

April 23, 2007

Dr. Gunter Kegel
Director - Radiation Laboratory
University of Massachusetts - Lowell
One University Avenue
Lowell, MA 01854

SUBJECT: NRC INSPECTION REPORT NO. 50-223/2007-201

Dear Dr. Kegel:

This letter refers to the inspection conducted on March 26-29, 2007, at your Research Reactor Facility. The inspection included a review of activities authorized for your facility. The enclosed report documents the inspection results, which were discussed on March 29, 2007, with you, Dr. John Wooding, Provost, and other members of your staff.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, the NRC has identified a violation of NRC requirements. The violation is cited in the enclosed Notice of Violation (Notice). The circumstances surrounding it are described in detail in the subject inspection report. The violation is of concern because it indicates a lack of attention to detail. In addition, one unresolved item and one inspector follow-up item were identified which will be revisited in a future inspection.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response in accordance with its policies to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) 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 Marcus H. Voth at 301-415-1210.

Sincerely,

/RA/Jennifer Golder for

Michael J. Case, Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-223

License No. R-125

Enclosures:

1. Notice of Violation

2. NRC Inspection Report No. 50-223/2007-201

cc w/enclosures: See next page

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

Office of the Attorney General
Environmental Protection Division
19th Floor
One Ashburton Place
Boston, MA 02108

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
40 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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NOTICE OF VIOLATION

Radiation Laboratory
University of Massachusetts - Lowell

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

During an NRC inspection conducted on March 26-29, 2007, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violation is listed below:

10 CFR 55.53 Conditions of licenses, states "Each license contains and is subject to the following conditions whether stated in the license or not:." 55.53(h) states "The licensee shall complete a requalification program as described by 55.59." 55.59 Requalification, states "(a) Requalification requirements. Each licensee shall - (1) Successfully complete a requalification program conducted for a continuous period not to exceed 24 months in duration. (2) Pass a comprehensive requalification written examination and an annual operating test. (c) Requalification program requirements. (1) Schedule. The requalification program must be conducted for a continuous period not to exceed two years, and upon conclusion must be promptly followed, pursuant to a continuous schedule, by successive requalification programs."

Contrary to the above, one licensed senior reactor operator did not take requalification written examinations or annual operating tests between 1998 and 2004.

This is a Severity Level IV violation (Supplement I).

Pursuant to the provisions of 10 CFR 2.201, the University of Massachusetts - Lowell is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the responsible inspector, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or Demand for Information may be issued as to why the facility license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the

NRC's document system (ADAMS), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated at Rockville, Maryland
this 23rd day of April, 2007

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

Docket No: 50-223

License No: R-125

Report No: 50-223/2007-201

Licensee: University of Massachusetts

Facility: Research Reactor at the University of Massachusetts - Lowell

Location: Lowell, Massachusetts

Dates: March 26-29, 2007

Inspectors: Marcus H. Voth
Phillip T. Young

Approved by: Johnny Eads, Branch Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Massachusetts - Lowell
Research Reactor Facility
NRC Inspection Report No.: 50-223/2007-201

This routine, announced inspection included on-site review of the licensee's programs concerning organization and staffing; operations, maintenance, and fuel handling logs and records; procedures; reactor operator requalification training; surveillance and limiting conditions for operation; experiments; design changes; oversight committee reviews; emergency planning; and transportation. Specific findings in each of these areas include:

Organization and Staffing

- The organization and staffing were consistent with Technical Specification requirements.

Operations Logs and Records

- The logs and records of operation provided adequate documentation of operations and indication that Technical Specification requirements were being met.

Procedures

- The existing facility procedures and the procedure review and upgrade project were found to be in accordance with Technical Specification requirements.

Requalification Training

- An unresolved item was identified concerning documentation of how ANSI/ANS Standard 15.4 had been applied in medical examinations for licensed reactor operators.
- An apparent violation was identified for the failure of one licensed senior reactor operator to complete requalification written examinations and annual operating tests which were a condition of the operator's license.
- The licensee was found to be in compliance with other requirements of the regulations and requalification program.

