



PEACH BOTTOM--THE POWER OF EXCELLENCE

PHILADELPHIA ELECTRIC COMPANY

PEACH BOTTOM ATOMIC POWER STATION

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Delta, Pennsylvania 17314

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October 11, 1990

Docket No. 50-278

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Licensee Event Report
Peach Bottom Atomic Power Station - Unit 3

This LER concerns a Technical Specification violation involving miscalibration of reactor water level instruments.

Reference:	Docket No. 50-278
Report Number:	3-90-012
Revision Number:	00
Event Date:	11/20/89
Discovery Date:	09/11/90
Report Date:	10/11/90
Facility:	Peach Bottom Atomic Power Station RD 1, Box 208, Delta, PA 17314

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(i)(B).

Sincerely,

cc: J. J. Lyash, USNRC Senior Resident Inspector
T. T. Martin, USNRC, Region I

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LICENSEE EVENT REPORT (LER)

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TITLE (4)
Miscalibration of Reactor Level Transmitters Result in Technical Specification Violation

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 NAMES		DOCKET NUMBER(S)																							
11	20	89	90	012	00	10	11	90			0 5 0 0 0																							
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">OPERATING MODE (9) N</td> <td style="width:25%;">20.402(b)</td> <td style="width:25%;">20.405(c)</td> <td style="width:35%;">50.73(a)(2)(w)</td> <td style="width:20%;">73.71(b)</td> </tr> <tr> <td rowspan="5">POWER LEVEL (10) 0 0 0</td> <td>20.406(a)(1)(i)</td> <td>50.36(e)(1)</td> <td>50.73(a)(2)(v)</td> <td>73.71(e)</td> </tr> <tr> <td>20.406(a)(1)(ii)</td> <td>50.36(e)(2)</td> <td>50.73(a)(2)(vii)</td> <td rowspan="4">OTHER (Specify in Abstract below and in Text, NRC Form 306A)</td> </tr> <tr> <td>20.406(a)(1)(iii)</td> <td><input checked="" type="checkbox"/> 50.73(a)(2)(i)</td> <td>50.73(a)(2)(viii)(A)</td> </tr> <tr> <td>20.406(a)(1)(iv)</td> <td>50.73(a)(2)(ii)</td> <td>50.73(a)(2)(viii)(B)</td> </tr> <tr> <td>20.406(a)(1)(v)</td> <td>50.73(a)(2)(iii)</td> <td>50.73(a)(2)(x)</td> </tr> </table>												OPERATING MODE (9) N	20.402(b)	20.405(c)	50.73(a)(2)(w)	73.71(b)	POWER LEVEL (10) 0 0 0	20.406(a)(1)(i)	50.36(e)(1)	50.73(a)(2)(v)	73.71(e)	20.406(a)(1)(ii)	50.36(e)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 306A)	20.406(a)(1)(iii)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)
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LICENSEE CONTACT FOR THIS LER (12)

NAME A. A. Fulvio, Regulatory Engineer	TELEPHONE NUMBER AREA CODE: 7 1 7 NUMBER: 4 5 6 - 7 0 1 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)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On 9/11/90 it was discovered during the performance of a surveillance test that level transmitter (LT) 3-2-3-99D was out of calibration causing level indicating switch (LIS) 3-2-3-99D trip setpoint to exceed technical specification limits. On 9/25/90, LT 3-2-3-99C was found similarly out of calibration causing LIS 3-2-3-99C trip setpoint to exceed technical specification limits. LT/LIS 3-2-3-99C and D are two of four instruments loops which provide a Group I Primary Containment Isolation system (PCIS) signal on triple low reactor water level. The other two instrument loops were functional. LT/LIS 3-2-3-99C and D are believed to have been out calibration since their last calibration during the Unit 3 seventh refueling outage. The cause of these miscalibrations is unknown. The calibration error of LT 3-2-3-99C and D was not detected during subsequent staff reviews due to uncertainties in reactor level indicators on LIS 3-2-3-99A, B, C, D, less than adequate acceptance criteria for wide range level instrument channel checks, and lack of clear understanding by Operations and I&C engineering personnel of the dynamic effects of recirc flow on the wide range level instrumentation. Operations and I&C personnel will receive training concerning the effect of flow on reactor water wide range level instrumentation. The transmitters were recalibrated.

