

September 15, 2004

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

SUBJECT: NRC INSPECTION REPORT NO. 50-186/2004-202

Dear Mr. Butler:

This letter refers to the inspection conducted on August 30 - September 2, 2004, at the University of Missouri Research Reactor facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of this inspection.

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 observation of activities in progress. Based on the results of this inspection, no significant safety concerns or noncompliances of NRC requirements were identified. No response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," 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 (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 Craig Bassett at 404-562-4712.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report
cc w/enclosure: Please see next page

University of Missouri-Columbia

Docket No. 50-186

cc:

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

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

Docket No. 50-186

License No. R-103

Report No. 50-186/2004-202

Licensee: University of Missouri-Columbia

Facility: University of Missouri Research Reactor

Location: Research Park
Columbia, Missouri

Dates: August 30 - September 2, 2004

Inspector: Craig Bassett

Approved by: Patrick M. Madden, Section Chief
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Missouri - Columbia
University of Missouri Research Reactor
Report No. 50-186/2004-202

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the licensee's 10 Megawatt (MW) Class I research and test reactor (RTR) safety programs including: organizational structure and functions, review and audit and design change functions, operator requalification, reactor operations, maintenance and surveillance, fuel handling, experiments, procedural control, and emergency preparedness since the last NRC inspection of these areas. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organizational Structure and Functions

- The organizational structure and staffing were consistent with Technical Specification requirements.

NRC Order Modifying License Compliance

- The licensee had completed many of the actions required by the Order and fulfilled many of the commitments made in their Safety Conscious Work Environment Plan.

Review and Audit and Design Change Functions

- The Reactor Advisory Committee and associated subcommittees were meeting as required and reviewing the topics outlined in the Technical Specifications.
- The evaluation of changes to facilities and procedures satisfied NRC requirements.

Operator Requalification

- Operator requalification was conducted as required by the Requalification Program.

Reactor Operations

- Operations shift turnovers, communication, and operator cognizance of facility conditions were acceptable.
- Licensee management continued efforts towards establishing a safety-conscious work environment at the facility.
- The Corrective Action Program was functioning as outlined by procedure.
- The licensee had reviewed and reported on events that required Licensee Event Reports to be written as specified in the Technical Specifications.

Maintenance and Surveillance

- The Work Control Program was being used to effectively accomplish maintenance activities at the facility.
- The surveillance program satisfied Technical Specification requirements.

Fuel Handling

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

Experiments

- The program for reviewing and conducting experiments satisfied Technical Specification and current protocol requirements.

Procedures

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

Emergency Preparedness

- The emergency preparedness program was conducted in accordance with the Emergency Plan.
- Emergency response equipment was being maintained and alarms were being tested monthly as required.
- The Letter of Agreement with the City of Columbia was being maintained and updated as needed.
- Emergency drills were being conducted annually as required by the Emergency Plan.
- Emergency preparedness training for staff personnel was being completed as required.

REPORT DETAILS

Summary of Plant Status

The licensee continued to operate their 10 MW research and test reactor in support of laboratory experiments, reactor operator training, various types of research, and irradiation of various target materials. During the inspection, the reactor was being operated 24-hours per day (except during the maintenance period on Monday morning) to support laboratory experiments and conduct product irradiation.

1. Organizational Structure and Functions

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.) 13, dated January 29, 2004, the inspector reviewed selected aspects of the following:

- University of Missouri Research Reactor (MURR) organization and staffing
- management and staff responsibilities outlined in the TS
- MURR Control Room Logbooks for the period from March through August 2004
- MURR Console Watch Logbooks for the period from March through August 2004

b. Observations and Findings

The inspector noted that the organizational structure had changed since the last inspection in the area of reactor operations (refer to NRC Inspection Report No. 50-186/2003-203). The MURR Reactor Facility Director now reports directly to the Office of the Provost in compliance with the NRC Confirmatory Order Modifying License dated December 19, 2003. The inspector also noted that the Assistant Reactor Manager - Engineering had been promoted to the position of Reactor Manager and the Assistant Reactor Manager position was open as of the date of the inspection. The licensee was actively searching for a person to fill the Assistant Reactor Manager - Engineering position.