Surveillance and Limiting Conditions of Operations

- The inspector found proper compliance with limiting conditions for operation and completion of surveillance requirements in accordance with the licensee's Technical Specifications.

Experiments

- The inspector did not identify any failure to meet Technical Specification requirements but did identify need for better documentation of the approval process for minor variations of routine experiments which will be reviewed in a subsequent inspection.

Design Changes

- The licensee had demonstrated the ability to implement design changes in accordance with regulations.

Committees, Audits and Reviews

- Review and oversight functions were being executed in accordance with Technical Specification requirements.

Emergency Planning

- The emergency preparedness program was maintained in accordance with the Emergency Plan and the emergency procedures.

Maintenance Logs and Records

- Maintenance required by Technical Specifications was being performed under the surveillance program.

Fuel Handling Logs and Records

- Fuel inspection was performed and fuel movements were logged in accordance with Technical Specification requirements.

Transportation

- Regulatory and license requirements were met in the shipment reviewed.

REPORT DETAILS

Summary of Plant Status

The licensee's one megawatt research reactor had been operated in support of educational experiments and demonstrations, research and service irradiations, reactor operator training, and periodic equipment surveillances. The licensee reported annual operation of 117 critical hours and 55 megawatt hours of operation in the most recent annual report. The inspector observed a reactor checkout and startup during the inspection.

1. Organization and Staffing

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

The inspector reviewed the following to verify compliance with the staffing requirements in Technical Specifications (TS) Section 6.1, Organization and Management:

- University of Massachusetts - Lowell (UML) Radiation Laboratory organization chart, Rev. May 2006
- Reactor Console Logbook #28 covering the period from February 28, 2005 to present

b. Observations and Findings

The reactor staff included three staff members with Senior Reactor Operator (SRO) licenses and five licensed student operators, three with SROs and two with ROs. Reactor logbook entries that were reviewed identified personnel at the controls and on call in compliance with TS requirements. Through discussion with personnel the inspector verified that the licensee's organizational structure was consistent with TS Figure 6.1.

c. Conclusion

The organization and staffing were consistent with TS requirements.

2. Operations Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with regulatory and license requirements:

- Reactor Console Logbook #28 covering the period from February 28, 2005 to present
- Operating Procedure RF-RO-9A, Reactor Operator Instruction Form, Rev. August 30, 2001
- Operating records from the following 2006 files:

RF-4, Daily Routine Check Sheet
RF-5, Radiation Monitoring System Daily Checks
RF-RO-7B, Pre-Startup Checksheet (Forced Convection)
RF-RO-6A, Critical Hourly Readings
RF-RO-6B, Radiation Monitoring Critical Hourly Readings
RF-RO-6C, Reactor Shutdown Sheet

b. Observations and Findings

The inspector observed a reactor checkout, startup, increase to full power and shut down. While the operator was thoroughly familiar with the procedures and had committed them to memory, he was methodical in following them and documenting readings. He followed the written instruction RF-RO-9A, Reactor Operator Instruction Form, and completed Forms RF-4, RF-5, RF-RO-6A/B/C, and RF-RO-7B. The inspector reviewed selected reactor console logbook entries and checklists performed over the past year and found them complete.

c. Conclusion

The logs and records of operation provided adequate documentation of operations and indication that TS requirements were being met.

3. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify that the licensee was complying with the requirements of TS Section 6.3, Operating Procedures:

- University of Massachusetts - Lowell Research Reactor (UMLRR) Procedure Manual
- Master matrix of procedure changes in process
- Reactor Safety Subcommittee (RSSC) minutes for 2006
- Administrative Procedure AP-1, Procedure Control and Distribution
- Administrative Procedure AP-2, Procedure Development

b. Observations and Findings

The inspector reviewed the licensee's system of procedures which addressed each of the TS requirements. The licensee was three years into a methodical procedure review and upgrade project, reportedly about half done. Priority was being given to those procedures in greatest need of revision. The review policy was that major changes with potential for safety significance were reviewed by the RSSC and signed by the RSSC chairman. Changes of lesser potential for safety significance were reviewed and signed by two staff members and summarized in a report for discussion at the next RSSC meeting. Minor changes of an editorial nature were processed by the author only. The inspector reviewed

RSSC records and procedure changes, concluding that the review being given to procedure changes was appropriately commensurate with the safety significance of changes.

c. Conclusions

The existing facility procedures and the procedure review and upgrade project were found to be in accordance with TS requirements.