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TEXT (If more space is required, use additional NRC Form 388A's) (17)

Requirements for the Report

This report is required pursuant to 10 CFR 50.73 (a)(2)(i)(B) to report a condition prohibited by Technical Specifications (Tech Specs).

Unit Status at Time of Discovery

Unit 3 was operating at approximately 47 percent of licensed reactor power.

There were no components, systems or structures that were inoperable which contributed to this event.

Description of Event

On 9/11/90, at 2100 hours, during the performance of a surveillance test, it was discovered that reactor water wide range level transmitter (EIIS:TDT) (LT) 3-2-3-99D was out of calibration. LT 3-2-3-99D provides a reactor water level signal to level indicating switch (EIIS:LIS) (LIS) 3-2-3-99D which in turn provides one of four primary containment isolation system (PCIS) (EIIS:JM) signals on reactor triple low water level (-160 inches/12 inches above top of active fuel). The logic for initiating this PCIS isolation is A or C and B or D. This miscalibration created an offset of LIS 3-2-3-99D setpoint to -178 inches. Additionally, on 9/25/90, it was discovered that LT 3-2-3-99C was out of calibration as well. This miscalibration created an offset of LIS 3-2-3-99C setpoint to -178 inches. These transmitters are normally calibrated during shutdown conditions due to the potential of producing a PCIS isolation if calibrated during reactor power operation.

Prior to this event, the local reactor water level indications on LIS 3-2-3-99C and D had been recognized at various times as going outside of their acceptable range (5" to 35") as specified on the daily shift surveillance log (ST 9.1-3X) between 11/30/89 and 8/30/90. On 11/30/89, the abnormal indications were observed by Operations personnel but discounted because they were believed to be associated with the transmitters being outside their normal operating pressure and temperature ranges during startup. The wide range level transmitters, which are calibrated for power conditions, normally read high in the operating range of reactor level when at reduced pressure. On 12/25/89 and 3/17/90, during reduced reactor power operations, the abnormal indications were again noticed by Operations personnel but later discounted because the indications subsequently returned within the acceptable range at higher power. On 5/2/90, during reduced power operation, the abnormal indications were again noticed but later discounted on 5/21/90 because it was believed they were caused by the indicators being calibrated close to the high end of their acceptable band. A calibration check of the transmitters was scheduled for the unit 3 mid cycle outage in October 1990. On 8/6/90, additional investigation performed by Instruments and Controls (I&C) engineering personnel involving instrument voltage outputs and comparisons to the narrow range water level instruments led to the conclusion that the C and D instruments were properly calibrated and the A and B were probably calibrated in the conservative low direction.

On 8/30/90, while investigating a reactor level indication problem on Unit 2, I&C Engineers performing the investigation became aware of the effects of reactor recirculation (recirc) flow on the wide range level instrumentation. As recirc flow

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

increases, the level indications on reactor vessel wide range level instruments are reduced by the dynamic effects in the area where their sensing lines penetrate the reactor vessel. Taking the effects of recirc flow into account, further investigation was performed and it was concluded on 9/10/90 that LT 3-2-3-99C and D could be out of calibration in the high, non-conservative, direction.

To compensate for the miscalibrations, the trip setpoints on LIS 3-2-3-99C and D were conservatively raised to -130" on 9/11/90 at 0300 hours. On 9/11/90, the surveillance test for the calibration of LT 3-2-3-99D was modified to allow calibration with the reactor in operation, and the calibration was completed at 2100 hours. On 9/25/90, LT 3-2-3-99C was similarly recalibrated.

Cause of the Event

The cause of the event was the miscalibration of LT 3-2-3-99C and D. The exact cause of the miscalibration of these transmitters is unknown. LT 3-2-3-99C and D were calibrated on the same day (7/5/89) by the same I&C technicians using the same test equipment. Because the transmitters were out of calibration by virtually the same amount, it is reasonable to presume a common factor affected both calibrations. The I&C technician (Utility, Non licensed) who directed the calibration was interviewed. He stated that he could remember no abnormalities associated with the calibration of LT 3-2-3-99C and D. The possibility that air was present in the instrument sensing lines during the calibrations was discounted because this would cause inconsistent results for the calibrations making it virtually impossible for both transmitters to be out of calibration by the same amount. The test equipment used during the calibration was found to be within tolerances during subsequent scheduled accuracy checks on 8/17/89 and 12/29/89 for the pressure gauge and digital voltmeter respectively.

