

March 5, 2009

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

SUBJECT: RHODE ISLAND ATOMIC ENERGY COMMISSION - NRC ROUTINE  
INSPECTION REPORT NO. 50-193/2009-201

The U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection on February 16-19, 2009, at the Rhode Island Nuclear Science Center Reactor facility (Inspection Report No. 50-193/2009-201). The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concern or noncompliance of requirements was identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390 "Inspections, examinations, requests for withholding", a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or the NRC's document system (Agencywide Document Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this inspection, please contact Marcus Voth at 301-415-1210 or electronic mail at [Marcus.Voth@nrc.gov](mailto:Marcus.Voth@nrc.gov).

Sincerely,

**/RA/**

Johnny H. Eads, 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: As stated

cc w/ encl: See next page

Rhode Island Atomic Energy Commission

Docket No.: 50-193

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Test, Research, and Training Reactor Newsletter  
University of Florida  
202 Nuclear Sciences Center  
Gainesville, FL 32611  
Dr. T. Tehan, Director

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Johnny H. Eads, Chief  
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See next page

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**TEMPLATE #: NRR-106**

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NAME	MVoth mhv	JDonohue jd	GLappert gkl	JEads jhe
DATE	3/3/09	03/4/09	3/3/09	3/5/09

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**U. S. NUCLEAR REGULATORY COMMISSION**  
**OFFICE OF NUCLEAR REACTOR REGULATION**

Docket No: 50-193

License No: R-95

Report No: 50-193/2009-201

Licensee: Rhode Island Atomic Energy Commission

Facility: Rhode Island Nuclear Science Center Research Reactor

Location: Narragansett, Rhode Island

Dates: February 16 to 19, 2009

Inspectors: Marcus H. Voth (Lead)  
Jack Donohue

Approved by: Johnny H. Eads, 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 Facility  
NRC Inspection Report No. 50-193/2009-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the licensee's Class I research reactor facility safety programs including organization and operations and maintenance activities; review and audit and design change function; experiments; procedures; radiation protection; effluent and environmental monitoring; and transportation. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with U.S. Nuclear Regulatory Commission (NRC) requirements.

### Organization and Operations and Maintenance Activities

- Organization and Operations and Maintenance Activities remain in compliance with the requirements specified in Technical Specifications.

### Review and Audit and Design Change Functions

- Within the scope of this review, the licensee's review and design change program was found in conformance with Technical Specification and Regulatory requirements.

### Experiments

- Within the scope of this inspection the licensee was observed to be conducting experiments in accordance with regulatory and license requirements.

### Procedures

- Written procedures were being maintained in accordance with Technical Specification requirements.

### Radiation Protection

- The licensee continued to maintain an effective radiation protection program in compliance with regulatory and Technical Specification requirements, resulting in low radiation exposures to facility workers and users.

### Effluent and Environmental Monitoring

- The inspectors found environmental monitoring to conform to Technical Specification requirements and effluents to be in compliance with regulatory limits.

### Transportation

- The licensee did not ship any radioactive material under the reactor license since the previous transportation inspection.

## REPORT DETAILS

### Summary of Facility Status

The Rhode Island Atomic Energy Commission's (RIAEC) Rhode Island Nuclear Science Center (RINSC) two megawatt research reactor continued to be operated in support of education, research, training, and surveillance. During the inspection, the reactor was operated to irradiate samples as part of its research mission.

#### 1. Organization and Operations and Maintenance Activities

##### a. Inspection Scope (Inspection Procedure (IP)-69006)

The inspectors reviewed the following as a limited review of this area:

- Reactor logbook #56, April 4, 2008 to present
- Maintenance logbook
- H. Bicehouse (RINSC) to D. Hughes (NRC), [Annual Report for the RINSC Pursuant to TS 6.8.4 for the period from July 1, 2007 to June 30, 2008], August 18, 2008
- Shift Staffing

##### b. Observations and Findings

The inspectors observed a reactor checkout, startup, approach to critical, escalation to full power, and a typical irradiation. The Reactor Logbook entries were reviewed satisfactorily with key information documented during reactor operations including start-up and shutdown, verifying compliance with the staffing requirements of Technical Specifications (TS) Sections 6.1.2 and 6.1.3 and that the NRC-licensed Reactor Operator (RO) and the Senior Reactor Operator (SRO) on duty were designated by name in the logbook.

