Commonwealth Edison
Dresden Nuclear Power Station
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March 19, 1990

EDE LTR #90-208

U.S. Nuclear Regulatory Commission
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Licensee Event Report #90-002-0, Docket #050249 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10 CFR 50.73(a)(2)(v)(D).

E. D. Eenigenburg
Station Manager
Dresden Nuclear Power Station

EDE/jmt

Enclosure

cc: A. Bert Davis, Regional Administrator, NRC Region III
File/NRC
File/Numerical

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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Dresden Nuclear Power Station, Unit 3	0 5 0 0 0 2 4 9	1 of 0 4

Title (4) High Pressure Coolant Injection (HPCI) System Inoperable Due to Flow Transmitter (FT) 3-2358 Amplifier Failure

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)
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OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
N		___ 20.402(b)	___ 20.405(c)	___ 50.73(a)(2)(iv)	___ 73.71(b)
POWER LEVEL (10)	0 2 7	___ 20.405(a)(1)(i)	___ 50.36(c)(1)	X 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 (12)

Name	TELEPHONE NUMBER AREA CODE
J. H. Swanson, Technical Staff System Engineer Ext. 2788	8 1 5 9 4 2 - 2 9 2 0

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	B J	F T	G 0 8 0	Y					

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)

During performance of Dresden Operating Surveillance (DOS) 2300-3, High Pressure Coolant Injection (HPCI) System Operability Verification, on February 24, 1990 at 1158 hours, the Nuclear Station Operator (NSO) observed that flow indicating controller (FIC) 3-2340-1 was indicating no flow while the HPCI pump was operating and lined up to the Condensate Storage Tank (CST) through the test return line. The HPCI system was declared inoperable at 1158 hours, and Unit 3 subsequently entered into a seven day Limiting Condition for Operation (LCO) time clock as required by Technical Specifications Section 3.5.C.2.a. The root cause of this event was attributed to failure of flow transmitter (FT) 3-2358 amplifier due to moisture intrusion. The amplifier was replaced and recalibrated. DOS 2300-3 was performed successfully on February 25, 1990 and HPCI was declared operable at 1045 hours. The safety significance of this event was minimal since manual operation of HPCI was possible and since all Emergency Core Cooling Systems (ECCSs) required by Technical Specification Section 3.5.C.2.a were operable. This was the first occurrence of this type involving HPCI Flow Transmitter failure.

PLANT AND SYSTEM IDENTIFICATION:

General Electric - Boiling Water Reactor - 2527 MWt rated core thermal power.

Nuclear Tracking System (NTS) tracking code numbers are identified in the text as (XXX-XXX-XX-XXXXX).

EVENT IDENTIFICATION:

High Pressure Coolant Injection (HPCI) [BJ] System Inoperable Due to Flow Transmitter (FT) 3-2358 Amplifier Failure

A. CONDITIONS PRIOR TO EVENT:

Unit: 3 Event Date: February 24, 1990 Event Time: 1158 hours

Reactor Mode: N Mode Name: Run Power Level: 27%

Reactor Coolant System (RCS) Pressure: 932 psig

B. DESCRIPTION OF EVENT:

On February 24, 1990 at 1045 hours with Unit 3 operating at 27% rated core thermal power and all required Emergency Core Cooling Systems (ECCSs) operable, performance of Dresden Operating Surveillance (DOS) 2300-3, High Pressure Coolant Injection (HPCI) System Operability Verification, was halted prior to completion. DOS 2300-3 was being performed to satisfy Technical Specifications Section 4.5.C, Table 4.5.1 item 1, Monthly Operability Test. In accordance with the surveillance, the HPCI turbine had been started and was operating at approximately 1400 rpm. The pump discharge was lined up to return to the Condensate Storage Tank (CST) [KA] through test return Motor Operated Valve (MOV), 3-2301-10, which had been throttled open. This configuration establishes a flow path for the HPCI pump to close minimum flow bypass valve MOV 3-2301-14 by developing approximately 1200 gallons per minute (gpm) flow. However, the Nuclear Station Operator (NSO) observed that although MOV 3-2301-14 had closed, Flow Indicating Controller (FIC) 3-2340-1 was indicating no flow. The HPCI Turbine was secured and the Instrument Maintenance Department (IMD) was contacted to investigate the problem. Initial investigation indicated that the respective power supply fuse had blown. The fuse was replaced; however, when a simulated flow signal was inserted for Flow Transmitter (FT) 3-2358, FIC 3-2340-1 still indicated no flow. Shortly thereafter, the power supply fuse blew again. A visual inspection of the flow transmitter by the IMD identified that the transmitter amplifier board had experienced overheating and failed. HPCI was immediately declared inoperable at 1158 hours. Work Request (WR) 91187 was initiated to replace or repair FT 3-2358, and Unit 3 was entered into a seven day Limiting Condition for Operation (LCO) time clock as required by Technical Specification section 3.5.C.2.a. An Emergency Notification System call was also completed at 1226 hours in accordance with 10CFR 50.72(b)(2)(iii)(D). Investigations performed under WR 91187 indicated that the amplifier associated with FT 3-2358 had failed. The amplifier was replaced and an instrument loop calibration was performed satisfactorily.

