

July 24, 2002

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

SUBJECT: NRC ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-223/2002-201

Dear Dr. Kegel:

This letter refers to the inspection conducted on June 12-14, 2002, at the University of Massachusetts - Lowell Research Reactor. The enclosed report presents the results of that inspection.

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, no safety concern or noncompliance to NRC requirements was identified. No response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>. If you have any questions concerning this inspection, please contact Mr. Thomas Dragoun at 610-337-5373.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
Operating Reactor Improvements Programs
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report No. 50-223/2002-201

cc w/enclosures: Please 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

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

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

Docket No: 50-223
License No: R-125
Report No: 50-223/2002-201
Licensee: University of Massachusetts
Facility: Research Reactor at University of Massachusetts - Lowell
Location: Lowell, Massachusetts
Dates: June 12-14, 2002
Inspector: Thomas F. Dragoun
Approved by: Patrick M. Madden, Section Chief
Research and Test Reactors Section
Operating Reactor Improvements Programs
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Massachusetts - Lowell
Report No: 50-223/2002-201

This routine, announced inspection included onsite review of selected aspects of the licensee's Class II research and test reactor operations program including: organizational structure and functions, surveillance and limiting conditions for operation, requalification training, procedures, design change reviews, and emergency planning.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organizational Structure and Functions

- The reactor operations organization and management functions were consistent with Technical Specification Section 6.1.

Surveillance and Limiting Conditions for Operations

- The reactor was operated within the limits specified in Technical Specification Sections 2.1 and 3.0. The conduct of surveillance tests satisfied the requirements in Technical Specification Section 4.0.

Requalification Training

- Operator requalification was conducted in accordance with the regulatory and licensee administrative requirements.

Procedures

- The licensee's procedures and associated changes were being reviewed and approved in accordance with the requirements.

Design Change Control

- The safety review of changes to procedures satisfied the requirements specified in 10 CFR 50.59 and Technical Specification Section 6.2.2(d).

Emergency Planning

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

REPORT DETAILS

Summary of Plant Status

The reactor was operated for a few hours for irradiation of an experimental sample during the inspection. An epoxy sealant applied to the joints in the reactor pool aluminum liner has eliminated or drastically reduced a long standing problem with pool water leakage.

1. Organizational Structure and Functions

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

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Technical Specification (TS) Section 6.1, Amendment 12, dated July 31, 1997, were being met:

- organizational structure
- management responsibilities
- staffing requirements for safe operation of the research reactor facility

b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that management responsibilities and the organization at the facility had not changed since the previous NRC inspection of reactor operations in November 1999 (Inspection Report No. 50-233/1999-201). The number of licensed operators declined from seven SRDs, three ROs, and six trainees to three SROs, no RO, one trainee, and a vacant full time position for a reactor engineer (SRO). The staffing level was adequate to support the current reactor utilization schedule.

During the previous inspection, a non-cited violation was identified for failure to provide the on-call SRO with a beeper. This was part of the licensee's corrective actions for a reportable event. A beeper is now available. The action described in Inspector Follow-up Item 50-223/1999-201-01 was complete and satisfactory and therefore this IFI is closed.

The Chief Reactor Operator (non-TS) position was upgraded to a fully funded University position. Previously, 50 percent of the funding came from other sources, and the position was filled by graduate students.

The licensee was experiencing problems with repair of electronic equipment including radiation survey meters. The staff did not have the expertise required to conduct the repairs. A contractor was hired and the problems were resolved.

A review of console logs for the period from the last inspection to date demonstrated that the staff required by TS 6.1.4 during reactor operations was satisfied.

c. Conclusions

The licensee's organization and staffing remain in compliance with the requirements specified in the TS Section 6.1.

2. Surveillance, Limiting Conditions for Operations, and Limiting Safety System Settings

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the reactor was operated within the limiting conditions specified in TS Sections 2.2.1 and 3.0 and periodic surveillance tests on safety systems were performed as stipulated in TS Section 4.0:

