

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-354/87-02

Docket No. 50-354

License No. NPF-50

Priority --

Category C

Licensee: Public Service Electric & Gas Company  
80 Park Plaza - 17C  
Newark, New Jersey 07101

Facility Name: Hope Creek Generating Station

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: January 12-16, 1987

Inspectors: H. J. Bicehouse 2/4/87  
H. J. Bicehouse, Radiation Specialist date  
H. J. Bicehouse for 2/4/87  
B. S. Davidson, Radiation Specialist date  
Approved by: W. J. Pasciak 2/6/87  
W. J. Pasciak, Chief, Effluent Radiation date  
Protection Section

Inspection Summary: Inspection on January 12-16, 1987 (Inspection Report  
No. 50-354/87-02)

Areas Inspected: Routine, unannounced inspection of the licensee's solid radioactive waste (radwaste) preparation, packaging and shipping program including previously identified items, management controls, quality assurance and implementation of the program during seven (7) shipments in December 1986.

Results: Within the areas reviewed, the following violations were noted, (i.e. failure to properly identify and quantify iron-59 and zirconium-95 in Shipment 86-04, Details 6.1 and 6.4; and incorrect certification for Shipment 86-04, Detail 6.1).

## DETAILS

### 1. Persons Contacted

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

#### 1.1 Licensee Personnel

- \*R. W. Beckwith, Station Licensing Engineer, Hope Creek Generating Station (HCGS)
- \*J. Clancy, Principal Health Physicist, Radiation Protection Services
- \*G. C. Connor, Operations Manager, HCGS
- \*E. J. Dalton, Principal Engineer, HCGS
- \*E. J. Galbraith, Acting Chemistry Engineer, HCGS
- \*A. E. Giardino, Manager - Station Quality Assurance (QA), HCGS
- B. Hunkele, Senior Supervisor, Radioactive Material Control, Salem Nuclear Generating Station (SNGS)
- \*M. J. Kobran, Lead Engineer, HCGS
- \*J. R. Lovell, Radiation Protection/Chemistry Manager, HCGS
- D. Mohler, Radiation Protection Engineer, SNGS
- \*J. J. Molner, Senior Radiation Protection Supervisor, HCGS
- G. T. Morrill, Radiation Protection Supervisor, Effluents, HCGS
- \*L. M. Piccirelli, QA Engineer, HCGS
- \*L. M. Silvey, Senior Operations Support Supervisor, HCGS
- J. Trego, Radiation Protection/Chemistry Manager, SNGS

Other licensee employees were contacted or interviewed during this inspection.

#### 1.2 NRC Personnel

- D. Allsopp, Resident Inspector
- \*R. Borchardt, Senior Resident Inspector

\*Attended the Exit Interview on January 16, 1987.

### 2. Scope of the Inspection

This routine inspection reviewed the licensee's solid radioactive waste (radwaste) preparation, packaging and shipping program as implemented by the licensee for seven (7) shipments (consisting of 16 liners) conducted in December 1986. Those shipments were reviewed relative to the licensee's Technical Specifications, radwaste generator requirements in 10 CFR 20.311 and 10 CFR 61.55-56 and radioactive materials shipper requirements in 10 CFR 71 and 49 CFR 170-189. The inspection completed reviews begun during Inspection 50-354/86-44 by examining implementation of the interface agreement between HCGS and SNGS regarding packaging and shipping activities. In addition, the licensee's actions regarding previously identified items were also reviewed.

### 3. Previously Identified Items

#### 3.1 (Open) Followup Item (50-354/85-44-10) Review test results for Solid Radwaste System.

The test program for the licensee's installed solidification/dewatering (asphalt) system remained incomplete. Discussions with operations and engineering personnel indicated that testing was being delayed by the licensee's configuration control procedures which made engineering changes to the system difficult and time-consuming. As a result, the licensee had not been able to complete testing by December 1986 as originally planned. This item remains open.

