U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-443/92-14

Docket No. 50-443

License No. NPF-86

Licensee: Public Service Company of New Hampshire
P. O. Box 300
Seabrook, New Hampshire 03874

Facility Name: Seabrook Station

Inspection At: Seabrook, New Hampshire

Inspection Conducted: June 15-19, 1992

Inspector: S. Sherbini 7/7/92
S. Sherbini, Senior Radiation Specialist date
Facilities Radiation Protection Section

Approved by: W. Pasciak 7-7-92
W. Pasciak, Chief, Facilities Radiation Protection Section date

Areas Inspected: A routine inspection of the radiological controls program on site. Areas inspected include calibration, quality assurance and records of counting laboratory and survey instruments, the whole body counting facility, and the personnel dosimetry system. Also reviewed were the respirator maintenance and fit testing facilities.

Results: The program areas reviewed were found to be well run by competent staff. The programs were found to be based on sound technical bases, and the program records were well maintained and complete. The procedures were adequate, with some deficiencies identified. Within the scope of this inspection, no violations were identified.

DETAILS

1.0 Personnel Contacted

1.1 Licensee Personnel

* M. Campbell, Health Physics Supervisor
* W. Cash, Health Physics Supervisor
* B. Clark, Rad Services Supervisor
* E. Darois, Health Physics Supervisor
* S. Dodge, Rad Services Department Supervisor
* V. Pascucci, QC Department Supervisor
* P. Plazeski, Rad Services Supervisor
  J. Rafalowski, Health Physics Department Supervisor
* R. Thurlow, Health Physics Supervisor

1.2 NRC Personnel

* N. Dudley, Senior Resident Inspector

* Denotes attendance at the exit meeting on June 19, 1992.

2.0 Respirator Maintenance Facility

The respirator maintenance facility was found to be well equipped with washing and drying equipment, frisking stations, and a leak testing facility. The maintenance facility was not in use at the time of this inspection but the equipment appeared to be well maintained, and the facility was well stocked with necessary supplies. Respirator storage was also found to be conducted in accordance with current good practices, with proper stacking of respirators and clearly visible expiration dates on the respirator packages.

According to Procedure HD0965.01, "Respiratory Protection Quality Assurance and Maintenance Program", in-service respirators are to be checked monthly for leaks on the leak-testing phantom. The respirators are selected randomly from the in-service population, and at least 10% are to be tested. An additional 5% of the respirators are to be tested for each respirator that fails. A computer program tracks each respirator in the licensee's facility and indicates which are in service and which not. A review of the licensee's records showed that required tests were being conducted.

3.0 Respirator Fit Testing

Fit testing of respirators is performed using quantitative methods with equipment that relies on ambient dust to measure the fit factor. According to Procedure HD0965.10, "Operation of the TSI Portacount", a minimum fit factor of 1000 is required to pass a fit test. The subject being tested is required to perform several types of movements, or exercises, during the test to ensure that the fit holds in different bodily configurations normally encountered during work. A fit factor is calculated by the machine for each exercise. Although the procedure does not specify the action to be taken if the fit factor for any of the exercises falls below 1000, the licensee stated that they require a minimum of 1000 for each exercise to consider the test a puss, and the overall fit factor for the test is not normally used.

The quality control for the fit testing equipment is limited to performing a zero check after the equipment is turned on. This check is done by attaching a High Efficiency Particulate Filter (HEPA) to the sampling line and observing the reading of dust particle concentration. A non-zero concentration indicates a possible leak in the sampling system. The inspector stated that although this test does check for system leaks, it does not test for proper functioning of the fit factor determination process. The licensee stated that the machine performs several internal checks to ensure that the components of the system are working properly, and that the manufacturer does not recommend any additional quality control checks. The licensee also stated that, based on their experience in using these machines, they would recognize any unusual data that resulted from a malfunction. Observation of a fit test during this inspection showed that testing was being performed in accordance with procedures and good practices.

4.0 Whole Body Counting and Excreta Bioassay

The licensee uses two whole body counting systems with computer software developed for the site by the Yankee Atomic Electric Company (YAEC). Each system consists of a germanium gamma detector with associated electronics and suitable shields. The person to be counted is seated in front of the detector collimator and the detector-subject distance is adjusted to suit the person's size. The licensee stated that, by using appropriate shield configurations, they are able to separately detect activity located in three regions of the body: the thyroid, the lung area, and the gastrointestinal area. Specific region counting is performed

if the detected activity in a whole body count exceeds 3.3 times the standard deviation of the count. An unshielded sodium iodine detector is placed on a wall close to each whole body detector and is used to monitor ambient background. The detector is set to alarm if the background deviates from prescribed limits.

