10 CFR 50.73

PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION
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SANATOGA, PENNSYLVANIA 19464
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J. DOERING, JR.
PLANT MANAGER
LIMERICK GENERATING STATION

January 4, 1991
Docket Nos. 50-352
50-353
License Nos. NPF-39
NPF-85

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

SUBJECT: Licensee Event Report
Limerick Generating Station - Unit 1

This LER reports a condition that resulted in various isolations associated with the Primary Containment and Reactor Vessel Isolation Control System, an Engineered Safety Feature actuation. This event was due to an original installation deficiency.

Reference:	Docket Nos. 50-352 50-353
Report Number:	1-90-033
Revision Number:	00
Event Date:	December 5, 1990
Report Date:	January 4, 1991
Facility:	Limerick Generating Station P.O. Box A, Sanatoga, PA 19464

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

Very truly yours,

J Doering

WGS:rgs

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

IE22 1/1

NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1): Limerick Generating Station

DOCKET NUMBER (2): 0 5 0 0 0 3 5 2

PAGE (3): 1 OF 0 5

TITLE (4): This LER reports a condition that resulted in isolations associated with the Primary Containment and Reactor Vessel Isolation Control System due to an original construction error.

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)
1 2	0 5	9 0	9 0	— 0 3 3 —	0 0	0 1	0 4	9 0	LGS, Unit 2	0 5 0 0 0 3 5 3
										0 5 0 0 0

OPERATING MODE (9): 4

POWER LEVEL (10): 0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

	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 (AREA CODE)
G. J. Madsen, Regulatory Engineer, Limerick Generating Station	2 1 5 3 2 7 - 1 2 0 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

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 December 5, 1990, at 1733 hours, while electrical separation repair work was being conducted in panel 10C609, a 60 AMP power supply fuse in panel 1AY160 unexpectedly blew. This loss of logic power resulted in the actuation of the Primary Containment and Reactor Vessel Isolation Control System, an Engineered Safety Feature (ESF), causing the isolations of various system inboard valves. In addition, the 'A' trains of the Standby Gas Treatment System and the Reactor Enclosure Recirculation System, both ESFs, automatically initiated as designed. A new fuse was obtained and installed at 1804 hours. At 1806 hours, all isolations were reset, and by 1845 hours all required systems that had isolated were restored to service. There was no release of radioactive material to the environment as a result of this event. The cause of this event was due to an original installation deficiency during the construction of Unit 1 associated with reversed wiring from the power supply bus in panel 1AY160, to fuses in panel 10C609. Rework in panel 10C609 required Instrumentation and Controls technicians to lift wiring up stream of the fuses in panel 1AY160. As a result of reversed wiring in panel 1AY160, rework being performed in panel 10C609 resulted in a blown fuse due to inadvertent grounding of a cable thought to be deenergized. The reversed wiring problem was corrected on December 5, 1990.

Unit Conditions Prior to the Event:

Unit 1 Operating Condition was 4 (Cold Shutdown) at a 0% Power Level.

Unit 2 Operating Condition was 1 (Power Operation) at a 99.9% Power Level.

Unit 1 was in the Shutdown (S/D) Cooling mode with the 'A' Loop of the Residual Heat Removal (RHR) system in service. Also, the Reactor Water Clean-Up (RWCU) system was in service to maintain adequate reactor water chemistry.

Prior to the event, Instrumentation and Controls (I&C) technicians and Installation Group electricians were repairing (sleeving) previously identified electrical separation deficiencies in panel 10C609. The controls of Administrative Procedure A-41.1, "Troubleshooting Safety Related/Tech Spec Equipment," were being followed by I&C technicians and Main Control Room (MCR) operations personnel were informed that this repair work would result in an 'A' Channel half scram. Therefore, licensed MCR operations personnel manually inserted an 'A' Channel Reactor Protection System (RPS) half scram so that the preplanned work would not cause this actuation.