#### 3.2 (Closed) Followup Item (50-354/85-52-38) Line loss tests for air particulate and radioiodines.

Contractor reports concerning line loss tests of the North and South Plant Vents were reviewed and appeared to be adequate. Contractor evaluations of radioiodine loss also appeared adequate. The licensee had incorporated correction factors based on test results in counting procedures for effluents from the vents. This item is closed.

#### 3.3 (Closed) Followup Item (50-354/86-39-02) Semi-Annual Radiological Effluent Report - RE 8817 failure explanation.

The licensee's Semi-Annual Radiological Effluent Report provided an explanation for the effluent monitor's failure. This item is closed.

#### 3.4 (Closed) Followup Item (50-354/86-39-05) Composite filter analysis for alpha and Sr-89/90.

Vendor analyses of composition filters for alpha and strontium-89/90 were reviewed. This item is closed.

#### 3.5 (Open) Unresolved Item (50-354/86-44-01) Reorganization of Radiation Protection per DD-18.

NRC-NRR had not completed its review of the licensee's requested changes to Technical Specification 6.2 and the Final Safety Analysis Report (FSAR). This item remains open.

#### 3.6 (Open) Followup Item (50-354/86-44-02) Procedures to classify, mark, label and manifest.

The interface agreement between HCGS and SNGS governing radwaste shipping had not been finalized, (i.e. signed by the representatives of the two sites), at the time of this inspection. Procedures under the agreement had not been developed. This item remains open.

- 3.7 (Open) Followup Item (50-354/86-44-03) Administrative controls to evoke recharacterization of waste streams.

Administrative controls had not been developed. This item remains open.

- 3.8 (Closed) Followup Item (50-354/86-44-04) QC Inspection Procedures.

The licensee's station QA organization developed checklists and implementing procedures for inspecting radwaste shipments. The checklists were reviewed and appeared to be generally adequate addressing HCGS preparation, packaging and shipping areas. This item is closed.

- 3.9 (Closed) Followup Item (50-354/86-44-05) QA Surveillance Procedures.

The licensee's station QA organization developed surveillance checklists for asphalt drum, LSA Box, radioactive materials and other radioactively contaminated article shipments. Those checklists appeared to be generally adequate addressing key activities of the preparation, packaging and shipping of solid radwaste. This item is closed.

- 3.10 (Open) Followup Item (50-354/86-44-06) Develop/Implement Site-Specific Process Control Program (PCP).

In November 1986, the licensee submitted a topical report on Class B and C wastes to support a request for approval of the process control program to process those waste classes. However, the PCP had not been approved and implementing procedures had not been completed. This item remains open.

#### 4. Management Controls

The licensee's management controls for the seven (7) shipments were reviewed to determine if clear designations of responsibilities and controlled instructions were provided for processing, packaging and shipping activities. Criteria provided in the licensee's Technical Specifications, Final Safety Analysis Report and 10 CFR 50, Appendix B were used in this review.

##### 4.1 Responsibilities

Sixteen liners containing startup resins, (i.e., reactor water cleanup, condensate demineralizer and "filter sludge" resins) were shipped in December 1986. Each liner was dewatered by a contracted dewatering servicer using the modifications to the solid radwaste system described in Inspection Report No. 50-354/86-44. Dewatering to less than 1% standing water was verified by quality control

inspections at the completion of dewatering and just prior to shipment. Each batch of resin was sampled and analyzed by gamma spectroscopy by the HCGS chemistry staff. Radioactive shipping and radwaste manifest documents were prepared by SNGS Radiation Protection personnel using the RADMAN computer program described in Inspection Report No. 50-354/86-44. Certification under 10 CFR 20.311(c) that the shipments were properly classified, described, packaged, marked and labeled and were in proper condition for transport were made by HCGS Radiation Protection personnel. All other preparation, packaging and shipping activities were conducted by HCGS personnel with the advice and oversight of SNGS personnel.

