U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-29/93-09

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: December 7, 1993 through January 27, 1994

Inspector: _____ 2/4/94
J. Nick, Radiation Specialist Date
Facilities Radiation Protection Section

Approved by: _____ 2/7/94
for R. Bores, Chief Date
Facilities Radiation Protection Section

Areas Inspected: Transportation of radioactive materials, preparation of radioactive materials for shipment, quality assurance, and transportation procedures for the component removal project.

Results: The licensee maintained an effective transportation program with areas of weakness noted. Within the scope of this inspection, one apparent violation was identified involving excess removable radioactive contamination levels on a shipping cask sent to Chem-Nuclear Systems Incorporated (CNSI) near Barnwell, South Carolina (see Section 3.0).

DETAILS

1.0 Individuals Contacted

1.1 Yankee Atomic Electric Company

*G. Babineau, Radiation Protection and Chemistry Manager
W. Cox, ALARA Specialist
M. Desilets, Radiation Protection Engineer
T. Henderson, Assistant Plant Superintendent
S. Litchfield, Health and Safety Supervisor
*R. Mellor, Yankee Project Manager
G. Maret, Site Manager - Component Removal Project
*N. St. Laurent, Plant Superintendent
*J. Thayer, Vice President and Manager of Operations
*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 via telephone

2.0 Purpose

The purpose of this inspection was to review the transportation of radioactive materials, preparation of radioactive materials for shipment, quality assurance, and radwaste and transportation procedures for the component removal project. The inspection also included an in-office review of the circumstances associated with the transfer, from the Yankee Atomic Electric Company's Yankee Nuclear Power Station to the Barnwell (S.C.) Disposal Site operated by Chem-Nuclear Systems Incorporated (CNSI), of a cask of radioactive waste that arrived at the Barnwell site with external non-fixed radioactive contamination in excess of the limits specified in 10 CFR 71.

3.0 Contaminated Cask Incident

On January 6, 1994, Yankee Atomic Electric Company (YAEC) shipped by highway as an exclusive use shipment a CNSI 3-55 cask containing approximately 6470 Curies of licensed material. The cask external surfaces, upon receipt at the Barnwell Disposal Site in Barnwell, South Carolina on January 7, 1994, were determined to have non-fixed contamination levels in excess of 1,500 dpm/cm^2. The efficiency of the Barnwell Disposal Site contamination

sampling methodology was determined to be 46%. Using this correction factor resulted in an adjusted non-fixed contamination level of approximately 690 dpm/cm^2.

10 CFR 71.87 lists the maximum permissible non-fixed contamination limit for beta-gamma emitting radionuclides as 22 disintegrations per minute per centimeter squared (22 dpm/cm^2). For exclusive use shipments, this limit may be increased by a factor of ten at the destination to 220 dpm/cm^2. This limit was exceeded and is an apparent violation (VIO 50-29/93-09-01).

3.1 Arrival of the Cask at Yankee

On December 20, 1993, an empty 3-55 shipping cask arrived at YAEC from the Barnwell Disposal Facility. Non-fixed contamination on the external surfaces was determined to be approximately 100,000 dpm/100 cm^2 or 1,000 dpm/cm^2. The non-fixed contamination limit was 220 dpm/cm^2. NRC Region I was notified by the licensee. Since this radioactive shipment originated in the Agreement State of South Carolina, the appropriate state officials investigated and evaluated this incident. Chem-Nuclear Systems Incorporated (CNSI), the operator of the Barnwell Disposal Facility, requested YAEC to decontaminate the cask and use it.

3.2 Decontamination Effects

After three cycles of decontamination at YAEC, the non-fixed contamination on the external surfaces of the cask was below 14 dpm/cm^2 and it was transported to the reactor containment building to be loaded with irradiated hardware removed from the reactor internals.

Following the loading evolution, the cask was decontaminated and evaluated for a period of approximately 15 days. The cask was decontaminated using Tri-Sodium Phosphate (TSP) and hot water three times using Scotch Brite pads and rags. Results indicated most areas were below 2 dpm/cm^2 with a few areas exceeding this level with a maximum of 37 dpm/cm^2. A fourth decontamination cycle resulted in all smear samples below 10 dpm/cm^2. The licensee kept the cask for one additional day to measure the contamination migration out of the pores of the cask surface. On January 6, 1994, the final survey indicated a few areas of elevated contamination, with a maximum of 13 dpm/cm^2. The shipment was released from YAEC at 0730 hours.

3.3 Arrival of the Cask at Barnwell

Upon receipt of the CNSI 3-55 shipment at the Barnwell Disposal Facility on January 7, 1994, the CNSI receipt inspection survey of the cask external surfaces indicated non-fixed contamination up to 1,500 dpm/cm^2.

A representative from the State of South Carolina indicated to the NRC Region I inspector that he had reviewed the decontamination and survey actions of both licensees (the state-licensed Barnwell Disposal Facility and the NRC-licensed Yankee facility) involved in the shipment. He determined that the CNSI 3-55 shipping cask had been properly decontaminated and surveyed prior to both portions of the shipment and that the cask surface pores had apparently become loaded with contamination, which had migrated out during transport. The State of South Carolina decided, under the circumstances, not to take any enforcement action against CNSI and was not recommending any Barnwell Disposal Facility burial restrictions against YAEC.

