

April 26, 2007

Jack Crawford
Radiation Safety Officer/Assistant Director
Environmental Health & Safety
University of Missouri-Columbia
Research Park Development Building
Columbia, MO 65211-3050

SUBJECT: NRC INSPECTION REPORT 030-02278/07-001(DNMS) AND
NOTICE OF VIOLATION - UNIVERSITY OF MISSOURI

Dear Mr. Crawford:

On April 25, 2007, the NRC completed inspection activities at the University of Missouri, Columbia, Missouri campus. The inspection included onsite activities on March 12 through 14, 2007, with continued in-office review through March 29, 2007, to obtain information regarding radiation surveys and decontamination activities performed in the MURR Building. The purpose of the inspection was to determine whether certain decommissioning and facility release activities were conducted safely and in accordance with NRC requirements. Specifically, inspectors reviewed the decommissioning program for: tracking of designated and formerly designated authorized radioactive material use locations; conducting and documenting radiological surveys necessary for unrestricted release of former use areas; decommissioning activities performed prior to the release of these areas; and maintaining required information important to the decommissioning and release of a facility for unrestricted use. At the conclusion of the on-site inspection on March 14, 2007, the inspectors discussed the preliminary findings with you and members of your staff. On April 25, 2007, a final exit meeting was conducted telephonically with you and members of your staff.

The inspection consisted of an examination of activities as they relate to safety and compliance with the Commission's rules and regulations. Areas examined during the inspection are identified in the enclosed report. Within these areas, the inspection consisted of a selective examination of procedures and representative records, interviews with personnel, and the conduct of NRC limited scoping surveys.

Based on the results of this inspection, the NRC has determined that four Severity Level IV violations of NRC requirements occurred. The violations were evaluated in accordance with the NRC Enforcement Policy included on the NRC's Web site at www.nrc.gov. The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the inspection report. The violations are being cited in the Notice because they involve the failure to: 1) maintain in a single document a list of all areas designated and formerly designated restricted areas; 2) perform reasonable and necessary surveys in two buildings following the cessation of licensed activities; 3) perform reasonable and necessary surveys to demonstrate compliance with the NRC's requirements for monitoring intakes of licensed materials by occupationally exposed workers; and 4) limit activities to those authorized by the University's NRC license.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). The NRC's document system is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

We will gladly discuss any questions you may have regarding this inspection.

Sincerely,

/RA by W. Snell Acting for/

Jamnes L. Cameron, Chief
Decommissioning Branch

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

Enclosures:

1. Notice of Violation
2. NRC Inspection Report 030-02278/07-001(DNMS)

DISTRIBUTION:

Docket File
 G. Grant, RIII
 S. Reynolds, RIII
 G. Shear, RIII
 K. O'Brien, RIII

DOCUMENT NAME:C:\FileNet\ML071160475.wpd

X Publicly Available Non-Publicly Available Sensitive X Non-Sensitive

To receive a copy of this document, indicate in the concurrence box "C" = Copy without attach/encl "E" = Copy with attach/encl "N" = No copy

OFFICE	RIII	RIII	RIII	RIII
NAME	KGNull	GMMcCann	JLCameron by W.Snell for	
DATE	04/19/07	04/19/07	04/26/07	

OFFICIAL RECORD COPY

NOTICE OF VIOLATION

University of Missouri
Columbia, Missouri

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

During an NRC inspection completed on April 25, 2007, four violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," the violations are listed below:

1. Title 10 CFR 30.35 requires, in part, that each person licensed under this part or Parts 32 through 36 and 39 of this chapter keep records of information important to the decommissioning of a facility in an identified location until the site is released for unrestricted use. Specifically, 10 CFR 30.35(g)(3) requires, in part, that a list contained in a single document be kept of all areas designated and formerly designated restricted areas as defined in 10 CFR 20.1003.

Contrary to the above, as of March 29, 2007, the licensee failed to keep a list contained in a single document of all areas designated and formerly designated restricted areas.

This is a Severity Level IV violation (Supplement VI).

2. Title 10 CFR 20.1501 requires that each licensee make or cause to be made surveys that may be necessary for the licensee to comply with the regulations in Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present.

