



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

April 13, 2021

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 ROUTINE INSPECTION REPORT
NO. 05000223/2020201

Dear Dr. Chowdhury:

From October 20 - 22, 2020, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the University of Massachusetts Lowell Research Reactor facility. The enclosed report presents the results of the inspection which were discussed on October 22, 2020, with you and members of your staff.

The inspection examined activities conducted under your license as they relate to public health and safety, and to confirm compliance with the Commission's rules and regulations, and with the conditions of your license. Within these areas, the inspection consisted of selected review of procedures and 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 Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

If you have any questions concerning this inspection, please contact Mr. Michael Takacs at (301) 415-2042, or by electronic mail at Michael.Takacs@nrc.gov.

Sincerely,

/RA/

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: See next page

University of Massachusetts - Lowell

Docket No. 50-223

cc:

Mayor of Lowell
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Lowell, MA 01852

Mr. Leo Bobek
Reactor Supervisor
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Ms. Samantha Phillips, Director
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Test, Research and Training
Reactor Newsletter
Attention: Ms. Amber Johnson
Department of Materials Science
and Engineering
University of Maryland
4418 Stadium Drive
College Park, MD 20742-2115

SUBJECT: UNIVERSITY OF MASSACHUSETTS LOWELL – U.S. NUCLEAR
REGULATORY COMMISSION ROUTINE INSPECTION REPORT
NO. 05000223/2020201 DATED: April 13, 2021

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

Docket No.: 50-223

License No.: R-125

Report No.: 05000223/2020201

Licensee: University of Massachusetts Lowell

Facility: University of Massachusetts Lowell Research Reactor

Location: Lowell, Massachusetts

Dates: October 20 - 22, 2020

Inspector: Michael Takacs

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. 05000223/2020201

The primary focus of this routine inspection at the University of Massachusetts Lowell (the licensee) Research Reactor facility was the onsite review of selected aspects of the safety programs for this Class II research reactor including: (1) procedures; (2) experiments; (3) health physics; (4) design changes; (5) committees, audits and reviews; and (6) transportation. The U.S. Nuclear Regulatory Commission (NRC) staff determined that the licensee's programs were acceptably directed toward the protection of public health and safety and in compliance with NRC requirements.

Procedures

- Procedures were current and were reviewed and approved as required by technical specifications (TS) and the licensee's administrative procedures.

Experiments

- Experiments were performed in accordance with TS requirements, the licensee's procedures, and NRC regulations.

Health Physics

- The radiation protection program was effective in minimizing radiation doses to individuals; radiation surveys were completed and documented as required; postings met regulatory requirements; personnel dosimetry was worn and recorded doses were within the NRC's regulatory limits; radiation safety refresher training was administered biennially as required by the radiation protection program; radiation monitoring equipment was maintained and calibrated as required by procedures and the radiation protection program; and environmental monitoring satisfied regulatory requirements.

Design Changes

- The design change program met regulatory requirements, TS, and the licensee procedure.

Committees, Audits and Reviews

- The Reactor Safety Subcommittee (RSSC) met quarterly and provided the oversight required by TS.

Transportation

- The program for transportation of radioactive materials (RAM) satisfied regulatory requirements.

REPORT DETAILS

Summary of Facility Status

The University of Massachusetts Lowell (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 operated for approximately 1 hour to support a commercial service irradiation.

1. Procedures

a. Inspection Scope (Inspection Procedure (IP) 69001)

The inspector reviewed the following to ensure that the requirements of TS Section 6.3 were met concerning written procedures:

- procedure AP-0, "Authority," Revision (Rev.) 3, dated March, 3. 2004
- procedure AP-1, "Procedure Control and Distribution," Rev. 1, dated September 18, 2003
- procedure AP-2, "Procedure Development," Rev. 1, dated September 18, 2003
- procedure AP-2 (R), "Procedure Action Form - Revised Procedure," Rev. 1, dated September 18, 2003
- procedure AP-6, "10 CFR 50.59 Screenings and Evaluations," dated December 16, 2009
- procedure RF-5, "Radiation Monitoring System Daily Check," Rev. 20, dated December 2017
- procedure RF-RO-7A, "Reactor Operator Instruction Form," Rev. 27, dated October 2015
- procedure RO-5, "Reactor Operations," Rev. 3, dated 10/2005
- procedure CP-1, "Logarithmic Power Channel Check and Calibration," dated December 13, 2006
- procedure CP-2, "Linear Power Channel Check and Calibration," dated December 11, 2006

b. Observations and Findings

The inspector determined that procedures were available for the activities specified by TS 6.3. The inspector noted that procedures provided adequate guidance for the performance of reactor operations and other system operations. The inspector, along with a senior reactor operator (SRO), performed a walk-through of procedures CP-1 and CP-2. The inspector noted that the SRO was knowledgeable on the equipment and instrumentation, and the inspector found no issues during the walk-through of the procedures.

c. Conclusion

The inspector determined that procedures were maintained and implemented in accordance with TS requirements and the licensee's administrative procedures.

2. Experiments

a. Inspection Scope (IP 69001)

To verify compliance with TS Sections 3.6 and 6.8, and Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, test and experiments," the inspector reviewed selected aspects of the following:

- irradiation request forms from January 7, 2020, to the present
- procedure RO-4, "Addition or Removal of Core Samples," Rev. 6, dated June 14, 2005
- procedure AP-6, "10 CFR 50.59 Screenings and Evaluations," dated December 16, 2009

b. Observations and Findings

The inspector determined, through discussion with the reactor supervisor and review of the radiation request forms, that no new experiments had been conducted since the last inspection. The inspector noted that experiments performed since the last inspection had been previously approved by the RSSC, and since no changes had been made to the experiments, they were considered routine. The inspector verified that all routine experiments were approved by the reactor supervisor and the radiation safety officer prior to the start of the experiment as required by licensee procedure.

c. Conclusion

The inspector determined that the program for the conduct of experiments was in accordance with TS, licensee procedure, and NRC regulations.

