NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

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TITLE (4)

Reactor Scram Due to Reactor Low Water Level Resulting From Component 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)
0 5	0 3	8 7	8 7	— 0 1 6	— 0 0	0 5	2 8	8 7	Dresden Unit 3	0 5 0 0 0 2 4 9
									N/A	0 5 0 0 0

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
POWER LEVEL (10)	0 3 1	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, 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
Edward J. Kotrich Technical Staff Engineer, Ext. 523	AREA CODE 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	J B	M C B D	B 0 4 5	N							

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 May 3, 1987 at 0912 hours, the Dresden Unit 2 reactor scrammed from 31% rated thermal power on a low reactor water level scram signal. The root cause of the event was a poor connection between an instrument board and cabinet on a new Feedwater Level Control System which had been installed prior to the April 22, 1987 startup from a refueling outage. While inserting a calibration module into the cabinet during troubleshooting of steam flow inputs, the connection loosened and caused oscillations in the controlling signal to a feedwater regulating valve. The valve operator then locked up in the open position which caused the reactor water level to increase. The high reactor water level caused the turbine and feedwater pumps to automatically trip to prevent moisture carryover from the reactor into the turbine. The reactor automatically scrammed on a low water level signal before the feedwater pumps could be restarted.

The safety significance of the event was minimal because the automatic low reactor water level scram occurred as designed, shutting down the reactor to ensure that sufficient reactor vessel inventory was maintained. The Reactor Operator responded to this event in accordance with approved procedures for transient level control and reactor scram. To prevent recurrence of this event, all connections between modules and the cabinet in the Feedwater Level Control System were verified secure and the manufacturer supplied a new firmware module to prevent signal oscillations. Three previous occurrences involving reactor scrams from a low water signal were reported by Licensee Event Reports #87-08 on Docket #050249, #84-10 on Docket #050249, and #84-09 on Docket #050237.

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

PLANT AND SYSTEM IDENTIFICATION:

General Electric Boiling Water Reactor - 2527 MWt rated core thermal power. Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

EVENT IDENTIFICATION:

Reactor Scram Due to Reactor Low Water Level Resulting from Component Failure.

A. PLANT CONDITIONS PRIOR TO EVENT:

Reactor Mode: N Mode Name: Run Event Date: May 3, 1987
Event Time: 0912 Power Level: 31%

B. DESCRIPTION OF EVENT:

On May 3, 1987 at 0912 hours and 31% power, while testing of a new Feedwater Level Control [JB] System was in progress to troubleshoot problems with the Steam Flow [SB] input to the Rod Worth Minimizer (RWM) [IL], a module was inserted into the Feedwater Level Control cabinet. Due to a defective module connection, the Level Control Circuit was broken causing the "2B" channel narrow range level to go downscale. The "2B" Feedwater Regulation Valve [SJ] locked up in the open position and the reactor water level increased above +55 inches. This high level signal then caused the feedwater pumps and main turbine [TA] to automatically trip to prevent moisture carryover from the reactor into the turbine. The reactor then scrammed on a low water level signal before the feedwater pumps could be restarted.

C. CAUSE OF EVENT:

A new level control system was being installed and calibrated under modification #M12-2-83-56 on Unit 2. This modification is identical to a modification which had been installed previously on Dresden Unit 3. During installation of the Configuration and Tuning Module (CTM) into the Bailey Network 90 Module Mounting Unit (MTU) located in Panel 902-18, it was necessary to exert pressure on a Bailey Control Input/Output Slave Module (CSM) mounted in the slot above where the CTM was being inserted. The Bailey Instruction Manual for this CTM expressly allows the positioning or removal of this CTM for any Process Control Unit (PCU) in the system for configuration and diagnostic purposes. The pressure exerted on the CSM (Bailey Model CIS01) involved a slight upward movement (about 1/8 inch). Although the CSM was fully inserted into the PCU, flexing of the PCU panel caused a disturbance on the databus supplying data to the multifunction controller.

