March 19, 2004

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

SUBJECT: NRC INSPECTION REPORT NO. 50-186/2004-201

Dear Mr. Butler:

This letter refers to the inspection conducted on March 1-4, 2004, at your University of Missouri - Columbia Research Reactor facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that 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 observations of activities in progress. Based on the results of this inspection, no safety concerns or noncompliances of NRC requirements were identified. No response to this letter is required.

In accordance with 10 CFR 2.790 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.

Should 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

Enclosures: NRC Inspection Report No. 50-186/2004-201

cc w/enclosure: Please see next page

cc:

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

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NAME	CBassett:rdr		EHylton:rdr		PMadden	
DATE	03/ /2004		03/ 18 /2004		03/ 19 /2004	

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

Docket No.:	50-186
License No.:	R-103
Report No.:	50-186/2004-201
Licensee:	Curators of the University of Missouri - Columbia
Facility:	University of Missouri - Columbia Research Reactor
Location:	Research Park Columbia, Missouri
Dates:	March 1-4, 2004
Inspector:	Craig Bassett
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section New, Research and Test Reactors Program (RNRP) Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Missouri - Columbia
Report No.: 50-186/2004-201

This routine, announced inspection included onsite review of various aspects of the licensee's programs concerning radiation protection, environmental monitoring, transportation of radioactive material, material control and accounting, and security as they relate to the licensee's 10 Megawatt, Class I Research Reactor. The licensee's programs were directed toward the protection of public and facility worker health and safety and were in compliance with NRC requirements. No safety concerns or violations of regulatory requirements were identified.

Organization and Staffing

- The licensee's organization and staffing were in compliance with the requirements specified in the Technical Specifications Section 6.1.

Review and Audit Functions

- Review and oversight functions required by the Technical Specifications Section 6.1 were acceptably completed by the Reactor Advisory Committee.

Health Physics

- Surveys were completed and documented as outlined in the Annual Report.
- Postings met regulatory requirements.
- Personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits.
- Radiation survey and monitoring equipment was being maintained and calibrated as required.
- The Radiation Protection and ALARA Programs satisfied regulatory requirements.
- Annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20.
- Radiation protection training was being conducted and was acceptable.

Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and Technical Specifications limits.

Transportation of Radioactive Materials

- Radioactive material was generally being shipped in accordance with the applicable regulations.

Material Control and Accountability

- Special Nuclear Material was acceptably controlled, stored, and inventoried.

Safeguards and Security

- Security activities and systems satisfied Physical Protection Plan requirements.

REPORT DETAILS

Summary of Plant Status

The University of Missouri - Columbia Research Reactor (MURR) continued to be operated in support of isotope production, gemstone irradiation, reactor operator training, and various types of research. During the inspection, the reactor was started-up and operated continuously during the week to support laboratory experiments and product irradiation.

1. Organization and Staffing

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

To verify that the staffing and organizational structure requirements were being met as specified in the Technical Specifications (TS), Section 6.1, Amendment No. 33, dated January 29, 2004, the inspector reviewed:

- current MURR organizational structure
- administrative controls and management responsibilities
- staffing requirements for safe operation of the facility

b. Observations and Findings

The organizational structure had changed since the last inspection in the area of radiation protection (refer to NRC Inspection Report No. 50-186/2003-202). The structure outlined in the organizational chart listed in Figure 6.0 of the TS had been changed to reflect the removal of the position of Chancellor from the chart and the reporting line of authority. This was done to improve oversight of MURR activities by senior university management. The MURR Facility Director now reports to the President of the University through the Office of the Provost.

Also, the position of MURR Facility Director had been permanently filled since the last inspection. The former Chief Operating Officer had been the Interim Director for a period of time and was subsequently selected to permanently fill the position. It was also noted that the position of Reactor Manager had been filled by the former Assistant Reactor Manager, Engineering. The individuals filling these positions, and several other recently filled positions at the facility, have worked at the facility for many years and were well qualified to assume their respective duties.

The organization and staffing at the facility, required for reactor operation, were as specified in the TS. Qualifications of the staff met program requirements. Review of records verified that management responsibilities were discharged as required by applicable procedures.

c. Conclusions

The organizational structure and staffing were consistent with TS requirements.

