



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
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January 27, 2003

Mr. Kenneth Heider, Vice President  
Operations and Decommissioning  
Yankee Atomic Electric Company  
49 Yankee Road  
Rowe, Massachusetts 01367

SUBJECT: NRC INSPECTION REPORT NO. 50-029/2002-002

Dear Mr. Heider:

On January 3, 2003, the NRC completed an inspection at your nuclear reactor facility in Rowe, Massachusetts, which covered an inspection period that began on July 8, 2002. The findings of the inspection were discussed with Mr. Brian Wood and members of his staff on January 6, 2003. The enclosed report presents the results of that inspection.

Your radiation protection, radioactive waste shipping, spent fuel handling, quality assurance and self-assessment, and maintenance and surveillance programs were inspected during this inspection period. In addition, your response to the NRC Security Order issued October 16, 2002, to all decommissioning reactor facilities operating a Dry Independent Spent Fuel Storage Installation, was reviewed. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspector. The programs were considered to be appropriately implemented and no safety concerns were identified. Effective programs for maintaining personnel exposures to radiation as low as is reasonably achievable and conducting spent fuel transfer activities were noted.

In accordance with Section 2.790 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/*

Ronald R. Bellamy, Chief  
Decommissioning and Laboratory Branch  
Division of Nuclear Material Safety

Docket No. 05000029  
License No. DPR-03

Mr. K. Heider

2

Enclosure: NRC Region I Inspection Report No. 50-029/2002-002

cc w/encl:

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G. van Noordennen, Manager, Regulatory Affairs

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Mr. K. Heider

3

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION I**

Docket No. 05000029

License No. DPR-03

Report No. 50-029/2002-002

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

Facility Name: Yankee Nuclear Power Station

Location: Rowe, Massachusetts

Dates: July 8, 2002 to January 3, 2003

Inspector: John Wray, Health Physicist

Approved by: Ronald R. Bellamy, Chief  
Decommissioning and Laboratory Branch  
Division of Nuclear Materials Safety, RI

## **EXECUTIVE SUMMARY**

### Yankee Facility NRC Inspection Report No. 50-029/2002-002

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, radioactive waste shipping, maintenance and surveillance, security, quality assurance and self-assessment, spent fuel handling, and freeze protection programs. The inspector noted good performance in maintaining personnel radiation exposures as low as is reasonably achievable and observed safe transfers of spent fuel to the Independent Spent Fuel Storage Installation (ISFSI).

#### **Operations and Decommissioning Status**

The licensee performed fuel transfers within the Spent Fuel Pool (SFP) in accordance with requirements. Designated spent fuel assemblies were loaded into Transportable Storage Canister (TSC) Nos. 2 through 9 during this inspection period. Fuel sipping operations were completed in a safe and compliant manner.

The licensee and their contractor NAC International maintained effective corrective action programs and performed effective audits and assessments to help self-identify and correct issues and problems.

The licensee established an adequate program to maintain the operability of systems and equipment, identified as important to safety, during the cold weather season.

An effective maintenance and surveillance program relative to safe storage, maintenance and control of spent fuel was implemented. An effective program to implement the maintenance rule in accordance with 10CFR50.65 was established.

Timely and effective security enhancements, required in response to the NRC Security Order dated October 16, 2002, were implemented.

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

The licensee provided good controls to limit exposures of workers to external and internal sources of radiation. Effective As Low As is Reasonably Achievable (ALARA) controls resulted in improved dose performance during this inspection period.

