

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 50-245/94-15; 50-336/94-13; and 50-423/94-13  
Docket Nos. 50-245; 50-336; and 50-423  
License Nos. DPR-21; DPR-65; and NPF-49  
Licensee: Northeast Nuclear Energy Company  
P.O. Box 270  
Hartford, Connecticut 06141-0270  
Facility Name: Millstone Nuclear Generating Station, Units 1, 2, and 3  
Inspection At: Waterford, Connecticut  
Inspection Conducted: February 28-March 4, 1994 and March 14-17, 1994

Inspector: Jason C. Jang 4-3-94  
Jason C. Jang, Senior Radiation Specialist  
Effluents Radiation Protection Section (ERPS)  
Facilities Radiological Safety  
and Safeguards Branch (FRS&SB)  
Date

Approved by: Judith A. Jouston 4/4/94  
Judith A. Jouston, Chief, ERPS, FRS&SB,  
Division of Radiation Safety and Safeguards  
Date

Areas Inspected: Announced safety inspection of the radioactive liquid and gaseous effluent control programs including: management controls, audits, air cleaning systems, calibration of effluent/process radiation monitoring systems, and implementation of the above programs.

Results: Within the areas inspected, the licensee implemented effective radioactive liquid and gaseous effluent control programs. The Chemistry Department staff demonstrated excellent knowledge in these programs. No safety concerns or violations of NRC requirements were identified.

## DETAILS

### 1.0 Individuals Contacted

#### 1.1 Licensee Personnel

- T. Arnett, I&C Engineer, Unit 2
- \* V. Ballestrini, Chemistry Specialist, Unit 3
- R. Beckman, I&C Manager, Unit 3
- R. Brulette, Operations Technician, Unit 3
- T. Burns, Instructor, Nuclear Training Department
- K. Covin, Operations Assistant, Unit 3
- M. Dolishny, I&C Supervisor, Unit 3
- \* J. Glaub, Chemistry Specialist, Unit 1
- R. Griffin, Chemistry Supervisor, Unit 2
- J. Kangley, Senior Engineer, Chemistry
- A. LaMan, Radiation Protection Specialist
- W. Larson, I&C Supervisor, Unit 1
- \* G. Mendenhall, QAS Lead Auditor
- \* S. Macklin, Chemistry Supervisor, Unit 3
- \* D. Miller, Station Senior Vice President
- E. Olszewski, I&C Engineer, Unit 1
- \* D. Peiffer, Chemistry Support Supervisor
- R. Poole, Chemistry Specialist, Unit 2
- \* W. Temple, Licensing
- D. Vining, I&C Supervisor, Unit 2
- \* J. Waters, Chemistry Manager
- \* P. Weekly, Acting Unit Service Director
- D. Wilkens, Chemistry Supervisor, Unit 1

#### 1.2 NRC Personnel

- \* P. Swetland, Sr. Resident Inspector
- \* Denotes those present at the exit interview on March 17, 1994.  
Other licensee employees were contacted and interviewed during this inspection.

### 2.0 Purpose

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

### 3.0 Management Controls

#### 3.1 Program Changes

The inspector reviewed the organization and administration of the radioactive liquid and gaseous effluent control programs and discussed with the licensee changes made since the last inspection, conducted on March 8-12, 1993. The inspector determined that there were no changes to the radioactive effluent control programs. The Chemistry Department has primary responsibility for conducting the radioactive liquid and gaseous effluent control programs. The Departments of Radwaste Operations and Instrumentation and Controls (I&C) also have responsibilities for supporting the effluent control programs, such as with radwaste discharges and radiation monitoring system calibration, respectively.

#### 3.2 Audit

The inspector reviewed the 1993 Quality Services Department (QSD) Audit Report Number A24026 (QSD-93-4207). This audit was conducted by the QSD and covered the radioactive liquid and gaseous effluent control programs. The inspector noted that the audit was conducted by members of the Assessment Services Department with assistance from other technical personnel. The audit covered the stated objectives and was thorough and of good technical depth. The audit identified one finding, as well as one recommendation to enhance the effluent control programs. Neither the finding nor the recommendation had safety significance. The inspector noted that the scope and technical depth of the audit were very good in assessing the radioactive liquid and gaseous effluent control programs.

