



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

November 24, 2023

Dr. Partha Chowdhury, Director
Nuclear Radiation Laboratory
University of Massachusetts-Lowell
One University Avenue
Lowell, MA 01854

SUBJECT: UNIVERSITY OF MASSACHUSETTS LOWELL – U.S. NUCLEAR REGULATORY
COMMISSION SAFETY INSPECTION REPORT NO. 05000223/2023201

Dear Dr. Chowdhury:

From October 16-18, 2023, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the University of Massachusetts Lowell Research Reactor facility. The enclosed report documents the inspection results, which were discussed on October 18, 2023, with you and members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed various activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

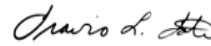
In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC website at <https://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

P. Chowdhury

- 2 -

If you have any questions concerning this inspection, please contact Juan Arellano at (301) 415-0477, or by email to Juan.Arellano@nrc.gov.

Sincerely,



Signed by Tate, Travis
on 11/24/23

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. 50-223
License No. R-125

Enclosure:
As stated

cc w/ enclosure: GovDelivery Subscribers

SUBJECT: UNIVERSITY OF MASSACHUSETTS LOWELL – U.S. NUCLEAR REGULATORY
COMMISSION SAFETY INSPECTION REPORT NO. 05000223/2023201
DATED: NOVEMBER 24, 2023

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DATE	10/31/2023	10/31/2023	11/2/2023	11/24/2023

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

Docket No.: 50-223

License No.: R-125

Report No.: 05000223/2023201

Licensee: University of Massachusetts Lowell

Facility: University of Massachusetts Lowell Research Reactor

Location: Lowell, Massachusetts

Dates: October 16-18, 2023

Inspectors: Juan Arellano
Mike Balazik

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

University of Massachusetts Lowell
Research Reactor Facility
Inspection Report No. 05000223/2023201

The primary focus of this routine announced inspection was the onsite review of selected aspects of the University of Massachusetts Lowell's (UML, the licensee's) Class II research reactor facility program, including: (1) organization and staffing; (2) operations logs and records; (3) requalification training; (4) surveillance and limiting conditions for operation (LCO); (5) emergency planning; (6) maintenance logs and records; and (7) fuel handling logs and records. The U.S. Nuclear Regulatory Commission (NRC) staff determined that the licensee's program was acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organization and Staffing

- The inspectors determined that the organization and staffing were in compliance with the technical specification (TS) requirements.

Operations Logs and Records

- The inspectors determined that the operations logs and records were maintained in accordance with the applicable TS and the licensee's procedural requirements.

Requalification Training

- The inspectors determined that the operator requalification program was conducted and completed in accordance with the NRC-approved program and regulatory requirements.

Surveillance and Limiting Conditions for Operation

- The inspectors determined that surveillances were conducted and LCO were maintained in accordance with TS requirements.

Emergency Planning

- The inspectors determined that the emergency preparedness program was conducted in accordance with the emergency plan.

Maintenance Logs and Records

- The inspectors determined that the maintenance activities were performed and documented in accordance with TS requirements.

Fuel Handling Logs and Records

- The inspectors determined that the fuel movements and inspections were conducted in accordance with TS and the licensee's procedural requirements.

REPORT DETAILS

Summary of Facility Status

The UML 1 megawatt research reactor is operated in support of education, research, commercial service irradiations, reactor operator training, and periodic equipment surveillances. During the inspection, the reactor was started up, operated, and shut down to support these ongoing activities.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69001, Section 02.01)

To ensure that the requirements of TS 6.1 were met, the inspectors reviewed the following:

- University of Massachusetts Lowell Research Reactor (UMLRR) Facility Operating License No. R-125, Docket No. 50-223, Renewed Facility Operating License, issued February 3, 2022
- UML radiation organizational work chart, dated October 12, 2023
- detailed job description, Senior Nuclear Reactor Engineer/Chief of Reactor Operations, November 2017
- detailed job description, Nuclear Reactor Supervisor, dated November 2017
- administrative procedure-0, "Authority," dated August 24, 2022
- UMLRR annual reports 2021, 2022, and 2023
- Radiation Safety Committee Charter, revision 2
- various appointment letters for the Reactor Safety Subcommittee (RSSC)
- UMLRR console logbooks 38, 39, and 40

b. Observations and Findings

The inspectors found that since the previous NRC inspection (Inspection Report No. 05000125/2021202), no changes were made to the organization as outlined by TS 6.1.1. The inspectors observed that a list of facility personnel is posted in the control room in accordance with TS 6.1.3 item 2. The inspectors found that the list contained the current names and contact information for management, operations, radiation safety, and other support personnel. The inspectors found staffing requirements were met as described in TS 6.1.3 when the reactor is not secured. The inspectors verified that no new members of the RSSC were appointed since the previous NRC inspection. The inspectors determined that staffing satisfied the requirements of TS 6.1.3, item 1. The inspectors noted that there were 10 NRC licensed operators working at the UMLRR consisting of 6 senior reactor operators, 4 reactor operators, and 2 operators currently in training.

c. Conclusion

The inspectors determined that the licensee's organization and staffing were in compliance with the requirements specified in the TSs.