4. Requalification Training

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements of 10 CFR Part 55 and the licensee's NRC-approved requalification program:

- Requalification Program for Licensed Reactor Operators and Licensed Senior Reactor Operators, License No. R-125, June 22, 1978
- ANSI/ANS-15.4-1988, Selection and Training of Personnel for Research Reactors
- UMLRR Reactor Operator Medical Evaluations Records
- UMLRR Reactor Operator Requalification Training Records

b. Observations and Findings

The inspector reviewed records of five randomly selected licensed reactor operators. Compliance with requirements was verified with the following exceptions.

In all cases physical examinations were performed within the required time periods. However, it was not clear from records that medical examinations were performed in accordance with the ANSI standard as was certified by the facility on NRC Forms 396. While the inspector did not observe any indication that operators may not meet these criteria, documentation did not consistently indicate that tests were performed to substantiate conclusions regarding ANSI/ANS 15.4-1988 Section 7.2.3, Disqualifying Conditions, and 7.2.4, Specific Minimum Capacities Required for Medical Qualification, or whether special consideration was given under 7.3, Waiver or Specifically Limited Approval. This matter is identified as an Unresolved Item (URI) and will be reviewed during a future inspection (URI 50-223/2007-201-01).

Records indicated that one NRC licensed SRO did not take requalification written examinations or annual operating tests between 1998 and 2004. During this time the operator was considered "inactive" and did not perform duties that required an SRO. However, 10 CFR 55.53 requires that as a condition of an operator license the licensee must participate in a requalification program meeting the requirements of 10 CFR 55.59. The facility licensee was informed that failure to administer the written examination or annual operating test to the

SRO in question was an apparent violation (VIO) of 10 CFR 55.53 (VIO 50-223/2007-201-02).

c. Conclusions

An unresolved item was identified concerning documentation of how ANSI/ANS Standard 15.4 had been applied in medical examinations for licensed reactor operators.

An apparent violation was identified for the failure of one licensed SRO to complete requalification written examinations and annual operating tests which were a condition of the operator's license.

The licensee was found to be in compliance with other requirements of the regulations and requalification program.

5. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with surveillance requirements and limiting conditions stated in the TS:

- Reactor Console Logbook #28 covering the period from February 28, 2005, to present
- Surveillance Master Schedule
- Operating records from the following 2006 files:
 - RF-4, Daily Routine Check Sheet
 - RF-5, Radiation Monitoring System Daily Checks
 - RF-RO-7B, Pre-Startup Checksheet (Forced Convection)
 - RF-RO-6A, Critical Hourly Readings
 - RF-RO-6B, Radiation Monitoring Critical Hourly Readings
 - RF-RO-6C, Reactor Shutdown Sheet

b. Observations and Findings

The inspector selected for detailed review a sample of limiting conditions for operation (LCO) and surveillance requirements from Sections 3.0 and 4.0, respectively, of the facility TS. He proceeded to verify that each selected LCO or surveillance was incorporated in facility procedures, performed on the required frequency, performed in a manner that adequately met the intent of the TS, and documented appropriately. The inspector found that each of these characteristics were being implemented appropriately.

c. Conclusions

The inspector found proper compliance with LCOs and completion of surveillance requirements in accordance with the licensee's TS.

6. Experiments

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with Section 6.8, Approval of Experiments, of the licensee's TS:

- Irradiation Request Forms (IRF) for January 2005 to February 2007

b. Observations and Findings

The TS consider two types of experiments. New experiments require evaluation by the Reactor Safety Subcommittee (RSSC). Performing an experiment having prior RSSC approval or a minor variation of a routine experiment requires approval of the Reactor Supervisor (RS) and Radiation Safety Officer (RSO) or their respective designee.

