

November 16, 2009

Dr. John A. Bernard, Jr.  
Director of Reactor Operations  
Massachusetts Institute of Technology  
Research Reactor  
MITNRL-NW 12  
138 Albany Street  
Cambridge, MA 02139

SUBJECT: MASSACHUSETTS INSTITUTE OF TECHNOLOGY - NRC ROUTINE  
INSPECTION REPORT NO. 50-020/2009-202

Dear Dr. Bernard:

On October 26-29, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at the Massachusetts Institute of Technology Research Reactor facility (Inspection Report No. 50-020/2009-202). The enclosed report documents the inspection results, which were discussed on October 29, 2009, with Professor David Moncton, Director, Nuclear Reactor Laboratory, Louis DiBerardinis, Director, Environment, Health, and Safety Office, and various members of the reactor facility staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observation of activities, and interviews with personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, and requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Craig Bassett at (404) 358-6515 or by electronic mail at [Craig.Bassett@nrc.gov](mailto:Craig.Bassett@nrc.gov).

Sincerely,

**/RA by John J. Donohue Acting For/**  
Johnny H. Eads, Chief  
Research and Test Reactors Branch B  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No.: 50-020  
License No.: R-37

Enclosure: NRC Inspection Report No. 50-020/2009-202  
cc: See next page

Massachusetts Institute of Technology

Docket No. 50-020

cc:

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Test, Research, and Training  
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The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observation of activities, and interviews with personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

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ACCESSION NO.: ML093200154

\* concurrence via e-mail

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DATE	11/06/2009	11/16/09	11/16/09

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

Docket No.: 50-020

License No.: R-37

Report No.: 50-020/2009-202

Licensee: Massachusetts Institute of Technology

Facility: Nuclear Reactor Laboratory

Location: Cambridge, Massachusetts

Dates: October 26-29, 2009

Inspectors: Craig Bassett  
Jack Donohue

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

## EXECUTIVE SUMMARY

Massachusetts Institute of Technology  
Nuclear Reactor Laboratory  
NRC Inspection Report No.: 50-020/2009-202

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Massachusetts Institute of Technology (the licensee's) Class I five megawatt research and test reactor safety program including: 1) organization and staffing, 2) review and audit and design change functions, 3) radiation protection; 4) environmental monitoring, 5) procedures, and 6) transportation of radioactive materials since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's program was acceptably directed toward the protection of public health and safety and in compliance with NRC requirements. No violations or deviations were identified.

### Organization and staffing

- Organizational structure and staffing were consistent with Technical Specification (TS) requirements.

### Review and Audit and Design Change Functions

- The Massachusetts Institute of Technology Reactor Safeguards Committee was meeting as required and reviewing the topics outlined in the TS.
- Quarterly and annual audits of facility programs were conducted as required.
- The design change program satisfied NRC requirements

### Radiation Protection

- Surveys were completed and documented as outlined in the Annual Report.
- Postings and notices met regulatory requirements.
- Staff personnel were wearing dosimetry as required and recorded doses were within the NRC's regulatory limits.
- Radiation survey and monitoring equipment was being maintained and calibrated as required.
- Radiation protection training was being conducted and was acceptable.
- The Radiation Protection and ALARA Programs satisfied regulatory requirements.

### Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

### Procedures

- The procedure review, revision, control, and implementation program satisfied TS requirements.

Transportation

- The licensee continued to ship radioactive material in accordance with regulatory requirements.

## REPORT DETAILS

### Summary of Facility Status

The Massachusetts Institute of Technology (MIT, the licensee) Nuclear Reactor Laboratory (NRL) five megawatt research and test reactor continued to be operated 24 hours a day, seven days a week, for three-month cycles in support of educational experiments, research and service irradiations, reactor operator training, and periodic equipment surveillances. At the end of each of the first two months of a cycle the reactor was shutdown for a short outage to perform surveillance testing. At the end of every third month the reactor was shut down for approximately one week for maintenance, refueling, and surveillance testing. During the inspection, the reactor was operated and shut down as needed to support various activities.

