

September 16, 2015

Mr. William E. Bonzer, Reactor Manager  
Missouri University of Science and Technology  
Nuclear Reactor Facility  
1870 Miner Circle  
Rolla, MO 65409-0630

SUBJECT: MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY - NRC ROUTINE  
INSPECTION REPORT NO. 50-123/2015-201

Dear Mr. Bonzer:

From August 17-20, 2015, the U.S. Nuclear Regulatory Commission (NRC or the Commission) conducted an inspection at your Nuclear Reactor Facility (Inspection Report No. 50-123/2015-201). The enclosed report documents the inspection results, which were discussed on August 20, 2015, with you and members of your staff.

This inspection was an examination of 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 activities, and interviewed personnel. Based on the results of the inspection, no findings of non-compliance with NRC requirements were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public inspections, exemptions, and requests for withholding," 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 component of NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>. If you have any questions concerning this inspection, please contact Mr. Mike Morlang at 301-415-4092 or [Gary.Morlang@nrc.gov](mailto:Gary.Morlang@nrc.gov).

Sincerely,

/RA/

Kevin Hsueh, Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

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

Enclosure:  
NRC Inspection Report No. 50-123/2015-201

cc: See next page

University of Missouri - Rolla

Docket No. 50-123

cc:

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

Planner, Department of Health and Senior Services  
Section for Environmental Public Health  
930 Wildwood Drive, P.O. Box 570  
Jefferson City, MO 65102-0570

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

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

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

Mr. William E. Bonzer, Reactor Manager  
Missouri University of Science and Technology  
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U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No: 50-123

License No: R-79

Report No: 50-123/2015-201

Licensee: Missouri University of Science and Technology

Facility: Nuclear Reactor Facility

Location: Rolla, Missouri

Dates: August 17-20, 2015

Inspector: Mike Morlang

Approved by: Kevin Hsueh, Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

Missouri University of Science and Technology  
Report No.: 50-123/2015-201

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

### Operations Logs and Records

- Operations logs and records were being maintained in accordance with Technical Specifications Section 6.8, "Records."

### Requalification Training

- The licensee's reactor operator requalification program was found to be effectively implemented pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55.

### Surveillance and Limiting Conditions for Operation

- The licensee was complying with the Technical Specifications requirements pertaining to surveillance and limiting conditions for operation.

### Emergency Planning

- The emergency preparedness program was being implemented and conducted in accordance with the facility's Emergency Plan.

### Maintenance Logs and Records

- Maintenance records and performance satisfied Technical Specifications and procedural requirements.

### Design Changes

The licensee maintained a procedure to process facility changes in accordance with regulatory requirements.

### Fuel Handling Logs and Records

- The licensee was conducting fuel handling activities and maintaining records in a manner consistent with regulatory and license requirements.

ENCLOSURE

## **REPORT DETAILS**

### **Summary of Facility Status**

The Missouri University of Science and Technology 200 kW pool-type research reactor (MSTR) continued to be operated in support of graduate and undergraduate instruction, laboratory experiments, reactor operator training, and various forms of research.

#### **1. Operations Logs and Records**

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

The inspector reviewed the following reactor operations records to ensure compliance with the requirements of Technical Specifications Section 6.8, "Records":

- MSTR Standard Operating Procedure (SOP)-102, "Pre-Startup Checklist," dated January 21, 2011
- 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
- Reactor Console Logbook #17 and #18, from September 26, 2013, to present
- MSTR SOP-105, "Reactor Shutdown Checklist," dated September 9, 2013
- MSTR SOP-107, "Permanent Hourly Logs and Operational Data," dated January 3, 2008
- MSTR Annual Progress Report for April 1, 2013, to March 31, 2014
- MSTR Annual Progress Report for April 1, 2014, to March 31, 2015
- MSTR Technical Specifications, dated March 30, 2009

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

All evolutions including maintenance and unplanned scrams were documented in the console logbook. Procedures covering reactor operations were being updated on a routine basis. Reactor operations were carried out following written procedures and Technical Specifications requirements. The inspector reviewed the logs and records related to reactor operations and confirmed that Technical Specifications operational limits had not been exceeded.

##### **c. Conclusion**

Operations logs and records were being maintained in accordance with Technical Specifications Section 6.8, "Records."

