May 1, 2015

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

SUBJECT: UNIVERSITY OF MISSOURI – COLUMBIA RESEARCH REACTOR – U. S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 50-186/2015-201

Dear Mr. Butler:

From March 30 to April 2, 2015, the U.S. Nuclear Regulatory Commission (NRC or the Commission) completed an inspection of the University of Missouri-Columbia Research Reactor (Inspection Report No. 50-186/2015-201). The enclosed report documents the inspection results, which were discussed on April 2, 2015, with you; Mr. Les Foyto, Associate Director, Reactor and Facilities Operations; Mr. Nathan Hogue, Health and Safety Manager; and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed various activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, and requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public

Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Mr. Johnny Eads at 301-415-0136 or by electronic mail at Johnny.Eads@nrc.gov .

Sincerely,

/RA/

Kevin Hsueh, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure:
NRC Inspection Report
No. 50-186/2015-201

cc: Please see next page

cc:

Mr. Les Foyto, Associate Director
Reactor and Facilities Operations
Research Reactor Center
University of Missouri - Columbia
Research Park
Columbia, MO 65211

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

Planner, Dept of Health and Senior Services
Section for Environmental Public Health
930 Wildwood Drive, P.O. Box 570
Jefferson City, MO 65102-0570

Deputy Director for Policy
Department of Natural Resources
1101 Riverside Drive
Fourth Floor East
Jefferson City, MO 65101

A-95 Coordinator
Division of Planning
Office of Administration
P.O. Box 809, State Capitol Building
Jefferson City, MO 65101

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

Should you have any questions concerning this inspection, please contact Mr. Johnny Eads at 301-415-0136 or by electronic mail at Johnny.Eads@nrc.gov .

Sincerely,

/RA/

Kevin Hsueh, Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

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

Enclosure:
NRC Inspection Report
No. 50-186/2015-201

cc: Please see next page

DISTRIBUTION:

PUBLIC	PRTB r/f	RidsNrrDprPrta Resource
RidsNrrDprPrtb Resource	MCompton	
JEads, NRR	AAdams, NRR	

ACCESSION NO.: ML15120A338 ***concurrence via e-mail** **TEMPLATE#: NRC-002**

OFFICE	NRR/DPR*	NRR/DPR
NAME	JEads	KHsueh
DATE	4/29/2015	5/1/2015

OFFICIAL RECORD COPY

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

Docket No.:	50-186
License No.:	R-103
Report No.:	50-186/2015-201
Licensee:	University of Missouri – Columbia
Facility:	University of Missouri – Columbia Research Reactor
Location:	Research Park Columbia, Missouri
Dates:	March 30 through April 2, 2015
Inspectors:	Johnny Eads Ossy Font
Approved by:	Kevin Hsueh, Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

ENCLOSURE

EXECUTIVE SUMMARY

University of Missouri – Columbia
University of Missouri – Columbia Research Reactor
Report No.: 50-186/2015-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the University of Missouri – Columbia (the licensee's) 10 Megawatt Class I research reactor safety program, including: (1) effluent and environmental monitoring, (2) experiments, (3) review and audit and design change functions, (4) procedures, (5) radiation protection, and (6) transportation of radioactive material since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's program was acceptably directed toward the protection of public health and safety and in compliance with the NRC requirements.

Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements.
- Releases were within the specified regulatory and Technical Specifications (TS) limits.

Experiments

- The program for reviewing and conducting experiments satisfied Technical Specifications and current procedural requirements.
- Changes/amendments to existing experiments were reviewed and approved as required.

Review and Audit and Design Change Functions

- The Reactor Advisory Committee acceptably completed the review, audit, and oversight functions required by Technical Specifications 6.1.
- Design changes were reviewed and approved in accordance with Technical Specifications requirements and the licensee's written procedures.

Procedures

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

Radiation Protection

- Surveys were completed and documented as specified by procedure and were outlined in the Annual Report.

- Postings and notices met regulatory requirements.

