U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 030-32693/92001(DRSS)

Docket No. 030-32693

License No. 24-00513-37 Category F1A Priority 2

AMS No. RIII-92-A-0119

Licensee: The Curators of the University of Missouri
The Chancellor
University of Missouri-Kansas City
Administrative Center
5115 Oak Street
Kansas City, MO 64110

Inspection Conducted: November 18-19, 1992

Inspectors: Michael F. Kurth — 12/23/92
Michael F. Kurth — Date
Radiation Specialist

Mark W. Mitchell — 12/23/92
Mark W. Mitchell — Date
Radiation Specialist

Reviewed By: Gary L. Shear — 12/23/92
Gary L. Shear, Chief — Date
Nuclear Materials Inspection
Section 2

Inspection Summary

Inspection on November 18-19, 1992 (Report No. 030-32693/92001(DRSS))
Areas Inspected: This was a special, announced safety inspection of the licensee's activities to evaluate compliance with Commission rules, regulations, and license conditions. The inspection included a review of concerns pertaining to the radiation safety program (AMS No. RIII-92-A-0119).
Results: On the areas inspected, two violations of NRC requirements were identified:

1. Failure to segregate radioactive waste from nonradioactive waste in the generating laboratories, License Condition No. 29. A., (Section 8); and

2. Failure to utilize ring badge dosimeters for procedures that involve the use of one millicurie or more of phosphorus-32, License Condition No. 29. A., (Section 7).

DETAILS

1. Persons Contacted

*Vice Provost Academic Affairs - Marvin Querry
*Dean Graduate Faculties and Research - Ronald MacQuarrie
*Radiation Safety Officer (RSO) - William Fields, Jr.
Health Physics Technician - Les Morrison
Researcher, Chemistry - Dr. Jean, Ph.D.
Researcher, Chemistry - Dr. Lou, Ph.D.
Researcher, Biological Sciences - Dr. Read, Ph.D.
Purchasing Director - Jerry Hornig
Receiving - William Phillips

*Indicates those present at the exit meeting held on November 19, 1992.

2. Inspection History

Their have been no previous inspections conducted at the licensee's facility regarding the implementation of NRC License No. 24-00513-37, which was enacted September 15, 1992.

3. Licensed Program

The University of Missouri-Kansas City uses NRC licensed radioactive materials in the conduct of academic research and development and demonstration purposes to students.

Currently, there are approximately fifty authorized users, thirty of which are active, performing research activities with radioactive material. Research use involves usually not more than one millicurie of phosphorus-32, iodine-125, hydrogen-3, carbon-14, sulfur-35, and sodium-22. Research work also involves the use of several gas chromatographs containing a nominal 15 millicuries of nickel-63 in a sealed source form.

The RSO reports to the Radiation Safety Committee (RSC) and to the Dean of Graduate Faculties and Research. The Dean reports to the Vice Provost of Academic Affairs, who in turn reports to the Chancellor of the campus.

No violations of NRC requirements were identified.

4. Radiation Safety Program Concerns

AMS No. RIII-92-A-0119

Concern A: The Radiation Safety Officer is too busy with unrelated activities to fulfill his duties as the RSO. The RSO does not devote his full-time employment to radiation safety.

Information provided by the RSO indicated that approximately 50-75% of his employment time at the university is devoted to fulfilling his duties as RSO. His duties include: supervision of the Office of Radiation Safety (ORS) staff members; reviewing user applications; providing training to personnel; approving the purchases of radioactive materials by researchers; acting as liaison between the authorized users and the RSC; reviewing dosimetry reports and reporting those to the RSC; and providing assistance in emergencies which involve the use of radioactive materials.

Additional information provided through interviews with the health physics staff, RSC members, and authorized users indicated that the RSO fulfills his duties by being available if an incident arises or to answer any questions regarding the safe use of radioactive materials. Also, a review of records indicated that the RSO fulfills his duties by: attending and participating in the RSC meetings; authorizing the purchases of radioactive materials by authorized users; coordinating the efforts of the ORS to respond to incidents; supervising the collection and storage of radioactive wastes; and periodically conducting audits of the labs to ensure the safe use of radioactive materials.

In summary, as required by the terms and conditions of the university's NRC license, the university has committed the RSO to devote 0.75 full time equivalency (FTE) to fulfilling his duties. Contrary to this, the RSO devotes less than 0.75 FTE (0.50-0.75 FTE) to fulfill his duties as RSO. However, interviews with personnel and the results of this inspection indicate that the RSO is fulfilling his duties.