A review of the operation of the whole body counting facility showed that the licensee maintains a good quality assurance program. Daily quality control (QC) includes a source check to verify the stability of system gain, the efficiency, and the system resolution, and a background check using a water phantom to verify the background level and the absence of any unexpected peaks in the background energy spectrum. According to Procedure HD0961.22, "Whole Body Counting System calibration", the efficiency is calibrated or checked at least annually or whenever maintenance is performed that may affect the efficiency. As part of the QC program, the computer software routinely verifies that the minimum detectable activity for each of the isotopes in the system library does not fall below specified levels (5% of the maximum permissible organ burden for the isotope).

The licensee also participates in the New England Collaborative In Vivo Bioassay Quality Assurance Program. This is a round-robin program conducted by YAEC to test the performance of whole body counting systems at power plants in the New England area. A phantom with radionuclides uniformly dispersed in the organs is used during these tests (Lawrence Livermore realistic tissue equivalent phantom). The tests verify the relative bias, relative precision, and detection limits, and the results are judged according to criteria specified in draft ANSI Standard N13.30, "American National Standards Draft Performance Criteria for Radiobioassay". A review of the licensee's records showed that the licensee generally participates in these tests at least twice per year, but that they did not take part in the last round of testing because of system unavailability. Testing was due to take place shortly following this inspection. A review of the daily QC data as well as the calibration data showed that the systems were being routinely checked and were being maintained in calibration and properly monitored.

The licensee also conducts an excreta bioassay program, but the sample analysis is done off site at the YAEC laboratories. A review of randomly selected recent data from this program showed that the program was being conducted in accordance with procedures and proper practices. The results of routine urine sampling and routine whole body counts showed only small intakes in a few cases. Whole body counts

performed following contamination or respirator misuse incidents also showed little or no intakes.

5.0 Instrument Calibration

5.1 Counting Laboratory

The operation and quality control (QC) of the counting room were reviewed during this inspection. Sample counting is the responsibility of the health physics group on site, as is count room QC. Some of the QC is sometimes performed by the rad services group on site, as is some of the simple repair work. More extensive repairs are done by a dedicated person in the I&C group.

Operation of the count room is described in Procedure HD0955.01, "General Count Room Guidelines". This procedure describes the methods to be used for counting various types of samples. The QC program for the counting room is not specified in a single procedure; rather, the QC for each instrument is described in the procedure for the operation of that instrument. The inspector stated that the lack of a clear statement of a QC plan for the laboratory, in which the types of QC checks, their frequencies, the acceptance criteria, and the responsibilities are specified, is considered a weakness. However, a review of the documentation for the counting laboratory showed that QC checks were being conducted routinely and on schedule for all the laboratory instruments in service. The lower limits of detection, the background for each instrument, and the counting time for that instrument are posted close to the instrument for ease of use by technicians when counting samples. Quality control charts are also maintained for stationary laboratory instruments. Charts are maintained for the source check count rates and the background counts. The charts were found to be current and showed the appropriate operating limits. The licensee stated that they are in the process of developing a set of QC functions in common with the chemistry laboratory and that this will result in better definition of the QC program.

5.2 Survey Instruments

Calibration of the survey instruments is the responsibility of the rad services group on site, and daily source checks of these instruments is performed by health physics. A calibration facility with a beam irradiator is used for calibrations. The irradiator contains four Cs-137 sources of strengths from 12 mCi to 400 Ci. The instrument scales are observed during calibration using a closed circuit TV

system. Traceability to the National Institutes of Standards and Technology (NIST) is maintained using transfer ionization chambers of the Shonka-Wykoff type. The chambers are calibrated by NIST every three years, and the associated electrometers are calibrated annually. The exposure rates from the irradiator are established at several points from the source and are decayed quarterly and verified annually. Criteria for instrument calibration and service conform to the requirements specified in ANSI N323-1978, "Radiation Protection Instrument Test and Calibration".

