

U.S. NUCLEAR REGULATORY COMMISSION

Docket No: 50-223

License No: R-125

Report No: 50-223/97201

Licensee: University of Massachusetts

Facility: Lowell University Research Reactor

Location: 1 University Avenue  
Lowell, Massachusetts

Dates: May 13-16, 1997

Inspector: Thomas F. Dragoun, Project Scientist

Approved by: Marvin M. Mendonca, Acting Director  
Non-Power Reactors and Decommissioning  
Project Directorate

EXECUTIVE SUMMARY

Reactor operations were conducted in a manner consistent with regulatory requirements and licensee commitments. Corrective actions regarding failure of containment isolation valve mechanisms and position indications were acceptable. The redesignated health physics technician position is filled by permanent staff.

## Report Details

### Summary of Plant Status

The reactor was operated periodically for experiments. Neutron dosimeters were irradiated with a collimated beam from the thermal column. Electronic components and medical equipment were irradiated with the Co-60 source. Upgraded nuclear instrumentation channels were being tested prior to installation.

### **01 Conduct of Operations**

#### **01.1 Organization and Operations and Maintenance Activities**

##### **a. Inspection Scope (Inspection Procedure 39745)**

The inspector reviewed:

- organization and staffing,
- administrative controls, and
- the console log

##### **b. Observations and Findings**

Current staffing consists of 8 licensed operators and 6 student trainees. The staff appears motivated and enthusiastic. Dissolution of the Nuclear Engineering Department has not affected the quality or number of trainees. The staffing level is able to support increased utilization of the facility, equipment repairs, and proposed projects.

In a June 3, 1996 letter, the licensee stated that the health physics technician position will be changed to a full-time staff position. The inspector confirmed that this new permanent position is filled with an experienced and qualified individual. Inspector follow up item 96-02-02 is closed.

The console log was neat, legible, and recorded required information. "Critical Hourly Readings" are taken on all measuring channels. Important systems are visually inspected using a checklist every four hours during operation. Conduct of surveillances and reactivity manipulations for operator requalification were clearly noted in the log. These are notable practices.

In a January 21, 1997 letter, the licensee reported failure of containment isolation valves "D" and "E" to close. These large disk-and-seal blast valves are spring loaded to close and open by an air-operated piston and pushrod acting on the disk center. The failures resulted from stripped threads at the piston to pushrod joint. Earlier detection of the failure was masked by a history of faulty valve position indications.

Short term corrective actions completed include temporary thread repairs, operating procedure changes, operator training, and repair and adjustment of the valve position indicating switches. Long term repair options are under review with the valve manufacturer. Licensee actions regarding this matter are acceptable.

c. Conclusions

Staffing requirements in TS 6.1 were satisfied. Operating records required by TS 6.7 were well kept and available for review. Actions relative to the failure of containment isolation valves were acceptable.

01.2 Experiments

a. Inspection Scope (Inspection Procedure 69745)

The inspector reviewed;

- potential hazards identification,
- control of irradiated items, and
- radiation controls

b. Observations and Findings

Experimenters and staff demonstrated a good understanding of hazards associated with experiments. Administrative controls and communications with the control room was good. Access to the high radiation area created by a beam from the thermal column port was controlled by physical barriers and a reactor operator trainee serving as watchman.

c. Conclusions

Experiments were conducted in accordance with regulatory requirements.

02 **Operational Status of Facilities and Equipment**

02.1 Surveillance

a. Inspection Scope (Inspection Procedure 61745)

The inspector reviewed:

- surveillance procedures,
- surveillance data, and
- limiting conditions of operation

b. Observations and Findings

Surveillances were found to be completed in accordance with a monthly schedule and results were within equipment specifications. Data folders are labeled with the appropriate TS section number allowing easy retrieval. Surveillance procedures were clear, descriptive, and employed generally accepted testing techniques or manufacturers recommendations. Procedures and data sheets specify the acceptance range for each entry. Data sheets also cross reference the appropriate console log entry (volume and page) for additional information. Data was complete and demonstrated equipment operability.

The inspector noted some data sheets were not readily available in the appropriate folder. The Reactor Supervisor and CRO indicated that data filing was behind schedule but would be corrected soon.

c. Conclusions

The safety equipment surveillances required by TS section 4.0 are completed as required.

03 Operations Procedures and Documentation

a. Inspection Scope (Inspection Procedure 42745)

The inspector reviewed:

- operating procedures and updates, and
- adherence to procedures

b. Observations and Findings

Procedures required by TS 6.3 were available, clear, and concise. Changes were approved by the Reactor Safety Subcommittee as required. Operators properly used procedures and demonstrated awareness of changes and reasons for the change.

c. Conclusions

Use of facility procedures, and changes thereto, satisfied TS 7.8 requirements.