The concern was substantiated in that the RSO appears to devote less than 0.75 FTE to radiation safety activities, however it does not appear that the time commitment of less than 0.75 FTE has affected the RSO's ability to fulfill his responsibilities in radiation safety.

No violations of NRC requirements were identified.

Concern B: The licensee does not have adequate staffing to fulfill the duties of the ORS. The staff currently consists of a RSO, 0.50-0.75 FTE and a Health Physics Technician, 1.0 FTE.

Interviews with ORS personnel indicate that the current ORS staff adequately fulfills its duties. The staff is responsible for the day to day activities associated with the safe use of radioactive materials. This includes such activities as: quarterly audits of laboratories; implementation of a waste disposal/waste storage program; training of university personnel; authorization of the purchase of radioactive materials by authorized users; response to incidents involving radioactive materials; survey of incoming packages; participation in quarterly RSC meetings; and enforcement of the terms and conditions of the university's NRC license.

Interviews with authorized users and lab personnel, and a review of records, concluded that the ORS staff fulfills its duties. Interviews

conducted with authorized users indicate that the ORS staff perform audits of their labs, at least on a quarterly basis, as required. The authorized users and lab personnel also indicated that the ORS staff is available to: review and approve their orders for radioactive materials; transfer their radioactive waste to the waste storage area; respond to any incidents involving radioactive materials; and provide health physics support if any assistance is needed.

A record review of lab audits indicated that they are being performed on a quarterly basis in labs which contain radioactive materials. Documents were reviewed concerning the transfer of radioactive waste from the labs to the waste storage location which appeared to be adequate.

As part of the terms and conditions of the university's NRC license, the ORS staff is to consist of: a RSO, 0.75 FTE; a Senior Health Physics Technician, 1.0 FTE; a Health Physics Technician or Trainee, 1.0 FTE; and a Secretary, 1.0 FTE. The ORS staff currently consists of a Health Physics Technician, 1.0 FTE, and a RSO, approximately 0.5 to 0.75 FTE.

During the exit interview conducted November 19, 1992, with university representatives (noted in Section 1), the licensee indicated that the university is in the process of adding additional staff members to the ORS office. These members will include a 1.0 FTE Senior Health Physics Technician and 1.0 FTE Administrative Assistant (Secretary). The RSO projected that these new staff members will be hired within the next six months. The addition of these two new staff members will ease the work burden of the existing staff.

The concern was substantiated in that the current ORS staff is 2.0 FTE short as noted in the university's NRC license, but the current staff is adequately fulfilling its duties. The university is also in the process of hiring additional ORS staff members to ease the work burden of the existing staff and fulfill the staffing commitment addressed in the university's NRC license.

No violations of NRC requirements were identified.

Concern C: Personnel who are responsible for the monitoring of compliance with the Waste Determination Plan report that they have been told by the RSO that there will be no documentation of violations of that plan, regardless of what the personnel observe in the various areas subject to its control.

During the course of the inspection the radiation safety staff indicated that the Waste Determination Plan, required by the U. S. Environmental Protection Agency (EPA), does not involve radioactive materials or the radioactive waste generated by the university. The RSO indicated that if hazardous waste is part of a mixture containing radioactive waste, the waste is labeled as radioactive waste and the university will follow NRC requirements in the storage and disposal of the waste.

Since the inspection showed that the Waste Determination Plan does not involve radioactive materials or radioactive waste, the concern will be referred to the U. S. EPA, Region VII.

The concern was not substantiated and no violations of NRC requirements were identified.

Concern D: The RSO, Radiation Safety Committee (RSC), and university management are not interested in compliance with NRC regulations. For example, personnel are seen eating, drinking, and smoking in laboratories labeled as containing radioactive materials. Also, radioactive materials are stored in unsecured laboratories.

Interviews with lab personnel indicated that they were aware that no eating, drinking, or smoking is to occur in the labs and they assured the inspectors that they do not eat, drink, or smoke in the labs. It was noted that most lab personnel had an office separate from the lab area where they could eat, drink, or smoke, and if they did not have an office, they knew of a place (cafeteria, break room, study area outside of the lab area) where they could eat, drink, or smoke.

During the course of the inspection, the inspectors reviewed approximately 10 laboratories. During these lab visits, no licensee personnel were observed eating, drinking, or smoking in laboratories containing radioactive materials. Radiation staff personnel indicated that storage of food and drink in laboratories where radioactive materials are used has been identified on occasion during routine laboratory audits. This was addressed on a case by case basis by the licensee. This inspection did not identify any laboratories where food and drink were stored.

During the course of the random lab audits, no radioactive materials were found to be unsecured.

