

October 16, 2007

Dr. T. Tehan, Director  
Rhode Island Nuclear Science Center  
Rhode Island Atomic Energy Commission  
16 Reactor Road  
Narragansett, RI 02882-1165

SUBJECT: RHODE ISLAND NUCLEAR SCIENCE CENTER - NRC ROUTINE INSPECTION  
REPORT NO. 50-193/2007-202

Dear Dr. Tehan:

This letter refers to the inspection conducted on September 25-27, 2007, at the Rhode Island Nuclear Science Center Research Reactor facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of this inspection.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this inspection, please contact Mr. Kevin M. Witt at 301-415-4075.

Sincerely,

**/RA/**

Johnny Eads, Branch Chief  
Research and Test Reactors Branch B  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-193  
License No. R-95

Enclosure: NRC Inspection Report No. 50-193/2007-202

cc w/encl. Please see next page

cc:

Governor Donald Carcieri  
State House Room 115  
Providence, RI 02903

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Rhode Island Atomic Energy Commission  
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Test, Research, and Training  
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University of Florida  
202 Nuclear Sciences Center  
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U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No: 50-193

License No: R-95

Report No: 50-193/2007-202

Licensee: Rhode Island Atomic Energy Commission

Facility: Rhode Island Nuclear Science Center

Location: Narragansett, Rhode Island

Dates: September 25-27, 2007

Inspector: Kevin M. Witt

Approved by: Johnny Eads, Branch Chief  
Research and Test Reactors Branch B  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

### Rhode Island Atomic Energy Commission Rhode Island Nuclear Science Center Reactor Inspection Report No. 50-193/2007-202

The primary focus of this routine, announced inspection included onsite review of selected aspects of the licensee's Class I research and test reactor safety programs including: requalification training, operations logs and records, surveillance and limiting conditions for operation, emergency planning, maintenance logs and records, fuel handling logs and records, and follow-up on previous open items.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

#### Requalification Training

- The licensee was meeting the requalification program requirements to ensure the effectiveness of all licensed operators.

#### Operations Logs and Records

- Operational activities were consistent with applicable Technical Specification and procedural requirements.

#### Surveillance and Limiting Conditions for Operation

- The licensee's program for completing surveillance inspections satisfied Technical Specification and licensee administrative controls.

#### Emergency Planning

- The emergency preparedness program was conducted in accordance with the approved Emergency Plan.

#### Maintenance Logs and Records

- Maintenance logs, records, and performance satisfied Technical Specification and procedure requirements.

#### Fuel Handling Logs and Records

- Fuel handling and control rod handling activities were completed and documented as required by Technical Specification and facility procedures.

#### Follow-up on Previous Open Items

- The Inspection Follow-up Item identified in a previous inspection report was closed.

## **REPORT DETAILS**

### **Summary of Plant Status**

The licensee's nuclear science center reactor, licensed to operate at a maximum steady-state thermal power of two megawatts (2 MW), continues to be operated in support of operator training, surveillance, and utilization involving neutron activation analysis. During the inspection the reactor was operated at two megawatts for routine sample irradiations.

#### **1. Requalification Training**

##### **a. Inspection Scope (Inspection Procedure [IP] 69003)**

The inspector reviewed selected portions of the following to ensure that the Operator Requalification Program was being acceptably implemented:

- operator physical examination records
- qualified operator licenses and expiration dates
- Rhode Island Nuclear Science Center (RINSC) Operations Log Book No. 55, dated from January 4, 2007 to present
- RINSC Operations Log Book No. 54, dated from November 2, 2006 to December 27, 2006
- RINSC Operating Procedures, Section 1, "General Considerations," original version - not revised to date
- RINSC Operating Procedures, Appendix U, "Reactor Operator Re-Qualification," Revision (Rev.) 2, approved June 29, 2005
- Form NSC-45, "Operator Requalification Program Checksheet" - associated with RINSC Operating Procedures, Appendix U
- Form entitled "The Rhode Island Nuclear Science Center Research Reactor Operator Requalification Exam" - associated with RINSC Operating Procedures, Appendix U
- Summary sheet entitled "Operator Requalification Exam" - associated with RINSC Operating Procedures, Appendix U
- Technical Specifications (TSs) for the RINSC, Amendment No. 29, dated December 28, 2004
- Annual Operating Report for 2006, dated August 27, 2007

