

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-293/90-01

Docket No. 50-293

License No. DPR-35

Licensee: Boston Edison Company
RFD #1 Rocky Hill Road
Plymouth, Massachusetts 02360

Facility Name: Pilgrim Nuclear Power Station

Inspection At: Plymouth, Massachusetts

Inspection Conducted: January 8-12 and January 22-26, 1990

Inspector:

Jason C. Jang
Jason C. Jang, Senior Radiation Specialist,
Effluents Radiation Protection Section

2-7-90
date

Approved by:

Robert J. Bores
Robert J. Bores, Chief, Effluents Radiation
Protection Section, Division of Radiation
Safety and Safeguards

2-8-90
date

Inspection Summary: Inspection on January 8-12 and January 22-26, 1990
(Inspection Report No. 50-293/90-01)

Areas Inspected: Routine, announced inspection of the licensee's radiological environmental monitoring program and liquid and gaseous effluent control program for operations including: management controls; quality control program for analytical measurements; effluent/process monitor calibrations; meteorological monitoring program; and implementation of the above programs.

Results: Within the areas inspected, no violations were identified. However, the unresolved item (293/89-10-02) was categorized as a non-cited violation. Response to the non-cited violation is not required (See Section 5.3 of this inspection report). The licensee was implementing the above programs effectively and is moving aggressively in the right direction.

DETAILS

1.0 Individuals Contacted

1.1 Licensee Personnel

- ***R. Anderson, Plant Manager
- *R. Cannon, Compliance Division Manager (Acting)
- **E. Cobb, I&C Division Manager
- *N. DiMascio, Radiological Section Manager
- **B. Eldredge, Radiological Assessor
- C. Goddard, Chemistry Division Manager
- **P. Hamilton, Compliance Division Manager
- ***K. Highfill, Station Director
- **J. Kelly, Compliance Engineer
- ***D. Long, Plant Support Department Manager
- **L. Loomis, Sr. Chemistry Engineer
- *B. Lunn, Sr. Compliance Engineer
- *J. McClellan, Sr. QA Engineer
- **D. McCloskey, Radwaste and Chemistry Section Manager
- ***B. McDonald, Radiological Technical Support Division Manager
- **J. Poorbaugh, Sr. QA Engineer
- ***K. Sejkora, Sr. Radiation Environmental Engineer
- **G. Stubbs, Maintenance Section Manager
- ***R. Swanson, Regulatory Affairs Department Manager
- ***L. Whittenberger, Radiological Section Deputy Manager
- **A. Williams, Radwaste Division Manager

1.2 NRC Personnel

- *R. Bores, Chief, Effluents Radiation Protection Section, DRSS
- *C. Carpenter, Resident Inspector
- **H. Eichenholz, Sr. Resident Inspector (Acting)

*Denotes those individuals present at the exit interview on January 12, 1990.

**Denotes those individuals present at the exit interview on January 26, 1990.

***Denotes those individuals present at both exit interviews.

Other licensee personnel were contacted or interviewed during this inspection.

2.0 Purpose

The purpose of this inspection was to review the licensee's ability to control and quantify radioactive liquids, gases, and particulates, and to conduct the radiological environmental monitoring program during normal and emergency operations.

3.0 Previously Identified Items

(Closed) Inspector Followup Item (50-293/87-35-03): Upgrading the main meteorological tower strip charts in the control room. The licensee installed new strip charts and these charts were operational at the time of the inspection. This item is closed.

(Closed) Inspector Followup Item (50-293/88-15-01): Minimize background radiation level for the liquid effluent monitor. The licensee improved the shielding to reduce background reading of the monitor from 4,000 counts per second (CPS) to 400 CPS. This item is closed.

(Closed) Inspector Followup Item (50-293/88-15-02): Update Sections 9.2 and 9.3 of the FSAR based on the Safety Evaluations. The inspector reviewed the licensee's corrective actions and verified the updated sections of the FSAR. This item is closed.

(Closed) Inspector Followup Item (50-293/88-29-01): Erosion control of contaminated soil in the contractor parking lot. The inspector verified the licensee's corrective actions as described in the licensee's response letter dated November 1, 1988. This item is closed.

(Closed) Violation (50-293/88-35-02): Radwaste operations conducted in Process Building Trucklock without Safety Evaluation. The licensee's corrective actions, including procedures and safety evaluation, were reviewed and corrective actions were adequate. The inspector took a tour of the area as part of the verification of the corrective actions. This item is closed.

(Closed) Unresolved Item (50-293/88-37-01): Further review of the licensee's Radioactive Effluents Technical Specification implementing procedures. The inspector reviewed selected implementing procedures to evaluate their adequacy to meet the Technical Specification requirements. The reviewed procedures were adequate to implement those requirements. (See Section 5.3 of this inspection report for details). This item is closed.