Pursuant to 10 CFR 20.1003, *survey* means an evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive material or other sources of radiation.

- A. Contrary to the above, the licensee did not make surveys to assure compliance with 10 CFR 20.1402, which limits radiation exposure to 25 millirem per year from residual radioactivity that is distinguishable from background. Specifically, the licensee failed to make, or cause to be made, reasonable and necessary surveys of Building 121 in June 1994 and the Missouri University Research Reactor Storage Building in May 2005, to demonstrate compliance with the 25 millirem exposure limit, following the cessation of licensed activities at these locations.
- B. Contrary to the above, the licensee did not make surveys to assure compliance with 10 CFR 20.1502(b), which requires that each licensee monitor exposures to radiation and radioactive material at levels sufficient to demonstrate compliance with the occupational dose limits of this part. Specifically, in May 2005, the licensee performed aggressive decontamination work in the Missouri University Research Reactor waste storage building that had the potential to create airborne concentrations of licensed materials and the licensee failed to make, or caused to be made, reasonable and necessary surveys to monitor the potential intakes by occupationally exposed workers.

These are Severity Level IV violations (Supplement IV).

3. Condition 32 of License No. 24-00513-32 requires, in part, that licensed material be possessed and used in accordance with statements, representations, and procedures contained in an application dated June 18, 2003.

Item 10E of the University's June 18, 2003 application states that the University will adopt the procedures for the safe use of radionuclides and emergencies as published in Appendix R of NUREG-1556, Volume 11. Appendix R, in part, describes model procedures for handling emergencies, including but not limited to general procedures for decontaminating areas, which have become contaminated as a result of spills and work associated with routine uses of radioactive materials.

Contrary to the above, in May 2005, the licensee conducted decontamination work in the Missouri University Research Reactor storage building utilizing a decontamination method on radiologically contaminated concrete, involving the use of a jack-hammer, which is not an authorized method pursuant to the University's license.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, the University of Missouri-Columbia is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555, with a copy to the Regional Administrator, Region III, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (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 will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

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.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your

response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

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

Dated this 26th day of April 2007

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 030-02278

License No: 24-00513-32

Report No: 030-02278/07-001(DNMS)

Licensee: University of Missouri-Columbia

Facility: Columbia Campus

Location: Columbia, Missouri

Dates: March 12 through 14, 2007 (on-site), with continuing in-office review through March 29, 2007, and final telephone exit meeting on April 25, 2007

Inspectors: George M. McCann, Senior Health Physicist
Kevin G. Null, Senior Health Physicist

Approved by: Jamnes L. Cameron, Chief
Decommissioning Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY
The University of Missouri
Report No: 030-02278/07-001(DNMS)

This inspection focused on the licensee's decommissioning program for: tracking of designated and formerly designated authorized radioactive material use locations; conducting and documenting radiological surveys necessary for unrestricted use of formerly designated use areas; decommissioning activities performed prior to the release of these areas; and maintenance of required information important to the decommissioning of a facility until the site is released for unrestricted use. During the inspection, the inspectors discussed the status of decommissioning activities with licensee personnel, and examined licensee records and procedures.

The University of Missouri-Columbia holds a Type A Medical Broadscope license, and is authorized to use a variety of radionuclides including, but not limited to, the following activities: 1) 10 CFR Part 35 medical procedures, 2) research and development as defined in 10 CFR Part 30, 3) student instruction and calibration of instrumentation, and 4) the measurement of moisture and density of soils using portable gauging devices. The University is authorized to use the material at several locations of use in and around the City of Columbia. In addition, the licensee is authorized to use portable gauges at temporary job sites anywhere in the United States where the NRC maintains jurisdiction.