Description of the Event:

On December 5, 1990, at 1733 hours, while an Installation Group electrician was lifting leads in panel 10C609 to support the repair (i.e., cable sleeving) of an electrical separation deficiency, a short to ground occurred causing a 60 AMP power supply fuse in panel 1AY160 to unexpectedly blow. Licensed MCR operations personnel immediately received an "'A' Channel RPS Out Of Service", annunciation and other annunciations associated with the loss of power to the 'A' channel RPS as a result of the blown fuse in panel 1AY160. This loss of logic power also resulted in the actuation of the Primary Containment and Reactor Vessel Isolation Control System (PCRVICS), an Engineered Safety Feature (ESF), and caused isolations in the following systems or subsystems:

- o Unit 1 'A' RHR system (EIIS:BO) in the S/D Cooling mode,
- o Unit 1 RHR Heat Exchanger Sample lines and RHR Drain to Radwaste,
- o Unit 1 RHR Heat Exchanger Vacuum Breaker lines,
- o Unit 1 RWCU (EIIS:CE) lines,
- o Unit 1 and Unit 2 Primary Containment Purge Supply & Exhaust lines,
- o Unit 1 and Unit 2 Primary Containment Exhaust to Equipment Compartment lines,
- o Unit 1 Primary Containment Sampling and Recombiner lines,
- o Unit 1 Primary Containment Instrument Gas lines (PCIG, EIIS:LK),

- o Unit 1 PCIG Tip Purge lines,
- o Unit 1 Drywell Chilled Water (DWCW) lines and Reactor Enclosure Chilled Water (RECW) to Recirculation Pump Seals, and
- o Unit 1 Miscellaneous Process lines

In addition, the following ESF actuations occurred:

- o Unit 1 Reactor Enclosure (RE) Heating, Ventilation and Air Conditioning (HVAC) system isolated and
- o Unit 1 Instrument Gas Block and Vent valves actuated as designed

The following RPS actuation occurred:

- o Unit 1 'A' Channel Half Scram (previously anticipated and initiated)

The isolation logic for the following systems require a signal from two independent channels and therefore did not result in any valve movement:

- o Unit 1 Main Steam Isolation Valves and Steam Line Drains and
- o Unit 1 Main Steam and Reactor Water Sampling lines

Additionally, the 'A' trains of the Standby Gas Treatment System (SGTS), a common plant system, and the Unit 1 Reactor Enclosure Recirculation System (RERS), both ESFs, automatically initiated as designed due to the isolation of the RE HVAC system.

MCR operators immediately suspended all work in panel 10C609 and entered Event (E) Procedure E-1AY160, "Loss of 'A' RPS/UPS Power," and confirmed that all the appropriate isolations were received. In addition, the 'A' Control Rod Drive pump, which had been operating, was then secured at 1742 hours to terminate cold water injection into the reactor vessel and prevent the reactor vessel water level from increasing. A replacement fuse was obtained and installed at 1804 hours. At 1805 hours, licensed MCR operators reset the logic associated with the PCRVICS isolations in accordance with General Plant Procedure GP-8, "Primary and Secondary Containment Isolation Verification and Reset." All isolations previously initiated were reset by 1806 hours.

The Unit 1 'A' Loop of S/D Cooling system was returned to service at 1832 hours. During the 59 minutes the 'A' S/D Cooling system was secured, the reactor coolant temperature increased from 120 degrees to 123 degrees. At 1841 hours, the RWCU system was returned to service. The 'A' PCIG system was then returned to service at 1845 hours. At 1859 hours the 'A' CRD pump was restarted.

A four hour notification was made to the NRC on December 5, 1990 at 2040 hours in accordance with the requirements of 10CFR50.72(b)(2)(ii), since this event

resulted in spurious automatic actuations of various ESFs. This report is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(iv).

Analysis of the Event:

All systems responded as designed during the loss of power caused by the blown fuse in panel 1AY160. During the 59 minutes that shutdown cooling was not in service, reactor coolant temperature increased approximately 3 degrees from 120 degrees to 123 degrees. The maximum reactor coolant temperature allowed by Technical Specifications (TS) is 200 degrees while in Operating Condition 4. Operations personnel had ample time to restore S/D Cooling prior to exceeding the TS limit since it would have taken over twenty six hours to reach this temperature limit. The loss of the DWCW system, the RECW system, and the PCIG system had no affect since the plant was shutdown for refueling. Additionally, there was no release of radioactive material to the environment as a result of this event.

