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Dresden Nuclear Power Station
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January 09, 1991

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Licensee Event Report #90-017, 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
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EDE/dal

Enclosure

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

ZDVR/108

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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 2	0 5 0 0 0 2 3 7	1 of 0 4

Title (4) Reactor Scram on Intermediate Range Monitor Hi-Hi Due to Unknown Cause

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	
1 2	2 0	9 0	9 0	0 1 7	0 0	0 1	0 9	9 1	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
Brian W. Sampson, Technical Staff System Engineer Ext. 2266	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	I G	X X X X	X X X X	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)

At 0420 hours on December 20, 1990, an automatic reactor scram occurred due to a spurious Hi-Hi neutron flux signal from the Intermediate Range Monitors (IRMs). A similar event occurred on December 23, 1990 at 0538 hours when once again IRM Hi-Hi flux indication caused an automatic reactor scram. In both cases, Unit 2 was in the Shutdown mode with all rods in at the time of the scram. Also, all Source Range Monitors (SRMs) and IRMs were observed to spike spuriously in each case. An investigation into the event by the Technical Staff, Instrument Maintenance Department, and System Operational Analysis Department failed to determine the root cause of the spiking. The investigation included, among other things, a review of plant conditions at the time of each scram, a study of the IRM recorder strip charts and the Unit 2 alarm typer, a review of SRM/IRM cable routing, and electronic monitoring of selected SRM/IRM drawers. Since the root cause of the spiking has not been determined and the spiking could not be artificially reproduced, no further corrective action will be taken. The safety significance of these events is minimal since the unit was in the Shutdown mode with all rods in for both cases. One previous occurrence of a similar event is documented in Licensee Event Report 90-015/050237, Intermediate Range Monitor Full Scram Due to Inductive Noise Input to the IRM/SRM power supplies.

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:

Reactor Scram on Intermediate Range Monitor Hi-Hi Due to Unknown Cause

A. CONDITIONS PRIOR TO EVENT:

Unit: 2 Event Date: December 20, 1990 Event Time: 0420 Hours

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

Reactor Coolant System (RCS) Pressure: 0 psig

B. DESCRIPTION OF EVENT:

On December 20, 1990 at 0420 hours with Unit 2 in the Shutdown mode during a refuel outage, a reactor scram signal was received when Reactor Protection System (RPS) [JE] Channels A and B tripped simultaneously. The RPS trip occurred when five of the eight Intermediate Range Monitors (IRMs) [IG] reached the Technical Specification setpoint for Hi-Hi neutron flux (120/125 percent of scale). However, all Source Range Monitors (SRMs) [IG] and IRMs were observed to spike to some degree. All IRMs were set on Range 1 at the time of the event. Since the unit was in the Shutdown mode, all control rods were fully inserted to position 00 prior to the scram. At the time of the event, Station Laborers were working beneath the reactor vessel. Initially, the cause of the scram was attributed to disturbance of the SRM/IRM cables by the Station Laborers, and as a result they were cautioned to exercise care when working near the cables. However, it was later determined that the Station Laborers were not in the immediate vicinity of the SRM/IRM cables at the time of the scram. The scram was reset at 1715 hours on December 20, 1990.

A similar event occurred on December 23, 1990 at 0538 hours under similar conditions. At this time a reactor scram signal was received when four of the eight IRMs reached the high core flux setpoint. As before, all SRMs and IRMs were observed to spike, and the IRMs were set on Range 1. The unit was in the Shutdown mode with all rods in at the time of the scram. There was no work being performed beneath the reactor vessel, nor was there any work being performed on the neutron monitoring system at this time. Throughout the next shift the SRMs and IRMs were observed to continue to spike. The scram was not reset until 0247 hours on December 24, 1990. Following this event an investigation into the root cause of both events was initiated by members of the Technical Staff, Instrument Maintenance Department, and the System Operational Analysis Department (SOAD).

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), which states that any event that results in manual or automatic actuation of any Engineered Safety Feature, including the Reactor Protection System, must be reported.

The investigation into the spurious SRM and IRM spiking failed to determine the root cause of the spiking. Shift logs were reviewed in an attempt to correlate plant activity to the spiking occurrences. The December 20 and December 23 scrams were investigated as well as a scram that occurred on November 20, 1990 that was attributed to a faulty relay (LER 90-015/050237). No obvious similarities concerning plant activities were found between the three events.

A list of previous modifications and plant changes were reviewed to determine any new plant conditions that may have lead to neutron monitor spiking. Several changes were found that had possible significance. The first of these was the replacement of existing SRM/IRM signal cables in the drywell with a new cable type, with the exception of the IRM 16 cable. Also, the SRM detector operating voltage for all four SRMs had been raised from 350 volts to 550 volts. Finally, temporary 480 volt welding feed cables were found in the vicinity of the preamplifier cabinets. The investigation was unable to show, however, that any of these changes were responsible for the spiking.

