LICENSEE EVENT REPORT (LER)

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 6

TITLE (4) Loss of 3A Reactor Protection System Bus and Subsequent ESF Actuations Due to a Loose Wire Connection

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 6	0 7	8 8	8 8	0 1 3	0 0	0 6	3 0	8 8	N/A	

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)	X 50.73(a)(2)(iv)	___ 73.71(b)
POWER LEVEL (10)	0 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)
		___ 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
Ronald Jackson, Technical Staff Engineer (X-483)	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 C	C N T R	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)

On June 7, 1988 at 1522 hours with Unit 3 shutdown for a refuel outage, a Reactor Protection System (RPS) Channel A Half Scram occurred due to the loss of the 3A RPS bus, the Reactor Building Ventilation System (RBVS) isolated, and the Standby Gas Treatment (SBGT) System auto-started. Loss of power to the 3B RPS MG Set caused the half scram to occur on RPS Channel A. This also caused the RBVS to isolate and the SBGT system to auto-start due to a loss of power to the Channel A RBVS and Refuel Floor radiation monitors.

A Work request was initiated to inspect the main feed breaker to the 3B RPS MG Set. Upon inspection of the breaker, a connection on one of two overload relays was found to be loose. Consequently, all the cable connections to the overload relays were lugged, and the 3B RPS MG Set was successfully started. To prevent future occurrences of this type, breaker maintenance procedures will be revised to ensure that all overload relay cable connections are solid in addition to utilizing a Thermovision device for detecting hot spots caused by poor connections. This was the first occurrence of a loose RPS MG Set overload relay connection causing an RPS MG Set trip and SBGT System auto-start. The safety significance of this event was minimal because loss of the 3B RPS MG Set resulted in a Channel A half scram as designed.

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].

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

EVENT IDENTIFICATIONS:

Loss of the 3A Reactor Protection System (RPS) Bus and Subsequent Engineered Safety Feature (ESF) Actuations due to a Loose Wire Connection.

A. CONDITIONS PRIOR TO EVENT

Unit: 3 Event Date: June 7, 1988 Event Time: 1522 hrs.

Reactor Mode: N Mode Name: Shutdown Power Level: 0%

Reactor Coolant System (RCS) Pressure: 0 psig

B. DESCRIPTION OF EVENT

On June 7, 1988 at 1522 hours with Unit 3 shutdown for a refuel outage, a Reactor Protection System [JC] (RPS) half scram occurred due to the loss of the 3A RPS bus. Concurrently with the half scram the Reactor Building Ventilation System [VA] (RBVS) isolated and the Standby Gas Treatment [BH] (SBGT) system auto-started. A High Voltage Operator (HVO) was dispatched to the Auxiliary Electrical Equipment Room to identify the cause of the loss of 3A RPS bus. The HVO discovered the 3B RPS MG Set output breaker tripped. The HVO also found the RPS Electrical Protection Assemblies (EPA) 3B-1 and 3B-2 breakers and the 3B RPS MG Set tripped. However, the 3B RPS MG Set feed breaker, located at Motor Control Center (MCC) 39-2, had not tripped. Further investigation revealed that only the underfrequency relay target for the 3B MG Set output breaker was latched up.

Loss of power to the 3B RPS MG Set caused the output breaker to trip on underfrequency and the EPA breakers to trip from the breaker shunt undervoltage trip coil. Consequently, the 3A RPS bus de-energized which in turn caused the Reactor Building Ventilation System (RBVS) to isolate and the Standby Gas Treatment (SBGT) to auto-start when the normal power supply to Channel A RBVS and Refuel Floor radiation monitors was lost. At 1606 hours, the RPS Channel A half scram was reset, the 3B RPS MG Set and RBVS were restarted and the SBGT System was secured.

At 1700 hours, the RPS Channel A half scram recurred with a subsequent isolation of the RBVS and auto-start of the SBGT System. Once again, this event was caused by a trip of the 3B RPS MG Set. At 1711 hours the Operating Department once again reset the half scram. At 1730 hours, the 3B RPS MG Set tripped for a third time. It was suspected that the thermal overloads on the main feed breaker (MCC 39-2) to the 3B RPS MG Set, located on MCC 39-2, were causing the trip. As a result, Work Request 75683 was initiated to inspect the main feed breaker for the 3B RPS MG Set.

C. APPARENT CAUSE OF EVENT

This event is being reported in accordance with Title 10 of the Code of Federal Regulations Part 50 Section 73(a)(2)(iv). This section of the code states that any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System, must be reported if the actuation was not part of a preplanned sequence during testing or reactor operation.