2. Review and Audit Functions

a. Inspection Scope (IP 69007)

In order to verify that the licensee had established and conducted reviews and audits as required by 10 CFR Part 20 and in TS Section 6.1, the inspector reviewed:

- Charter of the MURR Reactor Advisory Committee (RAC)
- MURR RAC meeting minutes, and related documents, from February 2003 to the present
- Selected Subcommittee meeting minutes from February 2003 to the present including the Isotope Use Subcommittee, the Reactor Safety Subcommittee, and the Procedure Review Subcommittee
- Selected meeting minutes of the MURR Radiation Safety Committee from February 2003 to the present
- Selected audits and reviews completed by various management and Health Physics (HP) personnel

b. Observations and Findings

The inspector reviewed the meeting minutes of the RAC and the meeting minutes of various subcommittees from February 2003 to the present. The minutes, and associated documents, indicated that the committee met at the required frequency and that a quorum was present. The topics considered during the meetings were appropriate and as stipulated in the TS.

A subcommittee of the RAC or other designated persons, including HP personnel, conducted audits and reviews as required and the full RAC reviewed the results. The inspector verified that the licensee had completed annual reviews of the Radiation Protection Program as required by 10 CFR Part 20. All aspects of the program had been reviewed. The inspector noted that the safety reviews and audits, and the associated findings, were acceptably detailed and that the licensee responded and took corrective actions as needed.

c. Conclusions

Review and oversight functions required by the TS were acceptably completed by the RAC.

3. Radiation Protection

a. Inspection Scope (IP 69012)

The inspector reviewed the following to verify compliance with 10 CFR Part 20 and the applicable licensee TS requirements and procedures:

- Selected radiation and contamination survey records for the past year through February of 2004

- Radiological signs and posting in various laboratories and in the Beam Port Floor area
- MURR dosimetry records for 2003 through February of 2004
- MURR Reactor Operations Annual Reports for 2002 and 2003
- Calibration and periodic check records for selected radiation survey and monitoring instruments for the past three years
- radiation protection training program records
- MURR Radiation Protection Program Manual dated January 1, 2003
- MURR Center Security, Emergency, and Health Physics Indoctrination Booklet last updated 2003
- MURR Corrective Action Program (CAP) reports concerning radiation protection for 2002 through the present
- MURR Procedure AP-HP-105, "Radiation Work Permit," Rev. 2, dated October 28, 2003, and the associated form, Form FM-17, "Radiation Work Permit"
- MURR Procedure AP-HP-117, "MURR Training Program," Rev. 3, dated June 12, 2003, and the associated forms, Form FM-26, "MURR Training Questionnaire," and Form FM-29, "Initial Training Packet"
- MURR Procedure AP-HP-120, "Beamport Area," Rev. 0, dated March 17, 2003
- MURR Procedure AP-HP-125, "Review of Unplanned Radiation Exposure," Rev. 0, dated February 7, 2003
- MURR Procedure IC-HP-300, "Calibration - Radiation Survey Instruments," Rev. 2, dated February 17, 2004, and the associated form, Form FM-62, "Radiation Instrument Certificate of Calibration"
- MURR Procedure IC-HP-331, "Calibration - Tennelec LB-5100 Alpha/Beta," Rev. 0, dated April 2, 2003
- MURR Procedure OP-HP-200, "Air Sampling - Containment Building Tritium," Rev. 1, dated November 25, 2003
- MURR Procedure OP-HP-220, "Tritium Bioassay," Rev. 1, dated June 12, 2003
- MURR Procedure RP-HP-100, "Contamination Monitoring - Performing a Swipe," Rev. 2, dated December 15, 2003
- MURR Procedure RP-HP-120, "Personnel Radioactive Contamination," Rev. 3, dated May 30, 2003, and the associated forms, Form FM-54, "Report of Personnel Contamination," and Form FM-76, "Personnel Contamination Log"
- MURR Procedure SV-HP-119, "Property Release," Rev. 0, dated February 12, 2002

The inspector also toured the licensee's facility, conducted a radiation survey in various areas of the Beam Port Floor, witnessed the use of dosimetry and survey meters, and observed the calibration of radiation monitoring equipment. Licensee personnel were interviewed as well.

b. Observations and Findings

(1) Surveys

Daily, monthly, and other periodic contamination and radiation surveys, outlined in the licensee's Reactor Operations Annual Report for 2003, were completed by HP staff members. Any contamination detected in

concentrations above established action levels was noted and the area was decontaminated. Results of the surveys were typically documented on survey maps and posted at the entrances of the various areas surveyed so that facility workers would be knowledgeable of the radiological conditions that existed therein.