Interviews with lab personnel indicated that doors to lab areas are locked when no one is in attendance and that if a lock is placed on the item used to store radioactive materials (storage vault, freezer, or refrigerator), the storage item is locked when radioactive materials are not in use.

Interviews with the RSO and university management indicate the university is committed to the safe use of radioactive materials and compliance with NRC regulations. Management demonstrated their interest in the radiation safety program by attending and participating in RSC meetings. They are also receptive to the needs of the ORS staff by providing financial support when necessary equipment is needed, such as the purchase of a trash compactor and vial crusher (to be received December 1992) to be used exclusively to reduce the volume of radioactive waste on campus.

Also, the RSO indicated that he has the authority and approval of university management to immediately stop any use of radioactive materials which he interprets as unsafe.

The concern was not substantiated and no violations of NRC requirements were identified.

Concern E: The proper training in radiation safety has not been provided to individuals who use radioactive materials.

Condition 29. A. of the university's NRC license requires the university to follow the training procedures outlined in Item 8 of the February 25, 1992 application.

Item 8 requires the RSO, the authorized users and supervisory personnel to be responsible for providing training to personnel. The RSO will provide training in the regulatory and license requirements, in radiation safety fundamentals and practices specific to authorized users, radiation workers, and ancillary personnel. The authorized users and supervisory personnel will provide training for the radiation workers under their supervision in the safe use of radioactive materials for their experimental protocols.

Interviews with the ORS staff indicated that training has been provided in the past to authorized users and those individuals who work under the supervision of those users. The RSO indicated that training will be provided within the next several months to train all authorized users in the compliance of the university's most recent NRC license, 24-00513-37. Also, the RSO indicated that it was the responsibility of the authorized user to ensure that any personnel working under his/her supervision attend a radiation safety training session provided by the ORS staff.

Interviews with random authorized users indicated that all of them have gone through some type of training, depending on their level of experience and isotope use, with the RSO. The training provided the authorized users with the policies and procedures required for them to safely use radioactive materials. Interviews with lab personnel indicated that a large percentage of them attended some form of training offered by the ORS office regarding the safe use of radioactive materials. All those interviewed indicated that training was provided to them by their particular instructor (authorized user) involving the safe use of radioactive materials.

Interviews were conducted with random custodians regarding the training provided to them by the ORS. They indicated that once a year a training session is held to educate them on the policies and procedures of the university on the safe handling of radioactive materials. The RSO indicated that this training, provided to non-users of radioactive materials, is tailored to their particular involvement with the material.

A review of training records indicated that yearly training has been provided to ancillary personnel by the ORS staff.

The concern was not substantiated and no violations of NRC requirements were identified.

5. Summary of Event- Potential Spill of Radioactive Material

On October 6, 1992, water began accumulating on the floor and bench top in room 508 of the Spencer Chemistry Building. A fitting on the lab faucet had become loose and water started overflowing in the sink and began to build up on the bench top and ran onto the floor.

Room 508 in the Spencer Chemistry Building is under the supervision of Dr. Jean, an authorized user. Dr. Jean possesses microcurie quantities of sodium-22 used in positron emission studies. Dr. Jean receives the sodium-22 in an unsealed, liquid form and uses foil to create his own sealed form of the isotope for his studies. Any sodium-22 in an unsealed form is kept in a storage vault for safe keeping. Any sodium-22 in a sealed form is stored in the fume hood behind several lead bricks. The sodium-22 possessed by Dr. Jean was accelerator produced and is therefore not under the jurisdiction of the NRC. Dr. Jean also possesses assorted microcurie check sources of cesium-137 and barium-133 in a sealed source form.

A researcher, Dr. Lou, discovered the water on the floor October 6, 1992, and immediately informed Dr. Jean. Dr. Jean indicated that he secured the lab and contacted Les Morrison, Health Physics Technician and staff member of the ORS. Dr. Jean and Mr. Morrison discussed the problem over the phone and came to the conclusion that no radioactive materials were in contact with the water. The fitting on the lab faucet was tightened and the water leak immediately stopped. Dr. Jean then used a Technical Associates Model PUG-1 to survey the spilled water and verified that no radioactive materials were present. The water was then cleaned up using paper towels, a wet/dry vacuum, and Dr. Jean's mop and bucket from his first floor lab in the Spencer Chemistry Building. After all the water was wiped up, Mr. Morrison performed a series of wipe tests to determine if contamination was present in the room. He indicated that the wipes taken showed no removable contamination present.

Mr. Morrison also surveyed the bucket, with the water present, and the mop, and found no readings above background. He was not aware that the wet/dry vacuum was used to clean up the water so it was not surveyed following the clean up.

