



**Boston Edison**

Filgrim Nuclear Power Station  
Rocky Hill Road  
Plymouth, Massachusetts 02360

10 CFR 50.73

**E. T. Boulette, PhD**  
Senior Vice President - Nuclear

January 4, 1996  
BECo Ltr. #96-001

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

Docket No. 50-293  
License No. DPR-35

The enclosed Licensee Event Report (LER) 95-011-00, "Reactor Core Isolation Cooling System made Inoperable due to Unplanned Maintenance to Replace Intermittent Tripping Power Inverter" is submitted in accordance with 10 CFR 50.73. A supplemental LER will be submitted following completion of the root cause investigation.

Please do not hesitate to contact me if there are any questions regarding this report.

*E.T. Boulette*  
E.T. Boulette, PhD

RLC/dmc/9501100

cc: Mr. Thomas T. Martin  
Regional Administrator, Region I  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

Sr. NRC Resident Inspector - Pilgrim Station

Standard BECo LER Distribution

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**LICENSEE EVENT REPORT (LER)**

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ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

**FACILITY NAME (1)**  
PILGRIM NUCLEAR POWER STATION

**DOCKET NUMBER (2)**  
05000-293

**PAGE(3)**  
1 of 4

**TITLE (4)**  
"Reactor Core Isolation Cooling System Made Inoperable due to Unplanned Maintenance to Replace Intermittent Tripping Power Inverter"

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 NAME	DOCKET NUMBER
12	06	95	95	011	00	01	04	96	N/A	05000
									N/A	05000

**OPERATING MODE (9)** N

**POWER LEVEL (10)** 100

**THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)**

20.402(b)	20.45(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v)(D)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER
20.405(a)(1)(iii)	50.73(a)(2)(i)(B)	50.73(a)(2)(viii)(A)	(specify in Abstract below and in Text, NRC Form 366A)
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** Robert L. Cannon - Senior Compliance Engineer  
**TELEPHONE NUMBER (Include Area Code)** 508-830-8321

**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)**

<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input type="checkbox"/> NO	<b>EXPECTED SUBMISSION DATE(15)</b>	MONTH	DAY	YEAR
			03	29	96

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On December 6, 1995, at 1445 hours the Reactor Core Isolation Cooling System (RCIC) was declared inoperable when RCIC Inverter 1340-16 appeared to have failed after being in service for approximately 5 and one-half months. The historical events log (annunciation) indicated multiple alarm/reset occurrences for the RCIC Inverter 1340-16, on Control Room Panel C904, from 1445 hours to 1653 hours. The operators observed that the inverter power lamp went off during a few of the alarm conditions indicating a loss of power to the RCIC flow control circuitry. Limiting Condition for Operation (LCO) 95-219 was entered and the RCIC System was removed from service for unplanned maintenance. Inverter 1340-16 was replaced in kind under Maintenance Request 19503503. The RCIC system was tested and declared operable at 2030 hours at which time the LCO was exited. Problem Report (PR) 95-9608 was written to document the intermittent tripping of the RCIC System inverter. The inverter that was removed from service was fully tested by Pilgrim Station maintenance and engineering support personnel. The testing did not identify any defect or anomaly in the operation of the inverter. This was confirmed with additional testing by the vendor, ABACUS Controls, Inc. A supplement to this LER will be submitted following completion of the root cause investigation.

The event occurred during power operations with the reactor mode selector switch in the RUN position. The reactor vessel pressure was approximately 1035 psig with reactor vessel water temperature at the saturation temperature for the reactor pressure. This report is submitted in accordance with 10 CFR 50.73(a)(2)(v)(D). The event posed no threat to the public health and safety.

**LICENSEE EVENT REPORT (LER)**

**TEXT CONTINUATION**

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
PILGRIM NUCLEAR POWER STATION	05000-293	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 4
		95	011	00	

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

BACKGROUND

The Reactor Core Isolation Cooling (RCIC) is designed to provide makeup water to the reactor vessel following reactor vessel isolation in order to prevent the release of radioactive materials to the environs as a result of inadequate core cooling. The RCIC flow control circuitry operates on 115V AC converted from 125V DC by inverter 1340-16. Inverter 1340-16 is located within Main Control Room Panel C904 and is manufactured by ABACUS Controls, Inc. A similar inverter (Manufactured by General Electric), 2340-13, performs a similar function for the HPCI System and is located within Main Control Room Panel C903. Inverters 2340-13 and 1340-16 were replaced and/or modified under Plant Design Changes (PDCs) 91-63, Field Revision Notice (FRN) 95-04-30, and FRN 95-04-32. The former inverters were original plant equipment and advancing technology had rendered them obsolete. The current inverters have wider operating ranges and greater high voltage trip setpoints than the former inverters. The current inverters are also equipped with an automatic reset feature for high or low voltage trips and will provide an alarm in the Main Control Room should the inverters trip. The inverter replacements were a portion of the corrective action taken for the conditions described in Licensee Event Reports (LERs) 50-293/91-006-00, 91-021-00, 91-025-00, and 95-002-01.

