U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-354/85-44

Docket No. 50-354

License No. CPPR-120 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, NJ

Inspection Conducted: September 10-13, 1985

Inspectors: H. J. Bicehouse 10/7/85
H. Bicehouse, Radiation Specialist date

J. J. Kottan 10/7/85
J. Kottan, Laboratory Specialist date

H. J. Bicehouse for 10/15/85
M. Miller, Radiation Specialist date

Approved by: W. Pasciak 10/15/85
W. Pasciak, Chief date
BWR Radiological Protection Section

Inspection Summary: Inspection on September 10-13, 1985 (Inspection Report No. 50-354/85-44

Areas Inspected: Routine unannounced inspection of the applicant's preoperational radiation protection, chemistry and radioactive waste (radwaste) programs including organization/staffing, in-house training, procedural development and facilities/equipment. The inspection involved 81 hours onsite by three regionally based inspectors.

Results: Within the areas reviewed, no violations or deviations were noted. However, several weaknesses in the applicant's developing program were identified and discussed with the applicant.

DETAILS

1.0 Persons Contacted

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

1.1 Public Service Electric & Gas Company (PSE&G)

*A. E. Giardino, Manager, Station Quality Assurance (QA)
*A. D. Barnabei, Principal QA Engineer
*R. T. Griffith, Principal QA Engineer
*M. F. Metcalf, Principal QA Engineer
*R. B. Donges, Lead QA Engineer
*J. L. Zerucha, Director, Startup
*J. E. Carter, Startup Manager
*G. C. Conner, Operations Manager
*S. LaBruna, Assistant General Manager
*E. Yocheim, Chemistry Engineer
*J. R. Lowell, Chemistry/Radiation Protection Manager
*E. A. Pearce, Plant Systems Startup
*C. W. Lambert, Site Engineering
*J. F. Duffey, Site Engineering
*M. P. Maradeo, Lead QA Engineer
*C. Jaffee, Startup Engineer
*J. L. Kotsch, Senior Health Physicist - Radiation Protection Services
*G. D. Owen, Site Construction
*I. Mermelstein, Licensing Engineer
*R. W. Skwarck, Site Engineering
*W. L. Britz, Manager, Radiation Protection Services

Other applicant's employees were contacted or interviewed during this inspection.

1.2 Bechtel Construction Company

*W. Goebel, QA Engineer
*T. Ferenchak, Assistant Resident Project Engineer
*W. Cole, Lead Site QA Engineer
*G. Moulton, Plant QA Engineer
*C. D. Headrick, Plant QA Engineer
*N. D. Griffin, Project Field Engineer

1.3 USNRC

*A. R. Blough, Senior Resident Inspector
*J. J. Lyash, Resident Inspector
*T. F. Dragoun, Radiation Specialist

*Attended the Exit Interview on September 13, 1985

2.0 Purpose

The purpose of this routine preoperational inspection was to review the applicant's developing radiation protection, chemistry and radwaste programs with respect to the following elements:

-- Organization/Staffing;
-- In-House Training;
-- Procedural Development; and
-- Facilities/Equipment.

3.0 Organization/Staffing

A recent reorganization of the radiation protection and chemistry groups merged the technical functions of these organizations within the applicant's station operations organization. The applicant's previous organization had been reviewed during Inspection No. 50-354/85-02. The reorganization was reviewed against commitments and guidance provided in:

-- Hope Creek Generating Station Final Safety Analysis Report (HCGS-FSAR), Volume 16, Section 13.1, "Organization Structure;"

-- NUREG-0731, "Guidelines for Utility Management Structure and Technical Resources",

-- NUREG-0761, "Radiation Protection Plans for Nuclear Power Reactor Licensees", (March 1981); and

-- Regulatory Guide 8.8, "Information Relevant to Ensuring That Occupational Radiation Exposures At Nuclear Power Stations Will Be As Low As Is Reasonably Achievable", (Revision 3, June 1978).

3.1 Chemistry/Radiation Protection Department

Revised organizational charts providing the duties and responsibilities of the Chemistry/Radiation Protection Department were reviewed. The Chemistry/Radiation Protection Manager and members of his staff were also interviewed. The inspector noted that the applicant had presented the reorganization to NRC's Office of Nuclear Reactor Regulation (NRR) and requested approval of changes to the HCGS-FSAR.

