

BOSTON EDISON

Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

Ralph G. Bird

Senior Vice President — Nuclear

April 6, 1990
BECo Ltr. ~~90-05~~
90.051

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) 90-003-00, "Automatic Closing of the Group 1 Isolation Valves Due to a False High Reactor Water Level Signal During Shutdown", 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
R. G. Bird

GJB/bal

Enclosure: LER 90-003-00

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 Due to a False High Reactor Water Level Signal During Shutdown																																																	
EVENT DATE (5)										LER NUMBER (6)										REPORT DATE (7)										OTHER FACILITIES INVOLVED (8)																			
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LICENSEE CONTACT FOR THIS LER (12)																																																	
NAME Gary J. Basileco - Senior Plant Engineer																				TELEPHONE NUMBER 5 1 0 8 7 1 4 7 1 - 1 8 5 1 3 1 4																													
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																																																	
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<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)																				<input checked="" type="checkbox"/> NO																													

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

On March 11, 1990 at 1825 hours, an automatic actuation of the Main Steam System/Group 1 portion of the Primary Containment Isolation Control System (PCIS) occurred due to a false high Reactor Vessel (RV) water level signal. The actuation resulted in the automatic closing of the related Primary Containment System isolation valves that were in the open position.

The isolation occurred when protective instrumentation downstream of the reference leg condensing chamber (12B) actuated. Trapped air in the reference leg sensing lines appears to have caused the actuation.

Corrective action planned includes eliminating air in the sensing lines by backfilling with demineralized water with a new backfilling procedure. Also, instrument performance will be closely monitored during the next startup and next shutdown to assess effectiveness of the backfilling.

The event occurred during the hot shutdown mode of operation with the reactor mode selector switch in the SHUTDOWN position. The reactor power level was zero percent. The RV pressure was approximately 10 psig with the RV water temperature at approximately 260 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 March 11, 1990 at 1825 hours, an automatic actuation of the Main Steam System/Group 1 portion of the Primary Containment Isolation Control System (PCIS) occurred due to a false high Reactor Vessel (RV) water level signal.

The actuation resulted in the following designed responses. The inboard and outboard Primary Containment System (PCS) Main Steam Isolation Valves (MSIVs), in the open position, closed automatically. The inboard and outboard PCS/Sample System Valves (AO-220-44 and -45), in the open position, closed automatically. The inboard PCS/Main Steam drain valve (MO-220-1), in the open position, closed automatically. The outboard drain valve (MO-220-2) in the open position, remained in the open position because it is controlled by circuitry that is not associated with the affected sensors.

The event occurred during the final stages of a planned shutdown while performing Attachment D ("Maneuvering to Cold Shutdown with MSIVs Open") of procedure 2.1.5 (Rev. 35) "Controlled Shutdown from Power". At that time level instrument LI-263-100B on Panel C-905 rapidly increased from +25 inches reactor water level to approximately +50 inches for about thirty seconds, and the isolation occurred. The isolation signal was reset and the MSIVs were reopened on March 11, 1990 at approximately 1829 hours.

Failure and Malfunction Report 90-52 was written to document the event. The NRC Operations Center was notified in accordance with 10CFR50.72 on March 11, 1990 at 2035 hours.

This event occurred during the hot shutdown mode of operation with the Reactor Mode Selector Switch in the SHUTDOWN position. The reactor power level was zero percent with the control rods in the inserted position. The RV pressure was approximately 10 psig with the RV water temperature at approximately 260 degrees Fahrenheit.