EVENT DESCRIPTION

On December 6, 1995, at 1445 hours the Reactor Core Isolation Cooling System (RCIC) was declared inoperable when RCIC Inverter 1340-16 appeared to have failed after being in service for approximately 5 and one-half months. The historical events log (annunciation) indicated multiple alarm/reset occurrences for the RCIC Inverter 1340-16, on Control Room Panel C904, from 1445 hours to 1653 hours. The operators observed that the inverter power lamp went off during a few of the alarm conditions indicating no power to the RCIC flow control circuitry. Limiting Condition for Operation (LCO) 95-219 was entered and RCIC System was removed from service for unplanned maintenance. Inverter 1340-16 was replaced in kind under Maintenance Request 19503503. Problem Report (PR) 95-9608 was written to document the intermittent tripping of the RCIC System Inverter. The inverter is manufactured by ABACUS Controls, Inc. of Somerville, N.J.

The NRC Operations center was notified in accordance with 10 CFR 50.72, at 1626 hours on December 6, 1995.

The event occurred during power operations with the reactor mode selector switch in the RUN position. The reactor vessel pressure was approximately 1035 psig with reactor vessel water temperature at the saturation temperature for the reactor pressure.

LICENSEE EVENT REPORT (LER)

TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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

CAUSE

The inverter that was removed from service was fully tested by Pilgrim Station maintenance and engineering support personnel. The testing did not identify any defect or anomaly in the operation of the inverter. This was confirmed with additional testing by the vendor, ABACUS Controls, Inc. The root cause investigation is continuing. A supplement to this LER will be submitted following completion of the root cause investigation.

CORRECTIVE ACTION

The RCIC Inverter 1340-16 was replaced with an identical inverter (in kind replacement) and returned to service at approximately 2030 hours on December 6, 1995. No further trips have been experienced.

SAFETY CONSEQUENCES

This event posed no threat to the public health and safety.

The Core Standby Cooling System (CSCS) consists of the HPCI System, Automatic Depressurization System (ADS), Core Spray System, and Residual Heat Removal/Low Pressure Coolant Injection (LPCI) mode. Although not part of the CSCS, the RCIC System is capable of providing water to the reactor vessel for core cooling, similar to the HPCI System. During the time period RCIC was inoperable, the HPCI System and the other CSCS Systems were operable and capable of providing core cooling.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(v)(D) because the RCIC System was removed from service for unplanned maintenance and therefore made inoperable due to the apparent failure of Inverter 1340-16 on December 6, 1995.

SIMILARITY TO PREVIOUS EVENTS

A review was conducted of Pilgrim Station Licensee Event Reports (LERs) issued since January 1984. The review focused on LERs involving RCIC or HPCI System inverter problems due to similar causes. The review identified previous events reported via LERs 50-293/85-029-00, 91-006-00, 91-021-00, 91-025-00, and 50-293.95-002-01

For LER 85-029-00, the HPCI inverter tripped during power operation on October 18, 1985. The most probable cause of the HPCI inverter trip was fluctuation of the inverter input DC voltage. The inverter was reset within 60 seconds restoring the HPCI System operability.

**LICENSEE EVENT REPORT (LER)**

**TEXT CONTINUATION**

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

For LER 91-006-00, the RCIC inverter and the HPCI inverter tripped during power operation on March 26, 1991. The inverter tripped when the Recirculation System Loop 'B' motor-generator set/pump was restarted. At the time of the event, the 125V DC Battery 'A' and Battery Charger 'A' were supplying power to the RCIC Inverter via 125 VDC Bus 'A'. The 125 VDC Battery 'B' and the 125 VDC backup battery charger were supplying power to the HPCI Inverter via 125 VDC Bus 'B'. The 125 VDC battery charger 'A' and backup battery charger were being powered from Bus A5 via Bus B1 and Bus B6, respectively. The cause of the inverter trips was a fluctuation of the input DC voltage that resulted when the "B" Recirculation Pump was started. Final corrective actions were taken under LER 91-025-00.

For LER 91-021-00, the RCIC System was declared inoperable on October 9, 1991. The RCIC System was declared inoperable because sufficient test data for the backup 125 VDC battery charger was not available to assure that the RCIC Inverter would not trip if a 125 VDC Bus 'A' voltage transient were to occur. At the time the RCIC System was declared inoperable, the 125 VDC backup battery charger was supplying the RCIC Inverter via the 'A' 125 VDC Bus. Final corrective actions were taken under LER 91-025-00.

For LER 91-025-00, the RCIC Inverter tripped during efforts by operators to restart RCIC following an overspeed trip on October 30, 1991. The inverter had tripped when the 'A' Residual Heat Removal (RHR) Pump was started. The RHR pump start caused an AC voltage transient that resulted in a DC voltage transient which caused the RCIC Inverter to trip. PDC 91-63 was implemented to replace the RCIC and HPCI Inverters with inverters with automatic reset, higher trip setpoints and wider ranges. Additionally, the three 125 VDC Battery Chargers were replaced under PDC 92-38 with new chargers designed to respond appropriately to expected AC voltage transients.

For LER 95-002-01, the HPCI and RCIC Systems became inoperable when the inverters which supply power to the HPCI and RCIC flow control circuitry tripped at different times. The HPCI inverter tripped due to an apparent internal fault on the "Converter Power Supply" board. The RCIC Inverter tripped and failed due to an internal fault on the power module. The most probable common cause failure existed due to the inverter power supply resistors not being sufficiently elevated above the circuit boards to provide adequate heat dissipation capability.

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES

The EIIS codes for this report are as follows:

<u>COMPONENTS</u>	<u>CODES</u>
Inverter (1340-16)	INVT
<u>SYSTEMS</u>	
Reactor Core Isolation Cooling (RCIC) System	BN