



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 25, 2022

Mr. Ethan Taber, Reactor Manager
Missouri University of Science
and Technology
Nuclear Reactor Facility
250 West 13th Street
Rolla, MO 65409-0630

SUBJECT: BOARD OF CURATORS OF THE UNIVERSITY OF MISSOURI – U.S. NUCLEAR
REGULATORY COMMISSION SAFETY INSPECTION REPORT
NO. 05000123/2022202 AND NOTICE OF VIOLATION

Dear Mr. Taber:

From June 6-9, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Missouri University of Science and Technology Research Reactor. The enclosed report documents the inspection results, which were discussed on June 9, 2022, with you and members of your 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 inspector reviewed selected procedures and records, observed various activities, and interviewed personnel.

Based on the results of this inspection, the NRC has determined that two Severity Level IV violations of NRC requirements occurred. These violations were evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's website at (<https://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>). The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report. The violations are being cited in the Notice because they constitute failures to meet regulatory requirements that have more than minor safety significance and the licensee failed to identify the violations.

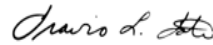
You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. If you have additional information that you believe the NRC should consider, you may provide it in your response to the Notice. The NRC review of your response to the Notice will also determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

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

To the extent possible, your response should not include any personal privacy or proprietary, information so that it can be made available to the Public without redaction.

If you have any questions concerning this inspection, please contact Andrew Waugh at (301) 415-0230, or via email to Andrew.Waugh@nrc.gov.

Sincerely,



Signed by Tate, Travis
on 07/25/22

Travis L Tate, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Docket No. 50-123
License No. R-79

Enclosures:
As stated

cc w/ enclosures: See next page

cc:

Homeland Security Coordinator
Missouri Office of Homeland Security
P.O. Box 749
Jefferson City, MO 65102

Planning Coordinator
Missouri Department of National
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1101 Riverside Drive
Jefferson City, MO 65101

Planner, Department of Health and Senior Services
Section for Environmental Public Health
930 Wildwood Drive
Jefferson City, MO 65102-0570

Deputy Director for Policy
Department of Natural Resources
1101 Riverside Drive
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Jefferson City, MO 65101

A-95 Coordinator
Commissioner's Office
Office of Administration
P.O. Box 809
State Capitol Building, Room 125
Jefferson City, MO 65101

Test, Research and Training
Reactor Newsletter
Attention: Amber Johnson
Dept of Materials Science and Engineering
University of Maryland
4418 Stadium Drive
College Park, MD 20742-2115

Dr. Ayodeji Alajo, Interim Program Director
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Dr. Joseph Graham, Director
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SUBJECT: BOARD OF CURATORS OF THE UNIVERSITY OF MISSOURI – U.S. NUCLEAR
REGULATORY COMMISSION SAFETY INSPECTION REPORT NO.
05000123/2022202 AND NOTICE OF VIOLATION DATED: JULY 25, 2022

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OFFICE	NRR/DANU/UNPO	NRR/DANU/UNPO/LA	NRR/DANU/UNPO/BC
NAME	AWaugh	NParker	TTate
DATE	6/24/2022	6/27/2022	7/25/2022

OFFICIAL RECORD COPY

NOTICE OF VIOLATION

Board of Curators of the
University of Missouri

Docket No. 50-123
License No. R-79

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted June 6-9, 2022, two violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 55.21, "Medical examination," states, in part, "A licensee shall have a medical examination by a physician every two years."

Contrary to the requirements in 10 CFR 55.21, three operators licensed at the Missouri University of Science and Technology Research Reactor failed to meet the conditions of their license by not receiving a medical examination from a physician every two years. In accordance with the conditions of their license, the medical examination was required to be completed in December 2021. Each of these operators conducted reactor operations after December 2021 and their licenses remained active until May 16, 2022, when their licenses were suspended due to the inability to meet proficiency requirements .

This is a Severity Level IV violation (section 6.4).

Missouri University of Science and Technology Research Reactor technical specifications (TS) section 4.1.1, "Excess Reactivity, Rod Worth, and Shutdown Margin Measurements," states that excess reactivity, control rod worth, and shutdown margin shall be measured following a change in core configuration.

