

August 20, 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. 50-20/2001-202

Dear Dr. Bernard:

This refers to the inspection conducted on June 25-29, 2001, at the Massachusetts Institute of Technology 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 by Patrick M. Madden Acting for/

Eugene V. Imbro, Acting Chief
Operational Experience 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. 50-20/2001-202

cc w/enclosure: Please see next page

Massachusetts Institute of
Technology

Docket No. 50-20

cc:

City Manager
City Hall
Cambridge, MA 02139

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.: ML012220376

TEMPLATE #: NRR-056

*Please see previous concurrence

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

Docket No: 50-20

License No: R-37

Report No: 50-20/2001-202

Licensee: Massachusetts Institute of Technology (MIT)

Facility: MIT Research Reactor

Location: 138 Albany Street
Cambridge, Massachusetts

Dates: June 25-29, 2001

Inspector: Thomas F. Dragoun

Approved by: Eugene V. Imbro, Acting Chief
Operational Experience 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 radiation protection program, effluent control program, and environmental monitoring 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.

RADIATION PROTECTION

The radiation protection program satisfied NRC requirements.

ENVIRONMENTAL PROTECTION

The environmental protection program satisfied NRC requirements.

Report Details

Summary of Plant Status

The reactor operated continuously at full power. The liquid waste tank was discharged twice. Housekeeping continues to improve. The rear security fence was relocated to allow trenching and installation of new campus utilities. Radiography of new utility steam and water lines caused elevated readings on the real-time environmental monitors. Various heavy construction on roads and buildings was underway in most quadrants around the reactor. A researcher's hand was contaminated after using the pneumatic sample transfer system.

1. RADIATION PROTECTION

a. Scope (IP 39745)

The inspector reviewed selected aspects of:

- organization and staffing
- radiation protection program policies and procedures
- reviews and audits
- radiological signs and posting
- routine surveys, sampling, and monitoring
- maintenance and calibration of radiation monitoring equipment
- exit surveys
- training
- personnel dosimetry
- As Low As Reasonably Achievable (ALARA) program

b. Observations and Findings

Institute management implemented a revised Environmental, Health, and Safety organization that eliminated the MIT Radiation Protection Officer position. This position shows in Technical Specification (TS) Figure 7.1-1 (Management Organization) and is required by TS 7.1.4. The licensee stated that proposed changes to these TS sections will be submitted to the NRC in the near future. This matter will be reviewed during the next inspection (Inspector Follow up Item 50-20/2001-202-01). Discussions with the reactor Health Physics (HP) staff indicated there were no negative impacts from the reorganization.

Of two HP technicians, one was replaced earlier this year and the second recently left. Recruitment efforts had begun. The departed technician's duties were shared by the Assistant Reactor Radiation Protection Officer (ARRPO) and remaining technician until the job was refilled.

The radiation protection program was unchanged since the last inspection. Procedures and policies were clear, detailed, technically sound, with consistent format and routinely reviewed for updating. The Reactor Radiation Protection Officer (RRPO) conducted annual reviews of the program as required by 10 CFR 20.1101. Most program areas were included in the review. Results were reported to the

Reactor Safeguards Committee.

The inspector noted a yellow and magenta warning sign with a radiation symbol and the words "Increased Radiation Levels" posted in several areas. The inspector questioned the meaning and use of non-standard wording. The RRPO stated that the sign was part of the ALARA program. The inspector stated that the radiological posting must be defined and workers informed of its meaning. Subsequent to the inspection, on July 2, 2001, the RRPO issued a memorandum and trained personnel that the sign was used only in radiation areas and signified locations of "higher than normal ambient.." or "...change in the area radiation levels". Action on this matter is complete and satisfactory.

Routine radiation surveys were conducted with appropriate instruments and the results were properly recorded. The inspector noted that there was no method to identify the person who conducted the survey. The RRPO stated that adding this data to the forms would be reviewed.

Instrumentation was adequately calibrated and maintained. The inspector noted that the exit friskers were operationally checked quarterly. The RRPO stated that more frequent checks would be considered and a source check added to the procedure. A researcher caused an alarm on an automated frisker. Immediate actions by the researcher and HP staff were appropriate. Investigation revealed that the researcher did not use gloves to load and unload pneumatic transfer system sample holders (rabbits). Sodium deposited on the rabbit by the researcher during handling became activated and contaminated the researcher's hands. The researcher was counseled as to the need to wear gloves when handling rabbits.

