May 24, 2010

Mr. Ralph Butler, Director
Research Reactor Center
University of Missouri-Columbia
Research Park
Columbia, MO 65211

SUBJECT: UNIVERSITY OF MISSOURI-COLUMBIA RESEARCH REACTOR – NRC NON-ROUTINE INSPECTION REPORT NO. 50-186/2010-203

Dear Mr. Butler:

On April 25–26, 2010, the U.S. Nuclear Regulatory Commission (NRC, the Commission) completed an unannounced non-routine inspection at the University of Missouri-Columbia Research Reactor (Inspection Report No. 50-186/2010-203). The enclosed report documents the inspection results, which were discussed on April 26, 2010, with Les Foyto, Reactor Manager, and other 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 observed various activities, interviewed personnel, and reviewed a few selected procedures and records. 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 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).

Should you have any questions concerning this inspection, please contact Craig Bassett at 404-358-6515 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/

Johnny H. Eads, Jr., Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report No. 50-186/2010-203
cc w/encl: Please see next page

University of Missouri-Columbia Docket No. 50-186

cc:

John Ernst, Associate Director
Regulatory Assurance Group
Research Reactor Facility
Columbia, MO 65211

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

Planner, Dept 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

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OFFICE	PROB:RI	PRPB:LA	PROB:BC
NAME	CBassett (*)	GLappert	JEads
DATE	5/5/2010	5/19/2010	5/24/2010

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

Docket No.	50-186
License No.	R-103
Report No.	50-186/2010-203
Licensee:	University of Missouri-Columbia
Facility:	University of Missouri Research Reactor
Location:	Research Park Columbia, Missouri
Dates:	April 25–26, 2010
Inspector:	Craig Bassett
Accompanied by:	Johnny H. Eads, Jr., Chief
Approved by:	Johnny H. Eads, Jr., Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Missouri-Columbia
University of Missouri Research Reactor
Report No. 50-186/2010-203

The primary focus of this non-routine, unannounced inspection was the onsite observation of selected crew activities at the University of Missouri-Columbia (the licensee's) 10 Megawatt (10MW) Class I research and test reactor. The inspection included observation and/or discussion of the licensee's: 1) organizational structure and staffing, 2) reactor operations, 3) maintenance and surveillance, 4) fuel handling, and 5) procedures. The licensee's activities were determined to be in compliance with the U.S. Nuclear Regulatory Commission (NRC) requirements and were acceptably directed toward the protection of public health and safety. No violations or deviations were identified.

Organizational Structure and Functions

- Shift staffing was consistent with Technical Specification requirements.
- Staffing appeared to be adequate for safe operation of the reactor facility.

Reactor Operations

- Reactor operations were conducted in accordance with written procedure and were acceptable.
- Operations shift turnovers and operator cognizance of facility conditions were acceptable.

Maintenance and Surveillance

- The Work Control Program established and implemented by the licensee was being used to effectively complete maintenance activities at the facility.
- The surveillance program currently in use by the licensee satisfied Technical Specification requirements.

Fuel Handling

- Fuel movements were conducted in accordance with Technical Specification and procedural requirements.

Procedures

- The procedure revision, control, and implementation program satisfied Technical Specifications requirements.

REPORT DETAILS

Summary of Plant Status

The University of Missouri-Columbia Research Reactor (MURR) is typically operated in support of isotope production, silicon irradiation, reactor operator training, and various types of research. During this non-routine inspection, the reactor was operated throughout Sunday evening until it was shutdown early Monday morning for normal weekly refueling and maintenance. The inspector observed licensed activities from 7:00 p.m. Sunday evening, April 25, until 7:00 a.m. Monday morning, April 26, 2010.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure [IP] 69006)

To verify that the licensee was complying with the requirements specified in Section 6.1 of the MURR Technical Specifications (TS), Revision (Rev.) 14, authorized by Amendment No. 34 to the facility operating license, dated October 10, 2008, the inspector reviewed selected aspects of the following:

- MURR organization and staffing
- Staff responsibilities outlined in the TS
- MURR Control Room Logbooks for the week of April 20 - 26, 2010
- MURR Console Watch Logbooks for the week of April 20 - 26, 2010

b. Observations and Findings

Through interviews with operations personnel and observation of crew activities, the inspector determined that the licensee continued to operate with five crews on a four-shift rotation. This allowed time for the “extra” crew to have additional training and procedure review on a rotating basis. Each operating crew was staffed with three or four individuals, with at least three people per shift. Operations shifts continued to be scheduled for a period of 12 hours.

