U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No.	50-29/94-02
Docket No.	50-29
License No.	DPR-03 Category C
Licensee:	Yankee Atomic Electric Company 580 Main Street Bolton, Massachusetts 01740-1398
Facility Name:	Yankee Nuclear Power Station
Inspection At:	Rowe, Massachusetts
Inspection Period:	February 7 - 9, 1994

Inspector: for _____ 3/17/94
J. Nick, Radiation Specialist — Date
Facilities Radiation Protection Section

Approved by: _____ 3/17/94
R. Bores, Chief — Date
Facilities Radiation Protection Section

Areas Inspected: Review of radiological activities for the component removal plan, transportation of radioactive materials, radiological controls program audits and assessments, and internal exposure control.

Results: The licensee maintained a very competent radiological controls program with no areas of weakness noted. Facility tours indicated good housekeeping in contaminated areas and proper radiological controls. Radioactive waste shipments were performed with no deficiencies noted. The quality assurance activities were very effective in identification and resolution of minor deficiencies. The internal exposure control and ALARA programs were very good. Within the scope of this inspection, no violations were identified.

DETAILS

1.0 Individuals Contacted

1.1 Yankee Atomic Electric Company

*G. Babineau, Radiation Protection and Chemistry Manager
*D. Caisyn, Quality Assurance
B. Colby, ALARA Specialist
W. Cox, ALARA Specialist
M. Desilets, Radiation Protection Engineer
D. Grippardi, Quality Assurance
*G. Maret, Site Manager - Component Removal Project
*N. St. Laurent, Plant Superintendent
*M. Vandale, Radiation Protection Engineer

1.2 NRC Personnel

H. Eichenholz, Senior Resident Inspector (Vermont Yankee Plant)
P. Harris, Resident Inspector (Vermont Yankee Plant)

*Denotes those individuals participating in the exit briefing

2.0 Purpose

The purpose of this inspection was to review radiological activities of the component removal project, transportation of radioactive materials, radiological controls program audits and assessments, and internal exposure control.

3.0 Facility Tours

3.1 Vapor Containment

The inspector toured most of the radiological controlled areas within the vapor containment including the charging floor and "Broadway" (the walk-way around the bioshield). Work was in progress on the charging floor for the segmentation of the reactor vessel internals. Some workers were stationed on the charging floor and others were stationed on the "bridge" above the vessel cavity. The vessel cavity was filled with water and the cutting and manipulating work was being performed under water. The workers raised items to the cutting table, performed the cuts, and then transferred the irradiated metals to cask liners. There were approximately eight cask liners with various contents in the reactor cavity. The inspector noted air sampling and air handling equipment in various positions, including a large hood above the cutting operations on the surface of the water in the reactor cavity. This hood was designed to capture any gases released during the cutting. One worker on the charging floor was wearing a personnel air sampler to measure the representative

breathing air for all workers on this elevation of the vapor containment. Personnel dosimetry was worn by all workers in this area. Radiation protection technicians were monitoring the dose rates for workers as the cutting operation progressed.

3.2 Balance of Plant

The inspector toured most of the radiological controlled areas outside the vapor containment including the primary auxiliary building, the radioactive waste processing building, the "new PCA" building, and the warehouse attached to the radwaste processing building. All radiation areas (RAs) and high radiation areas (HRAs) were posted and barricaded as required. Locked HRAs were maintained locked with appropriate warning signs. Housekeeping in contaminated areas was good, and contamination control was evident by the use of "step-off pads", personnel monitoring equipment (friskers), and contaminated area postings at the boundaries.

3.3 Other Areas

The inspector toured the perimeter of the restricted area. Fences and gates were posted with warning signs for the restricted area due to potential radiation exposure. The warning signs were visible in spite of snow-piles from a recent snowfall.

4.0 Radiological Activities

The licensee was continuing underwater cutting of the reactor vessel internals as part of the component removal plan. A new underwater filter compactor was being used to reduce the volume of used filters for radioactive waste shipment. Periodic shipments were performed to transport radioactive waste to the low level disposal site in Barnwell, South Carolina. The licensee was performing radiological surveys of the reactor cavity, the reactor internals, and used filters to aid in characterization of the waste content.