- Staff personnel were wearing dosimetry as required and recorded doses were within the regulatory limits.

- Radiation survey and monitoring equipment was being maintained and calibrated as required.

- The Radiation Protection and As Low As Reasonably Achievable Programs satisfied regulatory requirements.

- Annual reviews of the Radiation Protection Program were being completed by the licensee as required by Title 10 of the *Code of Federal Regulations* Part 20.

Transportation of Radioactive Material

- Radioactive material was generally being shipped in accordance with the applicable regulations. One minor violation was identified related to incorrect labels and paperwork of radioactive material shipments.

REPORT DETAILS

Summary of Facility Status

The University of Missouri – Columbia (the licensee) Research Reactor (MURR) continued to be operated in support of isotope production, silicon irradiation, reactor operator training, and various types of research. During the inspection, the reactor was operated continuously, following the weekly maintenance shutdown, to support laboratory experiments and product irradiation.

1. 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, TS 3.7, and the environmental monitoring program outlined in various procedures:

- Quarterly reports of environmental Thermoluminescent dosimeter (TLD) results
- Results of the analyses of environmental vegetation, soil, and water samples
- MURR Reactor Operations Annual Report for the period from January 1, 2014 , through December 31, 2014

b. Observations and Findings

(1) Gaseous and Liquid Releases

The inspector determined that gaseous releases continued to be monitored as required, were acceptably analyzed, and were documented in the annual operating reports. Airborne concentrations of gaseous releases were noted to be within the concentrations stipulated in 10 CFR Part 20, Appendix B, Table 2 and the limits stipulated in the TS. The dose rate to the public, as a result of the gaseous releases, was below the dose constraint specified in 10 CFR 20.1101(d).

The liquid releases from the facility to the sanitary sewer also continued to be monitored as required, were acceptably analyzed, and were documented in the annual reports. The inspector reviewed the analyses of the liquid that had been released and noted that the releases were within the limits specified in 10 CFR Part 20, Appendix B, Table 3.

(2) Environmental Soil, Water, and Vegetation Samples

The inspector reviewed the results of the environmental soil, water, and vegetation samples that were collected, prepared, and analyzed during

2014. These samples had all been collected and analyzed as required and within the time frame established by procedure. No significant issues were identified.

(3) Environmental Monitoring using TLDs

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. Review of the data indicated that there were no measurable doses above any regulatory limits.

c. Conclusion

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

2. Experiments

a. Inspection Scope (IP 69005)

The inspector reviewed the licensee's program for conducting experiments and selected aspects of the following to verify compliance with TSs 3.6 and 6.1.f:

- Listing of current experiments
- Current list of reactor utilization requests (RURs)
- MURR Procedure AP-RO-135, "Reactor Utilization Requests," Rev. 2, issued October 24, 2012
- MURR Reactor Operations Annual Report for the period from January 1, 2014, through December 31, 2014

b. Observations and Findings

The experiments conducted at the facility were required to be evaluated and reviewed using MURR administrative procedure AP-RO-135, "Reactor Utilization Requests." The procedure required that all experiments be reviewed and approved by the Reactor Manager and the Reactor Health Physics Manager. An individual proposing a new experiment was required to evaluate the irradiation of the target material to determine that, if performed within the limitations stated in the RUR safety evaluation, the irradiation experiment would remain within the TS limits for experiments. The safety evaluation included a review of: 1) thermal effects, 2) possible sample decomposition and pressure effects, 3) experiment failure, 4) loss of coolant flow, 5) failure of other experiments, 6) corrosive effects of the sample, and 7) possible explosive potential. The evaluation was also required to address post-irradiation sample handling procedures, detection of radioactivity produced, radiation hazards, and reactivity worth. If the experiment under review did not involve a new class of experiment or a question pursuant to 10 CFR 50.59, the Reactor Manager would then approve the RUR. Any RURs

involving a new class of experiment or a safety question were required to be reviewed by the Reactor Safety Subcommittee. These RURs were then reviewed and, if properly analyzed and found to be acceptable, were approved by the RAC.