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

Current licensed operators consisted of four Senior Reactor Operators (SROs). The licensee's requalification program is described in the program submitted to the NRC. The inspector reviewed the requalification program records for all of the licensed operators at the facility. The Assistant Director for Operations (ADO) and Reactor Supervisor (RS) are responsible for the implementation of the requalification program and administers all tests. Records showed that the requirements in the requalification program were being followed. The inspector verified that physical examinations of the operators were conducted biennially as required. Records showed that annual operating tests and biennial written examinations were sufficiently being completed by the qualified operators as stipulated in the program. The number of hours in the facility performing

licensed duties was recorded on the training records to ensure that all operators met the required minimum number of hours operating the reactor. The inspector confirmed that the requalification program was being administered in a manner that sufficiently maintains the effectiveness of all licensed operators.

c. Conclusions

The licensee was meeting the requalification program requirements to ensure the effectiveness of all licensed operators.

**2. Operations Logs and Records**

a. Inspection Scope (IP 69006)

The inspector reviewed selected aspects of the following to ensure that the operations program was being implemented as required in TS Sections 3, 4, and 6:

- staffing for reactor operations
- RINSC Operations Log Book No. 55, dated from January 4, 2007 to present
- RINSC Operations Log Book No. 54, dated from November 2, 2006 to December 27, 2006
- Operating Data Notebooks for 2006 and 2007
- RINSC Operating Procedures, Section 8, "Operations at Power and Adjustments in Power Level," latest rev. dated January 26, 1995
- RINSC Operating Procedures, Section 9, "Shutdown," latest rev. dated October 6, 1999
- RINSC Operating Procedures, Appendix AD, "Reactor Power Changes," Rev. 1, dated December 14, 2006
- RINSC Operating Procedures, Appendix V, "RINSC Pre-Startup Check Sheet," Rev. 11, dated March 8, 2007
- Form NSC-1, "Pre-Startup Check Sheet," Rev. 11, dated March 8, 2007
- Form NSC-1.c, "Shutdown Check Sheet," Rev. 1, dated December 14, 2006
- Form NSC-11, "Shift Record Data Sheet," Rev. 1, dated December 14, 2006
- Form NSC-15, "RINSC Checklist for Securing Reactor Facility," Rev. 1, dated October 24, 2003
- Form NSC-18, "RINSC Reactor Operations Data," Rev. 1, dated December 14, 2006
- Completed NSC-1 forms, dated from November 2, 2006 to present
- Completed NSC-1.c forms, dated from November 2, 2006 to present
- Completed NSC-11 forms, dated from November 2, 2006 to present
- Completed NSC-18 forms, dated from November 2, 2006 to present
- Annual Operating Report for 2006, dated August 27, 2007

b. Observations and Findings

Reactor operations were carried out following written procedures and TS requirements. The inspector verified that reactor operating characteristics, and other TS and procedure required entries, were recorded on the appropriate forms and logs. A review of the forms and logs indicated that TS operational limits had not been exceeded. Operations records confirmed that shift staffing met the minimum requirements for duty personnel.

The inspector determined that reactor operations were carried out following written procedures. During review of the operations logs, the inspector noted that there were minimal unintentional scrams. When a scram occurs, the root cause analysis is completed by a SRO before the resumption of operations.

c. Conclusions

Operational activities were consistent with applicable TS and procedural requirements.

