

August 5, 2013

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

SUBJECT: UNIVERSITY OF MASSACHUSETTS LOWELL – NRC ROUTINE INSPECTION  
REPORT NO. 05000223/2013-201

Dear Dr. Chowdhury:

This refers to the inspection conducted on July 9–11, 2013 at the University of Massachusetts Lowell Research Reactor facility (Inspection Report No. 05000223/2013-201, enclosed). 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 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 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 Taylor A. Lichatz at (301) 415-7128 or by electronic mail at [Taylor.Lichatz@nrc.gov](mailto:Taylor.Lichatz@nrc.gov).

Sincerely,

***/RA Patrick Isaac Acting for/***

Gregory T. Bowman, 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

University of Massachusetts - Lowell

Docket No. 50-223

cc:

Mayor of Lowell  
City Hall  
Lowell, MA 01852

Mr. Leo Bobek  
Reactor Supervisor  
University of Massachusetts - Lowell  
One University Avenue  
Lowell, MA 01854

Department of Environmental Protection  
One Winter Street  
Boston, MA 02108

Director  
Radiation Control Program  
Department of Public Health  
90 Washington Street  
Dorchester, MA 02121

Nuclear Preparedness Manager  
Massachusetts Emergency Management Agency  
400 Worcester Road  
Framingham, MA 01702-5399

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

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As Stated

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**ACCESSION NO.: ML13204A106**

**TEMPLATE #: NRC-002**

OFFICE	NRR/DPR/PROB/RI	NRR/DPR/PROB/BC
NAME	TLichatz	GBowman (PIsaac for)
DATE	7/24/2013	8/5/2013

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

Docket No: 50-223

License No: R-125

Report No: 50-223/2013-201

Licensee: University of Massachusetts Lowell

Facility: University of Massachusetts Lowell Research Reactor

Location: Lowell, Massachusetts

Dates: July 9-11, 2013

Inspector: Taylor A. Lichatz

Approved by: Gregory T. Bowman, Chief  
Research and Test Reactor Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

University of Massachusetts Lowell  
Research Reactor Facility  
Inspection Report No. 50-223/2013-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of Massachusetts Lowell Research Reactor facility's (the licensee's) Class II research reactor facility safety program including: operation logs and records, surveillance and limiting conditions for operation, design changes, committee audits and reviews, maintenance, and 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.

### Operations Logs and Records

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

### Surveillance and Limiting Conditions for Operation

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

### Design Changes

- The review, evaluation, and documentation of changes to the facility satisfied NRC requirements.

### Committee Audits and Reviews

- The Reactor Safety Subcommittee was meeting quarterly and reviewing the topics outlined in the Technical Specifications and conducting annual audits of facility programs as required.

### Maintenance Logs and Records

- Maintenance was performed and logs and records were maintained and consistent with technical specification and licensee procedure requirements.

### Fuel Handling

- Fuel movements and inspections were conducted in accordance with Technical Specification and procedural requirements.

## REPORT DETAILS

### Summary of Facility Status

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

#### 1. Operations Logs and Records

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

The inspector reviewed selected aspects of the following to ensure that the operations program was being implemented as required in Technical Specification (TS) Sections 3.0, 4.0, and 6.0:

- University of Massachusetts Lowell Research Reactor (UMLRR) Console Log Books, dated from August 3, 2009 to present
- Annual Report for the UMLRR, dated August 28, 2012
- Annual Report for the UMLRR, dated August 22, 2011
- Annual Report for the UMLRR, dated August 24, 2010
- Reactor Safety Subcommittee (RSSC) meeting minutes, First Quarter 2010 to present
- Procedure RO-5, "Reactor Operations," Revision (Rev.) 3, approval dated October 12, 2005
- Procedure RO-7, "Reactor Checkout," Rev. 1, approval dated July 28, 2008
- Form RF-4, "Daily Routine Check Sheet"
- Form RF-5, "Radiation Monitoring System Daily Checks"
- Form RF-RO-6A, "Critical Hourly Readings"
- Form RF-RO-6B, "Radiation Monitoring Critical Hourly Readings"
- Form RF-RO-6C, "Reactor Shutdown Sheet"
- Form RF-RO-7B, "Pre-Startup Checksheet (Forced Convection)"
- Form RF-RO-7c, "Pre-Startup Checksheet (Natural Convection)"
- Form RF-RO-9A, "Reactor Operator Instruction Form"