A maintenance logbook had been utilized to document in greater detail than the reactor logbook the nature of significant maintenance performed on the reactor and auxiliary systems. Staffing was compliant within TS requirements and had recent replacements of an Assistant Director for Reactor Operations and a Health Physicist.

Reactor Power was logged when the required power level was reached, and used to determine the fuel burn-up for the Annual Report required by TS Sec 6.8.4.a. The inspectors questioned the accuracy of fuel burn-up data reported in the Annual Report. RINSC Staff suggested that they review capabilities using newly acquired instrumentation to increase reporting accuracy. The licensee was informed that this issue will be considered an Inspector Follow-up Item (IFI) and will be reviewed during subsequent inspections. (IFI-50-193/2009-201-01).

c. Conclusions

Organization and Operations and Maintenance Activities remain in compliance with the requirements specified in Technical Specifications. The reactor was being maintained per TS requirements.

**2. Review and Audit and Design Change Functions**

a. Inspection Scope (IP 69007)

The inspector reviewed the following to ensure that the requirements of TS 6.0, Administrative Controls, and Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59 were being implemented effectively:

- File of Nuclear and Radiation Safety Committee (NRSC) Meeting Minutes from 2006 to 2008
- H. Bicehouse (RINSC) to D. Hughes (NRC), [Annual Report for the RINSC Pursuant to TS 6.8.4 for the period from July 1, 2007 to June 30, 2008], August 18, 2008
- 10 CFR 50.59 Reviews file, December 2004 through September 2007

b. Observations and Findings

Review of the minutes indicated that the meeting frequency, attendance, and actions met the requirements of TS Section 6.4, Review and Audit. Specifically, the inspectors verified that the NRSC had reviewed the two changes reported in the most recent annual report, improvements to the control rod drive system, and changes to the facility emergency plan.

c. Conclusions

Within the scope of this review, the licensee's review and design change program was found in conformance with Technical Specification and regulatory requirements.

**3. Experiments**

a. Inspection Scope (IP 69005)

The inspectors reviewed selected portions of the following documents and records to ensure that the requirements of TS Sections 3.8, Limitations on Experiments, 4.8, Surveillance of Experiments, and 6.4, Review and Audit, were being met:

- Reactor Experiment Notebook, desk copy maintained by M. J. Davis
- Appendix P, In core Irradiations, Rev 0, August 2, 2006
- Appendix AE, Glory Tube Gamma Irradiations, Rev 0, October 30, 2006
- Appendix AF, Reactor Experiment Approval, Rev 3, September 29, 2008
- Appendix AG, Reactor Experiment Request, Rev 1, September 29, 2008

- NSC (Nuclear Science Center) - Form 42, Reactor Experiment Request Form
- NSC Form 47, Attachment C, Reactor Experiment Approval
- Form NSC - 49, Rev 0, Reactor Operation Request
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, July 30, 2008
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, September 29, 2008
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, December 10, 2008

b. Observations and Findings

The licensee had made numerous improvements over the past two to three years to assure and document the fact that experiments were given adequate review in accordance with regulatory and TS requirements. Detailed procedures had been reviewed and approved by the NRSC. Experiments were screened pursuant to 10 CFR 50.59 requirements. Legacy experiments being done routinely had been subjected to the new review process to assure that safety considerations were known, documented, and properly applied. The inspectors reviewed evidence that experiments were reviewed and approved in accordance with TS requirements.

The inspectors observed reactor operations in support of a user performing an experiment involving the irradiation of numerous samples using the pneumatic transfer system. The reactor operator and experimenter maintained appropriate communication during the experiment, were both knowledgeable of their responsibility in executing the experiment, and exercised safety precautions in accordance with the approved procedure.

c. Conclusions

Within the scope of this inspection the licensee was observed to be conducting experiments in accordance with regulatory and license requirements.

**4. Procedures**

a. Inspection Scope (IP 69008)

The inspectors reviewed the following to ensure that the requirements of TS Sections 6.4, Review and Audit, and 6.5, Operating Procedures, were being met:

- Procedures Manual, desk copy maintained by M. J. Davis
- Appendix V, RINSC Pre-Start Checkout, Rev 12, July 30, 2008
- Appendix AD, Reactor Power Changes, Rev 3, July 30, 2008
- Form NSC - 1, Pre-Startup Check Sheet
- Form NSC - 1C, Shutdown Check Sheet
- Form NSC - 11, Shift record Data Sheet
- Form NSC - 18 RINSC Reactor Operations Data



- RINSC Nuclear and Radiation Safety Committee Full committee Meeting Minutes, July 30, 2008
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, September 29, 2008
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, December 10, 2008

b. Observations and Findings

The inspectors observed that the licensee maintained written procedures covering the areas specified in TS Section 6.5, Operating Procedures. A systematic approach was being used to update and reissue procedures. Newly revised procedures and major changes were reviewed and approved by the NRSC in accordance with TS Section 6.4, Review and Audit. The reviews and approvals were documented in the minutes of the NRSC meetings.

c. Conclusions

The licensee was maintaining and implementing written procedures in accordance with TS requirements.