Through a review of selected reactor operations logs for the period from March 2004 to the present, and through interviews with operations personnel, the inspector determined that the licensee was operating with five crews on a four-shift rotation. This allowed the "extra" crew time for in-depth training and procedure review on a rotating basis. Each operating crew was staffed with four individuals, with at least three qualified Reactor Operators (ROs) and/or Senior Reactor Operators (SROs) per shift. Record reviews and direct observations verified that shift turnover briefings were held during each shift change and that shift activities were discussed in detail. Staffing during reactor operation satisfied the requirements of TS Section 6.1.i.

c. Conclusions

The MURR organizational structure and staffing were consistent with the requirements of TS Section 6.1.a and Figure 6.0.

2. NRC Confirmatory Order Modifying License

a. Inspection Scope (IP 92701)

The inspector reviewed selected aspects of the following to ensure that the licensee was complying with an NRC Confirmatory Order Modifying License dated December 19, 2003:

- MURR Policy, POL-1, "Policy Prohibiting Discrimination for Raising Safety Concerns," Rev. 1, issued March 16, 2004
- MURR Procedure AP-RR-001, "Corrective Action Program," Rev. 6, issued April 2, 2004
- MURR Procedure AP-RR-010, "Facility Access Criteria," Rev. 10, issued July 29, 2004
- MURR Procedure AP-RR-011, "Facility Access Process," Rev. 8, issued August 31, 2004
- MURR Procedure AP-RR-020, "Safety Concern - Nuclear Significant," Rev. 1, issued December 19, 2003
- MURR Procedure AP-RR-021, "Safety Concern - Occupational," Rev. 1, issued December 19, 2003
- MURR Procedure AP-RR-022, "Administrative Concern and Conflict Resolution," Rev. 2, issued December 19, 2003
- MURR Procedure AP-RR-023, "MURR Safety Oversight Committee," Rev. 0, issued November 26, 2002
- MURR Procedure AP-RR-024, "Ombudsmen Program," Rev. 1, issued January 23, 2004
- MURR Procedure AP-RR-025, "Concern Investigation," Rev. 0, issued November 26, 2002
- MURR Procedure AP-RR-026, "Event Review," Rev. 0, issued May 5, 2003

b. Observations and Findings

(1) Confirmatory Order Modifying License Requirements

A meeting was held on November 3, 2003, between the NRC and the University of Missouri (MU), to discuss an NRC investigation regarding possible employment discrimination against a former research scientist at MURR. During the meeting, a Confirmatory Order was discussed. On December 19, 2003, the NRC issued MU a Confirmatory Order Modifying License which indicated that, based on the satisfactory completion of the conditions of the Confirmatory Order by MU, the NRC would not pursue further enforcement action in the matter. The following is a listing of the Confirmatory Order requirements and actions taken by the licensee to comply with the Order.

- (a) Requirement: The licensee was to modify the MURR chain-of-command so that the Facility Director reported to the Office of the Provost, who in turn would report to the Office of the President, MU, within 30 days of issuance of the Order.

Action Taken: The inspector verified that the licensee submitted a license amendment request on December 19, 2003, which modified the chain of command at MURR whereby the Director reported to the Office of the Provost. The amendment was approved by the NRC in a letter dated January 29, 2004.

- (b) Requirement: Develop a long-term plan for ensuring a safety conscious work environment (SCWE) by:
- (i) Conducting an employee cultural survey developed by an independent consultant or entity.
 - (ii) Conducting annual training for MURR employees and others who routinely use the facility on how to better ensure a SCWE.

Action Taken: The inspector verified that an employee cultural survey had been conducted by an independent consultant, Utilities Service Alliance (USA), during May 17-21, 2004. During this inspection, the licensee had received a copy of the results of the survey but had not had time to review it.

The annual SCWE training had not been completed but was to be conducted during the end of October or the beginning of November 2004.

- (c) Requirement: Modify the MURR access authorization procedures to focus on the need for access and to involve routine background checks so that the following would be required or addressed:
- (i) Personnel requesting sponsorship were to be required to discuss the following:
 - the basis for requesting access to the facility,
 - source of funding for the subject project,
 - necessary project resources,
 - benefits to MURR, and
 - whether the project would be consistent with MURR's published strategic plan and research priorities.
 - (ii) Any sponsor denying a written request for sponsorship shall provide the Director of MURR in writing with the basis for such denial within 15 days of receipt of the request.
 - (iii) Access requests shall be addressed by MURR within 60 days and a decision by the Director of MURR provided to the requestor in writing within that time period.

- (iv) The Provost shall be informed of any denial of access by the Director of MURR.
- (v) The Ombudsman Panel shall review any decision by the Director of MURR under (iii) above upon an appeal request in writing by the applicant within 15 days of receipt of the denial.