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

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b>	ii
<b>TABLE OF CONTENTS</b>	iii
<b>REPORT DETAILS</b>	1
<u>Summary of Facility Activities</u>	1
<b><u>I. Operations and Decommissioning Status</u></b>	1
<b>O1 Conduct of Operations</b>	1
O1.1 <u>Spent Fuel Pool Activity</u>	1
O1.2 <u>Self-Assessment, Auditing, and Corrective Action Program</u>	2
O1.3 <u>Station Freeze Protection Program</u>	3
O1.4 <u>Maintenance and Surveillance Program</u>	3
O1.5 <u>Miscellaneous Security Related Activities</u>	4
<b><u>II. Plant Support and Radiological Controls</u></b>	5
<b>R1 Radiological Protection Controls</b>	5
R1.1 <u>Occupational Exposure Controls</u>	5
R1.2 <u>Radioactive Waste and Transportation</u>	6
<b>III. MANAGEMENT MEETINGS</b>	7
<b>X1 Exit Meeting Summary</b>	7
<b>PARTIAL LIST OF PERSONS CONTACTED</b>	8
<b>LIST OF ACRONYMS</b>	9
<b>INSPECTION PROCEDURES USED</b>	9
<b>ITEMS OPENED, CLOSED, AND DISCUSSED</b>	9

## 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).

### I. Operations and Decommissioning Status

#### **O1 Conduct of Operations**

##### O1.1 Spent Fuel Pool Activity

###### a. Inspection Scope (60801)

A review of the activities associated with loading spent fuel assemblies into Transportable Storage Canister (TSC) Nos. 2 through 9 was conducted. The results of the fuel sipping campaign completed during this inspection period to test for additional failed assemblies from the lower Spent Fuel Pool (SFP) racks were also reviewed.

###### b. Observations

The inspector reviewed activities in the SFP during loading operations of TSCs. Fuel move sheets were examined and observation of work activities was conducted. Over 2000 fuel movements were completed during this inspection period. Except for one fuel move, all moves were made in accordance with regulatory requirements. This move resulted in an incorrect assembly placed into TSC No. 5. Condition Report (CR) 02-578 was generated and an investigation was initiated to determine root cause and significance. The inspector reviewed the licensee's findings and verified that the operator had loaded the designated assembly in accordance with the loading plan and approved OP-7107 Fuel Move Sheets. However, the move sheet contained an assembly, which had previously been determined to be defective, and therefore, not available for loading into this TSC. The inspector discussed the event with cognizant fuel handling personnel and reviewed the corrective actions. The assembly in question was removed from TSC No. 5 and replaced with an acceptable alternate assembly prior to permanently welding the lid in place. The error was detected during the procedurally required review process. No nuclear or radiological safety issues were identified.

In October, the licensee performed sipping on 115 lower tier fuel assemblies which had not been accessible until removal of the upper tier fuel assemblies. A benchmarking process was implemented to demonstrate the ability to detect failed fuel greater than 25 years old. One assembly was determined to be failed. The inspector reviewed the sipping process and procedures with cognizant licensee representatives and discussed the final disposition of the failed fuel. Failed fuel assemblies will be loaded into designated TSCs and transferred to the ISFSI near the end of the pool-to-pad campaign. No safety issues were identified.

During this inspection period, the SFP upper storage racks were emptied and removed. The inspector reviewed the removal process with licensee personnel. Proper contamination controls were utilized including underwater pressure washing, surveying for hot particles, and equipment containments. The racks were removed and placed in Sea Van containers awaiting shipment to a licensed radioactive burial facility. No safety concerns were identified.

c. Conclusions

The licensee performed fuel transfers within the SFP in accordance with requirements. Designated spent fuel assemblies were loaded into TSC Nos. 2 through 9 during this inspection period. Fuel sipping operations were completed in a safe and compliant manner.

O1.2 Self-Assessment, Auditing, and Corrective Action Program

a. Inspection Scope (40801)

A review was performed to evaluate the effectiveness of licensee controls in identifying, resolving, and preventing issues that degrade safety or the quality of decommissioning. The inspector evaluated the licensee's self-assessment, auditing, corrective actions, and root cause evaluations through a review of licensee documents and interviews with licensee personnel.

b. Observations

The inspector reviewed selected Quality Assurance (QA) Audits and Surveillances of licensee activities. Audits performed by the licensee and their contractor NAC were thorough and detailed, with adequate management attention to effect timely resolution of issues. The inspector reviewed selected condition reports and determined that an appropriate threshold for initiating a condition report exists.

