



MIT NUCLEAR REACTOR LABORATORY

AN MIT INTERDEPARTMENTAL CENTER

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15 January 2025

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Re: Massachusetts Institute of Technology, License No. R-37, Docket No. 50-20, Reportable Occurrence 50-20/2025-1: Control Room Operator Absent with Key Switch On; NRC OPS Center Log # EN 57487

Dear Sir or Madam:

The Massachusetts Institute of Technology hereby submits a report of an occurrence at the MIT Research Reactor (MITR) in accordance with paragraph 7.7.2(2) of the Technical Specifications. An initial verbal report was made by telephone to the U.S. Nuclear Regulatory Commission Headquarters Operations Center on Monday 6 January 2025 at 1750.

The format and content of this report was based on Regulatory Guide 1.16, Revision 1.

1. Report No. 50-20/2025-1
- 2a. Report Date: 15 January 2025
- 2b. Date of Occurrence: 6 January 2025
3. Facility MIT Nuclear Reactor Laboratory
4. Identification of Occurrence:

The MIT Research Reactor was shutdown but not secured on 6 January 2025 for a time period of about three minutes during which there was no licensed operator in the control room. Technical Specification 7.1.3(2) requires that whenever the reactor is not secured, an operator or senior operator shall be present in the control room.

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5. Condition Prior to Occurrence:

The reactor was in a shutdown condition with the <100 kW checklist being performed in preparation of in-core activities for the week. The reactor had been shutdown for more than two weeks for MIT institute holidays and scheduled maintenance.

6. Description of Occurrence:

On the morning of 6 January 2025, pre-operational checks to prepare the reactor for <100kW operation were in progress. These checks were being performed by a group of reactor trainees, with both the Training Supervisor and the Shift Supervisor present to monitor and assist. At approximately 0720, a trainee was withdrawing control blades per the checklist, in preparation for performing binary checks on the nuclear safety system. While blade #5 was being withdrawn, the nuclear safety system issued a short period trip from instrumentation noise. This resulted in a reactor scram, dropping all blades from their electromagnets and sending a "drive in" signal to all blade motors. However, the blade #5 motor continued to drive out, while all the other motors were driving in. The Training Supervisor consulted the Shift Supervisor for corrective action.

At approximately 0723, the Shift Supervisor, out of concern that the blade #5 motor would drive to its upper limit and damage its shear pin, left the control room to cut power to the blade #5 motor at the reactor top area. The Training Supervisor and two of the three trainees followed the Shift Supervisor to observe the process. One trainee stayed at the control room console throughout this time. The Shift Supervisor successfully cycled power to the blade #5 motor before it reached its upper limit, thereby allowing the motor to drive in. Approximately two and a half minutes later, the Shift Supervisor returned to the control room and realized the console key switch was still in the On position, with no licensed operator present in the control room.

7. Description of Apparent Cause of Occurrence:

The Shift Supervisor considered protecting the blade #5 motor a high priority, and left the control room immediately to take corrective action without first ensuring the reactor was in a secured condition.

8. Analysis of Occurrence:

Per Technical Specification 1.3.28(2)(b), the reactor is secured when, "The console key switch is in the off position and the key is removed from the lock," among other conditions.

Additionally, Technical Specification 7.1.3(2) states, "Whenever the reactor is not secured, two persons shall be onsite, one of whom shall be a licensed senior reactor operator. An operator or senior operator shall be present in the control room."

A blade motor must be stopped first before it can reverse direction. When the nuclear safety system issues a trip and a "drive in" signal to an outward-moving blade motor, the control blade will decouple from its electromagnet and drop into the core. However, without a "stop" status, the motor will misinterpret the "drive in" signal and continue to drive out. This is a known condition. At the time, the Shift Supervisor was the only one in the control room who had the knowledge of how to correct it.

The Shift Supervisor was concerned that the blade drive would reach the top of its housing and potentially damage the drive, and therefore considered immediate corrective action a high priority. The Shift Supervisor then left the control room without first placing the reactor in a secured condition by removing the console key.

The Shift Supervisor was aware of the reactor shifting between secured and non-secured states during the performance of the pre-operational checks, but did not think about it at the crucial moment, under the stress of underestimating the amount of time available to correct the abnormal condition. (With the blade motor running at 4.25 inches per minute, there were roughly 3.5 more minutes from when the outward motion was noted before the blade drive would reach its upper limit. The Shift Supervisor had sufficient time to remove the console key from the key switch before leaving the control room.)

It is concluded that this inadequacy did not cause the existence or development of an unsafe condition in connection with the operation of the reactor, and did not present a threat to general public health and safety. There was no elevated risk of sabotage, because the control room was continuously attended by a reactor staff member who had been background-checked for unescorted access as trustworthy and reliable. The amount of time that an adversary would require in order to use the key position to cause harm to the reactor would be many times the total span that the licensed personnel were absent from the control room.

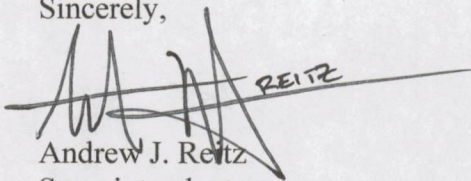
9. Corrective Action:

Training has been performed with the Shift Supervisor and the Training Supervisor on the differences between Reactor Shutdown, Reactor Secured, and Reactor Operating, and the requirements for each condition. This training will be extended to all licensed operators during annual walk-throughs in the requalification program. The importance of taking time during an abnormal situation to assess conditions will also be emphasized during these trainings.

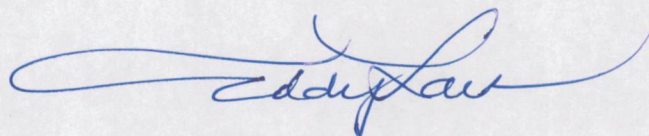
10. Failure Data

See ROR 50-20/1998-1 "Violation of Technical Specification No. 3.5.1(a) and Definition No. 1.1.2" where (in one case) the main airlock was bypassed open, and (in the other case) the truck lock inner door was opened, both of which resulted in loss of containment integrity, while the console key switch was in the On position.

Sincerely,

A handwritten signature in black ink, appearing to read "REITZ", with a horizontal line drawn through it.

Andrew J. Reitz
Superintendent
MIT Research Reactor

A handwritten signature in blue ink, appearing to read "Edward S. Lau".

Edward S. Lau
Assistant Director of Reactor Operations
MIT Research Reactor

A handwritten signature in blue ink, appearing to read "John P. Foster".

John P. Foster
Director of Reactor Operations
MIT Research Reactor

cc: MITRSC

USNRC - Senior Project Manager
Research and Test Reactors Licensing Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

USNRC - Senior Reactor Inspector
Research and Test Reactors Oversight Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation