



BOSTON EDISON

Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

George W. Davis
Senior Vice President - Nuclear

June 18, 1991
BECO Ltr. 91- 79

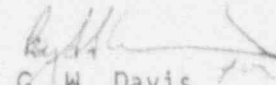
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

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

Dear Sir:

The enclosed supplemental Licensee Event Report (LER) 89-024-01, "Automatic Closing of the Outboard Primary Containment System Group 6 Isolation Valves", is submitted in accordance with 10 CFR Part 50.73.

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


G. W. Davis

GJB/bal

Enclosure: LER 89-024-01

cc: Mr. Thomas T. Martin
Regional Administrator, Region I
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Standard BECO LER Distribution

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Item Group 6 Isolation

OPERATING MODE (B)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 2.29 (Check one or more of the following): (31)				
POWER LEVEL (10)		0, 0, 1	20.402(b)	20.405(c)	20.406(a)(2)(iv)	20.406(a)(2)(v)	73.71(b)
			20.406(a)(1)(i)	50.36(a)(1)	50.73(a)(2)(iv)	50.73(a)(2)(v)	73.71(c)
			20.406(a)(1)(ii)	50.36(a)(2)	50.73(a)(2)(vi)	50.73(a)(2)(vii)(A)	OTHER (Specify in Abstract below and in Text, NRC Form 3664)
			20.406(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	
			20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(ix)		
			20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS ER (12)

AREA CODE	5	0	8	7	4	7	-	8	5	3	4
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC- TURER	REPORTABLE TO NPROS		CAUSE	SYSTEM	COMPONENT	MANUFAC- TURER	REPORTABLE TO NPROS	
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	I	I I I I	I I I				I	I I I	I I I		

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION DATE (IF)	MONTH	DAY	YEAR

☐ YES (If yes, complete EXPECTED SUBMISSION DATE)☐ NO

ABSTRACT (limits to 1400 spaces, i.e. approximately fifteen single space typewritten lines) [16]

On July 26, 1989 at 0123 hours, an automatic actuation of the outboard Reactor Water Cleanup (RWCU) System portion of the Primary Containment Isolation Control System (PCIS) occurred. The actuation resulted in the automatic closing of the outboard Primary Containment System Group 6 (six)/RWCU System isolation valves and a temporary interruption in RWCU System operation. The PCIS logic circuitry was reset and the RWCU System was returned to service on July 26, 1989 at approximately 0200 hours.

The direct cause of the actuation was a trip signal from the outboard RWCU System flow sensor. A multi-disciplinary investigation team determined that the cause of the trip signal was entrapped air in the instrument sensing lines. It was determined that a portion of the sensing lines was not sloped properly, creating a potential air trap. In addition, the snubbers contained within the instrument sensing lines were impeding the effectiveness of the backfills being performed. Corrective actions included redesigning the incorrectly sloped sensing line to prevent air from being trapped and adding vent connections upstream of the snubbers to allow for more effective backfills.

This event occurred during a startup with the reactor mode selector switch in the STARTUP position. The control rods were in a partially withdrawn position. The Reactor Vessel pressure was approximately 10 psig and the RV water temperature was approximately 221 degrees Fahrenheit. The reactor power level was approximately one percent. This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv) and this 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: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20556, 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) 0 5 0 0 0 2 9 3	LER NUMBER (6)			PAGE (3)		
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

REASON FOR SUPPLEMENT

This supplement satisfies the previous commitment to report the results of the root cause investigation regarding the Reactor Water Cleanup System isolation. The investigation was not complete when the initial report was submitted.

EVENT DESCRIPTION

On July 26, 1989 at 0123 hours, an automatic actuation of the outboard Reactor Water Cleanup (RWC) System portion of the Primary Containment Isolation Control System (PCIS) occurred.

The actuation resulted in the automatic closing of the outboard Primary Containment System (PCS) Group 6 (six)/RWC System isolation valves (MO-1201-5 and -80), a trip of the RWC System pumps, and a temporary interruption in RWC System operation. Concurrently, the Panel C-904C alarm, "Cleanup Lines Excess or Negative Flow", annunciated in the Control Room.

