

January 12, 2012

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 SPECIAL
INSPECTION REPORT NO. 50-193/2011-204

Dear Dr. Tehan:

The U. S. Nuclear Regulatory Commission (NRC, the Commission) conducted a Special Inspection on October 26-27, 2011 and December 14, 2011, at the Rhode Island Nuclear Science Center (RINSC) (Inspection Report No. 50-193/2011-204). The Special Inspection Team was assigned to assess the circumstances surrounding unexpected changes in the restricted area dose rates possibly in excess of 30 rem per hour in an area where personnel were present or which was accessible to personnel. These unexpected changes in work conditions caused higher than expected dose for personnel in the area.

The special inspection included an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations. Pursuant to your letter dated October 25, 2011 (Agencywide Documents Access and Management System Accession No. ML111313A012), describing the causes of the event and your corrective actions, the inspections included selected examinations of procedures and representative records, interviews with personnel, and observations of re-enacted activities. The exit meeting was conducted on December 14, 2011.

The enclosed report documents the inspections findings, which were discussed in a preliminary debriefing and a final exit meeting with you, H. Bicehouse, Radiation Safety Officer and Assistant Director for Radiation and Reactor Safety; M.J. Davis, Assistant Director, Rhode Island Nuclear Science Center; S. Guarino, Health Physicist; Z. Richards, Reactor Supervisor/ Senior Reactor Operator (SRO); and members of the Rhode Island Atomic Energy Commission (RIAEC).

The event that led to the conduct of this Special Inspection can be summarized as follows:

At approximately 10:00 a.m. on October 25, 2011 the reactor was moved from the high power section to the low power section of the pool. In this position the reactor core is positioned adjacent to the dry irradiation room (DIR). At approximately 11:15 am a student trainee entered the DIR to calibrate a radiation probe and received a radiation exposure of approximately 2.5 rem (initial estimate by licensee) total effective dose equivalent (TEDE) in five minutes. The estimates dose rates in the DIR were 30 rem/hr.

T. Tehan

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The individual had previously been working in the room when the core was located at the opposite end of the pool. He exited the room and assisted the SRO in moving the core to the end adjacent to the DIR for an experiment, but did not close and lock the gate. The SRO aware that the gate had not been shut directed the individual to close and lock the entrance gate before they continued the experiment.

The student trainee decided to enter the DIR without consulting the SRO before locking the gate to take a temperature measurement in the room needed to properly calibrate the probe. When he informed the SRO of his actions, the SRO immediately informed the facility staff of the potential for unintended exposure to personnel.

Based on the results of this inspection, the NRC has determined that a Severity Level IV violation of NRC requirements has occurred. This violation is being treated as Non-Cited Violation (NCV), consistent with Section 2.3.2.b of the Enforcement Policy. This NCV (NCV-50-193/2011-204-01) is described in the subject inspection report. If you contest the violation or significance of this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

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

Should you have any questions concerning this inspection, please contact Jack Donohue at (301) 452-1950 or by electronic mail at Jack.Donohue@nrc.gov

Sincerely,

/RA/

Johnny H. Eads, Jr., Chief
Research and Test Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Special Inspection Report No. 50-193/2011-204

cc w/encl: See next page

Rhode Island Atomic Energy Commission

Docket No.: 50-193

cc:

Governor, State of Rhode Island
State House Room 115
Providence, RI 02903

Dr. Stephen Mecca, Chairman
Rhode Island Atomic Energy Commission
Providence College
Department of Engineering-Physics Systems
River Avenue
Providence, RI 02859

Dr. John Breen, Chairman
Nuclear and Radiation Safety Committee
Providence College
549 River Ave
Providence, RI 02918

Dr. Andrew Kadak
253 Rumstick Road
Barrington, RI 02806

Dr. Bahram Nassersharif
Dean of Engineering
University of Rhode Island
102 Bliss Hall
Kingston, RI 02881

Dr. Peter Gromet
Department of Geological Sciences
Brown University
Providence, RI 02912

Dr. Alfred L. Allen
425 Laphan Farm Road
Pascoag, RI 02859

Mr. Jack Ferruolo, Supervising Radiological Health Specialist
Office of Occupational and Radiological Health
Rhode Island Department of Health
3 Capitol Hill, Room 206
Providence, RI 02908-5097

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

The individual had previously been working in the room when the core was located at the opposite end of the pool. He exited the room and assisted the SRO in moving the core to the end adjacent to the DIR for an experiment, but did not close and lock the gate. The SRO aware that the gate had not been shut directed the individual to close and lock the entrance gate before they continued the experiment.