3. Health Physics

a. Inspection Scope (IP 69001)

To verify compliance with 10 CFR Part 20, "Standards for Protection against Radiation," and TS Sections 3.4 and 4.3, the inspector reviewed the following:

- training records from 2019 to present
- personnel & environmental dosimetry records from 2019 to present
- annual radiation safety program audit for 2019
- annual operating report for 2019 - 2020
- as low as reasonably achievable (ALARA) report for 2018 and 2019
- facility radiological survey and wipe records for 2020
- survey meter calibration records for 2020
- UML "Radiation Safety Guide," dated February 2015

b. Observations and Findings

The inspector toured the facility with the Radiation Safety Officer (RSO) and noted that the use of personnel dosimetry and protective clothing, radiation

monitoring equipment, placement of radiological signs and postings, and the storage of radioactive material, was in accordance with regulatory requirements and the licensee's procedures. The inspector also noted that a copy of the current NRC Form 3, "Notice to Employees," was posted at both entrances to the reactor bay as required by 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations." The inspector reviewed select portable radiation survey meter calibration records and verified all calibrations were current and that each instrument had a current calibration sticker attached.

The inspector noted that the RSO performed and documented an annual audit of the radiation protection program as a means for assuring radiation exposures were maintained ALARA. The inspector reviewed the UML radiation safety training database and found that the biennial radiation safety refresher training had been completed by all staff and students as required by licensee procedure.

The inspector reviewed personnel dosimetry records and found the values for all staff and students to be below 10 CFR Part 20 limits. In addition, the inspector reviewed records regarding effluent releases to the atmosphere and liquid effluent releases (i.e., stack and sewer releases) and found these values to be below regulatory limits.

c. Conclusion

The inspector determined that the radiation protection program was effective in minimizing radiation doses to individuals; surveys were completed and documented as required; postings met regulatory requirements; personnel dosimetry was worn and recorded doses were within regulatory limits; radiation safety refresher training was administered biennially as required; radiation monitoring equipment was maintained and calibrated as required; and environmental monitoring satisfied regulatory requirements.

4. Design Changes

a. Inspection Scope (IP 69001)

To ensure that facility changes were reviewed and approved as required by TS Section 6.2 and 10 CFR 50.59, the inspector reviewed selected aspects of the following:

- annual operating report for 2019 - 2020
- RSSC meeting minutes from June 2018 to June 2020
- procedure AP-6, "10 CFR 50.59 Screening and Evaluations," Rev. 1, dated December 18, 2015
- licensee's 50.59 log book

b. Observations and Findings

Through interviews with staff, and a review of the licensee's 50.59 log book and RSSC quarterly meeting minutes, the inspector found that the licensee documented three changes in their 50.59 log book since the last inspection. The inspector determined that the changes were reviewed and approved in accordance with 10 CFR 50.59, TS, and the licensee procedure, and none required prior NRC approval.

c. Conclusion

The inspector determined the licensee acceptably reviewed changes at the facility in accordance with 10 CFR 50.59, TS, and the licensee procedure.

5. Committees, Audits and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the reviews stipulated in TS Section 6.2 were implemented as required:

- RSSC charter Rev. 2, dated July 1, 2014
- RSSC meeting minutes from June 2018 to June 2020

b. Observations and Findings

The inspector verified that the RSSC composition, meeting quorums, and meeting frequency were all in accordance with TS. The inspector reviewed the RSSC meeting minutes for the past 2 years and noted that the RSSC provided appropriate guidance and oversight in support of reactor operations.

c. Conclusion

The inspector determined that the RSSC provided the appropriate oversight in support of reactor operations as required by TS.

6. Transportation

a. Inspection Scope (IP 86740)

The inspector interviewed the RSO and reviewed the following to verify compliance with regulatory and procedural requirements for shipping of RAM:

- procedure HPP-3, "Work Instructions: Shipment of Radioactive Materials," dated November 13, 2015
- form FHPP-3, "Radioactive Material Shipment Form"
- UML database for transportation of radioactive material

b. Observations and Findings

The inspector noted that the RSO was responsible for all of the licensee's RAM shipments performed under the reactor license. The inspector reviewed a sample of RAM shipments and noted that all were properly shipped as excepted packages and noted that the associated records and packaging slips were completed as required by regulations. The inspector observed a health physics staff member and the RSO prepare a commercial service irradiated experiment for shipment as RAM and noted that the staff member and RSO were thorough and knowledgeable on the transportation requirements of RAM. The inspector also verified that the licensee had a copy of the offsite recipient's RAM license regarding the transfer of the irradiated experiment. The inspector noted that the offsite recipient's license was issued by the Commonwealth of Massachusetts, and it allowed for the possession of the specific type, form, and quantity of RAM to be shipped from UML.

c. Conclusion

The inspector determined that the program for transportation of RAM satisfied regulatory requirements.

7. Exit Interview

The inspector presented the inspection results to licensee management and RSSC members at the conclusion of the inspection on October 22, 2020. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

P. Chowdhury	Director, Nuclear Radiation Laboratory
L. Bobek	Reactor Supervisor
S. Snay	Radiation Safety Officer
D. Lajuenesse	Senior Reactor Operator
M. Tries	Chair, Reactor Safety Subcommittee
C. Fontes	Radiation Safety Inspector (UML staff)

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed:

None