The inspector discussed with the licensee their program for self-identifying problems and reviewed selected condition reports. Approximately 350 CRs were initiated during this inspection period. The threshold for identifying problems and initiating a CR appears to be at an appropriate level.

The inspector reviewed a number of CRs generated during the last two months of the inspection period.

CR 2002-799	DP-8525 non-compliance
CR 2002-794	13200-OP-2963, Att E non-compliance
CR 2002-792	13200-OP-2961, Att K non-compliance
CR 2002-786	13200-OP-2978, Att D non-compliance
CR 2002-768	RCA entry without TLD
CR 2002-761	13200-OP-7107 non-compliance

The inspector reviewed root cause determinations and corrective actions taken to prevent recurrence for each of the CRs listed above. Taken individually, the procedural non-conformances were insignificant and did not have adverse effects on the health and safety of plant workers or the public. They were all self-identified and entered into the licensee's system for timely corrective actions. The inspector discussed the number of similar CRs with licensee management. Management acknowledged the issue and had already initiated an investigation of procedural compliance issues. The licensee developed a system to track and trend CRs and determined that although the number of procedural non-compliance CRs is greater than desired, the number has been trending down since the beginning of 2002. The inspector reviewed the trending data on CRs and agreed that findings of non-compliance with procedural

requirements since the new procedures were issued in early 2002 was generally declining. No safety concerns were identified.

c. Conclusions

The licensee and their contractor NAC International maintained effective corrective action programs and performed very good audits and assessments to help self-identify and correct issues and problems.

O1.3 Station Freeze Protection Program

a. Inspection Scope (71714)

The inspector evaluated the licensee's preparations to maintain the operability of systems and equipment, identified as important to safety, during the cold weather season.

b. Observations

The inspector reviewed preventive maintenance and operations procedures, checklists and the schedule for weekly tests and checks of the equipment. The inspector observed a licensee representative conduct a required surveillance and discussed the process to resolve as-found deficient conditions. The inspector verified that heat-trace equipment was energized where required. No safety concerns were identified.

c. Conclusions

The licensee established an adequate program to maintain the operability of systems and equipment, identified as important to safety, during the cold weather season.

O1.4 Maintenance and Surveillance Program

a. Inspection Scope (62801)

The inspector reviewed the licensee's maintenance and surveillance program including planned and completed maintenance and surveillance activities of structures, systems and components important to the safe storage of spent fuel. The inspector reviewed the preventive and corrective maintenance program and observed the performance of selected preventive maintenance activities. The program established to implement the NRC maintenance rule (10CFR50.65) relative to the safe storage, maintenance, and control of spent fuel was reviewed.

b. Observations and Findings

Structures, systems, and components were in good material condition and spent fuel pumps were in good working order. Informational tags on equipment were appropriate and housekeeping was adequate. Appropriate security and fire protection measures were in place.

The inspector reviewed the preventive maintenance program and performance goals, including work prioritization, specific implementing procedures, and the work order tracking system procedure. Work is planned and coordinated with the appropriate departments in a timely manner, and work orders and specific procedures are provided in advance. The inspector verified the licensee's tracking program by checking the status of selected systems and components. There were no safety-related emergent issues. The licensee effectively managed the preventive maintenance program, including the backlog and emergent work. The inspector reviewed the maintenance department surveillance schedule and observed selected scheduled surveillances on plant equipment and systems. Work orders and procedures were at the job site. Follow-up work and testing were appropriately completed. The inspector verified that an equipment history file was being maintained and reviewed the specific history of maintenance on the yard area crane. No safety concerns were identified.

The inspector reviewed the maintenance rule implementing procedure with cognizant licensee personnel. A list of equipment, systems, and components important to the safe storage of spent fuel was completed in accordance with the requirements of 10CFR50.65. Performance criteria and department responsibilities have been established. Guidance for periodic assessments of the equipment and systems had been established. No safety concerns were identified.

c. Conclusions

An effective maintenance and surveillance program relative to safe storage, maintenance and control of spent fuel was implemented. An effective program to implement the maintenance rule in accordance with 10CFR50.65 was established.

