

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-272/84-29
50-311/84-28

Docket No. 50-272

License No. DPR-70/DPR-75 Priority -- Category C

Licensee: Public Service Electric and Gas Company

80 Park Place

Newark, New Jersey 07101

Facility Name: Salem Nuclear Generating Station, Units 1 & 2

Inspection At: Hancock's Bridge, New Jersey

Inspection Conducted: July 23-27, 1984

Inspectors: A.A. Weadock for 8/29/84
J. C. Jang, Radiation Specialist date

A.A. Weadock 8/28/84
A. A. Weadock, Radiation Specialist date

Approved by: M. Shanbaky 8/29/84
M. Shanbaky, Chief, Facilities date
Radiation Protection Section,

Inspection Summary: Inspection on July 23-27, 1984 (Combined Inspection Report
Nos. 50-272/84-29
and 50-311/84-28)

Areas Inspected: Routine, unannounced inspection of the licensee's chemical and radiochemical measurements program and effluents control program using the Region I Mobile Radiological Measurements Laboratory and laboratory assistance provided by DOE Radiological and Environmental Sciences Laboratory. Areas reviewed included status of previously identified items, organization and management control, training, laboratory quality control, confirmatory measurements and whole body counting system - the inspection involved 70 inspector-hours onsite by two NRC regionally based inspectors.

Results: The licensee was in compliance with NRC requirements in the areas examined during the inspection.

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DETAILS1. Persons Contacted

During the course of this routine inspection, the following personnel were contacted or interviewed:

1.1 Licensee Personnel

- *J. M. Zupko, Jr., General Manager - Salem Operations
- *E. A. Liden, Manager - Nuclear Licensing and Regulation
- *D. A. Perkins, Senior Quality Assistance Engineer
- *R. J. Dolan, Chemistry Engineer
- *W. L. Ferguson, Senior Supervisor - Radiation Protection
- G. Slaby, Senior Chemistry Supervisor
- P. Behrens, Nuclear Technical Supervisor
- H. Miller, Chemistry Staff Engineer
- *M. Simpson, Radiation Protection Services
- *S. Simpson, Nuclear Technical Supervisor
- B. Allen, Chemistry Supervisor - Radiochemistry Counting Room
- R. Cislo, Supervisor - Internal Dosimetry
- G. Dziuba, Chemistry Supervisor - Systems
- D. Zak, Chemistry Supervisor - Laboratory
- M. Press, Health Physics Technician Assistant

Other licensee or contractor employees were also contacted or interviewed during this inspection.

*Denotes those who attended at the exit interview.

1.2 NRC Personnel Attending the Exit Meeting

- L. Norrholm, Section Chief, Projects Branch No. 2B
- J. Linville, Senior Resident Inspector
- R. Summers, Resident Inspector

2.0 Purpose

The purpose of this routine inspection was to review the licensee's chemistry program and whole body counting program with respect to the following elements:

- Status of Previously Identified Items,
- Organization and Management Control,
- Personnel Qualifications and Training,
- Laboratory Quality Control,
- Whole Body Counting System, and
- Confirmatory Measurements

3.0 Status of Previously Identified Item

(Closed) Inspector Follow-up Items (272/84-02-01, 311/84-02-01) QC program to continue in the primary and secondary chemistry laboratory utilizing control charts. The licensee has implemented the use of control charts to track values for primary and secondary chemistry determinations.

4.0 Organization and Management Control

The inspector reviewed the organization for administration of the plant chemistry section. The chemistry section's responsibilities include radiological and non-radiological chemistry, operation and maintenance of the condensate polishers, and operation of the non-radioactive waste system. Chemistry Section supervisory personnel includes the Chemistry Engineer, the Senior Chemistry Supervisor, four Area Supervisors (Laboratory, Systems, Instruments, and Counting Room Supervisor), and two Staff Engineers. Plant personnel consist of seven Chemistry Technicians, twelve Chemistry Technician Assistants, and four Chemistry helpers. At the present time all positions are filled and no contracted personnel fill positions in the Chemistry Section.

All Chemistry personnel report to the Chemistry Engineer. The Chemistry Engineer reports to the Technical Manager who reports to the Plant Assistant Manager.

The inspector reviewed the results of a Chemistry Department Audit (#S-83-8) conducted by the Quality Assurance Nuclear Operations Department and the Chemistry Department's response to that audit. The audit was thorough and accurately identified deficiencies in the Chemistry Department's implementation of a Quality Control program. The inspector determined by discussion with supervisory personnel and review of current quality control practices that the Chemistry Department response to this audit was satisfactory.

No violations were noted in this area.

5. Personnel Qualifications and Training

The inspector reviewed experience resumes of selected chemistry technicians and technician assistants for compliance with Technical Specification requirements. The inspector also discussed the technician on-the-job training program with the chemistry laboratory supervisor, and reviewed results of the quarterly unknown analyses, performed by the technicians to comply with the Chemistry Department QC program. The inspector learned that the responsibility for quality control training for technicians will shortly be transferred from the Chemistry Section to the Nuclear Training Center.

