U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-272/94-20; 50-311/94-20; 50-354/94-20

Docket Nos. 50-272, 50-311, 50-354

License Nos. DPR-70, DPR-75, NPF-57

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

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

Inspection At: Hancock's Bridge, New Jersey

Inspection Conducted: August 29 - September 2, 1994

Inspector: _____ 9/28/94
J. Noggle, Senior Radiation Specialist date

Approved by: _____ 10/11/94
R. Bores, Chief, Facilities date
Radiation Protection Section

Areas Reviewed: The inspection was an announced review of the solid radwaste processing and radioactive material transportation programs at Salem and Hope Creek Generating Stations. Areas reviewed included: radwaste processing, preparation and shipment of radioactive material, and onsite storage of radioactive wastes. The inspection consisted of observations of onsite activities, interviews with personnel, and selective examinations of procedures and representative records by the inspector.

Results: The licensee's solid radwaste and transportation programs at both Salem and Hope Creek Generating Stations were of very good quality. There were two events involving the release of contaminated material that were reviewed during this inspection. One of the two events involved contamination of two individuals and resulted in a violation. The first event, reported by the licensee staff at Salem Generating Station, involved an operating procedure weakness in the use of an automatic equipment survey monitor. This event proved to be of limited safety significance, was adequately resolved by the licensee, and merited the exercise of NRC enforcement discretion. The second event, identified and reported by the licensee staff at Hope Creek Generating Station was documented in a previous NRC inspection report (No. 50-354/94-13) as an unresolved item. This event occurred on July 14-15, 1994 and involved the contamination of two painters as a result of contact with a contaminated ladder found outside the radiologically controlled area (RCA). The licensee has completed its review of this incident, but had not determined how the contaminated ladder had been released from the RCA. While corrective/preventive actions were implemented by the licensee, without a root

cause determination regarding the release of contamination, the effectiveness of the actions cannot be determined at this time. Accordingly, this does not warrant the exercise of enforcement discretion. This event is a violation of 10 CFR 20.1801, failure to secure licensed material from unauthorized removal from a controlled area.

DETAILS

1.0 Individuals Contacted

* L. Catalfomo, Salem Operations Manager
* T. Cellmer, Salem Radiation Protection and Chemistry Manager
* R. Gary, Hope Creek Senior Radiation Protection Supervisor - Operations
* A. Giardino, Manager - Quality Assurance Programs and Audits
* M. Gross, Salem Quality Assurance Principal Engineer
* W. Hunkele, Salem Radiation Protection Senior Supervisor - Radwaste
* E. Karpe, Quality Assurance Programs and Audits Principal Engineer
* C. Manges, Hope Creek Licensing Engineer
* M. Prystupa, Hope Creek Radiation Protection Manager
* D. Ruyter, Salem Senior Radiation Protection Supervisor
* A. Schettino, Hope Creek Quality Assurance

Other individuals were contacted or interviewed during the inspection.

* Denotes those individuals attending the exit meeting on September 2, 1994.

2.0 Two Contaminated Equipment Release Events

2.1 On August 12, 1994, the radiation protection (RP) staff at Salem Station detected 500 net counts per minute (cpm) while performing a direct frisk survey of a load cell that was being prepared for offsite shipment to a calibration facility. No removable contamination was detected. The load cell had been previously released from the radiologically controlled area (RCA) through the use of an automatic equipment survey monitor (Nuclear Enterprises, Inc., Small Article Monitor) on July 6, 1994. The licensee found that the vendor manual indicates the Small Article Monitor (SAM) will automatically begin a background count when the door is closed and a count is not initiated within 10 seconds. Therefore, if an article is placed in the SAM and greater than 10 seconds passes before initiating a count, the instrument will update the background count to include the radiation contribution from the enclosed article. In the subsequent count of the article, the SAM will subtract the artificial background with the result that no radioactivity may be detected and the contaminated article may be released from the RCA.

The licensee implemented the following immediate corrective actions for use of the SAM.