Within the scope of this review, no deviations were noted. However, the following weakness in the applicant's reorganization was noted:

- Section II. A.1 of NUREG-0731 states that one characteristic that forms the basis for a plant organization is that "distinct functional areas are separately supervised and/or managed". Figure 1 of NUREG-0731 shows radiation protection separate from chemistry.

Although the Radiation Protection Engineer (RPE) (reporting to the Chemistry/Radiation Protection Manager) had Radiation Protection Manager (RPM) responsibilities, the RPE position was vacant. The applicant estimated that the RPE position would be filled in 6-8 weeks with an individual (qualified under Regulatory Guide 1.8 as an RPM). However, the applicant estimated that it would take an additional 6 months to fully acquaint the RPE with his duties, responsibilities, and the applicant's radiation protection program. During that period, the Chemistry/Radiation Protection Manager would have the RPM duties in addition to his duties as department manager. The lack of a fully-trained and qualified RPE during the preoperational and early startup testing period is considered a weakness since:

-- the Chemistry/Radiation Protection Manager would be unable to devote sufficient attention to radiation protection being distracted from this responsibility by his responsibility for chemistry;

-- although chemistry would be separately supervised by the Chemistry Engineer, radiation protection activities would not be separately supervised as recommended in NUREG-0731; and, thus

-- radiation protection activities during preoperational and startup testing could be compromised by a lack of supervisory oversight and attention to technical details during this period.

At the exit interview on September 13, 1985, this weakness was discussed with the applicant's representatives.

3.2 Chemistry

The inspector reviewed the licensee's organization with respect to staffing and structure in the areas of chemistry and radioactive effluent control. The licensee's chemistry department is responsible for not only inplant chemistry and radiochemistry but also for liquid radioactive effluents. The health physics department is responsible for sampling and analysis of airborne effluent releases as well as calculation of offsite doses resulting from all effluent releases. The chemistry department is headed by a chemistry engineer, followed by a senior chemistry supervisor and senior staff chemistry engineer, followed by three chemistry supervisors. Each of the three supervisors has a functional area of control: operations, laboratory, and instruments. The Chemistry Engineer reports to the Chemistry/Radiation Protection Manager.

Technicians and assistant technicians are assigned to the supervisors. Currently, the licensee has 18 technicians: 5 technicians, 11 assistant technicians, and 2 apprentice technicians. The inspector noted that the chemistry staffing plan, both at the management and technician level, appeared to be adequate for fuel loading.

3.3 Radiation Protection Staffing

During Inspection No. 50-354/85-02, projected radiation protection staffing at that time was reviewed relative to commitments in Figure 13.1-13 of the HCGS-FSAR. The applicant revised the projected radiation protection staffing following the reorganization. The revised projected radiation protection staffing was reviewed relative to commitments in the HCGS-FSAR. No deviations were noted.

Current staffing was compared to the projected staffing. The applicant had the following vacancies relative to the projected staffing:

-- The Radiation Protection Engineer, i.e. the Radiation Protection Manager in the applicant's organization;

-- One Radiological Engineer;

-- Two Radiation Protection Supervisors;

-- Three Radiation Protection Technicians; and

-- Eleven Radiation Protection Assistants and Workers.

In addition, a second Radiological Engineer position was being staffed by a contract employee. The applicant stated that selections for the two Radiation Protection Supervisor positions had been made, offers tendered and accepted.

In addition to the weakness noted in Detail 3.1 the following apparent weakness was also noted:

-- Radiological Engineers review station procedures as part of the applicant's preoperational "As Low As Is Reasonably Achievable (ALARA)" program to control radiation exposures to personnel during preoperational startup testing and operation. The vacancy in Radiological Engineering increased the procedural review workload for the Senior Radiological Engineer and the remaining two Radiological Engineers. The inspector noted that the number of Radiological Engineers in the revised staffing plan had also been cut from one Senior Radiological Engineer and four staff Radiological Engineers to one Senior Radiological Engineer and three staff Radiological Engineers. In view of the

projected workload in reviewing preoperational/startup testing and operational procedures under development, the Radiological Engineer vacancy was considered a weakness in the applicant's staffing.

