March 30, 2010

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. 50-193/2010-201

The U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection on March 1-4, 2010, at the Rhode Island Nuclear Science Center Reactor facility (Inspection Report No. 50-193/2010-201). 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 Jack Donohue at 301-415-3163 or electronic mail at Jack.Donohue@nrc.gov.

Sincerely,

/RA/
Johnny H. Eads, Jr., Chief
Research and Test Reactors Oversight Branch
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

cc:

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Test, Research, and Training Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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WKennedy, NRR MCompton (Ltr only O13-E19) GLappert, NRR MRoss-Lee, NRR

ADAMS ACCESSION NO.: ML100750335 TEMPLATE #: NRC-002

OFFICE	PROB:RI	PRPB:LA	PROB:BC
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DATE	3/16/2010	3/29/2010	3/30/2010

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

Docket No:	50-193
License No:	R-95
Report No:	50-193/2010-201
Licensee:	Rhode Island Atomic Energy Commission
Facility:	Rhode Island Nuclear Science Center Research Reactor
Location:	Narragansett, Rhode Island
Dates:	March 1 to 4, 2010
Inspector:	Jack Donohue
Accompanied by:	Mary Jane Ross-Lee, Chief Research and Test Reactor Projects Branch
Approved by:	Johnny H. Eads, Jr., Chief Research and Test Reactors Oversight Branch 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. 50-193/2010-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Rhode Island Atomic Energy Commission (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, the licensee) 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 if its research mission.

1. Organization and Operations and Maintenance Activities

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

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

- Reactor logbook #57, June 17, 2009 to present
- Maintenance logbook
- H. Bicehouse (RINSC) to W. Kennedy (NRC), [Annual Report for the RINSC Pursuant to TS 6.8.4 for the period from July 1, 2008 to June 30, 2009], dated July 31, 2009
- Shift Staffing
- Form NSC-1, Pre-Start Check Sheet, dated December 10, 2008

b. Observations and Findings

The inspector 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 thru power operations, verifying compliance with the staffing requirements of Technical Specifications (TS) Sections 6.1.2 and 6.1.3 and that the Reactor Operator (RO) in training and the Senior Reactor Operator (SRO) on duty were designated by name in the logbook.

During operations, off site power was lost causing a scram. The diesel generator automatically started and provided emergency lighting and backup electrical power. Power was restored within one hour and the reactor shutdown was completed.

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.

c. Conclusions

Organization and Operations and Maintenance Activities remain in compliance with the requirements specified in TS. The reactor was being maintained per TS requirements. Staffing was compliant with 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) Section 50.59 were being implemented effectively:

- File of Nuclear and Radiation Safety Committee (NRSC) Meeting Minutes from 2008 to 2009
- H. Bicehouse (RINSC) to W. Kennedy (NRC), [Annual Report for the RINSC Pursuant to TS 6.8.4 for the period from July 1, 2008 to June 30, 2009], dated July, 2009
- Review of 10 CFR 50.59 file, December 2006 through September 2009

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 inspector verified that the NRSC had reviewed the three changes reported in the most recent annual report, improvements to the Secondary Water Analysis, the special nuclear material (SNM) Accounting and changes to the reactor Experimental Approval Procedure.

c. Conclusions

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

3. Experiments

a. Inspection Scope (IP 69005)

The inspector 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 XP-04, Incore Irradiations, Rev 1, dated December 4, 2009
- Appendix XP-12, Glory Tube Gamma Irradiations, Rev 1, dated December 4, 2009

- Appendix XP-02, Reactor Experiment Approval, Rev 4, dated March 10, 2009
- Appendix XP-01, Reactor Experiment Request, Rev 1, dated 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 2, Reactor Operation Request
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, dated March 10, 2009
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, dated July 22, 2009
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, dated October 30, 2009

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 inspector reviewed evidence that experiments were reviewed and approved in accordance with TS requirements.

The inspector observed reactor operations in support of a user performing an experiment involving the irradiation of numerous samples using the pneumatic transfer system. The RO 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. The experiment was not completed due to the inadvertent scram on loss of power.