#### 4.2 Procedures

The following procedures (used in the preparation, packaging, classification and shipping of the 16 liners) were reviewed relative to criteria in 10 CFR 20.311, 10 CFR 71.5, 10 CFR 71.12, Technical Specification 6.8 and 10 CFR 50, Appendix B, Criterion V:

- Vendor Operating Procedure (VOP)-SO.HC-101(R), "Chem-Nuclear System, Inc. FO-OP-032-Setup and Operating Procedure For the RDS-1000 Unit," Revision 0 (June 20, 1986);
- RP-RW.ZZ-004(Q), "Shipment of Radioactive Material," Revision 2 (June 24, 1986);
- RP-ST.ZZ-001(Q), "Radioactive Material Shipment Surveillance," Revision 0 (June 7, 1985);
- VRP-TE.ZZ-001(Q), "Shipment of Radioactive Waste For Burial," Revision 0 (December 16, 1986);
- VRP-TE.ZZ-002(Q), "Use of The NUPAC 14/210 Radioactive Shipping Package," Revision 0 (December 16, 1986); and
- VRP-TE.ZZ-003(Q), "Use of The Chem Nuclear 21-300 Radioactive Shipping Package," Revision 0 (December 16, 1986).

The three (3) "VRP" procedures were SNGS Radiation Protection procedures reviewed, approved and adopted for use as temporary HCGS procedures. The inspectors noted that none of the procedures required review of the accuracy of the RADMAN program regarding the identities and activities of the radionuclides in each liner provided in the computer-generated radioactive shipping and radwaste manifest records. Determining the identities of the radionuclides and their respective activities is important since the identities and activities affect the determination of the acceptability of radwaste for disposal in shallow land burial sites under 10 CFR 20.311 and 10 CFR 61 and the packaging and handling of radwaste shipments under 10 CFR 71. Since the licensee used the computer for those

determinations, a quality verification of the input data and the results of the computer's computations was an important step in ensuring the accuracy of the licensee's determinations regarding 10 CFR 20.311; 10 CFR 61.55-56 requirements and 10 CFR 71 package selection. Failure to ensure the accuracy of the computer-generated radioactive shipping and radwaste manifest records is a weakness of the licensee's program, and contributed to the problems noted in Detail 6.

## 5. Quality Assurance/Quality Control

The provisions of 10 CFR 71, Subpart H require the establishment of a QA program for the packaging and transportation of radioactive materials. A Commission-approved QA program which satisfies the applicable criteria of 10 CFR 50, Appendix B and which is established, maintained and executed with regard to transport packages is acceptable to meet the requirements of 10 CFR 71, Subpart H. The licensee elected to apply their currently established 10 CFR 50, Appendix B, QA program to the packaging and shipment of radioactive materials.

Specific quality control (QC) requirements to assure compliance with 10 CFR 61.55 and 61.56 are mandated by 10 CFR 20.311 in addition to the general QC requirements required by 10 CFR 50, Appendix B. A process control program for waste dewatering (and solidification) is required by Technical Specifications 3/4.11.3, "Solid Radioactive Waste Treatment," 6.8.1.h, "Process Control Program Implementation," and 6.13, "Process Control Program (PCP)." The implementation of QA/QC activities to the preparation, packaging and shipment of the 16 liners was reviewed.

### 5.1 Radwaste Generator QC Program

The licensee's performance in providing a QC program under 10 CFR 20.311(d)(3) was determined by review of dewatering procedures and records related to the 16 liners above and independent determination of waste classification for the 7 shipments under 10 CFR 61.55.

Within the scope of this review, no violations were noted. The Vendor's Process Control Program for dewatering the resins was reviewed, incorporated into licensee's procedures and implemented.

Specific inspection holdpoints related to dewatering were provided and implemented. All seven (7) shipments appeared to be adequately classified as Class A under 10 CFR 61.55 and to meet waste form requirements under 10 CFR 61.56(a).