The inspector noted that the RURs most commonly used at the facility were for product or sample irradiation. The inspector reviewed various recently approved RURs or amendments to previously approved RURs that had been submitted for review and approval. The experiments had been evaluated in accordance with TS requirements and the accompanying data sheets indicated that they were within reactivity limits. The safety analysis for each had been performed and the reviews and approvals completed.

The inspector noted that the experiments in progress during the inspection were conducted with the cognizance of the reactor manager and the licensed Senior Reactor Operator, and in accordance with TS requirements (e.g., reactivity limitations). The experiments reviewed by the inspector were being conducted in accordance with procedure and the materials produced were handled and transferred as required.

c. Conclusion

The program for reviewing and conducting experiments satisfied TS and procedural requirements. Changes/amendments to existing experiments were reviewed and approved as required.

3. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69007)

In order to verify that the licensee had established and conducted reviews and audits as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20 and TS 6.1, the inspector reviewed:

- Radiation Protection Program/materials license audits for 2014
- Other selected audits and reviews completed by management and HP personnel
- Selected subcommittee meeting minutes from April 2014 to the present, including the Isotope Use Subcommittee, the Reactor Safety Subcommittee, and the Reactor Procedure Review Subcommittee
- MURR Reactor Advisory Committee (RAC) meeting minutes and related documents, from April 2014 to the present
- MURR Administrative Policy, POL-3, “MURR Radiation Protection Program,” Rev. 13, issued December 9, 2013
- MURR Reactor Operations Annual Report for the period from January 1, 2014, through December 31, 2014

b. Observations and Findings

The inspector reviewed the meeting minutes of the RAC from April 2014 to the present and the meeting minutes of various subcommittees from April 2014 to the present. The minutes and associated documents indicated that the RAC met at the required frequency and that a quorum was present. The topics considered during the committee meetings and during the subcommittee meetings were appropriate and as stipulated in the TS.

The inspector reviewed the 2014 audit of the licensee's Radiation Protection Program. No significant issues were identified during the audit, but several areas for improvement were noted. The inspector also reviewed the Health Physics Manager's response to the audit findings to address each of the areas for improvement. The audits and responses to the audits appeared to be acceptable.

The inspector also reviewed the dose to target charts and ALARA reviews for 2014. These documents were prepared by the HP Manager for an annual review of the Radiation Protection Program. They provided an overview of the dosimetry results and exposure goals for each separate group working at MURR. The data was also used to establish new exposure goals for the various groups. The charts and reviews illustrated and documented the licensee's continued efforts to reduce personnel dose and maintain doses ALARA.

The licensee has an established design change review function implemented at the facility through MURR procedures AP-RR-003 and AR-RO-115. The procedures address 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. It includes the screening and safety review of changes, tests, or experiments to determine if, pursuant to 10 CFR 50.59, a change required the U.S. Nuclear Regulatory Commission (NRC) approval prior to being implemented. The inspector found procedures in place to control the review process and evidence of adherence to the procedures.

The inspector reviewed design changes completed and approved from April 2014 to the present and found that the changes were made in accordance with the licensee's procedures. The inspector reviewed various modifications related to Project Authorization (RL-76), "Production of I-131 Radiochemical Sodium Iodine Solution." The inspector discussed the application of 10CFR50.59 to these modifications and the potential need for NRC review and approval. The need for additional discussions with the NRC was noted and follow up related to this issue was identified as an Unresolved Item (URI) 50-186/2015-201-01.

c. Conclusion

Review, oversight, audit functions required by the TS were acceptably completed

by the RAC. Design changes were reviewed and approved in accordance with Technical Specifications requirements and the licensee's written procedures.

