March 19, 2015

Dr. Cameron Goodwin, 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. 50-193/2015-201

Dear Dr. Goodwin:

From February 23–26, 2015, the U.S. Nuclear Regulatory Commission (NRC or the Commission) conducted an inspection at the Rhode Island Nuclear Science Center Reactor facility (Inspection Report No. 50-193/2015-201). The enclosed report documents the inspection results, which were discussed on February 26, 2015, with you, members of your staff, and Dr. Clinton Chichester, Chairman of the Rhode Island Atomic Energy Commission.

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 review, no issues of noncompliance with NRC requirements were identified. No response to this letter is required.

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

Should you have any questions concerning this inspection, please contact Mr. Craig Bassett at (301) 466-4495 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/

Kevin Hsueh, 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:
NRC Inspection Report 50-193/2015-201

cc w/ encl: See next page

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DATE	03/10/2015	03/19/2015

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

Docket No:	50-193
License No:	R-95
Report No:	50-193/2015-201
Licensee:	Rhode Island Atomic Energy Commission
Facility:	Rhode Island Nuclear Science Center Research Reactor
Location:	Narragansett, Rhode Island
Dates:	February 23–26, 2015
Inspector:	Craig Bassett
Approved by:	Kevin Hsueh, Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

ENCLOSURE

EXECUTIVE SUMMARY

Rhode Island Atomic Energy Commission
Rhode Island Nuclear Science Center Reactor Facility
NRC Inspection Report No. 50-193/2015-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Rhode Island Atomic Energy Commission's (the licensee's) Class I research reactor facility safety program, including: (1) organization and staffing, (2) review and audit and design change functions, (3) procedures, (4) radiation protection, (5) effluent and environmental monitoring, and (6) transportation of radioactive material. The licensee's program was acceptably directed toward the protection of public health and safety and was in compliance with U.S. Nuclear Regulatory Commission (NRC) requirements.

Organization and Staffing

- Organization and staffing remain in compliance with the requirements specified in the facility's Technical Specifications (TS).

Review and Audit and Design Change Functions

- The review and audit program was being conducted acceptably and completed by the Nuclear and Radiation Safety Committee, as stipulated in TS Section 6.2.

- Changes made at the facility were being reviewed using guidance in the licensee's Facility Modification Procedure, AP-03, and Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59.

Procedures

- Written procedures were being reviewed, approved, and maintained in accordance with TS Section 6.5 requirements.

Radiation Protection

- Periodic surveys were completed and documented as required by procedure.

- Postings and signs met regulatory requirements.

- Personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits.

- Radiation survey and monitoring equipment was being maintained and calibrated as required.

- The radiation protection training program was acceptable and training was being completed as required.

- The radiation protection and the as low as reasonably achievable (ALARA) programs satisfied regulatory requirements.

Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

- The environmental protection program satisfied NRC requirements.

Transportation of Radioactive Material

- The shipments of radioactive material made under the reactor license were in compliance with NRC and Department of Transportation regulations.

REPORT DETAILS

Summary of Facility Status

The Rhode Island Atomic Energy Commission's (the licensee's) Rhode Island Nuclear Science Center (RINSC) two megawatt research reactor continued to be operated in support of education, research, and training. During the inspection, the reactor was operated at various power levels for a student tour and to irradiate samples as part of its research mission.

1. Organization and Operations and Maintenance Activities

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

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Sections 6.1 and 6.2 of the RINSC Technical Specifications (TS), Amendment No. 30, dated December 19, 2013, to Facility License No. R-95, were being met:

- RINSC organizational structure and staffing
- RINSC Annual Report for the period from July 1, 2012, through June 30, 2013, submitted to the U.S. Nuclear Regulatory Commission (NRC) on August 29, 2013
- RINSC Annual Report for the period from July 1, 2013, through June 30, 2014, submitted to the NRC on August 28, 2014

b. Observations and Findings

The inspector reviewed the facility organization and staffing. It was noted that the organizational structure had not changed since the previous inspection. As noted in previous inspection reports, there had been changes in various key positions at the facility. During this inspection it was noted that the individual selected to fill the position of Radiation Safety Officer (RSO) was relatively new to that position. Nevertheless, a review of the background of the individual indicated that he had the appropriate work experience and educational background required by TS Section 6.2.2. The organizational structure at the facility appeared to be in compliance with the TS.