- Issuance of a radiation protection supervisory directive on August 12, 1994 to inform the RP staff of the 10-second requirement for initiating operation of the SAM.
- Posting each SAM with instructions to initiate counting within 10 seconds.
- Re-instatement of a free-release log to record each article surveyed and released from the RCA. The use of this log had been discontinued from July 20, 1994 through August 12, 1994.
- Conducting comparative monitoring of articles using the SAM and a direct frisk using a conventional pancake Geiger-Mueller detector

for an unspecified time to note any other counting disparities with the use of the SAM.

- Conducting radiological surveys of onsite tool/equipment storage areas that consisted of passageway contamination surveys and approximately 10-20% surveying of "clean" tools and equipment. (No detectable contamination was found.)
- Retrieving and resurveying twelve suspect tools that were listed on the free-release log. (No detectable contamination was found on these tools.)

The inspector reviewed with the licensee the subsequent technical evaluation of the instrument's limitations. The inspector determined that the manufacturer-supplied instrument manual did specify the need for counting items within 10 seconds of placing them inside. The licensee had not captured this into a procedural requirement. In late 1991, the licensee had modified each SAM to require a remote count initiation signal to be provided by an RP technician located on the uncontrolled side of the RCA boundary. This unique instrument modification introduced a time delay as a result of the worker-RP technician interface required before an item was counted.

Further licensee technical evaluations determined that upon reaching a total count of $\geq$ 41,000 dpm, the instrument enters a high background alarm condition and places itself out of service. Several contaminated tools were used by the licensee to correlate this alarm level with frisker levels and the licensee determined that, depending on tool geometry differences, a SAM indication of 41,000 dpm under a low background condition, correlated with between 3,000 and 6,000 dpm as measured by a frisker direct survey. This level is above the station's release level of 1,000 dpm, however, because the SAM shutoff value is not orders of magnitude higher, the potential for release of safety significant levels of contamination was determined to be remote. The licensee had responded appropriately to the event, determined this to be an isolated event and took effective corrective actions to preclude recurrence. This fulfills the conditions of 10 CFR 2, Appendix C, Section VII for a non-cited violation of 10 CFR 20.1501, failure to survey, with respect to 10 CFR 20.1801, to provide control of licensed material.

2.2 A second event, reported by the licensee staff at the Hope Creek Generating Station, was documented in a previous NRC inspection report No. 50-354/94-13 as an unresolved item. This event occurred on July 14-15, 1994 and involved the contamination of two painters, apparently by contact with a contaminated ladder found in the fire water pump house that was outside of the RCA. Subsequent to the event, a direct frisk survey of the ladder by the licensee indicated most surfaces of the ladder were contaminated to 50,000 dpm, with removable contamination of 6,000 - 15,000 dpm/100 cm^2 on the ladder feet and steps, and 45,000 - 120,000 dpm/100 cm^2 removable contamination on the ladder side rails.

The licensee decontaminated the workers, returned the ladder to the RCA and initiated an investigation. At the time of the inspection, the licensee had completed this investigation and provided the inspector with the resulting conclusions and corrective actions. The licensee determined that the ladder had been previously stored in an uncontrolled sea-van containing miscellaneous maintenance equipment located in the Hope Creek yard area. The licensee also determined that the ladder had been previously used inside the RCA, and concluded that it could not have been surveyed prior to removal from the RCA, but could not determine how it had been removed without the prerequisite surveys. In addition to the immediate corrective actions mentioned above, the licensee provided the following additional corrective actions.

- The other equipment in the subject sea-van was surveyed and no contamination was detected.
- Other Hope Creek Station tool and equipment unrestricted storage areas were surveyed with no additional contaminated equipment reported.
- Tool box meetings were held by RP with other station departments. Radiation protection stressed the need for surveying equipment prior to removal from the RCA. The licensee also plans to include the incident in future contractor training.
- The licensee plans to provide for controlled area equipment storage areas on Turbine Building 77-foot elevation for future outages to minimize the amount of equipment to be surveyed and released from the RCA.
- The licensee plans to label all ladders in the RCA, "RCA Use Only", and to restrict their use accordingly.

