U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-354/90-22

Docket No. 50-354

License No. NPF-57

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

Facility Name: Hope Creek Nuclear Generating Station

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: December 10-14, 1990

Inspectors: D. Chawaga — 1-4-91
D. Chawaga, Radiation Specialist, Facilities Radiation Protection Section — date

D Mann — 1/4/91
D. Mann, Radiation Specialist, Facilities Radiation Protection Section — date

Approved by: W. Pasciak — 1-11-91
W. Pasciak, Chief, Facilities Radiation Protection Section, DRSS — date

Inspection Summary: Inspection on December 10-14, 1990 (Report No. 50-354/90-22).

Areas Inspected: A routine, unannounced inspection of the radiological controls program at your facility was conducted by D. Mann and D. Chawaga on December 10-14, 1990. Areas covered in this inspection included in-plant housekeeping and radiological postings, external exposure control, radiological occurrence reporting, ALARA outage preparation, training of the contractor health physics staff, and procedures associated with these areas.

Results: Within the scope of this inspection, no violations were identified.

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DETAILS

1.0 Personnel Contacted

1.1 Licensee Personnel

*R. Beckwith, Station Licensing Engineer - H.C.
*S. Funsten, Manager, Maintenance - H.C.
*R. Gary, Sr. Radiation Protection Supervisor - Operations
*R. Griffith, Sr. Manager, Station QA - H.C.
*J. Hagan, General Manager - Hope Creek Operations
*E. Karpe, Senior Radiation Protection Supervisor - ALARA
C. Kinne, Radiation Protection Supervisor - ALARA
D. Mason, Radiation Protection Supervisor - Operations
*V. McGaffic, Chemical Engineer - H.C.
M. Prystupa, Radiation Protection Engineer
S. Szymanski, Radiation Protection Supervisor - Operations
*J. Trejo, Manager, Rad Protection/Chemistry - Services
T. Wallender, Radiation Protection Supervisor - ALARA
*J. Wray, Radiation Protection Engineer - Salem
L. Zitkevitz, Radiation Protection Supervisor - Operations

1.2 NRC Personnel

T. Johnson, Senior Resident Inspector
K. Lathrop, Resident Inspector

2.0 Procedure Review

A sample of procedures was reviewed to determine their quality and ease of use. The sample included those procedures that applied to the areas reviewed during this inspection. Based on this review, the procedures were found to be well written, easy to read, and technically correct. However, the following problems were identified:

The equation for calculating individual exposures to concentrations of airborne radioactive material, i.e. MPC-Hours, is found in procedure HC.RP-TI.ZZ-0015(Q) - Rev. 2; "MPC-HOUR ACCOUNTING". The inspectors noted the following errors in this equation:

- o The equation did not enclose the sum of three factors within brackets, which is required using standard mathematical notation. This could lead to an incorrect MPC-hour calculation at a subsequent multiplication step.

The licensee stated that the brackets were removed from the equation during a computer conversion between the word processing package formerly used on site and the current package. The licensee corrected the notation and re-issued the procedure (Rev. 3) during the inspection.

- The procedure defines MPC_P, MPC_I, and MPC_T as "the total MPCs for particulates, iodines, and tritium from Reference 6.1". During inspector discussions with licensee personnel, the licensee identified an error in Reference 6.1. Reference 6.1 referenced 10 CFR 20 Appendix A, "Protection Factors for Respirators", instead of 10 CFR 20 Appendix B, "Concentrations in Air and Water Above Natural Background". This error was corrected by re-issuing the procedure (Rev. 3).

- However, the most significant problem with the equation was the exclusion of the actual nuclide concentration present in the air. No factor in the equation accounted for the actual nuclide concentration present in the air, which would be determined by taking an air sample. Also, no factor was defined to include the actual nuclide concentration present in the air.

  This problem was discussed with plant personnel during the inspection. The licensee stated that MPC-hours are determined by a computer algorithm during the isotopic analysis.

  The licensee demonstrated, using the MPC-hour accounting log, that no MPC-hours have been assigned since 1987.

  Because the equation in the revised procedure (HC.RP-TI.ZZ-0015(Q) - Rev. 3) did not include a factor or definition to account for the actual nuclide concentration present in the air, a further revision was initiated. The latest revision will be reviewed during a future inspection.

These errors are a concern for the following reason:

- HC.RP-TI.ZZ-0015(Q) - Rev. 2 was reviewed by various levels of supervision within the radiation protection (RP) department and issued with the above stated errors. HC.RP-TI.ZZ-0015(Q) - Rev. 3 was initiated following inspector discussions with licensee personnel and issued during the inspection, also reviewed by various levels of supervision within the radiation protection department. However, only two of the three identified errors was corrected in HC.RP-TI.ZZ-0015(Q) - Rev. 3.

