Entergy

Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
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Michael A. Balduzzi
Site Vice President

April 26, 2004

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

SUBJECT: Entergy Nuclear Operations, Inc.
Pilgrim Nuclear Power Station
Docket No.: 50-293
License No.: DPR-35

Licensee Event Report 2004-002-00

LETTER NUMBER: 2.04.037

Dear Sir or Madam:

The enclosed Licensee Event Report (LER) 2004-002-00, "High Pressure Coolant Injection System Fuse Failure While System Inoperable for Planned Maintenance and Testing," is submitted in accordance with 10 CFR 50.73.

There are no commitments contained in this letter.

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

Sincerely,

FOR M.A.B.

Michael A. Balduzzi

DWE/dm

Enclosure: LER 2004-002-00

cc: Mr. Hubert J. Miller
Regional Administrator, Region 1
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Senior NRC Resident Inspector

Mr. Travis Tate, Project Manager
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INPO Records

IE22

1. NRC Form 366 U.S. NUCLEAR REGULATORY COMMISSION	APPROVED BY OMB NO. 3150-0104
LICENSEE EVENT REPORT (LER) (See reverse for number of digits/characters for each block)	Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), 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. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

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TITLE (4)
High Pressure Coolant Injection System Fuse Failure While System Inoperable for Planned Maintenance and Testing

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
									N/A	05000
02	26	2004	2004	002	00	04	26	2004	FACILITY NAME N/A	DOCKET NUMBER 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)

20.2201(b)	22.2203(a)(3)(i)	50.73(a)(2)(i)(C)	50.73(a)(2)(vii)
22.2202(d)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(A)
20.2203(a)(1)	20.2203(a)(4)	50.73(a)(2)(ii)(B)	50.73(a)(2)(viii)(B)
20.2203(a)(2)(i)	50.36(3)(1)(i)(A)	50.73(a)(2)(iii)	50.73(a)(2)(ix)(A)
20.2203(a)(2)(ii)	50.36(3)(1)(ii)(A)	50.73(a)(2)(iv)(A)	50.73(a)(2)(x)
20.2203(a)(2)(iii)	50.36(c)(2)	50.73(a)(2)(v)(A)	73.71(a)(4)
20.2203(a)(2)(iv)	50.46(a)(3)(ii)	50.73(a)(2)(v)(B)	73.71(a)(5)
20.2203(a)(2)(v)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(C)	OTHER Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(vi)	50.73(a)(2)(i)(B)	X 50.73(a)(2)(v)(D)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Bryan Ford – Licensing Manager	(508) 830-8403

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BJ	FU	B569	Y					

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 15 single-spaced typewritten lines) (16)

On February 26, 2004, the High Pressure Coolant Injection (HPCI) system turbine gland seal condenser (GSC) condensate pump motor became de-energized during post work testing while the HPCI system was inoperable for planned maintenance and testing. An approved analysis has not been conducted to determine the ability of the HPCI turbine to operate for the duration of the system's mission time with the GSC pump inoperable.

The root cause was separation of the fuse element from the fuse end cap (ferrule) that was most likely due to manufacturing defect(s) introduced when the fuse was manufactured (pre-1994). The defect(s) resulted in a weak solder connection between the fuse end cap and fuse element. Inspection of the fuse identified the fusible link to be intact. The fuse was a Bussman Limitron, Class RK1, KWN-R-10 type fuse. The fuse was replaced and the pump was post work tested with satisfactory results. Corrective actions planned include the following. The scope of fuses to be replaced is being determined, new fuses are being procured, and selected fuses will be replaced with new fuses.

This condition posed no threat to public health and safety.

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

BACKGROUND

The Pilgrim Station core standby cooling systems (CSCS) consist of the high pressure coolant injection (HPCI) system, automatic depressurization system (ADS), residual heat removal (RHR) system low pressure injection (LPCI) mode, and core spray system. The HPCI system is designed to pump water into the reactor vessel for high pressure core cooling. Although not part of the CSCS, the reactor core isolation cooling (RCIC) system is also designed to pump water into the reactor vessel for high pressure core cooling, similar to the HPCI system.

