NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Pilgrim Nuclear Power Station	0 5 0 0 0 2 9 3	1 OF 0 6

TITLE (4)
High Pressure Coolant Injection System Inoperable due to Inoperable Motor Operated Valve

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)
0 3	2 4	8 9	8 9	0 1 3	0 0	0 4	2 4	8 9	N/A	0 5 0 0 0
									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) (11)			
POWER LEVEL (10)	0 2 5	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	X 50.73(a)(2)(v) D	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(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)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Douglas W. Ellis - Senior Compliance Engineer	AREA CODE 5 0 8 — 7 4 7 - 8 1 6 0

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
D	B J	I 8 4	L 2 0 0	Y					
D	B J	I M O	P 2 9 5	Y					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

On March 24, 1989 at 1815 hours, the High Pressure Coolant Injection (HPCI) System became inoperable during an operability surveillance test. The system became inoperable because a HPCI System turbine steam supply motor operated valve, normally in the closed position, would not open.

The cause for the failure of the valve to open was two loose screws used to adjust the valve's torque switch setting. The loose screws affected the torque setting and consequently caused damage to some of the valve operator internals and the failure of the valve operator motor windings. The valve operator (Limitorque size SMB-1) was repaired and the motor was replaced. The torque switch was set and the screws were torqued to 18 inch-pounds. MOVATS valve testing was performed with acceptable results. Additional corrective actions taken or planned include inspection of other safety-related motor operated valves, installing torque switch limiter plates and revision of applicable valve maintenance procedures. The motor (250 VDC, serial number WM70557) was manufactured by Peerless Electric/H.K. Porter Company Inc.

The HPCI System was returned to operable status on March 28, 1989 at 1535 hours. Technical Specification operability testing of appropriate systems was conducted while the HPCI System was inoperable.

This event occurred during power operation with the reactor mode selector switch in the RUN position. The Reactor Vessel (RV) pressure was 953 psig with the RV water temperature at 541 degrees Fahrenheit. The reactor power level was 25 percent. This report is submitted per 10 CFR 50.73(a)(2)(v)(D). This event posed no threat to the public health and safety.

IE22, 1

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

EVENT DESCRIPTION

On March 24, 1989 at 1815 hours and on April 4, 1989 at 1028 hours, the High Pressure Coolant Injection (HPCI) System was inoperable and separate 7 (seven) day Technical Specification (3.5.C.2) Limiting Conditions for Operation (LCOs) began at those times. The HPCI System was declared inoperable on March 24, 1989 because a motor operated valve (MO-2301-3) would not open during a HPCI System operability test that was conducted from the Control Room Panel C-903. The valve, normally closed, is located in the steam supply piping to the HPCI System turbine. The HPCI System was removed from service on April 4, 1989 for planned MOVATS valve (MO-2301-3) testing performed as part of corrective actions taken for the March 24, 1989 event.

Prior to the event, a (once per 18 month) HPCI System operability test began on March 24, 1989 at 1615 hours. The test was conducted from the system's Alternate Shutdown Panel (ASP) C-158 in accordance with Procedure 8.5.4.6 (Rev. 16), "HPCI Pump and Valve Operability from (the) Alternate Shutdown Panel". After completing the operability test (section 8.2), the system configuration was being restored to normal per procedure step 8.3.1. The licensed operator at the ASP noticed that the CLOSED position indicating light for the valve (MO-2301-3) was not lit. The valve was previously opened at procedure step 8.2.22 (turbine start) and subsequently closed (light lit) at step 8.2.29 (turbine secured from testing). Subsequent licensed operator investigation revealed that the 250 VDC circuit breaker of the valve's motor operator was tripped. The Control Room was notified and acknowledged that a related Control Room Panel C-904R alarm, "MCC-D9 Controller Loss of 125 or 250 VDC", had occurred. After the breaker (D-944) was reset, the valve's position (CLOSED) indicator light was lit. The system configuration was completed without further incident at 1633 hours. No additional valve (MO-2301-3) manipulation was performed at that time because another HPCI System operability test (Procedure 8.5.4.1) was scheduled.

At 1814 hours, the scheduled (quarterly) HPCI System pump operability test began and was conducted from Control Room Panel C-903 in accordance with Procedure 8.5.4.1 (Rev. 32), "[HPCI] System Pump and Valve Monthly/Quarterly Operability." At step 16.a of section 7.3 of the procedure, the control switch for the valve (MO-2301-3) was moved to the OPEN position for a start of the HPCI System turbine. After moving the switch, the Panel C-904R alarm, "MCC-D9 Loss of Control 125 or 250 VDC", occurred and the valve would not open. Because the valve would not open, the HPCI System was declared inoperable. At 1815 hours, LCO compensatory measures began in accordance with Procedure 8.5.4.5 (Rev. 5), "HPCI System Inoperable". Failure and Malfunction Report 89-137 was written to document the event. The NRC Operations Center was notified on March 25, 1989 at 1302 hours when the Control Room was informed that NRC notification was necessary because the HPCI System was inoperable.

