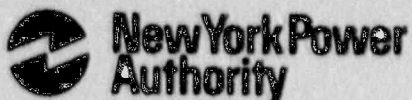


James A. FitzPatrick
Nuclear Power Plant
P.O. Box 41
Lycoming, New York 13093
315 342-3840



William Fernandez II
Resident Manager

April 16, 1990
JAFP-90-1328

United States Nuclear Regulatory Commission
Document Control Desk
Mail Station P1-137
Washington, D.C. 20555

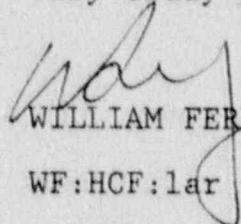
SUBJECT: DOCKET NO. 50-333
LICENSEE EVENT REPORT: 90-009-00
Reactor Scram - Loose Part in
Instrument Amplifier

Dear Sir:

This Licensee Event Report is submitted in accordance with
10 CFR 50.73(a)(2)(iv).

Questions concerning this report may be addressed to
Mr. Hamilton Fish at (315) 349-6013.

Very truly yours,


WILLIAM FERNANDEZ

WF:HCF:lar

Enclosure

cc: USNRC, Region I
USNRC Resident Inspector
INPO Records Center
American Nuclear Insurers

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) JAMES A. FITZPATRICK NUCLEAR POWER PLANT										DOCKET NUMBER (2) 0 5 0 0 0 3 3 3										PAGE (3) 1 OF 0 5																													
TITLE (4) Reactor Scram - Loose Part in Water Level Recorder Amplifier Resulted in Ground and False Low Water Level Signal Causing Real High Water Level and Turbine Trip																																																	
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 NAME(S)										DOCKET NUMBER(S)												
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OPERATING MODE (9)										THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																																							
N										20.402(b)										20.403(a)										X 00.73a(2)(iv)										73.71(b)									
POWER LEVEL (10)										20.403a(1)(i)										00.30(a)(1)										00.73a(2)(iv)										73.71(a)									
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										20.403a(1)(iii)										00.73a(2)(i)										00.73a(2)(v)(A)																			
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LICENSEE CONTACT FOR THIS LER (12)																																																	
NAME Hamilton C. Fish																				TELEPHONE NUMBER 3 1 5 3 4 9 - 6 0 1 3																													
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																						
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YES (If yes, complete EXPECTED SUBMISSION DATE)																				X NO										EXPECTED SUBMISSION DATE (15)																			
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ABSTRACT (Limit to 1,400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

EIIIS Codes are in []

The reactor scrammed from full power at 3:54 P.M. on 3/19/90. A false low reactor water level signal in the feedwater control circuit [JB] increased feed pump speed. This resulted in high reactor water level followed by a turbine trip and automatic reactor scram initiated by turbine stop valve closure [SB]. All systems performed as designed except for flow oscillations in the High Pressure Coolant Injection system (HPCI) [BJ] (LER-90-010) and one rod inserting only to position (02). HPCI injection was continued using manual operator control. A normal plant cooldown followed. The cause of the scram was an oversight by the vendor in the assembly of the amplifier component (purchased 10 years ago) of the strip chart recorder for narrow range water level. A one-quarter inch metal star lock washer was found wedged between the printed circuit board and the mounting track groove in the metal amplifier box. The washer was also in contact with a signal wire on the board. The resulting electrical ground created a short circuit to an installed ground on the feedwater level control circuit and a false low reactor water level signal. The plant was returned to service with the generator on line at 8:27 P.M. on March 23, 1990.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

FACILITY NAME (1) JAMES A. FITZPATRICK NUCLEAR POWER PLANT	DOCKET NUMBER (2) 0 5 0 0 0 3 3 3	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
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TEXT: If more space is required, use additional NRC Form 288A's (11)

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Description

The reactor scrammed from full power at 3:54 P.M. on March 19, 1990. One of the four Residual Heat Removal (RHR) [BP] pumps was out of service for maintenance. Prior to the scram the reactor water level was at a normal value of 200 inches above Top of Active Fuel (TAF). The strip chart recorder (06LR/PR-97) for reactor pressure and narrow range (164.5 to 224.5 inches TAF) reactor water level was being installed in the reactor control panel (09-5) following replacement of a signal amplifier. Upon connection of the recorder, a false low reactor water level signal was generated in the reactor feedwater level control circuit [JB]. In response to this signal the master controller increased feed pump speed. Reactor water level rapidly increased to a maximum of 238 inches TAF resulting in trip of the main turbine and reactor feedwater pumps at 222.5 inches. The main turbine stop valve [SB] closure generated a scram signal to the reactor protection system [JC]. High water level trip logic was also activated for the High Pressure Coolant Injection (HPCI) [BJ] and Reactor Core Isolation Cooling (RCIC) [BN] systems although they were not operating at that time.

The reactor reached 1130 psig during the transient. In accordance with design, two safety relief valves lifted and two more may have simmered but did not lift. Also in accordance with design, both reactor recirculation pumps [AD] tripped and the signal for alternate rod insertion was received.