If this event had occurred immediately following a S/D from rated power, MCR operations personnel would have had less time to respond due to increased decay heat. However, immediate and follow up actions for this type of event (loss of power to an RPS power distribution panel) are provided in procedures E-1AY160, Off Normal (ON) Procedure ON-113, "Loss of RECW," and GP-8. Licensed MCR operators receive requalification training to review and practice responses to simulated plant transients of this type. This training reinforces immediate operator actions, minimizing the time that systems are isolated, and reducing the impact on the plant. Therefore, as a result of this adequate procedural guidance, training, and prompt operator actions, the consequences of this type of event could be minimized.

If this event had occurred during full power operation, the potential exists that this event could have resulted in securing the Recirculation Pumps followed by a plant shutdown if immediate corrective actions were not taken quickly enough by licensed MCR operations personnel. Plant shutdown could have also been required due to Drywell temperature and pressure increases as a result of the loss of Drywell cooling. Additionally, if the PCIG system were left out-of-service for a long period of time the MSIVs could have drifted closed.

The potential consequences of this event were recognized prior to initiating the electrical separation rework in panel 10C609 and the decision was made by Plant Staff to complete the work while the plant was shut down. Plant staff based this decision on the minimized consequences of performing this work with Unit 1 in Operational Condition 4 (Cold Shutdown) and at a Power Level 0%.

Cause of the Event:

The cause of this event was due to an original installation deficiency associated with the wiring from the power supply bus in panel 1AY160 to fuse BB-F13-2 in panel 10C609.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Limerick Generatin Station, Unit 1	0 5 0 0 0 3 5 2	9 0	— 0 2 4 —	0 0	0 5 OF 0 5

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

Panel 1AY160 contains a power supply bus, fed by a 60 amp power supply fuse, that consists of various terminals used to distribute power to components. Terminal points DM-3 and DM-4 were designed to supply power to fuses BB-F13-2 and BB-F19-2 located in panel 10C609, respectively. Therefore, rework (wrapping) of the identified electrical separation deficiency in panel 10C609 required I&C technicians to lift wiring up stream of fuse BB-F13-2 at the power bus bar in panel 1AY160. This technique of de-energization is not normally used. Normally de-energization of circuits requiring work or testing is achieved by removing an upstream fuse. We decided not to remove the upstream 60 amp power supply fuse because this would have removed power from the 'A' RPS bus having undesirable affects. However, during original construction of LGS Unit 1 these leads were reversed such that terminal DM-3 fed fuse BB-F19-2 and terminal DM-4 fed fuse BB-F13-2. Therefore, when the Installation Group electrician lifted the lead on the downstream side of fuse BB-F13-2, thought to be de-energized, and the lead then came in contact with the internal panel wall a short to ground resulted causing the upstream 60 Amp power supply fuse to blow.

Corrective Actions:

This event is considered to be an isolated occurrence due to the infrequent type of repair work being performed to provide adequate electrical separation.

The reversed wiring associated with terminal points DM-3 and DM-4 in panel 1AY160 were corrected on December 5, 1990. In addition, leads at terminal points DM-5 and DM-6 were found to have been reversed and will be corrected during the next Unit 1 Refuel Outage due to the potential consequences of performing this work at power. Additionally, this event will be discussed in Continuing Training to heighten the awareness of plant personnel having the potential to perform this type of work in the future.

The reversed wiring at terminal points DM-3 and DM-4 and DM-5 and DM-6 are not considered to have any generic implications due to the fact that each terminal point provides identical power to downstream logic circuits. In addition, there is no effect on the function of the associated circuits based on previously completed unit start-up tests and logic system functional tests performed at each refueling outage to verify system operation.

Previous Similar Occurrences:

LER 1-88-16, 1-88-030, 1-89-006, 2-89-011, and 2-90-006 also reported various ESF actuations that resulted in isolations due to a blown power supply fuse. The corrective actions associated with the above listed LERs would not have prevented this event because it did not involve a wiring reversal between the power bus and fuse.

Tracking Codes: (B) - Construction/Installation Deficiency