May 14, 2003

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

SUBJECT: NRC INSPECTION REPORT NO. 50-186/2003-202

Dear Mr. Butler:

This letter refers to the inspection conducted on April 9 & 10, 2002, 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 by Alexander Adams, Jr., Acting for/

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

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

Enclosures: NRC Inspection Report No. 50-186/2003-202

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

Docket No.:	50-186
License No.:	R-103
Report No.:	50-186/2003-202
Licensee:	Curators of the University of Missouri - Columbia
Facility:	University of Missouri - Columbia Research Reactor
Location:	Research Park Columbia, Missouri
Dates:	April 9 & 10, 2003
Inspector:	Craig Bassett
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section Operating Reactor Improvements Program Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of various aspects of the licensee's programs concerning radiation protection, material control and accounting, and transportation of radioactive material 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 remain 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.
- Annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20.

Procedures

- Licensee Health Physics procedures and changes thereto were being reviewed and approved by the Procedure Review Committee and the Reactor Advisory Committee, as required.

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.
- Radiation protection training was generally 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 shipped in accordance with the applicable regulations.

Material Control and Accountability

- Special Nuclear Materials were acceptably controlled and inventoried.

REPORT DETAILS

Summary of Plant Status

The University of Missouri - Columbia Research Reactor (MURR) continues 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 to support laboratory experiments and product irradiation.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure [IP] 39745)

To verify that the staffing and organizational structure requirements were being met as specified in the Technical Specifications (TS), Section 6.1, Amendment No. 32, dated October 19, 2001, 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 not changed since the last inspection in the area of radiation protection (refer to NRC Inspection Report No. 50-186/2002-201). The position of MURR Facility Director had still not been filled since the former Director left in 2001. In the interim, the Chief Operating Officer is filling the position of Director. That has necessitated the appointment of an Interim Chief Operating Officer. Also, the person who had held the position of Reactor Manager had taken a six months leave of absence. Therefore, the position of Reactor Manager was being filled temporarily by the former Assistant Reactor Manager, Engineering. The people filling all the “interim” positions have worked at the facility for several, and in some cases many, years and are well qualified to assume the interim positions until the position of Facility Director is filled and the former Reactor Manager returns.

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

c. Conclusions

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

2. Review and Audit Functions

a. Inspection Scope (IP 40745)

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

- Reactor Advisory Committee meeting minutes for the past year to date
- Selected Subcommittee meeting minutes for the past year to date
- 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 Reactor Advisory Committee (RAC) and the minutes of the Reactor Safety Subcommittee from March 2002 to the present. The meeting minutes 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 and the entire program had been revised.

c. Conclusions

Review and oversight functions required by the TS were acceptably completed by the RAC. Annual reviews of the Radiation Protection Program were being completed by the licensee as required by 10 CFR Part 20.

3. Health Physics

a. Inspection Scope (IP 83743)

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 March of 2003
- radiological signs and posting in various laboratories, the basement, and in the Beam Port Floor area
- MURR dosimetry records for 2001 through February of 2002
- calibration and periodic check records for selected radiation survey and monitoring instruments
- Radiation Work Permits documented on Form FM-17, Rev. 0, dated October 5, 2001

- radiation protection training program records
- MURR Radiation Protection Program Manual dated January 1, 2003
- AP-HP-105, “Radiation Work Permit,” Rev. 1, dated August 23, 2002
- AP-HP-117, “MURR Training Program,” Rev. 2, dated February 7, 2003
- AP-HP-119, “High Radiation Area Access,” Rev. 0, dated February 7, 2003
- IC-HP-300, “Calibration - Radiation Survey Instruments,” Rev. 1, dated March 17, 2003
- IC-HP-331, “Calibration - Tennelec LB-5100 Alpha/Beta,” Rev. 0, dated April 2, 2003
- RP-HP-100, “Contamination Monitoring - Performing a Swipe,” Rev. 1, dated March 17, 2003
- SV-HP-119, “Property Release,” Rev. 0, dated February 12, 2002
- MURR Center Security, Emergency, and Health Physics Indoctrination Booklet last updated 2002

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

b. Observations and Findings

(1) Surveys

Daily and monthly contamination and radiation surveys, outlined in the licensee’s Reactor Operations Annual Report for CY2002, were completed by HP staff members as required. Any contamination detected in concentrations above established action levels was noted and the area was decontaminated. Results of the surveys were documented 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 and in the basement area. The radiation levels noted were similar to those listed on licensee survey maps of the areas and 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 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, as required by 10 CFR Part 19.

