

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-272/91-25
50-311/91-25

Docket Nos. 50-272
50-311

License Nos. DPR-70
DPR-75

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

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

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: September 9-13, 1991

Inspector: R. L. Nimitz 9/25/91
R. L. Nimitz, CHP, Senior Radiation Specialist Date

Approved by: W. J. Pasciak 9-26-91
W. J. Pasciak, Chief, Facilities Date
Radiation Protection Section, DRSS

Inspection Summary: Inspection on September 9-13, 1991 (NRC Combined
Inspection Report Nos. 50-272/91-25; 50-311/91-25)

Areas Inspected: This inspection was a routine, unannounced radiological controls inspection. The following areas were reviewed: licensee action on previous findings; external and internal exposure controls, radioactive material and contamination controls, outage performance, planning and preparation for the Unit 2 refueling outage and 10 year in service inspection activities, and control room habitability.

Results: One non-cited violation was identified. The violation involved worker adherence to procedures and completion of fuel receipt data sheets (Details Section 3.5 and 4.0). The inspector identified good planning and preparation for the upcoming Unit 2 outage, a well documented evaluation of the radiological controls performance for the last Unit 1 outage and generally good radioactive material and contamination controls. There appeared to be a need for enhanced supervisor oversight of counting room activities. One unresolved item associated with control room habitability was identified (Details Section 7.0).

DETAILS

1.0 Individuals Contacted

1.1 Public Service Electric and Gas Company

- *E. H. Villar, Licensing Engineer
- *V. Polizzi, Operations Manager, Salem
- *T. Cellmer, Radiation Protection/Chemistry Manager, Salem Station
- *J. Wray, Radiation Protection Engineer, Salem
- *P. Duca, Delmarva Power
- *E. Katzman, Principal Engineer
- *E. Galbraith, Chemistry Engineer, Salem Station
- *J. Clancy, Radiation Protection/Chemistry Manager, Hope Creek Station
- *E. Karpe, Senior Radiation Protection Supervisor-ALARA, Hope Creek Station
- *D. Lyons, Technical Engineer, Salem Station
- *J. Webster, Unit 1 Outage Manager, Salem Station

1.2 NRC Personnel

- *S. Pindale, NRC Resident Inspector, Salem Station
- *S. Barr, NRC Resident Inspector, Salem Station

The inspector also contacted other individuals during the course of this inspection.

*Denotes those individuals attending the exit meeting on September 13, 1991.

2.0 Purpose and Scope of Inspection

This inspection was a routine, unannounced Radiological Controls Inspection. The following areas were reviewed:

- the licensee's actions on previous findings;
- external exposure controls;
- internal exposure controls;
- Unit 1 outage performance;
- planning and preparation for the Unit 2 outage including 10 year in service inspection activities;
- radioactive material and contamination controls;
- new fuel receipt and handling; and
- review of a personnel exposure to ammonia gas.

3.0 Licensee Action on Previous Inspection Findings

- 3.1 (Open) Unresolved Item (50-272/91-08-01; 50-311/91-08-01): The licensee did not have a well defined radiation protection supervisor training program. The licensee was in the process of developing a radiation protection supervisor training program.

The program, according to the licensee's Radiation Protection Engineer, will define applicable requirements (e.g., specific procedure knowledge) prior to assuming assigned responsibilities. The program will also identify individuals authorized to approve personnel qualifications. The program is expected to be completed by December 31, 1991.