(Closed) Unresolved Item (50-293/89-10-02): Review of administrative control of radioactive liquid discharges, including adequacy of procedures and the qualification of chemistry computer code. The inspector reviewed the licensee's liquid effluent program and found it satisfactory (See Section 5.3 of this inspection report for details). This item is closed.

4.0 Audits

The inspector reviewed the following audits of the Radiological Environmental Monitoring Program and Radioactive Effluent Control Program, including the contractor laboratory, with respect to Technical Specification requirements.

- o QAD Audit #87-31, June 12-23, 1987

- o QAD Audit #88-52 November 28-December 9, 1988
- o QAD Audit #89-51 November 17-December 22, 1989
- o QAD Audit #88-19, Contractor laboratory, May 12-13, 1988
- o QAD Audit #89-36, April 24, 1989
- o Contractor Laboratory Audits for 1988 and 1989 by Laboratory Quality Control Audit Committee

Audits available appeared to cover the stated objectives and were thorough. The inspector also noted that the audit findings and recommendations were excellent. Audit thoroughness and technical depth were noteworthy. The licensee's followup to identified items was prompt and thorough. The audit responses submitted to the licensee by the contractor laboratory were also very good. No violations were identified in this area.

5.0 Liquid and Gaseous Effluent Controls

5.1 Program Changes

Since the previous inspection in this area (October 1987) there have been changes in the licensee's organization for administering programs to control liquid and gaseous effluents and radwaste. The inspector reviewed the licensee's new organization (reorganized in March 1989) to determine its adequacy. The Radwaste and Chemistry Section Manager/Deputy Manager supervises three divisions: Radwaste, Chemistry, and Program Services. This Section Manager reports to the Station Director through the Plant Manager. The Radwaste Division Manager is responsible for liquid effluent operations and solid radwaste, including shipping. The Chemistry Division Manager is responsible for plant chemistry, radiochemistry, and counting equipment. The Program Services Division Manager is responsible for the radwaste system, mechanics, and special projects for the radwaste operations.

The inspector determined that the reorganization did not reduce or change the responsibility for the radioactive effluents control and radwaste programs. The reorganization appears to enhance the ability to conduct the above programs. Management staff of the Radwaste and Chemistry Section appeared to be well qualified to conduct these programs effectively.

5.2 Review of Semi-annual Radioactive Effluent Reports

The inspector reviewed the semiannual radioactive effluent release reports for 1987, 1988, and the first half of 1989. These reports provided total released radioactivity for liquid and gaseous effluents, including projected radiation exposures to the public. No violations were identified in this area.

5.3 Liquid Effluent Controls

The inspector reviewed the following licensee procedures and liquid discharge permits to determine the adequacy of implementation of Section 3/4.8.A, "Liquid Effluents Concentration", of the Technical Specifications and of the Offsite Dose Calculation Manual (ODCM).

- o Procedure 7.9.2, "Liquid Radioactive Waste Discharge", Rev. 29, October 27, 1989
- o Procedure 7.3.38, "Radwaste Discharge Monitor Response during Batch Discharge (CH-62A)"
- o Procedure 1.8, "Master Surveillance Tracking Program", Rev. 10, May 31, 1989
- o Procedure 1.3.7.1, "Administration of the Radioactive Effluent Technical Specifications", Rev. 0, December 20, 1988
- o Procedure 6.2-055, "Radioactive Effluent Dose Assessments" Rev. 0, December 20, 1988

The inspector reviewed the licensee's corrective actions for the unresolved item (293/89-10-02) as part of this routine inspection. On August 30, 1989, a liquid discharge was released from a miscellaneous tank when the dose assessment for the release was well in excess of Technical Specification limits due to a computer code error. It is suspected that a computer code error in the Chemistry Division (loss of the exponential term) was responsible for this erroneous dose assessment. The actual release, however, was well within the Technical Specification limits. The licensee's root cause analyses and corrective actions were reviewed by the resident inspector during the previous inspection (See Inspection Report No. 50-293/89-10 for details). The results of root cause analyses performed by the licensee were: (1) error of the Chemistry Division computer code, (2) failure to follow procedures, (3) poor communication practices, and (4) human factor deficiencies within the procedure.

The inspector reviewed the above procedures to evaluate the implementation of the corrective actions and to evaluate the administration of the radioactive liquid releases. The inspector observed the simulated radioactive liquid effluent release process performed by the Chemistry Division and the Radiological Technical Support Division. The licensee followed appropriate procedures for the release, including manual calculation of the amount of radioactivity released, performed by the Chemistry Division and dose assessment performed by the Radiological Technical Support Division. Based on the procedure review and the release performance observation, the inspector determined that the implementation of the corrective actions was good.

