

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-293/85-20  
Licensee: Boston Edison Company  
800 Boylston Street  
Boston, Massachusetts 02199  
Facility: Pilgrim Nuclear Power Station  
Location: Plymouth, Massachusetts  
Dates: July 16, 1985 - August 19, 1985

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9/12/85  
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Inspection Summary: Inspection No. 50-293/85-20 on July 16 - August 19, 1985

Areas Inspected: Routine unannounced safety inspection of plant operations, including: followup on previous inspection findings, NRC Circulars, and Inspection Instructions; operational safety verification; followup on events and nonroutine reports; surveillance testing; maintenance and modification activities; TMI task action item followup; and health physics activities. The inspection involved 132.5 inspection-hours by a resident inspector, project engineer, and a reactor engineer.

Results: One violation was identified (Failure to maintain trip level settings for two main steam line high radiation monitors consistent with Technical Specification limits, detail 3). A concern regarding the adequacy of the licensee's method of taking safety related equipment out of service for testing and calibration is also discussed in detail 3.

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## DETAILS

### 1. Persons Contacted

Within this report period, interviews and discussions were conducted with members of the licensee and contractor staff and management to obtain the necessary information pertinent to the subjects to be inspected.

### 2. Followup on Previous Inspection Findings, NRC Circulars, and Inspection Instructions

(Closed) Unresolved Item (85-11-04). Review acceptability of high pressure coolant injection (HPCI) manual injection procedure. The licensee stated that the acceptability of opening both motor operated injection valves prior to starting the HPCI turbine during a manual injection had been discussed with General Electric Co. representatives. This method leaves a single untested discharge check valve to protect low pressure HPCI suction piping from overpressurization. The General Electric manual for the HPCI system does not specify when the discharge valves should be opened during manual HPCI injection. The HPCI discharge check valve failed to seat properly and caused an inadvertent overpressurization incident at Pilgrim in 1983. The licensee stated at the exit interview that the procedure would be changed to require that the HPCI turbine be started at the same time that the motor operated discharge valves were opened. The General Electric representative concurred with the change. This item is closed.

(Closed) Violation (85-01-02). Failure to maintain control room staffing consistent with 10 CFR 50.54. In a response letter dated August 7, 1985, the licensee indicated that several corrective actions had been implemented to ensure that the requirements of 10 CFR 50.54 were met. Since that time, the inspector has noted that a senior licensed operator has been present in the control room at all times and that a second licensed individual has been at the reactor controls at all times. The licensee no longer considers the control room bathroom to be part of the control room. This item is closed.

(Closed) Violation (85-01-04). Failure to conduct a compensatory surveillance test when the low pressure coolant injection system was inoperable. The licensee response letter, dated March 22, 1985, indicated that the control room staff was instructed to be more aware of required surveillance tests. No additional compensatory surveillance tests have been missed since that time. Administrative assistants currently assist the control room operators in ensuring that surveillance tests are completed in a timely manner. The inspector had no further questions. This item is closed.

(Closed) Follow Item (80-CI-07). Problems with HPCI Turbine Oil System. The licensee responded by BECo Letter 85-127, dated July 10, 1985, to the concerns raised in NRC Inspection Report 50-293/85-12. The licensee committed to performing local qualitative tests for water in each HPCI oil sample as it is drawn. The method, accuracy, conclusiveness, and implementation of these tests will be reviewed in a future inspection. This item is closed.

(Closed) Follow Item (Temporary Instruction 2515/67). Survey of licensee's response to selected safety issues. The licensee's actions to prevent mispositioning a control rod were reviewed during inspection 50-293/85-17. The results of the inspection were sent to Region I on July 1, 1985. Licensee procedures required that written instructions be used for scheduled control rod movements. Licensee procedures also contained guidelines for bypassing the rod worth minimizer, use of scram timing equipment, and use of the "emergency-in" mode of rod insertion and notch override switch in continuous rod withdrawal. All licensed operators and senior operators reviewed INPO SOER 84-02 which discusses mispositioned control rod events during requalification training in 1984. This temporary instruction is closed.