- 3.2 (Closed) Violation (50-272/91-13-01; 50-311/91-13-01): The licensee's personnel did not follow radiation protection procedures. The licensee did not verify that a vendor was authorized to receive a shipment of material that exhibited low levels of contamination. The inspector reviewed this matter with respect to the corrective actions outlined in the licensee's July 18, 1991, letter (NLR-N91124) to the NRC. The inspector's independent review indicated the licensee verified that the vendor was authorized to receive the radioactive material, the licensee obtained updated copies of applicable licenses, and the licensee revised applicable procedures to provided for verifications prior to shipment. The licensee also trained appropriate personnel on the revised procedures. This item is closed.
- 3.3 (Closed) Violation (50-272/91-08-02; 50-311/91-08-02): The licensee's personnel did not follow radiation protection procedure relative to personnel monitoring. The inspector reviewed this matter with respect to the corrective actions outlined in the licensee's April 25, 1991, letter (NLR-N91074) to the NRC. The inspector's independent review indicated that the licensee revised applicable radiation protection procedures to enhance guidance for relocation of dosimetry when working in dose rate gradients and trained appropriate personnel on the revised procedures. The licensee also revised the radiation protection and chemistry department work standards document to ensure consistent application of work standards during supervisor tours and observations of field activities. This item is closed.
- 3.4 (Closed) Unresolved Item (50-272/91-08-03): NRC to review the basis for suspension of surveys of material removed from steam generators during the Unit 1 outage. The licensee had provided the workers alarming dosimeters and a survey meter to check their hands after handling material. However, the meter was not periodically source checked for operability. Also, it was not apparent that the alarming dosimeters provided adequate assurances that workers would not handle highly radioactive small objects. The inspector noted on-going eddy current testing may alter the radiological environment.

The licensee subsequently re-initiated surveys of equipment that was removed from steam generator bowels pending review of survey results. The inspector's review of the data did not identify any anomalies. The licensee was reviewing survey plans for the Unit 2 outage to provide for appropriate surveys but yet minimize radiation protection technician exposures during surveys of material. This was considered a good initiative. Preliminary licensee reviews and plans indicated a potential for use of robotics for routine survey activities. This item is closed.

- 3.5 (Closed) Unresolved Item (50-272/90-02-01): NRC to review circumstances associated with three workers entering the radiological controlled area on December 4, 1989, without alarming dosimeters. The inspector's review indicated the workers realized they had inadvertently entered the area, notified radiation protection personnel, and obtained appropriate dosimeters. The workers had signed the original RWP but did not obtain a direct reading dosimeter. The licensee uses an electronic dosimeter for this purpose which is obtained by zeroing the device on an issue reader. This also logs them into the radiological controlled area. The workers did not obtain the dosimeters but entered the RCA with supplementary dosimetry. The workers had not entered a High Radiation Area. The licensee issued a radiological occurrence report, performed a human performance evaluation of this matter and counseled the involved workers. The licensee also included the event in site access training.

The inspector noted that the licensee's radiation protection procedure (RP) 301, Revision 1, Personnel Radiation Monitoring Requirements, states in section 7.2, that personnel shall wear at least one direct reading dosimeter device along with a thermoluminescent dosimeter. The inspector noted that the workers did not have dosimeters (integrating alarming dosimeters) and entered the RCA. The inspector concluded that this was a violation of Technical Specification 6.11 which requires that radiation protection procedures be adhered to. As a result, this unresolved item (50-272/90-02-01) is closed for administrative purposes. Because this matter had minor safety significance, was identified by the licensee and appropriate corrective actions were taken, in accordance with 10 CFR Part 2, Appendix A, Section V, Enforcement Actions, no Notice of Violation is issued (NCV 50-272/91-25-01). This item is closed.

4.0 New Fuel Receipt

The inspector reviewed the implementation of radiological controls for receipt of new fuel at Unit 2. The fuel will be loaded into the Unit 2 reactor during the Unit 2 outage. The outage was scheduled to commence in January 1992. The following matters were reviewed:

- external and internal exposure controls;
- contamination controls;

- calibration and performance checking of contamination monitoring equipment particularly alpha radioactivity monitoring equipment; and
- surveillance testing of criticality monitors.

