February 26, 2001

Dr. John A. Bernard, Jr.
Director of Reactor Operations
Massachusetts Institute of Technology
Research Reactor
MITNRL-NW12
138 Albany Street
Cambridge, MA 02139

SUBJECT: NRC ROUTINE, ANNOUNCED INSPECTION REPORT NO. 50-20/2001-201

Dear Dr. Bernard:

This refers to the inspection conducted on January 22-26, 2001, at the MIT 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.

No violations of regulatory requirements or significant safety issues were identified during this inspection. Accordingly, 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/NRC/ADAMS/index.html .

Should you have any questions concerning this inspection, please contact Mr. Thomas Dragoun at 610-337-5373.

Sincerely,

/RA/

Ledyard B. Marsh, Chief
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-20
License No. R-37

Enclosure: NRC Inspection Report No. 50-20/2001-201

cc w/enclosure: Please see next page

Massachusetts Institute of Technology

Docket No. 50-20

cc:

City Manager
City Hall
Cambridge, MA 02139

Assistant Secretary for Policy
Executive Office of Energy Resources
100 Cambridge Street, Room 1500
Boston, MA 02202

Department of Environmental Quality Engineering
100 Cambridge Street
Boston, MA 02202

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

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ACCESSION NO.: ML010540285 **TEMPLATE #: NRR-056**

*Please see previous concurrence

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OFFICE OF NUCLEAR REACTOR REGULATION

Docket No: 50-20

License No: R-37

Report No: 50-20/2001-201

Licensee: Massachusetts Institute of Technology

Facility: MIT Research Reactor

Location: 138 Albany Street
Cambridge, Massachusetts

Dates: January 22-26, 2001

Inspector: Thomas F. Dragoun

Approved by: Ledyard B. Marsh, Chief
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of selected aspects of the organizational structure and functions, design control program, requalification program, surveillance program, safeguards program, and security program since the last NRC inspection.

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 organizational structure and functions were consistent with Technical Specification requirements.

DESIGN CONTROL
The design change program satisfied NRC requirements.

OPERATOR REQUALIFICATION
Operator requalification was conducted in accordance with SAR Appendix 13.C.

SURVEILLANCE
The surveillance program and operational parameters satisfied Technical Specification requirements.

SAFEGUARDS
Special Nuclear Materials were acceptably controlled and inventoried.

SECURITY
Security activities and systems satisfied Physical Protection Plan requirements.

Report Details

Summary of Plant Status

The reactor was operated continuously at full power. Contract workers removed asbestos floor tiles and mastic from basement areas. Completion of the new boron-neutron capture therapy treatment room was in the final phases. The beam monitors were installed. A radiation survey with the reactor at low power and the fission converter shutters open identified areas requiring additional shielding. The weekly management meeting between radiation protection and reactor operations was held.

1. ORGANIZATIONAL STRUCTURE AND FUNCTIONS

a. Scope (IP 39745)

The inspector reviewed selected aspects of:

- organization and staffing
- qualifications
- management responsibilities
- administrative controls

b. Observations and Findings

The Vice President and Dean of Research will step down on July 1, 2001. A replacement has not been announced. One of two radiation protection (RP) technicians left. An experienced replacement was hired. The MIT Radiation Protection Officer (MIT-RPO) retired but was retained as a consultant to the Reactor RPO and Campus RPOs. Institute administration proposed a reorganization eliminating the MIT-RPO position. However, this position is shown in Technical Specification (TS) figure 7.1-1, Management Organization and is required by TS 7.1.4. Management discussions regarding the proposed reorganization are continuing.

The Nuclear Reactor Laboratory Organization was expanded since the last inspection. Added were a relicensing coordinator, a shift supervisor, and a permanent housekeeping/decontamination janitor. Review of records verified that management responsibilities continued to be administered as required by the TS. The operations schedule consists of approximately three months of continuous full power operation followed by a refueling/maintenance shutdown of several days. There are 25 licensed reactor operators on staff, of these, 17 are senior reactor operators. Recruitment of new trainees is underway to replace graduating student operators. The staffing level is sufficient to support the operations schedule. Logs indicated that shift staffing satisfied TS requirements.

c. Conclusions

The organizational structure and functions were consistent with TS requirements.

2. DESIGN CONTROL

a. Scope (IP 40745)

The inspector reviewed selected aspects of:

- facility design changes and records
- facility configuration

b. Observations and Findings

Records and observations showed that changes at the facility were acceptably reviewed in accordance with 10 CFR 50.59 and applicable TSs. None of the changes constituted an unreviewed safety question or required a change to the TSs. The change in shim blade #1 and #6 drive controls (Safety Review O-01-2) was reviewed in detail with cognizant personnel. No deficiencies were noted.

c. Conclusions

The design change program satisfied NRC requirements.

3. OPERATOR REQUALIFICATION

a. Scope (IP 69003)

The inspector reviewed selected aspects of:

- operator licenses
- operator physical examination records
- operator examination records
- reactor control manipulation records

b. Observations and Findings

Operator licenses were current. Physical examinations of the operators were conducted as required. Records showed that written and operating examinations of the operators were acceptably conducted. Logs showed that operators maintained active duty status, reviewed procedure changes, and reviewed emergency procedures as required.

c. Conclusions

Operator requalification was conducted in accordance with SAR Appendix 13.C.