The investigation also included a study of the IRM strip chart recorder output and the Unit 2 alarm typer output to determine if any of the IRMs exhibited a higher tendency to spike or were found to spike more severely. From this data it was determined that in these events the SRMs/IRMs tended to spike simultaneously as opposed to individually as has been common in the past. Also, it was noted that IRM 16 appeared to exhibit less noise than the remaining IRMs. This is the only channel to use the original organic cable inside a conduit in the drywell. All new cable was installed on the outside of the conduit, with the old cable left inside the conduit to serve as a backup. Although this new cable and routing may have affected the severity of the spiking, it did not appear to explain the source of the noise or the manner in which it was transmitted to the neutron monitoring system.

Cable routing of the SRMs/IRMs was examined. Four separate cable routes each contain the cables for one SRM and two IRMs. All power, signal, and high voltage cables are routed together. Also, all cables are tied together inside the preamplifier cabinets. The investigation was unable to determine if the cause of the spiking could be attributed to common cable routing.

Instrument Maintenance investigated the possibility of noise originating from the power supplies. The 24/48 volt battery connections were inspected and found to be normal. Also, the 125 volt dc battery charger was disengaged and then re-engaged in an attempt to induce a spike. Although a 50 amp surge is normally generated when this battery charger is engaged, no noise was seen on the neutron monitors, indicating that noise on the power supply was not entering the signal cable. Further investigation by Instrument Maintenance involved keying radios on different channels in various locations near the preamplifiers. The possibility of temporary lighting in the drywell creating noise on the neutron monitoring system was ruled out due to the fact that the lighting was disconnected at the times of the scrams. Also, system grounds were determined to be adequate.

Finally electronic monitoring was performed on selected SRM/IRM drawers by SOAD and the Technical Staff. A high frequency oscilloscope was used to monitor the signal transmitted to the SRM/IRM chassis while various 250 VDC-powered valves were manipulated in an attempt to induce spiking activiation of the 2-2301-8 valve, the 2-1301-2 valve, and the 2-2301-48 valve caused small noise disturbances on the instrumentation but not of any significant magnitude.

Also welding was performed in the reactor building to determine its effect on the neutron monitoring system. Overall, during this monitoring period, a small amount of noise was detected on the 15 volt power supply to the preamplifier from the 902-36 panel in the control room, but no spikes of the magnitude seen during the scram events could be reproduced. The possibility of noise entering through the 24/48 volt DC power supply was also investigated and ruled out. In summary, although some spiking was produced through welding and valve manipulations, the inability to reproduce a large spiking event made it impossible to isolate the cause of the problem.

Overall, the investigation revealed that the spiking is being caused by electrical noise generated in the plant. It was possible to generate some small spikes on the neutron monitoring system through valve manipulations, but to this point no determination has been made as to what plant conditions will cause large spikes or as to how the noise is entering the neutron monitoring system. In Licensee Event Report (LER) 90-015, Intermediate Range Monitor Full Scram Due to Inductive Noise Input to the IRM/SRM Power Supplies, a commitment was made to evaluate long term corrective actions to the SRM/IRM noise problem and to issue a supplemental report in the event that further information is revealed (237-200-90-13704). Any further developments concerning this LER will be included in that report.

D. SAFETY ANALYSIS OF EVENT:

Four IRMs provide input into each of the two RPS channels. A flux indication exceeding the Hi-Hi setpoint on any IRM will cause a trip of its associated RPS channel. A simultaneous trip of both RPS channels will in turn produce a full reactor scram. SRMs also provide RPS trips upon reaching their Hi-Hi setpoint provided that neutron monitoring shorting links are not installed. In both events, all shorting links were installed as is the normal configuration. In each of the two scram events multiple IRMs in each RPS channel simultaneously reached their Hi-Hi setpoint of 120/125 of full scale, causing a full reactor scram. However, since the unit was in the Shutdown mode in each case, all control rods were fully inserted and control rod withdrawal was prohibited. At the time of both events, no plant activities were in progress that would affect core reactivity. This indicates that both events can be attributed to noise on the neutron monitoring system.

Due to the fact that the unit was in the Shutdown mode with all rods in and all systems performed as designed, the safety significance of this event is minimal.

E. CORRECTIVE ACTIONS:

At present time it has been over ten days since the last spiking event was observed. Due to this fact and the fact that efforts to artificially induce a large spike have failed, it has not been possible to determine the root cause of the noise problem. At this time no further corrective actions are planned. In the event of another neutron monitoring spiking event, this investigation will be reopened (237-200-90-15601).

F. PREVIOUS OCCURRENCES:

LER/Docket Numbers	Title
90-015-0/050237	Intermediate Range Monitor Full Scram Due to Inductive Noise Input to the IRM/SRM Power Supplies

IMD personnel were performing Dresden Instrument Surveillance (DIS) 1500-5, Low Pressure Coolant Injection [BO] Containment Cooling Logic Test, when a full reactor scram was received on IRM Hi-Hi flux signals. The IRM spike was attributed to inductive noise input to the SRM/IRM power supplies from actuation of a faulty relay.

G. COMPONENT FAILURE DATA:

Manufacturer	Nomenclature	Model Number	Mfg. Part Number
N/A	N/A	N/A	N/A