It was also noted that two people had left the facility since the previous NRC inspection. Individuals who held the positions of Facility Engineer and Health Physics Technician/Senior Reactor Operator retired at the end of last year. The licensee had posted the positions and was in the process of interviewing candidates for the two vacant positions. Even with the decreased number of staff, the licensee was currently able to maintain routine reactor operations and training activities.

c. Conclusion

The organization structure and staff functions were in accordance 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 Section 6.0 and Title 10 of the *Code of Federal Regulations* (10 CFR) Sections 20.1101 and 50.59 were being implemented effectively:

- Nuclear and Radiation Safety Committee (NRSC) Charter, Rev. 3, approval dated November 15, 2013
- NRSC meeting minutes from March 2013 through the date of this inspection
- Various 10 CFR 50.59 screen/review forms concerning modifications or changes at the facility
- RINSC Operating Procedures, AP-03, "Facility Modifications," Rev. 1, NRSC approval dated November 15, 2013
- RINSC Annual Reports for the last two reporting periods
- RINSC Radiation Protection Annual Audits performed by the Radiation Safety Officer for Calendar Year (CY) 2013, completed during March 26-27, 2014 and for CY 2014, completed during January 30 – February 6, 2015

b. Observations and Findings

(1) Review and Audit Functions

The inspector reviewed the NRSC meeting minutes and associated records from March 2013 through the present. The records showed that meetings were being held at the TS-required frequency. Safety reviews and audits were conducted by various members of the NRSC or other designated persons as required. Topics of these reviews and audits were consistent with TS requirements to provide guidance, direction, and oversight for the facility, and acceptable use of the reactor. It was also noted that the Radiation Protection Program was being audited annually as required by 10 CFR 20.1101.

No significant problems or deficiencies were found during the NRSC's reviews and audits, but some areas for improvement were noted. Corrective actions were taken as needed.

(2) Design Change Functions

Through interviews with licensee personnel, the inspector determined that various changes had been initiated and/or completed at the facility since the last NRC inspection. The inspector reviewed the 10 CFR 50.59 review process used at the facility. It was noted that the licensee had developed a procedure, AP-03, to provide guidance for the completion of

10 CFR 50.59 screenings, reviews, and evaluations. The inspector noted that various screenings had been completed by the licensee. The results indicated that no further reviews/evaluations were required.

c. Conclusion

The NRSC was meeting as required and reviewing the topics outlined in the TS. Audits were being completed as required. Procedure and facility changes were being completed using the licensee's change review process outlined in Facility Modification Procedure, AP-03.

3. Procedures

a. Inspection Scope (IP 69008)

The inspector reviewed the following to ensure that the requirements of TS Sections 6.4 and 6.5 were being met:

- Selected RINSC Standard Operating Procedures (SOPs)
- Selected RINSC Radiation Safety Office SOPs
- NRSC meeting minutes from March 2013 through the present

b. Observations and Findings

The inspector observed that the licensee maintained written procedures covering the areas specified in TS 6.5, "Operating Procedures." A systematic approach was being used to update and reissue procedures. New procedures and major changes to existing procedures were required to be reviewed and approved by the NRSC. These reviews and approvals were typically documented in the minutes of the NRSC meetings.

The inspector noted that minor and major changes to various procedures had been made since the previous inspection. Also, several new procedures had been developed. The inspector verified that the major procedure changes and the new procedures had been reviewed and approved by the NRSC as required.

It was also noted that various RINSC Radiation Safety Office SOPs were being reviewed by the RSO. These procedures will either be revised, or eliminated and replaced with new procedures as deemed necessary. The licensee was informed that completion of the review and revision of the RINSC Radiation Safety Office SOPs would be considered as an Inspector Follow-up Item (IFI) and will be reviewed during a subsequent inspection (IFI 50-193/2015-201-01).

c. Conclusion

The licensee was maintaining and implementing written procedures in accordance with TS Section 6.5 requirements.

4. Radiation Protection

a. Inspection Scope (IP 69012)

The following documents were reviewed to determine compliance with 10 CFR Parts 19 and 20 and with TS Section 3.7.1 requirements regarding radiation protection:

- Radiation safety training modules and records
- RINSC Radiation Safety Manual dated October 2014
- RINSC Annual Reports for past two reporting periods
- RINSC Radiation Protection Annual Audit for the past 2 years
- Copies of NRC Form 3, “Notice to Employees,” posted at the facility
- Quarterly dosimetry reports for facility personnel from November 2012 through October 2014
- Selected survey program summary data and the associated survey reports for 2014
- Selected calibration records of area radiation monitors for the past 2 years
- Survey meter calibration files documenting the calibration of various portable survey instruments for the past 2 years
- RINSC Radiation Safety Office SOPs including Nos. 101, 201, 202, 300, 801, 802, 803, and 805

b. Observations and Findings

(1) Surveys

The inspector reviewed selected weekly, monthly, and quarterly radiation and contamination surveys. The surveys, which had been completed by health physics staff members, were generally completed in a timely manner. No contamination had been detected in concentrations above established action levels in the surveys reviewed. Some areas/items were noted with slightly elevated radiation levels, but no problems were found. Results of the surveys were acceptably documented.