During the inspection the inspector conducted a radiation survey of selected areas throughout the Beam Port Floor with an HP Technician. The radiation levels noted were similar to those detected by the licensee and listed on survey maps of the areas. No anomalies were noted.

(2) Postings and Notices

Copies of current notices to workers were posted in appropriate areas in the facility. Radiological signs and survey maps were typically posted at the entrances to controlled areas. Other postings also showed the industrial hygiene hazards that were present in the areas as well. The copies of NRC Form-3 noted at the facility were the latest issue, as required by 10 CFR Part 19, and were posted in various areas throughout the facility such as on the main bulletin board, in main hallways, and at the entrance to the Beam Port Floor area.

(3) Dosimetry

The inspector determined that the licensee used optically stimulated luminescent (OSL) dosimetry for whole body monitoring and thermoluminescent dosimeters (TLDs) in the form of finger rings for extremity monitoring. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program accredited vendor. An examination of the OSL results indicating radiological exposures at the facility for the past year showed that the highest occupational doses, as well as doses to the public, were within 10 CFR Part 20 limits. The records showed that approximately half of the facility personnel received occupational exposures of zero (0) to only a few millirem above background. The highest annual whole body exposure received by a single individual for 2003 was 1043 millirem. The highest annual extremity exposure for 2003 was 2620 millirem. Through direct observation the inspector determined that dosimetry was acceptably used by facility and contractor personnel.

(4) Radiation Monitoring Equipment

Examination of selected radiation monitoring equipment indicated that the instruments had the acceptable up-to-date calibration sticker attached. The instrument calibration records indicated that the calibration of certain portable survey meters (friskers) was typically completed by licensee staff personnel. The other instruments were usually shipped to vendors for calibration. Calibration frequency met procedural requirements and records were maintained as required. Area Radiation Monitors (ARMs) and stack monitors

were also being calibrated as required. These monitors were typically calibrated by licensee staff personnel.

During the inspection, the inspector observed the calibration of an ARM. The calibration range located in the MU Environmental Health and Safety Department building located near MURR was used for this procedure. The calibration was conducted by two licensee employees, a Senior Electronics Technician and an HP Technician. The calibration was thorough and was completed using the appropriate techniques and according to procedure. Proper precautions were used to maintain doses ALARA as well.

(5) Radiation Protection Program

The licensee's Radiation Protection and ALARA programs were established and described in the MURR Radiation Protection Program Manual dated March 1, 2004, and through the various HP procedures that had been reviewed and approved. The programs contained instructions concerning organization, training, monitoring, personnel responsibilities, and audits. The programs, as outlined and established, appeared to be acceptable. The inspector verified that annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20. The ALARA program, which was consistent with the guidance in 10 CFR Part 20, provided guidance for keeping doses as low as reasonably achievable.

The inspector reviewed the licensee's efforts to reduce the facility's collective dose by challenging each work or support group to set a goal of reducing their annual exposure by five percent (5 percent). The licensee was persistent and aggressive in tracking doses on a monthly basis. These efforts resulted in a reduction in nearly every group's annual dose for 2003. The reduction was attributed largely to keeping everyone constantly aware of ALARA. This was noted as a good initiative on the part of the licensee.

(6) Radiation Work Permit Program

TS Section 6.1.b requires that written procedures shall be in effect for operations of the reactor, emergencies, radiological control, and the preparation of shipping and the shipping of byproduct material produced under the reactor license.

MURR Procedure AP-HP-105, "Radiation Work Permit," Rev. 2, dated October 28, 2003, requires in Attachment 7.1, Form FM-17, "Radiation Work Permit Instructions," page 4, that the "Work Summary" portion of Section VII of the Radiation Work Permit be completed by the Job Supervisor or Reactor Health Physics Person entering applicable comments in Section VII and that the "Closure" portion of Section VII be completed by a Reactor Health Physics Person signing and dating the blanks provided for that purpose.

The inspector reviewed the seventy (70) Radiation Work Permits (RWPs) that had been written, used, and closed out during 2003 as stipulated in AP-HP-

105. It was noted that the controls specified in the RWPs were acceptable and applicable for the type of work being done. The RWPs had been initiated, reviewed, and approved as required. However, it was noted that about one half (34) of the RWPs used during the year had not been terminated or closed out as required. The "Work Summary" portion in Section VII had not been completed and the "Closure" blanks had not been signed and dated. The licensee acknowledged this and committed to correct the problem by holding specific training on the subject of properly completing Section VII of the RWP. The training was to occur the week of March 8, 2004. The inspector indicated that the training would be reviewed during a subsequent inspection.

The licensee was informed that failure to complete the "Work Summary" portion of Section VII and failure of a Reactor Health Physics Person to sign and date the "Closure" portion of Section VII of 34 of the 70 RWPs written in 2003 was an apparent violation of TS Section 6.1.b. However, this failure constitutes a violation of minor significance and is being treated as a Non-Cited Violation (NCV), consistent with Section IV of the NRC Enforcement Policy (NCV 50-186/2004-201-01). This item is considered closed.

(7) Radiation Protection Training

The inspector reviewed the training given to MURR staff members, to those who are not on staff but who are authorized to use the experimental facilities of the reactor, and to visitors. The training satisfied the requirements of 10 CFR Part 19 and the training program was acceptable. It was noted that the annual refresher training for all staff personnel had been conducted during November 2003.

(8) Facility Tours

The inspector toured the Beam Port Floor area and selected support laboratories with licensee representatives on various occasions. The inspector noted that facility radioactive material storage areas were properly posted. No unmarked radioactive material was noted. Radiation and High Radiation Areas were posted as required.

c. Conclusions

The inspector determined that the Radiation Protection and ALARA Programs, as implemented by the licensee, satisfied regulatory requirements because: 1) surveys were completed and documented acceptably to permit evaluation of the radiation hazards present; 2) postings met regulatory requirements; 3) personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits; 4) radiation survey and monitoring equipment was being maintained and calibrated as required; 5) the Radiation Protection Program was acceptable and was being reviewed annually as required; and, 6) the radiation protection training program was acceptable.

4. Effluent and Environmental Monitoring

a. Inspection Scope (IP 69004)

The inspector reviewed the following to verify compliance with the requirements of 10 CFR Part 20 and the TS Section 3.7:

- the environmental monitoring program outlined through various procedures
- MURR Reactor Operations Annual Reports for 2002 and 2003
- annual effluent monitoring and environmental surveillance program reports
- ALARA Review - Liquid Batch Release Review Forms for 2003
- ALARA Review - Monthly Airborne Effluent Review Forms for 2003
- MURR Reactor Operations Annual Report for CY 2003
- counting and analysis records contained in the HP Computer Folder "Environmental Reports"
- MURR Procedure IC-HP-310, "Calibration - Eberline Model PING 1A Stack Monitor - Particulate Channel," Rev. 2, dated January 23, 2004
- MURR Procedure IC-HP-311, "Calibration - Eberline Model PING 1A Stack Monitor - Iodine Channel," Rev. 2, dated January 23, 2004
- MURR Procedure IC-HP-312, "Calibration - Eberline Model PING 1A Stack Monitor - Gas Channel," Rev. 2, dated January 23, 2004
- MURR Procedure OP-HP-220, "Air Sampling - Containment Building Tritium," Rev. 1, dated November 25, 2003
- MURR Procedure OP-HP-221, "Environmental Sample - Analysis," Rev. 2, dated February 17, 2004
- MURR Procedure OP-HP-222, "Air Sampling - Containment Building Ar-41," Rev. 1, dated December 15, 2003
- MURR Procedure OP-HP-353, "Waste Tank Sample - Analysis," Rev. 1, dated February 17, 2004
- MURR Procedure SV-HP-121, "Building Exhaust Stack Effluent - Ar-41 Monitoring," Rev. 0, dated March 20, 2002

b. Observations and Findings

The inspector determined that gaseous releases continued to be monitored as required, were acceptably documented, and were within the annual dose constraints of 10 CFR 20.1101 (d), Appendix B concentrations, and TS Section 3.7 limits. The liquid releases from the facility to the sanitary sewer were within the limits specified in 10 CFR 20, Appendix B, Table 3.

Environmental soil, water, and vegetation samples were collected, prepared, and analyzed consistent with procedural requirements. On-site and off-site gamma radiation monitoring was completed using the reactor facility stack effluent monitor and various environmental TLDs in accordance with the applicable procedures as well. The data indicated that there were no measurable doses above any regulatory limits.

