



**Boston Edison**

Pilgrim Nuclear Power Station  
Rocky Hill Road  
Plymouth, Massachusetts 02360

10 CFR 50.73

**E. T. Boulette, PhD**  
Senior Vice President - Nuclear

October 31, 1995  
BECo Ltr. #95-111

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

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

The enclosed supplemental Licensee Event Report (LER) 91-022-01, "Settings of Reactor Water Cleanup High Flow Sensors Found Out of Tolerance During Surveillance", is voluntarily submitted in accordance with 10 CFR Part 50.73.

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

E.T. Boulette, PhD

MTL/laa/9102201

cc: Mr. Thomas T. Martin  
Regional Administrator, Region I  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

Sr. NRC Resident Inspector - Pilgrim Station

Standard BECo LER Distribution

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**LICENSEE EVENT REPORT (LER)**

(See reverse for number of digits/characters for each block)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 50.0 HRS FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714) 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.

**FACILITY NAME (1)**  
PILGRIM NUCLEAR POWER STATION

**DOCKET NUMBER (2)**  
05000-293

**PAGE(3)**  
1 of 5

**TITLE (4)**  
Settings of Reactor Water Cleanup High Flow Sensors Found Out of Tolerance During Surveillance

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
10	24	91	91	022	01	10	31	95	N/A	05000
<b>OPERATING MODE (9)</b> N <b>POWER LEVEL (10)</b> 100										
<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)</b>										
			20.402(b)		20.45(c)			50.73(a)(2)(iv)		73.71(b)
			20.405(a)(1)(i)		50.36(c)(1)			50.73(a)(2)(v)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)			50.73(a)(2)(vii)		X OTHER
			20.405(a)(1)(iii)		50.73(a)(2)(i)			50.73(a)(2)(viii)(A)		(specify in Abstract below and in Text, NRC Form 366A)
			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)(x)		

**LICENSEE CONTACT FOR THIS LER (12)**

**NAME**  
Marie T. Lenhart - Senior Regulatory Engineer

**TELEPHONE NUMBER (Include Area Code)**  
508-830-7937

**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
B	JM	DPIS	B080	N					

**SUPPLEMENTAL REPORT EXPECTED (14)**

YES (If yes, complete EXPECTED SUBMISSION DATE)	NO	<b>EXPECTED SUBMISSION DATE(15)</b>	MONTH	DAY	YEAR
X					

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)**

On October 24, 1991, during a routine calibration, both Reactor Water Cleanup (RWCU) System high flow switches were found to have trip setpoints greater than the Technical Specification limit (calculated at 16.6" of water). The trip setting necessary to meet the Technical Specification limit has since been recalculated at less than or equal to 21.4" of water. Therefore, the as found trip settings in October 24, 1991, did not result in less than the minimum number of operable instrument channels per trip system specified by Technical Specification Table 3.2.A.

The cause of the as-found trip settings on October 24, 1991 was setpoint drift. The switches were manufactured by I.T.T. Barton, model number 288A. The switches were recalibrated with satisfactory results on October 24, 1991. The internal microswitches were later replaced and the linkages adjusted for the two high flow switches to improve repeatability.

This condition was discovered during normal plant operation at 100 percent reactor power. The reactor mode selector switch was in the RUN position. The Reactor Vessel (RV) pressure was 1035 psig with the RV water temperature at 550 degrees Fahrenheit.

This report is voluntarily submitted. The as-found trip settings posed no threat to the public health and safety or to plant operation.

**LICENSEE EVENT REPORT (LER)**

**TEXT CONTINUATION**

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
PILGRIM NUCLEAR POWER STATION	05000-293	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 of 5
		91	022	01	

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

REASON FOR SUPPLEMENT

This supplement is voluntarily submitted to report the results of the re-calculation of the trip setting of the RWCU System high flow switches, DPIS-1243 and DPIS-1244, that is necessary to meet the Technical Specification Table 3.2.A requirement of less than or equal to 300 percent of rated flow. The re-calculation was part of the corrective action for LER 93-003. Supplemental LER 93-003-01 committed to the submittal of this supplemental report.

EVENT DESCRIPTION

On October 24, 1991, both Reactor Water Cleanup (RWCU) System high flow switches (DPIS-1243 and -1244) were found to have trip points greater than the Technical Specification Table 3.2.A limit.

The discovery occurred during the functional and calibration test portion of surveillance procedure 8.M.2-1.2.1 (Revision 13), "Reactor Water Cleanup High Flow". The trip point of DPIS-1243 was found to be 17.8" water. DPIS-1243 was immediately recalibrated to 15.8" water under 8.M.2-1.2.1. Later in the performance of the procedure, the trip point of DPIS-1244 was found to be 18.6" water. DPIS-1244 was recalibrated to 14.9" water. Failure and Malfunction Reports 91-438 and 91-439 were written to document the as-found trip settings of DPIS-1243 and DPIS-1244.

This condition was discovered during normal plant operation at 100 percent reactor power. The Reactor mode selector switch was in the RUN position. The Reactor Vessel (RV) pressure was 1035 psig with the RV water temperature at 550 degrees Fahrenheit.

CAUSE

The cause was setpoint drift. DPIS-1243 and -1244 are I.T.T. Barton model 288A differential pressure indicating switches. These switches had drifted out of calibration in the past. Systems Engineering personnel identified a possible cause for the setpoint drifts was the switches needed mechanical linkage alignment. The linkages on these instruments had not been previously aligned. Maintenance Requests (MR) 90-12-67 and 90-12-68 were written for this alignment. This work was not accomplished prior to the calibration described in this report. On November 4 and 5, 1991, I&C personnel conducted an inspection and alignment of DPIS-1243 and -1244.