Action Taken: The inspector verified that the licensee had modified the access authorization procedures to address all the items mentioned above. The major procedure that accomplished this was MURR Procedure AP-RR-010, "Facility Access Criteria," Rev. 10, issued July 29, 2004. The various issues were addressed, either in general or required verbatim, by this procedure.

- (d) Requirement: Post the Confirmatory Order at the MURR facility and inform MURR employees of its content.

Action Taken: The inspector verified that the Confirmatory Order was posted on the bulletin board in the front hallway of the facility by the main entrance. The inspector also verified that a memorandum had been sent via electronic mail (E-mail) from the Associate Director, Regulatory Assurance Group, to all MURR staff informing them that a Confirmatory Order had been issued by the NRC and indicating it had been posted on the bulletin board. The Order was also posted on the MURR intranet and the subject was mentioned by the Facility Director during the All Staff meeting on January 29, 2004.

- (e) Requirement: The President of MU was to issue a letter to all individuals with access to MURR which affirmed the licensee's commitment to a SCWE and which provided a summary of the licensee's policy to promote SCWE.

Action Taken: The inspector verified that the President of MU had written a letter to all MURR staff and visitors that stated the licensee's continued commitment to SCWE and included a summary of the licensee's policy to promote SCWE. The letter from the President to all individuals with access to MURR was dated January 13, 2004.

(2) Licensee Response

In a letter to the NRC dated February 5, 2004, the licensee addressed each of the requirements stipulated in the Confirmatory Order Modifying License. The following is a listing of the Confirmatory Order requirements and actions taken or commitments made by the licensee in response.

- (a) Requirement: Modify the MURR chain-of-command so that the Facility Director reported to the Office of the Provost, who in turn would report to the Office of the President, MU, within 30 days of issuance of the Order.

Action Taken: As noted above, the inspector verified that the licensee submitted a license amendment request on December 19, 2003, which

modified the chain of command at MURR whereby the Director reported to the Office of the Provost. The amendment was approved by the NRC in a letter dated January 29, 2004.

- (b) Requirement: Develop a long-term plan to ensure a safety conscious work environment (SCWE).

Action Taken: The licensee's response indicated that a "Plan For Continuing Improvement of the Safety Conscious Work Environment at MURR," dated January 28, 2004, had been developed. (The Plan was attached to the licensee's response dated February 5, 2004.) Through the licensee's response outlining the MURR SCWE Plan, the licensee committed to do the following:

- (i) Procedures to be reviewed and/or revised:
- Key procedures to ensure a safety conscious work environment:
 - MURR Procedure AP-RR-020, "Safety Concern - Nuclear Significant," Rev. 1, issued December 19, 2003
 - MURR Procedure AP-RR-021, "Safety Concern - Occupational," Rev. 1, issued December 19, 2003
 - MURR Procedure AP-RR-022, "Administrative Concern and Conflict Resolution," Rev. 2, issued December 19, 2003
 - MURR Procedure AP-RR-023, "MURR Safety Oversight Committee," Rev. 0, issued November 26, 2002
 - MURR Procedure AP-RR-024, "Ombudsmen Program," Rev. 1, issued January 23, 2004
 - MURR Procedure AP-RR-025, "Concern Investigation," Rev. 0, issued November 26, 2002
 - Procedures for gaining access to the facility:
 - MURR Procedure AP-RR-010, "Facility Access Criteria," Rev. 10, issued July 29, 2004
 - MURR Procedure AP-RR-011, "Facility Access Process," Rev. 8, issued August 31, 2004
- (ii) Policy Documents - The licensee indicated the MURR Facility Director would re-issue MURR Policy (POL-1), "Policy Prohibiting Discrimination for Raising Safety Concerns."

- (iii) Channels of Communications to be used at MURR would include the MURR Director's weekly "open office hours," "Director's Mailbox," and the MURR Director having periodic lunches with randomly selected staff members.
- (iv) Annual SCWE training for MURR management and staff.
- (v) Use periodic small group settings to help persons understand the need for SCWE and the protection they have in reporting safety concerns - Focus Groups.
- (vi) Independent SCWE Assessment - have an employee cultural survey/assessment conducted annually by an independent contractor for the next two years.

