

November 5, 2013

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.: 50-123/2013-201

Dear Mr. Bonzer:

From September 24–26, 2013, the U.S. Nuclear Regulatory Commission (NRC or the Commission) conducted an inspection at your Nuclear Reactor Facility (Inspection Report No. 50-123/2013-201). The enclosed report documents the inspection results, which were discussed on September 26, 2013, and during a telephone conference call on October 8, 2013, with you and members of your staff.

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. Based on the results of this inspection, no safety concerns or non-compliances 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 (PARS) 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 Mike Morlang at 301-415-4092 or Gary.Morlang@nrc.gov.

Sincerely,

/RA/

Gregory T, Bowman, 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.: 50-123/2013-201

cc: Please see next page

University of Missouri - Rolla

Docket No. 50-123

cc:

Homeland Security Coordinator
Missouri Office of Homeland Security
P.O. Box 749
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Planner, Dept of Health and Senior Services
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930 Wildwood Drive, P.O. Box 570
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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

If you have any questions concerning this inspection, please contact Mike Morlang at 301-415-4092 or Gary.Morlang@nrc.gov.

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

Docket No: 50-123

License No: R-79

Report No: 50-123/2013-201

Licensee: Missouri University of Science and Technology

Facility: Nuclear Reactor Facility

Location: Rolla, Missouri

Dates: September 24–26, 2013

Inspector: Mike Morlang

Approved by: Gregory T. Bowman, 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.: 50-123/2013-201

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) operating logs and records, (2) requalification training, (3) surveillance and limiting conditions for operations, (4) emergency planning, (5) maintenance logs and records, (6) design changes, and (7) fuel handling logs and records. The licensee's programs were acceptably directed toward the protection of public health and safety and were in compliance with U.S. Nuclear Regulatory Commission (NRC) requirements.

Operations Logs and Records

- Operating logs and records were being maintained in accordance with Technical Specification 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 Specification 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 Emergency Plan.

Maintenance Logs and Records

- The licensee was meeting Technical Specification requirements pertaining to preventative and corrective maintenance of equipment.

Design Changes

- The review and evaluation of changes to facilities and procedures satisfied NRC requirements specified in 10 CFR 50.59. One unresolved item was identified associated with a modification made to the reactor's rod control and position indication system.

Fuel Handling Logs and Records

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

REPORT DETAILS

Summary of Plant 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 Specification 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, from October 3, 2011, 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, 2011, to March 31, 2012
- MSTR Annual Progress Report for April 1, 2012, to March 31, 2013
- MSTR Technical Specifications, dated March 30, 2009

b. Observations and Findings

All evolutions including maintenance and unplanned scrams were documented in the console logbook. As indicated above procedures covering reactor operations were being updated on a routine basis. Reactor operations were carried out following written procedures and Technical Specification requirements. The inspector reviewed the logs and records related to reactor operations and confirmed that they indicated that Technical Specification operational limits had not been exceeded. The inspector observed the licensee complete the pre-startup checklist, startup the reactor to 10 watts, and shutdown the reactor.

c. Conclusions

Operating 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, from October 3, 2011, to present
- Operator Requalification Program for the University of Missouri-Rolla Reactor, Rev. 3, August 20, 2004
- MSTR Requalification Files for Individual Operators
- 2012 MSTR Operator's Requalification Test
- 2012 and 2013 Reactor Operator's Requalification Sheets
- MSTR file of Operator Form 396 for 2012
- MSTR Technical Specifications, dated March 30, 2009

b. Observations and Findings

There were four U.S. Nuclear Regulatory Commission (NRC) licensed senior 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. As only one senior reactor operator had a license longer than 2 years, there was only one biennial written exam conducted. The inspector reviewed the biennial medical examinations for all licensed personnel and confirmed that these examinations were being completed as required.

c. Conclusions

Operator requalification was up-to-date and was 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 Specification Section 4.0 and limiting conditions for operation specified in Technical Specification Section 3.0 were being met:

- Reactor Facility Monthly Surveillance Status Report, July 2011 to June 2013
- MSTR SOP-800, "Annual Checklist," dated August 1, 2013, for 2011 and 2012

- MSTR SOP-810, "Weekly Checks," Rev. February 21, 2011, for 2012 and 2013
- Reactor Console Logbook #17, from October 3, 2011, to present
- MSTR Annual Progress Report for April 1, 2011, to March 31, 2012
- MSTR Annual Progress Report for April 1, 2012, to March 31, 2013
- MSTR SOP-806, "Temperature Channel," Rev. April 4, 1994
- MSTR SOP-803, "Log Count Rate Calibration," Rev. June 7, 1999
- MSTR SOP-804, "Safety Amplifier System," Rev. June 7, 2002
- MSTR SOP-816, "Power Calibration," Rev. August 30, 1988
- MSTR SOP-813, "Rod Drop Time Measurement," Rev. September 5, 2013
- Monthly Ventilation and Confinement Surveillance for 2011, 2012 and 2013