Water had also leaked into room 506, located next to room 508. This room is supervised by Dr. Dreyfus, an authorized user. The water in this room was surveyed with the Technical Associates PUG-1 and was found to have no contamination present. This water was then cleaned up.

As a precautionary measure, all paper towels used in this clean up were categorized as radioactive waste and placed in the radioactive waste receptacle in Dr. Jean's lab.

6. Radiation Safety Program Concerns Regarding the Clean Up of Water in Room 508 of the Spencer Chemistry Building on October 6, 1992
AMS No. RIII-92-A-0119

Concern F: The health physics technician did not have the adequate training to effectively clean up the radioactive contamination spill.

Les Morrison, a Health Physics Technician and ORS Staff Member responded to Dr. Jean's call on October 6, 1992. The two discussed where the water emanated from and the likelihood of contamination. Because there was no sodium-22 directly in contact with the water and contamination was unlikely, Mr. Morrison and Dr. Jean fixed the leaking faucet. The water was then contained in the area with paper towels and surveyed with a Technical Associates PUG-1 showing no readings above background.

A series of wipe tests were taken on October 6, 1992, after the water was cleaned up to verify no removable contamination was on the floor and bench. Mr. Morrison indicated that the wipes showed no removable contamination on the floor or bench. He did not feel it was necessary to wipe the mop or bucket used because no removable contamination was found on the floor. Also, he indicated that he surveyed the bucket and mop with his survey instrument and found no readings above background.

The wet/dry vacuum and mop were surveyed by the NRC inspectors November 19, 1992, using a Victoreen Model No. 190, with a pancake probe, and showed no readings above background. The bucket used in the clean up showed readings slightly above background. The bucket was wipe tested by Les Morrison and the NRC inspectors, resulting in no removable contamination. Dr. Jean explained that the bucket is exclusively used for cleaning purposes in his lab and may accumulate trace amounts of sodium-22 from his general cleaning of the floors in his labs. Dr. Jean assured the inspectors the mop and bucket are stored under his control in his first floor lab in the Spencer Chemistry Building.

Also, a series of wipes were taken in room 508 on November 19, 1992, both by the NRC inspectors and the licensee. The wipes showed no removable contamination on the floor or bench top where the water had leaked onto.

Les Morrison has been an ORS staff member at the university for approximately eleven years. During these years, Mr. Morrison has received on-the-job training from William Fields Jr., RSO. His training included such items as: the use of radiation survey and analysis instrumentation; radioactive package receipt and handling procedures;

safety procedures involving any incidents with radioactive materials (e.g. spills); proper survey techniques; and radioactive waste handling procedures. A review of the spill incident, interviews with Mr. Morrison and a review of Mr. Morrison's training showed that Mr. Morrison was adequately trained to respond to and clean up a radioactive spill.

The concern was not substantiated and no violations of NRC requirements were identified.

Concern G: The University Police were not notified of the spill so the area could be properly secured from foot traffic and the spill could be adequately documented.

Dr. Jean indicated that upon notification of the water leak, he immediately secured the room by locking the door and posting Dr. Lou in the area so no one could enter the room. After the spill was determined to not pose a radiation hazard, Dr. Jean fixed the leaking faucet and cleaned up the water.

In summary, there was a water leak in laboratory 508 and a determination was made that no radioactive materials were involved. During this time, the room was secured and there was no regulatory requirement to report this event to the University Police.

The concern was not substantiated and no violations of NRC requirements were identified.

Concern H: The spill was cleaned up using a mop and bucket designated for general cleaning purposes. There is also no indication that appropriate decontamination procedures were followed to decontaminate the custodial equipment used and that the equipment was placed back into use.

Dr. Jean and Dr. Lou both stated a mop and bucket from Dr. Jean's lab on the first floor of the Spencer Chemistry Building were used to clean up the water spill. They also indicated that paper towels, and a wet/dry vacuum were used to clean up the water spill. Dr. Jean and Les Morrison stated that the mop and bucket were surveyed immediately after their use and showed no readings above background.

On November 19, 1992, a Victoreen Model No. 190 survey instrument was used to survey the mop, bucket, and wet/dry vacuum. The mop and wet/dry vacuum showed no readings above background. The survey of the bucket showed readings slightly above background.

Dr. Jean indicated that the above background reading may be from periodic cleanings of his lab and that the mop and bucket are in his control and used only in his labs for cleaning purposes.

Also, a series of wipe tests were taken of the bucket. One wipe was analyzed by the university and showed no readings above background. Another wipe was analyzed at the NRC Region III office and showed no readings above background.

As indicated earlier, the spill did not involve radioactive materials and therefore, decontamination procedures were not required.