In an attempt to determine the cause of the 3B RPS MG Set trip, the Electrical Maintenance Department (EMD) performed an inspection of the main feed breaker cubicle at MCC 39-2 per Work Request 75683. Also, the 3B RPS MG Set motor windings were bridged and meggered, the motor bearings were inspected and greased and the breaker thermal overloads were tested. There were no abnormalities found while testing the various components of the breaker and motor. However, during the inspection of the breaker cubicle a loose top connection was discovered on the C phase thermal overload of the running contactor.

After further inspection of the cable and overload terminal connection, it was concluded that the cable was too large for the terminal connection. With the cable connected to the terminal as shown on Figure 1, the excessive number of conductors between the plate and terminal prevented adequate compression of the conductors and thus created a loose connection. In addition, the terminal screw should normally be threaded through the terminal to ensure a proper connection is made; however, in this event the terminal screw was not threaded through the terminal because of the excessive number of cable conductors, also shown on Figure 1.

The running contactor and its thermal overloads were replaced previously on May 7, 1988 due to a shorted contactor. When the cable was reconnected to the thermal overload, it is believed a secure connection was not made. The loosened connection eventually heated the overload relay to the point at which the overload tripped the 3B RPS MG Set. In conclusion, the original installation cable connection configuration to the overload relay on the running contactor was the root cause of this event.

D. SAFETY ANALYSIS OF EVENT

The RPS system is designed to monitor critical parameters during all modes of reactor operation so as to protect against conditions that could threaten the fuel barriers and reactor coolant pressure boundary. Monitoring is performed by two separately powered RPS trip systems, RPS Channel A and Channel B, both of whose outputs are needed initiate protective action. Additionally, the system is designed to fail in the tripped condition upon loss of power. Since the reactor was in a cold shutdown condition, and no work was being done that had potential for draining the reactor vessel, the RPS system and the core and containment cooling systems were not required to be operable.

Therefore, the safety significance of this event was minimal. If this event would have occurred with the reactor operating at 100% rated core thermal power, the safety significance would have remained minimal since the RPS Channel A subsystem fails in the tripped condition and the RPS Channel B subsystem was operable at the time of this event. In addition, the Standby Liquid Control System [BR] (SBLC) and the Anticipated Transient Without Scram (ATWS) circuitry were available to mitigate reactor transients had the RPS system failed with the reactor at 100% rated core thermal power.

E. CORRECTIVE ACTION

Immediate corrective action included lugging the top and bottom cables on both overload relays per Work Request 75683. The new style connection is shown on Figure 2. This repair provided a secure connection from the cable to the overload relay since the conductors in the cables are crimped onto the lug. Following repairs of the main feed breaker and successful testing, the 3B RPS MG Set was returned to service on June 8, 1988 at 1330 hours. To prevent future occurrences of this type, the following Dresden Maintenance Procedures (DMP) will be revised by the EMD to ensure that all wiring connected to overload relays have secure connections following maintenance on breakers (249-200-88-05901).

1. DMP 7300-3, Inspection and Maintenance of 480V Breakers Type AK-2A-50/75.

2. DMP 7300-4, Inspection and Maintenance of 480V Breakers Type AK-2A-25.

3. DMP 7300-5, Inspection and Maintenance of 480V MCC Breakers/Contactors and 208V Contactors.

In addition, these procedure revisions will also address utilizing a Thermovision device to detect hot spots created by poor connections (249-200-88-05902). The EMD will also install the improved overload relay lug connection configuration on the 3A RPS MG Set and the Unit 2 RPS MG Sets (249-200-88-05903).

F. PREVIOUS EVENTS

A records review indicated that this was the first event on Dresden Unit 2 or Unit 3 involving an RPS MG Set trip and SBGT System auto-start caused by a loose overload relay wiring connection.