## 2. **Requalification Training**

### a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55 requirements for reactor operator requalification were being met:

- Reactor Console Logbook #17 and #18, from September 26, 2013, to present
- Operator Requalification Program for the University of Missouri-Rolla Reactor, Rev. 3, dated August 20, 2004
- MSTR Requalification Files for Individual Operators
- 2014 MSTR Operator's Requalification Test
- 2014 and 2015 Reactor Operator's Requalification Sheets
- MSTR file of Operator Form 396 for 2013 and 2014
- MSTR Technical Specifications, dated March 30, 2009

### b. Observations and Findings

There were three U.S. Nuclear Regulatory Commission (NRC) licensed senior reactor operators and six licensed reactor operators at the facility. The Requalification Program was maintained up-to-date and the operators' licenses were current. A review of the logs and records showed that training was being conducted in accordance with the licensee's NRC-approved Requalification and Training Program. Individual operator records showed that the required quarterly reactor operations, reactivity manipulations, and other operations activities were being documented as required. Two of the licensed reactor operators were in a suspended status pending retraining after being gone for the summer. The inspector reviewed the biennial medical examinations for all licensed personnel and confirmed that these examinations were being completed as required.

### c. Conclusion

Operator requalification was up-to-date and being performed as required by the MSTR Reactor Operator Requalification Program.

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

### a. Inspection Scope (IP 69001)

The inspector reviewed sections of the following documents to verify that periodic surveillance tests stipulated in Technical Specifications Section 4.0 and limiting conditions for operation specified in Technical Specifications Section 3.0 were being met:

- Reactor Facility Monthly Surveillance Status Report, January 2014 to August 2015

- MSTR SOP-800, "Annual Checklist," dated August 1, 2013, for 2014 and 2015
- MSTR SOP-810, "Weekly Checks," Rev. dated February 21, 2011, for 2014 and 2015
- Reactor Console Logbook #17 and #18, from September 26, 2013, to present
- MSTR Annual Progress Report for April 1, 2013, to March 31, 2014
- MSTR Annual Progress Report for April 1, 2014, to March 31, 2015
- MSTR SOP-806, "Temperature Channel," Rev. dated April 4, 1994
- MSTR SOP-803, "Log Count Rate Calibration," Rev. dated June 7, 1999
- MSTR SOP-804, "Safety Amplifier System," Rev. dated June 7, 2002
- MSTR SOP-816, "Power Calibration," Rev. dated August 30, 1988
- MSTR SOP-813, "Rod Drop Time Measurement," Rev. dated September 5, 2013
- Monthly Ventilation and Confinement Surveillance for 2014 and 2015

b. Observations and Findings

The inspector reviewed surveillance procedures and operating records used to document reactor operations to confirm that activities had been conducted in accordance with the limiting conditions for operation specified in Technical Specifications Section 3.0 and that surveillance testing was completed as required by Technical Specifications Section 4.0. Records were organized and generally maintained in accordance with administrative requirements. Logs and records were clear and easily retrievable and provided an accurate characterization of licensed activities. The licensee had a detailed schedule of surveillance requirements that aided in completion of the various requirements. While only required quarterly, ventilation and confinement surveillance was being conducted monthly.

c. Conclusion

The licensee was complying with the Technical Specifications requirements pertaining to surveillance and limiting conditions for operation.

**4. Emergency Planning**

a. Inspection Scope (IP 69001)

To verify that the licensee was implementing and complying with the NRC-approved Emergency Plan for the MSTR, the inspector reviewed selected aspects of:

- MSTR Emergency Plan, Rev. 7, dated November 1, 2013
- Emergency Plan Semester Evacuation Drill records for 2014 and 2015
- Emergency Box Inventories for 2013, 2014 and through July 2015
- MSTR SOP-501, "Emergency Procedures for Reactor Building Evacuation," Rev. dated December 10, 2009



- MSTR SOP-502, "Emergency Procedures for an Unusual Event," Rev. dated December 28, 1994
- MSTR SOP-503, "Emergency Procedures for an Alert," Rev. dated October 13, 2014
- MSTR SOP-504, "Emergency Procedures for a Site Area Emergency," Rev. dated December 28, 1994
- MSTR SOP-506, "Emergency Procedure for Bomb Threats," Rev. dated December 28, 1994
- MSTR SOP-507, "Emergency Procedures - Administrative Responsibilities," Rev. dated January 3, 2008
- MSTR SOP-508, "Emergency Procedure for Tornado Threat," Rev. dated May 13, 1999
- MSTR SOP-509, "Emergency Procedure for a Fire," Rev. dated April 7, 1998
- MSTR SOP-510, "Emergency Procedure for Earthquake," Rev. dated December 28, 1994
- Mutual Aid and Assistance Agreement between Phelps County Regional Medical Center, Rolla Fire Department, and Missouri University of Science and Technology, dated June 25, 2009

b. Observations and Findings

Section 10 of the MSTR Emergency Plan requires that building evacuation drills be held each regular semester due to the large turnover in student participation in reactor lab classes. The inspector reviewed evacuation drill records, annual table top discussion minutes, and training records to verify that annual emergency response training was conducted as required by the Emergency Plan. The inspector confirmed that notification procedures and phone numbers were current and posted (dated May 21, 2015). Emergency equipment was kept in several locations and inventoried on an annual basis.

c. Conclusion

The emergency preparedness program was being implemented and conducted in accordance with the facility's Emergency Plan.