2. Operations Logs and Records

a. Inspection Scope (IP 69001, Section 02.02)

To ensure that the requirements of TS 6.8 were met, the inspectors reviewed the following:

- reactor operator procedures (RO)-5, "Reactor Operations", revision 4
- select RF-4, "Daily Routine Check Sheet," performed 2023 - present
- select RF-5, "Radiation Monitoring System Daily Checks," performed 2023 - present
- select RF-RO-7B, "Pre-startup Check Sheet," performed 2023 - present
- select RF-RO-7A, "Reactor Operator Instruction Form," performed 2023 - present
- UMLRR annual reports for 2021, 2022, and 2023
- UMLRR console logbooks 38, 39, and 40

b. Observations and Findings

The inspectors found that logbook entries were maintained in accordance with approved procedures. The inspectors found that console logbook entries were made, including the names of licensed operators during reactor operations, location of fuel during movement, changes in reactor power and operations, and maintenance items as required by reactor operator procedures. The inspectors observed a licensed operator perform a startup checklist.

c. Conclusion

The inspectors determined that the licensee's logbook entries and records were maintained as required by facility procedures and TSs.

3. Requalification Training

a. Inspection Scope (IP 69001, Section 02.04)

To ensure the requirements of the requalification program were met, the inspectors reviewed the following selected aspects of the UMLRR requalification program:

- "Operator Requalification Program for the UMLRR," dated November 2016
- biennial written exam results, dated July 2022
- license reactor operator requalification – annual operators test dated May 13, 2021, and May 8, 2023
- requalification proficiency hours tracker spreadsheet
- biennial medical exam results, "NRC Form 396," and medical examinations
- requalification program biennial audit for 2022
- UMLRR console logbooks 38, 39, and 40

b. Observations and Findings

The inspectors found that training was conducted in accordance with the licensee's NRC-approved requalification and training program and was documented. The inspectors confirmed that the operators completed all the reactor operations and

examinations required by the program and requalification records were maintained as required by procedures. The inspectors found that operator medical examinations were completed every 2 years as required by the regulations.

c. Conclusion

The inspectors determined that the operator requalification program was conducted and completed in accordance with the NRC-approved program and that the medical evaluations were completed in accordance with regulatory requirements.

4. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001, Section 02.05)

The inspectors reviewed the following to verify compliance with TS 3.0 and to determine if surveillance tests were performed as required by TS 4.0:

- UMLRR Facility Operating License No. R-125, Docket No. 50-223, Renewed Facility Operating License, issued February 3, 2022
- surveillance tracker scheduled for 2023
- UMLRR console logbooks 38, 39, and 40
- calibration procedures (CP) - 2, "Linear Power Channel Check and Calibration," dated December 10, 2021
- CP-3, "Reactor Thermal Power Calibration," dated September 23, 2022
- CP-4, "Calibration Check of Temperature Monitoring Devices," dated March 23, 2022
- "Linear Power Channel Check and Calibration Form," performed September 5, 2023
- "Linear Power Channel Check and Calibration Form," performed November 8, 2022
- memorandum for the completion of thermal power calorimetric performed November 17, 2022
- form, "Calibration of Temperature Monitoring Devices," performed March 28, 2023
- form, "Calibration of Temperature Monitoring Devices," performed April 7, 2022
- form, "Control Blade Inspection," performed November 9, 2022
- form, "Control Blade Inspection," performed November 5, 2021
- form, "Containment Valve Closure Test," performed June 14, 2023
- select form, "Containment Valve Closure Test," performed from 2022 - present

b. Observations and Findings

The inspectors found that surveillance tests were completed as required by the TS and LCO verifications were completed on schedule and in accordance with the licensee's procedures. The inspectors observed a senior licensed operator perform a reactor startup after performing a startup checklist. In addition, the inspectors visually verified the monitoring instrument and scram function for seismic disturbance as required by TS 3.2.3.

c. Conclusion

The inspectors determined that the surveillances were conducted and LCO were maintained in accordance with TS requirements.

