UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

September 6, 2018

EA-18-095

Mr. Gary Ward
Vice Chancellor of Operations
Curators of the University of Missouri - Columbia
Environmental Health and Safety #8 RPDB
Columbia, MO 65211

SUBJECT: NRC ROUTINE INSPECTION REPORT NO. 03002278/2018001(DNMS) – CURATORS OF THE UNIVERSITY OF MISSOURI – COLUMBIA

Dear Mr. Ward:

On May 14 through 17, 2018, inspectors from the U.S. Nuclear Regulatory Commission (NRC) conducted a routine inspection at your Columbia, Missouri, campus, with continued in-office review through August 9, 2018. The in-office review included information that was not available during the onsite inspection including, but not limited to, an assessment of the Physics Building to determine if the building met the radiological criteria for unrestricted use as required by Title 10 of the *Code of Federal Regulations* (CFR) Part 20.1402. The purpose of the inspection was to review activities performed under your NRC license to ensure that activities were being performed in accordance with NRC requirements. Mr. Robert Gattone of my staff conducted a final exit meeting by telephone with Mrs. Felicity Beckfield of your staff on August 9, 2018, to discuss the inspection findings.

During this inspection, the NRC staff examined activities conducted under your license related to public health and safety. Additionally, the staff examined your compliance with the Commission's rules and regulations as well as the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of this inspection, one apparent violation of NRC requirements was identified and is being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's website at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. The apparent violation concerned the licensee's failure to secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas, as required by 10 CFR 20.1801.

Because the NRC has not made a final determination in this matter, the NRC is not issuing a Notice of Violation for this inspection finding at this time. The circumstances surrounding this apparent violation, the significance of the issue, and the need for lasting and effective corrective action were discussed with Mrs. Beckfield during the inspection final exit meeting on August 9, 2018.

Before the NRC makes its enforcement decision, we are providing you an opportunity to either: (1) respond in writing to the apparent violation addressed in this inspection report within 30 days of the date of this letter; or (2) request a Predecisional Enforcement Conference (PEC). **Please contact Geoffrey Warren at 630-829-9742 or Geoffrey.Warren@nrc.gov within ten days of the date of this letter to notify the NRC of your intended response.**

If you choose to provide a written response, it should be clearly marked as "Response to the Apparent Violation in NRC Inspection Report No. 03002278/2018001(DNMS); EA-18-095," and should include, for the apparent violation: (1) the reason for the apparent violation, or, if contested, the basis for disputing the apparent violation; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further violations; and (4) the date when full compliance was or will be achieved. In presenting your corrective actions, you should be aware that the promptness and comprehensiveness of your actions will be considered in assessing any civil penalty for the apparent violation. The guidance in NRC Information Notice 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action," may be useful in preparing your response. You can find the information notice on the NRC's website at: http://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1996/in96028.html. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate response is not received within the time specified or an extension of time has not been granted by the NRC, the NRC will proceed with its enforcement decision or schedule a PEC.

If you choose to request a PEC, the conference will afford you the opportunity to provide your perspective on the apparent violation and any other information that you believe the NRC should take into consideration before making an enforcement decision. The topics discussed during the conference may include the following: information to determine whether a violation occurred, information to determine the significance of a violation, information related to the identification of a violation, and information related to any corrective actions taken or planned to be taken. If a PEC is held, it will be open for public observation, and the NRC will issue a press release to announce the time and date of the conference.

Because your facility has not been the subject of escalated enforcement action within the last two years or two inspections, a civil penalty may not be warranted in accordance with Section 2.3.4 of the Enforcement Policy. In addition, based upon NRC's understanding of the facts and your corrective actions, it may not be necessary to conduct a PEC in order to enable the NRC to make a final enforcement decision. Our final decision will be based on your confirming on the license docket that the corrective actions previously described to the staff have been or are being taken.

In addition, please be advised that the number and characterization of the apparent violations described in the enclosed inspection report may change as a result of further NRC review. You will be advised by separate correspondence of the results of our deliberations on this matter.

Based on the results of this inspection, the NRC has also determined that four Severity Level IV violations of NRC requirements occurred. The violations were evaluated in accordance with the NRC Enforcement Policy. The violations concerned the licensee's failure to: (1) verify by an acceptable method that a transferee's license authorized receipt of material prior to transferring licensed material to a transferee, as required by 10 CFR 30.41(c); (2) put the shipping paper in a holder that was mounted to the side of the door on the driver's side of a vehicle, or on the driver's seat in the vehicle when the driver was not at the vehicle's controls as required by 49 CFR 177.817(e); (3) wear a laboratory coat or other protective clothing at all times in areas where licensed materials are used as required by License Condition Number 33.E of

Amendment Number 120; and (4) either conduct an evaluation for the need to wear dosimeter badges or monitor individuals with dosimeter badges, for several individuals who handled licensed materials, as required by 10 CFR 20.1502(a)(1), 10 CFR 20.1201(a), and License Condition Number 33.E. of Amendment Number 120. The violations are cited in the enclosed Notice of Violation (Notice). The NRC is citing the violations in the enclosed Notice because the inspectors identified the violations.

The NRC has concluded that information regarding the reason for the Severity Level IV violations, the corrective actions taken and planned to correct the violations and prevent recurrence, and the dates when full compliance will be achieved is already adequately addressed on the docket in the attached inspection report. Therefore, you are not required to respond to this letter concerning these violations unless the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response will be made available electronically for public inspection in the NRC's Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC's website at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made publicly available without redaction.

Please feel free to contact Robert Gattone of my staff if you have any questions regarding this inspection. Mr. Gattone can be reached at 630-829-9823.

Sincerely,

/RA/

Christine A. Lipa, Acting Director
Division of Nuclear Materials Safety

Docket No. 030-02278
License No. 24-00513-32

Enclosures:
1. Notice of Violation
2. IR 03002278/2018001(DNMS)

cc w/encl: Felicity Beckfield, CHP,
Radiation Safety Officer
State of Missouri

Letter to Gary Ward from Christine Lipa dated September 6, 2018.

SUBJECT: NRC ROUTINE INSPECTION REPORT NO. 03002278/2018001(DNMS) – CURATORS OF THE UNIVERSITY OF MISSOURI – COLUMBIA

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NOTICE OF VIOLATION

Curators of the University of Missouri – Columbia
Columbia, Missouri

Docket No. 030-02278
License No. 24-00513-32

During a U.S. Nuclear Regulatory Commission (NRC) inspection conducted on May 14, through May 17, 2018, with continued in-office review through August 9, 2018, violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

A. Title 10 CFR 30.41(c) requires that, prior to transferring byproduct material, the licensee verify that the transferee's license authorizes the receipt of the type, form, and quantity of byproduct material to be transferred. Title 10 of the *Code of Federal Regulations* (CFR) 30.41(d) specifies acceptable methods for this verification.