#### 1. Organization and Staffing

##### a. Inspection Scope (Inspection Procedure [IP] 69006)

The inspectors reviewed the following regarding the Massachusetts Institute of Technology Reactor (designated as MITR-II) organization, staffing, and management responsibilities to ensure that the requirements of Technical Specification (TS) Section 7, "Administrative Controls," (last revised by License Amendment Number [No.] 37, dated April 22, 2005), were being met:

- Management responsibilities
- Qualifications of facility radiation protection personnel
- MIT NRL Organization Chart, dated October 27, 2009
- Staffing requirements for operation of the research reactor
- "MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2007 to June 30, 2008," submitted August 27, 2008
- "MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2008 to June 30, 2009," submitted August 28, 2009

##### b. Observations and Findings

The inspectors noted that the Director of Reactor Operations reported to the Director of the MIT NRL, who in turn reported to the President of the university through the Vice President for Research. This organization was consistent with that specified in the TS. Also, the organizational structure and the responsibilities of the reactor staff had not changed since the last inspection.

Staffing levels remained consistent with those noted during the last inspection of this facility. The current reactor radiation protection organization consisted of the Reactor Radiation Protection Officer (RPO), a staff Officer, a Project Technician, a Senior Technician, and an Administrative Assistant. The RPO reported to the MIT Director, Environment, Health, and Safety (EHS) Office. It was noted that

the radiation protection personnel provided assistance and job coverage for Operations Group personnel.

c. Conclusions

The licensee's organization and staffing were in compliance with the requirements specified in TS Section 7.

**2. Review and Audit and Design Change Functions**

a. Inspection Scope (Inspection Procedure (IP) 69007)

To verify compliance with TS Sections 7.5.1 and 7.5.2 and Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, the following documents were reviewed:

- Charter of the MIT Reactor Safeguards Committee, dated December 10, 1985 and revised December 11, 2008
- Minutes of the MIT Reactor Safeguards Committee, meeting number (#) 97, held June 16, 2008
- Minutes of the MIT Reactor Safeguards Committee, meeting # 98, held December 11, 2007
- Minutes of the MIT Reactor Safeguards Committee, meeting # 99, held May 22, 2009
- Minutes of the Standing Subcommittee of the MIT Reactor Safeguards Committee, meeting held July 17, 2008
- MIT Administrative Procedure 1.4, "Review and Approval of Plans, Procedures, and Facility Equipment and Changes Thereto," latest revision dated May 6, 2008
- MIT Administrative Procedure 1.8, "Audits," latest revision dated January 10, 1986
- Administrative Audit for the Calendar Months of July, August, and September 2008, completed October 31, 2008
- Administrative Audit for the Calendar Months of October, November, and December 2008, completed February 13, 2009
- Administrative Audit for the Calendar Months of January, February, and March 2008, completed May 7, 2009
- MITR Annual Independent Audit Report for FY 2008 (June 2007 – June 2008), conducted by D. Rorer on December 8-9, 2008
- "MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2007 to June 30, 2008," submitted August 27, 2008
- "MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2008 to June 30, 2009," submitted August 28, 2009

b. Observations and Findings

(1) Review and Audit Functions

The inspectors reviewed the Reactor Safeguards Committee (RSC) charter and minutes of the MIT Reactor Safeguards Committee (MITRSC) and the Standing Subcommittee for the past year to verify compliance with TS requirements. Members were appointed and designated in writing as stipulated in the TS. A quorum was present for the various meetings and the meeting minutes indicated that a thorough review of the appropriate topics was conducted. The frequency of meetings exceeded the minimum requirements. The RSC appeared to be appropriately focused on performing both routine reviews and promptly attending to non-routine emerging issues.

As part of its safety oversight program, the licensee and an outside contractor performed audits of the operations and the radiation protection programs. The inspectors reviewed the report of recent internal audits and the report of the external audit.

(2) Design Change Functions

No design changes of equipment related to radiation protection had been made recently. However, the inspectors noted that the licensee had established a design change review function. It included the screening and safety review of changes, tests, or experiments to determine if, pursuant to 10 CFR 50.59, a change required U. S. Nuclear Regulatory Commission (NRC) prior approval or if it was within the umbrella of the existing Safety Analysis Report. The inspectors found procedures in place to control such a review process and evidence of adherence to the procedures.

c. Conclusions

The review and audit program was being conducted in compliance with the TS. The design change evaluation program was being implemented in accordance with the TS requirements and NRC regulations.

