

BOSTON EDISON

Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

Ralph G. Bird
Senior Vice President — Nuclear

October 16, 1990
BECo Ltr. 90- 123

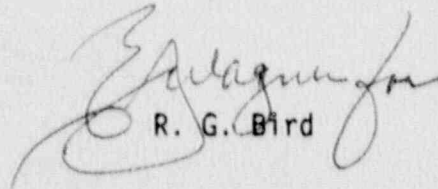
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

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

Dear Sir:

The enclosed Licensee Event Report (LER) 90-016-00, "Automatic Closing of the Group 1 Isolation Valves While Shutdown due to High Reactor Water Level", 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.


R. G. Bird

GB/bal

Enclosure: LER 90-016-00

cc: Mr. Thomas T. Martin
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
475 Allendale Rd.
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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TITLE (4) Automatic Closing of the Group 1 Isolation Valves While Shutdown due to High Reactor Water Level

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)					
MDWTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES			DOCKET NUMBER(S)		
0	9	17	9	0	0	0	1	6	N/A			0 5 0 0 0		
0	9	17	9	0	0	0	1	6	N/A			0 5 0 0 0		

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (1)									
POWER LEVEL (10) 0 0 0	20.402(b)		20.405(e)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)		73.71(b)			
	20.405(a)(1)(i)		50.36(e)(1)		50.73(a)(2)(v)		73.71(e)			
	20.405(a)(1)(ii)		50.36(e)(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)(ix)					

LICENSEE CONTACT FOR THIS LER (12)

NAME Gary J. Basileco - Senior Compliance Engineer	TELEPHONE NUMBER 5 0 1 8 7 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	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16)

On September 17, 1990 at 1923 hours, an automatic actuation of the Main Steam System/Group 1 (one) portion of the Primary Containment Isolation Control System (PCIS) occurred while shutdown due to a high Reactor Vessel (RV) water level. The actuation resulted in the automatic closing of the Main Steam Isolation Valves that were in the open position.

The cause of the actuation was high Reactor Vessel (RV) water level. The high RV water level occurred due to reactor water swell when the shutdown cooling (SDC) mode of the Residual Heat Removal System (RHRS) was being secured with two pumps in service. The RV level was higher than normal prior to this evolution because, in preparation for reactor startup, the RV was being heated (i.e. vessel head temperature was being increased). The cause of the high water level was that the RHRS operating procedure did not address two pump RHRS operation. Corrective action includes revising the RHRS operating procedure to address securing SDC with two pumps in operation and include an acceptable RV water level band in order to compensate for a RV water level increase when the RHRS is secured from SDC service.

The event occurred while in cold shutdown with the reactor mode selector switch in the REFUEL position for instrumentation checks. The reactor power level was zero percent with the control rods in the inserted position. The RV pressure was zero psig with the RV water temperature at approximately 196 degrees Fahrenheit. This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv) and this event posed no threat to the health and safety of the public.

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

EVENT DESCRIPTION

On September 17, 1990 at 1923 hours, an automatic actuation of the Main Steam System/Group 1 (one) portion of the Primary Containment Isolation Control System (PCIS) occurred due to a high Reactor Vessel (RV) water level. The actuation resulted in the following responses. The inboard and outboard Primary Containment System (PCS) Group 1 (one) Main Steam Isolation Valves (MSIVs), in the open position, closed automatically. The inboard and outboard PCS/Main Steam drain valves (MO-220-1 and -2) remained in the open position.

The event occurred when the "A" loop of Residual Heat Removal System (RHRS) was being taken out of the shutdown cooling (SDC) mode of operation. At that time reactor water level rose from approximately +31 inches to approximately +45 inches and the isolation occurred. The PCIS was reset and the MSIVs were reopened on September 17, 1990 at approximately 1957 hours.

Failure and Malfunction Report 90-320 was written to document the event. The NRC Operations Center was notified in accordance with 10 CFR 50.72 on September 17, 1990 at 2121 hours.