Technical Specification 6.8.A requires that written procedures and administrative policies be established and implemented that meet or exceed the requirements of Section 5.1 of ANSI N18.7-1972. ANSI N18.7-1972, Section 5.1, "Rules of Practice," states that rules and instructions pertaining to personnel conduct and control and method of conducting operations shall be established. Section 5.1.2 of ANSI N18.7-1972 states that procedures shall be followed. The licensee's Procedure 7.9.2, "Liquid Radioactive Waste Discharge", requires, in part, that the total quantity of radioactivity to be released and the projected dose commitment calculation for each release be reviewed by Chemistry Supervision. Chemistry Supervision failed to identify that the total quantity of radioactivity of the release as identified on the discharge permit was four to eight orders of magnitude higher than expected and failed to halt the liquid discharge even though the projected doses would have far exceeded Technical Specification limits. Failure to follow Procedure 7.9.2 to provide an adequate review process during the event on August 30, 1989 is an apparent violation of Section 6.8.A of the Technical Specifications.

However, failure to follow radioactive liquid release Procedure 7.9.2 during the event is considered a licensee identified violation in that (1) it was identified by the licensee; (2) it fits into Severity Level IV or V; (3) it was not reportable; (4) the licensee took aggressive actions to correct the deficiency and to prevent future recurrence; and (5) this was the first occurrence of this type of event. Consequently, no notice of violation will be issued and this issue is considered closed (293/90-01-01).

The inspector noted that the Radwaste and Chemistry Section organized a task force for the reduction of the volume of radioactive liquid releases from the site. The task force's efforts were focused on the operability and maintenance of current radwaste systems (short term projects) and on the installation and/or upgrading of necessary components (long term projects). One result of the task force study was to reduce the projected 1990 radioactive liquid release by 40%. The licensee is pursuing this goal vigorously. The inspector also noted that the licensee was working aggressively to improve the effectiveness of the effluent control program. No other violations were identified in this area.

5.4 Gaseous Effluent Controls

The inspector reviewed the following licensee procedures and release records to determine implementation of Section 3/4.8.D, "Gaseous Effluent Dose Rate", of the Technical Specifications and of the ODCM.

- o Procedure 7.9.1, "Gaseous Waste Discharge Procedures", Rev. 12, January 4, 1990
- o Procedure 8.10.3, "Determination of Conversion Factors for Main Stack and Reactor Building Vent"
- o Procedure 1.8, "Master Surveillance Tracking Program", Rev. 10, May 31, 1989

- o Procedure 1.3.7.1, "Administration of the Radioactive Effluent Technical Specifications", Rev. 0, December 20, 1988
- o Procedure 6.2-055, "Radioactive Effluent Dose Assessments" Rev. 0, December 20, 1988

Through a review of selected gaseous release records and the above procedures, and discussions with the licensee regarding releases, the inspector determined that the licensee has developed and is using an adequate program for gaseous effluent sampling, analysis, surveillance, and reporting. The inspector noted that the licensee was effectively implementing the ODCM methodology for controlling gaseous releases from the site. No violations were identified in this area.

5.5 Calibration of Liquid and Gaseous and Process Monitors

The inspector reviewed the recent calibration and functional test results for the following effluent and process monitors to determine the implementation of the Technical Specification requirements.

- o Liquid Radwaste Effluent Monitor
- o Air Ejector Offgas Monitor
- o Main Stack Normal Range Noble Gas Monitor
- o Main Stack High Range Noble Gas Monitor
- o Reactor Building Normal Range Effluent Monitor
- o Reactor Building High Range Effluent Monitor
- o Turbine Area Exhaust High Range Effluent Monitor
- o Main Steam Line High Radiation Monitors

The Chemistry Department has the responsibility to perform the radiological calibration, and the I&C Department has the responsibility to perform electronic calibration for the effluent and process monitors. Based on the above review, the inspector determined that the licensee is meeting the Technical Specification requirements with respect to these monitors. No violations were identified in this area.

5.6 Solid Radioactive Waste

The Radwaste Division of the Radwaste and Chemistry Section is responsible for processing solid radioactive waste, including radwaste transportation. The inspector reviewed the licensee's effort for this activity during the last quarter of 1989. The inspector noted that the licensee made four High Integrity Containers (HICs) and 12 miscellaneous (dry active waste, laundry, and contaminated soil) shipments during the last quarter of 1989. The inspector reviewed one HIC and five miscellaneous shipment records and found them satisfactory. The inspector also noted that the licensee had a 1990 campaign, "Minimize Radioactive Waste Onsite", and the licensee is pursuing this campaign aggressively. The inspector stated that the last quarter of 1989 effort and 1990 campaign showed excellent management

commitment for the effective solid radioactive waste reduction program. Within the scope of this review, no violations were identified.