### 3. Radiation Protection

a. Inspection Scope (IP 69012)

To ensure that the licensee was following the requirements of TS Section 7.10, Radiation Protection Program and 10 CFR Parts 19 and 20, the inspectors reviewed selected aspects of the following:

- Quarterly Landauer dosimetry reports for 2007, 2008, and 2009 to date
- Observations of facilities, equipment, operations, and postings during facility tours
- MIT Administrative Procedure 1.11, "Radiation Protection Office," latest revision dated September 19, 1979
- MIT Administrative Procedure 1.12, "Radiological Training and Dosimetry Classification," latest revision dated November 9, 2004
- MIT Administrative Procedure 1.19, "Receiving, Storing, and Issuing of NRL Materials," latest revision dated May 20, 2004
- MIT Reactor Radiation Protection Procedure 3001, "Radiological Surveys," Revision (Rev.) 4, latest revision dated October 2003
- "MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2007 to June 30, 2008," submitted August 27, 2008
- "MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2008 to June 30, 2009," submitted August 28, 2009

b. Observations and Findings

(1) Surveys

Daily, monthly, and other periodic contamination and radiation surveys, outlined in the licensee's Reactor Operations Annual Report for 2008, were completed by HP staff members. Any contamination detected in concentrations above established action levels was noted and the area or item was decontaminated. Results of the surveys were typically documented on survey maps and posted at the entrances of the various areas surveyed so that facility workers and visitors would be aware of the radiological conditions that existed therein.

One of the inspectors accompanied a Health Physics (HP) Technician during completion of the daily radiation surveys. Appropriate survey techniques were used and no problems were noted.

(2) Postings and Notices

Copies of current notices to workers were posted in appropriate areas in the facility. The copies of NRC Form-3 noted at the facility were the latest issue, as required by 10 CFR Part 19, and were posted in various areas throughout the facility such as on the main bulletin board, in main hallways, and at the entrance to the Reactor Building. The inspectors determined that radiological signs and, as noted above, survey maps were typically posted at the entrances to controlled areas. Other postings also showed the industrial hygiene hazards that were present in various areas as well.

(3) Dosimetry Use and Results

Through direct observation the inspectors determined that dosimetry was acceptably used by facility and contractor personnel. The inspectors determined that the licensee used optically stimulated luminescent (OSL) dosimetry for whole body monitoring and thermoluminescent dosimeters (TLDs) in the form of finger rings for extremity monitoring. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program accredited vendor (Landauer).

An examination of the OSL results indicating radiological exposures at the facility for the past two years showed that the highest occupational doses, as well as doses to the public, were within 10 CFR Part 20 limits. The records showed that approximately half of the facility personnel received occupational exposures of zero (0) to only a few millirem (mr) above background. The highest annual whole body exposure received by a single individual for 2007 was 473 mr deep dose equivalent (DDE). The highest annual extremity exposure for 2007 was 1670 mr and the highest shallow dose equivalent (SDE) was 616 mr. (The highest doses for 2007 exclude the dose received by one individual who received a higher than expected dose during that year.) The highest annual whole body exposure received by a single individual for 2008 was 383 mr DDE. The highest annual extremity exposure for 2008 was 1,380 mr and the highest SDE was 565 mr. The highest annual whole body exposure received by a single individual for 2009, through the second quarter of the year, was 121 mr DDE. The highest annual extremity exposure through the second quarter of 2009 was 570 mr and the highest SDE was 151 mr. In both 2007 and 2008 the highest whole body exposure was received by a reactor operator. The highest extremity exposure in 2008 was received by a person in the silicon handling group; as noted this person was an SRO.

The facility also collected and analyzed urine samples for Tritium (H-3) bioassay purposes. The highest attributable dose in 2007 from H-3 was 1.2 mr committed effective dose equivalent (CEDE). The highest H-3 attributable dose in 2008 was approximately 1.97 mr CEDE. The highest attributable dose to date in 2009 from H-3 was 0.38 mr CEDE.