The inspector determined that the contaminated painters were not subjected to any radiation exposure of safety significance and would not require monitoring or recording. The inspector determined that since the licensee has not discovered how the ladder had been removed from the RCA, corrective actions to preclude a similar event from occurring in the future as described above, may not be adequate. The failure to secure licensed material, the contaminated ladder, from unauthorized removal from a controlled area is a violation of 10 CFR 20.1801 (VIO 50-354/94-20-01).

3.0 Radiation Protection Organization Change

The licensee announced that the Radiation Protection Manager (RPM) at Salem Generating Station and the Principal Engineer for Radiation Protection Support were scheduled to exchange positions on September 12, 1994. Both individuals' qualifications were reviewed by the inspector with respect to Regulatory Guide 1.8, Revision 1, and were determined to meet the qualification requirements for the positions. No discrepancies were noted with respect to this organization change.

4.0 Radwaste/Transportation Organization

The radwaste/transportation organization consists of separate staffs at Salem and Hope Creek Stations. Each station provides independent solid radwaste processing and shipment preparation activities. The Salem Station staff provides final shipment documentation for the radwaste shipments originating out of both stations. Radioactive material shipment records are independently prepared by each radwaste/transportation organization. The Hope Creek Station staff is responsible for managing the onsite low level radwaste storage facility (LLRWSF). Both organizations consist of well qualified individuals with no turnover of personnel for many years. No safety concerns or violations were identified.

5.0 Audits and Surveillances

The inspector reviewed the latest radwaste/transportation program audit as required by Technical Specifications on a biennial basis. The latest audit, No. 94-152, was performed between May 16 and June 1, 1994. There were no findings reported, with areas for improvement noted in: developing double accountability at administrative interfaces, further developing program self-assessments, and in reducing the amount of shipping documentation retained for record retention purposes. The inspector reviewed these areas and determined that the audit recommendation for eliminating specific shipping record documentation was inappropriate, since the document examples mentioned in the audit are needed to demonstrate compliance with specific regulations, and need to be maintained. Upon further review of the audit, the inspector determined that the technical depth of the audit review was limited. The inspector learned that there were no technical specialists on the audit team. Although many technical areas were reviewed during the audit, the audit team relied in some instances on staff members in the program area to self-report technical weaknesses. This did not provide for an entirely independent technical review of the program area. The licensee indicated that a technical specialist was originally scheduled to participate in the audit, but became unavailable at the scheduled time. The licensee decided to conduct the audit as originally scheduled instead of rescheduling the audit. The licensee indicated that in the future, the radwaste audits would be conducted with an independent technical specialist(s) to ensure quality radwaste/transportation programs at Salem and Hope Creek Stations are maintained.

The licensee provided surveillances for every radioactive material or radwaste shipment that left the facility. The inspector reviewed selected radwaste shipping surveillances provided by the licensee and determined that they were very focused and of very good quality.

In summary, the licensee has provided excellent oversight of radioactive shipments leaving the station, which ensured that all shipments were made within the applicable regulations. The evaluation of the radwaste processing, sampling, and package preparation aspects of the program

relied on the biennial evaluation by an audit that was found to be technically shallow. Overall, the quality oversight of this program area was adequate.

6.0 Training

The inspector reviewed the training provided to the licensee's authorized radioactive material shippers to ensure an adequate level of expertise in the NRC and DOT regulations was maintained (as specified in IE Bulletin 79-19). The licensee conducted a 3-hour course on radioactive material shipping during July through September 1994, which was provided to all the RP technicians and radwaste supervisors at both stations. The inspector reviewed the lesson plan and examination and determined that this course was a good review of basic shipping preparation requirements for RP technicians. The inspector reviewed the training records for those personnel designated as the signatories for Salem and Hope Creek radioactive shipments and determined that these individuals had not received radioactive shipping regulation training during the last 3½ to 5 years. The licensee's commitment to IE Bulletin 79-19 specifies periodic retraining. The licensee agreed that 3½ to 5 years was too long. Both Hope Creek and Salem Stations committed to providing comprehensive NRC and DOT radioactive shipping regulation training within the next year. This will be reviewed in a future inspection.