The review was with respect to criteria contained in:

- Unit 2 Technical Specification Table 4.3-3, Radiation Monitoring Instrumentation Surveillance Requirements;
- Procedure RP 1104, Nuclear Fuel Inspections, Revision 1; and
- Procedure RP 502, Routine Operation of Radiation Protection/Chemistry Counting Facility, Revision 3

The evaluation of the licensee's performance in this area was based on discussions with cognizant licensee personnel and review of documentation. The licensee performed appropriate surveillance of criticality monitors. The following matters were brought to the licensee's attention:

- The licensee performed daily source checks of the alpha radioactivity smear counters that were used to check fuel receipt materials, including new fuel, for alpha radioactivity. The procedure controlling the source check operation (RP 502) indicated that any source measurements that fall outside of plus or minus (+/-) 2 standard deviations (SDs), should initiate a recount. If the recount still falls outside +/- 2 SDs, the instrument should be taken out of service. The inspector review of source check data and discussions with personnel indicated the following:
 - The acceptance criteria on the data sheet (RP 502, Attachment 12.2) for the source check used during fuel receipt was illegible.
 - A radiation protection technician who had signed off data as meeting acceptance criteria indicated the acceptance criteria was illegible. The radiation protection technician did not know the correct acceptance criteria as specified in procedures. The technician assumed +/- 3 SDs.
 - The supervisor responsible for the area also did not know the correct acceptance criteria. He also assumed +/- 3 SDs.
 - On August 13, 1991, the source check for an alpha smear counter (SAC-4 No. 491) was outside +/- 2 SDs and no recount was identified on the instrument's control chart.

- On August 14, 1991, two source checks on the alpha smear counter (SAC-4 No. 491) were outside +/- 2 SDs and the instrument (SAC-4 No. 491) was not taken out of service. The instrument continued to be used until August 23, 1991, when the instrument was taken out of service by a supervisor when its performance was questioned.
- The procedure did not require placing the instrument out of service but only recommended that it be placed out of service if acceptance criteria were not met.

The inspector concluded that procedures for source checking of counting instruments did not provide required action points for removing an instrument from service when its performance was in question and that all personnel using the counting equipment were not familiar with procedure specified acceptance criteria.

The above indicated an apparent need for enhanced supervisor oversight of the operation of the counting room. The licensee issued a night order to appropriate personnel on September 12, 1991, regarding the need to take instruments out of service that do not meet the +/- 2 SDs acceptance criteria.

- The licensee documented radiological survey data associated with fuel receipt on procedure form RP 1104, Attachment 12.2. Procedure RP 1104, Revision 1, specifies in Section 7.2, Unloading and Unwrapping Fuel Assemblies, that the surface of fuel assemblies were to be smeared after they have been unwrapped and that the maximum smear result was to be recorded on Attachment 12.2. The inspector noted that the unwrapped maximum smear data was not recorded on Attachment 12.2 for fuel assembly XM-06 on August 22, 1991. However, the data sheet had been signed off by a supervisor. Inspector discussions with the supervisor indicated the smear had been taken but that the data was not entered. The technician who performed the surveys also indicated the smear was taken. The supervisor requested that the data be filled in when he reviewed it but as of September 11, 1991, the data sheet was not completed as required by procedure.

The licensee re-smearred the subject fuel element on September 11, 1991, filled in the data sheet and counseled all radiation protection supervisors of the need to complete procedure requirements. This matter was considered a violation of Technical Specification 6.11 which requires that radiation protection procedures be adhered to.

Since this matter had minor safety significance and the licensee took appropriate corrective actions, no Notice of Violation was issued for this matter, as outlined in 10 CFR Part 2, Appendix A, Section V, Enforcement Actions. (NCV 50-311/91-25-01)

5.0 Outage performance and Outage Planning

5.1 Outage Performance

The inspector reviewed selected matters associated with the licensee's Unit 1 refueling outage that occurred during the period February 9, 1991 through April 26, 1991. The following matters were reviewed:

- performance of post-job evaluations of completed work activities particularly those that contributed the majority of total aggregate exposure during the outage;
- external and internal exposure controls including anomalous exposure values, mismatches between personnel thermoluminescent dosimetry results and pocket dosimetry (e.g. self-reading dosimeters), and apparent intakes of airborne radioactivity;
- personnel contamination control efforts; and
- station contamination controls.