### 3. Operational Safety Verification

#### a. Scope and Acceptance Criteria

The inspector observed control room operations, reviewed selected logs and records, and held discussions with control room operators. The inspector reviewed the operability of safety-related and radiation monitoring systems. Tours of the reactor building, turbine building, intake structure, station yard, switchgear rooms, battery rooms, and control room were conducted.

Observations included a review of equipment condition, security, house-keeping, radiological controls, and equipment control (tagging).

These reviews were performed in order to verify conformance with the facility Technical Specifications and the licensee's procedures.

#### b. Findings

- (1) On July 15, 1985, the A0-N-90 secondary containment ventilation damper would not completely close during a routine surveillance test. The failed damper was not reported to the control room until the next morning. As a result, secondary containment integrity was not maintained for approximately 19 hours. This incident was reviewed during a special NRC inspection, 50-293/85-21.
- (2) On July 16, 1985, the A0-N-82 and 83 secondary containment dampers failed to completely close during a routine surveillance test. These dampers are mounted in series in the supply duct for the re-fuel floor. The dampers were manually closed and control switches for the dampers tagged closed. The licensee notified the NRC of the inoperable dampers at 4:30 pm via the ENS telephone line. A Licensee Event Report, LER no. 85-019, was subsequently submitted on the incident.

The damper problem was attributed to worn and misaligned damper drive gears. The gears were repaired and the dampers returned to service later that day. Previous incidents involving multiple in series damper failures occurred on March 16, 1985 and April 12, 1985.

The licensee subsequently demonstrated that secondary containment was maintained during a secondary containment leakage test on September 1, 1985. The inspector had no further questions at this time.

- (3) On July 23, 1985, the plant staff corrected an improper hydrogen/oxygen burn problem in the Auxiliary Off Gas (AOG) system. Apparently, the improper burn resulted from the July 21, 1985 repair of the steam pressure regulator to the AOG steam jet compressor. During the repair, the AOG trains were bypassed. Following the repair, when the AOG system was returned to service, abnormal AOG operation was observed, including no temperature difference across the B recombiner and an abnormally high inlet temperature to the steam jet air ejector (SJAЕ) after condenser. The plant staff discussed the event with the FitzPatrick Station staff and found that the event's description matched the event FitzPatrick had experienced with a hydrogen/oxygen burn upstream of the recombiner. The plant staff utilized the corrective actions taken at FitzPatrick of reducing power and placing a second secondary steam jet into service. After ten minutes, the second jet was secured and AOG parameters returned to normal values.

The inspector reviewed the event with the Chief Operating Engineer and reviewed Internal Report (IR) 85-004 from the plant Operating Experience Review Program. The plant is reviewing operating procedure and operator training changes to properly cover the event.

- (4) On July 23, 1985 at 11:45 a.m., the recirculation flow unexpectedly increased in both recirculation loops. Reactor pressure increased to 1042 psig from a normal pressure of approximately 1035 psig during the transient. A turbine bypass valve opened. The licensee subsequently installed recorders on the "B" loop jet pump flow instruments and on the recirculation pump motor generator set to help determine the cause of the "B" loop instability. The "A" loop instabilities have been previously characterized as a bistable vortex phenomena related to the recirculation piping changes made during the 1984 outage. Since July 23, 1985, flow instabilities in the "B" recirculation loop have been studied and also tentatively characterized as bistable vortex-related. The licensee's evaluation is continuing. The inspector had no further questions at this time. The stability of recirculation loop flows will be reviewed during routine inspections of control room activities.
- (5) On July 23, 1985, the licensee was notified by a contractor testing laboratory that water had been detected in a fuel oil sample from the "A" fuel oil storage tank. The control room was not informed

that the fuel oil quality did not meet the requirements of the technical specifications until July 26, 1985. This incident was reviewed further during an NRC special inspection 50-293/85-21.