- Procedure RF-RO-9A, "Reactor Operator Instruction Form", dated August 30, 2001. Data for April 10, 16, 19, 22, 24, and May 2, 7, 8, 28, 2002.
- Procedure SP -15, "Rod Reactivity Worth Calibration", revision 4, dated March 28, 2002. Data for August 8, 2000, December 6, 2001, and January 15, 2002.
- Procedure SP -16, "Rod Drop and Drive Measurements", revision 5, dated October 3, 1994. Data for July 7, 2000, October 9, 2001, and November 1, 2001.
- Procedure SP -17, "Visual Inspection of Control Blades, Regulating Rod, and Fuel Elements", revision 4, dated August 27, 1998. Data for August 2, 2000 and November 1, 2001.
- Procedure RO-6, "Reactor Operations", revision 1, dated March 21, 2002. Data recorded per Attachment A for April 22, 24, May 2, 7, 8, and 28, 2002.
- Procedure CP-1, "Logarithmic Power Channel Check and Calibration", revision 1, dated May 31, 2001. Data for August 20, 2000 and August 2, 2001.
- Procedure CP-2, "Linear Power Channel Calibration", revision 1, dated May 31, 2001. Data for August 20, 2000 and August 2, 2001.
- Procedure SP-23, "Scram Function Test", revision 3, dated August 10, 2001. Data for May 2, and December 4, 2000, July 27, and December 26, 2001.
- Procedure SP -2, "Containment Valve Closure Initiation and Time", revision 3, dated February 23, 1994. Data for October 4, and December 27, 2001, and March 12, 2002.

b. Observations and Findings

During the last inspection, the Chief Reactor Operator (CRO) reported that some surveillance intervals were exceeded. The cumulative effect of this was "schedule creep." The Reactor Supervisor stated that this was remedied by issuing a Surveillance Master Schedule which fixes the month when a

surveillance must be done regardless of when it was last performed. This corrective action was complete and satisfactory. Inspector Follow-up Item 50-223/1999-201-02 is closed.

Also during the last inspection, the licensee reported that the upgraded reactor safety system instrumentation provided the display, scram, and interlock functions required by the TS Sections 3.2 and 3.3. However, difficulty was experienced in attempting to modify the circuitry to incorporate the non-TS scram described in section 4.4.15.2 of the Updated Safety Analysis Report dated February 14, 1985. The Reactor Supervisor stated that the contracted electronics engineer had successfully modified the circuitry.

Within the scope of records reviewed during this inspection, the surveillance, Limiting Conditions for Operation, and Limiting Safety System Setting (LSSS) verifications were completed on schedule and in accordance with licensee procedures. The LSSS was verified each time the reactor was started. All the recorded results were within the TS and procedurally prescribed parameters. The records and logs reviewed were complete and were being maintained as required.

Data from the recently computerized auxiliary equipment control and display panel was used to calculate reactor power in real time using the calorimetric method. This allows confirmation of the reactor power displayed by the nuclear instrumentation channels.

c. Conclusions

The reactor was operated within the limits specified in TS Sections 2.1 and 3.0. The conduct of surveillances satisfied the requirements in TS Section 4.0.

3. Requalification Training

a. Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements in 10 CFR Part 55 and the Requalification Program for Licensed Reactor Operators and Licensed Senior Reactor Operators dated June 22, 1978:

- active license status
- medical evaluation records
- reactor control manipulation records for the current biennial cycle of years 2000 to 2002
- records of required reading

b. Observations and Findings

The three SROs were up-to-date with the requalification requirements. In addition to the regulatory requirements, the licensee also implements the

recommendations in ANSI/ANS-15.4, "Selection and Training of Personnel for Research Reactors." These additional requirements were not required by the NRC. Requalification status for the staff was maintained in a computer database and hard copy. This record keeping allows easy identification of needs to complete the requalification requirements.

c. Conclusions

Operator requalification was conducted in accordance with the regulatory and licensee administrative requirements.

4. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed the changes to procedures since the last inspection to ensure that the requirements of TS Sections 6.2 and 6.3 and procedure AP-2, "Procedure Changes" original version dated March 19, 1990, were being met. Procedures reviewed included:

- Procedure SP-1, "Calibration of Radiation Monitoring System", revision 5, dated October 31, 2001
- Procedure SP-4, "Emergency Exhaust System Checkout", revision 3, dated October 31, 2001
- Procedure RO-6, "Reactor Operations", revision 0, dated March 21, 2002
- Procedure RO-9, "Reactor Checkout", revision 14, dated November 1, 2001
- Procedure AP-5, "Reactor Access", revision 0, dated May 31, 2001
- Procedure EO-2, "Major Fire or Explosion", revision 4, dated October 31, 2001
- Procedure EO-3, "Severe Storm", revision 4, dated October 31, 2001
- Procedure EO-4, "Attack Warning and Civil Disorder", revision 4, dated October 31, 2001
- Procedure EO-5, "Sabotage Threat to the Radiation Laboratory", revision 4, dated October 31, 2001
- Procedure EO-6, "Rupture of a Beam Tube or other Rapid Loss of Pool Water", revision 5, dated October 31, 2001
- Procedure EO-7, "Stuck Rod or Safety Blade", revision 2, dated October 31, 2001
- Procedure EO-8, "Loss of Electrical Power", revision 3, dated October 31, 2001
- Procedure EO-9, "Personnel Injury", revision 0, dated October 31, 2001

b. Observations and Findings

Most of the procedure changes were related either to the installation of the new nuclear instrumentation channels, new area radiation monitors, post 9-11 enhanced security, or the reformatting of the emergency plan. The revisions

were made in accordance with the administrative and regulatory requirements and approved by the Reactor Safety Subcommittee (RSSC).

c. Conclusions

The licensee's procedures and changes thereto were being reviewed and approved in accordance with the requirements.

