NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO 3150-0104
EXPIRES 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Trojan Nuclear Plant	0 5 0 0 0 3 4 4	1 OF 0 3

TITLE (4)

EHC Switch Failure Caused Load Rejection - Reactor Tripped Manually

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
1 2	0 6	8 7	8 7	—	0 3 7	—	0 0	0 1	0 5	8 8		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)	X	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	1 0 0	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, 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)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Bill Kershul, Plant Review Board Engineer	5 0 3 5 5 6 - 3 7 1 3

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
X	J J	H S	M 1 2 8	No							
X	W I	I S V	C 6 3 5	Yes							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On December 6, 1987, the reactor was manually tripped following a load rejection transient. About ten minutes after the reactor tripped, it was reported to the control room that the turbine-driven auxiliary feedwater (AFW) pump had not automatically started. The pump was manually started. Steam generator blowdown isolation valve MO-2808 failed to indicate completely closed following the main turbine trip. The upstream isolation valve closed as designed.

The cause of the load rejection transient was a failure of the load decrease push button in the electro hydraulic control (EHC) system. The failure of the turbine-driven AFW pump to auto-start was due to a loose electrical connection in the auto-start circuitry. The failure of valve MO-2808 to indicate fully closed was due to the threaded valve seat backing out and preventing complete closure indication for the valve.

The plant was placed in Mode 3 (hot standby). The EHC load decrease push button was replaced. The loose connection in the turbine-driven AFW pump auto-start circuitry was tightened. Other accessible terminal connections were checked for tightness, and no discrepancies were found. Blowdown valve MO-2808 was repaired and tested satisfactorily.

This event had no effect on public health and safety.

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NRC Form 3
(9-83)

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Trojan Nuclear Plant	0 5 0 0 0 3 4 4	8 7	— 0 3 7	— 0 0	0 2 OF 0 3

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

Description of Event

On December 6, 1987, the plant was in Mode 1 (power operations) with the reactor coolant system at 2250 psig and 585°F. At 1010 hours with no evolutions in progress, a load rejection transient began as evidenced by a turbine runback and control rods stepping-in. The load decrease continued and at about 15 megawatts, the reactor and turbine were manually tripped. Event Specific Emergency Instruction (ES)-0.1, "Reactor Trip Response" was entered. At 1012 hours, auxiliary feedwater (AFW) flow was observed to be adequate at about 240 gallons per minute (gpm) to each of the four steam generators. (ES-0.1 specifies that total AFW flow be > 495 gpm, but does not require that individual AFW pumps be confirmed to be running.) Shortly thereafter, it was noted by personnel in the pump room that the turbine-driven AFW pump was not running. At 1020 hours, control room operators were informed of this condition and it was determined that the AFW turbine trip and throttle valve (MO-3071) was closed. AFW flow rate at this time was determined to be about 150 gpm to each steam generator. An auxiliary operator was dispatched to the turbine-driven AFW pump room and it was confirmed that valve MO-3071 was closed. The pump was started manually from the control room and it was confirmed to be functioning properly. During the post-trip review, it was determined that the turbine-driven AFW pump had not automatically started during the transient. It was also determined that steam generator blowdown isolation valve MO-2808 failed to indicate fully closed following the main turbine trip. Upstream blowdown isolation valve MO-6719 did close as designed.

Cause of Occurrence

The cause of the load rejection transient was a failure of the load decrease push button in the electro hydraulic control (EHC) system. The push button was determined to have a failed microswitch which was believed to have failed randomly due to normal aging.

The failure of the turbine-driven AFW pump to auto-start was due to a loose electrical connection in the auto-start circuitry in control room panel C-05. The affected terminal previously had two wires connected. Investigation determined that a 1985 Detailed Construction Package (DCP) to improve pump reliability had removed a wire from that terminal. The remaining lead was touching the terminal but was not tightened. Although not firmly tightened, the lead still made contact with the terminal resulting in successful automatic starts on several occasions during testing since 1985. Since the last automatic start, the lead lost contact with the terminal which caused the failure. The initial indicated AFW flow of about 240 gpm to each steam generator and subsequent decrease to about 150 gpm was verified as normal overshoot of the diesel-driven AFW pump when it automatically starts.

The failure of valve MO-2808 to indicate fully closed was due to the threaded valve seat backing out. This prevented the valve stem from traveling the normal distance to closure, resulting in the close limit switch not actuating. The valve was actually closed and would have performed its design function.

Corrective Action

The immediate corrective action was to place the plant in Mode 3 (hot standby). The EHC load decrease push button was replaced.

The loose connection in the turbine-driven AFW pump auto-start circuitry was tightened. Other accessible terminal connections (about 75% of the total) in C-05 and local control panel C-160 were checked for tightness. No other discrepancies were found. Panel C-160 is scheduled to be replaced as part of a system upgrade in the 1988 refueling outage. The frequency and method of testing the AFW pump auto-start circuitry is being reviewed for improvements. Procedures associated with verification of AFW auto-start are being reviewed for improvements to ensure that the operating status of each AFW pump is confirmed. These reviews will be completed by March 4, 1988.

Blowdown valve MO-2808 was repaired and tested satisfactorily. A check of maintenance records for MO-2808 indicated that the valve was assembled and installed per the vendor technical manual. This valve had failed to indicate full closure in September 1987 and on November 29, 1987. On both occasions the valve was confirmed closed with no evidence of leakage, and the limit switch was adjusted. The limit switch adjustment following the November 1987 event was considered excessive and, therefore, an internal Event Report 87-185 was issued and is presently being evaluated. This valve and all similar 3/4 inch blowdown valves will be replaced as part of a system modification in the 1988 refueling outage.

The review of this event is continuing. Any significant changes identified when this review is completed will be included in a revision to this Licensee Event Report.

Significance of Occurrence

This event had no effect on public health and safety. Adequate AFW was provided to the steam generators. The loose electrical lead did not affect manual operation of the turbine-driven pump and still allowed all automatic features to function with the exception of opening of steam supply valve MO-3170.

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January 5, 1988
CAO-006-88

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

Gentlemen:

Licensee Event Report No. 87-37 is attached. This report discusses an event in which the reactor was manually tripped following a load rejection transient caused by a switch failure in the electro-hydraulic control system.

Sincerely,

C. A. Olmstead

C. A. Olmstead
General Manager
Trojan Nuclear Plant

c: Mr. John B. Martin
Regional Administrator
US Nuclear Regulatory Commission

Mr. Dave Yaden, Director
State of Oregon
Department of Energy

Mr. R. C. Barr
USNRC Resident Inspector
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