- (6) On July 30, 1985, the licensee declared a core spray motor operated injection valve, MO-1400-25B, inoperable because the valve would not stroke fully open. A Limitorque motor operator stem nut was subsequently replaced. The stem nut in the motor operator was examined and found to be machined differently than a previously installed stem nut. The previous stem nut had been counter bored on the bottom, which allowed the valve stem assembly to rise into the stem nut as the valve was opened. The lack of counter boring in the current stem nut limited valve stem travel to about sixty percent of the full stroke distance. The licensee's engineering group determined that the injection valve was still operable despite the restricted valve stem travel.

The current stem nut was installed recently during environmental qualification work on the motor operator. The licensee's QA group is investigating the incident to determine why a different design stem nut was installed. The investigation was ongoing at the end of the inspection period. The conclusions and corrective actions will be reviewed during a future inspection (85-20-01).

- (7) On August 12, 1985 at 4:15 p.m., the inspector questioned control room personnel about the "B" main steam line radiation monitor. The output from the monitor had decreased several days earlier (Attachment A) and the monitor had failed a daily check that morning. The main steam line radiation monitors supply trip signals to the reactor protection (RPS) and primary containment isolation (PCIS) systems.

The monitor was not declared inoperable after it failed its daily check. Instead, the I&C group was notified and an "A" priority maintenance request was processed to calibrate the monitor. Neither the I&C nor the Operations group recognized that the monitor had drifted far enough downscale so that the monitor's high level trip set point was beyond the technical specification limit. The Watch Engineer on duty at the time of the failed daily check stated that he discussed the monitor problem with his supervisor and was prepared to trip the appropriate RPS logics if the monitor had been declared inoperable.

The "B" main steam line radiation monitor was subsequently calibrated and returned to service later in the day on August 12, 1985.

During followup discussions on August 13, 1985, the inspector noted that the "C" main steam line radiation monitor had also drifted low (Attachment A), so that its setpoint was beyond the technical

specification limit. The licensee promptly adjusted the "C" monitor trip setpoint downward to a value consistent with the technical specification requirements.

Technical Specification Tables 3.1 and 3.2.A require that the high level radiation trip setpoints for the main steam line radiation monitors be maintained less than or equal to seven times the normal full power background level. Failure to maintain the "B" and "C" monitor setpoints less than or equal to seven times full power background levels for the time periods indicated in Attachment A is a violation of these technical specifications tables (85-20-02).

The licensee was previously cited for failing to maintain the main steam line radiation monitor trip set points below technical specification limits in 1980 (NRC Inspection 50-293/80-29).

The inspector observed that the "B" monitor was left partially disconnected and unable to trip for at least a half hour during the afternoon of August 12, 1985. Instrument and Controls technicians had been working on the monitor and had left the control room to locate replacement parts. Disconnecting the monitor left the RPS and PCIS systems with less than the minimum number of operable instrument channels per trip system required by Technical Specification Tables 3.1.1 and 3.2.A.

The inspector expressed concern about the length of time the "B" monitor had been disconnected. The licensee responded by ordering the I&C technicians back to the control room to complete the monitor calibration. Within 20 minutes, the monitor was returned to service.

The "B" monitor was inoperable for about six hours between the time the monitor failed its daily check and the time the calibration was completed. The appropriate RPS and PCIS trip systems were not tripped during this period. The monitor calibration lasted about two hours.

At the exit meeting, the licensee stated that there was no formal time limit for keeping safety related RPS and PCIS equipment out of service during testing and calibration.

Technical Specification Tables 3.1.1 and 3.2.A require that the RPS and PCIS trip systems be either operable or tripped. In addition, FSAR safety design basis 7.b for the RPS indicates that the RPS channels shall be single failure proof during any intentional test or calibration. The FSAR safety evaluation, section 7.2.4, also states that any intentional test or calibration shall cause an RPS trip system to trip. The licensee indicated that the matter would be reviewed. The acceptability of the licensee's method of taking safety related equipment out of service is unresolved, pending further review of the licensee's test program (85-20-03).