   Contrary to the above, on November 2, 2017, the licensee transferred 5.35 millicuries (mCi) of cobalt-57 (Co-57) to International Isotopes, Inc. and, prior to the transfer, the licensee did not verify by an acceptable method that International Isotopes, Inc.'s license authorized receipt of this material. In addition, on March 20, 2018, the licensee transferred 15 mCi of Co-57 to International Isotopes, Inc. and, prior to the transfer, the licensee did not verify by an acceptable method that International Isotopes, Inc.'s license authorized receipt of this material.

   This is a Severity Level IV violation (Section 6.3).

B. Title 10 CFR 71.5(a) requires that a licensee who transports licensed material outside of the site of usage, as specified in the NRC license, or where transport is on public highways, or 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 (DOT) in 49 CFR Parts 107, 171-180, and 390-397.

   Title 49 CFR 172.602(c) requires, with exceptions not applicable here, that the emergency response information specified in 49 CFR 172.602(a) must be maintained by each carrier who transports hazardous material in the same manner as prescribed for shipping papers. Title 49 CFR 177.817(e) requires, in part, that the driver of a motor vehicle containing hazardous material ensure that the shipping paper is readily available to, and recognizable by, authorities in the event of accident or inspection. Specifically, (i) when the driver is at the vehicle's controls, the shipping paper shall be: (a) within his immediate reach while he is restrained by the lap belt; and (b) either readily visible to a person entering the driver's compartment or in a holder which is mounted to the inside of the door on the driver's side of the vehicle; (ii) when the driver is not at the vehicle's controls, the shipping paper shall be: (a) in a holder which is mounted to the side of the door on the driver's side of the vehicle; or (b) on the driver's seat in the vehicle. Pursuant to 49 CFR 172.101, radioactive material is classified as a hazardous material.

   Contrary to the above, on May 4, 2018, the licensee transported 368 microcuries of phosphorus-32, and on May 15, 2018, the licensee transported 3.9 mCi of gallium-67 on a public highway. On both dates, the driver placed the shipping paper on the floor between the front bucket seats of the vehicle and locked the vehicle before the driver left the vehicle with licensed material inside; therefore, when the driver was not at the

vehicle's controls, the shipping paper was not in a holder that was mounted to the side of the door on the driver's side of the vehicle, or on the driver's seat in the vehicle.

This is a Severity Level IV violation (Section 6.8).

C. License condition number 33.E of Amendment Number 120 requires, in part, that the licensee conduct its program in accordance with statements made in the letter dated December 30, 2013. In Item 10.E. of the letter, entitled “Safe Use of Radionuclides and Emergency Procedures”, the licensee committed to adopt the general rules published in Appendix R to NUREG-1556, Volume 11, dated April 1999. Specifically, Appendix R describes topics to be implemented for the safe use of radioisotopes, which included, “Wear a laboratory coat or other protective clothing at all times in areas where licensed materials are used”.

   Contrary to the above, on May 15 and May 16, 2018, three trained radiation workers who were processing and handling licensed material in glove boxes were not wearing laboratory coats.

   This is a Severity Level IV violation (Section 6.3).

D. Title 10 CFR 20.1502(a)(1) states that each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this part. As a minimum, (a) each licensee shall monitor occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the licensee and shall supply and require the use of individual monitoring devices by (1) adults likely to receive in 1 year from sources external to the body, a dose in excess of 10 percent of the limits in 10 CFR 20.1201(a).

   License Condition Number 33.E. of Amendment Number 20 requires, in part, that the licensee conduct its program in accordance with the statements made in application dated December 30, 2013. In Item 10 on page 46, RES-5 of the application, the licensee committed to conduct a prospective evaluation and determine that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent of the allowable limits in 10 CFR Part 20, or would monitor individuals in accordance with the criteria in the section entitled 'Radiation Safety Program- Occupational Dose' in NUREG -1556, Vol. 7, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Academic, Research and Development and Other Licenses of Limited Scope”, dated December 1999.

   Contrary to the above, as of May 15, 2018, three radiation workers handled licensed material and the licensee failed to either conduct a prospective evaluation to determine that unmonitored individuals are not likely to receive a radiation dose in excess of 10 percent of the allowable limits in 10 CFR, Part 20 or monitor the individuals for occupational exposure to radiation.

   This is a Severity Level IV violation (Section 6.12).

The NRC has concluded that information regarding the reason for the violations, the corrective actions taken and planned to correct the violations and to address recurrence, and the date when full compliance was achieved, is already adequately addressed on the docket in the subject inspection report. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your

corrective actions or your position. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation, IR 03002278/2018001(DNMS) " and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region III, within 30 days of the date of the letter transmitting this Notice.

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days of receipt.

Dated this 6th day of September, 2018.
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U.S. NUCLEAR REGULATORY COMMISSION
REGION III

Docket No.	030-02278
License No.	24-00513-32
Report No.	03002278/2018001(DNMS)
EA No.	EA-18-095
Licensee:	Curators of the University of Missouri - Columbia
Main Facility:	University of Missouri – Columbia, Missouri, campus
Dates:	May 14 through 17, 2018, with continued in-office review through August 9, 2018
Exit Meeting Dates:	May 17, 2018 (preliminary) August 9, 2018 (telephonic)
Inspectors:	Robert G. Gattone, Jr., Senior Health Physicist Kevin Null, Health Physicist
Approved By:	Geoffrey M. Warren, Acting Chief Materials Inspection Branch Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

Curators of the University of Missouri - Columbia
NRC Inspection Report No. 03002278/2018001(DNMS)

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine inspection on May 14 through 17, 2018, with continued in-office review through August 9, 2018. The licensee identified an apparent violation of 10 CFR 20.1801 regarding failure to secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas. The inspectors identified another apparent violation of 10 CFR 20.1801. The licensee implemented corrective actions to prevent a similar violation.

The inspectors identified a violation of 10 CFR 30.41(c) and (d) involving failure to possess and read a current copy of the transferee's specific license before transferring byproduct material to a specific licensee of the Commission. The inspectors also identified a violation of 10 CFR 71.5(a) and 49 CFR 177.817(e) involving failure to put the shipping paper in a holder which is mounted to the side of the door on the driver's side of the vehicle or on the driver's seat in the vehicle when the driver was not at the vehicle's controls. The licensee implemented corrective actions to prevent similar violations.