4. Procedures

a. Inspection Scope (IP 69008)

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

- MURR Procedure BP-SH-052, "Radioactive Material Shipment Package Documentation and Labeling," Rev. 13, issued July 25, 2014
- MURR Procedure BP-SH-302, "Packaging and Shipment of Radioactive Material Using MURR Models 6 and 12," Rev. 5, issued July 25, 2014
- MURR Procedure BP-SH-099, "Packaging of Radioactive Material Using MURR Models 1500," Rev. 5, issued July 25, 2014
- MURR Procedure FB-SH-110, "Type B Shipment of Spent Fuel Using the BEA Research Reactor Package," Rev. 4, issued July 25, 2014
  - Attachment 11.1, "Spent Fuel Shipment Verification Record"
- MURR Procedure BPB-SH-027, "Survey and Decontamination of Returned Shipping Containers," Rev. 1, issued October 09, 2013
- MURR Administrative Policy, POL-18, "Procedure Writer's Guide," Rev. 9, issued February 10, 2015
- MURR Procedure AP-RO-115," Modification Records," Rev. 9, issued November 24, 2014
  - Attachment 8.1, "Modification Record: Short Form"
- MURR Procedure AP-RR-003,"10 CFR 50.59 Evaluations," Rev. 9, issued July 08, 2014
  - Attachment 9.1, "50.59 Screen"

b. Observations and Findings

Procedures can be created by any subject matter expert, making them the owner. The annual reviews were completed by the owners, as required, but changes can be made at any point during the year.

TS 6.1.b requires written procedures for the preparation and shipping of byproduct material and radiological control procedures for said shipments. The inspectors reviewed the procedures and observed them properly being used.

TS 6.1.c requires review from the Reactor Advisory Committee (RAC) for changes and modifications. The inspectors reviewed the associated procedures as well as the RAC reviews and generally found them being implemented appropriately.

c. Conclusion

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

5. Radiation Protection

a. Inspection Scope (IP 69012)

The inspector reviewed the following to verify compliance with 10 CFR Parts 19 and 20 and the applicable licensee TS requirements and procedures:

- MURR dosimetry records for 2014 and 2015 to date
- Dose report review forms for 2014
- Selected radiation and contamination survey records for the past year
- Radiological signs and posting in various facility laboratories and in the Laboratory Building Basement area
- Calibration and periodic check records for selected radiation survey and monitoring instruments for the past 2 years
- MURR Procedure IC-HP-300, "Calibration – Radiation Survey Instruments," Rev. 7, issued July 11, 2013
- MURR Administrative Policy, POL-3, "MURR Radiation Protection Program," Rev. 13, issued December 9, 2013
- MURR Reactor Operations Annual Report for the period from January 1, 2014, through December 31, 2014

The inspector also toured the MURR facility and observed the use of dosimetry and survey meters.

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 2014, were completed by HP staff members. Any contamination detected in concentrations above established action levels was noted and the area or item was decontaminated. Results of the surveys were typically documented on survey maps and posted at the entrances to the various areas surveyed so that facility workers and visitors would be aware of the radiological conditions that existed therein.

(2) Postings and Notices

Copies of current notices to workers were posted in appropriate areas in the facility. 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 the main bulletin board, the main hallways, and at the entrance to the beam port floor area. The inspector determined that appropriate radiological signs, as well as current copies of the survey maps (as noted above), were typically posted at the entrances to controlled areas. Other postings also showed the industrial hygiene hazards that were present in the areas.

(3) Dosimetry Use and Results

Through direct observation the inspector determined that dosimetry was acceptably used by facility and contractor personnel. The inspector determined that, last year, the licensee used optically stimulated luminescent (OSL) dosimetry for whole body monitoring and thermoluminescent dosimeters (TLDs) in the form of finger rings and wrist badges for extremity monitoring. An examination of the OSL and TLD 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.

(4) Radiation Monitoring Equipment

Examination of selected radiation monitoring equipment indicated that the instruments had the acceptable up-to-date calibration sticker attached. A review of selected instrument calibration records indicated that the calibration of swipe counters and portal monitors was typically completed by licensee staff personnel. Other instruments, such as portable survey meters, friskers, and neutron detectors were shipped to vendors for calibration. Calibration frequency met procedural requirements and records were maintained as required. The inspector noted that area radiation monitors, as well as air monitors and stack monitors, were also being calibrated as required. These monitors were also typically calibrated by licensee staff personnel.