Action Taken: The inspector verified that the procedures indicated by the licensee had been reviewed and revised as needed and were in place. The inspector verified that MURR Policy, POL-1, "Policy Prohibiting Discrimination For Raising Safety Concerns," Rev. 1, dated March 16, 2004, had been reissued by the licensee. During this inspection, and previous inspections, the inspector verified that the MURR Director was holding weekly "open office hours," that the "Director's Mailbox" program was in place for use by any concerned individual, and that periodic (usually monthly) lunches were scheduled by the MURR Director with randomly selected employees. Focus groups were being used to discuss various issues at MURR, including SCWE. As above noted, the inspector verified that an employee cultural survey had been conducted by an independent consultant, Utilities Service Alliance (USA), during May 17-21, 2004. The licensee was reviewing the results of the survey.

It was noted that training had not been conducted for 2004 but was tentatively scheduled for the end of October or the first part of November.

- (c) Requirement: Within 45 days after the date of the Order, modify the MURR access authorization procedures to better ensure transparency and clarity in its process.

Action Taken: The inspector verified that the licensee had modified the access authorization procedures to address the issues of transparency and clarity. The main procedure that accomplished this was MURR Procedure AP-RR-010, "Facility Access Criteria," Rev. 10, issued July 29, 2004. Most of the actions required by the Order were stated verbatim in the procedure.

- (d) Requirement: Post the Confirmatory Order at the MURR facility and inform MURR employees of its content.

Action Taken: As noted above, the inspector verified that the Confirmatory Order was posted on the bulletin board in the front hallway of the facility by the main entrance. The inspector also verified that a memorandum had been

sent via electronic mail (E-mail) from the Associate Director, Regulatory Assurance Group, to all MURR staff informing them that a Confirmatory Order had been issued by the NRC and indicating it had been posted on the main bulletin board.

- (e) Requirement: The President of MU shall, within 30 days of the date of the Order, issue a letter to all individuals with access to MURR which affirmed the licensee's commitment to a SCWE and which provided a summary of the licensee's policy to promote SCWE.

Action Taken: The inspector verified that the President of the University had written a letter to all MURR staff and visitors that stated the licensee's continued commitment to SCWE and included a summary of the licensee's policy to promote SCWE. The letter from the President was dated January 13, 2004.

c. Conclusions

The licensee had completed many of the actions required by the Order and fulfilled many of the commitments made in their SCWE Plan. Those actions remaining will be reviewed during subsequent NRC inspections.

3. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69007)

The inspector reviewed selected aspects of the following to ensure compliance with TS Section 6.1:

- Reactor Advisory Committee Charter, last revised February 3, 2004
- Reactor Advisory Committee meeting minutes from October 2003 through the present
- Reactor Safety Subcommittee meeting minutes from October 2003 through the present
- MURR Procedure AP-RR-003, "10 CFR 50.59 Evaluations," Rev. 2, issued May 12, 2004
- completed AP-RR-003 Attachment 1, 50.59 Screen Forms for 2004
- MURR Procedure AP-RO-115, "Modification Records," Rev. 1, issued September 18, 2003

b. Observations and Findings

(1) Review and Audit Functions

Records of the meetings held from October 2003 to date in 2004 by the Reactor Advisory Committee (RAC) and those of various safety subcommittees were reviewed. The records showed that meetings were held as required and safety reviews were conducted by the RAC or a designated subcommittee. Topics of these reviews were as required by the TS and were sufficient to provide guidance, direction, and oversight to ensure acceptable use of the reactor.

The inspector noted that personnel from the University of Missouri - Rolla had completed an audit of different aspects of the reactor facility operations and programs in February 2004. The audit appeared to be thorough and complete. The audit team had no negative observations about the operations of the MURR facility.

(2) Design Change Functions

The regulatory requirements stipulated in 10 CFR 50.59 were implemented at the facility through MURR Procedure AP-RR-003. The procedure was developed to address activities that affected changes to the facility Hazards Summary Report (HSR), modifications to the facility, changes to MURR procedures, new tests or experiments not described in the HSR, revisions to NRC approved analysis methodology, and/or proposed compensatory actions to address degraded or non-conforming conditions. The procedure adequately incorporated criteria provided by the regulation with additional requirements mandated by local conditions.

All new and revised procedures generated at the facility were screened with respect to the above procedure. Non-routine maintenance activities and all facility modifications were identified for screening by the facility Work Control Group with input from the on-duty operations personnel, including the lead senior reactor operator (LSRO). The procedure changes, maintenance activities, and modification packages were processed through and controlled by the Document Control Coordinator. The inspector verified that the changes to procedures were reviewed by the Procedure Review Subcommittee and that the proposed non-routine maintenance activities and facility modifications were reviewed by the Reactor Safety Subcommittee. The changes and modifications were subsequently approved by the Reactor Advisory Committee as required by the TS.