- (8) On August 12, 1985, the "B" salt service water pump was declared inoperable after failing to deliver adequate discharge pressure during a surveillance test, procedure no. 8.5.3.2. The pump intake was subsequently found to be partially clogged with a rag. The pump was returned to service later that day. No other salt service water pump was out of service at this time.

On August 13, 1985, the "A" salt service water pump also failed to deliver adequate discharge pressure during a surveillance test and was declared inoperable. A plastic bottle was subsequently found blocking the intake to this pump. Since the "C" salt service water pump was concurrently out of service for preventative maintenance, the licensee declared the "A" loop of the containment cooling subsystem inoperable and initiated compensatory surveillance testing. An hour later, the "C" salt service water pump was returned to service and containment cooling loop declared operable. On August 15, 1985, the "A" salt service water pump was returned to service.

The licensee subsequently removed several small pieces of floating debris from the salt service water bays in the intake structure, including: rope, rags, pieces of wood, and intact light bulbs. The licensee stated that divers would look for underwater debris in the bays when the plant cooling load had sufficiently decreased so that the pumps on one of the two bays could be shut down for the inspection.

The inspector expressed concern that additional debris in the salt service water bays might partially block the pump suction undetected. While salt service water pump surveillance tests had been conducted frequently due to recent preventative maintenance on the pumps, the surveillance interval in the technical specifications for the pump tests is three months. The licensee stated that until divers have verified that no further debris is present in the salt service water bays, the plant operators would record discharge pressures for the individual pumps on the shift tour sheets. These pressures will be reviewed by the control room staff for evidence of pump blockage. The inspector verified that the tour sheet was suitably modified and had no further questions at this time.

#### 4. Followup on Events and Nonroutine Reports

##### a. Events

On August 2, 1985, the inspector was notified that a degraded vital area barrier had been identified. A regional Physical Security Specialist subsequently reviewed this incident during NRC Special Inspection No. 50-293/85-24.



b. Review of Licensee Event Reports (LERs)

Licensee Event Reports submitted to the NRC Region I office were reviewed to verify that the details were clearly reported and that corrective actions were adequate. The inspector also determined whether generic implications were involved and if on site followup was warranted. The following reports were reviewed:

<u>No.</u>	<u>Subject</u>
85-15	Secondary Containment Isolation
85-16	Missed Reactor Building Vent Particulate Gross Radioactivity Analysis
85-17	Secondary Containment Isolation
85-18	Failure to meet Technical Specification Requirements for an Inoperable Secondary Containment Damper
85-19	Secondary Containment Dampers Inoperable

The secondary containment isolations described in LERs 85-15 and 85-17 were reviewed during NRC inspection 50-293/85-17. The failure to meet technical specification requirements described in LER 85-18 was reviewed during special NRC inspection 50-293/85-21. The inoperable secondary containment dampers described in LER 85-19 is discussed in Detail 3 of this report.

No inadequacies in the LERs were identified. The inspector had no further questions at this time.

5. Surveillance Testing

a. Scope

The inspector reviewed the licensee's actions associated with surveillance testing in order to verify that the testing was performed in accordance with approved station procedures and the facility Technical Specifications.

A list of the items reviewed is included in Attachment "B" to this report.

b. Findings

On August 18, 1985, the inspector noted that the total discharge head pressures at shutoff had been incorrectly calculated during surveillance tests of the salt service water pumps, Procedure No. 8.5.3.2. On August 5, 7, and 15, 1985, arithmetic errors were apparently made by the Operations Department staff in calculating pump discharge heads during the tests.

The calculated head pressure values were two to five feet of water pressure less than the correct values. This made the test results overly conservative.

In response to this item, the licensee immediately instituted independent verifications of all calculations done by the Operations Department staff during surveillance tests. The documentation for the August tests were also corrected. The licensee is planning to write a computer program to calculate surveillance tests in the future.

The inspector verified that subsequent salt service water surveillance test calculations were independently verified. The inspector had no further questions. The adequacy of licensee surveillance test calculations will be reviewed during future routine inspections.