Contrary to TS 4.1.1, the licensee changed the reactor core configuration multiple times without measuring excess reactivity, control rod worth, and shutdown margin afterwards. Specifically, the licensee only measured these parameters for changes to a new core configuration. The changes to the core configuration without measuring the required parameters happened 11 times between September 13, 2021, and the date of this inspection.

This is a Severity Level IV violation (section 6.1).

Pursuant to the provisions of 10 CFR 2.201, "Notice of violation," the Board of Curators of the University of Missouri is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, 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: (1) the reasons for the violations, or, if contested, the basis for disputing a violation or severity level; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken; 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 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, U.S. 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 (Agencywide Documents Access and Management System), accessible from the NRC website at <https://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 2.390(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, "Protection of Safeguards Information: Performance Requirements."

In accordance with 10 CFR 19.11, "Posting of notices to workers," you may be required to post this Notice within two working days of receipt.

Dated this 25th day of July, 2022.

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

Docket No.: 50-123

License No.: R-79

Report No.: 05000123/2022202

Licensee: Board of Curators of the University of Missouri

Facility: Missouri University of Science and Technology Research Reactor

Location: Rolla, MO

Dates: June 6-9, 2022

Inspector: Andrew Waugh

Approved by: Travis L Tate, Chief
Non-Power Production and Utilization
Facility Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Board of Curators of the University of Missouri
Missouri University of Science and Technology Research Reactor
Inspection Report No. 05000123/2022202

The primary focus of this routine announced inspection was the onsite review of selected aspects of the Board of Curators of the University of Missouri's (the licensee) Class II research reactor facility program, including: (1) operations logs and records; (2) requalification training; (3) surveillance and limiting conditions for operation (LCO); (4) design changes; (5) emergency planning; (6) maintenance logs and records; and (7) fuel handling logs and records. The U.S. Nuclear Regulatory Commission (NRC) staff determined that the licensee's program was acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements, except where noted below.

Operations Logs and Records

- The inspector determined that the operations logs and records were maintained consistent with applicable technical specifications (TS) and the licensee's procedural requirements.

Requalification Training

- The inspector found that contrary to Title 10 of the *Code of Federal Regulations* (10 CFR) 55.21, "Medical examination," three operators failed to meet the conditions of their license by not receiving a medical examination from a physician every two years. See section 2 of the report details below.
- With the exception noted above, the inspector determined that the operator requalification program was conducted and completed in accordance with the NRC-approved program and regulatory requirements.

Surveillance and Limiting Conditions for Operation

- The inspector found that contrary to surveillance requirement 4.1.1, the licensee changed core configurations multiple times without measuring excess reactivity, control rod worth, and shutdown margin as required. See section 3 of the report details below.
- With the exception noted above, the inspector determined that the surveillances were conducted and the LCO were maintained in accordance with TS requirements.

Design Changes

- The inspector determined that the design changes were conducted in accordance with TS, procedural, and NRC regulatory requirements.

Emergency Planning

- The inspector determined that the emergency preparedness program was conducted in accordance with the emergency plan.

Maintenance Logs and Records

- The inspector determined that the maintenance activities were performed and documented in accordance with the TS requirements.

Fuel Handling Logs and Records

- The inspector determined that the fuel movements and inspections were conducted in accordance with the TS and the licensee's procedural requirements.

REPORT DETAILS

Summary of Facility Status

The licensee's 200-kilowatt research reactor continues to be operated in support of education, research, training, and surveillance. The Missouri University of Science and Technology Research Reactor was not operated during this inspection.

1. Operations Logs and Records

a. Inspection Scope (Inspection Procedure [IP] 69001, Section 02.02)

The inspector reviewed the following to ensure that the logs and records were maintained as required by the licensee's administrative procedures and TS 6.8:

- standard operating procedure (SOP): 101, "General Operational Procedures," dated February 19, 2021
- SOP: 102, "Pre-startup Checklist Procedure," dated February 22, 2022
- SOP: 107, "Permanent Log, Hourly Log, and Operational Data," dated February 19, 2021
- select "Permanent Log Book" entries, 2020-present
- select hourly operating logs, 2020-present
- select equipment discrepancy reports, 2020-present
- measured parameters for multiple TS-required recorders

b. Observations and Findings

The inspector found that the licensee's operation logs and records were maintained as required by the licensee's TS and administrative procedures.