#### 3.3 Review of Semiannual Radioactive Effluent Reports

The inspector reviewed the semiannual radioactive effluent release reports for the second half of 1992, the first half of 1993, and the raw data for the second half of 1993. These reports provided data indicating total released radioactivity for liquid and gaseous effluents. The inspector also reviewed the annual radioactive effluents dose report for 1992. This report summarized the assessment of the projected maximum individual and population doses resulting from routine radioactive airborne and liquid effluents. Doses were well below the regulatory limits. The inspector determined that the licensee met the Technical Specification (TS) reporting requirements. The inspector

determined that there were no obvious anomalous measurements, omissions or trends in these reports.

#### 4.0 Radioactive Liquid and Gaseous Effluent Control Programs

The inspector reviewed the following licensee procedures and radioactive liquid and gaseous discharge permits to determine the implementation of the TS and the Offsite Dose Calculation Manual requirements for all units.

##### 4.1 Unit 1

- o CP 809A, Liquid Waste Discharge
- o CP 809C, Effluent Report Preparation
- o CP 806J, Stack Gas Sampling and Counting
- o CP 806X, Containment/Drywell Sampling and Analysis
- o SP 814A, Unit 1 Stack Gaseous Iodine and Particulate Filter Replacement and Analysis
- o SP 821, Unmonitored Liquid Release Paths

During the review of the above selected radioactive liquid and gaseous effluent procedures, the inspector noted that the licensee upgraded these procedures to include better techniques and format. These upgraded procedures were detailed and this made following all the steps much easier than with the old procedures.

During the review of Procedure SP 814A the inspector noted that on a monthly basis, the licensee analyzed a charcoal cartridge (24-hour sample) to determine a ratio of iodine-133 (I-133) to iodine-131 (I-131). This ratio, along with the routine I-131 activity measured in a weekly stack charcoal cartridge sample, was used to determine the weekly releases of I-133. Even though this was not required by the TS, the licensee used this technique to accurately quantify the I-133 activity released to the environment. The inspector determined that this was an excellent licensee initiative to develop this method to quantify the releases of I-133 through the main stack.

Procedure CP 806X described containment sampling and analyzing techniques for noble gases, particulates, and iodines prior to purging the containment to the environment. The containment/drywell air is released to the main stack through the standby gas treatment system. The main stack is equipped with a sampling station. The inspector reviewed selected analytical data of iodines, noble gases, and particulates for containment/drywell samples. These data

showed insignificant amounts of iodine ( $3.68\text{E-}11 \mu\text{Ci/cc}$  for I-133, as an example), noble gases, and particulates. The inspector determined that these insignificant activities in the containment and drywell air will be reduced to background levels after passing through the standby gas treatment system.

The inspector discussed with the licensee the potential unmonitored release pathway analysis, as part of the routine radioactive liquid effluent control program. The licensee is required to review the potential unmonitored release pathway to prevent unmonitored release to the environment. In fact, the licensee performed the pathway analysis. The inspector reviewed analytical results of unmonitored release pathway samples from February 1993 to February 1994. No detectable activity was seen in any of the 13 sampling locations throughout the site.

#### 4.2 Unit 2

- o CP-2809B, Liquid Waste Discharge
- o CP-2809C, Gaseous Discharge
- o SP 2821, Unmonitored Liquid Release Paths

During the review of selected radioactive liquid and gaseous release permits, the inspector evaluated comparisons between laboratory measurement results ( $\mu\text{Ci/cc}$ ) and effluent radiation monitoring system (RMS) results in counts per minute (cpm). Conversion factors ( $\mu\text{Ci/cc/cpm}$ ) were used to correlate from RMS readings to laboratory measurement results. Despite widely distributed gamma energies identified in the laboratory measurements, the response of the RMS readings were within about a factor of two of the results expected from laboratory measurements. This was a very good correlation.

The inspector determined that the above effluent control procedures were sufficiently detailed to facilitate performance of all necessary steps. The inspector also determined that the reviewed discharge permits were completed and met the TS requirements for sampling and analyses at the frequencies and lower limits of detection established in the TS.