#### 6. Maintenance and Modification Activities

The inspector reviewed the licensee's actions associated with maintenance and modification activities in order to verify that they were conducted in accordance with station procedures and the facility Technical Specifications. The inspector verified for selected items that the activity was properly authorized and that appropriate radiological controls, equipment tagging, and fire protection were being implemented.

A list of the items reviewed is included in Attachment "B" to this report. No inadequacies were identified.

#### 7. TMI Task Action Item Followup

A review was made of the current status of selected TMI Task Action Items (NUREG-0737). A list of the items examined during the review is included in Attachment "C" to this report. The following was noted during this review:

- II.K.3.15, Isolation of HPCI and RCIC. To resolve the potential problem of spurious isolation of HPCI and RCIC during initiation, the licensee has implemented the BWR Owners Group recommended and NRC approved modification of a time delay in the steam break detection logic. The inspector reviewed the applicable HPCI and RCIC surveillance tests to verify that the proper functioning of the time delay is routinely checked. Specifically, procedure 8.M.2-2.5.1, HPCI Steam Line High Flow Isolation, checks that relay 23A-K9 actuates 3 to 5 seconds after initiation, and procedure 8.M.2-2.6.1, RCIC Steam Line High Flow Isolation, checks that relay 13A-K7 actuates 3 to 5 seconds after initiation. Both tests are performed on a quarterly frequency. The inspector had no further questions. No inadequacies were identified.
- Item II.K.3.22, automatic switchover of RCIC suction. The licensee has received permission from the NRC to maintain a manual switchover of the RCIC suction from the condensate storage tank (CST) to the torus. Item II.K.3.22 requires that clear and cogent procedures exist for the manual

switchover. The licensee's RCIC procedure, No. 2.2.22, states that the torus is a backup supply of water for the RCIC system. However, the procedure does not give clear instructions for the switchover. The licensee indicated that the switchover only involved opening two torus suction valves from the control room (the CST suction valves automatically close when the torus suction valves open). The licensee agreed to add specific instructions for the switchover to the RCIC procedure. The inspector had no further questions.

#### 8. Health Physics Activities

- a. On July 29, 1985, the inspector met with the licensee Project Manager for the Radiological Improvement Program (RIP) to discuss the status of RIP milestones due in July. The manager indicated that all July milestones would be completed on time, with the possible exception of milestone number 14.1.

This milestone required that a program be instituted to follow up on corrective actions to ensure that the actions are effective. The licensee indicated that a program implementing this milestone would be in place shortly, but might not make the RIP deadline (July 31, 1985).

During discussions with the licensee, the inspector expressed concern that the licensee's planned program would only identify repetitive problems, e.g., repeated examples of poor frisking. Corrective actions for single major events, e.g., the presence of highly radioactive chips in the control rod drive room last year, would not be reviewed under the proposed program.

The followup program was subsequently modified to include followup on corrective actions for major events. The acceptability of the modified program was reviewed during NRC specialist inspection no. 50-293/85-22. The inspector had no further questions.

- b. On August 8, 1985, the licensee notified the resident inspector that an unmonitored airborne radioactivity release path from a process building to the environment had been identified. The station's hot (radioactively contaminated) machine shop ventilation system had been found to discharge into a normally nonradioactive ventilation system. The nonradioactive ventilation system is not monitored for radioactivity and discharges directly to the environment. The licensee stated that the ventilation duct in the hot machine shop was promptly sealed shut with plastic and tape and a survey made of the nonradioactive ventilation system.

This incident was subsequently reviewed during NRC inspection 50-293/85-22.

- c. The following information is included in this report to assist NRC management in following radiation exposure at the station. The monthly personnel radiation exposure for July, 1985 was 89.6 person-rems. The total yearly exposure through August 3, 1985 was 511.7 person-rems.

9. Management Meetings

During the inspection, licensee management was periodically notified of the preliminary findings by the resident inspector. A summary was also provided at the conclusion of the inspection and prior to report issuance. No written material was provided to the licensee during this inspection.

