U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-443/92-19

Docket No. 50-443

License No. NPF-56

Licensee: Public Service Company of New Hampshire
P. O. Box 330
Manchester, New Hampshire 03105

Facility Name: Seabrook Nuclear Station

Inspection At: Seabrook, New Hampshire

Inspection Conducted: August 31 - September 4, 1992

Inspector: _____ 8-28-92
D. Chawaga, Radiation Specialist — Date
FRPS, FRSSB, DRSS

Approved by: _____ 8-28-92
W. Pasciak, Chief, FRPS, FRSSB, DRSS — Date

Areas Inspected: This unannounced inspection of the radiological controls program primarily focused on the licensee's preparation for the 1992 refueling outage. The reactor was operating near full power during the inspection period. Topics discussed included the radiological control plans for outage work, outage exposure estimates, outage staffing, availability of equipment and supplies, and observations during plant tours.

Results: The inspector found that licensee personnel were well prepared to support upcoming radiological activities. Many lessons learned during the station's first outage were incorporated into the 1992 outage plan. One unresolved item was opened relating to sealed source survey requirements (see Section 8.0).

## DETAILS

### 1.0 Individuals Contacted

### 1.1 North Atlantic Energy Services Corporation

* M. Anderson, Radwaste Department Supervisor
* J. Bourassa, Quality Assurance Auditor - Radiation Protection (YAEC)
* M. Campbell, HP Supervisor - Operations
* W. Cash, HP Radiation Protection Supervisor
* B. Clark, Rad Services Supervisor - Instruments & Respiratory Protection
* W. DiProfio, Station Manager
* S. Dodge, Rad Services Department Supervisor
* D. Flahardy, HP Supervisor - Operations
* W. Leland, Chemistry/Health Physics Manager
* P. Plazeski, Rad Services Supervisor - Dosimetry
* T. Pucko, NRC Coordinator
  J. Rafalowski, Health Physics Department Supervisor
* F. Straccia, Senior Health Physicist
* K. Sterritt, HP Supervisor - ALARA
* J. Tarzia, Senior Health Physicist
* R. Thurlow, Senior Health Physicist

### 1.2 NRC

* N. Dudley, Senior Resident Inspector

* Denotes attendance at the exit meeting on September 4, 1992.

### 2.0 Purpose and Scope of Inspection

This unannounced inspection involved a review of the station's health physics (HP) program with regard to the following elements: radiological control plans for 1992 outage work, personnel radiation exposure estimates, outage staffing, availability of HP equipment and supplies needed for the outage, and observations during plant tours.

### 3.0 Summary of Outage Preparations and Initial Goals

The station's second refueling outage was scheduled to start on September 7, 1992 and last until November 4, 1992. According to licensee personnel, many of the lessons learned during the first outage were incorporated into this year's outage plan.

In the past, licensee personnel relied heavily on data from other reactor facilities in the development of personnel exposure estimates. As a result, these exposure estimates were not very accurate. Exposure projections typically overestimated the actual exposures received. For example, the routine operating exposure for cycle 1 was 7.8 person-rem as compared to the goal of 43.5 person-rem. Exposure for Refueling Outage 1 was 74.8 person-rem as compared to the goal of 181.2 person-rem. Combined, the total exposure for cycle 1 was 82.6 person-rem which was 37 percent of the 224.7 person-rem goal for that period. More station specific data were available for use in preparation for the 1992 outage. Subsequently, licensee personnel anticipated that estimates would more closely approximate actual exposures during the 1992 outage.

The greatest challenge to the Health Physics (HP) Department during the 1992 outage was expected to be the modification of the reactor coolant system's resistance temperature detectors (see Section 4.1). Other scheduled jobs such as refueling floor work, reactor coolant pump seal work and steam generator work were more common repetitive PWR outage tasks. The licensee planned to use strippable paint for reactor cavity decontamination. The reactor core will be completely off-loaded to the spent fuel pool and steam generator nozzle dams will not be used for steam generator work. A greater number of contract HP Technicians were hired for the 1992 outage compared to the first outage. The inspector reviewed the Radiation Work Permit (RWP) and ALARA review packages for the outage. Licensee personnel were comfortable with their progress in preparing HP work packages and, although many RWPs had not yet been completed, the inspector determined that there was not an excessive back-log of work in this area.

Overall, the inspector found that radiological control personnel were adequately prepared to support planned outage activities.

## 4.0 Major Radiological Work Efforts Scheduled for the 1992 Refueling Outage

### 4.1 Resistance Temperature Detector (RTD) Replacement (Licensee Goal - 60 Person-rem)

Removal of the RTD bypass piping has been considered to be a major accomplishment from a source term reduction perspective at many PWR facilities. Licensee plans to remove the reactor coolant system's RTDs and all associated piping early in the outage were expected to maximize exposure savings. New detectors which mount directly on the reactor coolant system piping will replace the bypass line/detector arrangement. Photographs and mock-ups were used extensively during planning for this work and an experienced supervisor was recruited to lead in the demolition phase. The licensee did not plan to use shielding during the demolition phase, however, extensive shielding of reactor coolant piping was planned for the installation of new detectors.