The operations crew observed during this inspection consisted of one Senior Reactor Operator (SRO), referred to at MURR as the Lead SRO (LSRO) and three Reactor Operators (ROs). The inspector noted that there were sufficient personnel on hand to conduct regular shift duties including reactor operation, completing rounds, handling samples, and preparing for and conducting various maintenance and surveillance activities. Also, staffing during the reactor operations observed satisfied the requirements of TS Section 6.1.i.

c. Conclusion

Shift staffing appeared to be adequate for safe operation of the facility and was consistent with the requirements of TS Section 6.1.i.

2. Reactor Operations

a. Inspection Scope (IP 69006)

To verify that the licensee was operating the reactor and communicating plant information in accordance with TS Section 3 and procedural requirements, the inspector reviewed selected portions of the following:

- MURR Control Room Logbook for the week of April 20 - 26, 2010
- MURR Console Watch Logbooks for the week of April 20 - 26, 2010
- Operations Shift Turnover sheets for the week of April 20 - 26, 2010
- MURR Procedure AP-RO-110, "Conduct of Operations," Rev. 14, issued February 13, 2009, and the associated forms, FM-57, "Long Form Startup Checklist," and FM-58, "Short Form Startup Checklist"
- MURR Procedure OP-RO-220, "Reactor Shutdown or Power Reduction," Rev. 5, issued July 2, 2008
- MURR Procedure OP-RO-410, "Pool Coolant System – One Pump Operation," Rev. 9, issued December 29, 2009
- MURR Procedure OP-RO-461, "Primary Coolant System," Rev. 8, issued August 18, 2008
- MURR Preventive Maintenance Procedure SEC-W1, "Communications Check," Rev. dated January 5, 2010

b. Observations and Findings

(1) Crew Activities

As noted above, the inspector observed facility activities from 7:00 p.m. Sunday evening April 25 until 7:00 a.m. Monday morning, April 26, 2010. This included accompanying an operator during routine operations rounds, interviewing crew members, observing a routine reactor shutdown, and observing various other activities. Activities that had been scheduled and that the operations crew planned to complete included:

- Routine reactor operations,
- Shutting down the reactor for maintenance at the prescribed time,
- Conducting a communications check with Campus Police,
- Conducting a check of a detector with the neutron source,
- Removing samples using various sample manipulating tools,
- Refueling the reactor using the procedure developed for the task,
- Logging the diesel generator weekly exercise,
- Relocating a cask inside the containment,
- Conducting an alarm and integrity check,
- Greasing the Cooling Tower (CT) Fans 1 & 2 drive motor bearings,
- Cleaning the CT basin and sump,
- Checking the CT fan bolts for the proper torque,
- Greasing the CT flow distribution control valves, and
- Moving a Control Blade to the DI Room.

Written procedures and checklists were used for each activity as required. The reactor was operated until the prescribed time and then was shut down as required. The various checks and tests were completed in a timely manner. Samples were removed from the reactor and placed in a transfer cask using the appropriate controls and as low as reasonably achievable (ALARA) practices. Refueling was accomplished as required and in accordance with the fuel movement sheets that had been developed for that purpose. The cask was relocated inside containment without incident. It was noted that the reactor operators followed the procedures and were knowledgeable and professional in the conduct of their duties. The inspector also noted that the preparations for the CT work included tagging out various valves and systems to isolate the CT equipment and make it safe to complete the work. The tagouts were completed by one RO and verified by a second RO as required.

(2) Staff Communication

The inspector attended the operations crew shift turnover meeting on Monday morning. The turnover was held at 6:30 a.m. and the status of the reactor and the facility was discussed. All operators of the relief crews reviewed the appropriate logs and records and were briefed on the upcoming shift activities and scheduled events before assuming the operations duty. Through direct observation and records review, the inspector verified that the content of the shift turnover briefing was appropriate and noted that shift activities and plant conditions were discussed in detail.

c. Conclusion

MURR reactor operations, shift turnovers, and operator cognizance of facility conditions during shutdown and maintenance activities, were acceptable.

3. Maintenance and Surveillance

a. Inspection Scope (IP 69006, 69010)

To verify that the licensee was meeting the requirements of their Preventive Maintenance Program and complying with TS requirements concerning the surveillance program, the inspector reviewed selected aspects of:

- Selected MURR Compliance Procedures
- Entries in the “Completed PM’s Notebook”
- “Maintenance List” for Monday, April 26, 2010
- Various “Preventive Maintenance Requirement Cards”
- Selected Compliance Procedure data sheets and records
- Various “Weekly Worklists for Maintenance Shutdown for 2010” kept in the “Maintenance Day Book”
- MURR Procedure GS-RA-100, “MURR Equipment Tag Out,” Rev. 7, issued July 30, 2008

- MURR Operator Aid OA-21, “MURR Maintenance Guidelines,” Rev. 4, issued July 31, 2007

b. Observations and Findings

(1) Maintenance

From previous inspections the inspector determined that the licensee had developed a Work Control Program to handle maintenance activities. The program was designed to ensure that all maintenance activities were screened, planned, and completed as scheduled, that post maintenance testing was conducted, and that the entire process was documented appropriately. As noted previously, all the maintenance activities, including equipment and valve tagouts, observed by the inspector were completed as outlined on the Maintenance List. The program appeared to be very effective.