ATTACHMENT "A" TO INSPECTION REPORT 50-293/85-20

The following full power background main steam line (MSL) radiation levels were logged by licensee chemistry personnel:

MSL MONITOR "B"

<u>Date</u>	<u>Full Power Background</u>	<u>7 Times Background</u>	<u>Actual Trip Set Point</u>	<u>Comment</u>
8/8/85	700 mR/hr	4,900 mR/hr	3,000 mR/hr	The "B" monitor was calibrated on 8/8 and the trip set point increased.
8/9/85	675	4,725	3,600	
*8/10/85	450	3,150	3,600	
*8/11/85	480	3,360	3,600	
*8/12/85	420	2,940	3,600	The "B" monitor was calibrated between the 8/12 and 8/13 readings.
8/13/85	760	5,320	3,600	

MSL MONITOR "C"

<u>Date</u>	<u>Full Power Background</u>	<u>7 Times Background</u>	<u>Actual Trip Set Point</u>	<u>Comment</u>
8/8/85	775 mR/hr	5,425 mR/hr	3,700 mR/hr	The "C" monitor was calibrated on 8/8 and the trip set point increased.
*8/9/85	500	3,500	5,100	
*8/10/85	500	3,500	5,100	
*8/11/85	490	3,430	5,100	
*8/12/85	500	3,500	5,100	
*8/13/85	500	3,500	5,100	The "C" monitor was calibrated between the 8/13 and 8/14 readings, and the trip set point lowered.
8/14/85	720	5,040	5,000	

\*The "B" or "C" MSL monitor trip set points did not meet the limits in Technical Specification Tables 3.1.1 and 3.2.A on these days.

ATTACHMENT "B" TO INSPECTION REPORT 50-293/85-20

The following surveillance and maintenance items were reviewed during the report period.

Portions of the following tests were reviewed:

- Salt service water pump surveillance tests during July and August, 1985
- Inservice testing data for the "B" salt service water pump on August 13, 1985
- Main steam line radiation monitor calibrations on August 8, 12, and 13, 1985. The inspector observed a portion of the calibration on August 12, 1985.
- Core spray valve operability tests on July 26 and 30, 1985
- ADS logic tests for other than shutdown between August 19 and 23, 1985.

Portions of the following maintenance and modification activities were reviewed:

- MR 85-481, "A" salt service water pump high vibration and low discharge
- MR 85-483, "A" salt service water pump pulled and rebuilt
- MR 85-485, "B" salt service water pump, low discharge pressure
- MR 85-488, "A" salt service water pump, insufficient head
- MR 85-479, Repair backdraft damper
- MR 85-489, Damaged gear on A0-N-80 secondary containment damper
- MR 85-490, "B" salt service water pump discharge pressure in alert range
- The inspector observed modification work associated with environmental qualification of electrical components. Specifically, the motor operator on the HPCI downstream suction valve, MO-2301-35, was being modified with an environmentally qualified motor (under Plant Design Change (PDC) 84-16G and MR 85-23-7) and with replacement components for the operator (under PDC 84-60 and MR 84-23-95). The inspector reviewed the work instructions and inspected the work in progress.

ATTACHMENT "C" TO INSPECTION REPORT 50-293/85-20

The status of the following TMI Task Action Items was reviewed during the inspection:

<u>Item</u>	<u>Subject</u>
1.A.1.1.1	Shift Technical Advisor on duty
1.A.1.2	Shift Supervisor Administrative duties
1.C.2	Implement shift turnover checklist
1.C.3	Define Shift Supervisor's responsibility
1.C.4	Limit access to the control room
II.B.2	Plant shielding modifications
II.E.4.2.4	Containment isolation reset modification
II.K.1	I.E. Bulletin 79-08
II.K.3.15	Isolation of HPCI and RCIC modifications
II.K.3.16	Reduction of challenges and failures of relief valves
II.K.3.22	Automatic switchover of RCIC system suction
II.K.3.25	Loss of offsite power effect on recirculation pump seals