Upon completion of the repairs under WR 91187, DOS 2300-3 was performed successfully. HPCI was declared operable at 1045 hours on February 25, 1990.

C. APPARENT CAUSE OF EVENT:

This report is being submitted in accordance with 10CFR50.73(a)(2)(v)(D), which requires the reporting of any event or condition that alone could have prevented the fulfillment of the safety function of a system required to mitigate the consequences of an accident.

Investigation by the IMD under WR 91187 revealed that the loss of flow signal from FT 3-2358 to FIC 3-2340-1 was due to the failure of the amplifier associated with FT 3-2358. The transmitter also supplies an input signal to the process computer to provide an analog readout of HPCI flow. The signal supplied to the flow controller is used to provide indication and to automatically control HPCI turbine speed to develop required pump flow. The amplifier failure was the result of exposure to moisture. Moisture came in contact with the amplifier board resulting in high current flow and component overheating which led to its subsequent failure. The resulting high instrument loop current flow caused a 1/10 amp slo-blo fuse in the loop power supply to blow, which in turn, resulted in the loss of the loop and the flow signal. Loss of flow transmitter instrument loop power had no affect on the flow controller power supply since this is essentially a separate circuit. A calibration check of the instrument loop had been completed on February 7, 1990 as part of Modification M12-3-86-24D demonstrating that the loop was functional at this time. Moisture exposure occurred after the transmitter cover was removed, approximately one week after the loop calibration check, to facilitate connection of test leads used to provide a signal to a recorder. The source of the moisture was attributed to either the humid environment that the transmitter is located in or to room decontamination cleaning activities that took place in the general vicinity of the transmitter. The recorder was set up in preparation for the performance of DOS 2300-7, High Pressure Coolant Injection Pump Test and Fast Initiation Test, which was scheduled to be performed upon completion of DOS 2300-3 as part of the post-refuel startup testing program. During normal operation, moisture intrusion into the transmitter is prevented by a sealed cover that is bolted in place. A maintenance history review indicates that no previous failures of this type have been experienced with these transmitters.

D. SAFETY ANALYSIS OF EVENT:

FT 3-2358 generates a proportional flow signal that is based on the differential pressure created across Flow Element (FE) 3-2356. The flow signal is supplied to FIC 3-2340-1 through a square root converter 3-2340-10 to produce a linear flow signal in relationship to flow rate. FIC 3-2340-1 compared actual flow (from FT 3-2358) to desired flow (Controller Setpoint) and adjusts HPCI turbine speed through a signal converter and the Motor Gear Unit (MGU) to obtain the desired pump flow. Loss of the flow signal from FT 3-2358 affected the flow indication at FIC 3-2340-1, the input signal used for the controller portion of FIC 3-2340-1 and the analog readout of HPCI flow in the process computer. With the loss of the input signal, the controller would demand maximum output. Although the controller would not have been able to function automatically to maintain a set flow, it would have permitted HPCI operation if required to mitigate the consequences of an accident. Operability of FT 3-2358 is not required by the Environmental Qualification program. As required per Unit 3 Technical Specifications Section 3.5.C.2.a, all active components of the Automatic Pressure Relief Subsystem [SB], the Core Spray Subsystem [BM], the LPCI subsystem [BO] and the Isolation Condenser system [BL] were operable. For these reasons, the safety significance of this event is considered minimal.

E. CORRECTIVE ACTIONS:

A review of work request history indicates no previous failures of this type. The flow transmitter was last calibrated on February 7, 1990.

WR 91187 was initiated as a result of this event. Under this WR, the amplifier for FT 3-2348 and the power supply fuse were replaced (249-200-90-03801). In addition, a 100 ohm resistor located at input terminals 1 and 2 at FIC 3-2340-1 was replaced due to high resistance (249-200-90-03802). This was unrelated to this event. After component replacement was completed, a loop calibration check was performed satisfactorily.

To prevent future recurrence of this event, DOS 2300-7 will be revised by the Operations Staff to provide a precaution stating that if it is necessary to remove transmitter covers to permit obtaining recorder traces of various HPCI parameters, the test leads should be connected in such a manner that will permit reinstallation of the cover after the leads have been connected. This revision is planned to be completed by September 1, 1990 (249-200-90-03803).

Additionally, in order to address potential future similar events, the following actions were initiated:

1. This event will be reviewed at an upcoming tailgate meeting in order to provide greater awareness of the potential for equipment damage due to water intrusion (i.e., during cleanup activities) and the need for adequate administrative controls for removal of covers to connect test equipment (249-200-90-03804).

2. The Maintenance Staff will revise Dresden Administrative Procedure (DAP) 15-6, Preparation and Control of Work Requests, to require that work package instructions include appropriate administrative controls for work involving cover removal for attachment of test leads (249-200-90-03805).

F. PREVIOUS EVENTS:

No previous events of this type involving flow transmitter failure have been experienced.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
General Electric	Differential Pressure Transmitter Amplifier	Type 550 & 555	1096K42700

An industry-wide NPRDS search revealed three transmitter failures associated with this type of transmitter.