**3. Surveillance and Limiting Conditions for Operation**

a. Inspection Scope (IP 69010)

The inspector reviewed the following to ensure that the surveillance requirements and limiting conditions for operation (LCOs) specified in TS Section 4.0 were met:

- RINSC Reactor Data Notebook
- RINSC Operations Log Book No. 55, dated from January 4, 2007 to present
- RINSC Operations Log Book No. 54, dated from November 2, 2006 to December 27, 2006
- Periodic Maintenance Notebook containing the documentation of all maintenance scheduled for the facility
- RINSC Operating Procedures, Section 10, "Reactor Facility Emergency Systems Checkout Procedure," latest rev. dated August 7, 1995
- RINSC Operating Procedures, Appendix A, "Confinement System Semi-Annual Surveillance," Rev. 0, approved November 20, 2001
- RINSC Operating Procedures, Appendix D, "Blade Speeds and Drop Times," Rev. 1, approved March 28, 2003
- RINSC Operating Procedures, Appendix N, "Primary Temperature Channel Calibration," Rev. 0, approved March 26, 2004
- RINSC Operating Procedures, Appendix W, "Alarm, Scram, and Interlock Checks," Rev. 5, approved August 2, 2006
- Form NSC-1a, "Alarm, Scram, and Interlock Check Sheet" - associated with RINSC Operating Procedures, Appendix W
- Form NSC-14a, "RINSC Standby Power System Check List," latest rev. dated April 19, 2006
- Form NSC-43, "Control Blade Parameter Sheet," - associated with RINSC Operating Procedures, Appendix D, as Attachment B
- Form NSC-44, "RINSC Emergency Generator Maintenance Checklist," Rev. dated September 1995
- Form entitled, "Confinement System Surveillance" - associated with RINSC Operating Procedures, Appendix A

b. Observations and Findings

The inspector noted that daily, monthly, quarterly and annual checks, tests, and/or calibrations for TS-required surveillance items were completed as required. The LCO verifications were completed on schedule and in accordance with licensee procedures. All of the recorded results were within the TS and procedurally prescribed parameters. The records and logs were noted to be complete and were being maintained as



required. The procedures for the surveillances provided clear and concise direction and control of reactor operational tests and surveillances.

c. Conclusions

The licensee's program for completing surveillance inspections satisfied TS and licensee administrative controls.

**4. Emergency Planning**

a. Inspection Scope (IP 69011)

To verify that the licensee was implementing and complying with the Emergency Plan (E-Plan) requirements and Section 6.1.4 of the TS, the inspector reviewed selected aspects of:

- emergency response supplies, equipment and instrumentation
- training records for emergency response personnel
- offsite support and support agreements
- RINSC E-Plan, Rev. 2, dated January 2007
- Emergency Plan Implementing Procedures, Rev. 0, dated June 19, 2007
- RINSC Operating Procedures, Section 10, "Reactor Facility Emergency Systems Checkout Procedure," latest rev. dated August 7, 1995
- RINSC Operating Procedures, Appendix AC, "Abnormal Procedures," Rev. 0, approved June 17, 2004
- Form NSC-14a, "RINSC Standby Power System Check List," latest rev. dated August 7, 1995 - associated with RINSC Operating Procedures, Section 10
- Form NSC-14b, "Evacuation System Check List," latest rev. dated March 18, 1996 - associated with RINSC Operating Procedures, Section 10
- Form NSC-83, "Emergency Cabinet Inventory List"
- Letter of Agreement (LOA) between Narragansett Police Department and RINSC, dated December 21, 2005
- LOA between City of Narragansett Fire Department (NFD) and RINSC, dated December 1, 2005
- LOA between Rhode Island Hospital and RINSC, dated January 10, 2006
- RINSC Emergency Contact List, dated July 25, 2007

b. Observations and Findings

The inspector verified that the RINSC E-Plan was being fully implemented to maintain the emergency preparedness of the reactor. The E-Plan was audited and reviewed biennially as required. The licensee recently revised the E-Plan and the inspector noted that the changes did not decrease the effectiveness of the plan. E-Plan Implementing Procedures (EPIPs) were also reviewed and revised as needed to effectively execute the E-Plan. The inspector verified that a list of emergency personnel, management, and offsite agencies was distributed to all personnel as required by the E-Plan. An Emergency Call list was also verified to be available at various locations.

Supplies, instrumentation, and equipment maintained at the facility and at the Emergency Support Center located in the Coastal Institute Building, were being

controlled and inventoried as required in the E-Plan. This included inspections and testing of the fire extinguishers and the fire suppression system at the facility. LOAs with offsite response organizations and support groups had been updated biennially and maintained as required. Communications capabilities with these support groups were acceptable and had been tested as required.