##### b. Observations and Findings

On Wednesday, July 5, 2013, the inspector observed a reactor startup and verified compliance with the appropriate written procedures and TS requirements. During the inspection, the inspector also reviewed the UMLRR console log books, monthly and daily surveillance sheets, and operation record forms. It was noted that the operators on duty were knowledgeable and proficient.

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 indicated that the

TS operational limits had not been exceeded and that the shift staffing met the minimum requirements.

c. Conclusion

Operational activities were consistent with applicable TS and procedural requirements.

2. **Surveillance and Limiting Conditions for Operation**

a. Inspection Scope (IP 69001)

To determine if the licensee conducted its surveillance program as required by TS Sections 3.0 and 4.0 and licensee commitments since the last inspection, the inspector reviewed:

- University of Massachusetts Lowell Research Reactor (UMLRR) Console Log Books, dated from August 3, 2009 to present
- Surveillance Master Schedule 2013
- Procedure SP-3, "Containment Leak Rate Test," Rev. 3, approval dated November 4, 2010
- Procedure SP-11, "Rod Drop and Drive Measurements," Rev. 6, approval dated August 31, 2010
- Procedure SP-12, "Inspection of Control Blades and Fuel," Rev. 5, approval dated January 31, 2011
- Procedure SP-15, "Scram Functions Test," Rev. 6, approval dated June 13, 2011
- Procedure CP-2, "Linear Power Channel Check and Calibration," Rev. 3, approval dated December 13, 2006
- Procedure CP-4, "Calibration of Temperature Monitoring Devices," Rev. 5, approval dated August 30, 2010

b. Observations and Findings

Daily, weekly, monthly and other periodic checks, tests, and verifications for TS required Limiting Conditions for Operation (LCOs) 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. The records and logs were noted to be complete and were being maintained as required.

Through the review of surveillances, the inspector noted that there was no "normal surveillance time," per TS surveillance intervals, set for each of the surveillances. Instead, the licensee refers back to the previous surveillance completion and the time restarts. While the inspector did not find any apparent violations within the random sampling of surveillances reviewed, the inspector is opening Unresolved Item (URI) 50-223/2013-201-01 to follow-up on the licensee establishing normal periods for each of the surveillances. Additionally, the

inspector requested that the licensee reexamine their surveillance records to

determine whether or not a missed surveillance did occur.

c. Conclusion

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

3. **Design Changes**

a. Inspection Scope (IP 69001)

To ensure that facility changes were reviewed and approved as required by TS Section 6.2 and Title 10 of the Code of Federal Regulations (10CFR) Section 50.59, the inspector reviewed selected aspects of:

- Annual Report for the UMLRR, dated August 28, 2012
- Annual Report for the UMLRR, dated August 22, 2011
- Annual Report for the UMLRR, dated August 24, 2010
- RSSC meeting minutes, First Quarter 2010 to present
- Procedure AP-6, "10 CFR 50.59 Screenings and Evaluations," Rev. 0, approval dated December 16, 2009
- Draft Procedure FP-7, "Beamport Irradiation Facility Operations," Rev. 0
- Activity Screening # 10-01, "Reactor Tests Using Down-Comer Flow Mode," dated February 25, 2010
- Activity Screening # 10-02, "Upgrades to Control Drive System," dated March 29, 2010
- Activity Screening # 11-01, "Pneumatic Tube (Rabbit) Control System Upgrade," dated September 29, 2011
- Activity Screening # 12-01, "Cooling Tower Replacement," dated January 9, 2012
- Activity Screening # 12-02, "Chart Recorder Replacement," dated January 12, 2012
- Activity Screening # 12-03, "Stack Monitor Replacement," dated December 21, 2012
- Activity Screening # 13-01, "Beamport Irradiation Facility," dated June 25, 2013

b. Observations and Findings

The inspector reviewed several changes to the facility during the past four years that were reviewed and approved under the 10 CFR 50.59 screening process. The procedure in use was noted as being comprehensive and easy to follow. All of the changes to the facility were well documented and a thorough evaluation was completed. The inspector noted that the RSSC reviewed the series of documents listed above as required in the facility TS.



c. Conclusion

Records indicated that changes at the facility were acceptably being reviewed and approved in accordance with 10 CFR 50.59 and applicable licensee administrative controls.