4. SURVEILLANCE

a. Scope (IP 61745)

The inspector reviewed selected aspects of:

- surveillance procedures
- limiting conditions for operation parameters
- logs and records

b. Observations and Findings

Surveillances and calibrations were completed on schedule and in accordance with licensee procedures. Limiting Conditions for Operation verifications were performed as required. All recorded results were within the TSs and procedurally prescribed parameters. The records and logs were complete and maintained as required.

The inspector noted that TS 3.9.7 required the reactivity worth of the heavy water reflector dump to be greater than the reactivity worth of the most reactive shim blade. Measurement of this parameter was last performed during the start up of MITR-2 in 1977. At that time, the reflector reactivity worth greatly exceeded the TS and exceeded the worth of all shim blades in bank. The licensee stated that the need to update this parameter would be reviewed.

During the April 2000 meeting of the MIT Reactor Safeguards Committee (MITRSC), a discrepancy was noted in the calculations of hydrogen build up in the air space above the reactor core. The Nuclear Reactor Laboratory Director issued a standing order to all operators dated May 2, 2000, to shut down the reactor in 5 minutes if the core purge blower trips. This would allow the reactor to be shut down well before an unacceptable build up of hydrogen concentration would occur. A calibrated hydrogen detector was purchased and installed in the core purge line. A testing procedure was approved by the MITSRC. Preliminary data indicated that the hydrogen concentration in the air space was strongly affected by minor changes in reactor water temperature. This was attributed to the solubility of hydrogen in water. A full test at steady state power levels between 1 MW and 2 MW was planned for the near future. The same detector will later be used for measurements in the reflector tank and the fission converter tank. Inspector follow up item 50-20/2000201-01 remains open pending completion of this study.

c. Conclusions

The surveillance program and operational parameters satisfied Technical Specification requirements.

5. SAFEGUARDS

a. Scope (IP 85102)

The inspector reviewed selected aspects of:

- assignment of responsibility for special nuclear material (SNM)
- accountability records and reports
- nuclear material inventory and locations

b. Observations and Findings

The Supervising Reactor Engineer administered a SNM control and accountability program that provided the quantity, identity, and current location of SNM held under license R-37 within the facility. A physical inventory was completed during each six month reporting period. This practice exceeds the requirement for an annual inventory of material. The possession and use of SNM was limited to the locations and purposes authorized under the license. The material control and accountability forms (DOE/NRC Forms 741 and 742C) were prepared and transmitted as required. Records were well kept.

c. Conclusions

Special Nuclear Materials were acceptably controlled and inventoried.

6. SECURITY FOR SNM OF MODERATE STRATEGIC SIGNIFICANCE

a. Scope (IP 81421)

The inspector reviewed selected aspects of:

- implementation of the physical protection plan
- records and reports
- physical barriers and access controls
- written security procedures

b. Observations and Findings

Some physical protection systems (barriers and alarms) were recently changed to eliminate spurious alarms. The inspector also noted that one other detector was not routinely tested. The licensee stated that the Physical Protection Plan will be updated and changes submitted to the NRC in accordance with 10 CFR 50.54(p)(2). This matter will be reviewed in a future inspection (Inspector Follow up Item 50-20/2001-201-01).

Access control was as required. Implementing procedures were consistent with the Physical Protection Plan. The inspector accompanied a SRO during performance of daily and weekly security checks. The checks were effectively performed and exceeded the requirements of the procedure. Acceptable MIT Police response was demonstrated to an alarm tripped at the request of the inspector.

c. Conclusions

Security activities and systems satisfied Physical Protection Plan requirements.

7. EXIT MEETING SUMMARY

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on January 26, 2001. The licensee acknowledged the findings presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

J. Bernard, Director of Reactor Operations
E. Lau, Assistant Operations Superintendent
F. McWilliams, Reactor Radiation Protection Officer
T. Newton, Assistant Operations Superintendent
S. Tucker, Quality Assurance Supervisor
F. Wormsley, Training Coordinator

INSPECTION PROCEDURES USED

IP 39745	CLASS I NON-POWER REACTORS ORGANIZATION AND OPERATIONS AND MAINTENANCE ACTIVITIES
IP 42745	CLASS I NON-POWER REACTOR REVIEW AND AUDIT AND DESIGN CHANGE FUNCTIONS
IP 61745	CLASS I NON-POWER REACTOR SURVEILLANCE
IP 69003	CLASS I NON-POWER REACTOR OPERATOR LICENSES, REQUALIFICATION, AND MEDICAL ACTIVITIES
IP 81421	FIXED SITE PHYSICAL PROTECTION OF SPECIAL NUCLEAR MATERIAL OF MODERATE STRATEGIC SIGNIFICANCE
IP 85102	MATERIAL CONTROL AND ACCOUNTING - REACTORS

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-20/2001201-01 IFI Update security plan.

Closed

none

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
IFI	Inspector Follow-up Item
IP	Inspection Procedure
MITRSC	MIT Reactor Safeguards Committee
NRC	Nuclear Regulatory Commission
RP	Radiation Protection
RPO	Radiation Protection Officer
TS	Technical Specifications