

June 12, 2017

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. 50-223/2017-201

Dear Dr. Chowdhury:

From April 24-27, 2017, the U.S. Nuclear Regulatory Commission (NRC, or the Commission) conducted an announced safety inspection at the University of Massachusetts Lowell Research Reactor facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of this inspection.

During this inspection, the NRC staff examined activities conducted under your license as they relate to public health and safety 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 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 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. Ossy Font at (301) 415-2490 or by electronic mail at Ossy.Font@nrc.gov.

Sincerely,

/RA/

Anthony J. Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-223
License No. R-125

Enclosure:
As stated

cc: See next page

SUBJECT: UNIVERSITY OF MASSACHUSETTS LOWELL – U.S. NUCLEAR
REGULATORY COMMISSION SAFETY INSPECTION REPORT
NO. 50-223/2017-201 DATED: JUNE 12, 2017

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University of Massachusetts - Lowell

Docket No. 50-223

cc:

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Reactor Supervisor
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Reactor Newsletter
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U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No. 50-223

License No. R-125

Report No. 50-223/2017-201

Licensee: University of Massachusetts Lowell

Facility: University of Massachusetts Lowell Research Reactor

Location: Lowell, Massachusetts

Dates: April 24-27, 2017

Inspector: Ossy Font

Approved by: Anthony J. Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Massachusetts Lowell
Research Reactor Facility
Inspection Report No. 50-223/2017-201

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

Organization and Staffing

- Organizational structure and responsibilities were consistent with technical specification (TS) requirements.

Operations Logs and Records

- Operation logs and records were maintained as required by the licensee's administrative procedures.

Requalification Training

- Operator requalification was conducted as required by the Requalification Program and Title 10 of the *Code of Federal Regulations* Part 55.

Surveillance and Limiting Conditions for Operation

- Limiting conditions for operation and surveillances required by TSs were being properly implemented.

Emergency Planning

- Emergency planning activities were generally in accordance with the Emergency Preparedness Plan and regulatory requirements.

Maintenance Logs and Records

- Maintenance logs and records were maintained and were consistent with TSs and licensee procedure requirements.

Fuel Handling

- Fuel movements were performed biennially and safely in accordance with TSs and licensee procedural requirements.

REPORT DETAILS

Summary of Facility Status

The University of Massachusetts Lowell (UML, the licensee) one megawatt research reactor continued to be operated in support of educational experiments and demonstrations, research and service irradiations, reactor operator training, and periodic equipment surveillances. During the inspection, the reactor was operated to support an educational experiment for nuclear engineering exchange students from Saudi Arabia.

1. Organization and Staffing

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

To ensure that the requirements of technical specification (TS) Section 6.1, "Organization and Management," were being met, the inspector reviewed:

- UML Radiation Laboratory Organizational Chart, dated January 13, 2017
- UML Research Reactor (UMLRR) Console Log Books #34 and #35, dated from May January 12, 2015 to present
- Annual Report for the UMLRR for the past two years

b. Observations and Findings

The organizational structure at the facility had not changed since the last U.S. Nuclear Regulatory Commission (NRC) inspection in this area. Through the review of logbooks and records, the inspector determined that operational staffing met the minimum TS requirements.

c. Conclusion

The facility organizational structure and functions were consistent with TS Section 6.1.

2. Operations Logs and Records

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

To ensure that the requirements of TS Sections 6.1 and 6.7, "Plant Operating Records," were being met, the inspector reviewed:

- UML Radiation Laboratory Organizational Chart, dated January 13, 2017
- UML Research Reactor (UMLRR) Console Log Books #34 and #35, dated from May January 12, 2015 to present
- Annual Report for the UMLRR for the past two years
- Reactor Operating (RO) Procedure RO-5, "Reactor Operations," Revision (Rev.) 3, dated October 12, 2005
- Daily surveillance checks (i.e., startup and shutdown checks)

b. Observations and Findings

During the inspection, the inspector reviewed the UMLRR console log books for the past two years, daily surveillance sheets, and operation record forms. The inspector verified that the reactor operating characteristics, and other procedurally required entries, were logged appropriately and that the checklists were completed. A review of the licensee's logs and records also indicated that the TS operational limits had not been exceeded and that the shift staffing met the minimum requirements.

During the inspection, the inspector observed a reactor startup and verified compliance with the appropriate written procedures and TS requirements. It was noted that the operators on duty were knowledgeable and proficient.

c. Conclusion

Operational activities were consistent with applicable TS and procedural requirements.

3. Requalification Training

a. Inspection Scope (IP 69001)

To ensure that the requirements of the NRC-approved Operator Requalification Program were being met, the inspector reviewed:

- "Operator Requalification Program for the University of Massachusetts Lowell Research Reactor for Licensed Reactor Operators and Licensed Senior Reactor Operators," Rev. 2.0, dated April 2008
- Personnel records (i.e., biennial medical exam, written and operations exams)
- Training and requalification records including duty hours completed

b. Observations and Findings

The inspector reviewed the individual files for all licensed operators, verifying completion of the required training and minimum number of hours performing their licensed functions, passing of the annual operations test and biennial written exam, and the biennial recertification by a medical examiner. All items were completed by the required frequency.

The inspector noted that some of the questions in the written exam had incorrect answers. The inspector noted that the examiner goes over answers with the test taker and that the exam bank will be reviewed to correct the answer key.

The inspector determined that the requalification program was being administered in a manner that sufficiently maintains the qualifications and proficiency of all licensed operators.

c. Conclusion

Operator requalification was conducted as required by the Requalification Program and Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55.

4. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001)

To ensure that the requirements of TS Sections 3.0, "Limiting Conditions for Operation," and 4.0, "Surveillance Requirements," were being met, the inspector reviewed:

- Surveillance Master Schedule 2017
- Procedures and forms covering TS Sections 4.1 – 4.7

b. Observations and Findings

Daily, weekly, monthly, semi-annual, annual and other periodic checks, tests, and verifications for TS required limiting conditions for operation (LCO) were being completed as required. The inspector performed a random sampling of the UMLRR required surveillances and verified all of the recorded results were within the TS and procedurally prescribed parameters. Generally, the records and logs were noted to be complete and were being maintained as required.

c. Conclusion

The program for surveillance and LCOs confirmation was implemented in accordance with TS Sections 3.0 and 4.0 requirements.

5. Emergency Planning

a. Inspection Scope (IP 69001)

To ensure that the requirements in the UMLRR emergency plan (E-Plan) were being met, the inspector reviewed:

- "Emergency Preparedness Plan for the UMLRR," Rev. 7, dated May 2013 and associated Emergency Procedures
- Biennial training and annual emergency drills
- Emergency Contact Sheet
- Form Health Physics Procedure FHPP-16, "Emergency Closet Inventory," and fire extinguisher checks
- Biennial Memorandum of Understandings (MOUs) with Emergency Services
- E-Plan Review

b. Observations and Findings

The inspector reviewed the licensee's E-Plan and accompanying procedures and verified that the annual review of the plan was completed by the Reactor

Supervisor and Radiation Safety Officer. Additionally, the emergency call list was noted to be reviewed periodically to verify its accuracy and that the emergency closet contained the required equipment. The inspector also verified that MOUs with the police and fire departments, the local hospital, and emergency medical services were updated biennially as required.

The inspector reviewed the annual emergency drills held the last two years. The E-Plan requirement of biennial offsite coordination and participation in these drills was also being implemented.

The inspector met with the hazardous material (HazMat) coordinator at the fire department as well as the deputy director for emergency management to discuss their procedures in responding to an emergency at the UMLRR as well as their participation in drills. The inspector noted that the fire department was prepared to respond to an emergency at the UMLRR.

c. Conclusion

The emergency preparedness program was generally conducted in accordance with the NRC-approved emergency plan and implementing procedures.

6. **Maintenance Logs and Records**

a. Inspection Scope (IP 69001)

To ensure that maintenance activities were consistent with regulatory requirements, the inspector reviewed:

- “10 CFR 50.59 Screening and Evaluations” Form No. (Administrative Procedure) AP-6-1 (Rev. 0, dated December 16, 2009) Screening and Evaluation; Activity Screening Number 16-01, “Replacement of Control Room Alarm Annunciator”
- Secondary Cooling System Piping Replacement
- Annual Report for the UMLRR for the past two years

b. Observations and Findings

There were two major maintenance activities performed during the last two years. The first, the annunciator replacement provides visible and audible annunciation of an alarm condition to the operator. The new alarm panel will perform the same function.

The second activity, the secondary cooling system piping replacement due to corrosion, had no indication of leakage from the primary coolant to the secondary. After the replacement was completed, the health physics group checked the pipe for possible contamination prior to disposal with none detected. Additionally, the secondary piping was pressure tested for leaks prior to being brought back into service.

The inspector reviewed associated logs and records and found them to be appropriate.

c. Conclusion

Maintenance logs and records were maintained and were consistent with TSs and licensee procedure requirements.

7. Fuel Handling

a. Inspection Scope (IP 69001)

To ensure the requirements of TS Sections 4.7, "Fuel Surveillance," and 6.7, "Plant Operating Records," were being met, the inspector reviewed:

- UMLRR Console Log Book #34, pg. 110, dated June 18, 2015, and 113, dated June 24, 2015
- Procedures associated with TS Section 4.7

b. Observations and Findings

The licensee is required by TS 4.7 to conduct fuel inspections every two years. The licensee primarily conducted fuel handling as part of the visual inspection of fuel surveillance. The inspector verified that fuel handling was conducted in compliance with procedures and the TS. The inspector also verified that the licensee was maintaining the required records of fuel movements as they were completed.

The inspector found that the procedures used for fuel handling and inspection appeared to be adequate. The procedures contained proper precautions for criticality and radiological safety and the appropriate personnel were present for the task.

c. Conclusion

Fuel movements were performed biennially and safely in accordance with TS and licensee procedural requirements.

8. Exit Meeting Summary

The inspector reviewed the inspection results with members of licensee management and Radiation Safety Subcommittee members at the conclusion of the inspection on April 27, 2017. 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

L. Bobek	Reactor Supervisor
D. Lajeunesse	Reactor Operations
T. Regan	Reactor Engineer

Other personnel

S. Snay	Radiation Safety Officer, UML
C. Armstrong	Lieutenant, HazMat Coordinator, City of Lowell Fire Department
G. Rose	Deputy Director, Emergency Management, Fire Chief's Office

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
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ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED

None

CLOSED

None

LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
E-Plan	Emergency Plan
IP	Inspection Procedure
LCO	Limiting Condition for Operation
MOU	Memorandum of Understanding
NRC	U.S. Nuclear Regulatory Commission
Rev.	Revision
TS	Technical Specification
UML	University of Massachusetts Lowell
UMLRR	University of Massachusetts Lowell Research Reactor