The above results were acceptably reported in the Reactor Operations Annual Report for 2002 and 2003. Observation of the facility by the inspector found no new potential release paths.

c. Conclusion

Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

5. Transportation

a. Inspection Scope (IP 86740)

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

- selected records of various types of radioactive material shipments
- MURR CAP reports concerning transportation for 2002 through the present
- MURR Procedure AP-SH-001, "Radioactive Materials Shipping," Rev. 0, dated November 9, 2001
- MURR Procedure AP-RR-026, "Event Review," Rev. 1, dated January 23, 2004
- MURR Procedure BPB-SH-005, "DOT 6M Packaging and Shipment of Type B Non-Waste Radioactive Material," Rev. 1, dated August 27, 2003
- MURR Procedure SP-SH-004, "Packaging Shipment of Type A, Non-Waste Radioactive Material," Rev. 1, dated June 6, 2002
- MURR Procedure WM-SH-011, "Shipment of Radioactive Material n.o.s., Waste For Hot Cell Host Cans," Rev. 0, dated December 1, 2003
- MURR Procedure WMB-SH-005, "Shipment of Type B Radioactive Waste Using Chem-Nuclear System 1-13G Cask," Rev. 1, dated August 27, 2003

b. Observations and Findings

(1) Program Review

Through records review and discussions with licensee personnel, the inspector determined that the licensee had shipped spent fuel and other types of radioactive material since the previous inspection in this area. The records indicated that the radioisotope types and quantities were calculated and dose rates measured as required. All radioactive material shipment records reviewed by the inspector, with the exception of the one discussed below, had been completed in accordance with Department of Transportation (DOT) and NRC regulations.

The inspector verified that the licensee maintained copies of shipment recipients' licenses to possess radioactive material as required and that the licenses were verified to be current prior to initiating a shipment. The training of the staff members responsible for shipping the material was also reviewed. The inspector verified that the shippers' training met DOT requirements.

(2) Shipment of Incorrect Sample

10 CFR 71.5(a) requires that a licensee who delivers licensed material to a carrier for transport comply with the applicable requirements of the regulations appropriate to the mode of transport of the Department of Transportation in 49 CFR Parts 171-189.

49 CFR 171.2(a) prohibits any person from offering hazardous material for transportation unless, among other requirements, the hazardous material is properly classified, described, packaged, marked, labeled, and in condition for shipment required or authorized under the Hazardous Material Regulations (49 CFR 171-177).

The inspector reviewed a shipment consisting of a solution of lutetium chloride the licensee made on Tuesday, September 9, 2003. The solution that was supposed to be shipped was marked as Sample 16874I on the licensee's paperwork and the shipping paperwork reflected the quantity of material shipped as that of Sample 16874**I**. However, on Thursday, September 11, 2003, the licensee's customer called to inform the licensee that they had received a sample reading 270 millicuries (mCi) when they had ordered, and were expecting to receive, a sample that should have read 155 mCi. (It was fortuitous that the customer had a radioactive materials license that allowed them to possess the larger amount of material that had been shipped.)

After checking the processing paperwork, the licensee discovered that a mistake had been made and the 270 mCi sample the customer received was consistent with the leftover stock solution from the process. The licensee determined that the solution that was actually shipped was Sample 16874**G** and not Sample 16874**I**. Consequently, the shipping paperwork contained the incorrect information concerning the amount/activity of material that was shipped.

This problem was noted and entered into the licensee's Corrective Action Program and assigned a CAP Number of 03-0063. An Event Review Team was assembled to review the situation, determine a root cause, and establish corrective actions. As a result, various corrective actions were initiated. The supervisor and a senior manager met with the technicians involved in the event, reviewed the problem, and discussed the operation. The supervisor emphasized the importance of the person observing the operation visually confirming that the person performing the operation placed the measured sample in the correctly labeled container. It was also noted that the process had been conducted in a shielded glovebox which provided limited visibility. The process was subsequently required to be performed in the remote processing box to provide better visibility and greatly reduce or eliminate the potential for recurrence of the error that occurred on September 9. Other training was conducted concerning the errors in the shipping process as noted below (see the next section (3) below).

The licensee was informed that failure to properly describe a hazardous material for shipment (by entering the incorrect quantity/activity of material on the shipping papers) was an apparent violation of 10 CFR 71.5(a). However, this licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (NCV 50-186/2004-201-02). This issue is considered closed.