### 5.2 Audits

Under the licensee's QA program, an audit of radwaste preparation, packaging and shipping activities was planned for February 1987. The inspectors noted that the licensee's QA procedures called for management evaluation of audits as required by 10 CFR 20.311(d)(3).

### 5.3 QA/QC Matrix

The licensee had developed a matrix to ensure that each aspect of the preparation, packaging and shipping activities interfaces between HCGS and SNGS were addressed by the licensee's QA organizations, (i.e, SNGS QA/QC, HCGS QA/QC and Corporate QA). However, quality verification of the waste stream sampling program, (including computer inputs/outputs for the RADMAN Program), were the responsibility of the SNGS Radiation Protection group under the matrix. As implemented during the seven (7) shipments reviewed, quality verification of computer inputs/outputs by the SNGS Radiation Protection group was a significant weakness of the overall QA/QC matrix which contributed to the problems noted with radioisotopic identification and activity determination.

## 6. Implementation

During December 1986, the licensee made seven (7) shipments (comprising 16 liners containing dewatered startup resins). Those radwaste shipments were reviewed against criteria provided in:

- 10 CFR 20.311, 61.55 and 61.56;
- 20 CFR 71;
- 49 CFR 170-189; and
- Station Technical Specifications and Procedures.

The licensee reported that the Agreement State in which the radwaste shipments were buried had not issued any violations or warnings for the seven (7) radwaste shipments received.

### 6.1 Waste Generator Requirements

The following waste generator requirements were reviewed and discussed with the licensee:

- Waste Manifests under 10 CFR 20.311(d)(4) and 20.311(b) and (c);
- Waste Classification under 10 CFR 20.311(d)(1) and 10 CFR 61.55;
- Waste Form and Characterization under 10 CFR 20.311(d)(1) and 10 CFR 61.56;
- Waste shipment labeling under 10 CFR 20.311(d)(2) and 10 CFR 61.55;
- Tracking of waste shipments under 10 CFR 20.311(d), (e), (f) and (h); and

- Disposal site license conditions (South Carolina Radioactive Material License No. 97 for the Barnwell site.)

Within the scope of this review, the following items were noted:

- 10 CFR 20.311(b) requires, in part, that the manifest accompanying radwaste shipments indicate as completely as practicable the radionuclide identity and quantity and the total radioactivity of the shipment.

Contrary to this requirement, the manifest accompanying licensee's shipment No. 86-04 failed to identify the radionuclides iron-59 and zirconium-95 and their activities. Although the presence of both radionuclides was clearly shown on the gamma isotopic analyses provided by the licensee's chemistry group, both radionuclides and their activities were omitted from the manifest sent with shipment on December 17, 1986. Calculations of the activities of these radionuclides (decay corrected from the date of gamma isotopic analysis to December 17, 1986) showed that iron-59 contributed approximately 3% and zirconium-95 approximately 2% of the corrected total activity of the shipment. In addition, evaluations by the licensee (reviewed and confirmed by the inspectors) indicated that the total activity of the shipment was in error by a factor of approximately 6. The manifest indicated approximately six (6) times more activity than was actually present. Failure to include iron-59 and zirconium-95 and their activities in the manifest accompanying shipment No. 86-04 constitutes a violation of 10 CFR 20.311(b) 50-354/87-02-01.