7.0 Radwaste Processing

7.1 Salem

The Salem Generating Station generated a total of 76.57 meters$(m)^3$ of radwaste for burial during 1993. This consisted of 9.1 m^3 of resin, 4.8 m^3 of filters and 62.7 m^3 of dry active waste (DAW). From January through July of 1994 the licensee has generated 3.4 m^3 of primary resin, 5.7 m^3 of radwaste resin, and 17.5 m^3 of DAW for a total of 26.6 m^3. The licensee has shown a continuing downward trend in radwaste generation since 1983 when 78,000 m^3 of radwaste were produced.

Salem Generating Station produces primary resin wastes, various filter cartridge wastes, and various contaminated trash, also known as dry active waste (DAW). In addition, miscellaneous waste water is processed through a vendor-supplied filter/demineralizer system. All spent primary resins and vendor-processed spent resins are dewatered in polyethylene containers according to procedure parameters that ensure less than 1% free standing water remains in these containers. The DAW materials are collected and shipped off site to Scientific Ecology Group (SEG), Inc. for waste segregation and incineration. Prior to the closure of the Barnwell Low Level Waste Storage Facility on June 30, 1994, SEG shipped the resultant ash for burial at Barnwell. Future DAW shipments to SEG will result in the waste ash being returned to Salem Generating Station for onsite storage. At the present time, no such return shipments have been made.

7.2 Hope Creek

The Hope Creek Generating Station produced 164 m^3 of radwaste burial volume for 1993, which consisted of 140 m^3 of resin and 24 m^3 of DAW. This DAW value represents a factor of approximately ten in volume reduction through offsite segregation and incineration. From January through July 1994, the licensee has generated 102 m^3 of resin and 78 m^3 of DAW for a total of 179 m^3 after volume reduction. Hope Creek Station has experienced a downward trend of radwaste produced from 303 m^3 in 1988, to 164 m^3 for 1993. Since 1994 included a refueling outage, an increase in radwaste production was expected for this year.

Hope Creek Generating Station produces reactor water cleanup resins and utilizes a vendor-supplied dewatering service to ensure the resins do not contain more than 1% free standing water. The equipment drain liquid wastes are processed through mechanical filters with the backwash sludge processed through the asphalt-extruder solidification system. Currently, the floor drain liquid wastes are processed through powdered resin filters that are also processed through the asphalt-extruder system. The licensee plans to modify the floor drain waste processing system within the next year to replace the powdered resin filter with a mechanical filter as was previously done for the equipment drain system. This modification should result in further solid radwaste reduction. All of the Hope Creek Station sludges and resins (except for the reactor water cleanup resins) are solidified through the asphalt-extruder system in a batch mode process. Each batch is sampled and analyzed by Chemistry to ensure proper pH, that there is negligible oil content in the waste material, and to determine the correct asphalt addition ratio. The wet waste material enters the asphalt-extruder and is heated to drive off all remaining liquid and melted asphalt is mixed with the solid waste product. The resulting mixture is collected into 55-gallon drums that are permanently capped and sealed in a remotely operated drum capping aisle. The filled waste containers are stored in a drum storage vault awaiting transfer to the onsite low level radioactive waste storage facility (LLRWSF).

The inspector reviewed selected licensee-supplied batch sampling records, asphalt sampling analytical records, waste-to-asphalt mixture ratio determination records, and control and accountability records for these radwaste storage drums. All records reviewed indicated that the appropriate process control parameters were met as specified in the Hope Creek Station Process Control Program. The inspector noted that since the licensee originally tested the product results in 1987, the final product has not been re-evaluated to ensure an appropriately stable waste form has been obtained. The licensee has been relying on sampling the waste input, verifying the quality of the asphalt product input, and meeting the prescribed waste-to-asphalt mixture ratios to achieve a stable waste product. In addition, temperature controls were maintained during waste processing. The licensee has a closed circuit television camera system to observe the waste material as it flows into the waste drums in order to verify that the waste material is flowing out of the asphalt-extruder and to verify that each waste drum is completely

filled. Actual waste stability testing of the final waste product was not performed and is not a requirement. However, due to the current requirement for extended onsite radwaste storage for at least 5 years, the licensee has the opportunity to test the waste product over time to provide analytical data for certifying the bitumenous waste as a stable waste form for future disposal in a State of New Jersey low level radioactive waste burial site. The licensee has not, as yet, begun operation of the onsite LLRWSF and is evaluating the capability to sample this bitumenous waste product on a periodic basis in order to demonstrate waste stability performance. This area will be reviewed during a subsequent inspection. No safety concerns or violations of NRC requirements were identified.