The inspectors identified a possible violation of 10 CFR 30.36(d)(4) involving failure to provide notification to the NRC in writing within 60 days of no principal activities being conducted at the Physics Building. This issue is an Open Item that will be closed when the licensee provides requested additional information and it is reviewed by the inspectors.

The inspectors identified a violation of License Condition Number 33.E of License Amendment Number 120 involving failure to wear laboratory coats or other protective clothing at all times in areas where licensed materials were used. The licensee implemented corrective actions to prevent a similar violation.

The inspectors identified a violation of 10 CFR 20.1502(a)(1) and License Condition Number 33.E. of Amendment Number 120 involving failure to conduct an evaluation for the need to wear dosimeter badges, or to monitor individuals with dosimeter badges, for individuals working with licensed materials. The licensee implemented corrective actions to prevent a similar violation.

Report Details

1 Program Overview

Licensed Activities and Inspection History

The licensee operated a large Type A medical/academic and research broad scope program under the authority of U.S. Nuclear Regulatory Commission (NRC) byproduct materials, License No. 24-00513-32. The license authorized, in part, the possession of any byproduct material with atomic numbers between 3 and 96, in any form, for medical use and for human research and development pursuant to 10 CFR 30.4, including animal use and select radionuclides, in any form, for laboratory research and development.

The licensee's nuclear medicine department provided services for University Hospital and Women's and Children's Hospital. The majority of the medical use occurred at the University Hospital. The nuclear medicine department was staffed with six full-time technologists who performed approximately 250-350 diagnostic nuclear medicine procedures monthly. The staff performed a full spectrum of diagnostic studies, using unit doses only and administered numerous iodine-131 (I-131) dosages (mostly capsules) for whole body follow-up studies, hyperthyroid, and thyroid carcinoma treatments. One physician served as the primary authorized user (AU). The primary AU met the requirements of an Authorized User as per 10 CFR 35.2, and he/she was designated as the AU of record for receipt, use, disposal, inspections, all other authorization records, and is the principal contact for the authorization. All Co-AU's were designated as secondary AUs for the nuclear medicine activities. The licensee had three secondary AUs, for traditional nuclear medicine (NM) studies (10 CFR 35.100, 35.200, and 35.300) and qualified physicians working under the supervision of the AUs. In addition, the licensee had 3 AUs for the yttrium-90 (Y-90) Microspheres SIR-Spheres program, and two of the three overlap in traditional NM studies.

The radiation oncology department was staffed with two authorized medical physicists and one primary AU, assisted by five secondary AU radiation oncologists, who administered 10-15 palladium-103 permanent prostate implants per year. The licensee had not conducted temporary iridium-192 gynecological implants since 2016.

The radiation safety program was managed by a dedicated full-time radiation safety officer (RSO), supported by four health physicists and one full time health physics technician. The RSO reported to the Director of Environmental Health and Safety and the director reported to the Vice Chancellor for Operations. The radiation safety staff audited all areas of use and storage at frequencies based on the amount of material processed/used. Each member of the radiation safety staff served as a principle auditor or project manager for select research laboratories. The radiation safety staff also performed confirmatory surveys monthly or quarterly based on the amount of material and use to ensure compliance with its NRC license and regulations.

The licensee established a Radiation Safety Committee (RSC) to review and approve all users and uses of licensed material. Each AU performed research under a permit issued by the RSC. AUs were required to renew their permits every three years. The RSC provided program direction and oversight through its established policies and procedures. The RSC met on a bimonthly basis to conduct business. The licensee established a medical quorum to review the human uses of byproduct material. There was no human research conducted since 2009.

On May 8 through May 12, 2017, an inspector from the NRC conducted a routine inspection at the licensee's Columbia, Missouri campus, with continued in-office review through May 26, 2017. No violations were identified during the inspection.

On April 11, 2016, through April 15, 2016, an inspector from the NRC conducted a routine inspection, with continued in-office review through June 1, 2016. As a result of that inspection, the NRC determined that two non-cited violations of NRC requirements occurred involving failure to: (1) use a nickel-63 source in accordance with the terms and conditions of a permit issued by the RSC, as required by the policies and procedures referenced in the license renewal application and by License Condition 31; and (2) secure licensed material within a research laboratory, as required by Title 10 of the *Code of Federal Regulations* (CFR) Section 20.1801.

2 Security of Licensed Material

2.1 Inspection Scope

The inspectors toured selected facilities to determine if the licensee secured licensed material as required, and interviewed selected licensee staff members regarding security of licensed material. The inspectors also reviewed a licensee report about the licensee's identification of an apparent security violation.

2.2 Observations and Findings

On May 11, 2017, the licensee identified an apparent violation of 10 CFR 20.1801. A health physics technologist (technologist) left a radioactive materials waste storage room unattended. The room contained 2.51 millicuries (mCi) of radium-223, 0.5 mCi of technetium-99m (Tc-99m), and 21 mCi of cesium-137 (Cs-137). The stored licensed material was not secured by the licensee which could have resulted in unauthorized removal or access of the licensed material. Specifically, upon leaving the room, the technologist turned the room door key right in a left locking deadbolt and nudged the door too softly to move it, leaving the door unlocked for about 30 minutes. The inspectors determined that the root cause of the apparent violation was human error.

During the onsite inspection on May 14, 2018, the inspectors observed that a University Hospital nuclear medicine hot lab door was propped open and not secured to prevent unauthorized removal or access to licensed materials that were stored in a controlled area. The hot lab was unsecured for a few minutes, and the licensee failed to maintain constant surveillance over the licensed material. Two nuclear medicine technologists were nearby; however, they were in separate rooms such that they were unable to surveil the licensed material that was in the hot lab. The hot lab contained 0.098 mCi of Cs-137, 3.15 mCi of cobalt-57 (Co-57), 0.118 mCi of barium-133, and 68.12 mCi of Tc-99m. There was no evidence of lost licensed material. The inspectors determined that the root cause of the apparent violation was individual error, in that the licensee propped the hot lab door open, thereby preventing the automatic door closer from closing, latching, and locking the hot lab door.

Title 10 CFR 20.1801 states, "The licensee shall secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas." The aforementioned security incidents are examples of an apparent violation of 10 CFR 20.1801.

Regarding the apparent security violation that occurred on May 11, 2017, the licensee secured the room and conducted an inventory of licensed material and verified that no

licensed material was missing. On May 23, 2017, the licensee replaced the door lock and installed an automatic door closer such that the door shuts automatically, locks on its own, and unlocks with use of a key.