**5. Radiation Protection**

a. Inspection Scope (IP 69012)

The following documents were reviewed to determine compliance with 10 CFR 19 and 20 and with TS Sections 3.7.1, Radiation Monitoring Systems, and 4.7, Radiation Monitoring Systems and Effluents, requirements regarding radiation protection:

- RINSC Radiation Protection Annual Audit, H. Bicehouse, Radiation Safety Officer (RSO), January 26 to 30, 2009
- Survey Program Summary Data for 2007, printed February 16, 2009
- Survey Program Summary Data for 2008, printed February 16, 2009
- NRC Form 3, "Notice to Employees," October 2008
- File of Landauer Dosimetry Reports, January 11, 2007 to January 11, 2008
- RINSC Radiation Safety Office, SOP Manual
- RINSC Radiation Safety Office, SOP 101, Radiation Safety Training, March 23, 2000
- RINSC Radiation Safety Office, SOP 220, Pocket Dosimeter Calibration, March 28, 2003
- RINSC Radiation Safety Office, SOP 300, Routine Surveys
- RINSC Radiation Safety Office, SOP 801, Instrument Calibration, November 6, 2000
- [Radiation Safety] Training file
- Radiation Safety Training Manual

- Summary of Radiation Area Monitors and Survey Meters as of January 25, 2006
- Instrumentation Calibration of Area Monitors (for reactor bridge, fuel safe, thermal column, heat exchanger area, and cleanup-demineralizer rooms), December 27, 2006
- Instrumentation Calibration of Area Monitors (for reactor bridge, fuel safe, thermal column, heat exchanger area, and cleanup-demineralizer rooms), November 19, 2008
- Main and Stack [Continuous Air] Monitor file
- Survey Meter Calibration File (for GSM 110) through December 21, 2007
- Air Monitor Data Sheet file through July 30, 2008
- Camberra Series 5 Low Background Alpha/Beta Counter Quality Control Records
- RINSC, Operating Procedures, Main Floor Area Monitor Channel Test, Procedure Appendix AB, Rev 1, July 2, 2003

b. Observations and Findings

Radiation Protection Procedures at the facility meet regulatory requirements and license commitments. The inspectors verified Form NRC-3 "Notice to Employees" is posted as required and caution signs, labels and controls were posted as required. The inspectors accompanied a HP technician during weekly surveys. Through the review of procedures and records, observations during facility tours, and discussion with staff personnel, the inspectors had determined that the licensee's radiation protection program was in accordance with TS requirements.

The licensee maintained and adhered to written procedures and instructions for all aspects of the radiation safety program. During tours through the facility the inspectors verified that postings for radiation workers were in accordance with regulations and procedures. Protective clothing was available if needed but areas were maintained in a clean condition such that it was not required during times of routine operation.

Workers and visitors (Boy Scouts) were observed wearing appropriate dosimetry throughout the facility. Routine radiation surveys, smear samples, and fixed monitor readings were taken throughout the facility to verify that radiation exposure rates were known and maintained As Low As Reasonably Achievable (ALARA). The licensee made effective use of data bases, monitoring for trends and abnormalities.

The inspectors found the scope of the radiation detection equipment calibration program to be sufficiently comprehensive and techniques used to be state-of-the-art.

The overall effectiveness of the radiation protection program was monitored with Optically Stimulated Luminescence Devices (OSLD) worn by workers. No worker received any significant exposure.

It should be noted that RIAEC on October 24, 2008 has requested withdrawal of

the request for renewal of Radioactive Material License No. 3K-063-01 (Broad Scope License) due to financial considerations. The loss of the broad scope license will have no impact on the reactor license.

c. Conclusions

The licensee had maintained an effective radiation protection program in compliance with regulatory and Technical Specification requirements, resulting in low radiation exposures to facility workers and users.