(3) Dosimetry

The inspector determined that the licensee uses optically stimulated luminescence dosimetry (SLD) for whole body monitoring and thermoluminescense dosimeters (finger rings) for extremity monitoring. The dosimetry is supplied and processed by a National Voluntary Laboratory Accreditation Program accredited vendor. An examination of the SLD 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 limitations. The records showed that approximately half of the facility personnel received occupational exposures of only a few millirem above background. The highest annual whole body exposure received by a single individual for 2002 was approximately 1390 millirem. The highest annual extremity exposure for the past year was approximately 2700 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 calibration of portable survey meters was typically completed by licensee staff personnel. However, some instruments were shipped to vendors for calibration. Calibration frequency met procedural requirements and records were maintained as required. Area Radiation Monitors and stack monitors were also being calibrated as required. These monitors were also typically calibrated by licensee staff personnel.

(5) Radiation Protection Program

The licensee's Radiation Protection and ALARA programs were established and described in the MURR Radiation Protection Program Manual dated January 1, 2003, and through the various HP procedures that had been reviewed and approved. The programs contained instructions concerning organization, training, monitoring, personnel responsibilities, audits, and maintaining doses ALARA. The programs, as established, appeared to be acceptable. The ALARA program provided guidance for keeping doses as low as reasonably achievable which was consistent with the guidance in 10 CFR Part 20.

(6) Radiation Work Permit Program

The inspector reviewed selected Radiation Work Permits (RWPs) that had been written and used during 2002 and this year to date 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, approved, and eventually terminated as required.

(7) Radiation Protection Training

The inspector reviewed the training given to MURR staff members, those who are not on staff but who are authorized to use the experimental facilities of the reactor, and visitors. The inspector also interviewed various individuals concerning the training they had received. All those interviewed were satisfied with the training received but some indicated that further training would be helpful. The training program was acceptable.

(8) Facility Tours

The inspector toured the Beam Port Floor area, selected support laboratories, and the basement area 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; and 5) 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
- annual effluent monitoring and environmental surveillance program reports
- ALARA Review - Liquid Batch Release Review Forms for 2002
- ALARA Review - Monthly Airborne Effluent Review Forms for 2002
- MURR Reactor Operations Annual Report for CY 2002
- counting and analysis records contained in the HP Computer Folder "Environmental Reports"
- IC-HP-319, "Calibration - NMC Model RAK - Particulate Channel," Rev. 0, dated March 4, 2002
- IC-HP-320, "Calibration - NMC Model RAK - Iodine Channel," Rev. 0, dated March 4, 2002
- IC-HP-321, "Calibration - NMC Model RAK - Gas Channel," Rev. 0, dated March 4, 2002

- OP-HP-221, “Environmental Sample - Analysis,” Rev. 0, dated February 25, 2002
- OP-HP-353, “Waste Tank Sample - Analysis,” Rev. 0, dated February 25, 2002
- SV-HP-110, “Environmental Sampling,” Rev. 1, dated February 21, 2003

b. Observation 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. The above results were acceptably reported in the Reactor Operations Annual Report for CY 2002.

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/shipping licensed radioactive material, the inspector reviewed the following:

- selected records of various types of radioactive material shipments
- AP-SH-001, “Radioactive Materials Shipping,” Rev. 0, dated November 9, 2001
- SP-SH-004, “Packaging Shipment of Type A, Non-Waste Radioactive Material,” Rev. 1, dated June 6, 2002

The inspector interviewed licensee personnel involved with shipping as well.

b. Observations and Findings

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 had been completed in accordance with Department of Transportation and NRC regulations.

c. Conclusions

Radioactive material was 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:

- nuclear material storage locations
- Special Nuclear Material (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 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. The inventory of material was verified to be consistent with material accountability records. Possession and use of SNM were 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 facility, including the fuel storage vault, and verified that the licensee was using and storing SNM in the designated areas. An inventory of the unirradiated fuel elements and other items in storage during the inspection demonstrated that the fuel was present and in the location specified.

c. Conclusions

Special Nuclear Material was acceptably controlled and inventoried.

