



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001**

December 12, 2023

Dr. Cameron Goodwin, Director
Rhode Island Nuclear Science Center
16 Reactor Road
Narragansett, RI 02882-1165

**SUBJECT: RHODE ISLAND ATOMIC ENERGY COMMISSION – U.S. NUCLEAR
REGULATORY COMMISSION ROUTINE INSPECTION REPORT
NO. 05000193/2023202**

Dear Dr. Goodwin:

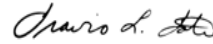
From August 28 – 31, 2023, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at your Rhode Island Nuclear Science Center reactor facility. The enclosed report documents the inspection results which were discussed on August 31, 2023, with you, Dr. Clinton Chichester, Chairman, Rhode Island Atomic Energy Commission, and members of your staff.

The inspection examined activities conducted under your license, as they relate to public health and safety, by confirming compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. Based on the results of this inspection, no findings of non-compliance 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, 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 Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any question concerning this inspection, please contact Craig Bassett at (240) 535-1842, or by email at Craig.Bassett@nrc.gov.

Sincerely



Signed by Tate, Travis
on 12/12/23

Travis L. Tate, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated:

cc: GovDelivery Subscribers

SUBJECT: RHODE ISLAND ATOMIC ENERGY COMMISSION – U.S. NUCLEAR
REGULATORY COMMISSION ROUTINE INSPECTION REPORT
NO. 05000193/2023202 DATED: DECEMBER 12, 2023

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OFFICE	NRR/DANU/UNPO/RI	NRR/DANU/UNPO/LA	NRR/DANU/UNPO/BC
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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No.: 50-193

License No.: R-95

Report No.: 05000193/2023202

Licensee: Rhode Island Atomic Energy Commission

Facility: Rhode Island Nuclear Science Center

Location: Narragansett, Rhode Island

Dates: August 28 – 31, 2023

Inspector: Craig H. Bassett

Accompanied by: Brian Lin, Inspector in Training

Approved by: Travis L. Tate, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

Rhode Island Atomic Energy Commission
Rhode Island Nuclear Science Center Reactor Facility
Inspection Report No. 05000193/2023202

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) Rhode Island Nuclear Science Center (RINSC) Class I, two-megawatt research reactor safety program including: (1) operator licenses, requalification, and medical examinations; (2) experiments; (3) organization and operations and maintenance activities; (4) review and audit and design change functions; (5) procedures; (6) fuel movement; and (7) surveillance. The U.S. Nuclear Regulatory Commission (NRC) staff determined the licensee's program was acceptably directed toward the protection of public health and safety and in compliance with NRC requirements.

Operator Licenses, Requalification, and Medical Examinations

- Operator requalification was completed as required by the licensee's Operator Requalification Program and operators received their biennial medical examinations as required by the regulations.

Experiments

- The program for reviewing, authorizing, and conducting experiments satisfied technical specification (TS) and procedural requirements.

Organization and Operations and Maintenance Activities

- Organizational structure and staffing were consistent with TS requirements and operations and maintenance activities were conducted in accordance with TS and procedural requirements.

Review and Audit and Design Change Functions

- The Nuclear and Radiation Safety Committee (NRSC) met at the required frequency, reviewed the topics outlined in the TSs, and completed audits as required by the TSs.
- Facility modifications and procedure changes were evaluated in accordance with the requirements specified in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, tests and experiments."

Procedures

- The procedural review, revision, and implementation program satisfied requirements of the TSs.

Fuel Movement

- Fuel movements and inspections were conducted in accordance with the TS and procedural requirements.

Surveillance

- The surveillance program was conducted in accordance with the TS and procedural requirements.

REPORT DETAILS

Summary of Facility Status

The licensee's RINSC Class I, two-megawatt research reactor continued to be operated in support of research, development, education, training, and surveillance. During the inspection, the reactor was operated in support of an experiment.

1. Operator Licenses, Requalification, and Medical Examinations

a. Inspection Scope (Inspection Procedure (IP) 69003)

The inspectors reviewed selected aspects of the following to ensure compliance with the licensee's operator requalification program outlined in RINSC administrative procedure (AP) AP-02, "Reactor Operator Re-qualification," Revision 4 and regulations:

- reactor logbooks Nos. 66 and 67
- senior reactor operator (SRO) and reactor operator (RO) requalification files containing copies of:
 - operator requalification program check sheet forms from 2021 – present (referred to as Nuclear Science Center Form No. 45 [NSC-45])
 - annual operational requalification examination forms from 2021 – present
 - biennial operator requalification examinations from 2021 - present
- individual SRO NRC Form 396, "Certification of Medical Examination by Facility Licensee," from 2021 – present

b. Observations and Findings

The inspectors confirmed that training was conducted in accordance with the licensee's requalification and training program. The inspectors noted that procedure reviews and examinations were documented, which included information regarding facility changes. The inspectors confirmed that other relevant information was routed to all licensed operators for their review. The inspectors also verified that other aspects of the program were completed, and records maintained including quarterly reactor operations, reactivity manipulations, supervisory activities, annual operations tests and supervisory observations, and biennial written exams. The inspectors noted that all operators received biennial medical examinations within the allowed time frame as required by the regulations. The inspectors confirmed that the program was well maintained and up to date.

c. Conclusion

The inspectors determined that operator training and requalification was conducted in accordance with the licensee's Operator Requalification Program and operators received their biennial medical examinations as required by the regulations.

2. Experiments

a. Inspection Scope (IP 69005)

The inspectors reviewed selected aspects of the following to verify that the licensee complied with TS sections 3.1, 3.8, 4.1, 4.8, 4.9, and 6.5:

- reactor console logbooks Nos. 66 and 67
- various recently approved experiments
- selected experiment approval and authorization forms containing administrative controls and precautions
- operating data notebooks for 2022 and 2023 containing completed copies of various reactor operations request forms (NSC-49)

b. Observations and Findings

The inspectors verified that there were no new experiments proposed since the last inspection but any new experiments or revisions to existing experiments would be reviewed by the reactor staff and reviewed and approved by the NRSC as required by TS 6.5. The inspectors also verified that irradiation request forms were completed and approved prior to reactor operations. The inspectors confirmed that experiments were conducted using approved methods or procedures and engineering and radiation protection controls were implemented to limit exposure of the workers handling the irradiated items.

c. Conclusion

The inspectors determined that the program for reviewing, authorizing, and conducting experiments satisfied the TS and facility procedural requirements.

3. Organization and Operations and Maintenance Activities

a. Inspection Scope (IP 69006)

To verify that the licensee complied with the requirements for organization and staffing; operations; and maintenance activities as specified in TS sections 2.0, 3.0, 6.1; and procedural requirements, the inspectors reviewed selected aspects of the following:

- reactor logbooks Nos. 66 and 67
- RINSC maintenance board 2022-2023 spreadsheet
- various forms and check sheets from 2022 – present including: NSC-1C, “Shutdown Check Sheet,” NSC-11, “Shift Record Data Sheet,” NSC-14A, “Emergency Power System Check List,” NSC-14B, “Evacuation System Check List,” NSC-18, “RINSC Reactor Operation Data,” NSC-44, “RINSC Emergency Generator Maintenance Checklist,” and, NSC-49, “Reactor Operations Request”
- annual beam port inspection documents and photos from 2022 – present
 - reactor pool and support structure inspection documents and photos from 2022-present
- various RINSC procedures including: IP-03, “Inspection of Reactor Pool and Suspension Frame,” Revision 1, IP-04, “Beam Port and Through Port Inspection,”

- Revision 1, MP-05, "Emergency Generator Maintenance," Revision 1, MP-10, "Evacuation System Test," Revision 2, MP-11, "Emergency Power Systems Operational Test," Revision 2, and OP-02, "Pre-Start Checkout," Revision 20
- RINSC annual reports for the periods from July 1, 2022, through June 30, 2023, dated July 14, 2021, and July 18, 2023, through June 30, 2022, dated July 27, 2022

b. Observations and Findings

(1) Organization

The inspectors reviewed the facility organization and staffing and found that the organization continued to be staffed as required by the TSs. The inspectors also confirmed that the organizational structure at the facility remained in compliance with the TSs.

The inspectors noted that there were four SROs and one RO on staff at the facility which was an adequate number of licensed staff members to support the reactor program.

(2) Operations

The inspectors noted that documentation was maintained to verify compliance with staffing requirements of TS sections 6.1.2 and 6.1.3. In addition, the inspectors verified that recorded results regarding reactor operation were within TS required parameters and normal operating ranges during reactor operations. The inspectors observed a reactor start-up, routine operation, and shutdown in support of an experiment.

(3) Maintenance

The inspectors noted that the licensee continued to use a spreadsheet for tracking maintenance and surveillance activities. The inspectors verified that the activities tracked were completed in accordance with TS and licensee procedures and preventive maintenance activities were completed as stipulated by procedure. The inspectors also confirmed that following maintenance activities, systems and equipment were tested to ensure that they were operational prior to returning them to service.

c. Conclusion

The inspectors determined that the organizational structure complied with the TS requirements and the present staffing level was adequate for current operations. The inspectors also determined that reactor operations and maintenance activities were conducted in accordance with the applicable procedure and TS requirements.

4. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69007)

The inspectors reviewed selected aspects of the review and audit program to ensure compliance with TS section 6.2, and selected design change activities to ensure

compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, test and experiments":

- NRSC meeting minutes and associated records for 2021 – 2023
- RINSC AP-03, "Facility Modifications," Revision 2
- RINSC forms NSC-24, "10 CFR 50.59 Screen" and NSC-51, "10 CFR 50.59 Review"
- RINSC annual reports for the last two reporting periods as noted above

b. Observations and Findings

(1) Review and Audit Functions

The inspectors confirmed that NRSC meetings, safety reviews, and audits were completed at the required frequency. The inspectors verified that topics of these reviews and audits were consistent with the TS requirements and provided guidance, direction, and oversight for the facility and use of the reactor.

(2) Design Change Functions

The inspectors evaluated the 10 CFR 50.59 review process used by the licensee at the facility. The inspectors noted that the licensee's procedure governing design changes provided guidance concerning the review of facility modifications, review of new experiments, and changes to procedures using the 10 CFR 50.59 review or evaluation process. The inspectors also noted that screening forms were used to determine whether a full 10 CFR 50.59 review and evaluation were required for any change that was contemplated. Through review of records and interviews with licensee personnel, the inspectors found that no changes were implemented for the facility since the last inspection.

c. Conclusion

The inspectors determined that the NRSC held meetings and reviewed the topics outlined in the TSs. The inspectors also determined that audits were completed, the design change program was implemented, and associated records were maintained as required by 10 CFR 50.59.

5. Procedures

a. Inspection Scope (IP 69008)

To verify that facility procedures were prepared, reviewed, revised, and implemented as required by TS section 6.4, the inspectors reviewed selected aspects of:

- various RINSC procedures including: AP-04, "License Amendment Request," Revision 2, CP-06, "Stack Monitor Calibration Check," Revision 4, MP-03, "Primary Water Analysis," Revision 4
- NRSC meeting minutes and associated records for 2021 – 2023

b. Observations and Findings

(1) Routine Procedure Review

The inspectors found that procedures were developed for the safe routine operation of the reactor, as well as for abnormal circumstances. The inspectors verified that substantive procedural changes, as well as all new procedures, were screened in accordance with the licensee's 10 CFR 50.59 process. The inspectors also verified that procedures were reviewed and approved by the NRSC as required by the TSs. Through discussions with the Reactor Supervisor, the inspectors confirmed that new and revised procedures were routed to staff members by various means including email and periodic staff meetings were also held to review facility and procedure changes.

(2) Procedure Development

The inspectors reviewed updated procedures and procedures in development. Procedure reviews were performed to verify current revisions were acceptable in accordance with TS and complied with approval requirements in the licensee's administrative controls. The inspectors noted that one instrument calibration required by the TS was not performed with formal guidance referring the operator to perform the calibration in accordance with the instrument's technical manual. Nuclear instruments are required to be calibrated on an annual basis in accordance with TS 4.2.6, ensuring that indicated reactor power levels are consistent with actual reactor power and therefore heat produced by the core. The inspectors verified that the facility performed the required nuclear instrument calibration in accordance with the instrument's technical manual and data was recorded on the calibration worksheet NSC-3 and was consistent with previous calibrations. Reactor operations logs, and any event notifications reports were reviewed to verify that the reactor was not operated above the licensed power level. In addition, the inspectors directly observed that the instrument readings appropriately trended with additional independent instrumentation during a reactor start up. The inspectors concluded that there is reasonable assurance of the nuclear instrument's operation. CP-08, "Nuclear Instrumentation Calibration," is a draft procedure awaiting review and approval. The draft procedure establishes required initial conditions, procedural steps, acceptance criteria for the channels, and required actions to re-calibrate the instruments in accordance with the instrument's technical manual. The licensee is expected to have CP-08 approved by the end of 2023 and will be sampled by the inspector during the next inspection. This issue will be tracked by the NRC as an inspection follow-up item (IFI) 05000193/2023202-01.

c. Conclusion

The inspectors determined the procedural review, revision, and implementation process satisfied the TS requirements.

