

October 31, 2003

EA-03-155

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

SUBJECT: NOTICE OF VIOLATION AND NRC SPECIAL INSPECTION REPORT  
NO. 50-20/2003-203

Dear Dr. Bernard:

This letter refers to the reactive inspection conducted on July 16-17, 2003, at your MIT Research Reactor facility. The inspection consisted of a review of the circumstances and corrective actions for an occurrence involving an inattentive reactor operator reported to the U.S. Nuclear Regulatory Commission (NRC) on June 30, 2003. The enclosed report presents the results of the 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 safety concerns were identified during the inspection.

However, the NRC determined that a violation of NRC requirements was identified during the inspection. The violation is cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding it are described in detail in the subject inspection report. In a drop-in meeting at MIT on August 28, 2003, and re-confirmed in a phone conversation on October 14, 2003, between yourself and Mr. Patrick Madden of the NRC, MIT declined the opportunity to conduct a pre-decisional enforcement conference on this matter.

In accordance with the Enforcement Policy, a base civil penalty in the amount of \$5,500 is considered for a Severity Level III violation. Because your facility has not been the subject of enforcement actions within the last two years, the NRC considered whether credit was warranted for *Corrective Action* in accordance with the civil penalty assessment process in Section VI.C.2 of the Enforcement Policy. Due to your self-identification with prompt notification and corrective actions, the NRC determined that *Corrective Action* credit is warranted. Therefore, to continue to encourage prompt reporting and comprehensive correction of violations, I have been authorized not to propose a civil penalty in this case. However, significant violations in the future could result in a civil penalty. The current Enforcement Policy is included on the NRC's Web site at [www.nrc.gov](http://www.nrc.gov); select **What We Do, Enforcement**, then **Enforcement Policy**.

Dr. J. A. Bernard, Jr

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You are required to respond within 30 days from the date of this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

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/reading-rm/adams.html>.

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

Sincerely,

*/RA/*

David B. Matthews, Director  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

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

Enclosures: Notice of Violation  
NRC Inspection Report No. 50-20/2003-203

cc w/enclosures: 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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## NOTICE OF VIOLATION

Massachusetts Institute of Technology  
MIT Research Reactor

Docket No. 50-20  
License No. R-37  
EA-03-155

During an NRC inspection conducted on July 16-17, 2003, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions", NUREG-1600, the violation is listed below:

Technical Specification 7.2.1(a) states, in part, "When the reactor is not shut down the minimum crew complement ...shall be two licensed operators...one of which shall be in the control room."

10 CFR 50.54(k) requires "An operator or senior operator licensed pursuant to part 55 of this chapter shall be present at the controls at all times during the operation of the facility."

Contrary to the above, on June 29, 2003, from approximately 6:15 am to 6:45 am (30 minutes), the reactor control operator was sleeping and therefore not "present" at the controls when the reactor was not shut down.

This is a Severity Level III violation (Supplement 1 - Reactor Operations).

Pursuant to the provisions of 10 CFR 2.201, Massachusetts Institute of Technology is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555, with a copy to the Research and Test Reactors Section Chief and a copy to the NRC Inspector for the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation; EA-03-155" and should include for the violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will

create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

Dated this 31<sup>st</sup> day of October 2003

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

Docket No: 50-20

License No: R-37

Report No: 50-20/2003-203

Licensee: Massachusetts Institute of Technology

Facility: MIT Research Reactor

Location: 138 Albany Street  
Cambridge, Massachusetts

Dates: July 16-17, 2003

Inspector: Thomas F. Dragoun

Approved by: David B. Matthews, Director  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY  
Massachusetts Institute of Technology  
Report No: 50-20/2003-203

The primary focus of this reactive inspection was the on-site review of the circumstances surrounding a report that a reactor operator was sleeping for 30 minutes while in control of the reactor.

The inspector concluded that the event was accurately reported to the NRC. The short term corrective actions taken by the licensee were effective. The reactor remained shut down as directed by the institute administration.



## REPORT DETAILS

### **Summary of Plant Status**

The reactor remained shut down as directed by University administration. Short term corrective actions were completed. Investigation into the inattentive operator event continued in order to determine the root causes and establish long term corrective actions to prevent a recurrence.

#### **1. Inattentive Operator Reportable Event**

##### a. Inspection Scope

The inspector reviewed selected aspects of the reportable event to determine the accuracy of the report details, licensee efforts to determine root causes, and the effectiveness of licensee corrective actions as follows:

- policies for determining the reactor shift manning schedule
- operability and reliability of control room communications equipment
- interviews with the RO and SRO involved with the event at the console
- console records for the four hour period that the SRO was in charge
- charts, printouts, and data recorded by control console equipment for this period
- all medical records for the SRO maintained by the Institutes' medical infirmary staff physicians to determine evidence of narcolepsy or petitmal seizure
- results of a study of control room air by the MIT Industrial Hygiene group
- meeting with all personnel from all shifts who may have additional data or observations regarding this event
- the involved SRO's recent work schedule
- ergonomic conditions in the reactor control room

##### b. Observations and Findings

On June 30, 2003, the licensee notified the Operations Center and the Senior Project Manager that a reactor console operator was asleep for about 30 minutes from approximately 6:15 to 6:45 AM while on duty at the reactor console on June 29, 2003. During this time period several attempts were made by the RO outside the containment to contact the SRO without success.