7. Follow-up on Previous Inspection Items

a. Inspection Scope

The inspector reviewed the licensee's actions taken in response to previously identified Inspector Follow-up Items.

b. Observation and Findings

(1) IFI 50-186/2002-201-01

During an inspection in April 2002, the inspector determined that certain groups of individuals at the facility, including reactor operators, HP personnel, and those involved with shipping radioactive material, typically received from 500 to 1650 millirem annually. Although the doses received were below the NRC limits, the licensee was informed that this was an area for improvement

and the issue of management and staff being more ALARA-conscious and developing ways to reduce personnel doses was identified as an Inspector Follow-up Item (IFI).

During this inspection the inspector noted that the licensee had taken various actions concerning this issue. In addition to training, the licensee had developed a program whereby each different organizational group at the facility was asked to review the total exposure for the group during the past three years, take an average of those totals, and set a goal which was ninety-five percent (95%) of that average. The exposure trend during the past two years for the facility and for most groups has generally been downward. Also, the Manager of Health Physics reviews each groups monthly total exposure during monthly management meetings.

Because the licensee had implemented the aforementioned actions, which apparently resulted in a decrease in personnel exposure, this item is considered closed.

(2) IFI 50-186/2002-201-02

During the inspection in April 2002, the inspector also noted that the annual Radiation Worker refresher training, typically given to staff members every fall (usually in September), had not been completed for 2001. The licensee indicated that the refresher training, generally referred to as Rad Worker training, had been postponed because other high priority training had been conducted during that period. The other training included an emphasis on Safety Conscious Work Environment training that had been provided for everyone on staff.

The licensee had subsequently provided Rad Worker training during the fall of 2002 . In addition, it was noted that each individual is required to review the licensee-provided MURR Center Security, Emergency, and Health Physics Indoctrination Booklet and take a brief test on its contents. (The booklet provides general radiation protection information, as well as information on security and emergency procedures.)

The inspector verified that the aforementioned actions had been taken by the licensee. The inspector also interviewed various licensee personnel and determined that they considered the training adequate. The licensee was encouraged to provide Rad Worker training annually. This item is considered closed.

c. Conclusions

Two Inspector Follow-up Items identified during a previous inspection were reviewed and closed during this inspection.

8. Exit Interview

The inspection scope and results were summarized on April 10, 2003, 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.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

C. Allen, Quality Unit Manager
K. Brooks, Interim Associate Director, Product and Service Operations
R. Butler, Interim Director of MURR
A. Coria, Training Coordinator
M. Dixon, Assistant Reactor Manger, Operations
R. Dobey, Manager, Health Physics
J. Ernst, Associate Director, Regulatory Assurance Group
L. Foyto, Acting Reactor Manager
J. Hemphill, Health Physicist
K. Kutikkad, Assistant Reactor Manager, Physics
S. Meier, Manager, Radioactive Materials Shipping
W. Meyer, Interim Chief Operation Officer
W. Oladiran, Manager, Facility Support Operations

INSPECTION PROCEDURES USED

IP 39745	Class 1 Research Reactors Organization, Operations, and Maintenance Activities
IP 40745	Class 1 Research Reactors Review and Audit and Design Change Functions
IP 69004	Class 1 Research Reactor Environmental Protection
IP 83743	Class 1 Research Reactor Health Physics
IP 85102	Material Control and Accounting - Reactors
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-186/2002-201-01	IFI	Follow-up on the issue of licensee management and staff personnel being more ALARA-conscious and developing ways to reduce personnel exposure.
50-186/2002-201-02	IFI	Follow-up on the issue of annual Rad Worker refresher training being provided for facility personnel.

LIST OF ACRONYMS USED

ALARA	As low as reasonably achievable
CFR	Code of Federal Regulations
HP	Health physics
IFI	Inspector Follow-up Item
IP	Inspection Procedure
MURR	University of Missouri - Columbia Research Reactor
NRC	Nuclear Regulatory Commission
PDR	Public Document Room
RAC	Reactor Advisory Committee
SNM	Special Nuclear Material
TS	Technical Specification