The inspector reviewed selected 50.59 Screen Forms processed during 2004. The completed forms showed that the issues were acceptably reviewed in accordance with Procedure AP-RR-003. It was noted that none of the changes or modifications were determined to constitute a safety question or concern and none required a license or TS amendment.

c. Conclusions

The RAC and associated subcommittees were meeting as required and reviewing the topics outlined in the TS. Audits of reactor operations were being conducted. The design change program satisfied NRC requirements.

4. Operator Requalification

a. Inspection Scope (IP 69003)

The inspector reviewed selected aspects of the following to ensure compliance with the "Operator Requalification Program - University of Missouri Research Reactor (MURR)" dated January 7, 1997:

- status of operator licenses
- operator training and examination records for the years 2003 and 2004
- "MURR Operator Active Status Log" for the past two years
- "Annual On-The-Job Training Requirements/Checklists" for the past two years
- "Written Examination Forms" for the past two years
- "Annual Operating Test Records" for the past two years
- "Change Review Sheets" for the past two years
- Medical examination records for the past four years

b. Observations and Findings

There were 13 qualified SROs and 6 ROs on staff at the facility; 2 people were in training. The Requalification Program was maintained up to date and RO and SRO licenses were current. MURR Operator Active Status Logs and records also showed that operators maintained active duty status as required.

A review of the logs and records showed that training was being conducted in accordance with the licensee's requalification and training program. Procedure reviews and examinations had been documented as required. Records of quarterly reactor operations, reactivity manipulations, other operations activities, and Reactor Supervisor activities were being maintained. Records indicating the completion of the annual operations tests and supervisory observations were also maintained. Biennial written examinations were being completed as required as well. The inspector noted that operators were receiving the required biennial medical examinations as well.

c. Conclusions

Operator requalification was being completed as required by the Requalification Program.

5. Reactor Operations

a. Inspection Scope (IP 69006)

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

- MURR Control Room Logbooks for the period from July through November 2004
- MURR Console Watch Logbooks for the period from July through November 2004
- Operations Shift Turnover sheets for September, October, and November 2004
- MURR Procedure AP-RO-110, "Conduct of Operations," Rev. 2, issued October 10, 2003 and the associated form FM-58, "Short Form Startup Checklist"
- MURR Procedure OP-RO-210, "Reactor Startup - Normal," Rev. 3, issued September 10, 2003

b. Observations and Findings

(1) Reactor Operation

The inspector observed facility activities on various occasions during the week including reactor operations, a routine patrol by an SRO, and the handling of samples and sample manipulating tools. The operations, patrol, and sample handling were conducted as planned and in accordance with the applicable procedures.

(2) Staff Communication

During the inspection, the inspector attended operations shift turnover meetings on Tuesday and Wednesday evenings. The status of the reactor and the facility was discussed on each occasion. All operators of the relief crews reviewed the appropriate logs and records and were informed of the upcoming shift activities and scheduled events.

The inspector attended the "Plan of the Day" (POD) meeting on Tuesday and Wednesday. The meeting, chaired by the Reactor Manager, was held daily and representatives from all organizations at the facility were in attendance. Safety-significant issues, if any, were discussed and any concerns or schedule conflicts were resolved. The inspector noted that the POD meeting provided everyone with an opportunity to be aware of current facility conditions and scheduled activities.

The inspector also attended an "Operations Meeting" held on Thursday morning. The meeting was chaired by the Reactor Manager and typically attended by the operations crew in training that week, the Assistant Reactor Manager - Physics, the Interim Chief Operating Officer, the Reactor Supervisor, and other invited persons. The meeting was held to keep the operators informed of the facility status and ongoing and planned activities.

(3) Corrective Action Program

The inspector reviewed the licensee's Corrective Action Program (CAP) which had been developed to provide staff members with a formal process to identify deficiencies and bring the issues to management's attention for resolution. The program was designed so that anyone could identify a discrepancy, concern, or improvement opportunity and enter the issue into the CAP system via the MURR intranet. When issues were identified, each issue was screened for safety significance, evaluated to determine the cause and its contributing factors, and assigned to a cognizant manager for resolution. Corrective actions were developed and implemented consistent with the significance of the issue and according to an established schedule.