8.0 Transportation

The following radioactive material and radioactive waste shipment records were reviewed by the inspector.

Shipment No.	Activity (Ci)	Volume (Ft^3)	Type
HC 93-16	610	120.3	Powdered Resin
HC 94-06	109	105	Bead Resin
HC 94-26	287	120.3	Bead Resin
HC 94-41	35.1	91	Bead Resin
HC 94-42	1E-2	1280	Snubbers
HC 94-43	5E-5	226	Oil
HC 94-45	134	120.3	Powdered Resin
HC 94-46	8.3	205.8	DAW
Salem 94-40	5E-7	1	Instruments
Salem 94-30	6E-2	2560	DAW
Salem 94-17	103	120.3	Resin
Salem 94-11	<1E-7	1	Sample
Salem 94-09	1E-1	300	DAW
Salem 94-04	<1E-7	1280	Metal
HC 94-34	3.8E-3	1	Samples
HC 94-31	4E-8	1	Samples
HC 94-30	4E-5	1	Oil Samples
HC 94-21	2E-3	9	Resin
HC 94-22	2.4E-1	872	DAW

All shipping records were determined to be complete and to meet the applicable requirements of 10 CFR Parts 20, 61, 71, and 49 CFR Parts 171-178. The inspector reviewed the shipping casks' Certificates of Compliance and verified that all consignee licenses were on file as required. No safety concerns or violations were identified.

9.0 Onsite Radwaste Storage

The licensee is nearing completion of a low level radioactive waste storage facility (LLRWSF) for the onsite storage of solid radioactive wastes generated by both Salem and Hope Creek Stations. This facility is 68' X 266' and consists of a concrete and steel structure designed to hold 1870 m^3 of radwaste, which will provide for at least five years' storage capacity. This is a seismically designed 28-foot high building consisting of one-foot thick concrete walls and an internal west vault area consisting of two-foot thick concrete walls with 1½-foot thick concrete roof slabs to accommodate the higher activity waste resin liners and bitumenous waste drums. The larger east vault area is designed for the storage of DAW containers. All wastes are to be stored in containers that are sealed and externally free of contamination. The building has been designed with a remotely operated overhead crane, a 740-gallon per minute ceiling-mounted wet sprinkler system for fire protection, and an isolated building sump for collection and sampling of any building liquid releases. The building's source term was based on historical waste product dose rates and the building was designed based on <0.5 mrem/hour in contact with the building, <1 mrem/yr to a member of the public, and 1 mrem/hr maximum dose rate in the remote crane control room. The design also incorporates derived dose rates expected to result from volume reduction of the wastes.

At the time of the inspection, the licensee had not completed this facility, however the licensee expected to begin use of the facility in early fall of 1994. The LLRWSF was constructed with a shielded cubicle for the repackaging of a radwaste container due to container failure, however, the licensee indicated that any open radwaste container would be removed to a radiologically controlled area in either Hope Creek or Salem Station for any package rupture or repackaging contingencies. The licensee indicated the possible use of the shielded cubicle area might be used for the storage of the oldest waste containers to allow periodic surveillance and allow ease of access while minimizing exposures during the surveillance activities. The licensee was also evaluating the possibility of sampling container contents periodically to establish baseline and periodic measurements of waste product stability to meet future burial site acceptance criteria. The inspector did not identify any safety concerns associated with operation of the LLRWSF for the storage of licensee-generated radioactive wastes.

10.0 Exit Meeting

The inspector met with licensee representatives (denoted in Section 1.0) on September 2, 1994. The inspector summarized the purpose, scope and findings of the inspection. The licensee acknowledged the inspection findings.