Plans were being developed by the licensee to expand component removal activities in a second phase of the operation. Phase two would involve further asbestos insulation removal, removal of the four main coolant pumps (MCPs), and removal of miscellaneous pumps and piping from other systems. Other systems being considered included the chemical volume control system (CVCS), the chemical shutdown system, the safety injection (SI) system, and the valve stem leak-off system. Dismantlement of the main steam piping system was also being considered. The second phase of the component removal project had been approved by the licensee's Board of Directors and specific planning sessions were being scheduled. The licensee planned to utilize contract labor companies with prior radiological experience for asbestos abatement and component removal activities.

Preliminary estimates of the personnel radiation exposure for the second phase of the component removal project were approximately 50 person-rem in 1994. The largest percentage of the estimate was from continued asbestos abatement in the vapor containment

and removal of the four main coolant pumps. The licensee stated that these numbers are early estimates, and are subject to change based on the actual scope of work.

5.0 Radioactive Waste

5.1 Transportation Records

The inspector reviewed a representative sample of the licensee's radiological waste shipping records for compliance with NRC and DOT regulations. No violations or deficiencies were noted.

5.2 Radioactive Waste Shipments

The inspector observed the preparation of a cask containing low-level radioactive wastes for shipment to the low-level radioactive waste site near Barnwell, South Carolina. The cask was a Chem-Nuclear Model 3-55 (CNSI 3-55) container with a steel liner. The cask contained approximately 57 cubic feet (8400 pounds) of radioactive material. The activity of the waste was estimated at 4300 Curies and the radioisotopes included cobalt-60, iron-55, and nickel-63. The licensee's calculations indicated a thermal generation of approximately 36 watts. According to the licensee's survey record, the maximum radiation dose rates were 1 millirem per hour at 2 meters from the vehicle, 6 millirem per hour at the surface of the vehicle, 40 millirem per hour on contact with the cask, and 0.02 millirem per hour in the tractor cab. Contamination levels were found as high as 1000 dpm/cm^2, but were decontaminated to less than the lower level of detection for the radiation detection equipment. Remaining levels were approximately 100 to 200 dpm/cm^2. These radiation dose rates and contamination levels were within NRC and DOT regulations for radiological shipments.

The radiological survey was conducted by one of the licensee's radiation protection technicians and was observed by a quality assurance engineer. The inspector observed that the vehicle was in good condition, was properly placarded, and had the sunscreen in place. The inspector did not note any discrepancies or violations of regulations or safety procedures.

5.3 Radioactive Waste Plan

The licensee had developed a plan for shipping low-level radiological waste in the near future. The plan was designed to maximize the amount of radioactive waste that could be shipped to the low-level radioactive waste site near Barnwell, South Carolina. The licensee's constraints included money budgeted for waste disposal, closure of access to the waste site after June 1994, and allocation of space at the waste site. When possible, the licensee was planning to continue using a vendor for volume reduction and decontamination of radioactive materials. The plan included

an effort to ship a significant volume of material that had been temporarily stored in the "old potentially contaminated area" (OPCA) building.

6.0 Program Audits/Assessments

The inspector reviewed the licensee's program for self-assessment and audits by reviewing the Radiological Occurrence Reports (RORs), quality assurance audit reports, quality assurance surveillance reports, and quality control implementation instructions.

Six RORs from 1993 and two RORs from 1994 were reviewed. The RORs contained instances when workers used the wrong RWP or did not follow station procedures for work in radiological areas. The events did not result in any significant personnel contaminations or unplanned exposures. Appropriate and timely corrective actions were taken by the licensee in each case. The licensee's system for identifying and correcting these issues was effective in preventing reoccurrence of the specific event. The licensee had also implemented some improvements to help in tracking RORs. As of October 1993, the licensee began assigning sequential tracking numbers to each ROR. As of this inspection, the licensee had recorded two RORs for 1994, Numbers 94-01 and 94-02.

The licensee's quality assurance group had performed an annual audit in the areas of radiological waste/process control plan, radiation protection, and chemistry/radiological effluent technical specifications/radiological environmental monitoring program/off-site dose calculation manual. The audits were performed between June and August 1993. The audit reports identified some areas of deficiency and recommended improvements. The inspector interviewed personnel and examined records to determine if the appropriate corrective actions had been performed. For each area of deficiency, the licensee's staff had taken appropriate corrective actions. The recommendations of the auditors were used in most cases.