Events that were determined to be "safety significant" were generally reviewed as required by an Event Review Team (ERT). The ERT was convened to collect the facts so that complete and accurate root and contributing causes could be determined. It was also the team's responsibility to develop corrective actions to prevent occurrence and/or recurrence of the same or similar problems. During this inspection, the inspector attended an ERT review meeting convened to consider an event that had occurred during August. The ERT functioned as outlined by procedure.

(4) Licensee Event Reports

The inspector reviewed the one Licensee Event Report issued to date in 2004 and interviewed licensee management concerning the event. The inspector determined that the event had been reviewed by an ERT as required by MURR Procedure AP-RR-026. The ERT had determined a root cause of the event and had developed applicable corrective actions as well. A report detailing the event and the cause had been submitted to the NRC as required by the TS. The inspector noted that the event had also been entered into the CAP system so that potential trends could be noted and corrected.

c. Conclusions

MURR operations shift turnovers, communications, and operator cognizance of facility conditions were acceptable. The Corrective Action Program was functioning as outlined by procedure. The licensee had reviewed and reported on an event that required a Licensee Event Report to be written as specified in the TS.

6. 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 Sections 2, 3, 4, and 5, the inspector reviewed selected aspects of:

- entries in the "Completed PM's Notebook"

- various "Preventive Maintenance Requirement Cards"
- Monthly "RO PM Lists" for 2004
- various "Weekly Worklists for Maintenance Shutdown for 2004" kept in the "Maintenance Day Book"
- "Maintenance Lists" for 2003 and 2004
- various MURR Compliance Procedures (CPs)
- selected CP data sheets and records
- MURR Procedure AP-RR-015, "Work Control Procedure," Rev. 3, issued January 23, 2004
- MURR Procedure GS-RA-100, "MURR Equipment Tag Out," Rev. 3, issued October 10, 2003
- MURR Operator Aid OA-21, "MURR Maintenance Guidelines," Rev. 2, issued June 2, 2004

b. Observations and Findings

(1) Maintenance

The inspector reviewed the Work Control Program that the licensee had developed 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. The inspector reviewed selected project packages that had been completed during the past 18 months. The projects had generally been completed and documented as required.

A planning and scheduling software package, *Maximo*, was being used to assist in this effort. The maintenance program appeared to be functioning properly and the software appeared to be very versatile and powerful in its application.

(2) Surveillance

Various periodic surveillance verifications and calibration of equipment, including the testing of various reactor systems, instrumentation, auxiliary systems, and security systems and alarms, were reviewed by the inspector. The licensee used "Compliance Procedures" (CPs) to conduct these verifications and followed the same established schedule each year. The data recorded in the Logbooks and on the CP records indicated that the verifications and calibrations had been completed on schedule and in accordance with licensee procedures. The results reviewed by the inspector were noted to be within the TS and procedurally prescribed parameters.

c. Conclusions

The Work Control Program was being used by the licensee to effectively accomplish maintenance activities at the facility. The surveillance program satisfied TS requirements.

7. Fuel Handling

a. Inspection Scope (IP 69009)

To ensure that the licensee was following the requirements of TS Sections 3.8, 4.1, 4.3, and 5.5, the inspector reviewed selected aspects of the following:

- selected Fuel Inspection Sheets for 2004
- selected Fuel Movement Sheets developed for fuel movement that were typically completed on the weekly scheduled Maintenance Day
- Fuel Status Board located in the Control Room
- MURR Procedure RP-RO-100, "Fuel Movement," Rev. 3, issued March 15, 2004
- MURR Procedure OP-RO-250, "Fuel Handling," Rev. 5, issued March 15, 2004

b. Observations and Findings

The inspector reviewed the fuel movement process and verified that fuel was moved according to established procedure and in conjunction with the specific fuel movement sheets developed by the Assistant Reactor Manager-Physics for each core loading. The inspector reviewed fuel movement sheets for 2004. They had been developed and used for core refueling, rearrangement of fuel storage, loading of spent fuel into a shipping container, and transferring new, unirradiated fuel from storage to the pool. 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 and on the fuel movement sheets for Core Number 04-41. No problems or anomalies were noted. The inspector also verified that the procedures governing fuel handling and movement had been revised and were the ones most recently approved by the RAC.

The inspector also reviewed selected fuel inspection sheets that had been completed to date. The sheets showed that the licensee noted no anomalies on the spent fuel elements inspected. The inspections were done in compliance with TS Section 5.5.

c. Conclusions

Fuel movement and inspection was conducted in accordance with TS and procedural requirements.