Regarding the apparent security violation that occurred on May 14, 2018, the licensee trained applicable staff about closing the hot lab door when leaving the hot lab, and the importance of not propping the hot lab door open such that the automatic door closer is able to close, latch, and lock the hot lab door. On May 15, 2018, the licensee trained all hospital nuclear medicine staff members about the apparent violation and its causes, discussed 10 CFR 20.1801 (including constant surveillance), and removed the hardware that propped the door open such that the automatic door closer was able to close, latch, and lock the hot lab door, and discussed the information with the AU. In addition, the licensee committed to continue enforcing the policies set forth as part of the radiation safety program, and emphasizing the importance of securing radioactive material from unauthorized removal or access.

The inspectors toured the licensee's HAZMAT building where radioactive waste was segregated and stored. The inspectors also interviewed a random selection of HAZMAT services personnel about the security of material stored in the building, including a portable moisture density gauge. The inspectors noted that the gauge was in storage at the time of the inspection, and was adequately secured as required in 10 CFR 30.34. No issues were identified concerning the gauge.

2.3 Conclusions

The licensee identified an apparent violation of 10 CFR 20.1801 regarding failure to secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas. The inspectors identified another apparent violation of 10 CFR 20.1801. The licensee implemented corrective actions to prevent a similar violation.

3 Transportation of Licensed Material

3.1 Inspection Scope

The inspectors assessed the licensee's transportation of licensed material by interviewing selected licensee staff members, observing demonstrations of how licensee staff members conducted transportation of licensed material, and reviewing associated records.

3.2 Observations and Findings

Pre-Verification before Transfer of Licensed Material

On November 2, 2017, the licensee transferred an International Isotopes, Inc. Model BM06E-57 source containing 5.35 mCi of Co-57 to International Isotopes, Inc. The licensee had International Isotopes, Inc.'s Amendment No. 21 of NRC License No. 11-27680-01MD, dated September 14, 2010, that was used to verify that International Isotopes, Inc. was authorized to receive the source. However, on November 2, 2017, the applicable International Isotopes, Inc.'s Amendment No. 21 of NRC License No. 11-27680-01MD was outdated and the current license amendment was No. 32. Fortunately, Amendment No. 32 authorized receipt of the source which avoided a violation of 10 CFR 30.41(a) and (b)(5) for transferring the aforementioned

source to a person who was not authorized to receive such byproduct material under the terms of a specific license issued by the Commission.

On March 20, 2018, the licensee transferred an International Isotopes, Inc. Model BM01 source containing 15 mCi of Co-57 on July 7, 2016. The licensee had International Isotopes, Inc.'s Amendment No. 21 of NRC License No. 11-27680-01MD that was used to verify that International Isotopes, Inc. was authorized to receive the source. However, on March 20, 2018, the applicable International Isotopes, Inc.'s amendment was No. 32. Fortunately, Amendment No. 32 authorized receipt of the source which avoided a violation of 10 CFR 30.41(a) and (b)(5) for transferring the source to a person who was not authorized to receive the byproduct material under the terms of a specific license issued by the Commission.

Title 10 CFR 30.41(c) states that before transferring byproduct material to a specific licensee of the Commission or an Agreement State or to a general licensee who is required to register with the Commission or with an Agreement State prior to receipt of the byproduct material, the licensee transferring the material shall verify that the transferee's license authorizes the receipt of the type, form, and quantity of byproduct material to be transferred. Title 10 CFR 30.41(d) provides methods for the verification required by paragraph (c) of this section, including section (d)(1) that states, the transferor may have in his possession, and read, a current copy of the transferee's specific license or registration certificate.

The licensee's failure to possess and read a current copy of the transferee's specific license or registration certificate before transferring byproduct material to a specific licensee of the Commission is a violation of 10 CFR 30.41(c) and (d). The inspectors determined that the root cause of the violation was licensee oversight of 10 CFR 30.41(c) and (d).

As corrective action to prevent a similar violation, the licensee verified that all of the offsite licenses on file have the current amendment. In addition, the licensee committed to revise a "Control Check Sheet for Packaging Radioactive Material for a Type A and Limited Quantity Shipment". Specifically, the licensee committed to add verbiage about the need to verify that the licensee has the transferee's current license amendment to verify that the transferee is authorized to receive the radioactive material before transferring the radioactive material. In addition, the licensee committed to update Standard Operating Procedures (SOPs) to add verbiage about the need to verify that the licensee has the transferee's current license amendment to verify that the transferee is authorized to receive the radioactive material before transferring the radioactive material.

Shipping Paper Accessibility

The licensee transported licensed material on a public highway. For example, on May 4, 2018, the licensee transported 368 microcuries of phosphorus-32, and on May 15, 2018, the licensee transported 3.9 mCi of gallium-67 on a public highway. On both dates, the driver placed the shipping paper on the floor between the front bucket seats of the vehicle and locked the vehicle before the driver left the vehicle with licensed material inside. The driver had hazmat training on March 24, 2017, which included training on the use of shipping papers.

Title 10 CFR 71.5(a) states, in part, that each licensee who transports licensed material outside the site of usage, as specified in the NRC license, or where transport is on public highways, or who delivers licensed material to a carrier for transport, shall

comply with the applicable requirements of the DOT regulations in 49 CFR parts 107, 171 through 180, and 390 through 397, appropriate to the mode of transport. Title 49 CFR 177.817(e) requires, in part, that the driver of a motor vehicle containing hazardous material ensure that the shipping paper is readily available to, and recognizable by, authorities in the event of an accident or inspection. Specifically, when the driver is not at the vehicle's controls, the shipping paper shall be: (a) in a holder which is mounted to the side of the door on the driver's side of the vehicle; or (b) on the driver's seat in the vehicle.

The licensee's failure to put the shipping paper in a holder which is mounted to the side of the door on the driver's side of the vehicle or on the driver's seat in the vehicle when the driver was not at the vehicle's controls is a violation of 10 CFR 71.5(a) and 49 CFR 177.817(e). The inspectors determined that the root cause of the violation was the driver's oversight regarding 10 CFR 71.5(a) and 49 CFR 177.817(e). As corrective action to prevent a similar violation, the licensee committed to place the shipping paper on the driver's seat when the driver is not at the vehicle's controls until a shipping paper pouch is ordered and mounted to the side of the door on the driver's side of the vehicle. In addition, the licensee committed to retrain applicable staff in the proper placement of shipping paperwork upon exiting the vehicle.