The inspector reviewed the applicable procedure CH-3.9.055, "Nuclear Training Center Portion of the Salem Chemistry Laboratory Quality Control Requirements" and found it satisfactory.

No violations were noted in this area.

6. Laboratory QC Program

The inspector discussed with the licensee the program for the quality control of analytical measurements. The adequacy and effectiveness of the licensee's non-radiological and radiological chemistry quality control programs were reviewed including the following procedures:

CH-3.9.017	Quality Control Requirements
CH-3.9.048	Counting Room Quality Control Requirements
CH-3.8.004	Interlab Comparison Analysis
CH-3.8.039	Efficiency Determination and Quality Control Charts Preparation and Usage for Counting Room Instrumentation, and
CH-3.4.015	MCA/Daily Energy/Efficiency and Background Control Chart.

Quality control programs require instrument performance checks including control charts, QC samples for intralaboratory and interlaboratory comparisons, and review of analytical results.

The inspector reviewed instruments performance checks for the liquid scintillation counter, the gamma spectrometry system, and the spectrophotometer. All QC requirements for instruments were implemented in the laboratory.

The inspector also reviewed non-radiological intralaboratory and radiological interlaboratory comparison results from the third quarter of 1983 to the second quarter of 1984. All comparisons were being performed and results were evaluated as required by the licensee's procedures.

The inspector verified by inspection of laboratory records that supervisory personnel were consistently reviewing laboratory quality control data. The inspector also noted the licensee has an adequate system for the timely identification of instruments requiring calibration.

No items of noncompliance were identified in this area at this time.

7. Whole Body Counting System

7.1 Purpose

The purpose of this inspection was to verify the capability of the licensee to adequately perform radiological bioassay using a whole

body counting system. A whole body counting phantom containing radioactive sources traceable to the National Bureau of Standards (NBS) was submitted to the licensee for analysis. The phantom duplicated the nuclides and the organ burdens that the licensee might encounter during normal operation. The phantom was analyzed using the licensee's normal methods and equipment.

7.2 Results Comparison

The inspector submitted the NRC phantom to the licensee and to the licensee's contractor. The licensee and the contractor have an APT Chair whole body counting system. The NRC phantom was counted in this system by the licensee and the contractor with sources in the lung and then in the gastrointestinal (GI) tract area. The lung and GI tract results are based on an average of three measurements performed by the contractor. The GI tract results are based on an average of two measurements performed by the licensee. The licensee was not able to perform the lung counting due to malfunction of the counting system. Table 1 contains the results of the intercomparison. Based on the intercomparison results, no violations were identified in this area.

7.3 Procedures and Data

The inspector reviewed the licensee's procedures and the contractor's procedures for the operation and calibration of the whole body counting system. Procedures of the licensee and the contractor contain detailed instructions for performing gain checks, source checks, and calibration checks at specified frequencies. Also included in the procedures are acceptance/rejection criteria for the various checks and requirements for use of quality control charts. The inspector reviewed the data for 1984 to date and noted that all quality control checks were performed in accordance with procedural requirements.

No violations were identified in this area.

8. Confirmatory Measurements - Chemistry and Health Physics

8.1 Chemistry

During the inspection, actual liquid, airborne particulates filter, charcoal, and gaseous effluent samples were split between the licensee and NRC Region I for the purpose of intercomparison. The effluent samples were analyzed by the Chemistry Group using their normal methods and equipment, and by the NRC using the NRC Region I Mobile Radiological Measurements Laboratory. Joint analyses of actual effluent samples are used to determine the licensee's capability to measure radioactivity in effluent samples.

In addition, a liquid effluent sample was sent to the NRC reference laboratory, Department of Energy, Radiological and Environmental Sciences Laboratory, for analyses requiring wet chemistry. The analyses to be performed on the sample are Sr-89, Sr-90, gross alpha, and tritium. The results will be compared with the licensee's results when received at a later date and will be documented in an subsequent inspection report.

8.2 Health Physics

An actual airborne particulates filter and charcoal samples were counted by the Health Physics' gamma spectrometry system and by the NRC Region I Mobile Radiological Measurements Laboratory to determine the capability to measure radioactivity in in-plant samples.

8.3 Results

The results of the comparisons are listed in Table 2. The results of the sample measurements comparison indicated that all of the measurements were in agreement under the criteria used for comparing results (see Attachment 1).

The results of an effluent sample liquid radwaste split between the licensee and NRC Region I during a previous inspection on September 19-23, 1983 (Inspection Reports 272/83-29 and 311/83-31), were also compared. The results of the comparison are listed in Table 2. All measurements were in agreement under the criteria used for comparing results except Fe-55. Although the analysis of Fe-55 is not required by the current Technical Specifications, it will be required by the new Radiological Environmental Technical Specifications, which will take effect in the near future. The licensee has anticipated this new requirement and ordered an Fe-55 standard source, which will be used to make spike samples. These samples will be sent to the licensee's contractor laboratory to determine the contractor's capability to measure Fe-55 in effluent samples.