The licensee's quality assurance group had also performed several surveillance activities of radiation protection and radiological waste operations in the past year. The inspector reviewed surveillance reports for several activities including the steam generators/pressurizer removal, cranes and rigging, component removal activities, and posting and control of radiological control areas. The inspector found the surveillance reports contained good detail and comprehensive reviews of the activities. The reports identified some minor deficiencies and generated several Deficiency/Observation Reports (DORs). The inspector reviewed several DORs to determine how the licensee resolved the deficiencies. As a result of the DORs, the licensee took prompt and effective corrective actions. The inspector concluded that the surveillance activities were very helpful in identifying and correcting several minor deficiencies.

The inspector also reviewed the quality control implementing instructions that provided guidance to the quality assurance personnel when performing surveillance activities during preparation and shipment of radiological waste. The inspector found that the instructions

provided very good checklists and other detailed information to allow the personnel to effectively monitor and inspect the activities.

7.0 Internal Exposure Control

The licensee's internal exposure control program was reviewed through interviews with licensee personnel and a review of the licensee's procedures and records. The inspector reviewed the licensee's procedures for plant airborne radioactivity surveys, use of breathing zone air (BZA) samples, derived air concentration (DAC) accountability, and evaluation of bioassay results. The air sample log records were reviewed by the inspector from the beginning of 1994 to the time of the inspection.

The licensee's procedures required routine airborne radioactivity samples in areas of the plant with previous, suspected, or potential airborne contamination. Confirmed airborne contamination was calculated in terms of DACs and assigned to personnel working in the contaminated areas based on stay times in the form of DAC-hours. BZA samplers were sometimes used to meet the requirement for an air sample that was representative of the air inhaled by the individual. The licensee allowed one worker to wear a representative BZA for other workers in the same area who were performing similar work.

Although the licensee did not expect individuals to exceed the monitoring requirement threshold of 200 DAC-hours or 10% of the Annual Limit on Intake (ALI), the licensee committed to perform monitoring and dose assessment to demonstrate compliance. If the air sample results indicated greater than 2.0 DAC-hours for an individual, the DAC-hours were assigned and tracked in the licensee's data base. A whole body count (direct bioassay) was required when an individual accumulated greater than 20 DAC-hours in a week.

Based on the direct bioassay results, the licensee established action levels for recording, evaluating, and investigating potential intakes of radioactive materials. The recording level was established at 10 DAC-hours; therefore, the results were considered insignificant if the total DAC-hours were less than 10. If the results indicated a total of greater than 40 DAC-hours, the licensee could take additional actions to further evaluate the incident related to the uptake. With a result greater than 100 DAC-hours, the individual was restricted from the radiation control area and follow-up, direct bioassay measurements and indirect bioassay measurements (fecal and urine samples) were required.

The inspector found that the air sample results for the monitoring year (1994) were very small. No personnel had greater than 20 DAC-hours; the largest internal dose assignment was 6 DAC-hours. The inspector determined that the licensee was effectively assigning and tracking internal exposures.

8.0 ALARA Program

Through interviews with personnel and review of several documents, the inspector examined the program to maintain personnel exposures as low as reasonably achievable (ALARA). The highest cumulative total effective dose equivalent assigned to a worker for 1994 to date was 360 millirem. This is very far below the 5,000 millirem per year allowed by NRC regulation. The licensee personnel accumulated approximately 168 person-rem during 1993, which is below the estimated total personnel exposure of 210 person-rem.

The licensee's staff was preparing dose estimates for the second phase of the component removal project, and some jobs would have an ALARA review performed in the future. Assuming the second phase activities were performed, the licensee estimated a total personnel exposure of approximately 146 person-rem for 1994.

Many ALARA techniques were used to maintain the total personnel exposure to a minimum, and the inspector concluded that the licensee continued to implement an effective ALARA program.

9.0 Exit Meeting

A meeting was held with licensee representatives at the end of the inspection period on February 9, 1994 (see Section 1.0 for a list of attendees). The purpose and scope of the inspection were reviewed and the findings of the inspection were discussed. The licensee representatives acknowledged the inspector's findings.