

February 12, 2018

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

SUBJECT: MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY – NUCLEAR  
REGULATORY COMMISSION ROUTINE INSPECTION REPORT  
NO. 50-123/2017-201

Dear Mr. Reisner:

From October 2-4, 2017, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Missouri University of Science and Technology. The enclosed report documents the inspection results, which were discussed on October 4, 2017, 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 inspectors reviewed selected procedures and records, observed various activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

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

If you have any questions concerning this inspection, please contact Mr. Anthony J. Mendiola at 301-415-1054 or by electronic mail at [Anthony.Mendiola@nrc.gov](mailto:Anthony.Mendiola@nrc.gov).

Sincerely,

***/RA Elizabeth Reed for/***

Anthony J. Mendiola Chief  
Research and Test Reactors Oversight Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

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

Enclosure:  
As stated

cc: w/enclosure: See next page

cc:

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SUBJECT: MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY – NUCLEAR  
REGULATORY COMMISSION ROUTINE INSPECTION REPORT  
NO. 50-123/2017-201 DATE: FEBRUARY 12, 2018

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<b>DATE</b>	2/6/18	2/6/18	2/12/18

**OFFICIAL RECORD COPY**

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

Docket No: 50-123

License No: R-79

Report No: 50-123/2017-201

Licensee: Missouri University of Science and Technology

Facility: Nuclear Reactor Facility

Location: Rolla, MO

Dates: October 2-4, 2017

Inspector: Ossy Font

Approved by: Anthony J. Mendiola, Chief  
Research and Test Reactors Oversight Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

### Missouri University of Science and Technology Nuclear Regulatory Commission Report No. 50-123/2017-201

The primary focus of this routine, announced inspection of facility operations was the onsite review of selected aspects of the Missouri University of Science and Technology Class II Research Reactor facility safety programs including: (1) procedures; (2) experiments; (3) health physics; (4) design changes; (5) committees, audits, and reviews; and (6) transportation. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with U.S. Nuclear Regulatory Commission (NRC) requirements.

#### Procedures

- Written procedures were being maintained in accordance with technical specifications (TS) requirements.

#### Experiments

- Reactor experiments were being performed in accordance with the requirements of the TS.

#### Health Physics

- The radiation safety program was commensurate with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20 requirements, TS, and procedures.

#### Design Changes

- The review and evaluation of changes satisfied NRC requirements specified in 10 CFR 50.59.

#### Committees, Audit and Reviews

- The radiation safety committee continued to perform independent oversight in accordance with TS requirements.

#### Transportation

- The licensee did not ship any radioactive material under the Facility Operating License No. R-79 since the previous transportation inspection.

## **REPORT DETAILS**

### **Summary of Plant Status**

The Missouri University of Science and Technology Reactor (MSTR, or the licensee) 200 kilowatts (thermal) pool-type research reactor continues to be operated in support of graduate and undergraduate instruction, laboratory experiments, reactor operator training, and various forms of research. During the inspection, the reactor was not operated due to equipment problems requiring the ordering of replacement parts.

### **1. Procedures**

#### **a. Inspection Scope (Inspection Procedure (IP) 69001)**

To ensure that the requirements of technical specification (TS) Section 6.4, "Operating Procedures," and TS Section 6.2.3, "Review Function," were being met, the inspector reviewed:

- MSTR standard operating procedure (SOP) 100, "Preamble," dated September 10, 2009
- MSTR SOP-101, "General Operations Procedure," dated November 19, 2009
- MSTR SOP-102, "Pre-Startup Checklist," dated June 16, 2017
- MSTR SOP-103, "Reactor Startup to Low Power," dated December 30, 2009
- MSTR SOP-104, "Reactor Power Changes and Stable Operations," dated February 9, 2012
- MSTR SOP-105, "Reactor Shutdown and Securing," dated June 16, 2017
- MSTR SOP 310, "Facility Modifications," May 21, 2015
- MSTR SOP 702, "Irradiation Request Forms [IRF]," dated August 9, 2016
- MSTR Annual Progress Report for the past two years
- Reactor Safety Committee (RSC) meeting minutes for the past two years

#### **b. Observations and Findings**

The inspector reviewed a number of procedures, including new revisions, and found that they met the requirements of the TS and that the RSC was reviewing changes.

Additionally, there is a requirement for licensed operators to review and acknowledge new procedure revisions prior to operating the reactor or within one month from the revision. This was being done by active operators.

#### **c. Conclusion**

Written procedures were being maintained in accordance with TS requirements.

## 2. Experiments

### a. Inspection Scope (IP 69001)

To ensure that the requirements of TS Section 3.7, "Experiments," and TS Section 6.5, "Experiments Review and Approval," were being met, the inspector reviewed:

- File of completed IRF for the past two years  
Permanent Reactor Logbook #18
- MSTR SOP 702, "Irradiation Request Forms," dated August 9, 2016
- MSTR Annual Progress Report for the past two years
- RSC meeting minutes for the past two years

### b. Observations and Findings

The inspector observed the regulating rod calibration lab and reviewed a random sampling of forms for experiments performed since the previous inspection. The inspector found that experiments were generally being reviewed, updated, and performed in accordance with TS requirements and the licensee's written procedures.

### c. Conclusion

Reactor experiments were being performed in accordance with the requirements of the TS.

