

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-20/88-03

Docket No. 50-20

License No. R - 37 Priority C Category F

Licensee: Massachusetts Institute of Technology

MIT Research Reactor

38 Albany Street

Cambridge, Massachusetts 02139

Facility Name: MIT Research Reactor (MITR - II)

Inspection Conducted: July 18-20, 1988

Inspector: Craig Z. Gordon  
C. Z. Gordon,  
Emergency Preparedness Specialist

8/25/88  
date

Approved by: W. J. Lazarus  
W. J. Lazarus, Chief  
Emergency Preparedness Section

8/29/88  
date

Inspection Summary: Inspection on July 18-20, 1988 (Report No. 50-20/88-03)

Areas Inspected: Routine, announced emergency preparedness inspection conducted by one NRC Region I based inspector of the facility organization, operations, notification, communication, equipment, and training.

Results: No violations were identified. The Emergency Plan and Procedures were found to be implemented in a manner to adequately protect public health and safety.

## DETAILS

### 1.0 Persons Contacted

- \*J. A. Bernard, Director, Reactor Operations
- G. R. Elder, Sergeant, Campus Security
- \*G. R. Hopkins, Assistant Director, Reactor Operations
- \*K. S. Kwok, Plant Superintendent
- E. F. Mallove, Assistant Director, News Office
- \*F. F. McWilliams, Radiation Protection Officer
- J. P. Reilly, Radiation Protection Officer

\*Denotes attendance at the exit meeting.

### 2.0 Massachusetts Institute of Technology Reactor (MITR-II) Emergency Plan

The inspector reviewed the MITR-II Emergency Plan for the Cambridge, Massachusetts site. The Plant Superintendent is responsible for updating and implementing the Plan and administering emergency preparedness program functions. The Plan was submitted to the NRC in August 1982, in response to changes in Emergency Planning requirements for test and research reactors. The Plan was developed in accordance with ANSI/ANS 15.16, draft II, dated November 1981 and the criteria of NUREG-0849, "Standard Review Plan for the Review and Evaluation of Emergency Plans for Research and Test Reactors". The Plan appears to meet the NUREG guidance with regard to information on emergency organization and responsibilities, radiological assessment, emergency action levels, designated emergency equipment and facilities, and training. Formal NRC Plan approval was issued in 1983.

Controlled distribution is limited to Plan holders within the reactor building. NRC and other support groups are provided with "unofficial" copies only. Controlled distribution of the Emergency Plan to the NRC (2 copies) and other groups who may be involved in emergency response including updates and revisions should be provided (50-20/88-03-01).

A description of different accidents and corresponding emergency action levels for each classification are provided in the areas of fuel damage, radiological effluents, natural phenomena, fire, and security threat. There are three (3) implementing procedures for corrective and protective actions: "Action 1X- General Emergency", Action 1Y- General Emergency", and Action 2Y- Event/ Alert/Site Area Emergency". Procedures 1X and 1Y for General Emergencies state that integrated offsite doses could exceed 1 Rem whole body and 5 Rem thyroid to offsite populations resulting from a 1 hour exposure and that protective action recommendations to local authorities may be necessary. In reviewing the Plan's definition of the Emergency Planning Zone (EPZ) however, the inspector noted that during design basis accidents, offsite doses are not expected to exceed 60 mR whole body or 1 Rem thyroid. In this regard, the Plan and Procedures are not consistent (50-20-88-03-02).

Further review of Procedures 1X and 1Y indicate that they contain complex narratives of information which interrelate key response actions and do not outline in an orderly manner specific tasks either to be performed by the Emergency Director or delegated to other response organization members (50-20/88-03-03).

### 3.0 Facilities And Equipment

The Control Room and Emergency Support Center (ESC) are the designated emergency response facilities. The inspector toured these as well as the assembly areas and noted that facilities appear to be well maintained. Radiation detection devices for emergency use are available from the reactor health physics group. Inventories of emergency equipment are performed on a regular basis. The inspector observed lockers in the Control Room and Reactor Building containing protective clothing, supplies for contamination control, respiratory protection equipment, radiation survey meters, decontamination supplies, and other necessary safety equipment used for emergency response and determined that sufficient equipment is generally available and that inventories were up to date. The inspector noted that self-reading dosimeters provided in Control Room lockers are capable of detecting exposures in the range of 0-5 Rem only, while lower range SRD's were unavailable (50-20/88-03-04).