(2) Surveillance

Various periodic surveillance verifications, including the testing of various reactor systems, checking items of equipment, and checking security systems and alarms, were observed by the inspector. The results reviewed by the inspector were noted to be within the TS and procedurally prescribed parameters.

c. Conclusions

The Work Control Program established and implemented by the licensee was being used effectively to complete maintenance activities at the facility. The surveillance program currently in use by the licensee satisfied TS requirements.

4. Fuel Handling

a. Inspection Scope (IP 69009)

To ensure that the licensee was handling and moving fuel appropriately and completing fuel inspections as required by TS Sections 3.8, 4.1, 4.3, and 5.5, the inspector reviewed selected aspects of the following:

- Fuel Status Board located in the Control Room
- MURR Fuel Status Maps sheets developed by the Assistant Reactor Manager - Physics
- MURR Fuel Movement Sheets developed prior to the fuel movements conducted on the Maintenance Day
- MURR Procedure OP-RO-250, “In-Pool Fuel Handling,” Rev. 11, issued February 13, 2009
- MURR Procedure RP-RO-100, “Fuel Movement,” Rev. 9, issued June 5, 2009

b. Observations and Findings

The inspector observed the fuel movement process and verified that fuel was moved according to established procedure and in accordance with the specific fuel movement sheets developed by the Assistant Reactor Manager-Physics for that core loading. The inspector also noted that fuel movement sheets had been developed for other fuel movements anticipated by the licensee. The inspector noted that proper radiation control and security precautions were taken by the crew as required. Following the completion of the core loading, the inspector also compared the location of fuel elements in the reactor core with the information maintained on the Fuel Status Board in the Control Room, on the current MURR Fuel Status Map, and on the fuel movement sheet for the that core. No problems or anomalies were noted.

c. Conclusion

Fuel movements were conducted in accordance with TS and procedural requirements.

5. Procedures

a. Inspection Scope (IP 69008)

To verify compliance with TS Sections 6.1.b and 6.1.c, the inspector reviewed selected portions of the following:

- MURR Procedure AP-RO-110, “Conduct of Operations,” Rev. 14, issued February 13, 2009, and the associated forms, FM-57, “Long Form Startup Checklist,” and FM-58, “Short Form Startup Checklist”
- MURR Procedure OP-RO-220, “Reactor Shutdown or Power Reduction,” Rev. 5, issued July 2, 2008
- MURR Procedure OP-RO-410, “Pool Coolant System – One Pump Operation,” Rev. 9, issued December 29, 2009
- MURR Procedure OP-RO-461, “Primary Coolant System,” Rev. 8, issued August 18, 2008
- MURR Preventive Maintenance Procedure SEC-W1, “Communications Check,” Rev. dated January 5, 2010

b. Observations and Findings

The inspector observed various activities during the inspection. All operations observed were conducted in accordance with procedures and in a professional manner. Procedure compliance was acceptable.

c. Conclusion

The procedure review, revision, control, and implementation program satisfied TS requirements.

6. Exit Interview

The inspection scope and results were reviewed with the licensee on April 26, 2010. The inspector discussed the findings for each area reviewed. The licensee acknowledged the findings and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

M. Ell	Reactor Operator
L. Foyto	Reactor Manager
J. Fruits	Assistant Reactor Manager - Operations
C. Herbold	Assistant Reactor Manager – Engineering
E. Hood	Lead Senior Reactor Operator
W. Kaster	Reactor Operator
D. Kutikad	Assistant Reactor Manager - Physics
B. White	Reactor Operator

INSPECTION PROCEDURES USED

IP 69006	Class I Research and Test Reactor Organization, Operations, and Maintenance Activities
IP 69008	Class I Research and Test Reactor Procedures
IP 69009	Class I Research and Test Reactor Fuel Movement
IP 69010	Class I Research and Test Reactor Surveillance

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
IP	Inspection Procedure
IR	Inspection Report
LSRO	Lead Senior Reactor Operator
MU	University of Missouri
MURR	University of Missouri-Columbia Research Reactor
NRC	U. S. Nuclear Regulatory Commission
Rev.	Revision
RO	Reactor Operator
SRO	Senior Reactor Operator
TS	Technical Specification