8. Experiments

a. Inspection Scope (IP 69005)

The inspector reviewed selected aspects of the following to verify compliance with TS Sections 3.6 and 6.1.f:

- listing of Reactor Utilization Requests
- listing of current experiments
- MURR Procedure EX-RO-105, "Reactor Irradiation Experiments," Rev. 3, issued November 26, 2003

- MURR Procedure EX-RO-120, "Beamport 'F' Operation," Rev. 1, issued November 18, 2003
- MURR Procedure EX-RO-126, "Thermal Column Door," Rev. 1, issued November 26, 2003

b. Observations and Findings

The experiments conducted at the facility were required to be evaluated and reviewed using the Reactor Utilization Request (RUR) protocol. The protocol required an individual proposing a new experiment to evaluate the irradiation of the target material to determine that, if performed within the limitations stated in the RUR safety analysis, the irradiation experiment would remain with the TS limits for experiments. The safety analysis included a review of: 1) thermal effects, 2) possible sample decomposition, 3) experiment failure, 4) loss of coolant flow, 5) corrosive effects of the sample, and 6) possible explosive potential. The analysis was also required to address post irradiation sample handling procedures, detection of radioactivity produced, radiation hazards, and reactivity worth. Each RUR, or revision, was required to be reviewed and approved by the Assistant Reactor Manager - Physics, the Health Physics Manager, and the Reactor Manager. The RURs were also required to be reviewed by the Reactor Safety Subcommittee and approved by the RAC.

The inspector reviewed four of the most recent RURs that had been submitted. The analysis for each had been performed and the reviews and approvals completed. The experiments were conducted with the cognizance of the reactor manager and the LSRO, and in accordance with TS requirements (e.g., reactivity limitations).

The inspector noted that the Reactor Manager was developing a procedure to more fully address what was required to develop and use an RUR. The licensee was informed that the development and implementation of the procedure will be noted by the NRC as an Inspector Follow-up Item (IFI) and reviewed during a future inspection (IFI 50-186/2004-202-01).

c. Conclusions

The program for reviewing and conducting experiments satisfied TS and protocol requirements.

9. 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-DC-100, "Controlled Document Revisions," Rev. 4, issued May 23, 2004
- MURR Procedure AP-DC-102, "Document Control," Rev. 2, issued May 23, 2004
- Various other MURR Procedures

b. Observations and Findings

Technical Specification 6.1.c required the RAC review procedure changes with safety significance. The Reactor Procedure Review Subcommittee was chartered to fulfill this requirement. The inspector verified that the subcommittee was meeting as required to review the current procedure revisions and changes. The inspector also verified that the various procedures, as well as the Emergency Plan and implementing procedures, were being reviewed annually as required and revised as needed.

c. Conclusions

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

10. Emergency Preparedness

a. Inspection Scope (IP 69011)

The inspector reviewed selected aspects of the following to verify compliance with the Emergency Plan for the University of Missouri Research Reactor Facility, Rev. 13, dated March 29, 2004:

- MURR Emergency Procedures Manual, Rev. 37, dated July 14, 2004
- MURR Emergency Call List, FM-104, Rev. 0, dated April 8, 2004
- Letter of Agreement with the City of Columbia dated May 19, 2003
- offsite support groups
- 2002, 2003, and 2004 emergency drill documentation and critiques
- MURR Procedure REP-RO-100, "Reactor Emergency Procedures," Rev. 2, issued June 2, 2004

b. Observations and Findings

The inspector reviewed the Emergency Plan (E-Plan) in use at the reactor and verified that the E-Plan was reviewed annually as required. The Emergency Procedures Manual (E-Plan implementing procedures) were reviewed and revised as needed to ensure effective implementation of the E-Plan.

Through records review and interviews with Facility Emergency Organization (FEO) personnel (i.e., emergency responders), the inspector determined that they were knowledgeable of the proper actions to take in case of an emergency. Training for these individuals had been conducted annually as required and documented acceptably.

The inspector verified that the Letter of Agreement with the City of Columbia had been maintained and updated as necessary. The agreement verified that the City of Columbia Fire Department would provide support for the facility and would be available during an emergency. Communications capabilities with support groups were acceptable and had been periodically tested. Emergency Call Lists had been revised and updated as needed and were available in the Control Room, the front

lobby, and in the various controlled copies of MURR Emergency Procedures Manuals as required. The inspector also observed an inventory of the required items in a licensee emergency cabinet and verified that emergency equipment was being inventoried semiannually as required.