The high water level trip of the feedwater pump turbines was followed by a rapid decrease in reactor water level to 131 inches TAF. The low reactor water level resulted in an automatic Group II primary containment isolation, isolation of the Reactor Water Cleanup system (RWC) [CE], trip of the reactor building ventilation system [VA], and initiation of the Standby Gas Treatment system (SBGT) [BH], automatic initiation of and injection into the vessel by HPCI [BJ] and RCIC [BN]. Because the initial automatic flow control response of HPCI was erratic (LER-90-010), operators placed it in manual control to restore reactor water level. Both HPCI and RCIC subsequently tripped on high reactor water level in accordance with design. The operators restarted reactor feed pump A to maintain reactor water level.

Following the scram procedure, operators verified the Group II primary containment isolation and then restored the RWC and reactor building ventilation system to service. During verification of insertion of control rods, control rod [AA] 30-07 was found at position 02 instead of full in at position 00. It was then fully inserted manually. The discharge check valve (34FWS-4B) for reactor feed pump B stuck in the open position. A normal plant cooldown was initiated to accommodate restart of the reactor recirculation pumps.

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 388A's) (17)

Upon determination of the cause and correction of the erratic response of HPCI (LER-90-010), the plant was restored to service with generator on line at 8:27 P.M. on March 23, 1990. The plant was off line for 4 days, 4 hours, 33 minutes.

Cause

A one-quarter inch outside diameter serrated metal star lock washer was found firmly wedged between a contact point on the circuit board and the circuit board mounting track groove in the metal amplifier box. Thus, the lock washer created an unintended conductive path from the amplifier to the metal amplifier case. The box in turn was connected to the recorder frame for the reactor pressure and level dual pen strip chart recorder. When the recorder assembly was reconnected to the water level control circuit at the control room panel, a shunting ground path was established between the recorder terminal case and an installed ground at a proportional amplifier in the reactor water level control system.

The effect of the ground was to create a short circuit across the signal input to the master controller. This in effect provided a reactor water level signal of zero to the feedwater controller. As previously described, this resulted in maximum feed pump output, high reactor water level, and scram of the reactor on turbine stop valve closure.

The performance of one of the pens on the dual pen recorder had been erratic which was symptomatic of a failing amplifier. Two amplifier sections were installed to replace the existing amplifiers. The replacement amplifiers were from existing inventory. Standard tests of the amplifier performance were conducted prior to installation by use of the external multi-pin connectors. These tests indicated proper operation of the amplifier. Individual pin to case ground tests which might have found the ground are not normally performed on this type of component. The metal covers on amplifier boxes had not been opened.

The replacement amplifier unit was a component of a dual pen indicating recorder received on August 6, 1980. The recorder was ordered as Quality Assurance (QA) Category I. Although the manufacturer provided a "Product Quality Certification", it was listed as "not important to safety" on the other vendor documentation. The recorder was inspected upon receipt to specifications for physical damage, cleanliness, physical properties, and workmanship. It was carried in the warehouse QA Category I inventory until it was issued to the Instrument and Control Department on July 27, 1988. Since that time, the recorder has served as a source of immediate replacement parts for compatible installed plant recorders. Both new amplifier units were removed and used to replace the two amplifier sections (one for each pen) in the in-service recorder. The amplifier case cover remained securely closed and was secured by a thumbscrew during this ten-year period.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
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TEXT (If more space is required, use additional NRC Form 305A's) (17)

The washer which caused the scram is identical to those used internally to fasten the multi-pin connector to the amplifier box. However, all connections in the box were found to be tight. No other parts were missing or loose. Therefore, the washer causing the ground is believed to have been in place since assembly of the device by the manufacturer.

Analysis

As an automatic scram, this event is reportable under the provisions of 10 CFR 50.73(a)(2)(iv) which requires reporting of any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature. The chain of events is provided in the description section.

FSAR Section 14, "Safety Analyses", Subsection 14.5, "Analysis of Operational Transients and Reactor Vessel Overpressure", was reviewed. The plant responded as designed for a normal turbine trip (with bypass) due to reactor vessel high water level. Vessel pressure and level control were maintained within acceptable ranges.

Failure of control rod 30-07 to fully insert automatically, erratic response of the HPCI system, and failure of 34FWS-4B to seat on reverse flow, had no detrimental effect on the course of the plant response to the scram.

The one control rod which did not completely insert automatically was subsequently fully inserted manually. The rod had automatically inserted to notch position 02. Experience has demonstrated that a small number of control rods in BWR plants will occasionally fully insert and then bounce back out to position 02. The reactivity represented by this single rod being at the first notch position is such that even if it had not been successfully inserted manually, sufficient shutdown margin would have been maintained and there would have been no safety consequences to the plant.

Corrective Action

Prior to the scram the performance of one of the two recorder pens was symptomatic of a deteriorating amplifier. As a prudent practice, the amplifiers for both pens were replaced. Following the scram, the amplifier containing the ground was removed and replaced with the original amplifier which had not been exhibiting deteriorating performance. Replacement parts are no longer available from the manufacturer.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES 8/31/85

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

Defective Component Data

Manufacturer: General Electric Company
Manufacturer Vendor Code: G082
Model: 109SK66701 (Amplifier)
Description: Signal Amplifier Circuit Board
Applications: Strip Chart Recorder
Reactor Water Level and Pressure
JAF Component: 06LR/PR-97 (Strip Chart Recorder)