The student trainee decided to enter the DIR without consulting the SRO before locking the gate to take a temperature measurement in the room needed to properly calibrate the probe. When he informed the SRO of his actions, the SRO immediately informed the facility staff of the potential for unintended exposure to personnel.

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JDonohue
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| NAME | JDonohue | GLappert | JEads |
| DATE | 1/05/2012 | 1/12/2012 | 1/12/2012 |

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

Docket No: 50-193

License No: R-95

Report No: 50-193/2011-204

Licensee: Rhode Island Atomic Energy Commission

Facility: Rhode Island Nuclear Science Center Research Reactor

Location: Narragansett, Rhode Island

Dates: October 26-27 and December 14, 2011

Inspector: Jack Donohue

Accompaniment: Johnny H. Eads, Jr.

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. 50-193/2011-204

The primary focus of this non-routine, announced special inspection was the on-site review by a Special Inspection Team (SIT) of unplanned high dose rate in an area where a student trainee was present. This inspection covered a period of two days of on-site inspection by one inspector and one Branch Chief. The inspection included a review of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, Standards for the Protection against Radiation including Subpart B, Radiation Protection Programs. A SIT was established in accordance with U.S. Nuclear Regulatory Commission (NRC) Management Directive 8.3, "NRC Incident Investigation Program."

Special Inspection

- The inspection team reviewed the licensee's proposed corrective action and those currently in place and found them acceptable.
- The inspection team reviewed 10 CFR 20.1601, Control of access to high radiation areas, and determined that the licensee failed to implement control access to a high radiation area commensurate with provision of 10 CFR 20.1601(a)(3.), and failed to ensure that "Entryways that are locked, except during periods when access to the area is required, with positive control over each individual entry".

REPORT DETAILS

Summary of Facility Status

The Rhode Island Atomic Energy Commission's (RIAEC, the licensee) Rhode Island Nuclear Science Center (RINSC) two megawatt Class I research reactor continued to be operated in support of research, service, education, training, and surveillance. During the inspection the reactor was not operated.

1. Special Inspection

a. Inspection Scope Inspection Procedure (IP) 98312)

The inspectors reviewed the licensee's investigation of the event with respect to Title 10 of the *Code of Federal Regulations* (10 CFR) Section 20.1601. In addition, the inspectors reviewed the procedures and documents listed in Attachment A.

b. Observations and Findings

By letter dated October 25, 2011 (Agencywide Documents Access and Management System Accession No. ML111313A012), RINSC submitted a report describing the causes of the event and the corrective actions planned and taken. The inspection included a review of this report and selected examinations of procedures and representative records, interviews with personnel, and observations of re-enacted activities.

1) Sequence of Events

The sequence of events below is based on interviews with licensee staff and all the data accumulated by the licensee and the U.S. Nuclear Regulatory Commission (NRC) staff.

At approximately 11:15 a.m. on October 25, 2011, as a result of the reactor core being positioned adjacent to the dry irradiation room (DIR), a student trainee who entered the room to calibrate a radiation probe received a radiation exposure of approximately 2.5 rem (initial estimate by licensee) TEDE in five minutes.

Dose rates in the DIR were estimated at 30 rem/hr. The individual had previously been working in the room when the core was located at the opposite end of the pool. He exited the room and assisted the senior reactor operator (SRO) in moving the core to the end adjacent to the DIR for an experiment, but did not close and lock the gate. The SRO aware that the gate had not been shut directed the individual to close and lock the entrance gate before they proceeded. The individual decided to enter the dry irradiation room without consulting the SRO before locking the gate to take a temperature measurement in the room needed to properly calibrate the probe. When he informed the SRO of his actions, the SRO immediately informed the facility staff of the potential for unintended

exposure to personnel. The immediate action was to discontinue the experiment, restore the reactor to the high power end and complete a safe reactor shutdown. The assistant Health Physicist performed surveys in the DIR and locked the gate upon leaving. Additionally the student trainee monitoring device was sent to the vendor to determine recorded exposure. The device reading was reported and recorded as a deep dose equivalent of 115 millirem and an eye dose equivalent of 115 millirem. These readings were far below the previous estimates.

2) Cause of Occurrence:

The cause of the occurrence incident was lack of adequate control over the high radiation area present in the DIR.

3) Corrective Actions:

Complete staff retraining on high radiation controls and procedures and ensure that all students and interns are fully trained on their site-specific tasks and responsibilities prior to access to radiologically controlled areas.

The licensee has developed a new procedure for operation of the DIR. This procedure will be reviewed by the RIAEC following review and approval by the Nuclear and Radiation Safety Committee.

The DIR will not be utilized until the Nuclear and Radiation Safety Committee is satisfied with our corrective actions.