(4) Radiation Monitoring Equipment

Examination of selected radiation monitoring equipment indicated that the instruments had the acceptable up-to-date calibration sticker attached. The instrument calibration records indicated that the calibration of certain portable survey meters (friskers) was typically completed by licensee staff personnel. In the event that an instrument could not be calibrated by the licensee, it was shipped to a vendor for calibration. Calibration frequency met procedural requirements and records were maintained as required. Area Radiation Monitors (ARMs) and stack monitors were also being

calibrated as required. These monitors were typically calibrated by licensee staff personnel.

(5) Radiation Protection Training

The inspectors reviewed the general employee radiation training (also known as GERT training) given to MIT staff members, to those authorized to use the experimental facilities of the reactor, to students, and to visitors. One of the inspectors completed the GERT training at the facility. The training satisfied the requirements of 10 CFR Part 19 and the training program was acceptable.

(6) MIT As Low As Reasonably Achievable (ALARA) Program

See Section 7 below for a discussion of the licensee's ALARA program and various action items developed following a higher than expected exposure of one individual that occurred in 2007.

(7) Facility Tours

The inspectors toured the reactor containment, the reactor control room, and selected support laboratories and maintenance areas with licensee representatives on various occasions. The inspectors noted that facility radioactive material storage areas were properly posted. Radiation and High Radiation Areas were posted as required and properly controlled.

b. Conclusions

The inspectors determined that the Radiation Protection and ALARA Programs, as implemented by the licensee, satisfied regulatory requirements because: 1) surveys were completed and documented acceptably to permit evaluation of the radiation hazards present; 2) postings met regulatory requirements; 3) personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits; 4) radiation survey and monitoring equipment was being maintained and calibrated as required; and, 5) the radiation protection training program was acceptable.

**4. Effluent and Environmental Monitoring**

a. Inspection Scope (IP 69004)

The inspectors interviewed licensee representatives and reviewed the following to verify compliance with the requirements pertaining to discharges from the facility and environmental surveys pursuant to TS 7.13.5.f and h:

- Facility records of measurements and analysis of effluent samples
- MIT Reactor Radiation Protection Procedure 3001, "Gamma Spectroscopy Utilizing Canberra Genie 2000," Rev. 2, latest revision dated December 2002

- “MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2007 to June 30, 2008,” submitted August 27, 2008
- “MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2008 to June 30, 2009,” submitted August 28, 2009

b. Observations and Findings

The licensee submitted timely written annual reports to the NRC in accordance with TS 7.13.5 in which annual releases of gaseous, liquids, and solid effluents were reported.

The only detectable gaseous release from the facility was Argon-41 from activated air which measured 47.5 percent of the 10 CFR Part 20 limit based on the authorized, conservative dilution factor of 3000. Using the COMPLY code at Level 4 for the same release indicated a much greater dilution factor and therefore a much smaller fraction of the release limit.

The licensee reported an annual liquid release of 577.5 millicurie of tritium, the predominant source being in the cooling tower blowdown to the sanitary sewer system. The concentration was below the 10 CFR 20.2003 limit with no credit for dilution due to other MIT waste streams (estimated at 2.7 million gallons per day).

Solid waste and tritiated liquid waste was shipped to a licensed, offsite disposal facility. There were no investigative studies or human therapy exposures during the year to be reported pursuant to TS 7.13.5.i.

The licensee recorded data throughout the year from five radiation monitors mounted within a quarter mile of the reactor. The data indicated that exposure to individuals in that area was approximately 0.3 millirem for the year. The predominant source of that exposure was noted to be Argon-41.

c. Conclusions

Effluent release measurements and analyses and environmental monitor measurements showed compliance with regulatory requirements.

**5. Procedures**

a. Inspection Scope (IP 69008)

To verify that the licensee was meeting the requirements of TS Section 7.8, Operating Procedures, the inspectors reviewed selected aspects of:

- MIT Administrative Procedure 1.4, “Review and Approval of Plans,

Procedures, and Facility Equipment and Changes Thereto,” latest revision dated May 6, 2008

- MIT Administrative Procedure 1.5, “Procedure Adherence and Temporary Change Method,” latest revision dated September 19, 1979

b. Observations and Findings

Since the licensee’s system of preparing, maintaining, and utilizing written procedures had been reviewed previously, this inspection was focused on verifying that the process continued to be properly implemented and that approved procedures were being followed. It was noted that some procedures needed to be revised so that they reflected current administrative conditions.