Other radiation protection procedures will be reviewed during future inspections to determine whether they are receiving an appropriate review prior to issuance.

3.0 Training of the Contractor Health Physics Staff

The inspector reviewed the training procedure NC.TQ-TP.ZZ - Rev. 3., "Radiation Protection Contractor Acceptance". This procedure assigns responsibility for completing Attachment B, "Contractor Qualification Verification Form" to Radiation Protection/Chemistry Services or Radiation Protection personnel. The individual completes an Attachment B for each contractor technician.

The review performed to complete Attachment B consists of:

- academic training
- related technical experience
- special skills/experience
- ANSI qualification in accordance with N18.1 - 1971 or N3.1 - 1981
- relevant experience (e.g. military, commercial, or other)
- references

Following this review, a potential contract technician enters the training program which consists of the following elements:

- screening exam
- procedure reading requirements
- site specific briefing
- site specific examination
- practical evaluation

Criteria for meeting these elements and exception criteria are also outlined in the procedure.

No violations or weaknesses in the contractor radiation protection staff training programs were identified.

4.0 Plant Tours, Posting, and Access Control

Tours of the licensee's facilities were conducted during this inspection. This included the reactor, turbine, and radwaste buildings. The tours showed housekeeping within the plant to be good. Any housekeeping problems were attributed to preparation for the outage, or the on-going and extensive painting program. Postings in the radiological controls areas (RCA) were also found to be good. Access control to the controlled areas was found to be good. The access control was considered to be good, in part because the licensee has replaced the self reading ionization chamber dosimeters with electronic integrating and alarming dose rate meters. These meters are integrated into a computer-based access control system that allows the licensee to exert greater control on the number of personnel who are permitted to enter under the active radiation work permits (RWPs).

5.0 Outage Preparation

5.1 Control Rod Drive Mechanism (CRDM) Maintenance

The station has an elaborate automated system for removal, maintenance and re-installation of the control rod drive mechanisms. The traversing incore probe tubing, under vessel wiring and shootout steel are removed and re-installed manually. The cameras, headphones, remote radiation detectors, demineralized water and air lines, catch containments and contaminated water drain lines are installed manually. The CRDMs are unbolted and removed from the reactor vessel using remote tooling. CRDM housing bolts are manipulated using a mechanism called a "Bolt Wrench" which is connected to a "Remote Handling Mechanism (RHM)". Once the CRDM is unbolted and uncoupled from the reactor assembly, it is lowered by the RHM to a shielded transfer cart. Most of the water released during CRDM removal is collected and routed to the subpile room sump. Precautionary surveys are performed at predetermined procedural steps to assure that workers in the subpile room are free of "hot particle" contamination. The transfer cart removes the CRDM from the subpile room to the CRDM maintenance room located outside of the drywell. The drive is transferred to the flush tank where the filter is removed and initial decontamination begins. CRDMs are decontaminated to less than 100,000 dpm/100 cm^2. After the CRDMs are taken to the CRDM rebuild room, they may be further decontaminated to less than 50,000 dpm/100 cm^2, so that maintenance can be performed on the mechanisms without the use of respirators.

Radiation protection personnel in the ALARA group have prepared pre-job reviews for removing/re-installing CRDMs in the drywell sub-pile room and for disassembling, cleaning and re-assembling the CRDMs in the CRD maintenance room.

For upcoming drywell work, the order in which CRDMs are removed is based on localized general area dose rates emanating from a Reactor Water Clean-Up drain line. A radiological hold point is established for CRD spud ends with dose rates greater than 50 R/hr to allow RP supervision to re-evaluate the radiological controls. Personnel involved in CRDM work have attended vendor mock-up training. Remote monitoring of undervessel work will be done using audio/video equipment as well as remote read-out dosimeters. For CRD Maintenance Room work, ALARA personnel have instituted actions to determine and remove any accumulation of activity, during the CRDM cleaning. Audio/visual equipment will be used to enhance communication between the maintenance technicians and the Drive Change Mechanism (DCM) control panel personnel. The inspectors viewed these actions as good licensee initiatives.

