U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-272/92-18 and 50-311/91-18

Docket Nos. 50-272 and 50-311

License Nos. DPR-70 and DPR-75

Licensee: Public Service Electric and Gas Company
P.O. Box 236
Hancocks Bridge, New Jersey 08038

Facility Name: Salem Generating Station, Units 1 & 2

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: November16-20, 1992

Inspectors: Jason C. Jang — 11-24-92
J. C. Jang, Sr. Radiation Specialist — date
Effluents Radiation Protection Section (ERPS), Facilities Radiological Safety and Safeguards Branch (FRS&SB)

Laurie Peluso — 11/24/92
L. A. Peluso, Radiation Specialist — date
ERPS, FRS&SB

Approved by: Marie T. Miller — 11/25/92
Marie T. Miller, Chief, ERPS, — date
FRS&SB, Division of Radiation Safety and Safeguards

Inspection Summary: Announced safety inspection of the licensee's programs for the Radiological Effluent Control Program, projected dose calculation ability, and implementation of the Offsite Dose Calculation Manual (ODCM).

Results: Within the scope of this inspection, excellent implementation of the above programs by the Chemistry Department was observed. The completion of the short-term project for the RMS was noteworthy.

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DETAILS

1.0 Individuals Contacted

1.1 Licensee Personnel

* D. Branham, RP/Chemistry Services
  S. Branosky, Maintenance Supervisor
* T. Carrier, Maintenance Engineer
* T. Cellmer, RP/Chemistry Department Manager
  G. Cranfield, Technical Supervisor, RP/Chemistry Department
* J. Crouch, Radiation Monitoring System Project Engineer
  J. Dierickx, Technical Supervisor, RP/Chemistry Department
* E. Galbriath, Principal Chemistry Engineer
  J. Grimm, System Engineer
* E. Lawrence, QA Audits
* M. Morroni, Technical Department Manager
* R. Oakes, Atlantic Electric- Salem Site Representative
* V. Polizzi, Operations Manager
* W. Schultz, Station QA Manager
* M. Shedlock, Maintenance Manager
* E. Villar, Licensing Engineer
  R. Yewdall, RP/Chemistry Services

1.2 NRC

* T. Johnson, Senior Resident Inspector
* S. Pindale, Resident Inspector

* Denotes those present at the exit interview on November 20, 1992. The inspector also contacted and interviewed other licensee employees.

2.0 Purpose

The purpose of this inspection was to review the licensee's program in the following areas.

- The licensee's ability to control and quantify effluent radioactive liquids, gases, and particulates.

- The licensee's ability to calculate projected doses to the public from radioactive liquid and gaseous (airborne) effluent releases during normal operation.

3.0 Management Controls

3.1 Program Changes

There were no significant changes in the licensee's radioactive liquid and gaseous effluent control programs since the previous inspection conducted in July 1991. The Chemistry Department has the responsibility to conduct the radioactive liquid and gaseous effluent control programs and to implement the Offsite Dose Calculation Manual (ODCM).

3.2 Review of Semiannual Effluent Reports and Annual Dose Assessment Report

The inspector reviewed the semiannual radioactive effluent release reports for 1991 and the first half 1992. These reports provided total released radioactivity for liquid and gaseous effluents. These reports also contained any changes to the ODCM as necessary and meteorological data. The inspector also noted that the licensee summarized historical radioactive liquid and gaseous release data since 1987 for trending purposes. The inspector determined that including the trending analysis data in the semiannual reports was noteworthy. There were no obvious anomalous measurements, omissions or trends.

4.0 Audits

The inspector reviewed the audits (Audit Numbers: 91-151 and 92-151) conducted by the Quality Assurance (QA) Department for the Radioactive Liquid and Gaseous Effluent Surveillance Programs and implementation of the ODCM. Three deficiencies in the area of radiation monitoring systems (Nuclear Engineering Design) were identified by the QA audit conducted in 1991. These deficiencies were followed by the QA Department. There were no deficiencies identified for the effluent control programs during the QA audit conducted in 1992. The QA Department used a tracking system to follow the corrective actions. The inspector noted that the scope and technical depth of the audits were very good to assess the effluent control programs.

5.0 Implementation of the Effluent Control Programs

The inspector reviewed the licensee's implementation of the Radioactive Liquid and Gaseous Effluent Control Programs through discussions with licensee personnel, review of selective radioactive liquid and gaseous release permits and procedures.

The Chemistry Department has the responsibility to conduct the effluent control programs. During discussions with the members of Chemistry Department, the inspector noted that the responsible individuals had excellent knowledge concerning: (1) radioactive liquid and gaseous effluent controls, (2) effluent Radiation Monitoring Systems (RMS), (3) quantifying the total amount of liquid and gaseous effluent release using the RMS, (4) protection of the public health and the environment, and (5) all aspects and requirements of the Offsite Dose Calculation Manual (ODCM).