The inspector found that new experiments were evaluated and documented by the RSSC over the life of the facility with relatively few new experiments evaluated in recent year. Most experiments currently performed are considered minor variations of routine experiments. While the initial experiments considered reactivity worth, effects of pressure and temperature buildup, radiation inventory, etc., the approval process for minor variations was intended to conclude that the variations fell within an umbrella of conditions approved for the initial experiment. This conclusion was supposedly being documented on IRFs signed by the RS and RSO.

The inspector found that some experiments were considered to be identical to others and were therefore performed without RS and RSO approvals on the IRF. The IRFs did not reference the original approved experiment under which a minor variation was being considered nor the umbrella considered to exist for approved experiment. While the inspector did not identify a safety issue or non-compliance, he noted that the IRF as presently used did not document compliance with the TS. The licensee indicated that the IRF usage would be reviewed in light of the inspector's comments. This matter is identified as an Inspector Followup Item (IFI) and will be reviewed during a future inspection (IFI 50-223/2007-201-03).

c. Conclusions

The inspector did not identify any failure to meet TS requirements but did identify need for better documentation of the approval process for minor variations of routine experiments which will be reviewed in a subsequent inspection.

7. Design Changes

a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with 10 CFR 50.59, the inspector reviewed selected aspects of:

- 50.59 Guidance File
- Safety Evaluation Determination for UMLRR Drives Control System, February 2003

b. Observations and Findings

The Licensee stated that they did not have a specific procedure for making changes to the facility, procedures or experiments but rather worked directly from NRC regulation 10 CFR 50.59 and TS 6.2.2 [RSSC review and audit responsibilities] on the few occasions that facility changes were made. The most recent change that reached the threshold for notification of the NRC via the annual report for the facility, but not prior NRC approval, was the 2003 change cited above. The inspector reviewed this file which consisted of the 50.59 review, design and installation notes, pre-operational test procedures and records of training on the changes.

c. Conclusions

The licensee has demonstrated the ability to implement design changes in accordance with regulations.

8. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that TS Section 6.2, Review and Audit, was being properly implemented:

- UML Radiation Safety Guide, August 2005
- Minutes of the RSSC meetings for December of 2005 and March, June, September and December of 2006

b. Observations and Findings

The inspector verified that the TS 6.2 requirements for the RSSC were being met. In particular, the Radiation Safety Guide included a charter for the Radiation Safety Committee (RSC), showing the RSSC reporting to the RSC and the RSC reporting to the Chancellor. RSSC minutes document meeting frequency, quorums, and matters considered that demonstrate TS compliance.

c. Conclusions

Review and oversight functions were being executed in accordance with TS requirements.

9. Emergency Planning

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify that the emergency preparedness was being maintained:

- Emergency Preparedness Plan for the University of Massachusetts Lowell Research Reactor, Revision 5
- Letters of Agreement with the City of Lowell Fire Department, City of Lowell Police Department, Saints Memorial Medical Center, and Trinity Ambulance Service
- results of quarterly inventory of emergency supplies
- results of table top drill conducted February 20, 2007, including the referenced facility emergency procedures

b. Observations and Findings

The inspector reviewed the table top drill conducted on February 22, 2007. The drill scenarios were realistic and challenging. The drill was well attended by facility staff and campus police. The post drill critique identified three program improvements to enhance campus police response.

Letters of agreement for off-site support were renewed in February and March of 2007. Interviews with the ambulance service, campus police, and Lowell Fire Department indicated a co-operative and effective relationship.

Emergency response supplies were inventoried quarterly.

c. Conclusions

The emergency preparedness program was maintained in accordance with the Emergency Plan and the emergency procedures.

10. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

To verify compliance with TS requirements the inspector reviewed selected aspects of:

- Reactor Console Logbook #28 covering the period from February 28, 2005 to present

b. Observations and Findings

Maintenance that is specified as TS surveillance requirements was treated as part of the licensee's surveillance program. Such maintenance is therefore addressed in Section 5 of this report along with other surveillance requirements.

c. Conclusions

Maintenance required by TS was being performed under the surveillance program.

11. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed the following to assure compliance with TS 6.3.2:

- UMLRR Procedure RO-2, Unloading and Reloading the Core to a Known Configuration, Rev.5, Issued April 1, 2005
- UMLRR Procedure RO-8, Handling of Irradiated Fuel, Rev.2, Issued May 22, 1991
- UMLRR Procedure RO-10, Receipt and Storage of New Fuel Elements, Rev.1, Issued February 16, 1984
- Core Loading Maps file, 1994 to present

b. Observations and Findings

The licensee reported that other than fuel moves in and out of the core for inspection, the last fuel moves were made January 3, 2003. TS 4.7 requires that a representative sample of reactor fuel elements must be inspected visually every two years. Documents were reviewed for the inspection of five elements on January 23, 2007. The previous inspection was done in December of 2004.

c. Conclusions

Fuel inspection was performed and fuel movements were logged in accordance with TS requirements.

12. Transportation

a. Inspection Scope (IP 86740)

The inspector reviewed the following records to verify compliance with regulatory requirements for the shipment of radioactive material:

- Shipping records for an Imaging and Sensing Technology detector, shipped July 14, 2006

b. Observations and Findings

The licensee reported that most shipments had been done under the campus broad byproduct material license; relatively few shipments were performed under the reactor license which was being inspected. Only one shipment of radioactive material was made under the reactor license since 2004 when some unirradiated highly enriched uranium fuel plates were shipped. The recent shipment identified above was a radiation detector that was subjected to a neutron radiograph, making it slightly radioactive.

c. Conclusion

Regulatory and license requirements were met in the shipment reviewed.

13. Exit Meeting

The inspector presented the inspection results to licensee representatives at the conclusion of the inspection on March 29, 2007. The inspector discussed the observations for each area reviewed and the apparent violation, follow-up item and unresolved item. The licensee acknowledged the findings and did not identify as proprietary any of the material provided to or reviewed by the inspector during the routine inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

L. Bobek	Reactor Supervisor
G. Kegel	Radiation Laboratory Directory
D. Medich	Radiation Safety Officer
M. Montesalvo	Radiation Services Manager
J. Nelson	Senior Reactor Operator
N. Rashidifard	Senior Reactor Operator
T. Regan	Chief Reactor Operator
S. Snay	Health Physics Technician
J. White	Professor of Chemical Engineering and Radiation Safety Subcommittee Chairman
L. Winnett	Administrative Assistant
J. Wooding	Provost and Vice-Chancellor for Academic Affairs

Others

John Vail	City of Lowell Fire Department
John Chemaly	Trinity Ambulance Service
Gus Savastano	Massachusetts Department of Public Health Radiation Control Program

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors
IP 86740	Transportation

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED:

50-223/2007-201-01	URI	Documentation of the application of ANSI/ANS-15.4-1988 in reactor operator medical examinations
50-223/2007-201-02	VIO	Failure of SRO to take requalification written examinations and annual operating tests
50-223/2007-201-03	IFI	Documentation of TS compliance when approving minor variations of routine experiments

CLOSED:

None

DISCUSSED:

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access and Management System
CFR	Code of Federal Regulations
HEU	Highly Enriched Uranium
IFI	Inspector Followup Item
IP	Inspection Procedure
IRF	Irradiation Request Form
LCO	Limiting condition for Operation
NRC	Nuclear Regulatory Commission
PARS	Publically Available Records
PSP	Physical Security Plan
RO	Reactor Operator
RS	Reactor Supervisor
RSC	Reactor Safety Committee
RSO	Radiation Safety Officer
RSSC	Reactor Safety Subcommittee
Rev	Revision
SNM	Special Nuclear Material
SRO	Senior Reactor Operator
TS	Technical Specification
UML	University of Massachusetts - Lowell
UMLRR	University of Massachusetts - Lowell Research Reactor
URI	Unresolved Item
VIO	Violation