- 10 CFR 20.311(c) requires, in part, certification by the waste generator that the transported materials are properly described. Contrary to this requirement, the licensee certified that shipment No. 86-04 was properly described when the identities of two radionuclides were missing and the activities due to those radionuclides were not identified and included in the total activity of the transported materials. Certification that Shipment No. 86-04 was properly described when it was not constitutes a violation of 10 CFR 20.311(c), 50-354/87-02-02.
- The RADMAN computer program used by the licensee selects scaling factors to compute the activities of "hard-to-identify" radionuclides from various libraries based on the input waste source information provided by its user. SNGS Radiation Protection personnel entered incorrect waste types for five (5)

of six (6) shipments. The following table summarizes these data input errors:

<u>Shipment No.</u>	<u>Input Waste Type</u>	<u>Actual Waste Type</u>
86-01	cleanup resin	filter sludge
86-02	cleanup resin	filter sludge
86-03	condensate resin	cleanup resin
86-04	condensate resin	condensate resin
86-05	cleanup resin	filter sludge and condensate resin
86-06	cleanup resin	filter sludge

These errors were discovered by the licensee during a systematic reevaluation of computer data conducted during the inspection.

- SNGS Radiation Protection personnel did not enter the gamma isotopic data (provided by HCGS Chemistry) into the RADMAN computer program. As a result, the computer program used "default" values to print the radionuclides present and to calculate their activities. The "default" values used "generic" isotopic mixes and dose-rate-to-curie conversion factors to identify and quantify the activities. This omission of gamma isotopic data from the resins and the incorrect choices of waste source contributed to the errors noted in the activities and isotopic mixes noted in the manifests.

## 6.2 Procurement and Selection of Packages

The licensee's selection of packages for the seven (7) shipments was reviewed relative to requirements in 49 CFR 173, "Shippers-General Requirements for Shipments and Packaging," and 10 CFR 71.12, "General License: NRC Approved Package." The licensee's performance relative to the criteria was determined by interviews with HCGS and SNGS Radiation Protection personnel, discussions with Quality Control personnel and review of documents, procedures and shipping records.

Within the scope of this review, no items were noted.

## 6.3 Preparation of Packages for Shipment

The licensee's preparation of the packages for shipment was reviewed relative to the requirements of 49 CFR Parts 172 and 173, 10 CFR 71.87 and Technical Specifications. The licensee's performance

relative to the criteria was determined by interviews of the HCGS Radiation Protection staff and examination of procedures, shipping records and other documents.

Within the scope of the review, no items were noted.

#### 6.4 Delivery of Packages to Carriers

The licensee's delivery of the packages to carriers was reviewed relative to criteria provided in:

- 10 CFR 71.5(a)(1)(iii), "Placarding;"
- 10 CFR 71.5(a)(1)(vi), "Shipping Manifests;"
- 10 CFR 71.5(a)(1)(iv), "Public Highway - 49 CFR Part 177;" and
- applicable Technical Specifications and procedures.

The licensee's performance relative to the criteria was determined by review of shipping records and discussion with cognizant licensee personnel.

Within the scope of this review, the following violation was noted:

- 10 CFR 71.5(a)(1)(vi) requires preparation of shipping papers in accordance with 49 CFR 172, Subpart C. 49 CFR 172.203(d) (i) requires the name of each radionuclide in the shipment and 49 CFR 172.203 (d)(iii) requires the activity of each package in the shipment be included in the shipping papers.

Contrary to the requirements, the licensee failed to include iron-59 and zirconium-95 and the activities resulting from those radionuclides in the shipping papers associated with Shipment No. 86-04. Failure to name iron-59 and zirconium-95 and include their activities constitutes a violation of 10 CFR 71.5 (a)(1) vi), 50-354/87-02-03.

#### 7. Exit Interview

The inspectors met with the licensee's representatives (denoted in Detail 1) at the conclusion of the inspection on January 16, 1987. The inspectors summarized the scope of the inspection and findings as described in this report.

The licensee's representatives indicated that radwaste shipments had been suspended pending completion of a review of preparation, packaging and shipping procedures. The inspectors discussed the importance of the

activities reviewed and the need for close attention to detail to avoid more serious problems, (e.g., misclassification of waste).

At no time during this inspection was written material provided to the licensee by the inspectors. No information exempt from disclosure under 10 CFR 2.790 is discussed in this report.