3.4 Summary

As the regulatory agency of jurisdiction for the YAEC shipment, the NRC has determined that an apparent violation of NRC requirements occurred as the result of the licensee's shipping activities. On January 27, 1994, the Radiation Protection Manager (RPM) and other representatives from the Yankee Nuclear Power Station were informed of this apparent violation of NRC requirements in a telephone conversation with Mr. J. Nick of the Region I Office. The representatives acknowledged the finding.

3.5 Corrective Actions

The licensee sent representatives to the CNSI burial site near Barnwell, South Carolina to verify radioactivity measurements. The licensee verified the excess levels of contamination found by the personnel at the burial site. The licensee also discussed the event with representatives of CNSI, as the cask owners. CNSI submitted a detailed plan to YAEC to help minimize the potential for recurrence of this problem in the future. YAEC initiated actions to minimize radioactivity levels in the reactor cavity water. Another item being considered by the licensee included the use of temporary coatings during underwater use. This would potentially minimize the levels of contamination to which the cask surface would be exposed.

4.0 Radioactive Material Shipments

The licensee had performed 15 low-level radioactive waste shipments during the period of this inspection. Below is a summary of the shipments along with the contents, destination, and total radioactivity.

Date	Container	Contents	Shipment Destination	Activity (Curies)
11/30/93	Pressurizer	N/A	CNSI, Barnwell, SC	3
12/7/93	Steam Generator #3	Cement	CNSI, Barnwell, SC	397
12/8/93	Steam Generator #2	Cement	CNSI, Barnwell, SC	322
12/15/93	Steel Box	Steel	CNSI, Barnwell, SC	55
12/15/93	Steel Box	Dry Active Waste	CNSI, Barnwell, SC	0.091
12/16/93	C-Van	Steel	CNSI, Barnwell, SC	0.011
12/17/93	8-120A Cask	Irradiated Hardware	CNSI, Barnwell, SC	44
12/22/93	C-Van	Dry Active Waste	SEG (waste processor)	0.030
12/22/93	C-Van	Steel	CNSI, Barnwell, SC	0.013
12/28/93	C-Van	Main Coolant Pump	CNSI, Barnwell, SC	0.840
12/28/93	C-Van	Steel	CNSI, Barnwell, SC	0.027
1/5/94	3-55-1 Cask	Irradiated Hardware	CNSI, Barnwell, SC	24,000
1/6/94	3-55-2 Cask	Irradiated Hardware	CNSI, Barnwell, SC	6470
1/7/94	8-120A Cask	Irradiated Hardware	CNSI, Barnwell, SC	18
1/24/94	3-55-1 Cask	Irradiated Hardware	CNSI, Barnwell, SC	27,200
1/25/94	14-195 Cask	Filter Media	CNSI, Barnwell, SC	9

The inspector observed the shipment of the last two steam generators to a rail line located approximately 6 miles from the Yankee plant. One generator was transported to a local rail line each day for two consecutive days on December 7 and 8, 1993. The steam generators were transported to a local rail line via a truck and trailer designed for heavy loads. The licensee and its contractor maintained very good quality controls over the truck transport. Appropriate controls included very slow transit speed (approximately 5 miles per hour); a dry run using the actual hauling vehicles and a heavy non-radiological cargo before the first steam generator shipment; and accompaniment of the shipment by health physics personnel, other licensee representatives, and State Police vehicles. The inspector observed the shipments and reviewed the shipping paperwork. All dose rates and contamination levels were within NRC/DOT regulations. The packages had been sealed and welded as required and the impact limiters were attached. The vehicle was placarded as required by regulations.

At the rail line, at the Hoosac Tunnel in the Township of Florida, the steam generators were loaded on a train car for rail shipment to the radioactive waste disposal site near Barnwell, South Carolina. The transfers from the trailer to the rail cars were done with lifting jacks. A crane was used to move blocks and lifting supports, but the crane was not used to lift the

steam generators. A dedicated rail shipment containing two steam generators was sent on December 8, 1993. The train cars included two engines, an idler car, and the two steam generators. The inspector verified that a health physics technician was accompanying the rail shipment and the required placards were attached to the rail cars.

5.0 Quality Assurance

The inspector reviewed a surveillance report generated by the licensee's quality assurance (QA) group regarding the actions taken for cask contamination levels in excess of regulatory limits (Yankee Rowe Plant Report No. 94-01). The QA engineer reviewed the circumstances as outlined in Section 3.0 of this report, and attended meetings between YAEC and CNSI personnel.

The engineer concluded that QA involvement was appropriate, the plant staff implemented conservative actions when the cask arrived at the Yankee site, and that plant actions to minimize external contamination levels during transit of the cask to South Carolina were appropriate. The engineer also concluded that the licensee implemented required corrective action mechanisms (i.e., event reports and information reports). The engineer stated that the licensee's isotopic analysis revealed the surface contamination present on the cask when it arrived in South Carolina was only slightly attributable to contaminated water in the YAEC reactor cavity. The YAEC QA group intended to perform a surveillance of the corrective action plan developed by CNSI.

The QA engineer also reviewed the licensee's procedures for compliance to regulatory requirements. The results of the review were satisfactory, but the engineer made two recommendations to enhance plant procedures. The first recommendation was to revise the procedure for cask shipments to require an isotopic analysis of the external contamination upon receiving and sending a radioactive material shipment. The second recommendation was to require a contamination survey on the day of a radioactive material shipment. The inspector will review these procedure changes in a future inspection.

Overall, the inspector found that the level of quality assurance oversight was very good for the recent contaminated cask incident and for other radioactive material shipments.

6.0 Exit Meeting

A meeting was held with licensee representatives via telephone at the end of the inspection period on January 27, 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.