U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No.	50-29/94-04
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:	April 19 - 22, 1994

Inspector: _____ 5/10/94
J. Nick, Radiation Specialist Date

Approved by: _____ 5/10/94
R. Bores, Chief Date
Facilities Radiation Protection Section

Areas Inspected: Review of radiological activities for the component removal plan, transportation of radioactive materials, implementation of the revisions to 10 CFR 20, the program to maintain workers' radiation exposure ALARA, and the status of previously identified items.

Results: The licensee's radiation protection program was generally effective in protecting the safety of workers during the component removal project. The organization was staffed with competent and knowledgeable personnel. Facility tours indicated good housekeeping in contaminated areas and proper radiological controls. Radioactive waste shipments were performed properly, with no deficiencies noted. The implementation of the revisions to 10 CFR 20 was very comprehensive, also with no deficiencies noted. The ALARA program was good, with one area of weakness involving the documentation of ALARA program initiatives and reviews. No violations of regulatory requirements were identifed.

DETAILS

1.0 Individuals Contacted

1.1 Yankee Atomic Electric Company

*G. Babineau, Radiation Protection and Chemistry Manager
B. Colby, Radiation Protection Engineer
*W. Cox, Radiation Protection Engineer
*M. Desilets, Radiation Protection Engineer
D. Drury, Health and Safety Representative
*R. Grippardi, Quality Assurance Supervisor
T. Henderson, Assistant Plant Manager
*J. Kay, Technical Services Manager
*N. St. Laurent, Plant Superintendent
*M. Vandale, Radiation Protection Engineer
J. Williams, Training Coordinator
*B. Wood, Site Manager - Component Removal Project

1.2 NRC Personnel

P. Harris, Resident Inspector (Vermont Yankee Plant)

*Denotes those individuals participating in the exit briefing

2.0 Status of Previously Identified Items

2.1 Item 50-29/93-09-01 (URI)

(CLOSED) An apparent violation of 10 CFR 71.87 was identified in NRC Inspection Report No. 50-29/93-09. The violation involved the shipment of a cask (containing radioactive waste with approximately 6470 curies of radioactivity) via an exclusive use vehicle from the Yankee Rowe facility on January 6, 1994, to the Barnwell Low-level Radioactive Waste Management Facility site near Barnwell, South Carolina, where it arrived on January 7, 1994. Upon arrival of the cask at the disposal facility, non-fixed contamination levels were detected on the surface of the cask in excess of the NRC regulatory limit. The levels were found to be approximately 690 dpm/cm^2, which is in excess of the NRC regulatory limit of 220 dpm/cm^2, as specified in 10 CFR 71.87(i)(2).

The licensee had taken comprehensive action prior to the shipment, in accordance with instructions from the cask manufacturer, including several decontaminations of the cask to achieve levels within the NRC regulatory limits and the measurement of contamination "weeping" rates. Despite these efforts, it appears that significant weeping of contamination from the pores of the cask occurred while in transit, apparently aggravated by environmental conditions encountered enroute such as temperature and humidity, as well as by cask vibrations caused by road transport. The NRC recognizes that the safety consequences of this event were minimal, particularly since the cask was covered at all times during shipment.

Based on the comprehensive actions that the licensee took in attempt to achieve compliance, and the low safety significance of this event, the NRC has decided to exercise enforcement discretion, pursuant to Section VII.B.6 of 10 CFR Part 2, Appendix C, the General Statement of Policy and Procedure for NRC Enforcement Actions (Enforcement Policy), and not issue a Notice of Violation in this case.

The licensee has implemented several corrective actions to prevent a recurrence of this event. The inspector noted that the licensee had performed approximately fifteen cask shipments since this event with no further violations of the non-fixed contamination limit.

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 work platform (bridge) above the shield tank cavity (STC). The STC was filled with water and the cutting and manipulating were being performed under water. The workers raised items to the cutting table, performed the cuts, and then transferred the irradiated metals to cask liners or other containers. There was one cask liner with various irradiated metal pieces in the reactor cavity. The licensee was also placing irradiated metals in containers designed to allow transfer from the STC to the spent fuel pool. These containers were roughly the dimensions of a fuel bundle (approximately 8 inches by 8 inches by 8 feet) so that they would fit through the fuel transfer canal. The irradiated metals from the core baffle contained levels of radioactivity that were higher than allowable for disposal as low level radioactive waste.

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 (PAB), the service building, the radioactive waste processing (compactor) building, the "new PCA (potentially contaminated area)" storage building, and the PCA 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.

3.4 Conclusion

The activities described above were determined to have been accomplished in accordance with applicable procedures and regulatory requirements. No violations or deficiencies were noted.

4.0 Radiological Activities

The licensee was continuing underwater cutting of the highly irradiated reactor vessel internals as part of the component removal plan. The 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 radioactive waste 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.