The multifunction controller interpreted this disturbance as a failure of selected "A" reactor level and automatically transferred to the "B" reactor level signal. The CSM that experienced the physical disturbance also processed the "B" reactor level analog input signal for digital transmission on the module mounting unit databus. Consequently, the newly auto selected level signal was

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disturbed resulting in large up and down level signal fluctuations. The multifunction controller attempted to reposition the "2B" feedwater regulating drag type valve as rapidly as the false "2B" reactor level signal was fluctuating. The "2B" feedwater regulating valve is a large air volume piston operated drag valve and during large signal transients is designed to lock up when the air supply header falls to 65 psig. This lockup then caused the subsequent turbine and reactor feedpump trip and reactor scram.

D. SAFETY ANALYSIS:

The safety significance of this event was minimal because the automatic low reactor water level scram occurred as designed, shutting down the reactor to ensure that sufficient reactor vessel inventory was maintained.

Technical Specification 2.1.C, "Limiting Safety System Setting", states that the reactor water low water level scram setting shall be greater than or equal to 144 inches above the top of active fuel in the vessel at normal operating conditions. This corresponds to a reactor level of +8 inch indicated. The actual low level scram setpoint is conservatively set at +16 inches indicated level. The Reactor Operator responded to this event in accordance with Dresden Operating Abnormal (DOA) Procedure 600-1, "Transient Level Control".

The scram was responded to in accordance with Dresden General Procedure (DGP) 2-3, Unit 2/3 Reactor Scram, which specifies the steps to be taken following an automatic scram. There were no problems encountered during the shutdown.

E. CORRECTIVE ACTION:

The immediate corrective action was to inspect and verify that all modules mounted in the Bailey Network 90 Module Mounting Unit were fully engaged with the associated cable connector of the circuit board. This was accomplished by simultaneously pushing on the front of each module and the back connector.

The manufacturer, Bailey Controls, was notified of the event and they were requested to investigate and recommend corrective action to prevent recurrence.

The firmware which had been installed was a Series K. The Bailey Controls engineers had developed a new Series L firmware for multifunction controllers which prevents this type of databus disturbance from being processed during program execution. The new Series L firmware I.C. chips were installed on May 6, 1987 by the Instrument Maintenance Department with the assistance of the Bailey Controls Service Representative. The two spare multifunction controllers in the Storeroom were also updated with the Series L firmware and a Modification Request Form was initiated to update Unit 3 multifunction controllers to the Series L type.

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F. PREVIOUS OCCURRENCES:

LER Number/Docket	Title
87-8/50-249	Reactor Scram While Unit was Shut Down Due to Low Reactor Water Level Resulting From Procedural Inadequacy and Component Failure. Corrective actions were to initiate a procedural change to add a provision for partially opening the reactor feedwater pump discharge valves just prior to starting the pump and to secure the manual engagement lever for the "B" reactor feedpump discharge valve.
84-10/50-249	Reactor Scram During Normal Operation Due to Low Reactor Water Level Caused by "A" Feedwater Regulating Valve Failing Closed Due to Vibration. Corrective actions were to drill holes into the regulating valve coupling block and install set screws to secure the valve stem and valve operator to the coupling block.
84-9/50-237	Reactor Scram Due to Reactor Low Water Level Caused by "A" Feedwater Regulating Valve Failing Closed Due to Vibration. Corrective action was to reconnect the valve operator and stem with sheet metal locktabs to prevent the locknuts from vibrating loose.

G. COMPONENT FAILURE DATA:

The failure was due to a faulty connection between the Bailey Controls Network 90 Control I/O Slave Module (model CIS01) and the back panel of the Bailey Controls Process Control Unit (model NMMU01).

Commonwealth Edison
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Telephone 815/942-2920

May 28, 1987

EDE LTR #87-349

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

Licensee Event Report #87-016-0, Docket #050237 is being submitted as required by Technical Specification 6.6, NUREG 1022 and 10 CFR 50.73(a)(2)(iv).

E.D. Eenigenburg
Station Manager
Dresden Nuclear Power Station

EDE/kjl

Enclosure

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

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