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 Specification Section 3.0 and that surveillance testing was completed as required by Technical Specification Section 4.0. Records were organized and were 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. Although only required quarterly, ventilation and confinement surveillance was being conducted monthly.

c. Conclusions

The licensee was complying with the Technical Specification 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. 6, dated December 30, 1994
- Emergency Plan semester Evacuation Drill records for 2012 and 2013
- Emergency Box Inventory for 2011 through 2013
- MSTR SOP-501, "Emergency Procedures for Reactor Building Evacuation," Rev. December 10, 2009
- MSTR SOP-502, "Emergency Procedures for an Unusual Event," Rev. December 28, 1994
- MSTR SOP-503, "Emergency Procedures for an Alert," Rev. December 28, 1994

- MSTR SOP-504, "Emergency Procedures for a Site Area Emergency," Rev. December 28, 1994
- MSTR SOP-506, "Emergency Procedure for Bomb Threats," Rev. December 28, 1994
- MSTR SOP-507, "Emergency Procedures - Administrative Responsibilities," Rev. January 3, 2008
- MSTR SOP-508, "Emergency Procedure for Tornado Threat," Rev. May 13, 1999
- MSTR SOP-509, "Emergency Procedure for a Fire," Rev. April 7, 1998
- MSTR SOP-510, "Emergency Procedure for Earthquake," Rev. 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 September 13, 2013). Emergency Plan support agreements with off-site response organizations were current. Emergency equipment was kept in several locations and inventoried on a semi-annual basis.

c. Conclusions

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 Specification Section 6.4 and maintenance record requirements of Technical Specification Section 6.8.1, the inspector reviewed:

- Surveillance file for 2011, 2012, and 2013
- Equipment Discrepancy Report files for 2011, 2012, and 2013
- Reactor Console Logbook #17, October 3, 2011, to present
- MSTR Annual Progress Report for April 1, 2011, to March 31, 2012
- MSTR Annual Progress Report for April 1, 2012, to March 31, 2013

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 easier to identify.

c. Conclusions

Maintenance records and performance satisfied Technical Specification 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, October 3, 2011, to present
- MSTR Annual Progress Report for April 1, 2011, to March 31, 2012
- MSTR Annual Progress Report for April 1, 2012, to March 31, 2013
- Facility Design Change Notebook
- Radiation Safety Committee Meeting Minutes for 2011, 2012 and 2013
- MSTR SOP-310, "Facility Modifications," Rev. April 28, 1997

b. Observations and Findings

The licensee had installed new control rod drive motors in August 2013. Part of the installation involved the removal of analog control rod position indication and the installation of a programmable logic controller to show the control rod positions on one digital display screen. The licensee had reviewed this design change under the requirements in 10 CFR 50.59, and concluded that the change did not require prior NRC approval. The design change review had been conducted as directed by procedure and had been reviewed and approved by the Reactor Safety Committee. However, during the inspection, the inspector discussed with the licensee whether the modification had introduced the possibility of a common cause failure associated with control rod position indication, and whether the newly installed equipment met NRC requirements for verification and validation to ensure it was of high quality. This issue was also discussed during a conference call with the licensee and other NRC staff members on October 8, 2013. The licensee was informed that this issue will be tracked as an unresolved item and that it will be reviewed and dispositioned during a future inspection (Unresolved Item 50-123/2013-201-1).

c. Conclusions

The licensee maintained a procedure to process facility changes in accordance with regulatory requirements. Unresolved Item 50-123/2013-201-1 was opened to review the licensee's evaluation of a facility modification to install new control

rod drive motors and control rod position indication to ensure these changes had been implemented appropriately and in accordance with NRC 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. February 6, 1997
- MSTR SOP-112, "Fuel Management," Rev. February 6, 1997
- Reactor Console Logbook #17 entries regarding fuel movements from June 4–23, 2013, and September 7–12, 2013
- MSTR Annual Progress Report for April 1, 2011, to March 31, 2012
- MSTR Annual Progress Report for April 1, 2012, to March 31, 2013
- 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 dates specified above. These fuel movements were part of the procedure for control rod drive motor replacement. 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. Exit Interview

The inspection scope and observations were summarized with members of licensee management and staff at an exit meeting held on September 26, 2013, and during a telephone conference call held on October 8, 2013. 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

R. Bono	Director of Environmental Health and Safety and Radiation Safety Officer
W. Bonzer	Reactor Manager
M. Henry	Senior Administrative Assistant, Missouri University of Science and Technology
R. Kendrick	Electronics Technician

INSPECTION PROCEDURE USED

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

Open

50-123/2013-201-1	URI	Review the modification to install new rod control and position indication system to ensure compliance with NRC requirements
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Closed

None

Discussed

None

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