

October 5, 2000

EA-00-154 and EA-00-173

Dr. Edward A. Deutsch, Director  
Research Reactor Center  
University of Missouri - Columbia  
Research Park  
Columbia, Missouri 65211

SUBJECT: NOTICE OF VIOLATION (NRC SPECIAL INSPECTION REPORT NOS.  
50-186/2000-202 and 50-186/2000-203) UNIVERSITY OF MISSOURI-  
COLUMBIA RESEARCH REACTOR

Dear Dr. Deutsch:

This letter refers to NRC Special Inspection Report No. 50-186/2000-202, dated July 26, 2000, which was conducted on April 14, June 15-16, and July 13, 2000, and to NRC Special Inspection Report No. 50-186/2000-203, dated July 27, 2000, which was conducted on July 11 - 13, 2000, at the University of Missouri-Columbia Research Reactor (MURR). The purpose of NRC Special Inspection No. 50-186/2000-202 was to follow up on an unplanned radiation field event that occurred at the reactor facility on April 12, 2000. The purpose of NRC Special Inspection Report No. 50-186/2000-203 was to follow up on an unplanned event that occurred on June 12, 2000, involving the removal of a control blade<sup>1</sup> from the reactor without first establishing the proper core configuration.

On September 6, 2000, an open predecisional enforcement conference was conducted at the Holiday Inn Select Executive Center, Parliament II Room, in Columbia, Missouri with members of your staff to discuss apparent violations, their significance, their root causes, and your corrective actions.

Based on the information developed during the inspections and the information that you provided during the conference, the NRC has determined that violations of NRC requirements occurred. These violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection reports.

As discussed in NRC Special Inspection Report No. 50-186/2000-202, on April 6, 2000, MURR removed shielding from the Spent Fuel Element Irradiation Facility. On April 12, 2000, during refueling of the reactor, a fuel element was placed in the Z-basket area of the reactor pool resulting in an unplanned high radiation area on the beam floor. Removal of the shielding from the Spent Fuel Element Irradiation Facility increased the possibility and potential consequence of a radiation exposure event. The fact that MURR did not evaluate this condition to determine if prior NRC review and approval was required is a violation of 10 CFR 50.59.

---

<sup>1</sup> The term control blade, control rod and shim rod are used interchangeably in the licensee's technical specifications.

Additionally, as discussed in NRC Special Inspection Report 50-186/2000-203, on June 12, 2000, MURR facility personnel removed control blade B from the reactor without first removing two fuel elements in accordance with operating procedures required by Technical Specification 6.1.b. With eight fuel elements in the reactor core and one control blade not fully inserted, the reactor did not meet the Technical Specification definition for either shutdown or secured. Therefore, the reactor was in operation. During reactor operation, Technical Specification 3.2.a, Limiting Condition for Operation, requires all control blades to be operable. This was not the case with the control blade removed. Removing control blade B from the reactor due to a failure to follow procedure resulted in reactor operation without control blade B operable. Therefore, these two examples of failure to follow Technical Specification requirements are considered one problem.

After careful consideration of the actual consequences, potential consequences, and the potential for impacting the NRC's ability to perform its regulatory function, these violations have been categorized in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600 at Severity Level IV.

Notwithstanding the fact that the NRC has concluded the violations that occurred had low actual and potential consequences, the NRC inspections as well as the University of Missouri's investigations revealed a number of root causes. Many of these root causes were common to both events. Problems in the areas of procedures, organizational function and structure, command and control of regulated activities, communications, fuel handling activities, and emergency response training were noted. The NRC will closely follow and evaluate the effectiveness of the University of Missouri's corrective actions.

You are required to respond to this letter within 30 days 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/NRC/ADAMS/index.html>. If you have any questions, please contact Alexander Adams at 301-415-1127.

Sincerely,

*/RA/*

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

University of Missouri  
at Columbia

Docket No. 50-186

cc:

University of Missouri  
Associate Director  
Research Reactor Facility  
Columbia, MO 65201

A-95 Coordinator  
Division of Planning  
Office of Administration  
P.O. Box 809, State Capitol Bldg.  
Jefferson City, MO 65101

Mr. Ron Kucera, Director  
Intergovernmental Cooperation  
and Special Projects  
Missouri Department of Natural Resources  
P.O. Box 176  
Jefferson City, MO 65102

Mr. William Vernetson  
Test, Research, and Training  
Reactor Newsletter  
University of Florida  
202 Nuclear Sciences Center  
Gainesville, FL 32611

Additionally, as discussed in NRC Special Inspection Report 50-186/2000-203, on June 12, 2000, MURR facility personnel removed control blade B from the reactor without first removing two fuel elements in accordance with operating procedures required by Technical Specification 6.1.b. With eight fuel elements in the reactor core and one control blade not fully inserted, the reactor did not meet the Technical Specification definition for either shutdown or secured. Therefore, the reactor was in operation. During reactor operation, Technical Specification 3.2.a, Limiting Condition for Operation, requires all control blades to be operable. This was not the case with the control blade removed. Removing control blade B from the reactor due to a failure to follow procedure resulted in reactor operation without control blade B operable. Therefore, these two examples of failure to follow Technical Specification requirements are considered one problem.

After careful consideration of the actual consequences, potential consequences, and the potential for impacting the NRC's ability to perform its regulatory function, these violations have been categorized in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600 at Severity Level IV.