O1.5 Miscellaneous Security Related Activities

a. Inspection Scope (81700)

The inspector reviewed enhanced security measures and evaluated compliance to requirements and commitments.

b. Observations and Findings

On October 16, 2002, the NRC issued an Order modifying the Rowe license to require compliance with the Interim Compensatory Measures (ICMs) for Dry Independent Spent Fuel Storage Installations. On November 5, 2002, the licensee responded to the Order and indicated the manner of compliance for each item. During this inspection, the inspector verified that all applicable actions were implemented as required.

c. Conclusions

Timely and effective security enhancements, required in response to the NRC Security Order dated October 16, 2002, were implemented.

**II. Plant Support and Radiological Controls**

**R1 Radiological Protection Controls**

R1.1 Occupational Exposure Controls

a. Inspection Scope (83750)

The inspector reviewed the licensee's program to determine the capability to monitor and control radiation exposure to employees and to determine adequacy of the licensee's radiation protection program under various conditions. The inspection consisted of observations and interviews with selected radiation protection supervisors and staff.

b. Observations

The inspector reviewed radiological controls of work associated with loading, transferring, and sealing TSCs Nos. 2 through 9. Effective use of temporary shielding, including water shield walls, lead blankets, and labyrinth entry ways, were observed. A locked enclosure was constructed to secure access to the loaded Transfer Cask (TFR) in the Fuel Transfer Enclosure building (FTE). Contamination controls were sufficient to prevent significant personnel contaminations and loss of radioactive material from designated contamination controlled areas. The inspector observed appropriate postings of radiation and high radiation areas, radioactive material storage areas, and contamination control areas. Current radiation and contamination survey data was posted at the work location and available for review by workers. Prior to entry into the TFR work area, workers were briefed by health physics personnel. Cameras and remote area dosimetry was effectively utilized to control personnel exposures. The following is a summary of collective personnel exposure in person-Rem by TSC compared to the licensee's estimate of exposure and total Radiation Work Permit (RWP)- hours expended on the job.

<u>TSC</u>	<u>DOSE</u>	<u>ESTIMATE</u>	<u>RWP-HOURS</u>	<u>kW RATING</u>
1	3.193	3.173	5136.4	8.345
2	1.876	2.862	1343.5	8.464
3	1.952	1.972	1219.7	8.015
4	1.040	1.832	1202.9	6.805
5	1.120	1.382	1111.6	7.057
6	1.486	1.257	1011.3	7.905
7	0.715	1.257	1282.3	5.712
8	1.206	1.335	1291.0	7.481
9	1.098	1.212	1274.9	7.534

The collective exposures indicate a generally downward trend, indicating use of lessons learned and added ALARA techniques. The most dose intensive job for each TSC is closure activities that include welding and non-destructive testing (NDT) of the shield and structural lids. Approximately 70% of the total dose is consistently expended by the welders because their work is performed in close proximity to the loaded TSC. The inspector interviewed selected welders conducting closure activities and determined that they were cognizant of the radiological conditions of their job site and were active in seeking further dose reductions.

The inspector discussed the helium leak detection process and reviewed the applicable procedure (QAP NAC 9.14A "Procedure for Leak Testing of NAC-MPC Transportable Storage Canister Shield Lid Welds"). The licensee uses a Mass Spectrometer Leak Detection system while employing the evacuated envelop method. The procedure can detect helium leaks on the order of 1.0 E-10 std cc/sec. The inspector reviewed the results of leak detection of the shield lid circumferential weld and the vent cover welds and compared the results to the Technical Specification leak rate limit of 8.0 E-08 std cc/sec. No safety concerns were identified.

The inspector reviewed personnel exposures for calendar year 2002. No individual exceeded 10CFR20 dose limits. A number of employees required dose extensions to 2000 mRem. The inspector verified that the proper management reviews were completed before workers were permitted to receive radiation exposures in excess of 1000 mRem. The highest exposed individual received 1967 mRem Total Effective Dose Equivalent (TEDE) dose in 2002. No safety concerns were identified.

c. Conclusions

The licensee has provided good controls to limit exposures of workers to external and internal sources of radiation. Effective ALARA controls resulted in improved dose performance during this inspection period.

