI below its operating range (+/- .5) and tripped. Approximately 22 seconds later CPC Channel "B" also tripped which satisfied the 2 out of 4 Reactor Protection System trip logic and a reactor trip occurred. The time delay between the two channel trips is not unusual for this type of situation. Each CPC receives information from their own instrumentation located in different areas around the reactor core. Due to the size of the core, slight differences in neutron flux occur around the core which can cause a delay between the time that 2 CPC channels trip.

There were no actuations of Engineered Safety Features other than the reactor trip, and all control systems functioned as designed. The operating crew followed all applicable procedures and placed the plant in a stable condition following the reactor trip.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

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EXPIRES: 8/31/88

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

The cause for the reactor trip was a higher power condition at the top of the core versus the bottom of the core. The top power peak condition was aggravated by the insertion of the Group 5 CEAs past the midplane in order to insert the Group 4 CEAs into the core. Inserting Group 5 past the midplane caused a power drop in the lower part of the core which resulted in the ASI decrease to the reactor trip setpoint.

The CPCs are designed to initiate automatic protective action to assure that the specified fuel design limits on Departure from Nucleate Boiling Ratio and Local Power Density are not exceeded during Anticipated Operation Occurrences. The ASI auxiliary trip is built into the CPCs to ensure that core parameters stay within the analyzed operating space of the CPCs. Since it is not possible to derive algorithms for all possible combinations of input parameters for the CPCs, operation outside of the operating space will automatically result in a channel trip as experienced in this event.

The root cause of this event was a deficient procedure. The procedure the operators used to shutdown the reactor did not contain sufficient strategies to control ASI at the end of core life. Strategies had been developed by the Reactor Engineering group to control ASI and were transmitted to the Operations Support group for evaluation and possible incorporation into plant procedures. However the strategies had not yet been implemented into the procedures when this event occurred.

To prevent recurrence procedural enhancements have been implemented to provide guidance to the control room operators on how to Control ASI during a plant shutdown. Also an Engineering Evaluation Request has been initiated to determine the possibility of eliminating the ASI auxiliary trip at low power levels.

At approximately 2252 on August 27, 1987 the unit was in Mode 3 (HOT STANDBY) when the Reactor Coolant System leak was determined to be a pressure boundary (AB) leak. The leak was occurring at a weld on the upstream side of the isolation valve for the flanged refueling water level indication connection. This line is connected to a shutdown cooling (BP) suction line that ties directly to the RCS. The leak rate was determined to be less than .5 gpm.

The plant was cooled down to Mode 5 (COLD SHUTDOWN) to facilitate the repair of the leaking weld. The valve was cut off and a new valve was installed. A root cause of failure evaluation was initiated to determine why the weld failed. A destructive examination of the weld crack surface was conducted and showed evidence of a lack of fusion at the weld root under the area of the weld which cracked. Preliminary analysis of the crack determined that the mode of failure was fatigue. The root cause of the failure is still under evaluation and final corrective actions will depend upon the outcome of the evaluation. The weld was installed by the Arizona Nuclear Power Project and does not have a model number. The root cause of the weld failure and further corrective actions will be addressed in a supplement to this report.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/88

FACILITY NAME (1)

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Palo Verde Unit 1

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

Prior to returning the Unit to power operation an evaluation was conducted to ensure that a safety concern did not exist regarding the cracked weld. The evaluation concluded that the Unit could safely return to power operation based on the following information.

1. The material of the piping, valve and weld is nominally Type 304 or 316 stainless steel which is inherently ductile and not prone to catastrophic failures.
2. Based on the leak-before-break logic, a complete and rapid degradation of the weld is not expected.
3. Based on RCS leak rate measurements and the past performance of the Containment Building Atmosphere Radiation Monitor (IL) to detect leaks, more than adequate notice is available if a significant leak occurs.
4. Vibrational readings were taken and were below established acceptance criteria for excessive vibration.

The reactor tripped as designed and all safety functions worked properly. The pressure boundary leakage was contained within containment and no abnormal radioactive releases occurred as a result of the event. The RCS leakage event is bounded by the current accident analysis contained in Chapter 15 of the Final Safety Analysis Report. Therefore this event had no impact on the health and safety of the public.

There were no structures, systems or components inoperable prior to the event that contributed to the event.

No similar reactor trips and no pressure boundary leakage events have been reported previously.



Arizona Nuclear Power Project

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

192-00282-JGH/TRB/JHT

September 25, 1987

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1
Docket No. 50-528
Licensee Event Report 1-87-018-00
File: 87-020-404

Attached please find Licensee Event Report (LER) No. 1-87-018-00 prepared and submitted pursuant to 10CFR 50.73. In accordance with 10CFR 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) 393-3531.

Very truly yours,

J. G. Haynes
Vice President
Nuclear Production

JGH/JHT/cld

Attachment

cc: O. M. DeMichele (all w/a)
E. E. Van Brunt, Jr.
J. B. Martin
R. C. Sorenson
E. A. Licitra
A. C. Gehr
INPO Records Center

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