The event occurred while in cold shutdown with the reactor mode selector switch in the REFUEL position for instrumentation checks. The reactor power level was zero percent with the control rods in the inserted position. The RV pressure was zero psig with the RV water temperature at approximately 196 degrees Fahrenheit.

BACKGROUND

Prior to the event, and in preparation for startup, the RV water level had been increased to approximately +40 inches so that the moderator would heat up the RV metal. The RV water level was later lowered to approximately +31 inches in preparing to secure from the SDC mode with both the "A" and "C" RHRS pumps in service. The RV water temperature was approximately 196 degrees Fahrenheit.

The evolution to remove SDC from service was conducted rapidly. The RHRS pump "A" was secured first with the Loop "A" operating at a flowrate of approximately 8800 gpm. The RHRS pump "C" was secured approximately two seconds after pump "A" was secured. The RHRS injection valve (MO-1001-28A) was fully closed approximately four seconds after the second pump was secured. The RV water level rose approximately 14 inches (i.e., from 31 inches to 45 inches) in nine seconds.

The actuation resulted in the automatic closing of MSIVS. The main steam drain isolation valves (MO-220-1 and -2) did not close. Subsequent investigation of the logic diagrams by the Operating crew confirmed that valves MO-220-1 and MO-220-2 did not close because not all of the instruments required to actuate closure reached their individual setpoint for the trip.

After the event, the RHRS was placed into SDC at 1951 hours and was later secured, with the "A" and "C" pumps in service, at 2215 hours. This evolution to secure SDC resulted in a level increase of approximately 13 inches. The resulting increase was well below the setpoint for the affected level instruments because the RV water level was lowered to approximately +25 inches prior to securing the pumps.

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

CAUSE

The cause of the actuation was a high RV water level condition. The maximum RV water level that occurred was approximately +45 inches. The PCIS channels A1 and B2 actuated when the water level reached approximately 45 inches which is within the PCIS high water level setpoint range (calibrated at 45 inches \pm 3 inches). The trip units LS-263-57A-2 and LS-263-58B-2 are part of the PCIS channels A1 and B2 circuitry, respectively. Only the normally open MSIVs closed because only PCIS channels A1 and B2 actuated. The logic for the automatic closing of the MSIVs is a PCIS channel 'A' (A1 or A2) and a PCIS channel 'B' (B1 or B2) actuation. The main steam drain valves remained open because only PCIS channels A1 and B2 actuated. The logic for the automatic closing of the inboard drain valve (MO-220-1) is an actuation of PCIS channels A2 and B2. The logic for the automatic closing of the outboard drain valve (MO-220-2) is an actuation of PCIS channel A1 and B1. The Technical Specification (Table 3.2.A) trip level setting for a high RV water level condition is less than or equal to +48 inches. The level transmitters associated with trip units LS-263-57B-2 (PCIS channel B1) and LS-263-58A-2 (PCIS channel A2) were functioning properly and were operable.

The cause of the high water level was that the RHRS operating procedure 2.2.19 did not address two pump RHRS operation nor give a recommended RV water level band for pump starts and stops when the RHRS was in the SDC mode of operation. Specifically, the procedure did not address an acceptable water level for securing SDC with the moderator at a high temperature (i.e., 196 degrees Fahrenheit). The water level that existed just prior to securing SDC from service (i.e., approximately +31 inches) has been used successfully in prior evolutions. In this event, the higher moderator temperature caused a slightly greater water level rise.

CORRECTIVE ACTION

Procedure 2.2.19 (Rev. 35), "Residual Heat Removal" is being revised to provide operational instruction on the following:

- Acceptable RV water level band for pump(s) starts/stops.
- Specific/unique instruction for 2 RHRS pump operation in the SDC mode.
- Sequence for securing from the SDC mode.