This event occurred during power operation with the reactor mode selector switch in the RUN position. The reactor power level was approximately 25 percent. The Reactor Vessel (RV) pressure was approximately 953 psig with the RV water temperature at approximately 541 degrees Fahrenheit.

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

CAUSE

The cause for the event was no specified torque value for the valve's (MO-2301-3) torque switch setting screws, and possible human factors during a recent torque switch adjustment. The torque switch was adjusted on February 23, 1989 (via MR 89-23-23). A torque value for the screws was not specified for the adjustment. Apparently, the torque applied to the screws for the adjustment, although sufficient to prevent the screws from loosening during several subsequent valve operations, was not sufficient to prevent the screws from loosening eventually.

The torque switch functions to control the torque of the actuator for the valve (MO-2301-3) operator during a valve closing operation. The valve position limit switch controls the actuator during a valve opening operation. The torque switch is adjusted by its dial and pointer. After a torque switch setting is selected, the setting is established by tightening the screws that mate the knurled portions of the torque switch dial and pointer.

As found, both of the torque switch screws were loose even though a flat washer was installed with each of the screws. A torque switch limiter plate was not installed. Without the limiter plate, the loose screws prevented proper operation of the torque switch and consequently caused damage to some of the valve operator internals and failure of the valve operator motor windings. Apparently, the valve gate became wedged in the valve seat because of high torque (loose torque switch screws) when the valve was closed from the ASP (Procedure 8.5.4.6 step 8.2.29). After the test was completed, a visual inspection of system components located in the area of the valve (MO-2301-3) revealed no apparent valve or valve operator problem. A visual inspection of the valve operator breaker (D-944) by Electrical Maintenance personnel revealed no apparent breaker problem.

Following the failure of the valve to open from Panel C-903 (Procedure 8.5.4.1), a considerable amount of smoke was observed in the area of the valve. The motor windings were meggered with unsatisfactory results. The motor windings failed when the valve, wedged in the closed position, attempted to open when its control switch was moved to the OPEN position (Procedure 8.5.4.1).

CORRECTIVE ACTION

The torque switch manufacturer (Limitorque Corporation) was contacted regarding the as-found torque switch. Except for the loose screws, the configuration of the torque switch was correct. The flat washers were correct even though the vendor manual incorrectly identified the washers as lockwashers. Because the vendor manual (V-0390) does not specify a torque value(s) for the screws, the manufacturer indicated that a torque value(s) from the Electric Power Research Institute document NP-5067, "Good Bolting Practices", was acceptable. The manufacturer also indicated that a torque switch limiter plate, although recommended, was not necessary for proper torque switch operation when the torque switch screws are adequately torqued.

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The valve (MO-2301-3) operator was rebuilt. The torque switch was set at 2 (two) and the setting screws were torqued to 18 inch-pounds.

The valve (MO-2301-3) operator motor was replaced. The manufacturer of the failed motor was Peerless Electric/H.K. Porter Company Incorporated. Nameplate data for the failed motor includes: 250 VDC, (frame) DS 204, (RPM) 1900, (AMPS) 17, (insulation class) RH, (horsepower) 4.33, 60 foot-pounds, 176-42-0004-0, (serial number) WM70557.

An evaluation was performed with acceptable results regarding possible damage to the valve (10 inch gate type). The maximum stall thrust developed by the motor operator (size SMB-1) is less than the maximum stem thrust that the valve can withstand continuously while in the open or closed position.

The HPCI System was returned to operable status on March 28, 1989 at 1535 hours following satisfactory valve (MO-2301-3) testing conducted from the ASP and a HPCI System operability test (8.5.4.1) conducted from Panel C-903. The torque switch was inspected with satisfactory results after the testing.

The HPCI System was removed from service on April 4, 1989 at 1028 hours for planned MOVATS valve (MO-2301-3) testing. The testing was performed to establish new baseline data for the valve operator. Following acceptable MOVATS testing, a HPCI System operability test (8.5.4.1) was conducted and the system was returned to operable status on April 5, 1989 at 2130 hours.

During the periods that the HPCI System was inoperable, appropriate LCO testing was conducted in accordance with Procedure 8.5.4.5 (Rev. 5), "HPCI System Inoperable". The procedure includes operability testing of the Reactor Core Isolation Cooling (RCIC) System, Automatic Depressurization System (ADS), Core Spray System, and the Low Pressure Core Isolation Cooling (LPCI) mode of the Residual Heat Removal (RHR) System.

Corrective actions being taken or planned include the following:

- Inspection of torque switches for proper setting and adequate torquing of torque switch setting screws for valves installed in safety-related applications. The inspection was based on a 95 percent confidence level sampling plan. The inspection size, initially 40 valves, was increased to 100 percent because the as-found torque for one torque switch screw was less than 12 inch-pounds (acceptance criteria). The screw, one of two, is installed in the torque switch for valve MO-1301-60. The as-found torque for the other screw was acceptable. The valve (MO-1301-60) is located in the RCIC System minimum flow bypass line.