9. Exit Interview

The inspector met with licensee representatives (denoted in Section 1.1) at the conclusion of the inspection on July 29, 1984. The inspector summarized the purpose and scope of the inspection and the inspector findings.

The licensee agreed to perform the analyses listed in Paragraph 8 and report the results to the NRC.

At no time during this inspection was written material provided to the licensee by the inspector.

ATTACHMENT 1Criteria for Comparing Analytical Measurements

This attachment provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgement limits are variable in relation to the comparison of the NRC Reference Laboratory's value to its associated uncertainty. As that ratio, referred to in this program as "Resolution", increases the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement must be considered acceptable as the resolution decreases.

$$\text{RATIO} = \frac{\text{LICENSEE VALUE}}{\text{NRC REFERENCE VALUE}}$$

<u>Resolution</u>	<u>Agreement</u>
< 4	0.4 - 2.5
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
> 200	0.85 - 1.18

TABLE 1

Type of Counting System: APT Chair

Isotope	Organ	NRC Value	Licensee Value Results in Total Nanocuries	HN Value*	Licensee Value NRC Value	HN Value NRC Value
Cs-137	Lung	99	Not Measured	168	N/A	1.7
Co-60	Lung	96	Not Measured	131	N/A	1.4
Cs-137	GI Tract	89	113	202	1.3	2.3
Co-60	GI Tract	86	108	101	1.3	1.2

*HN: Licensee's Contractor

TABLE 2

<u>SAMPLE</u>	<u>ISOTOPE</u>	<u>NRC VALUE</u>	<u>LICENSEE VALUE</u>	<u>COMPARISON</u>
<u>RESULTS IN MICROCURIES PER MILLILITER</u>				
#1 WHUT	H-3	(2.72±0.02)E-2	(2.55±0.26)E-2	Agreement
9-19-83	Sr-89	(3.60±0.14)E-6	(3.7±0.1)E-6	Agreement
	Sr-90	(8.9±0.7)E-8	(8.3±0.6)E-8	Agreement
	Fe-55	(1.1±0.2)E-7	(2.4±0.1)E-5	Disagreement
	Gross Alpha	(1.2±0.2)E-8	<8.0E-8	No Comparison
22CVCSMT	Mn-54	(2.7±0.3)E-6	(3.2±0.2)E-6	Agreement
7-23-84	Co-58	(4.85±0.09)E-5	(5.4±0.2)E-5	Agreement
2320	Co-60	(2.64±0.08)E-5	(3.0±0.2)E-5	Agreement
Unit 2	Cr-51	(2.43±0.10)E-3	(3.10±0.13)E-3	Agreement
RCS	Mn-54	(9.2±1.0)E-5	(9.1±1.4)E-5	Agreement
7-23-84	Co-58	(1.08±0.02)E-3	(1.20±0.03)E-3	Agreement
2250	Co-60	(3.1±0.2)E-4	(2.8±0.2)E-4	Agreement
	Cs-134	(3.06±0.14)E-4	(2.7±0.2)E-4	Agreement
	Cs-137	(4.21±0.17)E-4	(4.1±0.2)E-4	Agreement
	I-131	(9.0±0.2)E-4	(7.8±0.2)E-4	Agreement

84-22186	I-131*	(6.18±0.10)E-11	(6.23±0.05)E-11	Agreement
Charcoal				
Cartridge				
7-21-84				
1428	I-131**	(6.18±0.10)E-11	(5.29±0.06)E-11	Agreement
24 GDT				
7-23-84				
1940	Xe-133	(2.70±0.02)E-2	(2.82±0.04)E-2	Agreement

*Health Physics Gamma Spectrometry Result

**Chemistry Gamma Spectrometry Result

TABLE 2

<u>SAMPLE</u>	<u>ISOTOPE</u>	<u>NRC VALUE</u>	<u>LICENSEE VALUE</u>	<u>COMPARISON</u>
<u>RESULTS IN MICROCURIES PER FILTER</u>				
Unit 2 RCS	Cr-51	(4.71±0.06)E-1	(4.0±0.3)E-1	Agreement
Crud Filter	Mn-54	(8.0±0.4)E-3	(7.5±0.4)E-3	Agreement
7-23-84	Co-58	(1.425±0.013)E-1	(1.260±0.010)E-1	Agreement
2250	Co-60	(4.04±0.09)E-2	(3.24±0.07)E-2	Agreement
	I-131	(2.6±0.2)E-3	(2.0±0.3)E-3	Agreement

RESULTS IN MICROCURIES PER MILLILITER

84-22186	Co-58	(2.7±0.3)E-9	(3.8±0.2)E-9	Agreement
Particulate				
Filter	Co-60	(6.3±0.4)E-9	(7.0±0.3)E-9	Agreement
7-21-84	Cs-134	(4.3±0.3)E-9	(5.3±0.2)E-9	Agreement
1428				
Health				
Physics	Cs-137	(1.18±0.03)E-8	(1.5±0.3)E-8	Agreement