

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION

P. O. BOX A

SANATOGA, PENNSYLVANIA 19464

August 16, 1989

Docket No. 50-353

License No. NPF-84

U.S. Nuclear Regulatory Commission
 Attn: Document Control Desk
 Washington, DC 20555

SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 2

This LER reports upscale trips of "B" Intermediate Range Monitor (IRM) due to a faulty preamplifier and the full Reactor Protection System (RPS) scram signal initiated with the RPS system in a non-coincident configuration. This LER also reports a partial RPS scram signal from a momentary upscale trip on "F" IRM due to inadvertent contact by Maintenance Personnel of the undervessel "F" IRM assembly which is not reportable under 10CFR reportability requirements.

Reference:	Docket No. 50-353
Report Number:	02-89-003
Revision Number:	00
Event Date:	July 17, 1989
Report Date:	August 16, 1989
Facility:	Limerick Generating Station P.O. Box A, Sanatoga, PA 19464

This LER is being submitted pursuant to the requirements of 10CFR 50.73(a)(2)(iv).

Very truly yours,

M. J. McCormick, Jr.
 Plant Manager

CCE:sc

cc: W. T. Russell, Administrator, Region I, USNRC
 T. J. Kenny, USNRC Senior Resident Inspector, LGS

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LICENSEE EVENT REPORT (LER)

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TITLE (4) IRM Upscale Trips Resulting in RPS Scram Signals/Single Channel Scram Signals Due To A Faulty Preamplifier/Undervessel Work Activities

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	7	1	7	8	9	8	9	0	0	3	0	0	0	0	8	1	6	8	9	0	5	0	0	0	0

OPERATING MODE (8) 4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §. (Check one or more of the following) (11)										
	POWER LEVEL (10) 0 0 0	20.402(b)	20.405(c)	<input checked="" type="checkbox"/>	60.73(e)(2)(iv)	73.71(b)					
	20.406(e)(1)(i)	60.36(e)(1)		60.73(e)(2)(v)	73.71(c)						
	20.406(e)(1)(ii)	60.36(e)(2)		60.73(e)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	20.406(e)(1)(iii)	60.73(e)(2)(i)		60.73(e)(2)(vii)(A)							
	20.406(e)(1)(iv)	60.73(e)(2)(ii)		60.73(e)(2)(viii)(B)							
	20.406(e)(1)(v)	60.73(e)(2)(iii)		60.73(e)(2)(ix)							

LICENSEE CONTACT FOR THIS LER (12)

NAME C. R. Endriss, Regulatory Engineer, Limerick Generating Station	TELEPHONE NUMBER 2 1 5 3 2 7 - 1 2 0 0
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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	A	M	P	G	0	8	0	Y

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On July 17, 1989, at 1306, with all control rods full inserted a full Reactor Protection System (RPS) scram signal was generated. The scram signal was initiated by an upscale trip of the "B" Intermediate Range Monitor (IRM). Also on July 22, 1989, at 1510 a second short duration "B" IRM upscale trip occurred which initiated a full RPS scram signal. The RPS was in a non-coincident configuration. Neither event resulted in rod motion. Operations identified the scram signals and promptly responded in accordance with procedures. The scram signals were reset and Unit 2 was returned to the pre-event conditions per appropriate procedures. The "B" IRM upscale trips were due to a faulty preamplifier. The "B" IRM preamplifier was replaced and calibrated satisfactorily on August 9, 1989. Additionally, on July 21, 1989, at 2202 with RPS in a non-coincident configuration, a momentary upscale trip of the "F" IRM resulted in a single channel RPS trip and did not generate a full scram signal as expected. This response was investigated and found to be in accordance with design. The momentary upscale trip on the "F" IRM was caused by inadvertent contact to the "F" IRM assembly by maintenance personnel during work in the undervessel area. The maintenance personnel were exercising caution during undervessel work activities due to the known sensitivity of equipment in the area, but the clearances are such that incidental contact is extremely difficult to prevent.