The inspector observed that the measured parameters for several reactor operations met the TS requirements.

c. Conclusion

The inspector determined that the operations logs and records were maintained consistent with applicable TS and the licensee's procedural requirements.

2. Requalification Training

a. Inspection Scope (IP 69001, Section 02.04)

The inspector reviewed the following aspects of the licensee's requalification program to verify compliance with 10 CFR 55, "Operators' Licenses," and the licensee's NRC-approved operator requalification program:

- "Operator Requalification Program for the Missouri University of Science and Technology Reactor," dated January 10, 2018
- select training requalification sheets, 2020-present
- medical records for select licensed operators

- requalification records for select licensed operators
- “Self-Identified Violation of Operator Requalification Program for Missouri S&T Reactor (R-79),” dated May 14, 2021

b. Observations and Findings

The inspector reviewed the licensee event report submitted to the NRC on May 14, 2021. This event report documents a failure of the licensee to ensure that licensed operators were aware of procedure changes as required by 10 CFR 55.59 and the licensee’s operator requalification program. The inspector reviewed the licensee’s corrective actions for this event and found them to be adequate; therefore, no further action is required.

Section 55.21, “Medical examination,” of 10 CFR states, in part, “A licensee shall have a medical examination by a physician every two years.”

Contrary to the above, three operators did not meet the conditions of their license by not receiving a medical examination from a physician every two years..

The inspector found that three licensed operators were allowed to operate the reactor beyond December of 2021, which is when their medical examinations were required to be completed. The licenses for these individuals were suspended on May 16, 2022, due to the inability to meet proficiency requirements. During the inspection, the licensee stated the operator’s licenses will remain suspended until their medical fitness is certified by a physician and they come back into compliance with the conditions of their licenses. In accordance with the NRC Enforcement Policy section 6.4.d, this is determined to be a Severity Level IV violation and will be recorded as Notice of Violation (NOV) 05000123/2022202-01.

With the exception noted above, the inspector found that the licensee’s training was conducted and documented in accordance with their NRC-approved requalification and training program, and that the license operators requalification records were maintained.

c. Conclusion

The inspector found that contrary to 10 CFR 55.21 three operators failed to meet the conditions of their license by not receiving a biannual medical examination from a physician.

With the exception noted above, the inspector determined that the operator requalification program was conducted and completed in accordance with the NRC-approved program and regulatory requirements.

3. **Surveillance and Limiting Conditions for Operation**

a. Inspection Scope (IP 69001, Section 02.05)

The inspector observed completion of a weekly checklist. The inspector also reviewed the following to verify compliance with TS 3.0 and to determine if surveillance tests were performed as required by TS 4.0:

- SOP: 102, "Pre-startup Checklist Procedure," dated February 22, 2022
- SOP: 108, "Weekly Check," dated February 28, 2022
- SOP: 302, "Inspection of Control Rods," dated December 31, 2011
- SOP: 800, "Annual Checklist," dated May 25, 2022
- select pre-startup checklists, 2020-present
- select weekly surveillance checklists, 2020-present
- annual checklists, 2020-present
- select "Permanent Log Book" entries, 2020-present

b. Observations and Findings

Missouri University of Science and Technology Research Reactor TS section 4.1.1, "Excess Reactivity, Rod Worth, and Shutdown Margin Measurements," states that excess reactivity, control rod worth, and shutdown margin shall be measured following a change in core configuration.

Contrary to the above, the licensee changed core configuration without measuring excess reactivity, control rod worth, and shutdown margin 11 times between September 13, 2021, and the date of this inspection.

The inspector identified that the licensee only measured these parameters for changes to a new core configuration. As such, the parameters were not measured following 11 changes in core configuration, which was not in compliance with surveillance requirement 4.1.1. In accordance with the NRC Enforcement Policy section 6.1.d, this is determined to be a Severity Level IV violation and will be recorded as NOV 05000123/2022202-02.

With the exception noted above, the inspector found that the surveillance tests were completed as required by the TS and the LCO verifications were completed on schedule and in accordance with the licensee's procedures.

c. Conclusion

The inspector found that contrary to the surveillance requirement 4.1.1, the licensee changed core configurations multiple times without measuring excess reactivity, control rod worth, and shutdown margin afterwards.

