



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

October 18, 2005

Docket No. 05000029  
License No. DPR-03

Mr. Gregory A. Maret  
Vice President - Operations & Decommissioning  
Yankee Atomic Electric Company  
49 Yankee Road  
Rowe, Massachusetts 01367

SUBJECT: INSPECTION 05000029/2005-001, YANKEE ATOMIC ELECTRIC COMPANY,  
ROWE, MASSACHUSETTS

Dear Mr. Maret:

The NRC has completed an inspection at your nuclear reactor facility in Rowe, Massachusetts, which covered an inspection period that began on February 1, 2005 and concluded on July 31, 2005. The findings of the inspection were discussed with you and members of your staff upon the conclusion of our on site inspections on April 28, 2005, June 23, 2005 and July 21, 2005, and during a telephone conversation on October 12, 2005. The enclosed report presents the results of that inspection.

Your radiation protection, radioactive effluent monitoring, quality assurance and self-assessment, solid radwaste and transportation, and independent spent fuel storage facility programs were inspected during this inspection period. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, observations made by the inspectors, and independent direct radiation measurements made by the inspector. With respect to these areas of inspection, we note that you maintained an effective program for decommissioning of the site.

Based on the results of this inspection, the NRC has determined that a Severity Level IV violation of NRC requirements occurred during this inspection period. The violation involved the failure to post a high radiation area in the spent fuel pool excavation area as required by 10 CFR 20.1902(b). This violation is being treated as a Non-Cited Violation (NCV), consistent with Section VI.A of the NRC Enforcement Policy, because the violation was self-identified, was placed into your corrective action program, was corrected in a timely manner, was not repetitive or willful, and had a low potential for actual exposure of workers. The NCV is described in Section 2.2 of the enclosed inspection report. No response to this NCV is required.

If you contest this violation or the significance of this violation, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region I; and the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Gregory Maret

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In accordance with Section 2.390 of the NRC's "Rules and Practices," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and its enclosure will be placed in the NRC Public Document Room (PDR) and will be accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html>. No reply to this letter is required.

Sincerely,

/RA/

Marie Miller, Chief  
Decommissioning Branch  
Division of Nuclear Materials Safety

Enclosure:  
NRC Region I Inspection Report No. 50-029/2005-001

cc w/encl:  
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J. Kay, Principal Licensing Engineer  
G. van Noordennen, Manager, Regulatory Affairs  
F. Helin, Decommissioning Director  
R. Walker, Department of Public Health, Commonwealth of Massachusetts  
K. Smith, Yankee Rowe Community Advisory Board  
Citizens Awareness Network  
Commonwealth of Massachusetts, SLO Designee  
State of Vermont, SLO Designee

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION I**

Docket No. 05000029

License No. DPR-03

Report No. 05000029/2005-001

Licensee: Yankee Atomic Electric Company (YAEC)  
580 Main Street  
Bolton, Massachusetts 01740-1398

Facility Name: Yankee Nuclear Power Station

Location: Rowe, Massachusetts

Dates: February 1, 2005 to August 31, 2005

Inspectors: James Kottan, Sr. Health Physicist, DNMS  
David Everhart, Health Physicist

Approved by: Marie Miller, Chief, Decommissioning Branch, Region I

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## **EXECUTIVE SUMMARY**

Yankee Atomic Electric Company  
NRC Inspection Report No. 05000029/2005001

Inspections were conducted to determine whether the decommissioning activities carried out at the Yankee Rowe facility were conducted safely and in accordance with NRC requirements. Areas reviewed included the radiation protection program, radioactive effluent program, quality assurance and self-assessment program, solid radwaste and transportation program, and independent spent fuel storage facility.

### **Operations and Decommissioning Status**

The licensee maintained an adequate program to survey and monitor the Independent Spent Fuel Storage Installation (ISFSI).

The licensee maintained an effective program to self-identify, prevent and correct concerns and problems that would degrade safety or the quality of decommissioning.

The licensee's safety oversight and decommissioning project management organizations were sufficiently staffed and qualified to support ongoing decontamination, demolition, decommissioning and spent fuel storage activities.

The licensee maintained an adequate program for demolition and dismantlement of site buildings and structures.

The release of tritium contaminated shield blocks from the site to private property in Vermont is an unresolved item pending the review and evaluation of analytical results from shield block samples.