Notwithstanding the fact that the NRC has concluded the violations that occurred had low actual and potential consequences, the NRC inspections and your investigations of these events uncovered a number of root causes with many common root causes between the two events. Problems in the areas of procedures, organizational function and structure, command and control of regulated activities, communications, fuel handling activities, and emergency response training were noted. The NRC will closely follow and evaluate the effectiveness of your corrective actions.

You are required to respond to this letter within 30 days 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/NRC/ADAMS/index.html>. If you have any questions, please contact Alexander Adams at 301-415-1127.

Sincerely,  
**/RA/**  
 David B. Matthews, Director  
 Division of Regulatory Improvement Programs  
 Office of Nuclear Reactor Regulation

Docket No. 50-186  
 License No. R-103  
 Enclosure: Notice of Violation

**DISTRIBUTION:**

PUBLIC      REXB r/r      SCollins      DMatthews      PDoyle      MMendonca      **CITF**

AAdams      EHylton      LMarsh      VOrdaz      TDragoun      TMichaels

JPetrosino      WEresian      SHolmes      RLickus, RIII      Plsaac      CBassett\

CAder      JStrasma, RIII      TREis, OE      MSatorius, OEDO (O16-E15)

**DOCUMENT NAME: ML003751366**

**TEMPLATE #: NRR-056**

\*Please see previous concurrence

OFFICE	REXB:PM	REXB:LA	REXB:BC	NRR/ADIP	OE	DRIP:D
NAME	*AAdams:rdr	*EHylton	*LMarsh	*VOrdaz	JReis	DMatthews
DATE	09/25/2000	09/22/2000	09/25/2000	09/26/2000	09/29/2000	10/05/2000

C = COVER

E = COVER & ENCLOSURE  
 OFFICIAL RECORD COPY

N = NO COPY

## NOTICE OF VIOLATION

University of Missouri - Columbia  
University of Missouri Research Reactor

Docket No. 50-186  
License No. R-103

- I. During an NRC inspection conducted on April 14, June 15 and 16, and July 13, 2000, 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:

Title 10, Code of Federal Regulations [61 FR 39300, July 29, 1996], Part 50, Section 59 (10 CFR 50.59) states, "50.59 Changes, tests and experiments. (a)(1) The holder of a license authorizing operation of a production or utilization facility may (i) make changes in the facility as described in the safety analysis report, (ii) make changes in the procedures as described in the safety analysis report, and (iii) conduct tests or experiments not described in the safety analysis report, without prior Commission approval, unless the proposed change, test or experiment involves a change in the technical specifications incorporated in the license or an unreviewed safety question. (2) A proposed change, test, or experiment shall be deemed to involve an unreviewed safety question (i) if the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report may be increased; or (ii) if a possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report may be created . . . "

Contrary to the above, on April 6, 2000, the licensee removed shielding from the Spent Fuel Element Irradiation Facility. This facility is described in Section 6.5.3 of the University of Missouri Research Reactor Facility Hazards Summary Report dated July 1, 1965. Removal of this shielding increased the probability and potential consequence of a radiation exposure accident or malfunction and, therefore, is an unreviewed safety question. The failure to evaluate the change to determine if prior NRC review and approval was required before implementing the change is a violation of 10 CFR 50.59.

This is a Severity Level IV violation (Supplement I).

2. During an NRC inspection conducted on July 11-13, 2000, two violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, the violations are listed below as one problem:
- A. Technical Specifications (TS) Section 6.1.b requires that written procedures be in effect for normal operations of the reactor, emergencies, radiological control, and the preparation for shipping and the shipping of byproduct material produced under the reactor license.
- Maintenance Procedure, P.M. No. RX-S-1, with a revision date of October 1, 1997, requires in the Plant Conditions Required and Safety Precautions Section, Part C, that the reactor and all systems be

shutdown and two fuel elements be removed for an offset and control blade changeout.

University of Missouri - Columbia Research Reactor (MURR) Standard Operating Procedure (SOP), Revision 23, dated September 24, 1999, requires in Section II.3.1 that the core will be defueled of two fuel elements corresponding to the offset mechanism (and control blade) being removed.

Contrary to the above, on June 12, 2000, control blade B was removed from the reactor without two fuel elements being removed.

- B. TS Section 1.17 states that the reactor shall be considered in operation unless it is either shutdown or secured.

TS Section 1.20 states that the reactor shall be considered secured whenever it contains insufficient fuel in the reactor core to establish criticality with all control rods removed or whenever the following condition is met:

1. All shim rods are fully inserted.

TS Section 1.21 states that the reactor is shutdown when all shim rods are fully inserted and power is unavailable to the control rod magnets.

TS Section 3.2.a requires that all control blades, including the regulating blade, be operable during reactor operation.

Contrary to the above, on June 12, 2000, while the reactor was neither secured nor shutdown, control blade B was removed from the reactor rendering the control blade inoperable during reactor operation.

This is a Severity Level IV problem (Supplement I).

Pursuant to the provisions of 10 CFR 2.201, the University of Missouri-Columbia is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Chief, Events Assessment, Generic Communications and Non-Power Reactors Branch, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, MS O-12-D-1, Washington, DC 20555, 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" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (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 previous 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 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 to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be placed and made 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), 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. ADAMS is accessible from the NRC Web site (the Public Electronic Reading Room) at <http://www.nrc.gov/NRC/ADAMS/index.html>. 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.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated at Rockville, Maryland  
this 5th day of October 2000.