5. Emergency Planning

a. Inspection Scope (IP 69001, Section 02.10)

The inspectors reviewed the following selected portions of the licensee's emergency preparedness program to verify compliance with Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to Title 10 of the *Code of Federal Regulations*, Part 50, "Domestic Licensing of Production and Utilization Facilities," and the licensee's emergency plan:

- "Emergency Preparedness Plan for the Research Reactor," dated May 2023
- emergency services agreement with Lowell Fire Department dated July 18, 2023
- emergency services agreement with Lowell Police Department dated June 9, 2023
- emergency services agreement with PrideStar EMS, Inc. dated June 18, 2023
- emergency services agreement with Lowell General Hospital dated June 13, 2023
- "UML Research Reactor Emergency Drill," dated June 1, 2022
- emergency drill attendance sheet dated June 1, 2022
- critique of 2022 emergency drill
- emergency operating procedures-2, "Major Fire or Explosion," dated June 25, 2014
- emergency procedure-2, "Minor Fire or Minor Explosion at the Facility but Non-Specific to the Reactor or its Control Room," dated September 12, 2023
- "2023 Reactor E-drill scenario," dated June 1, 2023
- emergency drill attendance sheet dated June 1, 2023
- police training records for 2022
- checklists, "Emergency Closet Inventory," performed 2022 - present

b. Observations and Findings

The inspectors found that the emergency plan training was conducted, drills were performed, and emergency response call lists were maintained and posted as required by the emergency plan and licensee procedures. The inspectors toured the facility and observed the emergency closet confirming that the equipment was maintained as required by the emergency plan. In addition, the inspectors toured the campus dispatch center and found the call lists and procedures were maintained. The inspectors interviewed the dispatch operator on duty and found UMLRR alarm indications and response actions appropriate.

c. Conclusion

The inspectors determined that the emergency preparedness program was conducted in accordance with the emergency plan.

6. Maintenance Logs and Records

a. Inspection Scope (IP 69001, Section 02.11)

The inspectors reviewed the following selected maintenance logs and records to verify compliance with the requirements of TS:

- UMLRR annual reports 2021, 2022, and 2023
- UMLRR console logbooks 38, 39, and 40
- facility procedures (FP)-2, "Deionizer Regeneration," dated May 17, 2007
- FP-4, "Movement of Objects by Crane," dated May 29, 2019
- list of demineralizer regenerations
- select "RF-4 Daily Routine Check Sheet," performed from 2023 - present
- "Basic Safety Manual for Overhead Crane Operators"
- screen form for, "Replacement of Crane trolley with 15-ton and 2-ton hoists," dated October 19, 2022

b. Observations and Findings

The inspectors found that the scheduled and unscheduled preventive and corrective maintenance activities were performed and documented in accordance with TS requirements and the licensee's administrative procedures.

c. Conclusion

The inspectors determined that the maintenance activities were performed and documented in accordance with TS requirements.

7. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001, Section 02.12)

The inspectors reviewed the following fuel handling logs and activities to verify compliance with TS requirements:

- RO-2, "Unloading and Reloading the Core to a Known Configuration," dated April 1, 2005
- RO-8, "Handling of Irradiated Fuel," dated May 22, 1991
- UMLRR console logbooks 38, 39, and 40
- surveillance procedure (SP)-12, "Inspection of Control Blades and Fuel," dated January 13, 2011
- core loading maps binder
- memorandum, "SP-12 Fuel Inspection 2023," dated August 17, 2023
- memorandum, "2021 Fuel Inspection - Complete 08/24/2021"
- videos of fuel inspection for 2023
- "Fuel Storage Racks," dated August 30, 2022

b. Observations and Findings

The inspectors found that the fuel handling activities were conducted and documented in accordance with TS requirements and the licensee's procedural requirements. The inspectors observed that the fuel elements in the core and the storage racks aligned with the location of fuel elements documented in the logbooks and the reactor bay core map.

c. Conclusion

The inspectors determined that the fuel movements and inspections were conducted in accordance with TS and the licensee's procedural requirements.

8. Exit Interview

The inspection scope and results were summarized on October 18, 2023, with members of licensee management and staff. The inspectors described the areas inspected and discussed the inspection results.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

P. Chowdhury	Nuclear Radiation Laboratory Director
M. Tries	RSCC Chair
L. Bobek	Reactor Supervisor
S. Snay	Radiation Safety Officer
T. Regan	Chief Reactor Operator
T. Cao	Senior Reactor Operator
B. McNeely	Senior Reactor Operator

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors
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ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None