#### 4.3 Unit 3

- o CP-3809A, Liquid Waste Discharge
- o SP-3821, Unmonitored Liquid Release Pathway
- o SP-3823, Instantaneous Gaseous Release Rate Calculations
- o SP-3875, Normal Vent and ESF Building Gaseous Effluent Analysis

- o SP-3879, Containment Purge/Drawdown Sampling and Analysis
- o SP 3821, Unmonitored Liquid Release Paths

During the review of liquid release permits, the inspector performed independent calculations using the information listed on the release permits for the total amount of radioactivity being released. The licensee's result was about 20% higher than the inspector's result. The inspector concluded that the licensee's calculational method was overly conservative and discussed this issue with the licensee. The licensee will evaluate the conservatism in the near future and will use actual measurement values, as appropriate, for the effluent control program. The inspector had no further questions in this matter.

During the review of the Unit 3 gaseous/particulate effluent release permits, the inspector also noted that the licensee quantified and reported beryllium-7 (Be-7) activity in the ESF ventilation particulate filter sample. Because Be-7 originates as a result of spallation reactions (naturally occurring) in the atmosphere, rather than the result of nuclear power plant operations, reporting release of this isotope is unnecessary. The licensee, however, did not use this activity for calculating a projected dose to the public.

The inspector determined that the above effluent control procedures were sufficiently detailed to allow performance of all necessary steps. The inspector also determined that the reviewed discharge permits had been properly completed and met the TS requirements for sampling and analyses at the frequencies and lower limits of detection established in the TS.

#### 4.4 Assessment

The inspector also discussed with the licensee various aspects of the effluent control programs, such as communication with Radwaste Operations. The inspector determined that the effluent control procedures were sufficiently detailed to facilitate performance of all necessary steps. The inspector also determined that the reviewed discharge permits were completed and met the TS requirements for sampling and analyses at the frequencies and lower limits of detection established in the TS.

During discussion with the Chemistry Department staff of all three units, the inspector noted that the responsible individuals had maintained and continually enhanced their excellent knowledge in the areas of:

- (1) radioactive liquid and gaseous effluent controls,
- (2) effluent/process Radiation Monitoring Systems (RMS),
- (3) quantifying the total amount of liquid and gaseous effluent releases using the RMS,
- (4) protection of the public health and safety and the environment, and
- (5) the Offsite Dose Calculation Manual requirements.

Based on the above reviews, the inspector determined that the licensee had conducted effective radioactive liquid and gaseous effluent control programs. The inspector also noted that the licensee reviewed its effluent control programs vigorously with a view toward improvement.

#### 5.0 Calibration of Effluent/Process Radiation Monitoring Systems (RMS)

The inspector reviewed the licensee's most recent calibration results for the following effluent/process radiation monitors to determine the adequacy of implementation of the TS requirements for Units 1, 2, and 3.

##### 5.1 Unit 1

- o Radwaste Effluent Radiation Monitor
- o Service Water Effluent Radiation Monitor
- o Reactor Building Closed Cooling Water Radiation Monitor
- o Steam Jet Air Ejector Offgas Monitor
- o Main Stack Noble Gas Monitor (Normal and High Range)

The I&C Department had the responsibility to perform electronic calibrations for the above radiation monitors. The Unit 1 Chemistry Department had the responsibility to perform the radiological calibrations for Radwaste Effluent, Service Water, Reactor Building Closed Cooling Water, and Stack Gas Effluent Radiation Monitors. All reviewed calibration results were within the licensee's acceptance criteria.

During the review of main stack noble gas monitor (normal range) calibration results, the inspector noted that the licensee's acceptance criterion of the final readings was  $\pm 3/16$  inches from expected value (cpm) on a 6-decade-log meter that was located in the control room. Assessing this acceptance criterion was a very difficult task. The inspector discussed with the licensee this acceptance criterion. The inspector stated that a scaler (which reads in cpm) could be connected to the logarithmic meter to obtain readings. In fact, the licensee adopted this technique to perform an electronic calibration last year.

The licensee stated that this technique will be reviewed and adopted to perform radiological calibrations, as appropriate. The inspector stated that the progress of this method will be reviewed during a subsequent inspection.

## 5.2 Unit 2

- o Clean Liquid Radwaste Effluent Line Monitor
- o Aerated Liquid Radwaste Effluent Line Monitor
- o Steam Generator Blowdown
- o Condenser Air Ejector
- o Reactor Building Closed Cooling Water Radiation Monitor
- o Vent Noble Gas Monitor
- o Waste Gas Decay Tank Monitor

The I&C Department had the responsibility to perform electronic and radiological calibrations for the above radiation monitors. However, the Unit 2 Chemistry Supervisor had the responsibility to evaluate the radiological calibration results for acceptance.