(3) "Attention To Detail" Training

While reviewing various CAP Reports for 2003, it was noted that several of the reports dealt with errors that had been noted during preparations for shipments or "near misses" that had occurred during shipment processing. Examples of these were listing the incorrect activity for an isotope to the shipped, shipping a package on the wrong date, and various other shipping preparation and/or documentation errors. These problems, except for the one noted above, had been caught by various checks that were conducted later in the shipping process. Nevertheless, the licensee felt that the errors should have been noted earlier in the process by the person performing the initial activity or by the person verifying that the activity was done correctly.

As a result of these, and other problems noted during work at the facility, licensee management conducted training for all facility personnel in January 2004 on the subject of "attention to detail." The training discussed the "STAR" concept (Stop, Think, Act, Review) and was aimed at improving human performance and achieving excellence while minimizing human error. Although the impact of the training could not be determined during the inspection, the licensee was informed that this subject will be identified as an Inspector Follow-up Item (IFI) and will be reviewed during future NRC inspections and reviews of the licensee's CAP Program (IFI 50-186/2004-201-03).

c. Conclusions

Radioactive material was generally being shipped in accordance with the applicable regulations.

6. Material Control and Accounting

a. Inspection Scope (IP 85102)

To verify compliance with 10 CFR Part 70, the inspector reviewed:

- Special Nuclear Material (SNM) material storage locations and controls
- MURR SNM monthly and semi-annual inventory results
- accountability records (DOE/NRC Forms 741 and 742) for the past year

b. Observations and Findings

The material control and accountability program tracked locations and content of the SNM the licensee possessed at the facility. The items tracked included fuel elements, in-core flux probes, fission counters, neutron detectors, fuel plates, fuel pellets, fission plates, Plutonium filters, Uranium phase shifters, fuel solution vials, UO_2 foils, Nucleopore punchings, Nucleopore plates, and fission chambers and detectors. Possession and use of SNM was limited to the locations and purposes authorized under the license. The material control and accountability forms (DOE/NRC Forms 741 and 742) for the two previous accounting periods had been prepared and transmitted as required and within the time period specified.

The inspector toured the Beam Port Floor area and verified that the licensee was using and storing SNM in the designated areas. Through tours and records review, the inspector verified that the total amount of SNM in use or in storage at the facility was within the possession limits specified in the license.

c. Conclusions

Special Nuclear Material was acceptably controlled, stored, and inventoried.

7. Physical Security

a. Inspection Scope (IP 81401, 81402, 81403, 81421, and 81810)

To verify compliance with the licensee's NRC-approved Physical Security Plan and to assure that changes, if any, to the plan had not reduced its overall effectiveness, the inspector reviewed:

- security logs, records, and reports including the Safeguards Events Log and Maintenance Checklists of security equipment
- security systems and equipment checks including the Weekly Fuel Vault Integrity Test results and Intrusion Alarm Test results
- MURR Control Room Logbook documenting security patrols for the period from October 2003 to the present
- MURR Directive, MD-001, "Access Authorization," dated November 20, 2000
- MURR Procedure AP-RR-010, "Facility Access Criteria," Rev. 8, dated January 23, 2004
- MURR Procedure AP-RR-011, "Facility Access Process," Rev. 7, dated January 23, 2004
- selected records of personnel granted access to the facility as documented on FM-02, "MURR Access Request Form, " FM-03, "Access Sponsor List," FM-04, "Visitor/After Hours Access Form," and FM-22, "Containment Combination Request Form"
- MURR Center Security, Emergency, and Health Physics Indoctrination Booklet last updated 2003

The inspector also reviewed the training given in January 2004 concerning the revised procedure for access authorization to the facility.

b. Observations and Findings

The Physical Security Plan (PSP) was the same as the latest revision approved by the NRC entitled "Physical Security Plan for University of Missouri Research Reactor Facility," which had been reissued on December 12, 2002. Various procedures, which had been revised on January 22, 2004, were consistent with, and adequately implemented, the PSP. The inspector verified that the PSP was being reviewed annually as required.

Through records review and interviews with licensee personnel, the inspector also verified that there had been no safeguards events at the facility since the last inspection. The inspector noted that the PSP contained provisions to establish and maintain protection of new fuel and other SNM as well. It was further noted that the licensee was properly controlling and protecting the PSP and other safeguards information as required by the regulations.