Refresher training for staff regarding packaging and transport of waste was satisfactory. Refresher training on use of cranes was scheduled.

A National Voluntary Laboratory Accreditation Program certified vendor processed the personnel dosimetry each quarter. The ARRPO noted that he normally finds errors in the vendor data. The corrected vendor data was then entered into local databases for analysis and comparisons. Except for a few reactor operators associated with the Silicon Project, annual exposures of the staff were less than 10 percent of the NRC limits.

A supply of electronic pocket dosimeters were purchased and were being evaluated as replacements for the self-reading pocket dosimeters. The RRPO stated that this equipment will be used for the ALARA program.

Adequate implementation of the ALARA principle was noted in the use of warning signs discussed above and in the discussions during the weekly coordination meeting between the reactor and HP staffs.

c. Conclusions

The radiation protection program satisfied NRC requirements.

2. EFFLUENT AND ENVIRONMENTAL MONITORING

a. Scope (IP 69004)

The inspector reviewed selected aspects of:

- effluent reports
- control, monitoring, and recording of releases
- environmental monitoring
- waste storage

b. Observations and Findings

The annual report provided monthly tabulations of argon-41 stack releases and liquid effluent discharges. The constraint on air emissions specified in 10 CFR 20.1101 was satisfied. Doses to the public were below NRC limits.

No low specific activity solid waste was shipped during 2000, but a shipment of 47 drums and 14 boxes during the Spring of 2001 removed much of the waste generated during the construction of the new medical treatment facility. Records indicated that the packaging satisfied 10 CFR 71.12 and the manifest satisfied 10 CFR Part 20, Appendix G.

Two discharges of liquid effluent were made during this inspection. The tank contents were recirculated, sampled, and analyzed as specified by licensee procedures. Control and authorization for the discharge was conducted in accordance with procedures. Radioactive material concentrations were below NRC limits. Solubility requirements in 10 CFR 20.2003 for discharges to a sewer were satisfied by passing the effluent through mechanical filters.

The inspector noted that the environmental dosimeter results from certain monitoring locations near the front of the Nuclear Reactor Laboratory office building were elevated. The inspector conducted a survey using a microRem per hour meter with the reactor at full power. Readings were found to decrease inside the building moving towards the reactor and likewise decrease with distance outside of the building. The inspector concluded, and the RRPO confirmed, that structural material in the front facade of the building caused an environmental dose approximately four times higher than ambient levels at that location.

The licensee also maintains a real-time environmental dose rate monitoring system as required by the TSs. Radiation levels from these monitors are recorded on strip charts. During review by the inspector, elevated readings were noted. Discussions with the RRPO revealed that these elevated readings coincided with the conduct of radiography on new campus utility lines being installed near the reactor facility.

Solid radioactive waste was properly labeled and stored in designated, shielded areas. Most radiological and non-radiological housekeeping was improved. A notable exception was the "back engineering laboratory" whose condition has declined.

c. Conclusions

The environmental protection program satisfied NRC requirements.

3. EXIT MEETING SUMMARY

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on June 29, 2001. The licensee acknowledged the findings presented.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

T. Date, Assistant Reactor Radiation Protection Officer
E. Lau, Assistant Operations Superintendent
F. McWilliams, Reactor Radiation Protection Officer
T. Newton, Assistant Operations Superintendent
B. Rice, Senior Technician, Health Physics

INSPECTION PROCEDURES USED

IP 69004 CLASS I NON-POWER REACTOR EFFLUENT AND ENVIRONMENTAL MONITORING
IP 83743 CLASS I NON-POWER REACTORS RADIATION PROTECTION

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-20/2001-202-01 IFI Submit amendment to update TS organization

Closed

none

LIST OF ACRONYMS USED

ALARA As Low As Reasonably Achievable
ARRPO Assistant Reactor Radiation Protection Officer
CFR Code of Federal Regulations
IFI Inspector Follow-up Item
IP Inspection Procedure
HP Health Physics
NRC Nuclear Regulatory Commission
RRPO Reactor Radiation Protection Officer
TS Technical Specification