The documentation of the drills conducted during the past year was reviewed. Emergency preparedness and response training was being completed typically just prior to the drills. Through drill scenario and record reviews, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Emergency drills had been conducted annually as required by the E-Plan. Critiques were written following the drills to document the strengths and weaknesses identified during the exercise. Action items were developed to correct the problems identified.

The inspector visited the Rhode Island Hospital (RIH) to discuss their ability to handle any type of radiation emergency that could occur at RINSC. The inspector determined that there were adequate supplies and equipment available at the RIH to handle a radiation emergency. Through talking with the RIH medical physics staff, the inspector noted that the personnel had the appropriate training for the potential hazards. The inspector talked to the RIH Radiation Safety Officer (RSO) about the training programs used at the hospital to maintain their preparedness. The RSO stated that it would be useful to have further discussions with the RINSC about ways to improve the RIH staff support role. The licensee agreed that there should be further cooperation and the Director of the RINSC committed to working with the hospital to ensure the best possible assistance in an emergency. There appeared to be a good working relationship between the licensee and this support group.

c. Conclusions

The emergency preparedness program was conducted in accordance with the approved E-Plan.

**5. Maintenance Logs and Records**

a. Inspection Scope (IP 69006)

To verify that the licensee was complying with the applicable regulations, the inspector reviewed selected aspects of:

- RINSC Operating Procedures, Section 1, "General Considerations," original version - not revised to date
- RINSC Operations Log Book No. 55, dated from January 4, 2007 to present
- RINSC Operations Log Book No. 54, dated from November 2, 2006 to December 27, 2006
- Annual Operating Report for 2006, dated August 27, 2007

b. Observations and Findings

The inspector reviewed the maintenance records related to scheduled and unscheduled preventive and corrective maintenance activities that had occurred during the inspection

period. Routine and preventive maintenance was controlled and documented in the operation logs. These documents indicated that all maintenance activities were controlled and documented in accordance with the requirements in 10 CFR 50.59. All maintenance of reactor systems were reviewed and approved by the ADO and/or the RS. After all maintenance items are completed, system operational checks are performed to ensure the affected systems function before returning them to service.

c. Conclusions

Maintenance logs, records, and performance satisfied TS and procedure requirements.

**6. Fuel Handling Logs and Records**

a. Inspection Scope (IP 69009)

The inspector reviewed selected aspects of the following to verify compliance with TS Sections 3.9 and 4.9:

- fuel examination records
- fuel handling equipment and instrumentation
- RINSC Operations Log Book No. 55, dated from January 4, 2007 to present
- RINSC Operations Log Book No. 54, dated from November 2, 2006 to December 27, 2006
- RINSC Operating Procedures, Section 3, "Reloading the Core to a Known Configuration," original version - not revised to date
- RINSC Operating Procedures, Section 5, "Moving and Positioning the Core," original version - not revised to date
- RINSC Administrative Procedure, "Gasket Change out Program," Rev. 0, dated June 2007
- Form entitled, "Core Reloading or Change" - associated with RINSC Operating Procedures, Section 3

b. Observations and Findings

Core loading procedures provided a prescribed method to move and handle fuel consistent with the requirements and provisions of the TS Sections 3.9 and 4.9 and the licensee safety analyses. Fuel movement and fuel examination records showed that the fuel of the current core, Core No. 3, was moved in accordance with procedures and examined as required. The licensee recently moved all of the fuel in the core to storage for a coolant system repair in June 2007. After the repair was completed, the licensee replaced all of the fuel in the core and completed checks to ensure that the operation was completed in accordance with procedure. The licensee noted that upon initial startup with the core, the critical control rod positions were slightly different than the previous values. Upon further investigation, the licensee determined that one of the fuel elements was not seated properly in the grid plate. The licensee stated that operation in this configuration did not result in any hazardous conditions due to the minor differences in reactivity that were noted. After the misplacement was discovered, the licensee repositioned the fuel elements and verified that all elements were properly seated by remote camera. During the fuel movements, the inspector verified that all of the fuel was visually inspected and no anomalies were found.

c. Conclusions

Fuel handling and control rod handling activities were completed and documented as required by TS and facility procedures.