### **Plant Support and Radiological Controls**

The licensee maintained adequate controls to limit exposures of workers to external sources of radiation. Posting and labeling of radioactive materials and radiation areas met regulatory requirements. Personnel and equipment radiation and contamination monitors were properly maintained and calibrated. In general, the licensee implemented an effective program to control and limit occupational radiation exposure. In one instance, the licensee failed to post a high radiation area in the spent fuel pool excavation area in accordance with the requirements of 10 CFR 20.1902(b). This violation has been classified as a Non-Cited Severity Level IV violation, consistent with the NRC Enforcement Policy.

The radiological effluent program was adequately implemented. Radioactive effluents were properly sampled, analyzed and reported.

The licensee's implementation of the solid radioactive waste management and transportation program was adequate. Radioactive waste was properly characterized, classified, stored, packaged and shipped.

## **REPORT DETAILS**

### **Summary of Facility Activities**

Decommissioning activities at the Yankee Rowe Nuclear Power Station continued under the approval granted through a letter from the NRC to Mr. James Kay (October 28, 1996). The license termination plan (LTP) was approved July 28, 2005. All fuel was placed in storage in the onsite independent spent fuel storage installation (ISFSI) as of May 31, 2003. Building demolition and remediation activities are approximately 95% complete.

### **1.0 Facilities Management and Control**

#### **1.1 Spent Fuel Safety**

##### **a. Inspection Scope (60855 and 81700)**

The inspector toured the ISFSI, reviewed surveillance records and discussed ISFSI operations and security with the ISFSI Manager and ISFSI Shift Supervisor (ISS). Training records and the initial certification program for the ISFSI shift supervisor position, were also reviewed.

##### **b. Observations and Findings**

The inspector toured the perimeter of the ISFSI and observed that the vertical concrete casks were in good material condition, the ventilation openings were unobstructed and clear and the perimeter fence was intact and properly posted. Remote and roving surveillance of the security fence was observed by the inspector, and the inspector confirmed adequate security barriers were present to control and prevent unauthorized intruders. Additionally, the inspector toured the control room and verified the operability of the control room systems. The inspector observed the ISFSI shift supervisor take local temperature measurement readings and enter the data into the computer system for calculation of the temperature differential. The ISFSI cask temperature monitoring results were well within the required limits. Also the inspector noted that the ISFSI shift supervisor was knowledgeable of ISFSI monitoring and surveillance requirements. No safety concerns were identified.

##### **c. Conclusions**

The licensee maintained an adequate program for surveillance and monitoring of the ISFSI and stored spent fuel.

### **1.2 Quality Assurance Audits and Self Assessments (40801)**

##### **a. Inspection Scope (40801)**

The inspector assessed the quality assurance audit, surveillance and condition reports to determine the licensee's capability to self-identify and prevent issues that degrade safety or the quality of decommissioning.

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b. Observations and Findings

The inspector reviewed selected quality assurance audit reports and quality surveillance reports including:

Audit No. Y-05-A-03-01, Security Program and Emergency Preparedness  
 Audit No. Y-05-A-04-01, Radiation Protection Program  
 Audit No. Y-05-A-05-01, Quality Assurance Program  
 QSR-05-003-YR, Setup, Calibration and Operation of the Yankee Atomic Digital Gamma-Ray Spectroscopy System  
 QSR-05-009-YR, Condition Reporting and Investigation  
 OSR-05-014-YR, Final Status Survey with the Truck Monitor  
 QSR-05-015-YR, Final Status Survey  
 QSR-05-017-YR, Final Status Survey Training Program

Audits and surveillances performed by the licensee were thorough and sufficiently detailed to identify programmatic weaknesses or areas of declining performance in decommissioning program areas. Additionally, the review of the selected condition reports (CR) indicated that the licensee had in place a program for reporting on site safety issues, appropriately classifying the issues, and providing appropriate management review to resolve the issues.

c. Conclusions

The licensee maintained an effective program to identify, resolve and prevent issues that would degrade safety or the quality of decommissioning.