5.7 Air Cleaning Systems

The inspector reviewed surveillance test results (1988 and 1989 results) for the Standby Gas Treatment System and for Control Room ventilation with respect to Technical Specification requirements. All surveillance test results of pressure drop, visual inspection, in-place leak testing, laboratory testing, and air flow capacity met Technical Specification requirements. No violation or deviations were identified.

6.0 Radiological Environmental Monitoring Program (REMP)

6.1 Program Changes

The inspector reviewed the organization for administration of the REMP to determine the ability to conduct the program. The REMP is administered by the Senior Environmental Radiological Engineer at the Pilgrim site and the Radiological Technical Support Division (RTD). The responsibility of the REMP was transferred from the Corporate Office to the site during the reorganization in May 1989. The RTD Manager reports to the Radiological Section Manager (RSM). The RSM reports through the Plant Support Department Manager to the Station Director. Collection of environmental samples and calibration of air samplers and meteorological instrumentation continue to be performed by the General Test Division. Radiological analyses of the REMP samples are contracted to the Yankee Atomic Environmental Laboratory.

The inspector determined that the reorganization discussed in Section 5.1 enhanced the ability to conduct the REMP effectively and it did not reduce the responsibility for the REMP.

6.2 Direct Observation

The inspector examined sampling stations, including air samplers for iodines and particulates, milk sampling locations, TLD stations for the measurement of direct radiation, vegetation sampling stations, and discharge canal water composite sampling station. All air sampling equipment at the selected stations was operational at the time of the inspection. Milk samples appeared to be available at the sampling locations. Vegetation samples including cranberry appeared to be available during growing seasons. TLDs were placed at the designated monitoring stations. The composite water sampler was operational.

6.3 Review of Annual Reports

The inspector reviewed the Annual Radiological Environmental Reports for 1986, 1987, and 1988. These reports provided a comprehensive summary of

the results of the REMP around the Pilgrim site and met the Technical Specification reporting requirements. The inspector also reviewed available 1989 analytical data for the REMP during this inspection.

While reviewing the 1987 and 1988 annual reports, the inspector noted that the licensee performed special dose impact studies on blue mussel samples. Blue mussels were sampled at the discharge canal and analyzed for radioactivity (Co-60, Cs-137, and other radionuclides) on a quarterly basis as required. Based on the highest measured radioactivities in the mussel flesh, estimates of the maximum internal dose from the ingestion of these mussels were calculated. The internal doses from the ingestion of mussels harvested from the discharge canal were much less than one millirem in a year, which is well below federal limits to the public set forth by the NRC and EPA. The inspector had no further questions in this area.

No violations were identified in this area.

6.5 Review of REMP Procedures

The inspector reviewed the following selected procedures to determine the implementation of the REMP.

- o 6.2-013, "Administration of the Radiological Environmental Monitoring Program (REMP)", Rev. 0, December 22, 1988
- o SI-RP.8010, "Environmental TLD Quality Assurance Program"
- o SI-RP.8020, "Garden Census"
- o SI-RP.8025, "Milk-Producing Animal Census"
- o SI-RP.8100/GTD-4-0104, "Maintenance and Calibration of the Nuclear Air Sampler"
- o SI-RP.8105/GTD-4-0105, "Calibration of the Standard Sprague Dry Gas Meter"

The inspector also reviewed the calibration results for the air samplers and noted that all calibration results were within the licensee's defined acceptance criteria. Based on the above review, the inspector determined that the licensee had adequate procedures to implement the REMP.

6.6 Quality Assurance Program for REMP

The inspector reviewed the licensee's program for quality control of analytical measurements for the radiological analyses of environmental media including the EPA Cross-check Program. The inspector also reviewed the comparison results of the spiked environmental TLD readings for 1988 and 1989. The inspector examined selected samples of quality control data submitted to the licensee by its contractor laboratory. These data indicated, with few exceptions, agreement between EPA spike samples and the contractor's results. Where discrepancies were found, reasons for the differences were investigated and resolved satisfactorily. All spiked environmental TLD readings were within the licensee's acceptance criteria.

Based on these reviews, the inspector determined that the licensee was implementing the quality assurance program effectively. No violations were noted in this area.

6.7 Meteorological Monitoring

The inspector reviewed the 1988 and 1989 meteorological instrumentation calibration results for wind speed, wind direction, temperature, and delta temperature. A contractor calibrates all meteorological sensors, and the licensee performs channel calibrations. Quarterly calibration of meteorological equipment for the primary system and the backup system was performed by the licensee. All calibration results were within the licensee's defined acceptance criteria. No violations were identified.

7.0 Exit Interview

The inspector met the licensee representatives denoted in Detail 1.1 at the Pilgrim Site on January 12, and January 26, 1990. The inspector summarized the purpose and scope of the inspection, and discussed the inspection findings.