The inspector determined that radioactive effluent control procedures were sufficiently detailed to control all routine effluent releases effectively. The inspector also determined that the reviewed release permits were complete and met the requirements for sampling analyses at the frequencies and lower limits of detection established in the Technical Specifications.

Based on the above reviews, the inspector determined that the licensee was implementing an excellent radioactive liquid and gaseous effluent control programs.

6.0 Calibration and Manual of Effluent/Process Radiation Monitoring Systems (RMS)

6.1 Calibration

The inspector reviewed the most recent calibration test results for the following effluent/process RMS to determine the implementation of the Technical Specification requirements for both units.

- o Liquid Radwaste Effluent Line Monitors (R18)
- o Main Steam Line Monitors (R46)
- o Containment Vent Monitors - Noble Gas (R12), High Range (R44)
- o Plant Vent Effluent Monitors (R16)

The I&C Department has the responsibility to perform electronic and radiological calibrations. All reviewed calibrations were performed at the required frequencies and results were within the licensee's acceptance criteria.

The inspector, however, noted that the methodology in the final steps of the radiological calibration procedures for the liquid effluent monitors require improvement. The Radiological Protection/Chemistry Services supplies the calibration sources to the I&C Department without the source strength information. Therefore, the determination of the calibration factor (sensitivity) and the linearity for the RMS were very difficult. The inspector discussed with the licensee better radiological calibration practices. The licensee stated

that the current calibration technique and procedures will be reviewed and upgraded, as necessary, in the near future. The inspector stated that procedures will be reviewed during a subsequent inspection.

Based on the above reviews, the inspector determined that the licensee has an acceptable calibration technique for the effluent/process RMS.

6.2 RMS Manual

The licensee's Radiation Protection and Chemistry Services issued the RMS Manuals for both units in November 1991 as a final draft document. The inspector reviewed the manuals and noted that the manuals contained the following useful information for process and effluent monitors.

- o Description of the Monitor
- o Location of the Monitor
- o Characteristics of the Detector
- o Calibration Data
- o Setpoints
- o Conversion Factor (μCi/cc/cpm)

The Manuals, however, were not being used by the appropriate groups (Chemistry, Operations, I&C, and Radiation Protection) due to the final review stage. The inspector stated that final issuance and implementation of the Manuals will be reviewed during a subsequent inspection.

Based on the review of the RMS Manuals, the inspector stated that the issuance of the Manuals was an excellent effort to maintain the monitoring system integrity and operability.

7.0 Upgrading Status of RMS

During the previous inspection conducted in July 1991, the inspector reviewed the Engineering and Plant Betterment Project Scope Proposal (EWR No. 062-89-1116), "Radiation Monitoring System - Short Term RMS Modifications". This proposal contained (1) statement of problem, (2) objectives, (3) project team matrix, (4) project schedule, and (5) issues and considerations.

During this inspection, the inspector reviewed and discussed with the licensee the completion of the short-term RMS project. The licensee completed the short-term RMS project (e.g., upgrading electronic components for many process and effluent

RMS and installation of several new RMS). The inspector also reviewed the revised long-term project. The long-term project has three phases: (1) Phase 1; Competitive Scoping, by end of 1992, (2) Phase 2; Competitive Installation, by end of 1993, and (3) Phase 3; Remaining Scope, by end of 1996.

Based on the review of the long-term project and discussions with the licensee, the inspector determined that the licensee was pursuing the long-term project vigorously in the right direction. The progress of the RMS upgrading will be reviewed during a subsequent NRC inspection.

8.0 Air Cleaning Systems

The inspector reviewed the licensee's most recent surveillance test results as part of the examination of the implementation of the Technical Specification requirements. The reviewed systems were (1) the Containment, (2) Fuel Handling Area Ventilation Systems, (3) Auxiliary Building Exhaust Air Filtration Systems, and (4) the Control Room Emergency Filtration Systems for both units. The following test results were reviewed.

- o Visual Inspections
- o In-Place HEPA Leak Tests
- o In-Place Charcoal Leak Tests
- o System Air Capacity Tests
- o Delta Pressure Tests
- o Laboratory Tests for the Iodine Collection Efficiencies

All reviewed test results were found to be within the licensee's Technical Specification limits. During the review of the test results, the inspector noted that the licensee had difficulties determining the flow rates of the Fuel Handling Buildings in both units. This test was performed many times with mechanical adjustments before satisfying the acceptance criteria. The licensee has had difficulty obtaining the designed flow rate for the Auxiliary Building Exhaust Air Filtration System due to possible air balance problems. The inspector also noted that the licensee performed several trials to obtain the designed flow rate during the recent tests. The inspector noted similar problems during previous inspections. These problems would be resolved after the completion of the air balance test for the plant which was listed in the Salem Revitalization Program (See Inspection Report Numbers 50-272/91-20 and 50-311/91-20 for details).