**2.0 Decommissioning Performance and Status Review**

**2.1 Status of Decommissioning**

a. Inspection Scope(71801)

The inspector reviewed activities associated with demolition and dismantlement of onsite structures and buildings. Information was gathered through interviews with cognizant individuals, tours of the site and a review of procedures and records.

b. Observations and Findings

During this inspection period the reactor support structure (RSS) and the spent fuel pool building (SFP) were dismantled and demolished. The inspector reviewed radiological sample results data from the RSS and SFP and observed the licensee's operations for segregating and characterizing the RSS and SFP demolition debris for on site reuse or disposal. Adequate methods for complying with the regulatory release limits were in place including management of on site piles of demolition debris and rubble. The inspector also attended and observed

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licensee meetings that planned, reviewed and scheduled site decommissioning activities. The meetings were well run, and it appeared that site management and staff maintained adequate control of site decommissioning activities.

During this inspection period, the licensee informed the inspector that they had determined that 40 shield blocks from inside the RSS, which had been released from the site in 1999 and subsequently used to construct a wall on private property in the State of Vermont, were contaminated with tritium. The shield blocks were released from the site after radiation surveys of the surfaces of the shield blocks indicated no measurable surface contamination. Additionally, analyses of concrete samples from inside the RSS in the general area where the shield blocks were located indicated no volumetric contamination. Therefore, the licensee expected no volumetric contamination to be present in the shield blocks. In 2004, in preparation for demolition of the RSS and disposal of the RSS concrete rubble, additional samples of the RSS concrete were analyzed for volumetric contamination. The results of these analyses indicated that the concrete was volumetrically contaminated with tritium at about 200 picoCuries per gram (pCi/g). The tritium analyses performed in 2004 were about 100 times more sensitive than the tritium analyses performed in 1999. Based on these analytical results, the licensee has calculated the total tritium radioactivity in the shield blocks to be approximately 24 millicuries.

An NRC inspector performed an independent radiation survey of selected shield blocks in 1999 prior to their release from the site and confirmed that no measurable surface contamination was present on the shield blocks. Additionally, during this inspection period, the inspector performed a direct radiation survey of the shield block wall in Vermont and determined that the direct radiation levels were indistinguishable from background, approximately five to 10 microRem per hour. Samples of the wall were taken by the licensee and split between the licensee and the NRC during this inspection period. The NRC samples were sent to the NRC contract laboratory, Oak Ridge Institute for Science and Education (ORISE), Environmental Site Survey and Assessment Program (ESSAP) laboratory. The NRC sample results will be compared to the licensee's results when received and reported in a subsequent inspection report. In June 2005 the licensee submitted a request to the NRC under 10 CFR 20.2002 to permit the shield blocks to remain in place in the wall in Vermont. This 10 CFR 20.2002 request is currently undergoing review by the NRC

The inspector stated that the release of the contaminated shield blocks off site would be considered an unresolved item pending receipt of the split sample analytical results and comparison of these results. (Unresolved Item 5000029/2005-001/01)

c. Conclusion

The licensee maintained an adequate program for demolition and dismantlement of site buildings and structures.

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## **2.2 Occupational Exposure Controls**

### **a. Inspection Scope (83750)**

The inspector reviewed the licensee's radiation protection program in order to determine the licensee's capability to monitor and control radiation exposure to employees and to determine the adequacy of the licensee's radiation protection program. The inspector reviewed the circumstances involving an unposted High Radiation Area in the Spent Fuel Pool Excavation area.

### **b. Observations and Findings**

The inspector toured the site and made independent direct exposure radiation measurements. Based on the site tour, the inspector noted that observed areas of the site were appropriately posted and labeled for radioactive material. Radiation work permits and survey maps were posted at the entry point for the radiologically controlled area.

On July 21, 2005, the licensee's Radiation Protection Staff identified an unposted High Radiation area during a routine survey of a pipe which was uncovered during excavation in the spent fuel pool area. A Level 1 CR, documenting the discovery was entered into the Yankee Atomic Corrective Action Program (CR 05-465). The dose rate from the pipe measured 22 rem per hour on contact at the bottom of the pipe and 150 millirem per hour at one foot from the pipe. The pipe was subsequently shielded by the licensee and the area was posted as a High Radiation area. The pipe was then removed and placed in a shielded cask.