This concern was not substantiated and no violations of NRC requirements were identified.

Concern I: Inappropriate disposal of radioactive material from the spill in room 508 of the Spencer Chemistry Building.

Interviews with Dr. Jean, Dr. Lou, and Les Morrison indicate that the spill involved only water and no radioactive materials were present in the water.

On November 19, 1992, a survey of the sink in room 508, where the water from the spill was disposed, using a Ludlum Model 3, with a pancake probe (last calibrated October 1992) showed no readings above background.

This concern was not substantiated and no violations of NRC requirements were identified.

7. Personnel Radiation Protection-External

Condition 29. A. of NRC License No. 24-00513-37 requires the licensee to conduct its program in accordance with the statements, representations, and procedures contained in the application dated February 25, 1992. Item 10 M. of this application titled, Radiation and Contamination Surveys, requires, in part, that a mandatory radiation and contamination survey be performed after each use of one millicurie or more of phosphorus-32 and ring badge dosimeters be used for these procedures. The inspectors determined that since September 15, 1992, phosphorus-32 has been used in quantities of one millicurie or more in room 318 of the Biological Sciences Building and ring badges were not worn. Failure to wear ring badges while using one millicurie or more of phosphorus-32 is a violation of License Condition No. 29. A.

This was an oversite on the licensee's part not to issue ring badges to personnel handling a millicurie or more of phosphorus-32. Ring badges are normally offered to those who are required to wear them. These particular individuals were overlooked. Dr. Read, authorized user and supervisor of room 318, periodically receives phosphorus-32 in quantities of one millicurie or more then divides this into microcurie amounts. Ring badges were not worn during the time the millicurie or more of material was divided into microcurie amounts. However, these individuals were wearing whole body badges and their film badge results

were well below NRC regulatory limits. The licensee indicated that no incidents or accidents have occurred during the use of phosphorus-32. The licensee's corrective action is to determine who is required in laboratory 318 to wear ring badges and assign ring badges to those personnel.

One violation of NRC requirements was identified.

8. Waste Handling Procedures

During the course of the inspection, the radioactive waste handling procedures were reviewed. Interviews with lab personnel indicated that all radioactive waste generated in their labs is held onto and periodically collected by the ORS staff. The lab personnel indicated that they do not dispose of radioactive waste in the waste sewerage system or in the general trash.

Inspections were conducted of random labs which used or stored radioactive materials. Room 318 of the Biological Sciences Building, which is under the supervision of Dr. Read, Ph.D., authorized user, was found to have radioactive waste in the general trash. The radioactive waste consisted of a piece of tape from a gel dryer which appeared to contain traces of phosphorus-32. The tape was surveyed with a Victoreen Model No. 190, with attached pancake probe (NRC inspector's instrument, which was last calibrated June 29, 1992), measuring approximately 3000 counts per minute (equivalent to approximately 9000 disintegrations per minute) above background.

Condition 29. A. of NRC License No. 24-00513-37 requires the licensee to conduct its program in accordance with the statements, representations, and procedures contained in the application dated February 25, 1992. Item 11 of this application titled, Waste Management, requires that radioactive wastes be segregated from nonradioactive wastes in the generating laboratories. The failure of the licensee to segregate the piece of tape containing phosphorus-32, considered radioactive waste, from nonradioactive wastes in the generating laboratories constitutes a violation of License Condition No. 29. A.

Interviews with personnel who work in this laboratory indicated that the tape was placed in the general trash and not monitored for contamination. This was an oversite on the licensee's part. Dr. Read assured the inspectors that this was an isolated incident and that all waste generated in experiments using radioactive materials is surveyed for contamination prior to disposal in the general trash. The licensee immediately placed the radioactive waste in the proper radioactive waste receptacle. The licensee's overall corrective action is to emphasize to all radioactive materials users that trash generated from the use of radioactive materials is to be monitored, and at background levels, before disposal into the general trash.

One violation of NRC requirements was identified.

9. Other Areas Inspected

In addition to the areas described in this report, the inspector reviewed all areas of the radiation safety program including: the radiation safety committee; internal audits; instrument calibrations; radiological protection procedures; possession and use of radioactive materials; leak tests of sealed sources; receipt and transfer of radioactive materials; decay in storage program and radioactive waste storage; notifications and reports; posting and labeling; and transportation.

No violations of NRC requirements were identified.

10. Exit Meeting

At the conclusion of the inspection on November 19, 1992, the inspectors met with those individuals identified in Section 1 of this report. A summary of the areas inspected, the apparent violations, the NRC enforcement policy, and the forthcoming letter were discussed as well as the licensee's proposed corrective actions.