- Identification of applicable motor operated valves for future installation of a torque switch limiter plate. The limiter plate(s) will be installed as part of the valve preventive maintenance program.

- Revision of applicable valve maintenance procedures relative to torque values for torque switch screws.

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- Revision of the Vendor Manual (V-0390) to correctly identify part number 39 as flat washers instead of lockwashers for Limitorque (operator size SMB-00 through SMB-5) double torque switches.

SAFETY CONSEQUENCES

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

The LCO testing performed while the HPCI System was inoperable included operability testing of the RCIC System, ADS, Core Spray System, and the RHR System/LPCI mode.

This report is submitted in accordance with 10 CFR 50.73(a)(2)(v)(D) because the HPCI System was inoperable.

SIMILARITY TO PREVIOUS EVENTS

A review was conducted of Pilgrim Station Licensee Event Reports (LERs) submitted since January, 1984. The review was focused to LERs submitted in accordance with 10 CFR 50.73(a)(2)(v) involving the HPCI System.

The review identified events reported in LERs 50-293/85-008-00, 85-012-02, 85-013-00, 85-023-00, and 85-029-00.

For LER 85-008-00, the HPCI System became inoperable on March 31, 1985 during an operability test. During the test (Procedure 8.5.4.1), a HPCI System turbine overspeed trip occurred. The cause for the overspeed trip was attributed to a faulty connector in the HPCI System turbine control system.

For LER 85-012-02, the HPCI System became inoperable on the following dates:

- On May 18, 1985 during an operability (quick start) test (8.5.4.1), the HPCI System turbine tripped and restarted. The cause was attributed to the transient effects of the test.

- On May 23, 1985 during an operability (quick start) test (8.5.4.1), the HPCI System/Primary Containment System (PCS) isolation valves (MO-2301-4 and -5) closed automatically due to a high (steam) flow isolation signal. The valves are located in the steam supply piping to the HPCI System turbine. The cause was attributed to air induced into a high (steam) flow switch during a calibration (on May 20, 1985) combined with the effects of the test.

- On June 6, 1985 during surveillance testing, the HPCI System/PCS isolation valves (MO-2301-4 and -5) closed automatically due to a high (steam) flow isolation signal. The cause was attributed to the improper installation (on June 3, 1985) of some monitoring instrumentation that caused binding of the HPCI System turbine control valve linkage. The instrumentation was improperly installed because of inadequate (utility) administrative controls for the work performed by non-licensed contractor personnel.

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For LER 85-013-00, the HPCI System became inoperable on May 29, 1985 because of an automatic actuation of the HPCI System portion of the Primary Containment Isolation Control System. The actuation resulted in the closing of the HPCI System/PCS isolation valves (MO-2301-4 and -5). The cause for the actuation was attributed to a false high (steam) flow isolation signal from a high steam flow switch (flow sensor).

For LER 85-023-00, the HPCI System became inoperable on August 27, 1985 during an operability test. During the test (Procedure 8.5.4.1), the HPCI System turbine control valve did not operate properly. Investigation revealed a leaking nipple in the oil supply line to the (hydraulic) control valve. The cause for the leaking nipple was attributed to unidentifiable personnel inadvertently stepping on the oil supply line.

For LER 85-029-00, a HPCI System inverter circuit failure (trip) alarm occurred on October 18, 1985 and was reset approximately 60 seconds later. The inverter trip affected the operability of the HPCI System flow controller that functions to automatically control the speed of the HPCI System turbine. The manual controls for the turbine were operable at the time of the event. The cause for the inverter trip was attributed to a possible fluctuation of the inverter's 125 VDC input voltage.

ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) CODES

The EIIS codes for this report are as follows:

COMPONENTS	CODES
Alarm, Power	JA
Circuit Breaker, DC (D-944)	72
Motor (MO-2301-3)	MO
Operating Mechanism (Motor Operator)	84
Valve (MO-2301-3)	V
Valve, Electrically Operated (MO-2301-3)	20
Valve, Shutoff (MO-2301-3)	SHV

SYSTEMS	
DC Power System - Class 1E (250 VDC)	EJ
High Pressure Coolant Injection System	BJ
Panels System (C-158 and C-903)	JL

10 CFR 50.73

BOSTON EDISON
Pilgrim Nuclear Power Station
Rocky Hill Road
Plymouth, Massachusetts 02360

Ralph G. Bird
Senior Vice President — Nuclear

April 24 , 1989
BECo Ltr. 89-062

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

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

Dear Sir:

The attached Licensee Event Report (LER) 89-013-00, "High Pressure Coolant Injection System Inoperable due to Inoperable Motor Operated Valve" 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.

for R. G. Bird

DWE/bjh

Enclosure: LER 89-013-00

cc: Mr. William Russell
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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