**5. Maintenance Logs and Records**

a. Inspection Scope (IP 69001)

To verify compliance with maintenance procedure requirements of Technical Specifications Section 6.4 and maintenance record requirements of Technical Specifications Section 6.8.1, the inspector reviewed:

- Surveillance file for 2013, 2014, and to date in 2015
- Equipment Discrepancy Report files for 2011, 2012, and 2013
- Reactor Console Logbook #17 and #18, from September 26, 2013, to present

- MSTR Annual Progress Report for April 1, 2013, to March 31, 2014
- MSTR Annual Progress Report for April 1, 2014, to March 31, 2015

b. Observations and Findings

The licensee maintained a detailed equipment deficiency file subdivided by individual system, such as rod drives, safety systems, and pneumatic systems. The detail of the entries allowed immediate retrieval of important information, such as part numbers. Preventative maintenance was well controlled and documented in the surveillance files and the permanent console logbooks. Completed maintenance items were marked in red in the console log book, making them easy to identify.

c. Conclusion

Maintenance records and performance satisfied Technical Specifications and procedural requirements.

**6. Design Changes**

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that if design changes were made, they were reviewed and approved in accordance with 10 CFR 50.59, the Technical Specifications, and the licensee's administrative procedures:

- Reactor Console Logbook #17 and #18, from September 26, 2013, to present
- MSTR Annual Progress Report for April 1, 2013, to March 31, 2014
- MSTR Annual Progress Report for April 1, 2014, to March 31, 2015
- Facility Design Change Notebook
- Radiation Safety Committee Meeting Minutes for 2013, 2014 and 2015
- MSTR SOP-310, "Facility Modifications," Rev. dated April 28, 1997

b. Observations and Findings

The licensee had not made any changes to the facility since the last inspection in this area.

c. Conclusion

The licensee maintained a procedure to process facility changes in accordance with regulatory requirements.

## **7. Fuel Handling Logs and Records**

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

To verify compliance with regulatory and license requirements, the inspector reviewed:

- MSTR SOP-207, "Fuel Handling," Rev. dated August 7, 2015
- MSTR SOP-112, "Fuel Management," Rev. dated February 6, 1997
- Reactor Console Logbook #18 entries regarding fuel movements on September 19, 2014
- MSTR Annual Progress Report for April 1, 2013, to March 31, 2014
- MSTR Annual Progress Report for April 1, 2014, to March 31, 2015
- Core Loading and Fuel Rack Maps posted in the reactor bay

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

The inspector reviewed records of fuel movements that were done on the date specified above. These fuel movements were part of the procedure for control rod annual inspection. The fuel transfer forms, which are part of the standard procedure, were verified against the console log and the core maps for accuracy. Serial numbers were verified during fuel moves and a physical inventory was completed following completion of the fuel moves.

### **c. Conclusion**

The licensee was conducting fuel handling activities and maintaining records in a manner consistent with regulatory and license requirements.

## **8. Follow-up Item**

Inspector follow-up item (IFI) 50-123/2012-201-1 to ensure pen and ink changes to procedures are reviewed and approved by the Reactor Safety Committee was discussed and will remain open until all procedures with pen and ink changes are updated.

## **9. Exit Interview**

The inspection scope and observations were summarized with members of licensee management and staff at an exit meeting held on August 20, 2015. 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**

W. Bonzer	Reactor Manager
M. Henry	Senior Administrative Assistant, Missouri University of Science and Technology
A. Alchin	Electronics Technician and Senior Reactor Operator
C. Reisner	Training Coordinator and Senior Reactor Operator

**INSPECTION PROCEDURE USED**

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

Open

None

Closed

None

Discussed

50-123/2012-201-1	IFI	Follow-up item to ensure pen and ink changes to procedures are reviewed and approved by the Reactor Safety Committee
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**PARTIAL LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
IP	Inspection Procedure
MSTR	Missouri University of Science and Technology Reactor
NRC	U.S. Nuclear Regulatory Commission
Rev	Revision
SOP	Standard Operating Procedure