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 inspector 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 OP-2, RINSC Pre-Start Checkout, Rev 13, dated December 10, 2008
- Appendix OP-3, Reactor Power Changes, Rev 4, dated December 10, 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, dated March 10, 2009
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, dated July 22, 2009
- RINSC Nuclear and Radiation Safety Committee, Full committee Meeting Minutes, dated October 30, 2009

b. Observations and Findings

The inspector 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," dated October 2008
- File of Landauer Dosimetry Reports, Quarterly reports for 2009
- RINSC Radiation Safety Office, SOP Manual

- RINSC Radiation Safety Office, SOP 101, Radiation Safety Training, dated March 23, 2000
- RINSC Radiation Safety Office, SOP 220, Pocket Dosimeter Calibration, dated March 28, 2003
- RINSC Radiation Safety Office, SOP 300, Routine Surveys, dated February 10, 2004
- RINSC Radiation Safety Office, SOP 801, Instrument Calibration, dated 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), dated November 19, 2008
- Main and Stack [Continuous Air] Monitor file
- Survey Meter Calibration File (for GSM 110) through February 28, 2010
- Air Monitor Data Sheet file through February 28, 2010
- 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, dated July 2, 2003

b. Observations and Findings

Radiation Protection Procedures at the facility meet regulatory requirements and license commitments. The inspector verified Form NRC-3 “Notice to Employees” is posted as required and caution signs, labels and controls were posted as required. The inspector reviewed weekly, monthly, quarterly and annual surveys. Through the review of procedures and records, observations during facility tours, and discussion with staff personnel, the inspector 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 students (Roger Williams College) 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 inspector 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 has not renewed the Radioactive Material License No. 3K-063-01 (Broad Scope License) due to financial considerations. The facility will use the University License (3K-040-01) to ship non-R-95 reactor license radioactive material.

c. Conclusions

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

6. Effluent and Environmental Monitoring

a. Inspection Scope (IP 69004)

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

- Dosimetry Records for 2009
- H. Bicehouse (RINSC) to W. Kennedy (NRC), [Annual Report for the RINSC Pursuant to TS 6.8.4 for the period from July 1, 2008 to June 30, 2009], dated July 31, 2009

b. Observations and Findings

The inspector 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 .02 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 inspector reviewed the data from a small primary water leak. Analysis over a two year period indicates the leak rate to be about eight gallons/day. Leak collectors have been put into place in the locations where the leaks have typically

occurred. Sodium (Na-24) has not been detected in the water and the Tritium concentration are an order of magnitude below the 10 CFR 20 release limits. This event has been reviewed by the Nuclear Radiation and Safety Committee (NRSC). The RINSC staff will continue to monitor the leak and the NRSC will define the magnitude of the leak at which they need to be inform and develop a plan in the event that magnitude is reached.

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.

Conclusions

The inspector found environmental monitoring to conform to TS requirements and effluents to be in compliance with regulatory limits.

7. Transportation

a. Inspection Scope (IP 86740)

The inspector reviewed the following document to determine compliance with NRC (10 CFR Parts 20 and 71) Standards for Protection against Radiation and Packaging and Transportation of Radioactive Material and Department of Transportation (DOT) Title 49 of the *Code of Federal Regulations* Parts 171-178, transport regulations.

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

b. Observations and Findings

The inspector reviewed the RINSC Radiation Protection Audit for radioactive shipments made under the R-95 reactor license, interviewed 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 reactor license since the previous transportation inspection.

8. Follow up on Previous Identified Items

Unresolved item follow-up

Inspector Follow-up Item (IFI) 50-193/2009-201-01, 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.

Observation and Finding

RINSC has added an integrated megawatt per hour (MWH) feature to the rod drive display system. This feature calculates the MWH of operation by determining reactor power level as measured by the wide range monitor and integrating over time. The display system provides an indication of the lifetime MWH of operation of the facility.

Conclusions

RINSC staff has improved the accuracy in Reactor Power determination. IFI 50-193/2009-201-01 is considered closed.

9. Exit Interview

The inspection scope and results were summarized on March 4, 2010, with members of licensee management. The inspector 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

M. Damato	Health Physics Technician and Reactor Operator
M.J. Davis	Assistant Director for Reactor Operations
B. MacGregor	Facility Engineer
B. Nassersharif	Acting Chairman, Rhode Island Atomic Energy Commission
T. Nunes	Rhode Island Atomic Energy Commission
Z. Richards	Reactor Operator Trainee
T. Tehan	Director, Rhode Island Nuclear Science Center
C. Waring	Health Physicist

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
IP 92701	Follow up

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

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.

Discussed

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access Management System
ALARA	As Low As Reasonably Achievable
10 CFR	Title 10 of the *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