The following positive observations were made:

- The licensee developed a comprehensive post outage report dated August 22, 1991, which was distributed to station management. A copy was sent to the Vice-President Nuclear. The report summarized the outage from an exposure control and performance standpoint. Lessons learned were identified and tracked for resolution.
- The licensee used a bonus/penalty contract arrangement with the vendor.
- The licensee issued an ALARA performance indicator report daily which "graded" work activities. The grade included consideration of various radiological performance matters.
- An outage incentive program was developed whereby personnel could earn points toward additional days off.
- The licensee solicited comments from station staff after the outage to identify areas for improvement
- The licensee maintained good contamination controls during the outage. The licensee entered the outage with 6% of applicable floor space contaminated and exited the outage with 4.5%. The maximum value sustained was 6.5%

- The licensee closely tracked personnel contaminations during the outage. A total of 119 personnel contaminations were identified relative to an outage goal of 80. The licensee took corrective actions (e.g. counseling contractor personnel) when personnel contamination rates increased.
- There were no unplanned or anomalous personnel external exposure results.
- Although the licensee did experience elevated airborne radioactivity on the steam generator work platforms during certain work evolutions, there was no significant intakes of airborne radioactivity during the outage.
- The licensee's Unit 1 outage exposure goal was 230 person-rem. The licensee sustained 289 person-rem (by pocket dosimeters). The additional exposure was attributable to out of scope work.
- The licensee has been aggressively controlling generation of radwaste. Actions taken include use of ion selective water clean up methods, prevention of unnecessary material entering the radiological controlled area, and aggressive supervisor oversight. For example, in 1990 the licensee shipped for burial about 82 cubic meters of radioactive waste which was well below industry averages.

In addition, the inspector noted that the total station occupational personnel exposure for 1990 was 272 person-rem as compared to an industry three year average (1988-1990) of 640 person-rem for a two unit site. The licensee has projected an aggregate exposure for the station of 350 person-rem for 1991. The above information indicates good efforts by the licensee to minimize personnel exposure, radwaste and contamination.

5.2 Outage Planning and Preparation

The inspector reviewed the planning and preparation for the Unit 2 cycle 6 refueling outage scheduled to commence in early January 1992. The outage will span about 75 days and include a 10 year in service inspection. The in service inspection will include off-loading of the reactor core, removal and inspection of the core barrel and non-destructive examination of the reactor vessel. The inspector evaluated the licensee's performance in this area by review of documents and discussions with personnel. The following matters were noted:

- The licensee's ALARA personnel have conducted several meetings to determine the full scope of work and initiate ALARA planning. In particular, attention has been directed toward the steam generator work which historically accounted for about 40% of the aggregate exposure sustained during previous outages.

- To identify areas program enhancement, the licensee sent personnel to other stations. Stations visited included Surry, North Anna, Millstone, Seabrook and Indian Point.
- The licensee was establishing ALARA implementing procedures. Previously the licensee used a station ALARA administrative procedure for program guidance.
- The licensee is currently drafting the augmented organization structure for the outage.
- The licensee enhanced computer programs for report generation and established an ALARA awareness campaign.
- The licensee is currently training personnel on the revised 10 CFR 20, Standards for Protection Against Radiation.

The inspector concluded that good efforts were underway to plan and prepare for the Unit 2 outage and 10 year in service inspection.

6.0 Radiological Controls

The inspector toured the radiological controlled area (RCA) during the inspection. The following matters were reviewed.

- posting barricading and access control (as applicable) to Radiation and High Radiation Areas;
- contamination controls;
- use and positioning of personnel radiation monitoring devices;
- use of appropriately checked radiation survey instrumentation; and
- posting, labeling and control of radioactive material.