The inspectors found that the procedures were being properly prepared, reviewed, and implemented. Management and supervisory oversight was focused on the proper implementation and adherence to procedures. The inspectors observed that procedures were being followed.

c. Conclusions

Procedures were being properly prepared and implemented in compliance with license requirements.

**6. Transportation**

a. Inspection Scope (IP 86740)

To verify compliance with regulatory requirements for shipping licensed radioactive material, the inspectors reviewed the following:

- Various completed forms, NRC Form 540, Uniform Low Level Radioactive Waste Manifest, for 2008 and 2009
- MIT Administrative Procedure 1.19, “Receiving, Storing, and Issuing of NRL Materials,” latest revision dated May 20, 2004
- MIT Reactor Radiation Protection Procedure 1101, “Receipt of Radioactive Material,” Rev. 4, latest revision dated September 2000
- MIT Reactor Radiation Protection Procedure 1102, “Receipt and Handling of New Fuel,” Rev. 5, latest revision dated November 2002
- MIT Radiation Protection Program, Required Procedures for Radiation Protection Procedure, Section III-H, “Transportation of Radioactive Material,” Seventh Edition (interim), latest revision dated January 2006
- “2008 DOT Shipping Audit,” completed by a Senior Reactor Operator on January 29, 2009
- “MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory Commission for the Period July 1, 2007 to June 30, 2008,” submitted August 27, 2008
- “MIT Research Reactor, Nuclear Reactor Laboratory, Massachusetts Institute of Technology Annual Report to the U.S. Nuclear Regulatory

Commission for the Period July 1, 2008 to June 30, 2009," submitted August 28, 2009

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspectors determined that the licensee had shipped spent fuel, radioactive waste, and other types of radioactive material since the previous inspection in this area. The records indicated that the radioisotope types and quantities were calculated and dose rates measured as required. The radioactive material shipment records reviewed by the inspector had generally been completed in accordance with Department of Transportation (DOT) and NRC regulations. It was noted that the Operations Group completed the majority of the shipments but that no formal procedure(s) existed for making shipments.

The inspectors also verified that the licensee maintained copies of consignees' licenses to possess radioactive material as required and that the licenses were verified to be current prior to initiating a shipment. The training of the staff members responsible for shipping the material was also reviewed. The inspector verified that the shippers had received training covering the various requirements of the DOT.

c. Conclusions

The licensee continued to ship radioactive material in accordance with regulatory requirements.

**7. Follow-up on Previously Identified Items**

a. Inspection Scope (IP 92701)

To determine what items the licensee had completed in response to Inspector Follow-up Item, IFI 50-020/2008-203-01, the inspectors reviewed:

- MIT ALARA Committee Charter, dated March 10, 2008
- MIT Reactor ALARA Procedure, "Dose Evaluation," undated
- MIT Reactor ALARA Procedure, "ALARA Program," undated
- MIT Reactor ALARA Procedure, "ALARA Job Reviews," undated
- MIT Reactor ALARA Procedure, "ALARA Suggestion Program," undated
- MIT Reactor ALARA Procedure, "ALARA Goal Development and Tracking," undated
- Meeting minutes of All-Hands meetings conducted to discuss ALARA and other radiation protection issues held on January 22, January 29, May 6, and July 9, 2008
- MIT ALARA Policy signed by the Director, NRL; the Director EHS; and the Chair, Reactor Safeguards Committee, dated March 2008
- MIT Reactor ALARA Committee Meeting minutes for meetings held on July 3, July 29, August 5, August 26, September 23, October 21, October 27, and November 24, 2008

- Action Item status matrix for issues related to the 2007 high exposure event
- Bulletin board ALARA display of cumulative dose received versus ALARA objectives, electronic dosimeter alarms, etc.
- Observations of facilities, equipment, operations, and postings during facility tour

b. Observations and Findings

IFI 50-020/2008-203-01 - Track ALARA Committee action items remaining from the 2007 higher than expected exposure event.