CAUSE

The actuation was initiated from the Reactor High Water Level trip units LIS-263-58A and LIS-263-58B. These trip units receive signals from level transmitters LT-263-58A and LT-263-58B which are both connected to a common condensing chamber 12B (commonly referred to as "B" reference leg). While the cause of the actuation cannot be confirmed with certainty, it is likely that air trapped inside instruments and/or instrument tubing gradually expanded as reactor pressure decreased, and migrated up through vertical sections of the tubing. This resulted in a slightly less positive pressure on the reference leg side for each level instrument sharing that common instrument line. The level instruments instantaneously reacted to the change in differential pressure and sensed a (false) higher than actual water level. Equipment downstream of condensing chamber 12B including level recorders, panel indicators and computer points recorded the instantaneous level increase and the appropriate trip units actuated. The "A" side instruments did not exhibit a similar increase. Valve MO-220-2 remaining open confirms that the "A" side instruments were not affected.

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The Emergency and Plant Information Computer (EPIC) System "Delta Data" file provided information on points that changed state (digital) or exceeded a band (analog). This file shows traces that confirm level increases at the output of level transmitters LT-263-72B and LT-263-120B and also shows time correlation for the primary containment isolation trip which was driven by transmitters LT-263-58A and LT-263-58B, all located on the "B" side. Level Instrument LI-263-100B, which went high at the time of the event, receives its signal from LT-263-72B. The traces also show no level increases or unusual occurrences with any "A" side instruments.

In addition, Control Room level recorders LR 1001-604A and LR 1001-604B strip charts were available for review. The false high water level is captured on the chart from LR 1001-604B where an increase to approximately +50 inches was recorded. The chart for LR 1001-604A did not have a similar indication. This further confirms that only the "B" side instruments were affected (see attached Diagram).

It appears that the cause of the high water level (i.e., actuation) was air in the "B" side reference leg sensing lines. Air most likely was present from either a previous calibration or some other prior maintenance activity which did not maintain waterfill. Analysis was performed to support this most probable cause. Recognizing the calibrated setpoints of the subject instruments, size and configuration of the instrument lines and calculating the time it would take a postulated air bubble to rise, it is highly likely that the high water level signal was due to trapped air in the reference leg. The analysis performed was also consistent with instrument response (time and output) as seen on the level recorder strip charts.

CORRECTIVE ACTION

Sensing lines will be backfilled with demineralized water prior to restarting from the current outage. A station procedure has been developed to provide the necessary instructions for performance of the backfill. This should minimize the amount of trapped air in the sensing lines. The backfilling procedure will be reviewed by the training department and will be incorporated into the Instrumentation and Controls plant status update portion of the Continuing Training Program.

During the next startup and next shutdown, the performance of reactor water level instruments will be closely monitored using permanent plant recorders. This monitoring will allow plant personnel (operations and systems) to determine effectiveness of the corrective actions taken.

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

SAFETY CONSEQUENCES

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

The actuation was the designed response to the (false) high water level signal. The actuation caused the PCIS Group 1 isolation valves, including 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 from the reactor vessel resulting from either a major leak from the steam piping outside the 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.

This report is submitted in accordance with 10CFR50.73(a)(2)(iv) because the Group 1 portion of the PCIS logic circuitry actuated.

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 10CFR50.73(a)(2)(iv) that involved a false high reactor water level signal due to air in the reference leg sensing lines.

One previous event was identified in 1984. LER 84-019-00 documents a Group 1 isolation signal that occurred when reactor water level indication from the "A" level instrumentation trended up to +45 inches. The cause was excess cooling in the area of the "A" reference leg. Corrective action, related to the response of Generic Letter 84-23, included installing new reference legs outside the drywell, minimizing the vertical piping drop inside the drywell and replacing reactor water level instrumentation with transmitters and electronic switching devices. The installations were completed during the last refueling outage.

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

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODESCOMPONENTSCODESValve, Isolation (MSIVs)
Recorder, Level
Transmitter, Level
Switch, LevelISV
LR
LT
LISSYSTEMSContainment Isolation Control System (PCIS)
Engineered Safety Feature Actuation System (PCIS/RPS)JM
JE

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U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OAH NO. 0150-0104
EXPIRES 03/10/08

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SIMPLIFIED DIAGRAM OF REACTOR VESSEL INSTRUMENTATION (‘B’ SIDE ONLY)