A tour of the Control Room identified a licensee change in the method for determining emergency classifications. In order to classify emergencies due to operational problems, the licensee provided emergency action levels and resultant classifications based upon increases in readouts from the auxiliary core purge monitor. It appears that the licensee developed these EAL's because no other symptomatic means is available to provide operators with direct monitor readings which correlate with emergency classifications. The inspector reviewed the EAL changes and licensee's safety review and noted that the prescribed action levels are not specific initiating conditions (trigger points), which, if exceeded, will result in classification. Instead, such levels are monitor readings which must be sustained over time. In the case of the Unusual Event classification, the emergency cannot be classified until elevated auxiliary core purge monitor readings continue for a period of 2' hours. Although the basis for selecting each action level adequately relates to MPC values, overall benefit to the licensee's emergency response program cannot be determined (50-20/88-03-05). Other emergency action levels for classification are related to measured site boundary radiation levels, offsite dose calculations based upon multiple increments of measured stack area monitors (and MPC values of I-131), or increases in the gas and particulate monitors. These EAL's are more appropriate for research reactor licensees and allow the Emergency Plan to be immediately implemented.

#### 4.0 Notifications and Communications

An incident may be reported at any time (24 hours) by a caller dialing telephone extension 911 and being connected to the Campus Police. The MIT-public telephone communications network used for emergency notification by the licensee consists of commercial telephones located throughout the reactor building. Portable radios are available for use by Campus Police and emergency response staff for environmental monitoring. The on-duty Shift Supervisor becomes the Emergency Director and assumes the lead role for overall direction and control of the emergency. This includes interfaces with MIT support groups, the radiation protection officer, and upper-level licensee management.

Primary telephones and an intercom system are located in the Control Room and Emergency Support Center to make initial notifications to the emergency organization. Telephone numbers for NRC notification are in place at the Control Room desk. Notification messages to NRC and other groups are required to contain information about the description of the event, emergency classification, expected or actual radiation release, meteorological data, dose assessment, and protective action recommendations. Although the notification and communication capability is adequate, the Plan does not provide for 15 minute notification to the State of Massachusetts and City of Cambridge after declaration of an emergency (50-20-88-03-06).

#### 5.0 Coordination With Offsite Groups

The inspector reviewed Section 4.3 of the Emergency Plan, "Organizations Responsible for MITR Emergency Response" and contacted representatives of site support groups in the hospital and medical facility, news office, and Campus Police Department to determine each group's understanding of the role and responsibilities it will fulfill in response to emergency incidents in the reactor building.

Representatives stated that full support would be provided to emergency personnel during emergencies. The Plant Superintendent indicated that arrangements are in place for local governmental support from the City of Cambridge to coordinate and assist with most emergencies at the MIT site. Individuals also stated that they were familiar with basic radiological hazards associated with reactor operation and had previously attended site tours. Based upon discussions with these individuals, the inspector determined that adequate outside assistance is available to support MITR staff in dealing with emergency response activities in the reactor building.

#### 6.0 Drills and Exercises

Shift supervisors and operations staff are designated for Emergency Director positions and receive specialized emergency training from the Plant Superintendent. Classroom instruction covers a review of EAL's, corrective actions, radiological controls, communications capability,

and emergency implementing procedures. This training is included as part of the preparation for operator licensing examination. For requalification, licensed operators are required to review the Emergency Plan and implementing procedures annually.

Qualification criteria for key emergency response personnel consists of participation in emergency drills and exercises, acting as scenario evaluators, performing Emergency Plan reviews, and helping in scenario development and planning. The inspector noted that a comprehensive exercise which simultaneously tests the major portions of the Plan is not conducted, but evacuation, medical, security, and fire drills are held at least once per year. Exercises and drills are critiqued (initiated in 1988), documented, and results are discussed with the Reactor Safeguards Committee for possible corrective action.

#### 7.0 Exit Meeting

The inspector met with the licensee representatives listed in Section 1 of this report at the conclusion of the inspection and summarized the observations made during the inspection.

The licensee was informed that previously identified findings were adequately addressed and no violations were found.

Licensee management acknowledged the findings and indicated that appropriate action would be considered.

At no time during this inspection did the inspector provide any written information to the licensee.