Resume's for incumbents in the various radiation protection staff positions were reviewed against commitments in Section 12.5.1.2 of the HCGS-FSAR. No deviations were noted.

4.0 Training and Qualifications

The inspector reviewed the training and qualifications for chemistry management and chemistry technicians. The training program for new technicians consists of the same program implemented by PSE&G for its Salem Nuclear Generating Station. A review of this training program was conducted during an inspection conducted on January 16-19, 1984, (Inspection Report Nos. 50-272/84-02, 50-311/84-02). In addition, the licensee also maintains qualification cards on specific procedures and analytical instrumentation for each chemistry technician. Specific vendor training on instrumentation has also been given.

A review of chemistry management and technician qualification with respect to Regulatory Guide 1.8, "Personnel Selection and Training", which references ANSI N18.1, "Selection and Training of Nuclear Power Plant Personnel", indicated that all of the chemistry management personnel met the ANSI requirements. Four of the five technicians met the ANSI requirements. The inspector reviewed the qualifications for seven of the eleven assistant technicians, and all appeared to meet the ANSI requirements. All chemistry management personnel have B.S. or Associate degrees with several having M.S. degrees. Also many of the technicians have B.S. or Associate degrees. The inspector discussed the analyses to be performed by the ANSI-qualified technicians with the licensee. The licensee stated that those analyses required by Technical Specifications would be performed by or under the direction of an ANSI-qualified technician. The inspector had no further questions in the area.

5.0 Procedural Development

The applicant's program to prepare, review and approve procedures in radiation protection, radwaste and chemistry was reviewed against criteria and commitments provided in:

-- 10 CFR 50, Appendix B, Criterion II, "Quality Assurance Program";

-- Regulatory Guide 1.33, "Quality Assurance Program Requirements (Operational);

-- Regulatory Guide 1.68, "Initial Test Programs For Water-Cooled Nuclear Power Plants";

-- ANSI/ANS 3.2-1982, "Administrative Controls And Quality Assurance For the Operational Phase Of Nuclear Power Plants";

-- HCGS-FSAR, Volume 1, Section 1.8, "Conformance To NRC Regulatory Guides";

-- HCGS-FSAR, Volume 16, Section 12.5.3, "Procedures"; and

-- HCGS-FSAR, Volume 16, Section 13.5, "Plant Procedures".

5.1 Radiation Protection Procedures

In addition to the above, Radiation Protection Procedures were reviewed against 10 CFR 20 requirements and health physics practices. The following radiation protection procedures were reviewed and discussed with members of the radiation protection staff:

-- Station Administrative Procedure (SA-AP) - 024, "Radiological Protection Program", Revision 2 (7/14/85);

-- SA-AP-046, "Radiological Access Control Program", Revision 0 (2/22/85);

-- Radiation Protection Administrative Procedure (RP-AP) - 101, "Radiation Work Permits", Revision 0 (8/21/85); and

-- SA-AP-007, "ALARA Program", Revision 1 (5/14/85).

SA-AP-024 provides a description of the station radiation protection program and establishes basic criteria in training, qualification, surveillance, instrumentation, actions to alarms, dose control, dosimetry and ALARA. Six suggestions for technical improvement to the procedure were discussed with the Chemistry/Radiation Protection Manager and members of his staff including:

-- emergency plan training in alarms, warnings and responses;

-- surveys as evaluations under 10 CFR 20.201;

-- administrative dose limits and extension requirements reflecting personnel dosimetry measurement errors;

-- emergency dose limits being voluntary;

-- guidance on special personnel monitoring; and

-- clarification of airborne radioactivity exposure requirements.

The applicant stated that the suggestions would be considered and appropriate changes to the procedure made during subsequent revisions. Revisions to SA-AP-024 will be reviewed during a subsequent inspection. 50-354/85-44-01.