Based on the above reviews, the inspector determined that the licensee implemented the Technical Specification requirements for the above air cleaning systems.

9.0 Comparisons of the Projected Dose Calculation Program

During this inspection, the inspector performed an independent verification of the licensee's capability for calculating projected doses to the public resulting from discharges of radioactive liquids and gases to the environment. The licensee calculated the projected dose to the public based on the data incorporated into the radioactive liquid and gaseous discharge. The inspector also used the same parameters contained in the discharge (e.g., dilution factor, total amount of radioactivity released, meteorological data, etc.) to calculate the maximum projected doses to the public for intercomparison. The licensee used its computer code and the NRC used the "PCDOSE code".

The PCDOSE code was developed by Idaho National Engineering Laboratory (EG&G Idaho, Inc.) for the U.S. Nuclear Regulatory Commission. The code was designed to calculate the maximum projected radiation dose to an individual and the average dose to the population due to radionuclides in radioactive liquid and airborne effluent releases from a nuclear power plant. The code was designed for normal operation rather than for emergency situations. The code was developed from the methodology found in both NUREG-0133 and Regulatory Guide 1.109 (Revision 1). The PCDOSE code serves as a basis of comparison with similar programs conducted by individual utilities which operate nuclear power plants.

During this inspection, the inspector reviewed the Offsite Dose Calculation Manual (ODCM) for site specific parameters and current methodology for the noble gas, liquid, and particulates (including tritium and iodines) release pathways. The ODCM exactly coincides with the licensee's computer code, which follows the NRC Regulatory Guide 1.109 for all parameters with one exception. In the case of the noble gas release pathway, the licensee uses the shielding factor from NRC NUREG-0133, which is acceptable to the NRC.

The comparison results of all pathways were in agreement as shown in Tables 1-4 with the exception of Table 3 Grass-Cow-Milk Pathway. The licensee's results were higher than the NRC's results because the licensee's computer code did not incorporate decay correction for that pathway. The licensee, therefore, performed hand calculations with decay corrections. The results were same as the NRC's results.

Based on the above comparison results and reviews, the inspector determined that the licensee conducted an excellent projected dose calculation program. The inspector noted that the responsible individual had excellent knowledge to implement the effluent control programs.

10.0 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 November 20, 1992 at the Salem site. The inspector summarized the purpose, scope, and findings of the inspection.

Table 1. Dose Assessment Comparisons for Adult (mrem)

Source: Liquid Effluent Release

	Bone	Liver	Total Body	Thyroid	Kidney	Lung	GI-LLI
Salem	1.01E-3	2.24E-3	2.23E-3	6.83E-4	6.10E-4	1.96E-4	8.16E-3
NRC	1.01E-3	2.24E-3	2.23E-3	6.83E-4	6.11E-4	1.96E-4	8.13E-3

Table 2. Dose Assessment Comparisons for Noble Gases Release

	Beta Air (mrad)	Gamma Air (mrad)	Skin Dose (mrem)	Total Body (mrem)
SALEM	6.37E-5	1.99E-5	4.22E-5	1.65E-5
NRC	6.37E-5	1.99E-5	4.24E-5	1.65E-5

Table 3. Thyroid Dose Assessment Comparisons for Iodine Release

Inhalation Pathway

	Adult (mrem)	Teen (mrem)	Child (mrem)	Infant (mrem)
SALEM	7.07E-8	8.67E-8	9.62E-8	8.79E-8
NRC	7.08E-8	8.70E-8	9.65E-8	8.81E-8

Grass-Cow-Milk Pathway

	Adult (mrem)	Teen (mrem)	Child (mrem)	Infant (mrem)
SALEM	1.60E-6	2.54E-6	5.01E-6	1.21E-5
NRC	8.02E-7	1.27E-6	2.50E-6	6.09E-6

Table 4. Total Body Dose Assessment Comparisons for Particulates Release

Inhalation Pathway

	Adult (mrem)	Teen (mrem)	Child (mrem)	Infant (mrem)
SALEM	1.98E-9	1.48E-9	6.73E-10	2.56E-10
NRC	1.98E-9	1.48E-9	6.75E-10	2.56E-10

Vegetation Pathway

	Adult (mrem)	Teen (mrem)	Child (mrem)
SALEM	5.27E-8	4.56E-8	3.91E-8
NRC	5.27E-8	4.56E-8	3.91E-8