The motive power for water injection into the reactor vessel from the HPCI system is provided by the HPCI turbine-pump (P-205). The turbine is equipped with instrumentation and accessories that include the gland seal condenser (GSC), GSC condensate pump (P-220), and GSC blower. The GSC functions to condense steam from the HPCI turbine gland seal system. A portion of the water from pump P-205 is directed to the GSC for the condensing function. The GSC blower functions to exhaust non-condensible gases from the GSC. Pump P-220 functions to pump condensate from the GSC. Pump -P220 is designed to automatically start if the condensate level in the GSC increases to a preset level, and can be manually started via a control switch in the control room. The control circuit for pump P-220 is powered by 125-volt DC power and is protected and powered by a fuse such that the circuit is de-energized by the electrical opening or removal of the fuse.

Technical Specification (TS) 3.5.C.1 specifies HPCI system operability when irradiated fuel is in the reactor vessel, reactor pressure is greater than 150 psig, and reactor coolant temperature is greater than 365° F. TS 3.5.C.2 specifies a 14-day limiting condition for operation (LCO) from and after the date the system is made or found inoperable for any reason provided that during such 14 days all active components of the ADS, RCIC system, RHR system (LPCI mode), and core spray system are operable. TS 3.5.C.3 specifies a 24-hour timeframe for the initiation of an orderly shutdown (to a cold shutdown condition) if the requirements of Technical Specification 3.5.C cannot be met.

On February 25, 2004, at about 0450 hours, the HPCI system was removed from service in accordance with Technical Specification 3.5.C.2 and tagged for planned maintenance and testing. As part of the maintenance activities, a pre-evolution briefing was conducted at about 2100 hours for a manual start of the HPCI system. After completing the prerequisites, the HPCI turbine was started in accordance with the procedure at about 0057 hours on February 26, 2004. The turbine was stopped in accordance with the procedure at about 0100 hours.

EVENT DESCRIPTION

On February 26, 2004 at about 0105 hours, it was identified that the power indicating lamp for the HPCI turbine GSC condensate pump P-220 was not illuminated as expected and that pump P-220 would not operate. The discovery occurred about 5 minutes after the HPCI turbine was stopped in accordance with the procedure for a manual start of the HPCI turbine.

Initial investigation found the fuse to the pump to be electrically open. The fuse was replaced. After the fuse replacement, pump P-220 was tested with satisfactory results.

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The NRC Operations Center was notified of the condition on February 26, 2004, at 0838 hours, in accordance with 10 CFR 50.72. This action was taken because an approved analysis has not been conducted to determine the ability of the HPCI turbine to operate for its mission time without the operation of the GSC and/or GSC blower and/or GSC condensate pump P-220.

After the completion of the planned maintenance and testing of the HPCI system, the system was returned to operable, standby service by 1818 hours on February 27, 2004.

The condition occurred while at 100 percent reactor power with the reactor mode selector switch in the RUN position. The reactor vessel pressure was approximately 1035 psig with the reactor water temperature at the saturation temperature for the reactor pressure.

CAUSE

The cause was the failure of a 10-amp fuse in the 125-volt DC control power circuit for pump P-220. The fuse was manufactured by Bussman Limitron, Class RK1, KWN-R-10; no date code was identified on the fuse.

An examination of the fuse failure and previous fuse failures revealed the fuse elements did not open, indicating the fuse(s) did not experience an overcurrent condition. Further examination indicated each fuse failure was due to separation of the fuse element end tab from the inside end cap (ferrule).

The root cause was separation of the fuse element from the fuse end cap (ferrule) that was most likely due to manufacturing defect(s) introduced when the fuse was manufactured (pre-1994). The defect(s) resulted in a weak solder connection between the fuse end cap and fuse element. The separation occurred as a result of a weak solder connection.

CORRECTIVE ACTION

The following corrective actions have been taken.

The failed fuse was replaced. After the fuse replacement, pump P-220 was tested with satisfactory results.