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

Unit Conditions Prior to the Event:

Operation Mode: 4 (Cold Shutdown)

Reactor Power: 0%

Significant Plant Conditions:

- o Prior to initial criticality
- o The Reactor Protection System (RPS)(EIIS:JD) was configured to initiate a full scram signal in response to a single Startup Range Monitor (SRM) (EIIS:IG) or Intermediate Range Monitor (IRM) (EIIS:IG) trip signal (non-coincident trip signal response).(1)

(1) Unit 2 RPS was in a non-coincident configuration as a response to withdrawing a single control rod for testing or maintenance prior to initial SHUTDOWN MARGIN determination which is demonstrated during initial criticality.

Description of the Event:

Event 1:

On July 17, 1989, at 1306, with all Unit 2 control rods fully inserted, a full RPS scram signal was generated. The scram signal was initiated by an upscale trip of the "B" IRM of the Neutron Monitoring System (EIIS:IG). The RPS was in a non-coincident trip signal configuration, received the "B" IRM trip signal and initiated a full scram signal. Since all control rods were fully inserted prior to this event, no rod motion occurred. All systems functioned properly in response to the scram signal. Operators identified the scram signal and promptly responded correctly in accordance with the Scram Trip Procedure, T-100. The scram signal was reset at 1330 and other applicable portions of the Post Scram Restoration Trip Procedure, T-99, were performed. Unit 2 was restored to the pre-event conditions in accordance with the Reactor Protection System Scram Reset General Plant Procedure, GP-11. The upscale trip signal on the "B" IRM was attributed by operations at the time of the event to electronic noise. This conclusion was based on the fact that no other IRM exhibited an elevated signal, no SRM exhibited a high count rate, and the "B" IRM upscale trip was of short duration (approximately 0.1 second). Notification of this

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event was made on July 17, 1989 at 1604, in accordance with 10CFR 50.72(b)(2)(ii) as an automatic actuation of an Engineered Safety Feature (ESF).

Event 2:

On July 22, 1989, at 1510 a second short duration "B" IRM upscale trip occurred. The RPS was still in a non-coincident trip signal configuration and initiated a full scram signal. Since all control rods were fully inserted except one which was fully withdrawn and hydraulically disarmed for maintenance on its control rod drive (EIIIS:AA) mechanism prior to this event, no rod motion occurred. All systems functioned properly in response to the scram signal. Operators identified the scram signal and again promptly responded correctly in accordance with the Scram Trip Procedure, T-100. The scram signal was reset at 1515 and other applicable portions of the Post Scram Restoration Trip Procedure, T-99, were performed. Unit 2 was restored to the pre-event conditions in accordance with the Reactor Protection System Scram Reset General Plant Procedure, GP-11. The upscale trip signal on "B" IRM was again attributed to electronic noise based on the aforementioned rationale. Notification of this event was made on July 22, 1989 at 1707, in accordance with 10CFR 50.72(b)(2)(ii) as an automatic actuation of an ESF.

Event 3:

The following event is not reportable pursuant to 10 CFR reportability requirements but is being included in this LER for informational purposes. On July 21 at 2202 with RPS in a non-coincident configuration a momentary upscale trip of the "F" IRM resulted in a RPS trip from the "B" channel logic. The single channel RPS trip did not generate a full scram signal (Both "A" and "B" channel logics) as expected. At 2204 the "B" channel RPS trip was reset. At 2227 an "A" channel manual half scram signal was initiated to verify the "A" channel scram capability. The half scram signal functioned as designed and was reset at 2228. At 2239 the "A" channel manual half scram signal was reinitiated pending further investigation into the event. This investigation was conducted with the Reactor Mode Switch administratively restricted to the Shutdown position which prevents any control rod withdrawal. The average response time for an "F" IRM upscale trip to initiate a RPS "B" channel trip is 39 milliseconds. The average response time for an "F" IRM upscale trip to initiate a non-coincident cross channel RPS "A" channel trip is 132 milliseconds. The combination of the "A" and "B" RPS channel trips initiates a full scram signal. Both of these response times are within the RPS design and operating parameters. The "F" IRM upscale trip lasted only 48 milliseconds based on review of the Emergency Response Facility Display System

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computer records. The RPS response of a single channel trip ("B" channel) to the momentary "F" IRM upscale trip signal was in accordance with design. Notification of this event was made on July 21, 1989 at 0133, in accordance with 10CFR50.72(b)(2)(ii) as an automatic actuation of an ESF. At the completion of the event investigation, this issue was determined to be not reportable since no ESF actuation occurred. At 0438 on July 23 the "A" channel half scram signal was reset. The restriction which maintained the Reactor Mode Switch in the Shutdown position was lifted only after the Plant Operations Review Committee (PORC) and the Nuclear Review Board (NRB) examined the results of the investigation and concurred with the explanation therein. These examinations were completed satisfactorily on August 3 and August 4 by PORC and NRB respectively.