3.3 Conclusions

The inspectors identified a violation of 10 CFR 30.41(c) and (d) involving failure to possess and read a current copy of the transferee's specific license before transferring byproduct material to a specific licensee of the Commission. In addition, the inspectors identified a violation of 10 CFR 71.5(a) and 49 CFR 177.817(e) involving failure to put the shipping paper in a holder which is mounted to the side of the door on the driver's side of the vehicle or on the driver's seat in the vehicle when the driver was not at the vehicle's controls. The licensee implemented corrective actions to prevent similar violations.

4 Open Item: Notification of Cessation of Principal Activities

4.1 Inspection Scope

The inspectors interviewed selected licensee staff to obtain information regarding compliance with the Decommissioning Timeliness Rule in 10 CFR 30.36(d)(4). In addition, the inspectors reviewed selected documents pertinent to 10 CFR 30.36(d)(4).

4.2 Observations and Findings

The inspectors identified that principal activities had not been conducted in the Physics Building on the licensee's Columbia campus since approximately 5 years ago. The inspectors noted that the licensee had not notified the NRC in writing that no principal activities had been conducted for a period of 24 months in any separate building or outdoor area that contained residual radioactivity such that the building is unsuitable for release in accordance with NRC requirements.

The licensee contracted a company to conduct a closeout survey to determine if the Physics Building was releasable per 10 CFR 20.1402, "Radiological Criteria for Restricted Use".

Subsequently, the inspectors completed their review of the contractor's report on August 5, 2018. On August 6, 2018, the inspectors called the licensee's RSO to request

additional information that was not in the contractor's report. The requested additional information should provide information to determine if the Physics Building was releasable per 10 CFR 20.1402. As such, the NRC cannot determine if a violation of 10 CFR 30.36(d) occurred until the licensee provides the requested information. As such, this is an Open Item.

When the inspectors receive and review the requested information, they will determine whether or not a violation of 10 CFR 30.36(d)(4) occurred. The inspectors will brief the results with the licensee. In addition, the inspectors will provide the results in a separate correspondence.

Title 10 CFR 30.36(d)(4) requires that within 60 days of the occurrence of no principal activities being conducted for a period of 24 months in any separate building that contains residual radioactivity such that the building is unsuitable for release in accordance with NRC requirements, the licensee shall provide notification to the NRC in writing of such occurrence.

4.3 Conclusions

The inspectors identified a possible violation of 10 CFR 30.36(d)(4) involving failure to provide notification to the NRC in writing within 60 days of no principal activities being conducted at the Physics Building. This issue is an Open Item that will be closed when the licensee provides the requested additional information and it is reviewed by the inspectors.

5 Personal Protection Equipment (PPE)

5.1 Inspection Scope

The inspectors reviewed and evaluated the licensee's practices for safely using radionuclides. This was conducted through observations of licensed activities and interviews of licensee staff members during tours of selected research laboratories. The inspectors toured a representative sampling of laboratories and observed the storage, use, and handling of RSC-approved radionuclides.

5.2 Observations and Findings

The license authorized several radionuclides for research and development (R&D) studies. R&D laboratories were approved by the licensee's RSC, and were categorized as either high risk (category I), medium risk (category II) or low risk (category III). Requirements for facilities and equipment, contamination and radiation level surveys, AU training and experience, and laboratory worker training, were defined for each laboratory type.

On May 15 and May 16, the inspectors visited a category II laboratory that was approved to possess and use mCi quantities of natural uranium and thorium, depleted uranium, and neptunium-237, in any form. Due to the hazards associated with studies that were being conducted in this laboratory, the handling of the nuclides was conducted within ventilated glove boxes. During tours and observations, the inspectors noted that three trained radiation workers who were processing and handling RSC-approved radionuclides in glove boxes, were not wearing laboratory coats. The inspectors interviewed the workers who stated that laboratory coats were not used because the laboratory coat sleeves restricted their arm movement in the glove ports of the boxes.

License Condition Number 33.E of Amendment Number 20 requires, in part, that the licensee conduct its program in accordance with statements made in the letter dated December 30, 2013. In Item 10.E of the letter, entitled “Safe Use of Radionuclides and Emergency Procedures”, the licensee committed to adopt the general rules published in Appendix R to NUREG-1556, Volume 11, dated April 1999. Specifically, Appendix R describes topics to be implemented for the safe use of radioisotopes, which included, “Wear a laboratory coat or other protective clothing at all times in areas where licensed materials are used”. The licensee’s failure to wear laboratory coats or other protective clothing in areas where licensed materials were being used is a violation of License Condition Number 33.E. of Amendment Number 120.

At the time the violation was observed, the licensee staff in the laboratory were instructed to don laboratory coats. Immediate corrective action was taken by the end of the day on May 16, and the inspectors observed that all three workers were wearing laboratory coats. The licensee re-educated AUs and laboratory personnel on the importance of proper PPE usage, created a laboratory PPE policy for all campus laboratories, and committed to enforce existing applicable policies. In addition, the licensee committed to have its Industrial Hygienist (IH) perform a formal risk assessment regarding the concern about the laboratory coat sleeves restricting arm movement in the glove ports of the boxes. The licensee will also prepare a lab specific PPE plan for the laboratory where this violation was observed. In addition, the licensee committed to re-train AUs and laboratory personnel on the importance of proper PPE usage. The licensee also committed to create a laboratory PPE policy for all campus laboratories inclusive of NRC license application requirements (NUREG-1556, Volume 11, dated April 1999 Appendix R) and enforce any existing applicable policies as outlined in the RSM.

As follow up, a licensee IH who was accompanied by a health physicist conducted a risk assessment regarding lab specific personal protection equipment and dosimetry. As a result, the IH recommended: (1) that each member of the laboratory team be assigned his/her own lab coat(s) and that the lab coat(s) be sized appropriately as to maximize comfort and protection; and (2) laboratory coats with ribbed cuffs will be worn because they would not be as likely to bunch up while working inside the glove boxes.

The applicable laboratory staff agreed to wear lab coats and expressed concern about thermal comfort while wearing lab coats. The IH concurred with that concern and requested that the licensee evaluate the laboratory to document the temperature and determine what can be done to make the room more comfortable. The IH also observed that each member of the lab wore long pants and closed-toed shoes. Protective eyewear was present inside the laboratory and everyone engaged in active work was wearing some form of ANSI-approved eye protection. Disposable gloves were also present inside the laboratory and there was evidence of use. The licensee indicated that the root cause for non-compliance with respect to the laboratory coats was thermal comfort and that it should be addressed as described above.