The calibration error was not detected during subsequent reviews involving instrument channel checks due to uncertainties in reactor level indicators on LIS 3-2-3-99A, B, C, and D, less than adequate acceptance criteria for wide range level instrument channel checks in ST 9.1-2(3)X, Y, and Z, and a lack of clear understanding by Operations and I&C engineering personnel of the effects of recirc flow on the wide range level instrumentation.

Analysis of Event

No actual safety consequences occurred as a result of this event.

Based on an analysis of the daily surveillance log data during the period of this event, it appears that LIS 3-2-3-99C and D were out of calibration from the time they were last calibrated on 7/5/89. These instruments were required to be operable starting on 11/20/89 when Unit 3 startup commenced following the seventh refueling outage.

The miscalibration of LT 3-2-3-99C and D resulted in an offset of the trip setpoint for LIS 3-2-3-99C and D of -18 inches, reducing it to -178 inches of reactor water level. Since the variable leg instrument sensing line tap for these instruments is located at -172 inches, the level at which the trip setpoint would have been reached could not have been sensed by LT 3-2-3-99C and D at normal reactor pressures.

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LT 3-2-3-99A and B were calibrated on a different day by a different crew of I&C technicians using different test equipment than the LT 3-2-3-99C and D. LIS 3-2-3-99A and B had been reading expected values during the time that LT 3-2-3-99C and D were out of calibration, and were in close agreement with LT 3-2-3-99C and D after they were recalibrated.

From 11/20/89 until 9/11/90, the automatic trip functions provided by LT/LIS 3-2-3-99A, B, C, and D were not challenged. If the reactor level had dropped to the triple low level (-160 inches) trip point, the Group I PCIS isolation would still have occurred since LT/LIS 3-2-3-99A and B were fully functional. In addition to reactor vessel triple low level, Group I PCIS initiation signals are also generated on main steam line high radiation, main steam line tunnel high temperature, main line high flow, and main steam line low pressure.

An engineering evaluation revealed that the miscalibration of wide range level instruments does not affect abnormal operational transients or the control rod drop, or loss of coolant outside of containment accident scenarios. For the large break loss of coolant accident (LOCA), the Group I PCIS isolation could be provided by Main Steam line low pressure permissive which would occur due to the rapid reactor depressurization. For small break LOCA, the Automatic Depressurization System (EISS:RV) is used to depressurize the reactor vessel. At 850 psig, the main steam line low pressure permissive would be available to provide a Group I PCIS isolation. Emergency Core Cooling system functions were not affected by the miscalibration of LT 3-2-3-99C and D.

Corrective Actions

As soon as the miscalibration was suspected, the trip setpoints for LIS 3-2-3-99C and D were raised to -130 inches on 9/11/90 to compensate for the possible miscalibration of LT 3-2-3-99C and D. After appropriate procedural changes, LT 3-2-3-99D was recalibrated on 9/11/90 after the miscalibration was confirmed. LT 3-2-3-99C was recalibrated on 9/25/90.

Information from the investigation of this miscalibration event will be disseminated to I&C technicians.

Acceptance criteria for mismatches between indications on reactor vessel level instrumentation has been established in ST 9.1-2(3)X, Y, and Z. Additionally, ST 9.1-2(3)X, Y, and Z will be revised to include the appropriate acceptable range for reactor wide range level instruments at different reactor power ranges and to include acceptance criteria for mismatches between indications on other instruments. These changes will reduce the threshold for identifying potential instrumentation problems.

Detailed, device-specific discussion of the effects of the recirc flow, reactor pressure, and reactor power on the wide range reactor level instrumentation and what the implication is for interpreting level data will be included in licensed operator training and the technical staff and management (TS&M) training programs.

An evaluation will be performed to determine the feasibility for installing alternative indication or performing voltage checks on local instruments which have relatively inaccurate indicators.

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Previous Similar LER's

One previous similar LER was identified. LER 2-90-21 reported an event in which certain reactor vessel level instrumentation would not have actuated their associated safety function within technical specification limits due to equipment failure. Because the event described in this report was caused by instrument miscalibrations, the corrective actions taken at a result of LER 2-90-21 could not have prevented this event.