5. Design Change Control

a. Inspection Scope (IP 69001)

The inspector reviewed the following documents to verify compliance with 10 CFR Part 50.59 and TS Section 6.2.2(d):

- Design change safety review "Upgrade of Process Control Cabinet" submitted to the RSSC on October 25, 2001
- Design change safety review "Ex-Core Fast Neutron Irradiator Facility" approved by the RSSC on February 16, 2001

b. Observations and Findings

The licensee has implemented the revised 10 CFR 50.59 requirements and associated regulatory guidance that were effective on March 13, 2001. Both reviews mentioned above have documented a detailed description of system operation as it relates to the screening questions required by the revised regulations. The screening process for both changes concluded that further evaluation was not required.

c. Conclusions

The safety review of changes to procedures satisfied the requirements specified in 10 CFR 50.59 and TS Section 6.2.2(d).

6. Emergency Preparedness

a. Inspection Scope (IP 69001)

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

- Emergency Preparedness Plan for the University of Massachusetts Lowell Research Reactor, revision 5, dated April 2002
- Letters of Agreement with the City of Lowell Fire Department, City of Lowell Police Department, Saints Memorial Medical Center, and Trinity ambulance service
- biennial training records for the off-site support personnel held in June 2001

- drill records and critiques for November 30, 2000 and March 27, 2002
- results of quarterly inventory of emergency supplies

b. Observations and Findings

By letter dated May 21, 2002, the licensee informed the NRC that the Emergency Preparedness Plan (EPlan) was revised in accordance with 10 CFR 50.54q. NRC approval of the changes was not required since the changes did not decrease the effectiveness of the EPlan and the EPlan was put into effect.

Radiological safety during routine and emergency entries into the reactor containment building was enhanced by a computer monitor located outside the main airlock that displayed the current radiation levels of all radiation detectors inside the containment building.

Letters of agreement for off-site support were renewed in August 2001, and remained in effect. The hospital staff, police officers, and ambulance crews were provided with emergency response training in June 2001.

Drills were conducted annually as required and critiqued to identify emergency response weaknesses. Drill scenarios were realistic and challenging. Critiques were thorough but no major weakness was identified. The RS stated that a separate meeting with the reactor staff was conducted after the drill to provide training in regards to the EPlan as part of the requalification program.

Emergency response supplies kept in the hallway closet near the Reactor Supervisor's (RS) office were inventoried as required. The inspector verified the inventory. However, the RS stated that the respiratory protection equipment (two filtered masks and two SCBA) would be returned to the campus safety office. The licensee plans to justify the return of the respiratory protection equipment on the following basis: 1) the RSO and RS concluded that there was no likely radiological emergency scenario that would require respiratory protective equipment; 2) emergency responders (e.g. fire fighters) are expected to bring their own equipment; 3) the reactor does not maintain an approved respiratory protection program; and 4) routine maintenance and inspections of the equipment by the safety office has fallen behind schedule.

The inspector noted that the equipment was included in the inventory in section 8.6 of the EPlan and advised the licensee that they will need to revise the EPlan appropriately after this equipment is removed.

c. Conclusions

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

7. Exit Interview

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on June 14, 2002. The licensee acknowledged the findings presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

L. Bobek, Reactor Supervisor
D. Medich, Radiation Safety Officer
T. Regan, Chief Reactor Operator
G. Kegel, Radiation Laboratory Director

INSPECTION PROCEDURES

IP 69001 Class II Non-power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-223/1999-201-01 IFI Provide beeper to the on-call SRO.

50-233/1999-201-02 IFI Take corrective action for missed surveillance intervals.

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
CRO	Chief Reactor Operator
IFI	Inspector Follow-up Item
IP	Inspection procedure
LSSS	Limiting Safety System Settings
NRC	Nuclear Regulatory Commission
RO	Reactor Operator
RS	Reactor Supervisor
RSO	Radiation Safety Officer
RSSC	Reactor Safety Subcommittee
SRO	Senior Reactor Operator
TS	Technical Specification