5.3 Conclusions

The inspectors identified a violation of License Condition Number 33.E of License Amendment Number 120 involving failure to wear laboratory coats or other protective clothing at all times in areas where licensed materials were used. The licensee implemented corrective actions to prevent a similar violation.

6 Occupational External Dosimetry

6.1 Inspection Scope

The inspectors reviewed the licensee's external dosimetry program for monitoring occupational radiation exposure. The inspectors observed licensed activities and interviewed selected licensee staff members in randomly selected RSC-approved research laboratories, and reviewed occupational exposures records.

6.2 Observations and Findings

The inspectors reviewed dosimetry reports for calendar years (CY) 2017 and 2018 to date. The maximum whole body and extremity exposures for CY 2017 were 289 millirem (mrem) and 4413 mrem, respectively. For CY 2018 to date, the maximum whole body exposure was 160 mrem, and the maximum extremity exposure was 284 mrem.

During tours of radioactive material use laboratories and while conducting interviews and observations of radiation workers handling radionuclides, the inspectors noted that the radiation workers routinely used whole body and extremity dosimeter badges. However, the inspectors conducted observations in a category II laboratory and noted that three radiation workers were not wearing whole body and extremity dosimeters while they were handling RSC-approved radionuclides. Interviews of the three workers indicated that they believed that they were not required to wear dosimeter badges. The radiation workers also confirmed that they typically did not wear dosimeter badges. Members of the licensee's Environmental Health & Safety (EH&S) staff stated that the radiation workers did not have an evaluation to determine if they were likely to receive 10 percent of the regulatory limits specified in 10 CFR Part 20 to determine whether or not the radiation workers were required to wear dosimeter badges.

Title 10 CFR 20.1502(a)(1) states that each licensee shall monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this part. As a minimum, (a) each licensee shall monitor occupational exposure to radiation from licensed and unlicensed radiation sources under the control of the licensee and shall supply and require the use of individual monitoring devices by (1) adults likely to receive in 1 year from sources external to the body, a dose in excess of 10 percent of the limits in 10 CFR 20.1201(a).

License Condition Number 33.E. of Amendment Number 120 requires, in part, that the licensee conduct its program in accordance with the statements made in application dated December 30, 2013. In item 10 on page 46, RES-5 of the application, the licensee committed to conduct a prospective evaluation and determined that unmonitored individuals are not likely to receive, in one year, a radiation dose in excess of 10 percent of the allowable limits in 10 CFR Part 20, or would monitor individuals in accordance with the criteria in the section entitled 'Radiation Safety Program-Occupational Dose' in NUREG -1556, Vol. 7, 'Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Academic, Research and Development and Other Licenses of Limited Scope", dated December 1999. Failure to conduct an evaluation for the need to wear dosimeter badges, or to monitor individuals with dosimeter badges is a violation of 10 CFR 20.1502(a)(1) and License Condition Number 33.E. of Amendment Number 120.

The inspectors determined that this was a legacy issue in that radiation workers in this laboratory had not used dosimeter badges for a number of years. The radiation workers also stated that they believed wearing extremity dosimeters while using the glove boxes could cause a tear of the glove port material, creating airborne hazards. The IH assessed the aforementioned dosimetry concern and the potential for compromising the integrity of the gloves by assigning ring dosimeters for the radiation workers to wear. The IH determined that the concern had already been answered as lab members demonstrated that they were now wearing the ring dosimeters. The licensee indicated that the root cause regarding the concern about potential damage to the glove box gloves by wearing ring dosimeters was addressed sufficiently because the laboratory workers are now wearing the dosimeters.

The inspectors also evaluated the extent of this issue by reviewing EH&S' process for evaluating the use of dosimeter badges throughout the licensee's radiation protection program. The inspectors determined that this appeared to be an isolated case that had carried over for several years and that EH&S staff, in conjunction with AUs, routinely conducted evaluations for the use of dosimeter badges. No other similar issues were identified.

The licensee implemented corrective actions to prevent a similar violation. Specifically, on the day that the violation was identified, the licensee assigned dosimeter badges to the three aforementioned radiation workers and the workers started to wear their dosimeter badges. The licensee will review their dosimeter badge results to inform their evaluation to determine if the workers are likely to receive in one year from sources external to the body, a dose in excess of 10 percent of the limits in 10 CFR 20.1201(a). In addition, the licensee stated that they would use dosimetry results for the three staff who use radioactive material at the highest frequency for a year to inform their dose modeling for the other laboratory staff. The licensee also committed to update the radiation worker application form to include dosimetry evaluation comments, update and/or create SOPs to ensure that a dose evaluation is performed by Radiation Safety staff for all radiation worker applicants, and re-educate applicable staff members.

In addition, the licensee committed to address the concerns of the staff in the laboratory where this violation was observed regarding the potential for extremity dosimeters damaging the glove port material within the glove box as part of the aforementioned Industrial Hygiene assessment.

6.3 Conclusions

The inspectors identified a violation of 10 CFR 20.1502(a)(1) and License Condition Number 33.E. of Amendment Number 120 involving failure to conduct an evaluation for the need to wear dosimeter badges, or to monitor individuals with dosimeter badges. The licensee implemented corrective actions to prevent a similar violation.

7 Other Areas Inspected

7.1 Inspection Scope

The inspectors reviewed other areas of the licensee's radiation protection program by interviewing selected staff, observing licensed activities, observing demonstrations of how licensed activities had been or would be conducted based on scenarios posed by the inspectors, and reviewing selected records. Areas reviewed included, in part, fume hood operability, radioactive waste processing, area survey procedures and protocols,

possession and calibration of survey instrumentation, implementation of emergency procedures in research laboratories, training program for radiation workers, transportation of radioactive material, incident notification, interim alternate radiation safety officer, radiation protection program audits, yttrium-90 (Y-90) SIR-Spheres, radiation safety committee (RSC) activities, animal research, air effluent assessment, and possession limit compliance.

7.2 Observations and Findings

Fume Hood Operability

The inspectors observed a potentially unsafe condition within a fume hood in a laboratory where licensed material was used. The fume hood was used to ventilate two enclosed glove boxes. The glove boxes were used on a routine basis to process RSC-approved radionuclides. The hood was also used to store several containers of radioactive waste that had been generated in the laboratory. At the time of the inspection, the inspectors noted that the waste containers were being stored in the fume hood in a fashion that could potentially obstruct exhaust air from the glove boxes through the hood. Failure to properly ventilate the glove boxes could result in a safety issue for laboratory workers. At the request of the inspectors, the licensee's facilities management staff measured the air flow rate through the hood and confirmed that there were some low air flow spots; however, the average flow rate measured over the entire sash opening was within acceptable industry standards. The licensee recognized the potential safety issue and removed several containers from the hood. Licensee staff also reconfigured other items that were left in the hood in order to eliminate the low air flow spots. Subsequent air flow measurements indicated that the low air flow spots were eliminated.

