

## 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

March 19, 1992  
Docket No. 50-353  
License No. NPF-85

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

SUBJECT: Licensee Event Report  
Limerick Generating Station - Unit 2

This LER reports a condition prohibited by Technical Specifications due to an equipment malfunction. The Reactor Core Isolation Cooling system was already inoperable for performance of maintenance when a fuse blew that alone could have prevented the High Pressure Coolant Injection (HPCI) system from fulfillment of its safety functions needed to maintain the reactor in a safe shutdown condition and mitigate the consequences of an accident. This LER also reports two related events where a fuse blew that alone could have prevented the HPCI system from fulfillment of its safety functions needed to maintain the reactor in a safe shutdown condition and mitigate the consequences of an accident.

Reference:	Docket No. 50-353
Report Number:	2-92-004
Revision Number:	00
Event Date:	February 21, 1992
	February 24, 1992
	February 26, 1992
Report Date:	March 19, 1992
Facility:	Limerick Generating Station
	P.O. Box 2300, Sanatoga, PA 19464-2300

This LER is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(v).

Very truly yours,



JLP:cah

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

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## LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)										DOCKET NUMBER (2)										PAGE (3)																			
Limerick Generating Station, Unit 2										0 5 0 0 0 3 5 3										1 OF 0 3																			
TITLE (4) High Pressure Coolant Injection system in a condition on multiple occasions that could have prevented the fulfillment of its safety function because of blown power supply fuses.																																							
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 (5)																				
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OPERATING MODE (9)										THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)																													
1										20.402(b) 20.405(c) 50.73(a)(2)(iv) 73.71(b)																													
POWER LEVEL (10)										20.405(a)(1)(i) 50.36(a)(1) X 50.73(a)(2)(iv) 73.71(v)																													
1 0 0										20.405(a)(1)(ii) 50.36(a)(2) 50.73(a)(2)(iv) OTHER (Specify in Abstract below and in Text APC Form 368-1)																													
										20.405(a)(1)(iii) X 50.73(a)(2)(ii) 50.73(a)(2)(viii)(A)																													
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LICENSEE CONTACT FOR THIS LER (12)																																							
NAME															TELEPHONE NUMBER																								
G. J. Madsen, Regulatory Engineer, Limerick Generating Station															AREA CODE 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 NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC																														
B99	B/J	I/N/V T	T/2/4/8	YES																																			
SUPPLEMENTAL REPORT EXPECTED (14)															EXPECTED SUBMISSION DATE (15)																								
YES (If yes, complete EXPECTED SUBMISSION DATE)															X NO																								

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

On February 21, 1992, a Unit 2 High Pressure Coolant Injection (HPCI) system inverter power supply fuse (F28) blew which made the HPCI system flow control circuitry and the HPCI system inoperable. Because the Reactor Core Isolation Cooling (RCIC) system was already inoperable for maintenance, Technical Specifications (TS) ACTION for TS Section 3.5.1 could not be met. With both the HPCI and RCIC systems inoperable, this resulted in a condition prohibited by TS and TS Section 3.0.3 was entered which requires initiation of a plant shutdown within 1 hour. After completing the maintenance work order on the RCIC system, it was declared operable and TS Section 3.0.3 was exited before actions to shutdown the plant were required to be initiated. After troubleshooting was completed, the fuse was replaced and the HPCI system was declared operable. On February 24, 1992, a different Unit 2 HPCI system inverter power supply fuse (F29) blew which made the flow control circuitry and the HPCI system inoperable. On February 26, 1992, the F28 HPCI system inverter power supply fuse blew again. Again the HPCI system flow controller and the HPCI system were made inoperable. The actual consequences of these events were minimal because an accident condition did not occur during the times in which the HPCI system was inoperable and because sufficient Emergency Core Cooling System were available. The cause of the blown F28 and F29 fuses is believed to be due to a degraded inverter. The inverter was replaced on February 28, 1992.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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

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

Unit Conditions Prior to the Event:

Unit 2 was in Operational Condition 1 (Power Operation) at 100% power level.

The Reactor Core Isolation Cooling (RCIC) system (EII:BN) was inoperable for scheduled maintenance.