Consequences of the Event:

The actual consequences of the three events were minimal in that the reactor was at zero percent power level and all control rods were fully inserted, with the exception of the one that was hydraulically disarmed for maintenance during Event 2. There was no release of radioactive material to the environment as a result of these events. The reason these events would not occur with the reactor at power is the RPS would be in a coincident configuration thus preventing a single channel IRM from causing a full RPS scram signal.

Cause of the Event:

Events 1 and 2:

The "B" IRM upscale trips were due to a faulty preamplifier. During investigation into this event, an intermittent problem with the "B" IRM preamplifier was discovered. The degraded preamplifier made the upscale trip channel overly sensitive to the surrounding environment. Slight preamplifier movement caused by any vibration intermittently initiated the upscale trips.

Event 3:

The momentary upscale trip on "F" IRM was caused by inadvertent contact to the undervessel "F" IRM assembly. During work on a control rod drive mechanism in the undervessel area, inadvertent contact by maintenance personnel with the "F" IRM assembly occurred.

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This generated a short duration upscale trip signal. The maintenance personnel were exercising caution during undervessel work activities due to the known sensitivity of equipment in the area, but the clearances are such that incidental contact is extremely difficult to prevent.

Corrective Actions:

Events 1 & 2:

Operations identified the scram signals and promptly responded correctly in accordance with the Scram Trip Procedure, T-100. The scram signals were reset and other applicable portions of the Post Scram Restoration Trip Procedure, T-99, were performed. Unit 2 was restored to the pre-event conditions in accordance with the Reactor Protection System Scram Reset General Plant Procedure, GP-11.

Event 3:

The "B" channel RPS Trip was reset in accordance with applicable portions of the Post Scram Restoration Trip Procedure, T-99. The "A" channel manual half scram signal was initiated to verify the "A" channel scram capability. The half scram signal functioned as designed and was restored as mentioned above via T-99. As a precaution the "A" channel manual half scram signal was reinitiated pending further investigation. Additionally the Reactor Mode Switch was administratively restricted to the Shutdown position which prevented any control rod withdrawal.

All Events:

The Unit 2 rod withdrawals that potentially impacted the SHUTDOWN MARGIN were completed on July 23 at 0525 and RPS was returned to a configuration that requires two IRM upscale trip signals to initiate a full RPS scram signal (coincident trip signal response).

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Actions Taken to Prevent Recurrence:

Events 1 & 2:

The "B" IRM preamplifier was replaced and calibration completed satisfactorily on August 9, 1989. The "B" IRM preamplifier failure is an isolated occurrence. The preamplifiers in all other IRMs, in both Unit 1 and Unit 2, have operated satisfactorily as exhibited by the lack of spikes in IRM indication during similar conditions. The failed preamplifier is being analyzed to determine the intermittent fault mechanism. If significant information is discovered during this investigation a supplement to this LER will be issued.

Event 3:

The General Employee Training lesson plan has recently been revised to include a section that is heightening the awareness of all plant personnel of events (i.e., actuations and initiations) that can occur due to inadvertently actuating plant systems while performing other work functions. Additionally, discussions were conducted with maintenance personnel to verify caution was exercised as directed by the implementing procedures during undervessel work activities due to the known sensitivity of equipment in the area. Also, letters will be written to Plant personnel by the appropriate management to heighten personnel awareness of inadvertent actuation of plant systems while performing other work functions.

Previous Similar Occurrences:

Although other RPS actuations have occurred (LER's 84-002, 84-005, 84-023, 84-039, 84-040, 85-007, 85-021, 85-024, 85-026, 85-046, 85-073, 85-083, 85-095, 86-001, 86-011, 86-020, 87-046, 87-048, 88-012, 88-013, 88-016, and 89-032) none have a similar cause and are not considered previous similar occurrences.

Tracking Codes: B15 - Failure Due to Normal Wear
A2 - Failure to follow implementing procedure