SA-AP-046 provides controls for access to various areas within the radiologically controlled area (RCA). Control of access to primary containment (i.e. Drywell/Torus) and the Traversing In-core Probe (TIP) area were discussed with the Chemistry/Radiation Protection Manager and members of his staff. At the exit interview on September 13, 1985, the applicant's representative stated that procedures for TIP area entry would be developed by October 15, 1985. (see related item in Detail 7.5). Control of access to inerted primary containment will be reviewed during a subsequent inspection. 50-354/85-44-02

SA-AP-046 did not provide minimum acceptable time standards for conducting whole body self-monitoring contamination surveys ("Frisking"). The applicant stated that minimum whole body frisking time criteria would be considered. SA-AP-046 will be reviewed during a subsequent inspection. 50-354/85-44-03

SA-AP-101 (Revision 0) described a manual radiation work permit (RWP) program. The program will be modified to a computer-based program when the applicant's computer system becomes available. The Extended RWP program was reviewed and discussed with the Chemistry/Radiation Protection Manager and members of his staff. Qualification of radiation protection and operations personnel to perform surveys for Extended RWPs was discussed with the applicant and will be reviewed during a subsequent inspection. 50-354/85-44-04

SA-AP-007 provided station policies, goals, standards and organization for the applicant's ALARA program. SA-AP-007 was reviewed for conformance to guidance provided in Regulatory Guide 8.8, "Information Relevant To Ensuring That Occupational Radiation Exposure At Nuclear Power Stations Will Be As Low As Is Reasonably Achievable", Revision 3 (6/78). Within the scope of this review, the applicant appeared to be developing a generally adequate ALARA program. The ALARA program will be reviewed in more detail during subsequent inspections. 50-354/85-44-05

5.2 Test Procedures

Procedural development and completed/approved procedures for the applicant's test and startup programs for radiologically important systems were reviewed against the criteria above and the HCGS-FSAR, Volume 17, Section 14.2, "Construction Verification, Preoperational and Power Test Program". Project schedules were reviewed and discussed with representatives of the applicant's startup group to determine when systems would be turned over to the startup group,

preoperational testing of the system would be completed and the system turned over to Hope Creek Operations. Procedures supporting the preoperational test program were identified and their review/approval status was determined. Seven preoperational test procedures were reviewed for test objectives, acceptance criteria and verification of completion of procedural steps relative to commitments provided in the HCGS-FSAR.

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

5.3 Chemistry

The inspector discussed procedures with the licensee. The licensee has written greater than 90 percent of the chemistry procedures including chemical analysis, sampling, and instrument calibration. The procedures are in various stages of review and approval. The inspector discussed Appendix A "Typical Procedures for Pressurized Water Reactors and Boiling Water Reactors", of Regulatory Guide 1.33 and Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment" with the licensee. The inspector also discussed the quality assurance of chemical measurements with the licensee. In addition, the inspector discussed the analytical methods the licensee plans to use for various chemical analyses. The inspector stated that this area would be reviewed during a subsequent inspection. 50-354/85-44-06

7. Facilities Equipment

The applicant's facilities and equipment in the radiation monitoring system chemistry and radwaste processing areas were reviewed against commitments provided in the HCGS-FSAR. Tours of the applicant's facilities, observations of the equipment, and review of system drawings and other documents were used to verify that the facilities and equipment were built/installed as described in the HCGS-FSAR.

7.1 Chemistry

The inspector toured the facilities including the chemical laboratories, counting rooms, various sampling systems, liquid process and effluent monitors, and airborne process and effluent monitors. The chemistry laboratory is completed and occupied. Major instrumentation includes an ion chromatograph, atomic absorption spectrophotometer, UV/VIS spectrophotometer, total organic carbon analyzer, and gas chromatograph. Other laboratory equipment and supplies such as pH meters, balances, ovens, glassware, reagents, and chemical were in adequate supply. All of the major instrumentation is not yet fully operational and completely calibrated. The chemistry count room contains a

computer-based gamma spectroscopy system with three germanium detectors; a liquid scintillation counter; a low-background gas flow proportional counter; and computer terminals, plotters and printers. The health physics counting room contains two germanium detectors and terminals interfaced to the chemistry gamma spectroscopy system; a low background gas flow proportional counter; two windowless gas flow proportional counters; and terminals, printers, and plotters. The chemistry department will calibrate the health physics germanium detectors. The inspector discussed counting room and chemistry laboratory equipment calibration with the licensee. The licensee stated that all equipment would be calibrated by November, 1985. The inspector stated that he would return in November, 1985 with spiked samples for radiological and chemical analyses. 50-354/85-44-07