**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 INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
PILGRIM NUCLEAR POWER STATION	05000-293	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	3 of 5
		91	022	01	

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

Initially there was little repeatability in the trip settings. Inspection of the sensors found the switch actuating arm linkages needed adjustment. The pressure sensing tube normally drives an actuating cam. As the torque tube and actuating cam turn, rollers on the actuating arm should maintain a constant vertical position. When the roller reaches the notch in the center of the cam, the vertical position of the rollers will change. This causes the plunger screw on the affected actuator arm to actuate the high (positive) or low (negative) switches. During the alignment of DPIS-1243 and -1244, the sensor linkages needed adjustment. The plunger screw would actuate the switches without the cam roller completely changing its vertical position. The switches were actuating due to cam rotation and not due to cam rollers traveling vertically in the cam's notch. This misalignment caused the problem with repeatability. The linkages in both DPIS-1243 and -1244 were adjusted, via MRs 90-12-67 and 90-12-68, to ensure proper switch actuation. The trip settings were checked for repeatability and post work tested with satisfactory results via procedure 8.M.2-1.2.1.

A contributing factor to the out-of-tolerance trip settings was the scale of DPIS-1243 and -1244. The scale range is -50 inches water to +50 inches of water. The normal setpoint range of DPIS-1243 and -1244 is 14 to 16 inches of water. The difference between the high end of the trip setting band and the previously calculated limit (16.6") was 0.6 inches of water. This meant an instrument drift of 0.6 percent of full scale could result in exceeding the calculated limit.

CORRECTIVE ACTION

Corrective actions taken consisted of the following. DPIS-1243 and -1244 were immediately recalibrated on October 24, 1991 in accordance with 8.M.2-1.2.1. On November 4 and 5, 1991, both sensors had their linkages, cams, and rollers aligned in accordance with the vendor manual (V-0055). The trip settings were verified to be repeatable following the alignment.

The trip setting necessary to meet the Technical Specification Table 3.2.A requirement of less than or equal to 300 percent of rated flow was later re-calculated to be less than or equal to 21.4" of water. The new calculation was performed in accordance with the guidance contained in NRC Regulatory Guide 1.105 (Rev. 2), "Instrument Setpoints for Safety-Related Systems", and Instrument Society of American Standard ISA-S67.04 (1982), "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants". The calculation included total loop uncertainties, such as calibration uncertainty, instrument accuracy, temperature effects, instrument drift, and process (i.e., elbow tap) uncertainty.

The RWCU System high flow switches were evaluated for possible replacement. The evaluation concluded that replacement of the high flow switches was not necessary. The microswitches of the flow switches, however, were replaced and the mechanical linkages were adjusted to improve repeatability via MR 19302649 (DPIS-1243) and MR 19302648 (DPIS-1244) in September, 1993. In addition, FRN 94-04-01 installed permanent head tanks to DPIS-1243 and DPIS-1244 to facilitate more accurate calibration of these switches.

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 INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), 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.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
PILGRIM NUCLEAR POWER STATION	05000-293	91	022	01	4 of 5

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

SAFETY CONSEQUENCES

The as-found trip settings of DPIS-1243 and -1244 posed not threat to the public health and safety.

The RWCU high flow switches are part of the Primary Containment Isolation Control system (PCIS). These switches provide an automatic isolation signal to isolation valves in the Group 6 (six)/RWCU portion of the Primary Containment System (PCS). In the event the RWCU flow increases to greater than 300 percent of rated flow, DPIS-1243 is designed to initiate the closing of the inboard PCS/RWCU isolation valve, MO-1201-2. Similarly, DPIS-1244 is designed to initiate the closing of the outboard PCS/RWCU isolation valves MO-1201-5 and MO-1201-80. Pressure is sensed off of the inner and outer portions of a pipe elbow in the RWCU suction line via pipe elbow taps that are connected to the high flow switches. This arrangement functions to detect a RWCU pipe break inside or outside the containment. The design of an elbow tap is such that a positive differential pressure will be developed for flow in either direction. The Technical Specification limit of less than or equal to 300 percent flow had previously been calculated, considering instrument inaccuracies, to be equivalent to 16.6" water on DPIS-1243 and DPIS-1244. The Technical Specification limit has been recalculated at less than or equal to 21.4" of water. None of the as-found trip settings of the flow sensors exceeded 21.4" of water. Therefore, the RWCU System flow switches DPIS-1243 and DPIS-1244 would have functioned to close the RWCU System isolation valves at less than 300 percent rated flow with the trip settings found on October 24, 1991.

SIMILARITY TO PREVIOUS EVENTS

A review was conducted for similarity to previous Pilgrim Station License Event Reports (LERs) written since January 1984. The review focused on LERs submitted in accordance with 10 CFR 50.73 (a)(2)(i) that involved Barton Model 288A flow sensors. The review identified a related condition reported via LER 50-293/85-032-00.

For LER 85-032-00, 5 of 16 main steam high flow switches were found out of calibration. The cause was believed to be improper alignment of the switch linkage during field installation of a conversion kit. The switch linkages were realigned. Since then the main steam high flow switches have been replaced with analog trip switches of a different manufacturer.

LICENSEE EVENT REPORT (LER)

TEXT CONTINUATION

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FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
PILGRIM NUCLEAR POWER STATION	05000-293	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	5 of 5
		91	022	01	

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

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES

The EIIS Codes for instrument drift is as follows:

<u>COMPONENT</u>	<u>CODE</u>
Switch, Indicating, Differential, Pressure	PDIS
<u>SYSTEMS</u>	
Containment Isolation Control System (PCIS)	JM
Primary Containment System (PCS)	JM
Reactor Water Cleanup System (RWCU)	CE