The evaluation of the licensee's performance in the area was based on review of documentation and discussions with cognizant personnel. The inspector also made independent radiation dose rate measurements during plant tours.

Within the scope of this review, no violations were identified. The following matter was brought to the licensee's attention:

- A 10:00 a.m. on September 9, 1991, the inspector observed oil leaking from the No.11 Monitor Tank Pump (elevation 64 foot Auxiliary Building). The oil ran from a contaminated area to a clean area. The oil was smear checked for contamination, found non-contaminated and cleaned up.

7.0 Control Room Habitability Concern

The inspector reviewed the circumstances surrounding the reported detection (by smell) of ammonia by an NRC inspector during an NRC inspection on August 14, 1991. In addition, the inspector also reviewed the control of ammonia relative to control room habitability. The evaluation of the licensee's performance in this area was based on discussions with personnel, review of documentation and tours of the ammonia storage location and vent location.

The following observations were made:

- The event occurred on August 14, 1991, during filling of the 3,000 gallon ammonia storage tank located in the Unit 1 Turbine Building. Ammonia vapor, from a roof top vent was apparently drawn into the Turbine Building supply duct located down wind, at that time, from the vent.
- Because the licensee had experienced some personnel detection of ammonia during a previous filling operation, the licensee had routed the vent to an area farther away from the supply duct and had personnel standing by to collect airborne ammonia samples.
- The licensee postulated that a wind shift had blown the ammonia vapor toward the supply duct.
- The licensee's sampling for ammonia vapor did not indicate that personnel were exposed to concentrations in excess of allowable eight hour concentration values or short term allowable exposure values.

The licensee initiated a number of actions relative to this matter as follows:

- The event was discussed at the Salem Accident Prevention Committee Meeting on September 10, 1991.
- To minimize the possibility of inadvertent exposure of personnel to ammonia vapor, the licensee implemented a number of interim actions. These included delivery of ammonia on back shifts, assignment of additional chemistry personnel to the observation of off-loading of ammonia, placement of warning signs on elevations 100 and 120 foot of the turbine buildings to prevent personnel access, assignment of a safety representative to conduct air monitoring and assignment of the cognizant system engineer to the off-loading to provide technical guidance and gather information for use in generating long term corrective actions.

In addition to the above, the inspector made the following observations relative to ammonia impact on control room habitability:

- The licensee's updated Final Safety Analysis Report did not discuss ammonia impact on control room habitability.
- It was not apparent that the licensee addressed on site storage of ammonia in his July 1, 1980, response to NUREG 0737 item III.D.3.4.

The licensee subsequently completed a preliminary safety assessment of the ammonia storage on control room habitability and concluded no significant habitability problems, relative to ammonia, were present.

The inspector further discussed this matter with the licensee's station licensing personnel during a September 23, 1991, telephone conversation. During the telephone conversation, the licensee's Principal Engineer-Licensing, Mr. Ray Brown, indicated that the following actions would be taken:

- Within 30 days following receipt of the letter transmitting this inspection report, the licensee will provide, in a letter to the NRC:
 - the results of the preliminary safety assessment of on site storage of ammonia on control room habitability;
 - a summary of other toxic chemicals, not previously evaluated and stored on site, that could potentially affect control room habitability and a discussion as to the planned actions relative to the identified toxic chemicals and their potential impact on control room habitability.

The licensee's personnel indicated that the final safety analysis for the control room habitability, relative to ammonia storage, would be completed by December 31, 1991. The licensee's representatives also indicated that the Final Safety Analysis Report would be updated with the new information (relative to ammonia) on control room habitability in July 1992. The above items were considered an unresolved item (50-272/91-25-02).

8.0 Exit Meeting

The inspector met with the licensee's representatives denoted in section 1 of this report on September 13, 1991. The inspector summarized the purpose, scope and findings of the inspection. No written material was provided to the licensee.