Initial plans had been developed by the licensee for the clean-up and decontamination of the STC. These activities would begin after all reactor internals segmentation activities were

completed. The plans outlined the proposed disposal method for various wastes, debris, and other material in preparation for decontamination of the STC.

Plans were continuing to be 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. The contract labor companies had begun to construct scaffolding and other staging areas in preparation of asbestos abatement and component removal activities. Estimates of the personnel radiation exposure for the second phase of the component removal project were approximately 40 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 was also negotiating a contract with a vendor for dismantlement and purchase of the secondary side electric production system. The contract would include complete removal of the high pressure turbine; the low pressure turbine; the static and rotating exciters; the station service and main transformers; spare system parts; and miscellaneous piping, water treatment equipment, and pumps. The NRC inspector expressed concern about the radiation survey and monitoring methods used for the free release of this potentially contaminated equipment. The licensee stated that they intended to use the same criteria that had been used in the past for free release of potentially contaminated material. This item will be reviewed during future inspections.

4.1 Conclusion

The activities described above were determined to have been accomplished in accordance with applicable procedures and regulatory requirements. No violations were noted.

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. The records were maintained in good condition.

5.2 Radioactive Waste Shipments

Below is a listing of radioactive waste shipments that had been sent from the Yankee Rowe facility since January 25, 1994.

Date	Container	Contents	Shipment Destination	Activity (Curies)
2/3/94	CNSI 3-55-1 cask	Irradiated metals	CNSI, Barnwell, SC	5110
2/8/94	CNSI 3-55-2 cask	Irradiated metals	CNSI, Barnwell, SC	4300
2/15/94	CNSI 3-55-1 cask	Irradiated metals	CNSI, Barnwell, SC	3760
2/17/94	CNSI 3-55-2 cask	Irradiated metals	CNSI, Barnwell, SC	3800
2/17/94	Cargo vans (2)	DAW/trash	SEG (waste processor)	0.327
2/23/94	CNSI 3-55-1 cask	Irradiated metals	CNSI, Barnwell, SC	1930
2/28/94	CNSI 3-55-2 cask	Irradiated metals	CNSI, Barnwell, SC	3660
2/23/94	Cargo van	Dry Active Waste	CNSI, Barnwell, SC	0.040
3/2/94	CNSI 3-55-1 cask	Irradiated metals	CNSI, Barnwell, SC	7930
3/7/94	14-195H cask	Filter media	CNSI, Barnwell, SC	48.5
3/9/94	CNSI 3-55-2 cask	Irradiated metals	CNSI, Barnwell, SC	8760
3/11/94	CNSI 3-55-1 cask	Irradiated metals	CNSI, Barnwell, SC	7700
3/16/94	CNSI 3-55-2 cask	Irradiated metals	CNSI, Barnwell, SC	8190
3/22/94	CNSI 3-55-1 cask	Irradiated metals	CNSI, Barnwell, SC	4130
3/24/94	CNSI 3-55-2 cask	Irradiated metals	CNSI, Barnwell, SC	1700
3/25/94	8-120A cask	Irradiated metals	CNSI, Barnwell, SC	127
4/4/94	CNSI 3-55-1 cask	Irradiated metals	CNSI, Barnwell, SC	6430
3/23/94	Cargo vans (2)	Contaminated metals	CNSI, NSSF, Barnwell	29
3/23/94	Steel cases	Camera equipment	CNSI, NSSF, Barnwell	0.005
3/28/94	Cargo vans (2)	HEPA filters/trash	SEG (waste processor)	572
4/6/94	Cargo van	Contaminated metals	CNSI, Barnwell, SC	6
4/5/94	8-120B cask	Irradiated metals	CNSI, Barnwell, SC	146
4/7/94	8-120A cask	Irradiated metals, charcoal filter media	CNSI, Barnwell, SC	10

5.3 Radioactive Waste Plan

The licensee had implemented part of the YAEC 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. As shown in the table of radioactive waste shipments (Section 5.2 of this report), some of this material was already shipped.

5.4 Conclusion

The activities described above were determined to have been accomplished in accordance with applicable procedures and regulatory requirements. No violations or deficiencies were noted.

6.0 Implementation of Revisions to 10 CFR 20

YAEC implemented the revisions to 10 CFR 20 on January 1, 1994. The inspector reviewed the licensee's procedures that were developed for implementation of the revisions to 10 CFR 20. The inspector also reviewed the documentation for the licensee's training of personnel on these changes. The inspector concluded that the procedures were well written and contained the requirements of 10 CFR 20.

6.1 Declared Pregnant Woman Policy

The licensee developed a procedure to limit the dose to an embryo/fetus through controlling the exposure to the pregnant female worker. The procedure was written to comply with 10 CFR 20.1208 and applies to women who declare their pregnancy to licensee management. No concerns or areas of weakness were identified by the inspector.

6.2 Very High Radiation Areas

The licensee did not plan to have any accessible areas that met the criteria of a Very High Radiation Area (VHRA) as defined in 10 CFR 20. Therefore, the licensee's procedures defined the VHRA, but did not provide examples or potential areas.