Many of the lessons learned from other plants were incorporated into the station's ALARA plans for this modification. The inspector reviewed the licensee's plans for shielding, job coverage, personnel monitoring, ventilation, contamination control, and remote handling of radioactive components. No weaknesses were noted during that review. The licensee established an aggressive goal of not exceeding 60 person-rem for the entire modification. The lowest exposure for this type of RTD modification on any domestic PWR has been approximately 62 person-rem.

4.2 Reactor Disassembly and Reassembly (19.7 person-rem)

The 1992 goal for reactor head removal and reinstallation was 19.7 person-rem. Reactor head stud work (2.5 person-rem for detensioning and 3.5 person-rem for retensioning) was expected to be the single largest contributor to exposure on the reactor head. Licensee personnel planned to use a remote operated air drive system for much of the reactor head stud work. One stud could not be removed from the vessel during the first refueling outage. This stud will remain in place during the 1992 outage. A cover has been devised to protect the stud while the reactor cavity is full of water. Use of the stud cover is expected to cost 90 person-millirem.

The station does not have a reactor head shield. In an internal memorandum, dated September 16, 1991, the Health Physics Department provided an analysis to management which detailed the relative benefits of three different head shielding designs. Head shield would provide worker protection during seal ring installation and removal, reactor head stud work, fuel handling operations, and for general occupancy on the refueling deck while the head is removed from the cavity. Reactor head shielding was estimated to reduce local dose rates by a factor of 4 and provide a savings of 8 person-rem per outage. Radiation protection personnel noted that purchase of a head shield was cost beneficial from an ALARA perspective and recommended that a shield be purchased prior to 1992 refueling outage.

At the time of this inspection, this purchase was on hold pending further review. Licensee personnel planned to install a shadow shield in the cavity to create a low dose rate waiting area and some minor shielding of the reactor head was planned. The inspector will review ALARA efforts implemented for work near the reactor head during the outage.

4.3 Steam Generator Eddy Current Testing and Tube Plugging (10 person-rem)

A contract services company will be performing primary side steam generator work. According to licensee personnel, the contractor would use experienced personnel and would be performing their own mock-up training as deemed necessary. Steam generator surveys will be completed using thermoluminescence dosimeters (TLDs), extendable GM detectors and hand-held ion chambers. The licensee plans to conduct pre-job and pre-task briefings for all primary side steam generator work.

During the first refueling outage, the NRC specialist inspector noted that survey practices for materials being removed from the steam generator were weak. In response to the noted weakness, the licensee posted an HP Technician on the platform outside of the primary manway to survey such materials. Remote monitoring will be used during the 1992 outage in an attempt to lower HP Technician exposure. Robotics and manway shielding will be used extensively to reduce overall personnel exposure on the steam generator platform.

4.4 Summary of Jobs Totaling Less Than 10 Person-rem

A variety of inservice inspection tasks including regenerative heat exchanger weld inspection (mock-up at Unit 2) and ultrasonic testing (UT) of the reactor vessel flange area were estimated to be completed at or below the goal of 9.0 person-rem. As a result of Radiation Protection Department efforts, the reactor vessel UT work will be done with new equipment which was expected to significantly reduce worker occupancy times in high dose rate areas near the reactor flange.

Secondary side steam generator sludge lancing and foreign object search and retrieval (FOSAR) work were scheduled to be performed by experienced contract personnel for a goal of approximately 6.0 person-rem. Scaffold work in support of this job was estimated to cost about 500 person-millirem.

Reactor cavity decontamination was scheduled to be done using strippable paint. Some limited decontamination is planned to be done prior to initial head removal. However, the majority of cavity decontamination work will be performed after the core has been unloaded. Cavity decontamination work had an estimated goal of 3.3 person-rem.

The goal for snubber testing, inspections and bracket work was estimated at 2.8 person-rem. The licensee had plans to reorient several snubber brackets to facilitate ease of removal in the future. Detailed job history files and maps were available in the planning phase for snubber work. The licensee elected to use ladders rather than scaffolding in an attempt to reduce occupancy time and worker exposure.

The goal for fuel handling operations was estimated to be 2.5 person-rem. Improved tooling, water filtration and better training were anticipated to result in improved ALARA performance during fuel handling operations. The reactor head, which is stored on the refueling floor during fuel transfer, was expected to contribute to the dose received by fuel handling personnel.

Motor operated valve (MOV) surveillance work was not expected to exceed the goal of 2.5 person-rem. Revised procedures, remote operating devices and the use of computer assisted test equipment were expected to lower occupancy times at the valves and contribute to dose savings. Mock-up training had been performed to familiarize workers with the new MOV testing techniques.

According to licensee personnel, a proficient and experienced contractor staff was scheduled to perform reactor coolant pump seal work at or below the goal of 1.5 person-rem. The licensee planned to use articulating arms to assist workers with the movement of component parts. Both inner and outer seal packages were scheduled to be replaced as cartridges rather than attempting in-place rebuilding of the seals.