Additional corrective action being planned includes incorporating the details of this event into the Licensed Operator Requalification Training Program and highlighting the procedural changes affecting the RHRS/SDC mode of operation.

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TEXT (If more space is required, use additional NRC Form 360A's) (17)

SAFETY CONSEQUENCES

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

The high RV water level resulted from the expansion (swell) of RV water that occurred when the RHRS pumps "A" and "C" were secured from service. The actuation was the designed response to the RV water level that occurred. The actuation caused the MSIVs to close. The MSIVs are designed to fulfill the following objectives:

- Prevent excessive damage to the fuel barrier by limiting the loss of reactor coolant inventory from the reactor vessel resulting from either a major leak in the main steam piping outside primary containment, or a malfunction of the pressure control system resulting in excessive steam flow from the reactor vessel.
- Limit the release of radioactive materials by closing the nuclear system process barrier in case of a gross release of radioactive materials from the fuel to the reactor cooling water and steam.
- Limit the release of radioactive materials by closing the primary containment barrier in case of a major leak from the nuclear system inside the primary containment.

Since this event would not have prevented the fulfillment of the above stated objectives, the consequences of this event were determined to be of no safety significance.

The highest RV water level that occurred was approximately +45 inches which was approximately 67 inches below the main steam line nozzles.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(iv) because the actuation of the Group 1 portion of the PCIS logic circuitry was not planned.

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) that involved a high RV water level and were associated with either the RHR system or a procedural inadequacy. The review identified similar events reported in LERs 50-293/84-020-00, 89-007-00 and 89-015-00.

For LER 84-020-00, a PCIS Group 1 (one) isolation signal occurred due to a high RV water level on December 25, 1984 at 1905 hours. The isolation signal resulted in the automatic closing of the MSIVs. At the time of the event, the reactor power level was approximately one percent, the reactor mode selector switch was in the STARTUP position, the RV pressure was approximately 100 psig, the RV water level was being manually controlled, and the RHRS was in the Suppression Pool Cooling (SPC) mode of operation. The cause for the high water level was attributed to leakage of RHRS/SPC water past the seat of an RHRS valve (MO-1001-28A) and into the RV.

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For LER 89-007-00, a PCIS Group 1 (one) isolation signal occurred due to a high RV water level on February 4, 1989 at 0936 hours. The isolation signal resulted in the automatic closing of the inboard MSIVs. The outboard steam line "C" MSIV closed automatically and the other outboard MSIVs remained closed. At the time of the event, the reactor power level was approximately 0.8 percent, the RMSS was in the STARTUP position, and the RV pressure was approximately 278 psig. The MSIVs were being tested with a differential pressure of approximately 150 psid across the seat of the MSIV(s). The high water level was caused by the swell (expansion) of RV water that occurred when the outboard line "C" MSIV was opened for testing. The cause for the event was attributed to an inadequacy in the development and review of the approved test procedure and a relatively fast opening time for the MSIV.

For LER 89-015-00, a high RV water level on May 3, 1989 at 0326 hours resulted in an automatic sequence of designed responses that included a Turbine-Generator Trip, a PCIS Group 1 (one) isolation signal, and an RPS scram signal and reactor scram at 24 percent reactor power. At the time of the event, the RMSS was in the RUN position and the RV pressure was approximately 940 psig. The high water level occurred while troubleshooting the actuator controls for the Feedwater System Train 'B' regulating valve (FV 642B). The primary cause for the high water level was attributed to the use of a general troubleshooting procedure (3.M.3-8) for troubleshooting the actuator controls of the feedwater regulating valve (FV-642B).

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES

COMPONENTS

Valve, Isolation (MSIVs)
Pump (P-203A, C)

CODES

ISV
P

SYSTEMS

Containment Isolation Control System (PCIS)
Engineered Safety Feature Actuation System (PCIS)
Residual Heat Removal (RHRS/SDC mode)

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