During the inspection, the inspector accompanied the facility health physicist during completion of routine weekly radiation and contamination surveys of the reactor bay and a laboratory where radioactive samples were processed. The techniques used during the survey were adequate and the survey was conducted and documented as required. The inspector also conducted a radiation survey of these areas using an NRC-supplied instrument. The radiation levels noted by the inspector were comparable to those found by the licensee and no anomalies were noted.

(2) Postings and Notices

Radiological signs were typically posted at the entrances to controlled areas. Other postings also showed the industrial hygiene hazards that were present in the areas. Caution signs, postings, and controls for radiation areas and high radiation areas were as required in 10 CFR Part 20, Subparts G and J. The inspector noted that licensee personnel observed the signs and postings and the precautions for access to the various controlled areas in the facility.

Copies of current notices to workers were posted in appropriate areas in the facility. The copies of NRC Form 3, "Notice to Employees," noted at the facility were the latest issue and were posted in various areas of the facility as required by 10 CFR Part 19.11. These locations included the main bulletin board in the hallway by the Radiation Safety Officer's office, the control room, and the lunch room.

(3) Dosimetry

The inspector determined that the licensee used pocket ion chambers and thermoluminescent dosimeters (TLDs) for whole body monitoring of x-ray, beta, gamma, and neutron radiation exposure. The licensee also used TLD finger rings for extremity monitoring. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program accredited vendor. An examination of the TLD results indicating radiological exposures at the facility for the past 2 years showed that all of the occupational doses for facility personnel, as well as doses to the public, were within 10 CFR Part 20 limits. Through direct observation the inspector determined that dosimetry was acceptably used by facility personnel.

(4) Maintenance and Calibration of Radiation Monitoring Equipment

Examination of selected items of radiation monitoring equipment indicated that the instruments had the acceptable up-to-date calibration sticker attached. Review of the instrument calibration records for various meters indicated the calibration of portable survey meters was typically completed by licensee staff personnel. However, some instruments were shipped to vendors for repair and calibration as needed. The inspector verified that the survey instruments were calibrated semiannually which met procedural requirements. Calibration records were being maintained as required.

The inspector also reviewed the calibration records of various area radiation monitors (ARMs) and stack monitors. It was noted that these monitors were being calibrated annually as required and were typically calibrated by licensee staff personnel.

(5) Radiation Protection Training

The inspector reviewed the training given to RINSC staff members, to those who are not on staff but who are authorized to use the experimental facilities of the reactor, and to students taking classes at the facility. The training program was provided online at the University of Rhode Island's website. It included initial radiation worker training for those new to the facility. The training consisted of various modules including: facility orientation, basic concepts and terms, radiobiology, basics of radiation protection, radiation detection, personnel dosimetry, as low as reasonably achievable (ALARA), practical radiation protection, and radioactive waste management. Additional training was given to each person as appropriate based upon the position and/or duties of the individual. It was noted that refresher training was now being given to radiation workers at the facility.

The inspector reviewed the training given to staff members and other radiation workers who used facility resources. It appeared to be appropriate. The inspector also verified that annual refresher training was given as required. The training program was acceptable.

(6) Radiation Protection Program

The licensee's radiation protection and ALARA programs were established and described in the RINSC Radiation Safety Manual, dated October 2014, and through associated health physics procedures that had been reviewed and approved. The program contained instructions concerning organization, training, monitoring, personnel responsibilities, handling radioactive material, and maintaining doses ALARA. The program, as established, appeared to be acceptable and satisfied regulatory requirements.

The licensee did not have a respiratory protection program or planned special exposure program; neither program was required based on the current level of activity at the facility.

(7) Facility Tours

The inspector toured the reactor bay including the Dry Irradiation Facility; the basement area; and selected support laboratories with licensee representatives on various occasions. The inspector noted that facility radioactive material storage areas were properly posted. No unmarked radioactive material was noted.

c. Conclusion

The inspector determined that the radiation protection and ALARA programs, as implemented by the licensee, satisfied regulatory requirements. Specifically, (1) periodic surveys were completed and documented acceptably to permit evaluation of the radiation hazards present; (2) postings and signs met regulatory requirements; (3) personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits; (4) radiation survey and monitoring equipment was being maintained and calibrated as required; and (5) the radiation protection training program was being implemented as stipulated in procedure.