**6. Effluent and Environmental Monitoring**

a. Inspection Scope (IP 69004)

The inspectors reviewed the following to verify that the requirements of TS Section 4.7, Radiation Monitoring Systems and Effluents, were being met:

- Dosimetry Records for 2008
- H. Bicehouse (RINSC) to D. Hughes (NRC), [Annual Report for the RINSC Pursuant to TS 6.8.4 for the period from July 1, 2007 to June 30, 2008, August 18, 2008]

b. Observations and Findings

The inspectors toured the facility with a staff member doing a routine weekly facility radiation survey, observing where environmental releases of gaseous, liquid and solid radioactive material are generated and monitored.

The predominant environmental release from the facility was argon-41 resulting from activated air entrained in the reactor pool water, present in beam tubes, and used for cooling pneumatic transfer tubes. The gaseous release was 8 percent of the regulatory limit based on computations using the COMPLY code with Level 4 input; that is, actual building and effluent stack dimensions with site meteorological data.

The licensee made only one liquid release during the past year, a 450 gallon batch release analyzed to be 3.45 percent of the permissible release concentration.

The licensee reported that there were no shipments of solid waste from the facility during the past year.

The licensee maintained OSLDs at three locations around the exterior of the facility and sent them to a commercial processor quarterly along with personnel dosimeters. Since the areas monitored had limited public access the licensee adjusted the readings by occupancy times, resulting in dose rates at those locations less than a tenth of the regulatory limit.

c. Conclusions

The inspectors found environmental monitoring to conform to Technical Specification requirements and effluents to be in compliance with regulatory limits.

**7. Transportation**

a. Inspection Scope (IP 86740)

The inspectors reviewed the following document to determine compliance with NRC (10 CFR Parts 20 and 71) Standards For Protection Against Packaging Against Radiation and Transportation Of Radioactive Material and Department of Transportation (DOT) (49 CFR Parts 171-178) transport regulations.

- RINSC Radiation Protection Annual Audit, H.J. Bicehouse, Radiation Safety Officer dated January 26-30, 2009.
- Staff interviews

b. Observations and Findings

The inspectors reviewed the RINSC Radiation Protection Audit for radioactive shipments made under the reactor license (R-95) and staff personnel and found that there were no shipments made since the previous transportation inspection.

c. Conclusions

The licensee did not ship any radioactive material under the R-95 license since the previous transportation inspection.

**8. Exit Interview**

The inspection scope and results were summarized on February 19, 2009, with members of licensee management. The inspectors described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. It was agreed that no proprietary information was addressed and that the results of the inspection are subject to management review.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee

H. Bicehouse, Radiation Safety Officer and Assistant Director for Radiation and Reactor Safety  
M. Damato, Health Physics Technician and Reactor Operator  
M.J. Davis, Reactor Supervisor  
S. Mecca, Chairman, Rhode Island Atomic Energy Commission  
T. Tehan, Director, Rhode Island Nuclear Science Center  
C. Waring, Health Physicist  
E. Wentz, Assistant Director for Reactor Operations

## **INSPECTION PROCEDURES USED**

IP 69004	Class 1 Research and Test Reactor Effluent and Environmental Monitoring
IP 69005	Class 1 Research and Test Reactors Experiments
IP 69006	Class 1 Research and Test Reactors Organization and Operations and Maintenance Activities
IP 69007	Class 1 Research and Test Reactors Review and Audit and Design Change Functions
IP 69008	Class 1 Research and Test Reactors Procedures
IP 69012	Class 1 Research and Test Reactor Radiation Protection
IP 86740	Transportation

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

### Opened

50-193/2009-201-01 IFI Reactor Power was logged when reaching the required power level and used to determine the fuel burn-up for the Annual Report. RINSC Staff will investigate a more accurate determination.

### Closed

None

### Discussed

None

**LIST OF ACRONYMS USED**

ADAMS	Agencywide Document Access Management System
ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
IFI	Inspector Follow-up Item
IP	Inspection Procedure
NRC	Nuclear Regulatory Commission
NRSC	Nuclear and Radiation Safety Committee
NSC	Nuclear Science Center
OSLD	Optically Stimulated Luminescent Device
Rev	Revision
RIAEC	Rhode Island Atomic Energy Commission
RINSC	Rhode Island Nuclear Science Center
RO	Reactor Operator
RSO	Radiation Safety Officer
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TS	Technical Specification