An instrument Equipment History card is maintained for each instrument in use. The card documents all repairs and calibrations performed on the instrument and any difficulties observed during its use. A review of these cards showed that they were current and well maintained. Although instrument calibration frequencies are not specified in the instrument procedures, they are specified in the Final Safety Analysis Report (FSAR) and also in the Radiation Protection Manual. A computer program tracks the calibration due date for each instrument in service. Instruments are calibrated to read within 10% of the known exposure dose rates at the point of calibration. Procedure HD0963.02, "Control and Calibration of Health Physics Instrumentation and Equipment", specifies that a notification of unsatisfactory instrument be initiated whenever the as-found reading of an instrument being calibrated deviated more than 20% from the proper reading. The licensee stated that these notifications are used to make any necessary adjustments in assigned doses that were based on the readings of that instrument.

Survey instruments in service are response-checked every day by the health physics group. However, discussions with the licensee indicated that the instruments were not being checked on all the scales that may be used in the plant, nor are there indications on the instruments that some of the scales were not checked. The inspector stated that this practice is a source of some concern. The licensee stated that they will evaluate the matter and take appropriate action. These items will be reviewed during a future inspection.

6.0 Personnel Dosimetry System

A thermoluminescent dosimetry (TLD) system is used for the dosimetry of record on site. Three varieties of the basic system are used for routine whole body beta/gamma monitoring, neutron dosimetry, and extremity dosimetry. A review of the operating procedures and system records showed that a good calibration and quality control program is

maintained for the TLD systems, and that the calibrations and QC tests were current. The systems are also accredited by NVLAP (National Voluntary Laboratory Accreditation Program) in all test categories. A technical basis document was available that showed in detail the methods used to obtain the various doses from the TLD data, and the test irradiations performed to verify the adequacy of the analysis algorithm.

7.0 Procedures

The procedures applicable to the areas described in this report were reviewed during the inspection. They were found to be generally adequate, with most being sufficiently clear and complete to properly define the function addressed by the procedure. However, a weakness noted in many of the procedures reviewed was that important information was in some cases omitted from the procedures, with reliance placed on training and long experience on site to supply the missing details. Some examples are listed below.

- Source specifications are often omitted from calibration and QC procedures, the reference in the procedure simply stating that a beta or an alpha source be used, often without specifying the radionuclide to be used or the source geometry or characteristics. For example, Procedure HD0963.15, "Calibration of the Eberline MS-2", a scaler with a GM detector, specifies that a beta source be used in the calibration but does not provide any further details on the nature of the source. Sometimes, the procedure user is given a choice but no basis for making a decision. For example, Procedure HD0963.27, "Calibration of the Eberline R02/R02A Ion Chamber and Bicron RSO-50 Ion Chamber" , specifies that the Sr-90 source is normally the beta source used, "however, the Tl-204 or Pm-147 may also be used". The licensee uses a slab source for calibrating those detectors for beta response, and the dose rate at the center of the ion chamber in the detector is used as the reference dose rate to make the calibration measurements. The procedure, however, does not supply this information.

- Some procedures do not provide sufficient guidance on the implementation of the activity described by the procedure. For example, Procedure HD0955.01, "General Count Room Guidelines" states that the procedure provides the "flow paths for smears and the various types of air samples that are counted by HP". However, the procedure does not provide a clear flow path to be followed for each type of sample, but provides a number of alternative possibilities, without providing criteria for selection of an appropriate alternative. For example, the procedure states that air

samples may be counted on the GM counter, the proportional counter, or the gamma spectrometer, but does not provide any further guidance. The procedure also instructs the user to perform gamma spectroscopy on smears if necessary but does not specify the conditions under which such action would be necessary.

- Quantities are sometimes used in procedures without definition. For example, lower limit of detection (LLD), and minimum detectable activity (MDA) are used in some procedures but are not defined nor is the their mode of use clearly explained.

- Acceptance criteria for QC tests are frequently not given in the procedures. For example, Procedure HD0963.02, "Control and Calibration of Health Physics Instrumentation and Equipment" does not provide acceptance criteria for the daily background checks. In other cases, the method to be used to establish these criteria is not described.

The licensee stated that they have recently started a project to review and improve site procedures and that these and other deficiencies will be corrected as part of this project. This area will therefore be reviewed during future inspections.

8.0 Exit Meeting

The inspector met with licensee representatives at the end of the inspection on June 19, 1992. The inspector reviewed the purpose and scope of the inspection and discussed the inspection findings.