6.3 Planned Special Exposures

Although the licensee did not plan to use the process, a procedure was written to delineate the requirements and limitations for the use of a planned special exposure (PSE) allowable under 10 CFR 20.1206. The licensee believed that it would be advantageous to develop the procedure and provide training for the PSE in the event that it may be used in the future. The inspector found that the procedure incorporated the guidance and requirements as stated in NRC publications and regulations.

6.4 TEDE ALARA/Respirator Use

The licensee's procedures for internal dose assessment, assignment, and tracking were discussed in a previous inspection report (NRC Inspection Report No. 50-29/93-09). The inspector determined that the procedural guidance for the ALARA principle and total effective dose equivalent (TEDE) was good, with no weakness noted.

6.5 Training

The licensee provided training on the revisions to 10 CFR 20 to all personnel before the implementation date of January 1, 1994. The inspector reviewed the records for attendance of personnel to ensure that all individuals had received this mandatory training. A number of randomly selected records for personnel who had performed work in the radiologically controlled area of the plant were reviewed. All selected personnel had records of attendance for the training. The inspector also reviewed the lesson plans and hand-out material for the training session. The inspector noted that the materials contained a good level of detail and contained colored representations of radiological area posting signs. The training material was of very good quality, with no weakness noted.

The inspector reviewed the computerized self-study version of the General Employee Training (GET). The inspector noted that the licensee had incorporated the requirements of the revision to 10 CFR 20 into the GET program. Graphics were used to represent the radiological area posting signs. The inspector had one concern with the availability of NRC Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure". Although the GET material mentioned the health risks to a developing fetus, the information was not detailed. The licensee did not reference the Regulatory Guide or offer a copy to employees. The licensee's Training Coordinator agreed to review this concern. The licensee's review and determination of this concern will be reviewed in future inspections. The inspector had no further concerns and did not identify any weakness in this area.

6.6 Conclusion

Overall, the licensee had effectively implemented the revisions to 10 CFR 20.

7.0 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). As of April 21, 1994, the highest cumulative total effective dose equivalent assigned to a worker for 1994 to date was approximately 1500 millirem. This is far below the 5,000 millirem per year allowed by NRC regulations. The personnel working at the licensed facility accumulated approximately 168 person-rem during 1993, which was under the estimated total personnel exposure of 210 person-rem.

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 overall effective ALARA program, although some weakness was identified. One area of weakness was due to the lack of documentation regarding ALARA discussions and decisions. Although the licensee discussed ALARA topics at daily planning meetings, the ALARA initiatives were not documented. The initial ALARA review for the vessel segmentation work relied upon the capability to control the radiation dose rates to workers through dose reduction activities. These activities included water radioactivity levels and residual build-up on the STC walls and the floating air hood. But when the highly irradiated components were cut, the water activity levels were higher than expected and the water filtration/demineralization capability was limited. Therefore, the licensee could not effectively control the reduction of the major source term.

The licensee had placed lead shielding on the work platform over the STC during cutting of the highly irradiated components. The inspector concluded that there was no procedural guidance for the evaluation of the dose reduction versus the cost of installation. Additionally, there were no clear criteria to determine when the shielding should be added to the work platform. The shielding was added to the work platform during the work stoppage between March 24 and March 31, 1994. If the shielding had been added from the start of the work, the inspector estimated that the dose savings could have been between 0.5 to 1.5 person-rem from September 1993 through March 1994.

The documentation of ALARA reviews performed during the segmentation project was also lacking. The licensee had documented one job review dealing with the changing of torch tips. This review was very well written and incorporated good radiological work guidance for future torch tip changes. Although the activity levels and dose rates were increasing on the segmentation work, the job was not formally reviewed to determine if other radiological controls were appropriate or necessary. The inspector concluded that the lack of documentation for ALARA program initiatives and reviews constituted a weakness in the radiological controls program.

Some good ALARA initiatives were implemented for the vessel segmentation, including flushing of piping in the PAB to lower dose rates, adding shielding on the work platform and the charging floor, and adding water filtration equipment in the STC. Total dose accumulated by personnel performing the segmentation corresponded well with the initial job estimates. As of April 20, 1994, the actual total dose was approximately 24 person-rem, against the initial estimated dose of approximately 33 person-rem. The inspector noted a good awareness by workers for the ALARA principles during observation of the vessel internals segmentation activities.

Planning was continuing for ALARA initiatives during the second phase of the component removal and the STC clean-up. ALARA initiatives included shielding for the MCPs, an underwater vacuum system for cleaning the STC, and shielding in the PCA (radwaste) warehouse. The inspector found the ALARA planning for future work very good, with a moderate amount of documentation.

7.1 Conclusion

While no violations of regulatory requirements were identified, some areas of weakness were noted in the ALARA program.

8.0 Exit Meeting

A meeting was held with licensee representatives at the end of the inspection period on April 22, 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.