(5) Radiation Protection and ALARA Programs

The licensee's Radiation Protection and ALARA Programs continued to be established and described in the MURR Administrative Policy, POL-3, "MURR Radiation Protection Program," and implemented 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 MURR management ALARA efforts were well organized and continued to produce dose reduction results. ALARA goals were set and performance indicators were established. Each group in the MURR

organization had an established ALARA goal for the year, and the facility dose was tracked by group, as well as for each individual.

The ALARA Program provided instructions and guidance for keeping doses as low as reasonably achievable and was consistent with 10 CFR Part 20 requirements. MURR management and staff continued their efforts to maintain personal doses ALARA.

(6) Radiation Work Permit Program

The inspector reviewed selected radiation work permits that had been written, used, and closed out during 2014 and those issued to date in 2015. It was noted that the instructions specified in MURR Procedure AP-HP-105, Attachment 7.1, and those on the associated forms (e.g., Form FM-17, "Radiation Work Permit Instructions") had been followed. Appropriate review by management and health physics personnel had been completed. The controls specified in the radiation work permits were acceptable and applicable for the type of work being done.

(7) Facility Tours

On various occasions during the inspection, the inspector toured the hot cell area and selected support laboratories with licensee representatives. The inspector noted that facility radioactive material storage areas were generally properly posted. Radiation and high radiation areas were generally posted and properly controlled as required.

c. Conclusion

The inspector determined that the Radiation Protection and ALARA Programs, as implemented by the licensee, generally satisfied regulatory requirements. Specifically, (1) surveys were generally completed and documented acceptably to permit evaluation of the radiation hazards present; (2) postings generally 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 Program was acceptable and was being reviewed annually as required.

6. Transportation of Radioactive Material

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:

- MURR Procedure BP-SH-052, "Radioactive Material Shipment Package Documentation and Labeling," Rev. 13, issued July 25, 2014

- MURR Procedure BP-SH-302, “Packaging and Shipment of Radioactive Material Using MURR Models 6 and 12,” Rev. 5, issued July 25, 2014
- MURR Procedure BP-SH-099, “Packaging of Radioactive Material Using MURR Models 1500,” Rev. 5, issued July 25, 2014
- MURR Procedure FB-SH-110, “Type B Shipment of Spent Fuel Using the BEA Research Reactor Package,” Rev. 4, issued July 25, 2014
  - Attachment 11.1, “Spent Fuel Shipment Verification Record”
- MURR Procedure BPB-SH-027, “Survey and Decontamination of Returned Shipping Containers,” Rev. 1, issued October 09, 2013
- Selected records of various types of radioactive material shipments for 2014 and to date in 2015
- Selected training records for staff personnel authorized to ship radioactive material

b. Observations and Findings

During the inspection, the inspector observed the preparations for a number of irradiated sample shipments. Each shipment was made in a Type B shipping container. Throughout the process the inspector noted adherence to procedures and attention to maintaining radiation doses ALARA. Shipping personnel reviewed the irradiation records and the contents of the packages were verified using gamma spectroscopy. Shipping papers were prepared by one person and reviewed for accuracy and completeness by a second staff member. The licensee verified consignee information (i.e., possession of a license to receive radioactive materials, address, and contact information). Also, appropriate labels were completed and applied to the shipping containers. The inspector verified that the shipping papers contained all required information and that the appropriate labels were correct and applied to the packaging. An HP technician performed a final review of the shipment paperwork. Other quality assurance checks were also adequate and completed as required. Throughout the shipping process, it was noted that MURR staff members were knowledgeable of their duties and conducted a thorough review of all documentation.