6. Fuel Movement

a. Inspection Scope (IP 69009)

The inspectors reviewed the following to verify compliance with TS section 4.9.2 and subsection 6.8.1, which require visual inspection of fuel elements every 5 years on a rotating basis and maintenance of records associated with fuel inventories and transfers, respectively:

- reactor logbooks Nos. 66 and 67
- “RINSC Refuel Movement Plan for LEU Core 8,” Revision 1
- fuel inspection documents and photos for 2021, 2022, and 2023
- RINSC IP-01, “Core Element Movement and Inspections,” Revision 2
- RINSC OP-05, “Reactor Fuel/Reflector Movement,” Revision 3
- core change summary for conversion from RINSC low-enriched uranium (LEU) Core #7 to LEU Core #8

b. Observations and Findings

The inspectors reviewed documentation of selected fuel movements and interviewed licensee staff about the process. The inspectors noted that a plan for each series of fuel movements was developed prior to the activity and was used for core refueling and core rearrangement. The inspectors verified that fuel was inspected in accordance with a specific inspection schedule and that fuel inspections were completed in 2022 and 2023. The inspectors also verified that fuel was used and stored in approved locations as indicated. The inspectors confirmed that the fuel handling equipment was stored and secured.

c. Conclusion

The inspectors determined that fuel movements were conducted in accordance with written procedures that met the TS requirements and fuel inspections were completed annually.

7. Surveillance

a. Inspection Scope (IP 69010)

The inspectors reviewed the following to verify compliance with the limiting conditions for operation specified in TS sections 3.1 through 3.9 and to determine whether periodic surveillance tests, checks, and calibrations of selected safety systems were performed as stipulated in TS sections 4.1 through 4.9:

- reactor logbooks Nos. 66 and 67
- RINSC maintenance board 2022 – 2023 spreadsheet
- initial LEU Core #8 control rod worth documents
- initial LEU Core #8 excess and shutdown margin reactivity documents
- annual excess reactivity and shutdown margin documents
- gamma spectrum analysis reports for primary water and secondary water from 2022-present

- various form and worksheets for 2022 – present including: NSC-3, “Nuclear Instrumentation Calibration Worksheet,” NSC-3A, “Secondary Water,” NSC-3D, “Weekly Gross Radioactivity for Primary Water,” NSC-5, “Primary Temperature Channel Calibration,” NSC-43, “Control Rod Reactivity Insertion Rates 10/4/21,” NSC-69, “Be Reflector Lifetime N Fluence,” NSC-80, “Primary Flow Channel Calibration”
- various RINSC procedures including: CP-01, “Primary Temperature Channel Calibration,” Revision 2, CP-02, “Primary Coolant Flow Channel Calibration,” Revision 1, CP-03, “Control Room Differential Pressure Gage Calibration,” Revision 1, CP-05, “Argon – 41 Calibration Factor,” Revision 1, CP-06, “Stack Calibration,” Revision 3, MP-02, “Emergency Air Filter Efficient Test,” Revision 5, MP-03, “Primary Water Analysis,” Revision 4, MP-04, “Secondary Water Analysis,” Revision 2, TP-01 “Shim Safety Blade Drop Time Measurement,” Revision 2, TP-02, “Determining Cold, Clean Critical Rod Heights,” Revision 0, TP-03, “Determining Control Rod Worth,” Revision 1, and, TP-05, “Determining Shutdown Margin and Excess Reactivity,” Revision 0

b. Observations and Findings

The inspectors noted that data recorded in the reactor logbooks and on the surveillance data sheets indicated that system and instrument checks, tests, and calibrations were completed on schedule and in accordance with licensee procedures. The inspectors verified the results of these surveillance items were within the TS and procedurally prescribed parameters and no problems were noted.

c. Conclusion

The inspectors determined that the surveillance program was conducted as specified by the TS requirements.

8. Exit Interview

At the conclusion of the inspection on August 31, 2023, the inspectors presented the inspection results to licensee management and staff. The inspectors reiterated the areas inspected and discussed the inspection observations. The licensee acknowledged the results of the inspection and did not identify as proprietary any of the material provided to or reviewed by the inspectors during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

J. Davis	Assistant Director for Operations
J. Dunn	Principal Reactor Operator
C. Goodwin	Facility Director
S. Halverson	Reactor Operator
M. Marrapese	Reactor Supervisor

Other Personnel

C. Chichester	Chairman, Rhode Island Atomic Energy Commission,
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INSPECTION PROCEDURES USED

IP 69003	Class I Research and Test Reactor Operator Licenses, Requalification, and Medical Examinations
IP 69005	Class I Research and Test Reactor Experiments
IP 69006	Class I Research and Test Reactors Organization and Operations and Maintenance Activities
IP 69007	Class I Research and Test Reactor Review and Audit and Design Change Functions
IP 69008	Class I Research and Test Reactor Procedures
IP 69009	Class I Research and Test Reactor Fuel Movement
IP 69010	Class I Research and Test Reactor Surveillance

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000193/2023202-01	IFI	Follow-up on licensee's actions to complete CP-08, "Nuclear Instrumentation Calibration" for calibrating nuclear instrumentation and have it reviewed and approved by the NRSB.
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Closed

None