4. **Committee Audits and Reviews**

a. Inspection Scope (IP 69001)

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

- RSSC meeting minutes, First Quarter 2010 to present

b. Observations and Findings

The inspector verified that the RSSC was composed of at least five members and met at least quarterly as required by Section 6.2 of the facility TS. The inspector reviewed the RSSC meeting minutes for the past four years. Review of the subcommittee meeting minutes indicated that the RSSC provided appropriate guidance and direction for reactor operations, and ensured acceptable use and oversight of the reactor.

c. Conclusion

RSSC review functions required by the TS were being implemented and documented.

5. **Maintenance Logs and Records**

a. Inspection Scope (IP 69001)

To verify that the licensee's operational and maintenance activities have been consistent with regulatory requirements, since the last inspection, the inspector reviewed selected aspects of:

- University of Massachusetts Lowell Research Reactor (UMLRR) Console Log Books, dated from August 3, 2009 to present
- Annual Report for the UMLRR, dated August 28, 2012
- Annual Report for the UMLRR, dated August 22, 2011
- Annual Report for the UMLRR, dated August 24, 2010

b. Observations and Findings

The licensee informed the inspector that principal maintenance activities are documented and recorded in the reactor console logbooks, per the requirement of TS Section 6.7. The inspector reviewed the logbooks for the maintenance records related to scheduled and unscheduled preventative and corrective maintenance activities.

After all maintenance items were completed, system operational checks were performed to ensure the affected systems were operable before returning them to service.

c. Conclusion

Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements.

6. **Fuel Handling Logs and Records**

a. Inspection Scope (IP 69001)

To determine whether fuel was inspected, handled and maintained as required by TS Sections 4.7 and 6.7 since the last inspection, the inspector reviewed the following records:

- University of Massachusetts Lowell Research Reactor (UMLRR) Console Log Books, dated from August 3, 2009 to present
- Annual Report for the UMLRR, dated August 28, 2012
- Annual Report for the UMLRR, dated August 22, 2011
- Annual Report for the UMLRR, dated August 24, 2010
- Procedure RO-8, "Handling of Irradiated Fuel," Rev. 2, dated March 8, 2006
- Procedure SP-12, "Inspection of Control Blades and Fuel," Rev. 5, dated January 13, 2011

b. Observations and Findings

The licensee primarily conducts fuel movements for fuel inspections. The last fuel movement was performed for an inspection on June 27, 2011 and was well documented. The inspector found that the procedures used for the safe handling of fuel elements were adequate.

c. Conclusion

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

7. **Exit Meeting Summary**

The inspector reviewed the inspection results with members of licensee management and RSSC members at the conclusion of the inspection on July 11, 2013. The licensee acknowledged the items presented.

## PARTIAL LIST OF PERSONS CONTACTED

### Licensee

L. Bobek	Reactor Supervisor
E. Mohan	Radiation Services
D. Lajeunesse	Reactor Operations

## INSPECTION PROCEDURES USED

IP 69001      Class II Research and Test Reactors

## ITEMS OPENED, CLOSED, AND DISCUSSED

### OPENED

50-223/2013-201-01    URI      Follow-up to potential violation of TS surveillance periodicity requirements

### CLOSED

None

### DISCUSSED

None

## LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Document Access and Management System
IP	Inspection Procedure
IR	Inspection Report
LCO	Limiting Condition for Operation
NRC	U. S. Nuclear Regulatory Commission
Rev.	Revision
RSSC	Radiation Safety Subcommittee
TS	Technical Specifications
UML	University of Massachusetts Lowell
UMLRR	University of Massachusetts Lowell Research Reactor
URI	Unresolved Item