**7. Follow-up on Previous Open Items**

a. Inspection Scope (IP 92701)

The inspector reviewed the actions taken by the licensee following identification of one Inspection Follow-up Item (IFI) during a previous inspection.

b. Observations and Findings

- (1) IFI 50-193/2006-204-01 - Follow-up with the licensee to ensure that all procedures are followed as written, specifically Procedural Appendix X, "Monthly Maintenance," which has not been completed in several months.

NRC Inspection Report No. 50-193/2006-204, dated November 21, 2006, outlined the situation. During that inspection, the inspector reviewed the procedure for completing monthly checks and the associated records of completion. During review of the records, the inspector noted that the items on the list were not actually being checked on a monthly basis. The purpose of this procedure is to ensure the extraneous items that are related to the function of auxiliary items support the safety of the reactor facility. The discussion section of Procedural Appendix X states, "These steps should be performed monthly." The inspector noted that the last time the steps were completed was January 27, 2006. The licensee stated that there is no requirement for completion of this procedure and most of these items are checked by completing other routine tasks around the facility. The General Considerations Procedure states in section 1.34, "All operations shall be in accordance with these procedures." The inspector communicated to the licensee the importance of ensuring that all procedures are followed as written.

While reviewing this issue, the inspector noted that the licensee deleted the procedure by Nuclear and Radiation Safety Committee (NRSC) vote on December 14, 2006. This issue is considered closed.

c. Conclusions

The IFI identified in a previous inspection report was closed.

**8. Exit Interview**

The inspector presented the inspection results to licensee management at the conclusion of the inspection on September 27, 2007. The inspector described the areas inspected and discussed in detail the inspection observations. No dissenting comments were received from the licensee. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

## **KEY POINTS OF CONTACT**

### Licensee Personnel

H. Bicehouse, Radiation Safety Officer and Assistant Director for Reactor Safety  
J. Davis, Reactor Supervisor  
M. Damato, Health Physics Technician and Reactor Operator Trainee  
D. Johnson, Health Physicist  
B. MacGregor, Reactor Operator and Facility Engineer  
S. Mecca, Rhode Island Atomic Energy Commission Chairman  
M. Middleton, Assistant Director for Reactor Operations  
T. Tehan, Director, Rhode Island Nuclear Science Center

### Other Personnel

G. Donovan, Rhode Island Hospital Medical Physicist  
N. Jacobs, Rhode Island Hospital Radiation Safety Officer  
J. Medeiros, Rhode Island Hospital Medical Physicist

## **INSPECTION PROCEDURES USED**

IP 69003	Class 1 Research and Test Reactor Operator Licenses, Requalification, and Medical Examinations
IP 69006	Class 1 Research and Test Reactors Organization, Operations, and Maintenance Activities
IP 69009	Class 1 Research and Test Reactor Fuel Movement
IP 69010	Class 1 Research and Test Reactor Surveillance
IP 69011	Class 1 Research and Test Reactor Emergency Preparedness
IP 92701	Followup

## **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

None

### Closed

50-193/2006-204-01	IFI	Follow-up with the licensee to ensure that all procedures are followed as written, specifically Procedural Appendix X, "Monthly Maintenance," which has not been completed in several months.
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## **LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
ADO	Assistant Director for Operations
CFR	Code of Federal Regulations

E-Plan	Emergency Plan
EPIP	Emergency Plan Implementing Procedures
IFI	Inspection Follow-up Item
IP	Inspection Procedure
LCO	Limiting Conditions for Operation
LOA	Letter of Agreement
MW	Megawatt
NFD	City of Narragansett Fire Department
NRC	Nuclear Regulatory Commission
NRSC	Nuclear and Radiation Safety Committee
Rev.	Revision
RIH	Rhode Island Hospital
RINSC	Rhode Island Nuclear Science Center
RS	Reactor Supervisor
RSO	Radiation Safety Officer
SRO	Senior Reactor Operator
TS	Technical Specifications