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AUTH.NAME AUTHOR AFFILIATION
BRADISH,T.R. Arizona Public Service Co. (formerly Arizona Nuclear Power
LEVINE,J.M. Arizona Public Service Co. (formerly Arizona Nuclear Power
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 92-001-00:on 920109,a reactor trip due to low steam generator level.Caused by failure of wires connected to a switch assembly.Plant was stabilized in Mode 3 at normal operating temperature & pressure.W/920207 ltr.

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NOTES:Standardized plant. 05000529

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Arizona Public Service Company
PALO VERDE NUCLEAR GENERATING STATION
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

192-00772-JML/TRB/RKR
February 7, 1992

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Mail Station P1-37
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529 (License No. NPF-51)
Licensee Event Report 92-001-00
File: 92-020-404

Attached please find Licensee Event Report (LER) 92-001-00 prepared and submitted pursuant to 10CFR50.73. In accordance with 10CFR50.73(d), a copy of this LER is being forwarded to the Regional Administrator, NRC Region V.

If you have any questions, please contact T. R. Bradish, Compliance Manager, at (602) 393-2521.

Very truly yours,

James M Levine

JML/TRB/RKR/nk

Attachment

cc: W. F. Conway (all with attachment)
J. B. Martin
D. H. Coe
INPO Records Center

P852422505

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FACSIMILE

LICENSEE EVENT REPORT (LER)

FACILITY NAME	DOCKET NUMBER	PAGE
Palo Verde Unit 2	0 5 0 0 0 5 2 9	1 OF 0 7

TITLE: Reactor Trip Due to Low Steam Generator Level

EVENT DATE			LER NUMBER			REPORT DATE			OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
									N/A	0 5 0 0 0
0 1	0 9	9 2	9 2	0 0 1	0 0	0 2	0 7	9 2	N/A	0 5 0 0 0

OPERATING MODE	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following)			
POWER LEVEL	0 1 7	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
		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)(vii)	OTHER (Specify in Abstract below and in Text)
		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)(x)	

LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER
Thomas R. Bradish, Compliance Manager	AREA CODE 6 0 2 — 3 9 3 - 2 5 2 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	J B	X I C	F 1 8 0	Y					

SUPPLEMENTAL REPORT EXPECTED		EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 4	1 3	9 2

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

At approximately 1653 MST on January 9, 1992, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) at approximately 17 percent power when an automatic reactor trip occurred due to low level in the number 1 steam generator because a feedwater supply valve did not open automatically as required. The reactor trip occurred during power ascension following a refueling outage. Following the reactor trip, the plant was stabilized in Mode 3 (HOT STANDBY) at normal operating temperature and pressure. The reactor trip was diagnosed as an uncomplicated reactor trip in accordance with the emergency plan implementing procedures. Prior to the automatic reactor trip, Control Room personnel began reducing power, started the "B" motor driven Auxiliary Feedwater pump and established auxiliary feedwater flow to the number 1 steam generator. No other safety system responses occurred and none were required.

The cause of the feedwater supply valve not opening was fatigue failure of wires connected to a switch assembly on the auto/manual controller for the valve. The fatigue failure of the wires prevented the feedwater supply valve from receiving an open signal from the main feedwater control system. The cause of the switch assembly failure is being investigated. The root cause of failure investigation is expected to be completed by March 9, 1992. The results of the root cause investigation and any recommended corrective actions will be described in a supplement to this report which is expected to be submitted by April 13, 1992. As immediate corrective action the faulty controller was replaced.

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

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TEXT

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

At 1653 MST on January 9, 1992, Palo Verde Unit 2 was in Mode 1 (POWER OPERATION) at approximately 17 percent power during startup from a refueling outage.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: Any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS)(JC).

At approximately 1653 MST on January 9, 1992, Palo Verde Unit 2 experienced an automatic reactor (RCT)(AC) trip due to low level in the number 1 steam generator (AB) because a feedwater supply valve (FCV)(SJ) did not open automatically as required. The reactor trip occurred during power ascension following a refueling outage. Following the reactor trip, the plant was stabilized in Mode 3 (HOT STANDBY) at normal operating temperature and pressure. The reactor trip was diagnosed as an uncomplicated reactor trip in accordance with the emergency plan implementing procedures. Prior to the automatic reactor trip, Control Room personnel (utility, licensed), in response to the decreasing steam generator level, began reducing power, started the train "B" motor driven auxiliary feedwater pump (P)(BA) and established auxiliary feedwater (BA) flow to the number 1 steam generator. No other safety system responses occurred and none were required.