During the review of the above RMS calibration results, the inspector noted that the licensee was in the process of changing the calibration technique for the gaseous effluent RMS. The licensee had performed the primary calibration using three different activities of Kr-85 sources. On January 26, 1994, the licensee performed the primary (using Kr-85 sources) and secondary calibrations (using three different activities of Cs-137 button sources) for the waste decay tank RMS (RM-9095). The inspector reviewed both primary and secondary calibration results. The inspector determined that the results were very good. The inspector discussed with the licensee a trending analysis of secondary conversion factors (either  $\mu\text{Ci}/\text{cpm}$  or  $\text{cpm}/\mu\text{Ci}$ ) as a function of time, for the RM-9095 and other gaseous effluent RMS. The licensee representative stated that this would be evaluated.

Based on the above review, the inspector determined that the licensee was implementing TS requirements effectively.

## 5.3 Unit 3

- o Liquid Waste Monitor
- o Waste Neutralization Sump Effluent Line Monitor
- o Steam Generator Blowdown Monitor
- o Turbine Building Floor Drains Effluent Line Monitor



- o Vent Noble Gas Monitor
- o Engineering Safeguards Building Monitor

The I&C Department had the responsibility to perform electronic and radiological calibrations for the above radiation monitors.

During the review of the above calibration results, the inspector independently verified several calibration results including linearity tests and conversion factors. Using the licensee's raw data, the inspector performed statistical analyses (linear regression) in order to compare results with the licensee. The inspector determined that these independent comparisons for linearity and for conversion factors were excellent.

Based on the above review, the inspector determined that the licensee was effectively implementing the TS.

#### 5.4 Nuclear Training Department

During this inspection, the inspector evaluated an RMS training program for I&C technicians conducted by the Nuclear Training Department. The inspector reviewed the Training Manual and discussed its contents with the RMS training instructors. The inspector noted that the Training Manual contained appropriate learning objectives and training sequences. The training required 40 hours in class and a test upon completion of the training (passing grade: 80 % or better).

The RMS training for the I&C technicians consisted of radiation physics, radiation detector calibrations, detector theory, and other areas. The inspector discussed with the RMS training instructors the contents of the RMS training for I&C technicians. Addition of the following topics in the training program would be beneficial to the I&C technicians and/or to the I&C Supervisors to grasp the entire electronic and radiological calibration processes and concepts. The Nuclear Training Department Instructor stated that this would be evaluated and, if appropriate, incorporated in future training.

- (1) Radiation counting statistics.
- (2) Data reduction technique using statistical analysis.
- (3) Evaluation of the acceptance criteria based on the statistical analysis rather than criteria suggested by the vendor.
- (4) Energy responses of different detectors (e.g., GM, and NaI).

## 6.0 Air Cleaning Systems

The inspector reviewed the licensee's most recent surveillance test results to determine the implementation of TS requirements for the following air cleaning systems for Units 1, 2, and 3. The surveillance tests for these air cleaning systems were required by the Technical Specifications.

- Unit 1
  - o Standby Gas Treatment System
- Unit 2
  - o Secondary Containment Enclosure Building Filtration System
  - o Control Room Emergency Ventilation System
- Unit 3
  - o Auxiliary Building Filter System
  - o Control Room Emergency Ventilation System
  - o Fuel Building Exhaust Filter System

The inspector also reviewed the following surveillance test results.

- o Visual Inspection
- o In-Place HEPA Leak Tests
- o In-Place Charcoal Leak Tests
- o Air Capacity Tests
- o Pressure Drop Tests
- o Laboratory Tests for the Iodine Collection Efficiencies

All reviewed test results were within the licensee's Technical Specification acceptance criteria with the exception of the laboratory tests for the iodine collection efficiency for the Unit 1 Standby Gas Treatment System. The licensee had purchased and replaced three new charcoal trays out of six trays before the surveillance tests. This technique is acceptable based on the other test results, such as the In-Place Charcoal Leak Test. The inspector had no further questions in this area.

Based on the above reviews, the inspector determined that the licensee met TS requirements. The inspector had no further questions in this area.

## 7.0 Exit Interview

The inspector met with the licensee representatives denoted in Section 1.1 of this inspection report at the conclusion of the inspection on March 17, 1994. The inspector summarized the purpose, scope, and findings of the inspection. The licensee acknowledged the inspection findings.