5.2 ALARA Pre-outage Planning Package

The inspectors reviewed the ALARA package for the scheduled outage work where a high dose expenditure is anticipated. These included:

- o refuel floor work, due to the amount of time involved in performing a full core off-load
- o snubber visual/functional testing in radiation areas
- o CRDM change-out
- o In-service Inspection (ISI)

The refuel floor work will require a projected 61.732

person-rem. The ALARA group has a breakdown of projected dose expenditure by RWP, which corresponds to major tasks such as vessel disassembly, cavity decontamination, and Local Power Range Monitor (LPRM) work. Some of these tasks are further broken down into sub-tasks that will be performed using the same RWP. The visual/functional testing of snubbers has a projected dose expenditure of 25.5 person-rem for functional testing and 8.9 person-rem for visual inspections. The total dose to be expended for drywell CRD work is estimated at 14.57 person-rem. The dose projection is further divided as follows: CRD removal/installation, 6.52 person-rem; DCM work, 1.94 person-rem; preparation/return of undervessel area, 5.60 person-rem; and rebuilding CRDs, 0.50 person-rem. The ISI work has a projected expenditure of 14.5 person-rem.

5.3 Outage Meetings

The inspectors attended an outage overview meeting that the licensee held for all radiation protection personnel. Topics discussed were logistical; such as, the outage is scheduled for 52 days "breaker-to-breaker", the refuel floor work is critical path, 35 CRDMs will be changed out, 20 LPRMs will be changed out, and which reports will be used by management to track outage progress. During the meeting, the rationale behind the outage task schedule was presented. This discussion answered questions about "why" tasks are scheduled in a particular order. Answering this type of question promotes understanding among the licensee personnel and therefore enhances personnel cooperation. The inspectors felt that this was a good licensee initiative.

5.4 Radiation Protection Supervision Meeting

The inspectors attended a radiation protection supervision meeting. The supervisors assembled, in the first quarter of 1990, a refuel outage tasks list containing items that needed to be done prior to the outage. These items included such tasks as: identify jobs that could use containment devices, complete ALARA reviews, determine and fix undervessel communication equipment, review supervisor qualifications, determine RP shift schedule for the refuel outage, schedule RP re-qualification training, provide a dioctylphthalate (DOP) test schedule, purchase outage stationery supplies, evaluate a permanent fix for the RWCU bottom head drain elbow, determine Filtration, Recirculation and Ventilation System (FRVS) run times and impact on refuel floor activities, perform preventive maintenance on radwaste equipment, set-up drywell control point and place cords/cables in the overhead, and so on. Responsibility for the completion of these items was assigned to individual RP supervisors. An initiation and completion date was assigned and the status of each item was tracked by computer. The inspectors viewed this as a good licensee initiative.

6.0 Review of Radiological Occurrence Reports (RORs)

Procedure HC.RP-IT.ZZ-1001(Q), "Radiological Occurrence Investigations" requires licensee personnel to immediately notify Radiation Protection upon "witnessing an event which creates a potential for significant exposure of personnel to radiation or radioactive materials". This notification initiates the generation of an ROR.

The computer database used to track the RORs, also sorts the RORs by type. The licensee has identified the following 8 major types of ROR, with many sub-types: all contaminations, RWP violations, spread of contaminations, outside RCA contaminations, all ALARA problems, dosimetry problems, all HRA violations, and miscellaneous. This sorting feature in the software package is used for trend identification. The inspector, after reviewing selected ROR packages and trending reports, concluded that the ROR program receives appropriate radiation protection supervision review and is well maintained. The RP Supervisor responsible for tracking and trending the RORs maintains an informal tracking/trending program that extends back to 1987. This allows trending of incidents that occur only a few times in any one year, but recur each year. The inspector felt that this long-term trending was a good licensee initiative.

The Senior RP Supervisor - Operations issues a "Monthly Summary of Radiological Occurrence Reports" to all station managers. This report contains a summary of each occurrence broken down by severity level, type, and apparent root cause. This report, and issue frequency, is required by procedure. The same procedure requires that the issue frequency be changed to weekly during plant outages.

During the review of ROR packages, the inspector observed that RP supervision meet with the responsible supervisor to discuss the occurrence. Such meetings were repeatedly held, without a procedural requirement as part of the corrective actions.

7.0 External Exposure Control

The inspectors reviewed the licensee's program for external dosimetry. Procedure HC.RP-TI.ZZ-301(Q), "Personnel Radiation Dose Monitoring" outlines the criteria for comparing doses recorded by thermoluminescent dosimeter (TLD) to those recorded by the digital alarming dosimeter (ALNOR). The criteria requiring a comparison to be made is:

- o The TLD or the ALNOR reading greater than 100 mrem

  and

- o A discrepancy between the TLD and ALNOR readings in excess of 30%

The licensee stated that the percentage criteria used to evaluate discrepancies will be lowered because sufficient data has been collected to demonstrate very close agreement between the TLD and ALNOR results. The licensee stated that there is uniform agreement between the TLD and ALNOR (i.e., the agreement is a gaussian distribution centered around 1).

8.0 Exit Meeting

The inspector met with licensee representative at the conclusion of this inspection, on December 14, 1990. The inspector reviewed the purpose and scope of the inspection and discussed the inspection findings.