Radioactive Waste Processing

The inspectors toured the licensee's hazardous waste processing/storage facility and interviewed staff members about personal dosimetry, survey instrumentation, safe handling and segregating radioactive waste from other hazardous waste, security of radioactive waste during shipment on campus, and training. No concerns were identified.

Area Survey Procedures, Protocols, and Inspector Surveys

In the same laboratory pertinent to the aforementioned potentially unsafe condition within a fume hood, radiation workers demonstrated how area surveys were conducted for contamination and the inspectors reviewed records of surveys that had been performed. The inspectors noted that appropriate monthly surveys were being performed for this type of laboratory as required in the license. However, the inspectors determined that daily surveys after the use of licensed materials were not being performed as required in the licensee's Radiation Safety Manual (RSM). "Procedures for Surveys", a section in the licensee's RSM, stated that "authorized users shall be responsible for ensuring that both monitoring during use and after use are performed with each use of radioactive material." The inspectors noted that daily surveys were not routinely being conducted in the laboratory as required in the RSM. Even though the RSM was an internal document and not part of the licensee's NRC license, the inspectors were concerned that the procedure was not being implemented.
The concern was communicated to the licensee, and the licensee reminded the authorized user and radiation workers of the survey requirement and their responsibility to implement procedures that were described in the RSM. The licensee's assigned

health physicist spoke with the lead radiation worker in the lab regarding the concern. In addition, the licensee planned to update the Radiation Safety internal inspection question set to include a specific question about the requirement to perform surveys at the end of each day when radioactive materials are used.

To address the concern, the licensee planned to retrain licensee radiation safety inspectors and the radiation workers on the requirements for doing surveys at the end of each day when radioactive materials are used. The inspectors also noted that the permit approval process for each AU required a signed statement by the AU that he/she has read and understands the requirements in the RSM. Although the licensee's RSM is an internal document and not incorporated into the NRC license, the inspectors were concerned that authorized users and their staff may not fully understand, or be aware of, the requirements in the RSM.

The inspectors used NRC-owned, calibrated survey meters to conduct an independent ambient exposure survey at selected surfaces of a lead safe that contained a molybdenum-99/technetium-99m generator and the highest result was 0.04 milliRoentgen per hour (mR/hr). In addition, the inspectors measured a maximum of 0.7 mR/hr at selected surfaces of a box containing a molybdenum-99/technetium-99m generator. The inspectors also conducted independent surveys in both restricted and unrestricted areas of RSC-approved laboratories, and the radioactive waste storage building. Radiation levels ranged from 0.05 mR/hr (background) in unrestricted areas to 0.30 mR/hr in research laboratories.

Transportation of Radioactive Material

The inspectors reviewed an NRC Form 540 Uniform Low-Level Radioactive Waste Manifest Shipping Paper dated March 14, 2018, showing that the licensee transferred 1,050 megabecquerels of Cs-137 and strontium-90 that was received by Alaron Corporation. The sources were leak tested prior to transfer and there were no leaking sources. The inspectors had no concerns.

Incident Notifications

The inspectors noted that the licensee did not have any radiation dose overexposures, theft or loss of licensed material, or any other applicable incidents that required the licensee to notify the NRC since the last inspection.

Interim Alternate Radiation Safety Officer

The inspectors noted that Dr. Silvia Jurisson served as an alternate RSO from October 17, 2017, until January 15, 2018, in accordance with License Condition 33.

Radiation Protection Program Audits

The inspectors reviewed the licensee's record dated February 8, 2018, for its annual audit of its radiation protection program for 2017. The inspectors had no concerns.

Y-90 SIR-Spheres

The inspectors reviewed the licensee's use of Y-90 SIR-Spheres for liver cancer treatment. The licensee began using Y-90 SIR-Spheres on November 29, 2017. The licensee performed about three Y-90 SIR-Spheres treatments per month. The inspectors reviewed selected written directives for Y-90 SIR-Spheres, and they had all of

the required information. The licensee used Tc-99m-labeled macro aggregated albumin to test liver to lung shunting prior to conducting the Y-90 SIR-Spheres treatments. In addition, the licensee conducted post treatment assessment of residual Y-90 SIR-Spheres radioactivity to determine the percentage of the administered dose to the patient. Most of the Y-90 SIR-Spheres patients had post treatment single-photon emission computed tomography (SPECT)/computed tomography (CT) and planar imaging of the liver and the lungs. As of the onsite inspection, the licensee had no known Y-90 SIR-Spheres treatments that deviated from the applicable written directives and treatment plans.

RSC Activities

The inspectors reviewed RSC activities including the amendment request to add a high dose remote afterloader unit for medical use. In addition, the RSC acted on a Permit for a new chemistry procedure. The inspectors reviewed a random sample of permits for all of the categories of labs that were reviewed and signed by the RSC and there were no concerns identified.

Animal Research

The inspectors reviewed animal research with a focus on Synovetin Osteoarthritis homogeneous Sn-177m colloid (Synovetin) research with dogs. As of the onsite inspection, the licensee had completed the Synovetin research with dogs. The inspectors toured the licensee's Radiation Isolation Ward and interviewed applicable licensee staff, including the AU. The inspectors noted that the AU wore applicable personal protective equipment while using the Synovetin, including booties, lab coats, and gloves. The licensee also used floor liners to prevent the spread of contamination, and the work area was posted as required. Radioactive waste was placed in a plastic-lined container and the container was labeled, "Caution Radioactive Material". The licensee had a calibrated survey meter in the facility.

For Synovetin, the licensee held the dogs in its isolation facility when: (1) the half-life was greater than 24 hours (held for at least 3 days); and (2) the dog had greater than 0.7 mR/hr at 1 meter from the dog. The inspectors reviewed the licensee's "Client Instruction Sheet for Animals Post Release Sn-177m Radioactive Drug Administration". The instructions included the following precautions for the dog owners to follow for the next 3 weeks: (1) close contact (within 3 feet) with the patient must be limited to 1 hour per day; (2) young children, babies and pregnant women must be restricted from the patient; (3) litter boxes and/or waste should be collected and disposed of daily; (4) after handling the patient or waste, you must thoroughly wash your hands; (5) the patient must be confined to your premises; and (6) in the event of the patient's death, the veterinary clinician must be contacted for follow up and consultation in the proper disposal of the remains. The inspectors reviewed selected licensee records for released dogs and the dose rates at 1 meter from the dogs showed that the owners would not exceed 2 mrem in any one hour and not exceed 100 mrem in a year, assuming that the owners complied with the licensee's Client Instruction Sheet for Animals Post Release Synovetin-Sn-177m Radioactive Drug Administration.