## 05 Operator Training and Qualification

### a. Inspection Scope (Inspection Procedure 41745)

The inspector reviewed:

- active license status,
- training records,
- records of reactivity manipulations
- medical examinations, and
- written examinations

### b. Observations and Findings

There were no expired licenses among the roster of active operators. The biennial requalification written exams use a full NRC initial qualification exam. It is administered and corrected by the Reactor Supervisor. This ensures all required technical areas are tested. Generalized staff training and individual specific training to correct weaknesses is determined by the CRO and RS. The CRO also publishes a required reading list of procedure and TS changes and audits completion.

Records of training, console manipulations, medical evaluations, and written exams were current for each operator.

### c. Conclusions

The requalification program is conducted in accordance with the NRC approved program.

## 07 Quality Assurance in Operations

### 07.1 Review and Audit and Design Change Functions

#### a. Inspection Scope (Inspection Procedure 40745)

The inspector reviewed:

- Reactor Safety Subcommittee membership and minutes of meeting,
- Subcommittee written charter,
- interview with the Subcommittee chairman, and
- a recent security audit.

b. Observations and Findings

Records indicated that the Subcommittee met at the required frequency and reviewed reactor operations. In a February 1997 meeting, the committee accepted the finding of no URSQ from the 10 CFR 50.59 review of the replacement nuclear instrumentation channels on site for testing. The scientific diversity and proficiencies of the membership satisfied TS requirements. The Subcommittee charter was reissued by the current Chancellor in October 1994. Elements of the charter reflect TS oversight requirements. The chairman expressed satisfaction with the functioning of the Subcommittee.

The CRO conducted a thorough and detailed audit of security practices. Corrective action for reported weaknesses was underway.

c. Conclusions

Review and audit functions required by TS 6.2 were acceptably completed.

P1 Conduct of EP Activities

a. Scope (Inspection Procedure 82745)

The inspector reviewed:

- facilities, equipment, and supplies,
- exercises and drills, and
- training.

b. Observations and Findings

A revised Emergency Preparedness Plan was submitted to the NRC in September 1994 and implemented in January 1995. Local facilities, equipment and supplies were as required in the plan. Improved communication is anticipated after receipt of donated radios. A merger of hospitals resulted in a change in location of the emergency room, which is also nearby. The recent drill tested the response of this new location. The drill was well planned, well conducted, and identified a few area for improvement. The speed and professionalism of the EMT response received favorable comments.

Training required by Section 10.1 of the Plan was complete except for some members of the campus police. Agreements with off-site support agencies were in effect but due for the biennial update.

c. Conclusions

The emergency plan was acceptably implemented.



X1. Exit Meeting Summary (Inspection Procedure 30703)

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on September 20, 1996. The licensee acknowledged the findings presented.

## PARTIAL LIST OF PERSONS CONTACTED

Licensee

- \* L. Bettenhausen, Reactor Supervisor
- \* W. Church, Radiation Safety Officer
- G. Kegel, Director, Radiation Laboratory
- D. Medich, Chief Reactor Operator

\* Denotes those present at the exit meeting.

## INSPECTION PROCEDURES USED

- IP 30703: ENTRANCE AND EXIT INTERVIEWS
- IP 39745: CLASS I NON-POWER REACTORS ORGANIZATION AND OPERATIONS AND MAINTENANCE ACTIVITIES
- IP 40745: CLASS I NON-POWER REACTOR REVIEW AND AUDIT AND DESIGN CHANGE FUNCTIONS
- IP 41745: CLASS I NON-POWER REACTOR OPERATOR LICENSES, REQUALIFICATION, AND MEDICAL ACTIVITIES
- IP 42745: CLASS I NON-POWER REACTOR PROCEDURES
- IP 61745: CLASS I NON-POWER REACTOR SURVEILLANCE
- IP 69745: CLASS I NON-POWER REACTOR EXPERIMENTS
- IP 82745: CLASS I NON-POWER REACTOR EMERGENCY PREPAREDNESS

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

none

Closed

50-233/96-02-02 IFI      Fill permanent HP technician position



## LIST OF ACRONYMS USED

CFR Code of Federal Regulations  
CRO Chief Reactor Operator  
EMT Emergency Medical Technician  
EP Emergency preparedness  
IFI Inspector Follow Item  
IP Inspection Procedure  
NRC Nuclear Regulatory Commission  
RS Reactor Supervisor  
SAR Safety Analysis Report  
SRO Senior reactor operator  
TS Technical Specifications  
URSQ UnReviewed Safety Question