The Palo Verde steam generators use dual feedwater flow paths (SJ) during normal operation. One flow path is through the six (6) inch downcomer line (SJ). The other flow path is through the 24 inch economizer line (SJ). From initial startup to approximately 15 percent power, feedwater to the steam generators is directed through the downcomer line. At approximately 15 percent power, feedwater flow is redirected from the downcomer line to the economizer line. This swapover is accomplished by the feedwater control system (JB) automatically closing the downcomer valve (ISV)(SJ) and then throttling the economizer valve (FCV)(SJ) open.

Prior to this event at approximately 1645 MST on January 9, 1992, reactor power was increased from approximately 14 percent to approximately 17 percent power for feedwater swapover. The downcomer valves for both steam generators closed and steam generator levels began to decrease as expected. The feedwater

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control system initiated an "open" demand signal to throttle the economizer valves open to provide the required flow and maintain steam generator level. At approximately 1649 MST, the level in the number 2 steam generator began to recover as expected, but the level in the number 1 steam generator continued to decrease. The feedwater control system responded to the decreasing level in the number 1 steam generator by increasing the "open" demand signal to the economizer valve and increasing the main feedwater pump (P)(SJ) speed. At the same time, a Control Room Reactor Operator (utility, licensed) also increased main feedwater pump speed to raise steam generator level. At the swapover power levels (approximately 15 to 17 percent power), the economizer valves only open approximately two (2) to three (3) percent. This small change in valve position is not readily observable on the valve position indication available in the Control Room. Control Room personnel were not aware that the "open" demand signal which is observable on the control board, was not being sent to the economizer valve.

At approximately 1652 MST, while Control Room personnel were investigating the cause of the low steam generator number 1 level, the operating main feedwater pump tripped on high discharge pressure. Control Room personnel (utility, licensed) reduced power, started the train "B" motor driven Auxiliary Feedwater pump (P)(BA) to establish auxiliary feedwater (BA) flow to the number 1 steam generator, and restarted the main feedwater pump to establish feedwater flow through the downcomer line. At approximately 1653 MST, the reactor automatically tripped on low steam generator level. During the same time period, with steam generator level approaching the low level trip setpoint and anticipating a reactor trip, a Control Room Reactor Operator (utility, licensed) depressed the manual trip push button. The minimum level reached in the number 1 steam generator was approximately 42 percent. The trip setpoint in Technical Specification (TS) 2.2.1, Table 2.2-1, "Reactor Protective Instrumentation Trip Setpoint Limits" is greater than or equal to 44.2 percent for low steam generator level.

An investigation of the event determined that the economizer valve did not open as required during the swapover.

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

Other than the economizer valve discussed in Section I.B, no other structures, systems, or components were inoperable at the start of the event which contributed to this event.

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D. Cause of each component or system failure, if known:

The cause of the economizer valve not opening during the swapover was fatigue failure of wires connected to a switch assembly (HS)(JB) on the main control board auto/manual controller (XIC)(MCBD)(JB) for the number 1 steam generator economizer valve. The fatigue failure of the wires prevented the economizer valve from receiving an open signal from the main feedwater control system during the swapover. An investigation determined that the auto/manual controller switch assembly configuration allows switch travel past the required switch position (i.e., past switch detentes) resulting in a failure of one (1) of two (2) screws securing the auto/manual switch assembly to the controller. This allowed the switch assembly to repeatedly move when the switch position was changed causing the fatigue failure of the wires connected to the switch assembly.

E. Failure mode, mechanism, and effect of each failed component, if known:

The fatigue failure of the wires connected to the switch assembly prevented the economizer valve from receiving an open signal from the main feedwater control system during the swapover. This resulted in the reactor trip on low steam generator level when the downcomer valve closed and the economizer valve failed to open during the swapover, isolating both feedwater lines to the number 1 steam generator.

F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable - no failures of components with multiple functions were involved.