The High Radiation area was located inside a contaminated area, inside the radiologically controlled area (RCA). The closest time intensive work, the excavation of the spent fuel pool was being performed at the bottom of the spent fuel pool, at least 20 feet away from the source. A less traveled area above the pipe would have been shielded by at least three to four feet of earth and concrete. Based on the location of the pipe it appeared unlikely that anyone would remain in any area in close proximity to the pipe for any significant period of time.

All personnel entering the RCA were provided with dosimetry. Dosimetry consisted of thermoluminescent Dosimeters (TLDs) and self reading dosimeters (SRDs). A review of dosimetry records revealed no abnormal exposures for this time period.

The inspector reviewed CR 05-465 in order to assess the licensee's root cause analysis and actions taken to prevent recurrence. The review indicated a thorough evaluation was performed by the licensee, and the corrective actions appeared appropriate to resolve and prevent future problems.

10 CFR 20.1902(b) requires that licensee's post each high radiation area with a conspicuous sign. Contrary to this, on July 21, 2005, a pipe was identified by the licensee, reading 150 mRem per hour at approximately 30 cm in violation of 10 CFR 1902(b), causing a high radiation area at the location, an area posted as a radiation area. However, because the inaccessibility of the exposed pipe resulted in a low potential for worker exposure, and because

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of the timeliness and effectiveness of licensee corrective actions, the violation is being considered a Non-Cited Violation consistent with Section VI.A of the NRC Enforcement Policy. (NCV 5000029/2005-001/02)

c. Conclusions

The licensee generally implemented an effective program to control and limit occupational radiation exposures.

**3.0 Radioactive Waste Management**

**3.1 Effluent and Environmental Monitoring**

a. Inspection Scope (84750)

The inspector reviewed the licensee's 2004 *Annual Radioactive Effluent Release Report and Revised Off-Site Dose Calculation Manual (ARERR)* and the licensee's 2004 *Annual Radiological Environmental Operating Report (AREOR)*. The inspector also reviewed additional radiological effluent and environmental monitoring data such as 30 day airborne dose projections and liquid effluent release data.

b. Observations and Findings

The inspector toured the licensee's facilities and noted that radioactive liquid effluent waste sources were from construction de-watering, sumps, and decontamination. Sources of airborne radioactive effluents were decommissioning activities such as the demolition of the RSS. The inspector noted that Revision 17 of the Off Site Dose Calculation Manual (ODCM) addressed inclusion of near-field airborne monitoring stations to detect potential airborne radioactivity due to demolition work. These air sampling stations were placed into service on February 3, 2004 when the primary vent stack was shut down.

The 2004 ARERR provided data indicating total released radioactivity for liquid and gaseous effluents, as well as waste disposals. There were no anomalous measurements, omissions or adverse trends in the report. The 2004 assessment of the projected maximum individual doses resulting from routine radioactive airborne and liquid effluents was included, as required. The calculated dose estimates were well below the regulatory dose criteria of 10 CFR 50, Appendix I and 40 CFR 190. The inspector also noted from review of the AREOR that there were no station related direct radiation doses measured by the licensee's radiological environmental monitoring program TLDs in 2004. The licensee had documented its technical bases for its changes to the ODCM. The Annual Reports and changes to the ODCM were well documented.

c. Conclusion

The licensee was controlling liquid and airborne radioactivity releases in an effective manner in accordance with ODCM requirements and applicable procedures. The licensee implemented and met the ODCM requirements for sampling, analyzing, and assessing the projected dose to

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the public.

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### **3.2 Radioactive Waste Management and Transportation**

#### **a. Inspection Scope (86750)**

The inspector reviewed the licensee's program for the shipment of radioactive waste to determine compliance with NRC and the Department of Transportation (DOT) transportation regulations. The inspection of this area consisted of field observations, interviews with licensee personnel, and a review of records and procedures related to the packaging and shipping of waste radioactive materials.

#### **b. Observations and Findings**

The inspector reviewed data for selected shipments for this inspection period. The review included package radiation surveys, nuclide characterization, hazardous waste classification, and 10 CFR 61 documentation. These shipments were low level radioactive waste shipments in various types of intermodal containers. The inspector reviewed Procedure AP-8329, *Control of Radioactive Demolition Project Shipping Containers*. Shipping containers were stored at designated locations within the site. Loaded containers awaiting shipment were appropriately marked and labeled. Additionally, the container storage area was adequately posted.