The pressurizer spray line will be shielded during the outage and a permanent pressurizer heater platform was scheduled for installation. The platform should reduce exposures during later outages by eliminating the need for scaffolding in this frequently accessed area of containment. Pressurizer relief valve work was estimated to total 0.6 person-rem. Licensee personnel planned to use a torque wrench which "lights" rather than "clicks" at the desired torque value. The use of this tool was expected to expedite work by providing improved ergonomics in the potentially noisy environment of the pressurizer. The lighted tool does not require the operator to stare at the dial and was expected to allow the operator to position his/her head further from high dose rate components.

Other miscellaneous outage work was expected to total approximately 45.3 person-rem making the licensee's total outage exposure estimate approximately 157.3 person-rem. The 1992 operating exposure at the time of this inspection totaled approximately 3 person-rem. The licensee's ability to estimate planned outage exposures and adequately support emergent work will be reviewed during the outage inspection.

## 5.0 Outage Staffing

The station maintained a permanent staff of approximately 14 HP Technicians. During the first outage, 44 senior and 7 junior contract technicians were added to the staff (51 total HP contractors). The licensee experienced shortages in HP Technicians during the first outage and was forced to compensate with the extensive use of overtime and had to delay some jobs.

For the 1992 Outage, contractor staffing levels were increased to 75 senior and 11 junior technicians (86 total HP contractors). The inspector reviewed the qualifications of several newly hired contract HP Technicians. The licensee effectively implemented station procedure, HD0951.05, Revision 01, "Selection and Qualification of Contracted Operations Health Physics Technicians," which clearly defined experience requirements for Senior Health Physics Technicians. No weaknesses were noted in the inspector's review of the procedure or contractor staffing practices.

6.0 Equipment and Supplies

The inspector reviewed the licensee's inventory of HP equipment available for use during the 1992 outage. The following chart details some of the inspector's findings:

| Instrument type | Ready for use | Total possessed |
|---|---|---|
| RO-2 ion chambers | 23 | 29 |
| RO-2A ion chambers | 21 | 21 |
| RSO-5 ion chambers | 10 | 12 |
| R-07 ion chambers | 4 | 4 |
| 3090-3 remote monitors | 8 | 11 |
| RM-14 friskers | 59 | 60 |
| E-140N friskers | 23 | 26 |
| CM-7A contam. monitors | 4 | 4 |
| SAM small article monitors | 5 | 5 |
| Alarming dosimeters | 79 | 114 (30 just acquired) |
| AMS-3 air monitors | 6 | 6 |
| Lapel air samplers | 24 | 25 |
| HD-29A air samplers | 28 | 28 |
| AVS-28A air samplers | 28 | 30 |
| HV809V1 air samplers | 22 | 26 |

No weaknesses were noted in the inspector review of HP instrument inventories.

The inspector discussed the availability of shielding with licensee personnel. Approximately 1,100 lead blankets were on-site and readily available for use. Approximately 500 of those blankets were reserved for use on reactor coolant piping in support of the RTD modification. A total of 200 additional lead blankets were allocated to shield other components such as letdown piping and the pressurizer surge and spray lines. The inspector determined that the licensee had an adequate inventory of shielding to support outage plans.

According to licensee personnel, adequate amounts of respirators, protective clothing, ventilation units and other general HP supplies (i.e., postings, smears, air sample filters) were available on-site to support outage activities. The inspector will assess the availability of such resources during the outage.

## 7.0 Facility Tours

Housekeeping was well maintained considering that the plant was about to begin a major refueling outage. Several lay-down areas had already been established in preparation for shutdown activities. Materials stored within the plant did not obscure radiological postings or challenge contaminated area boundaries. Radiological postings were observed to be clear, concise and in accordance with station procedures.

All locked high radiation areas visited were secured in accordance with NRC license requirements. Contaminated areas were reduced in size which allowed most areas of the plant to be toured without protective clothing. Radiation Protection Department personnel interviewed were found to be well versed in the plant's radiological conditions and knowledgeable of work in progress. All work observed within the Radiologically Controlled Area (RCA) was progressing safely. The inspector reviewed the licensee's recent Radiological Occurrence Reports (RORs). All of the RORs reviewed were well handled by licensee personnel and no consistent programmatic weaknesses were noted related to implementation of the in-plant radiological control program.

No safety concerns were noted during the inspector's tour of the facility.

## 8.0 Sealed Source Leak Testing

During a recent self assessment audit, the licensee identified a potential violation of NRC contamination survey requirements for a hermetically sealed cadmium and americium source contained in a density gauge used at the station. Licensee personnel were in the process of gathering records to determine if surveys had been done in accordance with the General License requirements of 10 CFR 31.5, "Certain measuring, gauging or controlling devices" and Technical Specification 3/4.7.8, "Sealed Source Contamination." Licensee personnel surveyed the source and found it to be free of contamination. The inspector determined that the licensee had resolved any pending safety concern associated with this issue. This issue will be resolved during a future NRC inspection after the licensee has had time to further investigate the issue and gather all pertinent records. (UNR 50-443/92-19-01)

## 9.0 Exit Meeting

The inspector met with the licensee representatives listed in Section 1.0 of this report on September 4, 1992. Inspection findings were discussed during the meeting.