G. For a failure that rendered a train of a safety system inoperable, estimated time elapsed from the discovery of the failure until the train was returned to service:

Not applicable - no failures that rendered a train of a safety system inoperable were involved.

H. Method of discovery of each component or system failure or procedural error:

The fatigue failure of the wires connected to the switch assembly was discovered by maintenance and engineering personnel (utility, nonlicensed) during an investigation of the reactor trip and the failure of the economizer valve to open. There were no procedural errors which contributed to this event.

I. Cause of Event:

The root cause of the switch assembly failure is being investigated in accordance with the Palo Verde Incident Investigation Program. The root cause of failure investigation is expected to be completed by March 9, 1992. The results of the root cause investigation will be described in a supplement to this report which is expected to be submitted by April 13, 1992.

J. Safety System Response:

Other than the reactor trip described in Section I.B, there were no safety system responses and none were necessary.

K. Failed Component Information:

The auto/manual controller is manufactured by Foxboro Company. It is model number 255PA custom ECEP-9133.

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

The plant responded as designed, no safety limits were exceeded, and the event was bounded by the safety analysis in the Palo Verde Updated Final Safety Analysis Report (FSAR). The purpose of the reactor protection system low steam generator level reactor trip is to provide sufficient time for actuating the emergency feedwater pumps to remove decay heat from the reactor in the event of a reduction in steam generator water inventory. The trip setpoint for the reactor trip on low steam generator level is required to be set at greater than or equal to 44.2 percent (TS 2.2.1, Table 2.2-1). The minimum level reached in the number 1 steam generator during this event was approximately 42 percent. The trip setpoint for the low steam generator level auxiliary feedwater engineered safety features actuation system is required to be set at greater than or equal to 25.8 percent (TS 3.3.2, Table 3.3-4). Therefore steam generator level was maintained well above the trip setpoint for the low steam generator level auxiliary feedwater engineered safety features actuation system.

This event is categorized as a decrease in heat removal by the secondary system. The Palo Verde Updated FSAR analysis for loss of feedwater is analyzed at 100 percent power. Loss of feedwater is a moderate frequency event and is primarily concerned with the potential for overpressurization. The event described in this LER is bounded by the Palo Verde safety analysis described in the Updated FSAR. Both primary and secondary pressures remained below safety limits [2750 pounds per square inch absolute (psia) for pressurizer pressure and 1375 psia for secondary pressure]. Pressurizer (AB) pressure remained less than 2268 psia during this event. Secondary pressure remained below the lift

setpoints (first bank lifts at 1250 psia) of the main steam safety valves (RV)(SB). Actual peak secondary pressure was less than 1222 psia. The bounding peak pressure event for Palo Verde is the loss of condenser vacuum discussed in Updated FSAR Section 15.2.3. Specified acceptable fuel design limits were not challenged during this event.

Based on the above, there were no adverse safety consequences or implications as a result of this event. This event did not result in any challenges to fission product barriers or result in any releases of radioactive material. This event did not adversely affect safe operation or the health and safety of the public.

III. CORRECTIVE ACTION:

A. Immediate:

The plant was stabilized in Mode 3 (HOT STANDBY) at normal operating temperature and pressure. The faulty controller was replaced.

B. Action to Prevent Recurrence:

1. Operations personnel in all three units were briefed on the proper operation of the auto/manual switches and how to identify a loose auto/manual switch.

2. There are 15 of these type controllers used in each unit. All of these controllers are used in nonsafety related functions. The controllers were checked in Units 1, 2 and 3. Three (3) controllers, one (1) in each unit, had loose switch assemblies. The controllers in Units 1 and 2 have been replaced. A replacement controller is not available onsite to replace the loose controller in Unit 3. The replacement controller is expected onsite by the beginning of March 1992. The Unit 3 controller is for one (1) of the Unit 3 steam bypass control valves (SBCV). This SBCV is not in service since only seven (7) of eight (8) SBCVs are in service during full power operation.

3. The cause of the switch assembly failure is being investigated in accordance with the Palo Verde Incident Investigation Program. The root cause of failure investigation is expected to be completed by March 9, 1992. The results of the root cause investigation and any recommended corrective actions will be described in a supplement to this report which is expected to be submitted by April 13, 1992.

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TEXT

IV. PREVIOUS SIMILAR EVENTS:

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