The inspector determined that the console operators manning the reactor for the three shift schedule are a mix of permanent staff and licensed student operators. Shift assignments remain unchanged except for weekends. Weekend coverage is provided by volunteers from the pool of operators. Students are limited to 32 working hours per week. The Senior Reactor Operator reported to be inattentive had worked the day shift (0800 - 1600 hours, June 23 through 27, 2003) during the week prior to working the weekend of June 28 and 29, 2003, on night shift (0000 - 0800 hours). NRC staff considers the shift change to be one of the root cause factors in the occurrence.

The licensee conducted operational checks on all communication equipment in the control room. The ringer on the console telephone was set to "soft." The control was

set to "loud" and disabled from further adjustment. All other communication checks indicated satisfactory performance. The inspector interviewed the reactor operators from all three shifts and determined that communications failures are rare.

The inspector reviewed the console log and hourly reading records for the four hour period that the SRO was on the console. Console records were clear and detailed. Hourly records were properly kept with no discernable change in penmanship and reasonable values were recorded for the reactor conditions at the time (xenon transient). Printouts from the console data logging computer confirmed that a reactor shim occurred at 0647 hours. The makeup water alarm triggered by the RO's attempts to wake up the SRO was properly recorded at 0652 hours in the log by the SRO. He was not aware of it's significance until later. The inspector concluded that the SRO correctly performed critical activities several minutes before and after the sleeping episode. However, for the approximate period between 0615 hours and 0645 hours on June 29, 2003, the SRO was asleep and inattentive to the fulfillment of his duties as console operator. This event constitutes an apparent violation of Technical Specification 7.2.1 (minimum shift coverage) and 10 CFR 50.54(k) (operator at the controls). (Violation 50-20/2003-203-01)

Additional short term corrective actions completed by the licensee includes:

- Weekend operations suspended. One SRO per shift will be in the building to provide the enhanced security actions.
- The two duty operators (minimum) required for operations will communicate every 30 minutes during reactor operations.
- Written observations and recommendations from all licensed operators for ensuring alertness while on the console were received and are under management review. This action resulted from a recommendation by the safeguards committee.
- The chairman of the safety committee and senior MIT administrators were briefed about the event.
- The control room operators on night duty and second half of swing shift are rotated every 2 to 3 hours.
- The occurrence was reviewed with all licensed operators.
- A coffee pot, microwave, and radio were purchased for use in the control room.
- The Standing Subcommittee of the MIT Reactor Safeguards Committee met and provided direction to the staff.

The inspector reviewed the SRO's medical file. The NRC required medical exam for Reactor Operators was completed in August 2002. This exam consisted of completing Form 344, Revision 7, dated 1981. The inspector noted that no testing was performed to detect a medical condition that could cause a sleeping episode such as narcolepsy or petitmal seizure. Subsequent extensive medical testing and evaluation of the SRO by the licensee's medical staff determined that there was no medical condition that would contribute to the sleeping event. The inspector noted that the 10 CFR Part 26 fitness for duty regulations do not apply to research and test reactor operators.

The MIT Industrial Hygiene office assessment of the air quality in the control room did not find any unusual or unexpected conditions.

At the inspector's request, the operations superintendent convened a meeting of all personnel in the building at that time. The inspector addressed the group and requested that anyone with any information related to this event contact the inspector. A brief description of the information that was available at that time and the tentative conclusions was presented. No additional information was obtained.

The inspector reviewed the ergonomic conditions in the control room and concluded that conditions were not conducive to sleep.

The NRC has a rulemaking in progress regarding fatigue of workers at nuclear facilities (SECY 01-0113 dated June 22, 2001). A staff review of this occurrence concluded that the sequence of events matched the known parameters associated with certain fatigue conditions.

A review of the records of NRC enforcement actions available to the public via the ADAMS data base indicated that no action has been taken against this licensee or any of the licensed reactor operators.

c. Conclusions

The licensee promptly notified the NRC of the sleeping operator event and took corrective action in a timely manner. The occurrence was an isolated event and there is no evidence that operators in the past were sleeping on the back shift and no evidence that the SRO involved has done this before. However, the event constitutes a violation of Technical Specification 7.2.1 (minimum shift coverage) and 10 CFR 50.54(k) (operator at the controls). (Violation 50-20/2003-203-01)

**2. Exit Interview**

The inspection scope and results were summarized on July 17, 2003, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee

J. Bernard, Director of Reactor Operations  
E. Lau, Assistant Operations Superintendent  
T. Newton, Assistant Operations Superintendent

## **INSPECTION PROCEDURES USED**

N/A

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

### Opened

50-20/2003-203-01 Failure to provide the minimum shift coverage required by Technical Specification 7.2.1 and failure to provide a licensed operator at the controls during reactor operation as required by 10 CFR 50.54(k).

### Closed

None

## **LIST OF ACRONYMS USED**

CFR	Code of Federal Regulation
NRC	Nuclear Regulatory Commission
TS	Technical Specifications
RO	Reactor Operator
SRO	Senior Reactor Operator
VIO	Violation