With the exception noted above, the inspector determined that surveillances were conducted and LCO were maintained in accordance with the TS requirements.

4. Design Changes

a. Inspection Scope (IP 69001, Section 02.08)

The inspector reviewed the following to ensure that modifications to the facility were made in accordance with the requirements of 10 CFR 50.59, "Changes, tests and experiments," and TS:

- SOP: 310, "10 CFR 50.59 Changes, Tests, and Experiments," dated July 17, 2017
- select meeting minutes from 2020-present

- progress reports for the Missouri University of Science and Technology's research Reactor from 2020-present
- select equipment discrepancy reports, 2020-present

b. Observations and Findings

The inspector found that the design changes were reviewed and approved as required by 10 CFR 50.59. The inspector also found that the performance of modified equipment and the procedures and drawings related to that equipment met regulatory, TS, and licensee procedural requirements.

c. Conclusion

The inspector determined that the design changes were conducted in accordance with TS, procedural, and NRC regulatory requirements.

5. Emergency Planning

a. Inspection Scope (IP 69001, Section 02.10)

The inspector reviewed the following selected portions of the licensee's emergency preparedness program to verify compliance with Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," and the licensee's emergency plan:

- "Emergency Plan for Missouri Science and Technology Nuclear Reactor Facility," dated March 2, 2022
- evacuation drill records, 2020-present
- annual emergency plan training records, 2020-present
- SOP: 501, "Emergency Procedures for Reactor Building Evacuation," dated August 1, 2017
- SOP: 502, "Emergency Procedures for an Unusual Event," dated July 31, 2017
- SOP: 503, "Emergency Procedures for an Alert," dated August 1, 2017
- SOP: 505, "Enhanced Reactor Security," dated July 31, 2017
- SOP: 506, "Bomb Threat," dated July 31, 2017
- SOP: 507, "Emergency Procedures - Administrative Responsibilities," dated March 8, 2022

b. Observations and Findings

The inspector found that the emergency plan training was conducted, drills were performed, emergency response call lists were maintained and posted, and emergency equipment was maintained and available as required by the emergency plan and licensee procedures.

c. Conclusion

The inspector determined that the emergency preparedness program was conducted in accordance with the emergency plan.

6. Maintenance Logs and Records

a. Inspection Scope (IP 69001, Section 02.11)

The inspector reviewed the following selected maintenance logs and records to verify compliance with the requirements of TS:

- select equipment discrepancy reports, 2020-present
- select "Permanent Log Book" entries, 2020-present

b. Observations and Findings

The inspector found that scheduled and unscheduled preventive and corrective maintenance activities were performed and documented in accordance with TS requirements and the licensee's administrative procedures.

c. Conclusion

The inspector determined that the maintenance activities were performed and documented in accordance with the TS requirements.

7. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001, Section 02.12)

The inspector reviewed the following fuel handling logs and activities to verify compliance with TS requirements:

- SOP: 205, "Fuel Management," dated February 19, 2021
- SOP: 207, "Fuel Handling," dated August 7, 2015
- "Transfer Order Forms," 2020-present
- "MSTR Core and Rack Storage Forms," 2020-present
- select "Permanent Log Book" entries, 2020-present
- core loading and fuel rack maps

b. Observations and Findings

The inspector found that the fuel handling activities were conducted and documented in accordance with the TS requirements and the licensee's procedural requirements.

c. Conclusion

The inspector determined that the fuel movements and inspections were conducted in accordance with the TS and licensee's procedural requirements.

8. Exit Interview

The inspection scope and results were summarized on June 9, 2022, with members of licensee management and staff. The inspector described the areas inspected and discussed the inspection results.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

E. Taber	Reactor Manager
J. Graham	Facility Director
A. Skye	Senior Reactor Operator

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors
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ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000123/2022202-01 Contrary to Title 10 of the *Code of Federal Regulations* 55.21, "Medical examination," three operators failed to meet the conditions of their license by not receiving a biannual medical examination from a physician.

05000123/2022202-02 Contrary to surveillance requirement 4.1.1, the licensee changed core configurations multiple times without measuring excess reactivity, control rod worth, and shutdown margin afterwards.

Closed

None

Discussed

None