As a result of a higher than expected exposure of one individual in 2007, the licensee established various ALARA Action Items. During a previous inspection conducted in May of 2008, the NRC inspectors observed that numerous actions had been completed or implemented as on-going practices. To acknowledge the licensee's numerous pro-active follow-on measures to enhance safety and ALARA as a result of the findings of their internal analysis of the incident and the NRC Special Inspection Report, and to focus attention on the much smaller list of remaining action items, IFI 50-020/2007-203-01 was closed. The licensee was informed that a new IFI would be established to continue tracking the remaining ALARA action items (IFI 50-020/2008-203-01).

Following the higher than expected exposure event, the Reactor Radiation Protection Officer, and the HP staff, along with the Reactor Superintendent and other MIT managers and group leaders, recognized that improvements could be made in the area of dose reduction. Consequently, greater emphasis was placed on ALARA. An ALARA program enhancement program was initiated and an ALARA policy was formulated. A formal ALARA committee for the reactor was organized and various ALARA procedures were written. (It was noted that these procedures have not been formally reviewed and approved to date.) ALARA goals were set and performance indicators were established. Each group in the MITR organization established an ALARA goal for the year and the facility dose was then tracked by group, as well as for each individual.

With emphasis placed on achieving the various groups' ALARA goals, the facility dose has been reduced. In 2006, the calendar year facility dose was 6.30 rem. In 2007, the yearly facility dose was 7.42 rem. In 2008, due to the establishment of aggressive ALARA goals, continued efforts on dose reduction, worker awareness, and various other improvements, the facility dose was 3.71 rem. The goal for 2009 has been set at 4.3 rem. However, again due to increased emphasis on ALARA and dose awareness, the actual facility dose is likely to be less than the goal.

Although much progress has been made in the area of dose reduction and ALARA implementation, some items on the ALARA Action Items list remain to be completed. IFI 50-020/2008-203-01 will remain open pending further review by the NRC.

c. Conclusions

As a result of the inspection, IFI 50-020/2008-203-01 remained open.

**8. Exit Briefing**

The inspection scope and results were summarized on October 29, 2009, with members of licensee management. The inspectors described the areas inspected and discussed the preliminary inspection findings. The licensee did not present any dissenting opinions or identify any information to be withheld from public disclosure.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee Personnel

T. Bork	Irradiation Service Coordinator
D. Cormier	Senior Technician, Reactor Radiation Protection Office (RRPO), EHS
E. Lau	Superintendent for Reactor Operations
W. McCarthy	Reactor Radiation Protection Officer, RRPO, EHS
D. Moncton	Director, MIT Nuclear Reactor Laboratory
P. Nawazelski	Reactor Operator
T. Newton	Associate Director, Reactor Engineering
J. Quattrochi	Staff Officer, Reactor Radiation Protection Office, EHS
S. Tucker	Quality Assurance Supervisor

### Other Personnel

L. DiBerardinis	Director, Environment, Health, and Safety (EHS) Office
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## **INSPECTION PROCEDURES USED**

IP 69004	Class 1 Research and Test Reactor Effluent and Environmental Monitoring
IP 69005	Class 1 Research and Test Reactors Experiments
IP 69007	Class 1 Research and Test Reactors Review and Audit and Design Change Functions
IP 69008	Class 1 Research and Test Reactor Procedures
IP 69012	Class 1 Research and Test Reactor Radiation Protection
IP 86740	Transportation of Radioactive Materials
IP 92701	Follow-up on Previously Identified Items

## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### OPENED:

None

### DISCUSSED:

50-020/2008-203-01	IFI	Track ALARA Committee action items remaining from the 2007 higher than expected exposure event.
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### CLOSED:

None

### LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Documents Access and Management System
ALARA	As Low As Reasonably Achievable
CFR	<i>Code of Federal Regulations</i>
EHS	Environmental Health and Safety
IFI	Inspector Follow-up Item
IP	Inspection Procedure
LSA	Low Specific Activity
MIT	Massachusetts Institute of Technology
MITR	Massachusetts Institute of Technology Reactor
MITRSC	Massachusetts Institute of Technology Reactor Safeguards Committee
No.	Number
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
Rev.	Revision
RO	Reactor Operator
RSC	Reactor Safeguards Committee
TS	Technical Specification