Engineering will develop a remote alarm system for the DIR gate similar to one presently used near the heat exchangers.

c. Conclusion

Regulation 10 CFR 20.1601, "Control of access to high radiation areas" requires that the licensee ensure that each entrance or access point to a high radiation area has one or more of the following features: (1) A control device that, upon entry into the area, causes the level of radiation to be reduced below that level at which an individual might receive a deep-dose equivalent of 0.1 rem (1 mSv) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates; (2) A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry; or (3) Entryways that are locked, except during periods when access to the areas is required, with positive control over each individual entry.

The licensee followed the immediate actions for placing the reactor in a safe shutdown condition. The notification procedures and processes were reviewed and the licensee notified the NRC following the immediate actions and completed the event report on schedule according to their technical specifications.

The inspectors reviewed the RINSC letter dated October 25, 2011 (Agencywide Documents Access and Management System Accession No. ML111313A012) and verified the remaining items were scheduled to be completed. In addition, the inspectors determined that the situation was not fortuitous and that the resulting exposure did not represent a substantial potential for exposure in excess of regulatory limits. The violation was not repetitive and the licensee did not have a prior opportunity to identify the problem or take the action to correct the event. The inspectors determined this was an isolated event due to: 1) the minimum time the trainee was exposed was several minutes and 2) the distance the intern maintained from the source. The recorded exposure was 115 mrem in approximately five minutes or 1.38 R/hr where the trainee took the measurements. The typical time to complete the temperature activities in the DIR for this evolution would be approximately five minutes, far less than the three and one-half hours which would have been required to exceed dose limits.

Although the licensee had established the requirements of 10 CFR 20.1601 (3), the licensee failed to lock the gate upon exiting the "High Radiation Area" (HRA). The SRO requested the student trainee to lock the gate, but the student instead entered the DIR to revalidate temperature data. The student left the area and reported to the SRO. The SRO realization the potential exposure situation notified management and the assistant Health Physicist (HP) entered the HRA to perform surveys. The assistant HP locked the gate upon exiting.

The inspection team concludes that a violation of NRC requirements occurred: (1) the licensee failed to implement control access to high radiation areas commensurate with provisions of 10 CFR 20.1601(a). However, because the violation was identified by the licensee, was not repetitive, was not willful, and because various remedial actions were taken, this will be identified as Non-Cited Violation (NCV) in accordance with Section 2.3.2.b of the NRC Enforcement Policy (NCV 50-193/2011-204-01).

2. Exit Interview

The inspector presented the inspection results to licensee management at the conclusion of the initial inspection on October 27, 2011 and during the exit meeting conducted on December 14, 2011. The Inspection Team described the areas inspected and discussed in detail the inspection observations. No dissenting comments were received from the licensee. The licensee acknowledged the observations presented 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

| | |
|--------------|--|
| H. Bicehouse | Radiation Safety Officer and Assistant Director for Radiation and Reactor Safety |
| M.J. Davis | Assistant Director, Rhode Island Nuclear Science Center |
| S. Guarino | Health Physicist |
| Z. Richards | Reactor Supervisor/ Senior Reactor Operator |
| T. Tehan | Director, Rhode Island Nuclear Science Center |

INSPECTION PROCEDURES USED

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| IP 93812 | Special Inspection |
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ITEMS OPENED, CLOSED, AND DISCUSSED

OPEN.

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| NCV 50-193/2011-204-01 | NCV | The licensee failed to implement access control to High Radiation Areas commensurate with provisions of 10 CFR 20.1601(a). |
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CLOSED

NONE

PARTIAL LIST OF ACRONYMS USED

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| 10 CFR | Title 10 of the <i>Code of Federal Regulations</i> |
| ADAMS | Agency-wide Document Access Management System |
| DIR | Dry Irradiation Room |
| HRA | High Radiation Area |
| IFI | Inspector Follow-up |
| IP | Inspection Procedure |
| IR | Inspection Report |
| MW | Megawatts |
| NRC | U. S. Nuclear Regulatory Commission |
| Rev. | Revision |
| HP | Health Physicist |
| NRSC | Nuclear Radiation Safety Committee |
| RIAEC | Rhode Island Atomic Energy Commission |
| SIT | Special Inspection Team |
| SRO | Senior Reactor Operator |
| TEDE | Total Effective Dose Equivalent |
| TS | Technical Specifications |

ATTACHMENT A

Licensee Procedures Reviewed

- OP-2 "RINSC Pre-Start Check-Out"
- OP-3 "Reactor Power Changes"
- XP-10 "Irradiation Operation in DIR"
- RINSC SAR
- RINSC Technical Specifications
- Reactor Operations Logs October 25, 2011