The inspector examined the sampling panels for process liquid sampling, radwaste sampling, reactor system sampling, and condensate system sampling. All sampling station installations were not yet completed. These areas will be examined again during a subsequent inspection as well as the preoperational tests performed on these systems. 50-354/85-44-08

The inspector also examined the liquid and airborne process and effluent radiation monitoring systems. The inspector discussed process and effluent radiation monitor calibration with the licensee. (See Details 7.3 and 7.4.) The inspector had no further questions in this area.

7.2 Solid Radioactive Waste System

The inspector noted this system included the following major components; waste sludge collection tank, centrifuge, two extruder/evaporators, crystallizer, drum capper and dry active waste compactor. The collection portion of the solid radioactive waste system will be tested by preoperational test HC-2.1 "Solid RW Collection and Phase Separation", which was submitted to the Test Review Board (TRB). The volume reduction and packaging portion of the solid RW system will be tested by ten preoperational test identified, as follows:

- HC-1.01 "Solid RW Auxiliary Boiler", (approved 8/30/85);
- HC-1.02 "Solid RW Overhead Crane" (awaiting PORC approval);
- HC-1.03 "RW Centrifuge" (submitted to TRB);
- HC-1.04 "RW Asphalt System" (submitted to TRB);
- HC-1.05 "Solid RW Sludge Tank and Feed System", (submitted to TRB);

- HC-1.06 "Solid RW Fill Station" (submitted to TRB);
- HC-1.07 "Solid RW Capper/Conveyor" (awaiting PORC approval);
- HC-1.08 "Solid RW Extruder - Evaporator & Peripherals", (submitted to TRB);
- HC-1.09 "Solid RW Concentrates Feed" (submitted to TRB); and
- HC-1.12 "Solid RW Compactor" (approved 8/30/85);

The crystallizer will be tested by preoperational test HC-3.1 "Solid RW Evaporator", which was submitted to the TRB.

Performance tests for the Solid Radioactive Waste System are scheduled to be conducted between September 23 and November 25, 1985. The inspector verified that the major components of the Solid RW System were installed as described in the HCGS-FSAR. There were no discrepancies observed, however additional walkdowns will be performed during observation of preoperational testing. 50-354/85-44-09

The inspector indicated that the test results will be reviewed during a future inspection prior to fuel load. 50-354/85-44-10

7.3 Liquid Radioactive Waste System

The inspector noted this system comprised the equipment and floor drains, decontamination drains, liquid radioactive collection and processing subsystems, laundry drains and chemical waste processing subsystem; and radioactive waste demineralizer regeneration subsystem. The Liquid R/W System will be tested by six preoperational tests identified as follows:

- HB-1 "Liquid Radwaste Resin Regeneration" (approved 7/26/85);
- HB-2 "Chemical Radwaste Processing" (awaiting PORC approval);
- HB-3 "Radwaste Floor & Equipment Drains Processing" (submitted to TRB);
- HB-4 "Radwaste Neutralization & Waste Concentration" (submitted to TRB);
- HB-5 "Radwaste Floor & Equipment Drains Collection" (submitted to TRB); and
- HH-1 "Rad Laundry Drains" (approved 7/16/85).

The inspector verified that the major components of the Liquid RW System were installed as described in the HCGS-FSAR. However, the inspector noted the following concerns with regard to ALARA design and human factors:

- The Resin Regeneration and Transfer Room did not provide sufficient space from a potentially high radioactive piping run when an individual would have to enter this room. For example, the resin transfer line ran ~ 20 feet along a pathway that was ~ 2 feet wide; and a valve on the line was installed upside down, which would increase exposure during maintenance.

- The RW Control Room had mislabeled liquid flow paths; installed a ventilation fan adjacent to the control panel which would increase noise level; and provided poor lighting.