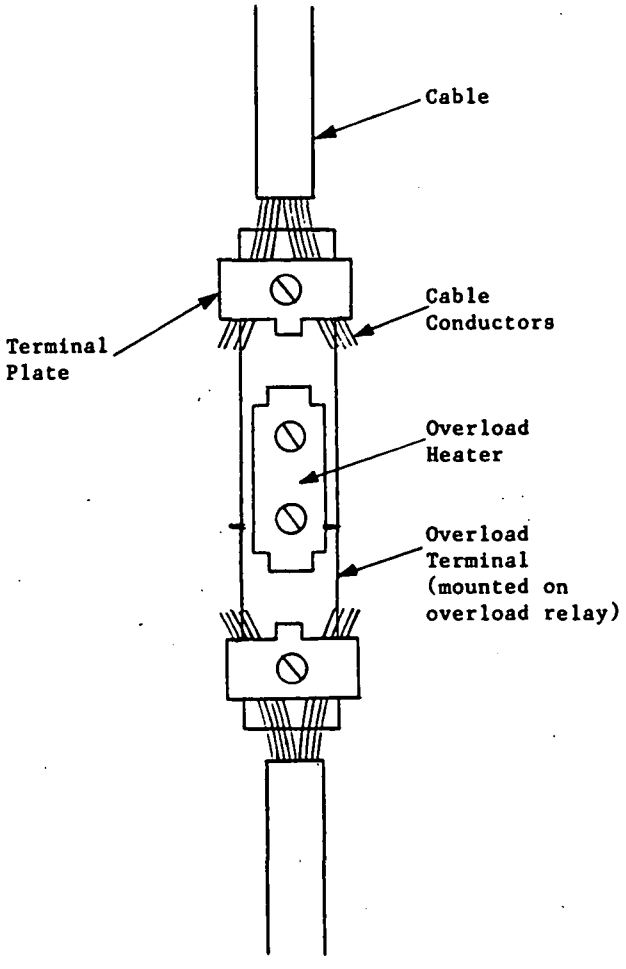
G. COMPONENT FAILURE DATA

Manufacturer: General Electric Co.

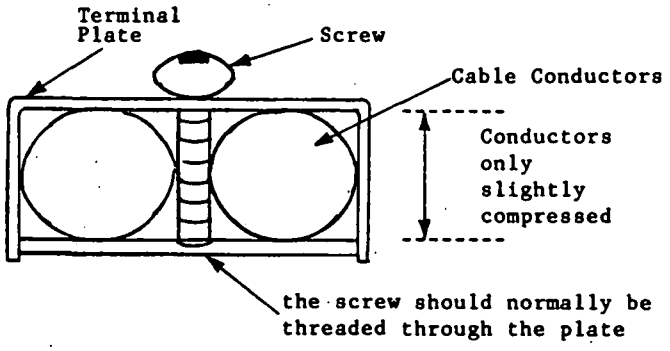
Nomenclature: Contactor

Model Number: CR106D0

An industry wide NPRDS search was conducted to determine if similar component failures have been reported. During the search, one component failure was found involving loose wiring connections.



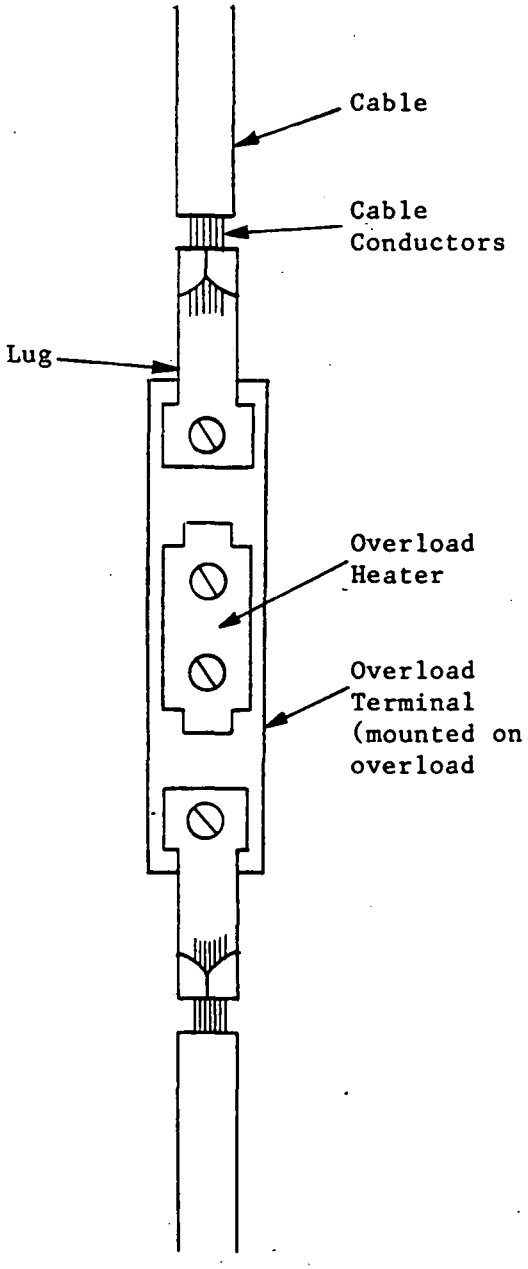
FRONT VIEW



TOP VIEW

"AS FOUND" OVERLOAD RELAY TERMINAL CONNECTION

Figure 1



FRONT VIEW

"AS LEFT" OVERLOAD RELAY TERMINAL CONNECTION

Figure 2

Commonwealth Edison
Dresden Nuclear Power Station
R.R. #1
Morris, Illinois 60450
Telephone 815/942-2920

June 30, 1988

EDE LTR #88-490

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

Licensee Event Report #88-013-0, Docket #050249 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/ade

Enclosure

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

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