In accordance with the Alarm Response Procedure (ARP-904C), the alarm was confirmed, the system responses were verified, and the RWC System piping outside the Drywell was inspected for integrity with satisfactory results. The inboard and outboard RWC System flow sensing lines were backfilled with water. The PCIS logic circuitry was reset and the RWC System was returned to service on July 26, 1989 at approximately 0200 hours.

Failure and Malfunction Report 89-284 was written to document the event and the NRC Operations Center was notified as required by 10 CFR 50.72 on July 26, 1989 at 0308 hours.

This event occurred during a startup with the reactor mode selector switch in the STARTUP position. The control rods were in a partially withdrawn position. The Reactor Vessel (RV) pressure was approximately 10 psig and the RV water temperature was approximately 221 degrees Fahrenheit. The reactor power level was approximately one percent. The Recirculation System (Loops 'A' and 'B') was in service. The Residual Heat Removal System was not in service.

BACKGROUND

A modification (PDC 89-16) was implemented on July 23, 1989 while shutdown (prior to the startup). The modification included the installation of a time delay to the inboard and outboard PCIS circuitry for the RWC System flow sensors (DPIS-1243 and DPIS-1244). The time delay buffers the circuitry from minor RWC System flow fluctuations to preclude an unnecessary closing of the RWC System isolation valves and a temporary interruption in RWC System operation. The modification was implemented because of similar actuations that had been experienced previously.

On July 26, 1989 at 0100 hours, the RV head vent valves were closed as part of the startup process. When the vent valves are closed, the pressure in the instrumentation lines increases when the Reactor Vessel pressure increases as expected during startup.

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 RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, 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 NRC Form 366A's) (17)

CAUSE

The direct cause of the actuation was a trip signal from the outboard RWCU System flow sensor (DPIS-1244). After the actuation, the flow sensor was found in the tripped condition. A multi-disciplinary investigation team was formed to determine the cause of the trip. The investigation included review of RWCU System operational data, the calibration procedure for the inboard and outboard flow sensors DPIS-1243 and DPIS-1244 and other documents related to the flow sensors. The investigation included extensive testing on the RWCU System instrument sensing lines for supplemental data gathering.

Results of the investigation indicate the isolation was caused by entrapped air in the instrument sensing lines. A plant walkdown of the RWCU isolation instrumentation from the process pipe taps to flow sensors DPIS-1243 and 1244 identified an area of piping that was not sloped properly. This area of piping was identified as a location where air pockets could become trapped. Past methods used to purge the air from the sensing lines, including backfilling and blowing down the sensing lines, had been unsuccessful. The investigation also determined the snubbers contained within the instrument sensing lines were impeding the effectiveness of backfills thereby contributing to the formation of air pockets. Testing confirmed the snubbers restricted flow, thus preventing trapped air from being purged.

CORRECTIVE ACTION

Plant Design Change (PDC) 90-10 was implemented during the 1990 mid-cycle outage to prevent air from being trapped in the sensing lines. The PDC reworked the slope of the low pressure side sensing line outboard of the drywell penetration. This change also reconfigured the instrument tubing and added vent connections upstream of the snubbers. These changes were made to allow for more successful backfills following maintenance or test activities that could introduce air into the system. In addition, PDC 90-06 modified the instrument snubber pin settings to achieve optimum performance of the RWCU high flow sensors.

Following the installation of the two design changes, several plant pressurizations and startups have been conducted without automatic RWCU isolations. Periodic surveillances of the RWCU system sensing instruments have shown normal readings with no fluctuations or indications of trapped air.

SAFETY CONSEQUENCES

The temporary interruption in RWCU System operation 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: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

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The automatic closing of the PCS Group 6 (RWCU System) isolation valves results from any one of the following accident mitigating trip signals: low Reactor Vessel water level; cleanup (RWCU System) area high temperature; cleanup (RWCU System) inlet high flow (DPIS-1243 and DPIS-1244).