The inspector identified these concerns to cognizant licensee plant staff. This area will be reviewed during a future inspection. 50-354/85-44-11

Performance tests for the Liquid RW System are scheduled to be conducted between September 30 and November 25, 1985. The inspector indicated that the test results will be reviewed during a future inspection prior to fuel load. 50-354/85-44-12

7.4 Gaseous Radioactive Waste System

The inspector noted preoperational test HA-1 "Gaseous Radwaste" would be the performance test for the Off-gas System. The inspector noted that HA-1 was being drafted and that the test was scheduled to begin October 28, 1985.

The major components of the Off-gas System were verified to be installed as described in the FSAR. However, the inspector discussed with the start-up test engineer a recent design change. The test engineer stated that the last valve (V246) in the system prior to release to the stack was now a fail open valve instead of fail closed one. The licensee stated they would change V246 to a fail closed to prevent a possible release from a back pressure when the system gate valve would be closed. The inspector also noted that the radiation detectors just upstream of V246 were not installed. (See Related Item Detail 7.5).

The inspector stated this area will be reviewed during a future inspection prior to fuel load. 50-354/85-44-13

7.5 Radiation Monitoring System

The inspector reviewed the status of installation, calibration and functional testing of the applicant's Radiation Monitoring System (RMS). The applicant's contract with the original vendor for the RMS had been cancelled and a second vendor contracted in June 1985. The inspector noted that the entire RMS as described in the HCGS-FSAR would not be available to support the applicant's projected fuel load date. The applicant requested deferral of portions of the RMS in a letter to NRR dated September 10, 1985.

Review of the applicant's request for deferral of portions of the RMS showed:

- the technical justification for deferrals was predicated on the ability to monitor and evaluate offsite releases;
- deferred equipment diminished the applicant's ability to analyse the causes and sources of radiological problems in order to mitigate consequences; and
- area radiation monitors to protect workers would be capable of local alarms only at the projected fuel load date reducing the applicant's ability to minimize exposures during abnormal and emergency situations.

The inspector noted that the applicant's proposed schedule for providing the deferred RMS equipment and capabilities appeared to conflict with NRC policy for issuance of a license only when plant configuration was essentially ready to support operation to the permitted power level (5% or 100%).

In addition to the reduced capability of the area radiation monitors, the applicant's deferral request would delay:

- early detection capability for airborne radioactive material releases from the Turbine Building and Radwaste Areas of the Auxiliary Building;
- monitoring capability to indicate heat exchanger leakage from potentially contaminated/normally contaminated streams to normally clean streams of plant coolant water;
- capability to automatically isolate the condensate return pump on detection of radioactivity in the condensate stream;
- capability to detect leakage from the waste evaporators and signal the need for operator action;

- warning capacity for the need to trip normal ventilation and go to the recirculation/filter mode for the Technical Support Center heating and ventilation system; and

- monitoring capability for High Efficiency Particulate Activity (HEPA) filter functions in the Reactor Building and HEPA/charcoal efficiency in the Auxiliary Building.

The acceptability of the deferrals and the applicant's schedule for obtaining full capability as described in the HCGS-FSAR is unresolved. 50-354/85-44-14

Applicant's Specifications Numbers 10855-J-373 (Q) Revision 1 and 10855-J-363 Revision 1 and RMS system drawings were reviewed. Within the scope of this review, the following weakness in the location of area radiation monitor was noted:

- The applicant's design for area radiation monitors does not provide an area radiation monitor to measure radiation levels within the TIP room. The capability to monitor radiation levels within the TIP room is necessary to warn individual workers who may be present to sudden large increases in radiation level due to irradiated probes and to allow measurement of radiation levels prior to entry to prevent exposures to very high radiation fields which are potentially present. Provision of a radiation area monitor with the full capabilities for local and remote readout and alarm function in the design and installation of the TIP Area RMS will be reviewed during a subsequent inspection. 50-354/85-44-15

8.0 Exit Interview

The inspector met with the applicant's representatives (denoted in Detail 1) at the conclusion of the inspection on September 13, 1985. The inspector summarized the purpose and scope of the inspection and findings as described in this report.

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