The inspector determined that annual emergency drills had been conducted and off-site support organization notification and/or participation was as required by the E-Plan. A critique was held following each drill to discuss any weaknesses noted during the exercise and to develop possible solutions or corrective actions to the problems identified. The inspector also reviewed the documentation of a special exercise sponsored by the City of Columbia Police Department (PD) and the University of Missouri Police Department (MUPD). The special exercise appeared to be extensive in nature, well run, and very informative for all those involved.

c. Conclusions

The emergency preparedness program was conducted in accordance with the Emergency Plan.

11. Follow-up On Previously Identified Items

a. Inspection Scope (IP 92701)

The inspector reviewed actions concerning one Unresolved Item (URI) identified during an inspection in November 2003.

b. Observations and Findings

(Closed) URI 50-186/2003-201-01 - Follow-up on the licensee's efforts to implement an effective program for reviewing all active Reactor Utilization Requests.

The licensee's procedure in place at that time governing RURs, "Standard Operating Procedure VIII," required in step 1.1.D.1 that active RURs be reviewed by the Reactor Manager and the Principle Experimenter on an annual basis. During the inspection in November 2003, the inspector noted that a review of the active RURs was completed in March 2002 but none had been conducted to date in 2003. The issue was identified as an Unresolved Item pending action by the licensee.

During this inspection, the inspector reviewed the status of the reviews of the RURs. It was noted that all the active RURs had been reviewed by the end of 2003. This had been documented by a "Memo To File" written by the Reactor Manager. This item is considered closed.

c. Conclusions

One URI was reviewed and closed.

12. Exit Interview

The inspection scope and results were summarized on September 2, 2004, with members of licensee management and staff. The inspector described the areas inspected and discussed in detail the inspection findings.

No dissenting comments were received from the licensee. The licensee did not identify, as proprietary, any of the material provided to or reviewed by the inspector.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

B. Brocker, Lead Senior Reactor Operator
R. Butler, Director, MURR
M. Dixon, Assistant Reactor Manager - Operations
R. Dobby, Health Physics Manager
J. Ernst, Associate Director, Regulatory Assurance Group
L. Foyto, Reactor Manager
J. Fruits, Work Control Manager
A. Gaddy, Document Control Coordinator
R. Hudson, Lead Senior Reactor Operator and Operations Training Coordinator
J. Hemphill, Acting CAP Coordinator
W. Meyer, Chief Operations Officer
A. Saale, Lead Senior Reactor Operator
M. Wallis, Lead Senior Reactor Operator

Other Personnel

D. Klusmeier, Associate Director, Facility Services/Materials Management, University of Missouri Hospital
R. Martin, Lieutenant, City of Columbia Fire Department, Fire Station No. 7

INSPECTION PROCEDURES USED

IP 69003 Class I Research and Test Reactor Operator Licenses, Requalification, and Medical Activities
IP 69005 Class I Research and Test Reactor Experiments
IP 69006 Class I Research and Test Reactor Organization, Operations, and Maintenance Activities
IP 69007 Class I Research and Test Reactor Review and Audit and Design Change Functions
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
IP 69011 Class I Research and Test Reactor Emergency Preparedness
IP 92701 Followup

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-186/2004-202-01 IFI Follow-up on the development and implementation of a procedure dealing with Reactor Utilization Requests.

Closed

50-186/2003-201-01 URI No 2003 review of Reactor Utilization Requests had been completed by the reactor manager and principle experimenter as required.

LIST OF ACRONYMS USED

CAP	Corrective Action Program
CFR	Code of Federal Regulations
CP	Compliance Procedure
E-Plan	Emergency Plan
ERT	Event Review Team
IFI	Inspector Follow-up Item
IP	Inspection Procedure
IR	Inspection Report
LSRO	Lead Senior Reactor Operator
MU	University of Missouri
MURR	University of Missouri-Columbia Research Reactor
MW	Megawatt
NRC	Nuclear Regulatory Commission
PM	Preventive Maintenance
PDR	Public Document Room
POD	Plan of the Day (meeting)
RAC	Reactor Advisory Committee
Rev.	Revision
RTR	Research and Test Reactor
RUR	Reactor Utilization Request
SCWE	Safety-Conscious Work Environment
SOP	Standard Operating Procedure
TS	Technical Specification