## 3. Health Physics

### a. Inspection Scope (IP 69001)

To ensure that the requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," 10 CFR Part 20, "Standards for Protection against Radiation," and TS Section 3.6, "Radiation Monitoring Systems and Radioactive Effluents," and TS Section 4.6, "Radiation Area Monitors and Radioactive Effluents," were being met, the inspector reviewed:

- MSTR SOP 615, "Radiation Work Permits," dated November 18, 2014
- "Missouri S&T Monthly Reactor Health Physics Audit"
- "Missouri S&T Annual Ar-41 Release Verification," dated October 27, 2014
- "Statement of Training and Experience for Use of Radiation Sources," release records for the past two years
- "2016 Audit of the "Missouri S&T Radiation Protection and A.L.A.R.A. Program," dated January 20, 2017
- Dosimeter calibration reports for the past two years
- Survey meter calibration records for the past two years
- Personal and environmental dosimetry records for the past two years
- MSTR Annual Progress Report for the past two years



b. Observations and Findings

The inspector reviewed procedures and records, observed postings and dosimetry use during facility tours, and interviewed facility personnel, including discussing the radiation protection training program. Additionally, the inspector reviewed, survey and calibrations records as well as audit reports and found they were completed at the required frequency. The inspector also reviewed the personal and environmental dosimetry records and the by-product air and water release and water analysis records and found they were all below regulatory limits. The inspector determined that the licensee's radiation protection program is adequately implemented.

c. Conclusion

The radiation protection program was effective and in compliance with TS and regulatory requirements.

**4. Design Changes**

a. Inspection Scope (IP 69001)

To ensure that the requirements of 10 CFR 50.59, "Changes, Tests, and Experiments," and the licensee's administrative procedures were being met, the inspector reviewed:

- Permanent Logbook #18
- MSTR Annual Progress Report for the past two years
- RSC meeting minutes for the past two years
- MSTR SOP-310, "Facility Modifications," dated July 17, 2017
- Facility Design Change Notebook
- "50.59 Screen and Evaluation of Installation of the Digital Recorders"
- "Paperless Temperature/CAM Recorder," No. 17-01, dated July 24-2017

b. Observations and Findings

The facility recently changed and installed a digital recorder. The temperature and constant air monitor paper recorders were replaced with a digital recorder to eliminate the cost of paper. The inspector reviewed the 10 CFR 50.59, screening and evaluation and determined they were properly done. Testing was performed on August 10, 2017, as part of maintenance activities.

c. Conclusion

The review and evaluation of changes satisfied NRC requirements specified in 10 CFR 50.59.

## **5. Committees, Audits and Reviews**

### **a. Inspection Scope (IP 69001-02.09)**

To ensure that the requirements of TS Section 6.2, "Review and Audit," were being met, the inspector reviewed:

- MSTR Annual Progress Report for the past two years
- RSC meeting minutes for the past two years
- "Missouri S&T Monthly Reactor Health Physics Audit" "2016 Audit of the "Missouri S&T Radiation Protection and A.L.A.R.A. Program," dated January 20, 2017
- Annual audits for the past two years

### **b. Observations and Findings**

The licensee used a single independent oversight safety committee to fill requirements for both the reactor license and the campus byproduct material license. The committee meet quarterly but is only required to meet annually by TS Section 6.2.2, "Charter and Rules." The Reactor Manager briefed the committee each quarter on matters relating to reactor safety.

The inspector reviewed the meeting minutes as well as the annual audits and found that the committee was performing its oversight duties appropriately.

### **c. Conclusion**

The RSC continued to perform independent oversight in accordance with TS requirements.

## **6. Transportation**

### **a. Inspection Scope (IP 86740)**

To ensure compliance with regulatory and procedural requirements for transferring or shipping licensed radioactive material, the inspectors reviewed the following:

- Radioactive waste disposal records for the past two years
- Radioactive material shipper certificate

### **b. Observations and Findings**

The inspector reviewed the file for radioactive shipments made under the reactor license No. R-79 and found that there were no shipments made since the previous transportation inspection. The licensee did transfer radioactive waste to the University Materials License and allow the Health Physics Department personnel to remove the waste from the reactor facility.

Additionally, the inspector verified that the shipper re-training had been completed within the past three years.

c. Conclusion

The licensee did not ship any radioactive material under the reactor license No. R-79 since the previous transportation inspection.

**7. Exit Interview**

The inspection scope and results were summarized on October 4, 2017, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. The licensee acknowledged the results of the inspection.

### **PARTIAL LIST OF PERSONS CONTACTED**

C. Reisner	Interim Reactor Manager
A. Alchin	Electronics Technician and Senior Reactor Operator
M. Bresnahan	Director of Environmental Health and Safety

### **INSPECTION PROCEDURE (IP) USED**

IP 69001	Class II Non-Power Reactors
IP 86740	Inspection of Transportation Activities

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

Open

None

Closed

None

Discussed

None

### **PARTIAL LIST OF ACRONYMS USED**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
IP	Inspection Procedure
IRF	Irradiation Request Form
MSTR	Missouri University of Science and Technology Reactor
NRC	U.S. Nuclear Regulatory Commission
SOP	Standard Operating Procedure
TS	Technical Specification
RSC	Reactor Safety Committee