Physical protection systems (barriers, alarms, and equipment) were reviewed and observed by the inspector and were determined to be in accordance with the PSP. Access control was being implemented as stipulated in the PSP, AP-RR- 010, and AP-RR-11. Acceptable security response and training of the staff were demonstrated through observation of operator daily rounds, alarm response, and drill participation in accordance with procedures. Annual security training was being provided to the staff, as well as MU Police Department personnel, as required. The inspector also verified that the physical protection systems were being maintained and tested in accordance with the PSP.

The inspector visited the campus MU Police Department and reviewed their response procedures. Acceptable security response and support in accordance with procedures and training were demonstrated through interviews and alarm response records. The offsite support being provided by the campus police department was acceptable.

c. Conclusions

Security activities and systems satisfied PSP requirements.

9. Exit Interview

The inspection scope and results were summarized on March 4, 2004, with members of licensee management and staff. The inspector described the areas inspected and discussed in detail the inspection findings. The licensee's Physical Security Plan was identified as proprietary information, however, no proprietary information is contained in this report. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Ballew, Health Physics Technician
R. Butler, Director of MURR
A. Coria, Training Coordinator
R. Dobey, Manager, Health Physics
J. Ernst, Associate Director, Regulatory Assurance Group
L. Foyto, Reactor Manager
A. Gaddy, Document Control Coordinator
M. Harlow, Senior Electronics Technician
J. Hemphill, Health Physicist
M. Kilfoil, Manager, Hot Cell Operations
K. Kutikkad, Assistant Reactor Manager, Physics
J. Lanigan, MURR Safety Associate
C. McKibben, Associate Director
S. Meier, Manager, Radioactive Materials Shipping
W. Meyer, Chief Operation Officer

Other Personnel

D. Kamp, Supervisor, MU Police Department

INSPECTION PROCEDURES USED

IP 69004:	Class 1 Research and Test Reactor Effluent and Environmental Monitoring
IP 69006:	Class 1 Research and Test Reactor Organization, Operations, and Maintenance Activities
IP 69007:	Class 1 Research and Test Reactor Review and Audit and Design Change Functions
IP 69012:	Class 1 Research and Test Reactor Radiation Protection
IP 81401:	Plans, Procedures, and Reviews
IP 81402:	Reports of Safeguards Events
IP 81403:	Receipt of New Fuel at Reactor Facilities
IP 81421:	Fixed Site Physical Protection of Special Nuclear Material of Moderate Strategic Significance
IP 81810:	Protection of Safeguards Information
IP 85102:	Material Control and Accounting - Reactors
IP 86740:	Inspection of Transportation Activities

OPENED, CLOSED, AND DISCUSSED

Opened

50-186/2004-201-01	NCV	Failure to complete the “Work Summary” portion of Section VII and the failure of a Reactor Health Physics Person to sign and

date the “Closure” portion of Section VII of 34 of 70 RWPs issued in 2003 as required by MURR Procedure No. AP-HP-105.

OPENED, CLOSED, AND DISCUSSED (Cont'd)

50-186/2004-201-02	NCV	Failure to properly describe a hazardous material for shipment by entering the incorrect quantity/activity of material on the shipping papers as required by 10 CFR 71.5(a).
50-186/2004-201-03	IFI	Follow-up on the subject of "attention to detail," the "STAR" concept (Stop, Think, Act, Review) training, and potential improvements in human performance and achieving excellence while minimizing human error.

Closed

50-186/2004-201-01	NCV	Failure to complete the "Work Summary" portion of Section VII and failure of a Reactor Health Physics Person to sign and date the "Closure" portion of Section VII of 34 of 70 RWPs issued in 2003 as required by MURR Procedure No. AP-HP-105.
50-186/2004-201-02	NCV	Failure to properly describe a hazardous material for shipment by entering the incorrect quantity/activity of material on the shipping papers as required by 10 CFR 71.5(a).

LIST OF ACRONYMS USED

ARM	Area Radiation Monitor
ALARA	As low as reasonably achievable
CAP	Corrective Action Program
CFR	Code of Federal Regulations
DOE	Department of Energy
DOT	Department of Transportation
HP	Health physics
IFI	Inspector Follow-up Item
IP	Inspection Procedure
mCi	Millicurie
MURR	University of Missouri - Columbia Research Reactor
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OSL	Optically stimulated luminescent (dosimeter)
PSP	Physical Security Plan
PDR	Public Document Room
RAC	Reactor Advisory Committee
RWP	Radiation Work Permit
SNM	Special Nuclear Material
TLD	Thermoluminescent dosimeter
TS	Technical Specification