The inspector verified that the licensee maintained on file copies of consignees’ licenses to possess radioactive material as required. As noted above, the license of each specific consignee was verified to be current prior to initiating a shipment. Some licensees had received timely renewal extensions. The amount of radioactive material being shipped was compared to that amount authorized by the license. The inspector also verified that the licensee staff members who were designated as “shippers” had received training within the last 3 years.

The licensee also shipped spent fuel and records reviewed by the inspector had been completed in accordance with Department of Transportation and NRC regulations. The inspector also observed the return shipment of an empty spent fuel cask. Worker safety, both radiological and work related, was noted during the movement of the heavy equipment. In one instance, contamination was detected on a fork lift wheel. Work stopped in order for the Health Physics group

to clean and determine the source, which included having all workers pass through a portal monitor. It was apparent that safety was paramount.

During a review of the corrective action program, the inspector noted that the licensee initiated two shipment-related items. The first instance involved a Lutetium-177 order where the package label had the correct shipment information, but the dangerous goods (DG) paperwork was missing the transport index (TI) number. The carrier identified the problem and returned the package. The correct DG paperwork was generated and the package sent out the following day.

The second instance involved incorrect information on the shipping label and the Straight Bill of Lading (BOL). The irradiation group chose the incorrect standex information for the customer. The primary isotope, Cr-51, was listed correctly, but additional isotopes were not and, therefore, a higher activity was incorrectly included. The paperwork for the order was verified through the irradiation group to the shipping group but the error was not identified. Additionally, the error was not identified during the spectrum analysis because the additional isotopes were impurities and showed up as noise compared to the primary isotope. The licensee identified the error at a later time, contacted the carrier, and sent the replacement BOL and labels which included the correct isotopes and the lower activity.

In both instances human errors were the root cause. A similar issue was identified during the previous transportation inspection (NCV 50-186/2014-201-02. While this issue should be corrected, it constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section 2 of the Enforcement Policy.

c. Conclusion

Radioactive material was generally being shipped in accordance with the applicable regulations. One minor violation was identified.

7. Exit Interview

The inspection scope and results were summarized on April 2, 2015, with members of licensee management and staff. The inspectors described the areas inspected and discussed in detail the inspection findings. The licensee acknowledged the results of the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Butler	MURR Facility Director
J. Clark	Irradiation Manager
R. Dobey	Health Physics Support Manager
J. Ernst	Senior Advisor
L. Foyto	Associate Director, Reactor and Facilities Operations
J. Fruits	Reactor Manager
A. Gaddy	Compliance Specialist
N. Hogue	Health and Safety Manager
L. Juengermann	Shipping Manager

INSPECTION PROCEDURES USED

IP 69004	Class 1 Research and Test Reactor Effluent and Environmental Monitoring
IP 69005	Class 1 Research and Test Experiments
IP 69007	Class 1 Research and Test Reactor Review and Audit and Design Change Functions
IP 69008	Class 1 Research and Test Reactor Procedures
IP 69012	Class 1 Research and Test Reactor Radiation Protection
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND/OR DISCUSSED

Opened

50-186/2015-201-01	URI	Follow up on facility modifications related to production of I-131

Closed

None

LIST OF ACRONYMS USED

ALARA	As low as reasonably achievable
BOL	Bill of Lading
CAP	Corrective Action Program
10 CFR	Title 10 of the *Code of Federal Regulations*
DDE	Deep dose equivalent
DG	Dangerous Goods
HP	Health physics
IFI	Inspector Follow-up Item
IP	Inspection Procedure
MURR	University of Missouri – Columbia Research Reactor
NCV	Non-Cited Violation
No.	Number
NRC	U. S. Nuclear Regulatory Commission
OSL	Optically stimulated luminescent (dosimeter)
POD	Plan of the Day
RAC	Reactor Advisory Committee
RAG	Regulatory Assurance Group
Rev.	Revision
SDE	Shallow dose equivalent
TI	Transportation Index
TLD	Thermoluminescent dosimeter
TS	Technical Specifications
URI	Unresolved Item
VIO	Violation