Closeout Inspection and Surveys

- The inspectors determined that, overall, the licensee's program for managing and tracking current locations of restricted use was managed adequately. However, the inspectors identified one violation for failure to have a single document listing former and current locations designated as restricted areas as required by 10 CFR 30.35(g)(3). (Section 1.0)

Radiation Protection

- The inspectors concluded that the licensee's release of the former waste storage facility (Rad Storage Barn), the Environmental Trace Substance Laboratory, and two former burial sites were in accordance with NRC release criteria at the time these sites were released for unrestricted use. The inspectors identified three violations for the failure to: 1) perform reasonable and necessary surveys in Building 121 and the MURR waste storage building following the cessation of licensed activities at these locations; 2) perform reasonable and necessary surveys to demonstrate compliance with the NRC's criteria for monitoring intakes of licensed materials by occupationally exposed workers; and 3) limit activities involving licensed material to those authorized in the license. (Section 2.0)

Report Details¹

1.0 Closeout Inspections and Surveys (IP 83890)

1.1 Inspection Scope

The inspectors reviewed and evaluated the licensee's management oversight procedures, practices, and documentation used to track areas formerly designated for use of licensed radioactive material, and the subsequent decommissioning and release of those areas for unrestricted use. The inspectors interviewed the University's health physics management and staff regarding the maintenance and tracking of decommissioning records necessary for the release of areas for unrestricted use and license termination pursuant to requirements of 10 CFR Part 30.35 *Financial Assurance and Recordkeeping for Decommissioning*.

The inspectors reviewed and evaluated the following documents: 1) Decommissioning Funding Plan (including a list of university facilities evaluated for decommissioning), 2) the University's application for renewal dated June 18, 2003 (tied down in the university's NRC license), 3) spill and incident records, 4) lists of "Building and Rad Labs" dated March 13, 2007, "Closed Out Labs (draft) dated March 12, 2007, and Authorized User Active and Inactive Labs" and 5) select laboratory/building drawings and diagrams.

1.2 Observations and Findings

The licensee maintained spill and incident records and reports in a single file. The records did not identify, nor was the licensee aware of, any incidents with persistent contamination that would need to be addressed during future decommissioning activities. Records related to drawings and structures of restricted areas where radioactive material was used were maintained on campus at 311 Jesse Hall. The licensee did not maintain a single document that listed all of the areas formerly and currently designated as restricted areas. The licensee's radiation safety staff produced several documents that contained lists of areas formerly and currently designated as restricted areas. However, there were inconsistencies in the data among the lists. For example, the University's 1992 Decommissioning Funding Plan listed 35 facilities where licensed material was used. Whereas, a current document, entitled "Buildings with Rad Labs," dated March 13, 2007, listed 74 facilities which did not include some of the locations listed in the 1992 document. Additionally, the licensee's data did not include formerly designated restricted areas from several terminated NRC licenses that were issued to the University prior to being consolidated into the current broadscope license.

Title 10 CFR 30.35(g) requires, in part, that each person licensed under Part 30 keep records of information important to the decommissioning of a facility in an identified location until the site is released for unrestricted use. Specifically, 10 CFR 30.35(g)(3) requires that a list contained in a single document and updated every two years, be kept of all areas designated and formerly designated restricted areas as defined in

¹A list of acronyms used in the report is included at the end of the Report Details.

10 CFR 20.1003. The licensee's failure to maintain a list of current and former locations designated as restricted areas of use constitutes a violation of 10 CFR 30.35(g)(3). This is a Severity Level IV violation (VIO 030-02278/07-001-01).

1.3 Conclusion

The inspectors determined that, overall, the licensee's program for managing and tracking current locations of restricted use was managed adequately. However, the inspectors identified one violation for failure to have a single document listing former and current locations designated as restricted areas as required by 10 CFR 30.35(g)(3).

2.0 **Radiation Protection (IP 83822)**

2.1 Inspection Scope

The inspectors evaluated the licensee's procedures and practices for survey, decontamination, and the release of areas for unrestricted use associated with decommissioning activities applicable to all of the University of Missouri-Columbia campus locations. The inspectors reviewed and evaluated the following documents: 1) RSIP-S-03-F2, "Close Out Survey Checklist;" 2) "Removable Contamination Survey Levels and Actions," from the University's Radiation Safety Manual; 3) Radiation Emergency Procedures; 4) decommissioning procedures, 5) RSIP-S-03, "Close Out Survey" procedure; 6) RSIP-S-03-F1, "Authorized User Close Out Checklist;" and 7) survey instrument calibration records.

The inspectors toured the Environmental Trace Substance Laboratory (ETSL), Building 121, and the Missouri University Research Reactor (MURR) storage building, which were all located at the licensee's Sinclair Farm site. The inspectors reviewed the decommissioning survey reports for the Rad Storage Barn, and evaluated the licensee's decommissioning activities conducted at the MURR Storage building.

2.2 Observations and Findings

The licensee used the Rad Storage barn to store dry solid radioactive waste from 1987 through 1998. The University documented the close-out survey and release of the barn in an April 16, 1998 report. The report also included a record of a March 6, 1998 telephone conversation that the licensee's radiation safety officer (RSO) had with NRC Region III decommissioning staff pertaining to the release of the barn. The release was in accordance with NRC policy on decommissioning and release criteria in effect at that time. In addition, two separate sites, located at the University Sinclair Farm and Hinckson Creek properties, had been used in the past for the authorized burial of radioactive wastes. On July 17, 1997, the University submitted an assessment to the NRC regarding the past burials at the Sinclair Farm and Hinckson Creek sites. On August 7, 1997, the NRC responded and informed the licensee that both areas could be released for unrestricted use.

The University ceased authorized activities at the ETSL in December 1995. The use of licensed material at this site was limited to nickel-63 gas chromatographs and other sealed sources. Records of the radioactive material used at this location indicated that there were no leaking sources. Based on that information, additional surveys were not

required to demonstrate compliance with the NRC's radiological criteria for unrestricted use contained in 10 CFR 20.1402.

The University ceased authorized activities in Building 121 at the Sinclair Farm site in June 1994. The use of licensed materials at this site included animal studies using unsealed hydrogen-3 and carbon-14. Prior to releasing Building 121 for unrestricted use soon after licensed activities ceased at that location, the licensee's radiation safety staff did not perform any surveys to evaluate the presence of residual contamination. The licensee was not able to provide any additional information regarding the levels of residual radioactivity in Building 121 following its release for unrestricted use.

The University ceased authorized activities in the MURR waste storage building in 2004. The University stored contaminated materials and equipment from the University's research reactor until the end of that year. The licensee identified cesium-137, cobalt-60, and hydrogen-3, in addition to other contaminants, on the equipment stored in the building. In May 2005, following removal of the contaminated materials and equipment from the building, the licensee performed surveys in the MURR waste storage building to identify the presence of residual radioactivity. The surveys were limited to measurements of radiation levels in millirem per hour using a handheld radiation survey instrument. Based on the results of those surveys, the licensee determined that decontamination efforts were required. Following decontamination, the licensee performed additional surveys, which included surveys for removable contamination and limited analysis of the concrete debris for radioactivity. The licensee did not evaluate the results of the surveys against dose-based release criteria. The licensee had not determined the likely dose to an average member of the critical group from any residual contamination remaining in the MURR waste storage building.

Title 10 CFR Part 20, Section 20.1501 requires, in part, that a licensee make or cause to be made surveys that may be necessary for the licensee to comply with the regulations in Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present. Title 10 CFR Part 20, Subpart E, *Radiological Criteria for License Termination*, § 20.1402 *Radiological criteria for unrestricted use*, limits radiation exposure to 25 millirem per year from residual radioactivity that is distinguishable from background.

The licensee's failure to perform reasonable and necessary surveys in Building 121 and the MURR waste storage building following the cessation of licensed activities at these locations, constitutes a violation of 10 CFR 20.1501. This is a Severity Level IV violation (VIO 030-02278/07-001-02).

During the May 2005 decontamination activities in the MURR storage building, University and MURR staff used a jack-hammer to break up the concrete floor to remove the residual contamination. Condition No. 32 of NRC License Number 24-00513-32, requires, in part, that the licensee conduct its program in accordance with its application dated June 18, 2003. Item 10E of the application, states the University's commitment to adopt the procedures for the safe use of radionuclides and emergency procedures as published in Appendix R of NUREG-1556, Volume 11. Appendix R, in part, describes model procedures for handling emergencies, including but not limited to general procedures for handling spills. The procedures did not address the use of

aggressive decontamination techniques, such as the use of a jack-hammer. The licensee's use of a jack-hammer to break up the concrete floor to remove the residual contamination was an activity that was not authorized on the University's license, and constitutes a violation of License Condition No. 32. This is a Severity Level IV violation (VIO 030-02278/07-001-03).