Description of the Event:

On February 21, 1992, at 1825 hours the Unit 2 High Pressure Coolant Injection (HPCI) system (EII:BJ) inverter power supply fuse (EII:FU), F28, blew which made the HPCI pump flow control circuitry inoperable. The HPCI system was declared inoperable and the Technical Specifications (TS) ACTION for TS Section 3.5.1, "ECCS-OPERATING," could not be met. With both the HPCI and RCIC systems inoperable, this resulted in a condition prohibited by TS and TS Section 3.0.3 was entered which requires initiation of a plant shutdown within 1 hour. After completing the maintenance work order on the RCIC system, the RCIC system was declared operable and TS Section 3.0.3 was exited at 1924 hours before actions to shutdown the plant were required to be initiated. Instrumentation and Controls (I&C) technicians performed troubleshooting of the inverter internal resistance to determine if the fuse and inverter were functioning properly. After confirming normal operation, the F28 fuse was replaced and the HPCI system was declared operable at 2050 hours. The inverter was investigated further, but the I&C technicians did not identify any abnormal conditions prior to or after the F28 fuse was replaced. A four hour notification was made to the NRC at 2133 hours in accordance with the requirements of 10CFR50.72(b)(2)(iii) because the HPCI system was in a condition that alone could have prevented the fulfillment of its safety function to maintain the reactor in a safe shutdown condition and mitigate the consequences of an accident.

On February 24, 1992, at 1440 hours, a different Unit 2 HPCI system inverter power supply fuse (F29) blew which made the flow control circuitry and the HPCI system inoperable. The inverter was suspected of being the cause of the two different blown fuses. The fuse was replaced and I&C technicians again investigated the inverter, including performance of the inverter calibration procedure and a check of the power supplies fed from the inverter, but could not identify any problems. The inverter appeared to be operating properly. A four hour notification was made to the NRC at 1700 hours in accordance with the requirements of 10CFR50.72(b)(2)(iii) because the HPCI system was in a condition that alone could have prevented the fulfillment of its safety function to maintain the reactor in a safe shutdown condition and mitigate the consequences of an accident. Troubleshooting of the HPCI system focusing on the inverter continued on February 25, 1992, including the monitoring of the inverter during a HPCI system manual slow start, a HPCI system manual quick start, and performance of a pump, valve, and flow test. After successfully completing all testing, the HPCI system was declared operable at 2000 hours on February 25, 1992.

On February 26, 1992, at 1222 hours the F28 HPCI system inverter power supply fuse blew again. Again the HPCI system flow controller and the HPCI system were

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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APPROVED OMB NO. 3150-0104

EXPIRES 8/31/85

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

TEXT (If more space is required, use additional NRC Form 366A 2) (17)

made inoperable. The fuse was replaced at 1225 hours to make the HPCI system available but inoperable during further troubleshooting. A four hour notification was made to the NRC at 1445 hours in accordance with the requirements of 10CFR50.72(b)(2)(iii) because the HPCI system was in a condition that alone could have prevented the fulfillment of its safety function to maintain the reactor in a safe shutdown condition and mitigate the consequences of an accident. Troubleshooting of the HPCI flow control system was initiated to investigate the inputs and outputs of the power supplies. Troubleshooting on the HPCI system by I&C technicians continued through February 27, 1992, without clearly identifying any defective equipment. Because the output of the power supplies fed from the inverter are fused and because the inverter is designed to protect itself from downstream shorts and faults by shutting down on an overload condition, the determination was made that the most likely source of the problem was the inverter. Discussions with the manufacturer of the inverter confirmed our own diagnosis that the blown fuses were symptomatic of inverter degradation and they agreed that it should be replaced. The inverter was replaced on February 28, 1992. After satisfactory performance of a HPCI system manual slow start and a HPCI system manual quick start the HPCI system was declared operable at 2105 hours on February 28, 1992. This report is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(i)(B) and 10CFR50.73(a)(2)(v).

Analysis of the Event:

The actual consequences of these events were minimal in that an accident condition did not occur during the times in which the HPCI system was inoperable. If an accident had occurred while the HPCI system was inoperable, sufficient Emergency Core Cooling Systems were available to maintain safe shutdown of the reactor and mitigate the consequences of an accident.

Cause of the Event:

The cause of the blown F28 and F29 fuses is believed to be due to a degraded inverter.

Corrective Actions:

The inverter was replaced on February 28, 1992, and no power supply fuse has subsequently blown. The inverter removed from the HPCI system has been sent to the manufacturer for performance of a failure analysis.

Previous Similar Occurrences:

A similar inverter for the Unit 1 RCIC system was replaced in 1988 after power supply fuses were repeatedly blown. Troubleshooting did not conclusively determine the inverter to be the root cause of the blown fuses; however, no fuses were blown subsequent to the inverter replacement.

Tracking Codes: B99 - Other deficiency