Air Effluent Assessment

The inspectors reviewed the licensee's assessment of radioactive air effluent that was released. The licensee conservatively used licensed material receipt records for the radionuclides and activities for each calendar year for input into the COMPLY code for air effluent assessment based on the assumption that all of the received licensed

material was exhausted through the stack (i.e., Actinide Lab and Iodine-125 lab). The licensee measured the volume of air per unit time that was released from the stack to determine the concentration of radioactivity per volume of air to verify compliance with Appendix B, Table 2, Column 1 in 10 CFR Part 20. The inspectors reviewed the licensee's 2017 Comply Record dated March 1, 2018, and there were no concerns identified.

Possession Limit Compliance

Authorized users ordered licensed material and radiation safety staff were notified of the orders. The radiation safety staff notified the applicable individual(s) when the licensed material arrives. Upon receipt of the licensed material, the radiation safety staff checked compliance with the license possession limits, including the received licensed material.

The radiation safety staff secured the received licensed material in a lead-lined safe prior to transfer to the AUs. The inspectors noted that the room containing the lead safe was locked and access was limited to authorized persons. In addition, there was no eating, drinking, or smoking allowed in the room.

The inspectors observed a health physics technician (HPT) demonstrate how she received licensed material, which included surveys for removable contamination on all 6 sides of the box containing licensed material, and use of an ion chamber survey instrument to conduct ambient exposure rate surveys of the box. The HPT also demonstrated how she would respond to radiation survey results of the packages containing licensed material that were over the NRC regulatory limits. The HPT was aware of the NRC regulatory limits pertinent to surveys of received packages containing licensed material. The HPT demonstrated how she used computer software to monitor licensed material possession compliance. The software included all of the licensed material in possession and it contained the applicable permit possession limits. The software also verified whether or not the newly received licensed material exceeded the permitted possession limits. There were no concerns identified.

Possession and Calibration of Survey Instrumentation

During tours of RSC-approved research laboratories and the HAZMAT Services building, the inspectors noted the possession of appropriate survey instrumentation for detecting the presence of contamination and measuring radiation levels. The inspectors also noted that instrumentation was properly calibrated as required by the licensee's NRC license. At the request of the inspectors, several randomly selected radiation workers demonstrated how the instruments were used to conduct required surveys. No issues were identified.

Implementation of Emergency Procedures

Through interviews of randomly selected radiation workers in RSC-approved laboratories and a review of documented incidents in various laboratories, the inspectors determined that the licensee developed and implemented an appropriate level of emergency procedures for each category type of RSC-approved laboratory. No issues regarding the development and implementation of emergency procedures were identified.

Training Program for Radiation Workers

The inspectors reviewed the licensee's implementation of its training program for

radiation workers and associated documentation of training that was provided. The inspectors also interviewed a random selection of laboratory workers about the formal training that they had received, as well as laboratory-specific training provided by their immediate supervisor. The inspectors determined that the radiation workers had received a level of training that was appropriate for the type of licensed material that they were permitted to handle. No issues were identified.

7.3 Conclusions

Three concerns were identified. Specifically: (1) the licensee had a potentially unsafe condition within a fume hood; (2) the licensee did not routinely conduct daily surveys in a laboratory after the use of licensed materials as required in the licensee's RSM; and (3) the authorized users and their staff may not fully understand, or be aware of, the requirements in the RSM. Overall, the licensee effectively implemented other areas of its radiation protection program as required in the NRC license. The inspectors did not identify a violation of NRC regulatory requirements.

8 Exit Meeting Summary

On May 17, 2018, the inspectors conducted a preliminary exit meeting to discuss preliminary inspection findings. On August 9, 2018, the inspectors conducted a final exit meeting to present the inspection findings and the aforementioned open item. The licensee did not identify any documents or processes reviewed by the inspectors as proprietary. The licensee acknowledged the findings presented.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONNEL CONTACTED

Eric Acosta, Graduate Research Assistant
Isaac Adams, HazMat Services Technician I, Environmental Health and Safety (EHS)
*Felicity Beckfield, Radiation Safety Officer/Assistant Director, EHS
Haley Blasa Railton, Health Physics Technician I, EHS
*Ron Dobey, Health Physics Manager, MURR
Dennis Elmore, Industrial Hygienist, Special Projects, EHS
*Teki Grahl, Radiation Safety Professional, EHS
Jon Hendrell, HazMat Services Technician III, EHS
*Todd Houts, Environmental Health and Safety Director
Huatao Guo, Ph.D., Principal Investigator, Molecular Microbiology and Immunology
Eskil Hudson, Radiation Safety Professional, EHS
*Silvia Jurisson, RSC Chair
Jae Wan Kwon, Ph.D., Principal Investigator, Electrical Engineering and Computer Science
Joni Lanceford, Veterinary Nuclear Medicine Technologist
Jimmy Lattimer, Veterinarian Authorized User
Megan McLean, Graduate Research Assistant, Animal Science Research Center
*Ashley Milligan, Supervisor, Nuclear Medicine, MU Health Care
Michael Murray, Graduate Research Assistant
Alex Myers, Graduate Research Assistant
Santa Naorem, Fellow, Post-Doctoral
*Chris Pearman, HazMat Services Coordinator, EHS
*Rachel Pope, Radiation Safety Professional, EHS
*Thomas Quin, Ph.D., RSC Vice Chair and Principal Investigator, Biochemistry
Pokpong Rungthanaphatsophon, Fellow, Post-Doctoral
Michael Tarlton, Graduate Research Assistant
Sean Villanova, Fellow, Post-Doctoral
Justin Walensky, Ph.D., Principal Investigator, Chemistry
*Gary Ward, Vice Chancellor for Operations, Interim Vice Chancellor for Student Affairs
Robert Ward, Graduate Research Assistant
*Jon White, Manager, Environmental Affairs, EHS

* Attended preliminary exit meeting on May 17, 2018
^ Participated in the telephonic final exit meeting on August 9, 2018

INSPECTION PROCEDURES USED

IP 87134 – Medical Broad-Scope Programs