Prior to performing the decontamination work involving the jack-hammer, the licensee did not perform any evaluations of the potential for airborne contamination or the potential intakes by occupationally exposed workers. During those decontamination activities, the licensee did not perform any air monitoring in the work areas to determine actual airborne contamination levels in the work area. 10 CFR 20.1502(b) requires that each licensee monitor the occupational intake of radioactive material by and assess the committed effective dose equivalent to adults likely to receive, in 1 year, an intake in excess of 10 percent of the applicable ALI(s) in table 1, columns 1 and 2, of Appendix B to 10 CFR Part 20. The licensee's failure to make, or cause to be made, reasonable and necessary surveys to evaluate the potential intakes of radioactive material by occupationally exposed adult workers constitutes a second example of a violation of 10 CFR 20.1501. This is a Severity Level IV violation (VIO 030-02278/07-001-04).

2.3 Conclusion

The inspectors concluded that the licensee's release of the former waste storage facility (Rad Storage Barn), the Environmental Trace Substance Laboratory, and two former burial sites were in accordance with NRC release criteria at the time these sites were released for unrestricted use. The inspectors identified three violations for the failure to: 1) perform reasonable and necessary surveys in Building 121 and the MURR waste storage building following the cessation of licensed activities at these locations; 2) perform reasonable and necessary surveys to demonstrate compliance with the NRC's criteria for monitoring intakes of licensed materials by occupationally exposed workers; and 3) limit activities involving licensed material to those authorized in the license.

3.0 **Exit Meeting Summary**

The inspectors presented preliminary inspection findings to members of the licensee management team at the conclusion of onsite inspection activities on March 14, 2007. The licensee did not identify any documents or processes reviewed by the inspectors as proprietary. A final exit meeting was held via telephone conference on April 25, 2007.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

- * Jackie Jones, Vice Chancellor, Administration Services
- Peter Ashbrook, Director, Environmental Health and Safety
- *#Jack Crawford, Radiation Safety Officer, Environmental Health and Safety
- *#Kevin Finley, Compliance, Administrative Services
- * Tim Hoffman, Associate Professor, Internal Medicine
- Duane Keisler, Professor, Animal Science
- * Ramadhir Mitra, Pathology
- * Ward Childers, Diagnostic Imaging Manager, Administrative Services
- #John Ernst, Research Reactor
- *#David Burgess, Health Physicist, Environmental Health and Safety
- *#Gary Lewis, Health Physicist, Environmental Health and Safety
- *#Mary Aldrich, Health Physicist, Environmental Health and Safety
- #Lee Juengermann, Health Physicist, Environmental Health and Safety
- Steve Wilson, EHT
- Casey Nelson, EHT
- Scott Furst, EHT

* Persons present at the preliminary exit meeting on March 14, 2007.

Persons present at the telephonic exit meeting on March 29, 2007.

INSPECTION PROCEDURES USED

IP 83890 Closeout Inspections and Surveys
IP 83822 Radiation Protection

ITEMS OPENED, CLOSED, AND DISCUSSED

<u>Opened</u>	<u>Type</u>	<u>Summary</u>
VIO 030-00278/07-001-01	VIO	Failure to maintain a list of formerly and currently designated restricted areas.
VIO 030-00278/07-001-02	VIO	Failure to make or cause to be made surveys necessary to demonstrate compliance with 10 CFR 20.1402.
VIO 030-00278/07-001-03	VIO	Failure to limit activities to those authorized in the NRC license.
VIO 030-00278/07-001-04	VIO	Failure to make or cause to be made surveys necessary to demonstrate compliance with 10 CFR 20.1502.

Closed
None

Discussed
None

PARTIAL LIST OF DOCUMENTS REVIEWED

Licensee documents reviewed and utilized during the course of this inspection are specifically identified in the "Report Details" above.

LIST OF ACRONYMS USED

ALARA	As low as reasonably achievable
CFR	Code of Federal Regulations
ETSL	Environmental Trace Substance Laboratory
IP	Inspection Procedure
NRC	Nuclear Regulatory Commission
MURR	Missouri University Research Reactor
RSO	Radiation Safety Officer
VIO	Violation