R1.2 Radioactive Waste and Transportation

a. Inspection Scope (86750)

The inspector reviewed selected records of radioactive waste shipments for the calendar year 2002 to determine compliance to NRC and Department of Transportation regulations. Loading, shoring, and placarding of a waste shipment on December 17, 2002, was observed.

b. Observations

A total of 61 shipments of radioactive material and waste containing 19.7 curies of total activity were made in the year 2002. The licensee made 28 of these shipments and the onsite waste contractor made 33. Most of the shipments were for transferring trash, laundry, or waste samples. However, one shipment of SFP resin beads, containing 19.3 curies of total activity, was made to the NRC-licensed radiological burial site in Barnwell, South Carolina.

The inspector randomly selected ten radioactive waste shipment packages to determine compliance to regulatory requirements. These packages included shipments of laundry, mixed wastes, dewatered resins, and radioactive trash. The inspector reviewed package dose rate survey data, radioactive material labeling, total activity, nuclide distributions, manifests, hazard

waste classification, 10CFR61 documentation, and final truck surveys where applicable. Documentation satisfied regulatory requirements. The mixed waste shipment of trash, sand, and paint chips that was made on December 17, 2002, was inspected regarding loading operations, placarding, and shoring of the load. No safety concerns were identified.

c. Conclusions

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

### **III. MANAGEMENT MEETINGS**

#### **X1 Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management periodically during the inspection, and during an exit meeting with Mr. B. Wood and others on January 6, 2003. The licensee acknowledged the findings presented by the inspector. The inspector 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.

## PARTIAL LIST OF PERSONS CONTACTED

\*G. Babineau, Safety Oversight Manager  
W. Blackadar, YAEC, Radiation Protection Oversight  
\*R. Dee, NAC, Scheduler  
S. Garvie, Security Supervisor  
E. Heath, Asst. Safety Oversight Manager  
K. Heider, Vice President, YAEC  
F. Helin, NAC, Site Project Manager  
\*B. Holmgren, Dry Cask Storage Oversight Manager  
J. Kay, YAEC-Regulatory Affairs  
C. Lloyd, Lead QA Engineer  
K. LaDuke, QA Auditor  
J. McCumber, YAEC Oversight  
T. Osterhoudt, NAC, Operations Manager  
\*C. Palmer, NAC, Health Physics Manager  
\*N. Rademacher, NAC, Site QA Manager  
\*S. Racz, Sr. Technical Specialist-QA  
\*J. Rollins, YAEC-Regulatory Affairs  
B. Sklar, NAC, Plant Services Manager  
M. Vandale, YAEC Oversight  
\*F. Williams, Plant Superintendent  
M. Williams, Framatome, Fuel Handling Operations Manager  
\*B. Wood, Site Manager

\* These individuals participated in the exit briefing held on January 6, 2003

## LIST OF ACRONYMS

ALARA	As Low As is Reasonably Achievable
CR	Condition Report
CFR	Code of Federal Regulations
FTE	Fuel Transfer Enclosure
ICM	Interim Compensatory Measures
ISFSI	Independent Spent Fuel Storage Installation
Kw	Kilo-watt
NAC-MPC	NAC Multi-Purpose Cask Storage System
NDT	Non-destructive Test
PDR	Public Document Room
QA	Quality Assurance
RWP	Radiation Work Permit
SFP	Spent Fuel Pool
TEDE	Total Effective Dose Equivalent
TFR	Transfer Cask
TSC	Transportable Storage canister

## INSPECTION PROCEDURES USED

IP 40801	Self Assessments, Audits, and Corrective Actions
IP 60810	Spent Fuel Pool Activities
IP 62801	Maintenance and Surveillances
IP 71714	Cold Weather Preps
IP 81700	Security
IP 83750	Occupational Radiation Exposure Control
IP 86750	Radwaste Management and Transportation of RAM

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

NONE

### Closed

NONE

### Discussed

NONE