5. Effluent and Environmental Monitoring

a. Inspection Scope (IP 69004)

The inspector reviewed the following to verify that the requirements of TS Sections 3.7 and 4.7 were being met:

- Air monitor data sheet file to the present
- Main and stack continuous air monitor file
- Environmental dosimetry records for 2013 through 2015 to date
- Selected RINSC calibration procedures, including CP-06 and CP-07
- RINSC Radiation Protection Annual Audits for the past 2 years
- RINSC Annual Report for the last two reporting periods

b. Observations and Findings

(1) Environmental Radiation Monitoring

Environmental radiation monitoring was accomplished using TLDs placed in three different monitoring stations. Since the areas monitored had limited public access, the licensee adjusted the readings by using occupancy times. The results of these readings at those locations indicated dose rates less than the regulatory limit.

(2) Gaseous Effluent Releases

The inspector determined that gaseous releases continued to be monitored as required, calculated according to procedure, and acceptably documented in the annual reports. 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 airborne concentrations of the gaseous releases were within the concentrations stipulated in 10 CFR Part 20, Appendix B, Table 2. Also, the dose rate to the public as a result

of the gaseous releases was well below the dose constraint specified in 10 CFR 20.1101(d) of 10 millirem per year.

(3) Liquid Effluent Releases

A review of the liquid effluent releases from the facility to the sanitary sewer indicated that the releases were well within the monthly average concentration limits established in 10 CFR 20, Appendix B, Table 3.

(4) Monitoring Equipment Calibration and Maintenance

Calibration records indicated that monitoring equipment was acceptably maintained and calibrated as required. Records were current and acceptably maintained. Observation of the facility by the inspector indicated no new potential release paths.

c. Conclusion

Effluent releases were within the specified regulatory and TS limits. The environmental protection program satisfied NRC requirements.

6. Transportation of Radioactive Material

a. Inspection Scope (IP 86740)

The inspector reviewed the following documents to determine compliance with NRC and Department of Transportation (DOT) regulations governing the transport of radioactive material as specified in 10 CFR Parts 20 and 71 and 49 CFR Parts 171–178:

- Licenses of shipment consignees
- Radioactive material shipping papers and related records
- Training records for those designated as “shippers”
- RINSC Radiation Protection Annual Audit for the past 2 years
- Selected RINSC Radiation Safety Office SOPs, including Nos. 420 and 501

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspector determined that the licensee had not shipped radioactive material (RAM) during 2013, but had made various RAM shipments in 2014 including three Limited Quantity shipments and one exempt quantity shipment. The records indicated that the shipments had been surveyed as required. All radioactive material shipment records reviewed by the inspector had been completed in accordance with DOT and NRC regulations.

The inspector verified that the licensee was maintaining copies of shipment recipients' licenses to possess radioactive material as required and that the licenses were verified to be current prior to initiating a shipment. The inspector also reviewed the training of RINSC staff members responsible for shipping radioactive material. The inspector verified that licensee personnel designated as "shippers" had received the appropriate training covering the DOT, International Air Transport Association, and International Civil Aviation Organization requirements within the past 3 years.

c. Conclusion

The licensee shipments of RAM under the facility's reactor license were in accordance with NRC and DOT requirements.

7. Exit Interview

The inspection scope and results were summarized on February 26, 2015, with members of licensee management and staff, as well as the Chairman of the Rhode Island Atomic Energy Commission. The inspector described the areas inspected and discussed in detail the inspection findings. The licensee acknowledged the results of the inspection and did not identify any information reviewed as proprietary.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Chichester	Chairman, Rhode Island Atomic Energy Commission
J. Davis	Assistant Director, Rhode Island Nuclear Science Center
C. Goodwin	Director, Rhode Island Nuclear Science Center
C. Hathaway	Health Physicist
P. Martin	Reactor Supervisor
S. Nam	Radiation Safety Officer

INSPECTION PROCEDURES USED

IP 69004	Class 1 Research and Test Reactor Effluent and Environmental Monitoring
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 on Previously Identified Items

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-193/2015-201-01	IFI	Follow-up on the licensee's actions to complete the review and revision of the RINSC Radiation Safety Office SOPs.

Closed

None

LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ADAMS	Agencywide Document Access Management System
ALARA	As Low As Reasonably Achievable
ARM	Area Radiation Monitor
CY	Calendar Year
DOT	Department of Transportation
IFI	Inspector Follow-up Item
IP	Inspection Procedure
NRC	U.S. Nuclear Regulatory Commission
NRSC	Nuclear and Radiation Safety Committee
RAM	Radioactive Material
Rev.	Revision
RINSC	Rhode Island Nuclear Science Center
RP	Radiation Protection
RSO	Radiation Safety Officer
SOP	Standard Operating Procedure
TLD	Thermoluminescent Dosimeter
TS	Technical Specification