The RWCU System has a power generation design basis only. The objectives of the system are to: maintain high reactor water purity; remove corrosion products from the Reactor Vessel water; and, provide a method for decreasing Reactor Vessel water inventory (level) during heatup. The system purifies the water from the RV lower head drain line and a portion of Reactor Vessel recirculation flow from the suction pipe of the Recirculation System Loop 'A' pump, sending the water through the RWCU System filter demineralizer units for mechanical filtration and ion-exchange processes and returning the entire processed flow to the Reactor Vessel or a portion of the flow to the Main Condenser or Radwaste System.

An interruption in RWCU System operation during a startup affects the ability to decrease the Reactor Vessel water inventory (level) that increases due to the expansion of the water during heatup.

If an interruption in RWCU System operation had occurred during power operation, the reactor water chemistry would degrade progressively over time. Depending upon the length of time of the interruption, the degradation could possibly result in undesirable Reactor Vessel water chemistry values.

Control Room operator actions for response to RWCU System alarms or malfunctions are addressed in written procedures. The procedures include "Alarm Response Procedure", ARP-904C (Center), ARP-904R (Right) and 2.4.27, "Reactor Water Cleanup System Malfunctions".

This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv) because the outboard RWCU System portion of the PCIS logic circuitry was actuated by an (false) accident mitigating signal.

SIMILARITY TO PREVIOUS EVENTS

A review was conducted of Pilgrim Station Licensee Event Reports (LERs) submitted since January 1984. The review focused on LERs submitted in accordance with 10 CFR 50.73(a)(2)(iv) involving a trip signal that resulted from air in the instrumentation sensing lines for flow sensors DPIS-1243 or 1244. The review identified events reported in LERs 50-293/89-006-00, 89-018-00 and 89-021-00.

For LER 89-006-00, an automatic closing of the inboard PCS/RWCU System isolation valve (MO-1201-2) occurred during a startup on February 10, 1989 at 1320 hours. The cause was attributed to air in the instrumentation line(s) to the RWCU System flow sensors. The air was trapped in the flow sensing line(s) during a (dry) calibration (procedure 8.M.2-1.2.1 Rev. 17) of the flow sensors and caused a trip signal from the inboard flow sensor when the RV pressure increased during the startup. At the time of the event, the RV pressure was 15 psig and the Recirculation System pumps (Loops 'A' and 'B') were in service.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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For LER 89-018-00, an automatic closing of the two outboard PCS/RWCU System isolation valves (MO-1201-5 and -80) occurred during a startup on May 25, 1989 at 1710 hours. The cause was attributed to air in the instrumentation sensing line(s) of the RWCU System flow sensor(s). The air was trapped in the flow sensing line(s) following a leak rate test of two RWCU System isolation valves (MO-1201-2 and -5). The flow sensing lines were drained as part of the leak rate test. Air was trapped in the flow sensing line(s) when the piping and instrumentation lines were refilled after the leak rate test. At the time of the event, the RV pressure was 18 psig and the Recirculation System pumps (Loops 'A' and 'B') were in service.

For LER 89-021-00, an automatic closing of the inboard and outboard PCS/RWCU System isolation valves (MO-1201-2, -5, and -80) occurred during a startup on June 15, 1989 at 1540 hours. The direct cause for the event was attributed to air in the instrumentation sensing lines of the inboard and outboard RWCU System flow sensors (DPIS-1243 and DPIS-1244). The most likely cause for the air was attributed to dissolved gasses that came out of solution when the Reactor Vessel was previously depressurized, and/or when the sensing lines were previously backfilled. At the time of the event, the RV pressure was 7 (seven) psig and the Recirculation System pumps (Loops 'A' and 'B') were in service.

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES

The EIIS codes for this report are as follows:

COMPONENTSCODES

Switch, Differential, Pressure (DPIS-1244)
Valve, Isolation (MO-1201-5 and -80)

PDS
ISV

SYSTEMS

Containment Isolation Control System (PCIS)
Engineered Safety Features Actuation System (PCIS)
Primary Containment System (PCS)
Reactor Water Cleanup (RWCU) System

JM
JE
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CE