The inspector observed the shipment of intermodal containers including the loading of the containers on trucks, vehicle inspection and radiation surveys, and preparation of shipment papers. Also the inspector observed operations at the intermodal transfer facility used by the licensee for the transfer of radioactive waste shipments from trucks to rail cars. The inspector reviewed the preparation of the transfer facility, the transfer activities and surveys performed following the transfer. Additionally, the inspector reviewed the steps used in preparing the rail shipment for safe transport.

Licensee radwaste shipping personnel were knowledgeable and experienced and familiar with the procedures, software, and regulatory requirements for shipments of radioactive material. No safety concerns were identified.

#### **c. Conclusions**

The licensee maintained an effective radioactive material shipping program in compliance with regulatory requirements.

### **4.0 Exit Meeting Summary**

The inspectors presented the inspection results to members of licensee management periodically during the inspection, and during exit meetings at the conclusions of on site inspections on April 28, 2005, June 23, 2005, and July 21, 2005. The licensee acknowledged the findings presented by the inspectors. During the inspection, the inspectors reviewed with the licensee whether any materials examined during the inspection should be considered proprietary. While proprietary information was reviewed during the inspection, no proprietary information is contained in this report.

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**PARTIAL LIST OF PERSONS CONTACTED**

- \*G. Babineau, YAEC, Safety Oversight Manager
- \*W. Barley, YAEC, Radwaste Minimization Coordinator
- \*D. Calsyn, YAEC, Quality Assurance Manager
- \*R. Dee, YAEC, Scheduler
- \*B. Holmgren, YAEC, Decommissioning Project Manager
- R. Kacich, YAEC, President
- \*D. Maffei, YAEC, Waste Manager
- \*G. Maret, YAEC, Vice President of Decommissioning
- \*K. Myers, Health Physics Manager, Duratek
- \*D. Montt, YAEC, HP and Chemistry Supervisor
- \*N. Rademacher, YAEC, Decommissioning Project Manager
- \*J. Rollins, YAEC, Regulatory Affairs Manager
- \*D. Smith, YAEC, FSS Project Manager
- \*R. Trudeau, YAEC, QA Auditor
- \*R. Williams, YAEC, ISFSI Operations Manager

\* These individuals participated in the exit briefings.

**LIST OF ACRONYMS**

ADAMS	Agency Document Access and Management System
ALARA	As Low As Reasonably Achievable
AREOP	Annual Radioactive Effluent Release Report
AREOR	Annual Radioactive Environmental Operating Report
CR	Condition Reports
DOT	Department of Transportation
ESSAP	Environmental Site Survey and Assessment Program
ISFSI	Independent Spent Fuel Storage Installation
ISS	ISFSI Shift Supervisor
LTP	License Termination Plan
NCV	Non-cited Violation
ODCM	Offsite Dose Calculations Manual
ORISE	Oak Ridge Institute for Science and Education
PAB	Primary Auxiliary Building
pCi/g	pico Curies per gram
PCP	Process Control Program
PDR	Public Document Room
RCA	Radiological Controlled Area
RSS	Reactor Support Structure
SDR	Self Reading Dosimeters
SFP	Spent Fuel Pool
TLD	Thermoluminescent Dosimeter
URI	Unresolved Item
YAEC	Yankee Atomic Electric Company
YNPS	Yankee Nuclear Power Station

**INSPECTION PROCEDURES USED**

IP 36801	Organization, Management, and Cost Controls
IP 37801	Design Changes
IP 40801	Self Assessment, Auditing, and Corrective Action
IP 60855	Operation of ISFSI
IP 71801	Decommissioning Performance and Review Status
IP 83750	Occupational Radiation Exposure Control
IP 83801	Final Surveys at Permanently Shutdown Reactors
IP 84750	Radioactive Waste Treatment and Effluent & Environmental Monitoring

**ITEMS OPENED, CLOSED, AND DISCUSSED**Discussed

None

Opened

05000029/2005-001/01	URI	Tritium contaminated shield blocks released from the site.
05000029/2005-001/02	NCV	Failure to post a high radiation area in accordance with 10 CFR 20.1902(b).

Closed

05000029/2005-001/02	NCV	Failure to post a high radiation area in accordance with 10 CFR 20.1902(b).
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