Pilgrim specific fuse failure history searches were performed to identify premature fuse failures.

Testing has been performed on about 300 spare Bussman KWN-R type fuses. The testing identified 3 additional fuse failures (separation of the fuse element end tab from the inside end cap).

A hold has been placed on all Bussman type KWN-R and type KTK fuses manufactured before 1994 that are in the warehouse inventory.

Corrective actions planned include the following. The scope of fuses to be replaced is being determined, new fuses are being procured, and selected fuses will be replaced with new fuses. These actions are being tracked in the corrective action program.

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SAFETY CONSEQUENCES

The condition posed no threat to public health and safety.

The power indicating lamp for pump P-220 was discovered not illuminated by the on-shift control room licensed operator at about 0105 hours on February 27, 2004. The control room panels are walked-down during each shift turnover of the control room operators. The power and position indicating lamps on the control panels, including the indicating lamp for pump P-220, are observed during the shift turnover walkdown and are also observed periodically during each shift by the on-shift licensed operator. The power and position indicating lamps are also observable by other on-shift licensed operators in the control room including the Operations Shift Supervisor. During these activities, the indicating lamp for pump P-220 was illuminated. Therefore, the fuse failure is assumed to have occurred at or near the time of discovery.

The Core Standby Cooling Systems (CSCS) consist of the HPCI system, Automatic Depressurization system (ADS), Core Spray system, and the Residual Heat Removal (RHR) system in the Low Pressure Core Coolant Injection (LPCI) mode. Although not part of the CSCS, the Reactor Core Isolation Cooling (RCIC) system is capable of providing water to the reactor vessel for high pressure core cooling, similar to the HPCI system. During the period the HPCI system was inoperable for planned maintenance and testing, the RHR system was inoperable for the LPCI mode for brief periods when the RHR system was aligned for the suppression pool cooling mode. These brief periods were less than the 24-hour timeframe specified by Technical Specification 3.5.C.3. Except for those periods, the RHR/LCPI mode and the ADS, Core Spray, and RCIC systems were operable. In the unlikely event the RCIC system was to become inoperable while the HPCI system was inoperable and core cooling was necessary, an actuation (automatic or manual) of the ADS would function to reduce reactor vessel pressure for low pressure core cooling provided independently by the RHR (LPCI mode) and/or Core Spray system.

The HPCI system was operable before the system was removed from service when the pump P-220 fuse failure occurred. Although the fuse failure would not have prevented the system from automatically or manually starting and responding as designed, if the fuse failure had occurred when the HPCI system was operating the failure of pump P-220 resulting from the fuse failure could have potentially prevented the system from operating for the duration of the system's mission time.

REPORTABILITY

This report was submitted in accordance with 10 CFR 50.73(a)(2)(v)(D) because the HPCI turbine GSC pump P-220 motor was de-energized. Although the fuse failure occurred after the HPCI system was removed from service in accordance with Technical Specifications, it could not be conclusively determined the system would have operated with a fuse failure and resultant failure of pump P-220 during the system's mission time. An approved analysis has not been conducted to determine the ability of the HPCI turbine to operate for the system's mission time without the operation of the GSC and/or GSC condensate pump P-220 and/or GSC blower.

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SIMILARITY TO PREVIOUS EVENTS

A review was conducted of Pilgrim Station Licensee Event Reports (LERs) issued since 1995. The review focused on LERs involving fuse failures. This review identified a similar event reported in LER 2002-001-00, "HPCI System Inoperable due to Fuse Failure." The cause was a failed fuse (Bussman type KWN-R-10) that is part of the 125-volt DC control power circuit of the normally closed HPCI system injection valve MO-2301-8. Inspection of the failed fuse identified a separation that had occurred at an internal solder connection between the fuse end cap and the fusible link.

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES

The EIIS codes for this report are as follows:

COMPONENTS	CODES
Fuse	FU
Pump (P-220)	P
SYSTEMS	
High Pressure Coolant Injection (HPCI) system	BJ
DC Power system-Class 1E	EJ