

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-186/82-01(DETP)

Docket No. 50-186

License No. R-103

Licensee: University of Missouri
Research Park
Columbia, MO 65201

Facility Name: Research Reactor Facility

Inspection At: Research Reactor Site, Columbia, MO

Inspection Conducted: August 16-17, 1982

Inspectors: *P. C. Lovendale*
P. C. Lovendale

W. B. Grant
W. B. Grant

Approved By: *L. R. Greger*
L. R. Greger, Chief
Facilities Radiation
Protection Section

9/14/82

9/14/82

9/14/82

Inspection Summary

Inspection on August 16-17, 1982 (Report No. 50-186/82-01(DETP))

Areas Inspected: Routine, unannounced inspection of radiation protection and radwaste management programs, including: qualifications; audits; training; radiation protection procedures; instruments and equipment; exposure control; posting, labeling, and control; surveys; notifications and reports; effluent releases; receipt, transfer, and transportation of radioactive material; previous commitments; and independent measurements. The inspection involved 36 inspector-hours onsite by two NRC inspectors.

Results: Of the fourteen areas inspected, no items of noncompliance or deviations were found in twelve areas, three apparent items of noncompliance were found in the remaining areas (failure to perform surveys - Section 9, failure to post a radiation and radioactive materials area - Section 13c, and storage of radwaste at an unauthorized offsite facility - Section 13c).

DETAILS

1. Persons Contacted

- *D. Alger, Acting Director, Research Reactor Facility
- *O. Olson, Manager, Reactor Health Physics
- *J. Tolan, University Radiation Safety Officer
- *S. Growcock, Health Physics Technician
- *R. Stewart, Health Physics Technician
- *J. Litton, Senior Health Physics Technician
- *C. McKibbin, Reactor Manager
- V. Spate, Chemist
- S. Gunn, Reactor Service Engineer

*Denotes those present at the exit meeting.

2. General

This inspection, which began with visual observation of facilities, equipment, posting, labeling, and access controls at 8:00 a.m. on August 16, 1982, was conducted to examine the routine, operational radiation protection and radwaste management programs. During this initial and subsequent tours of the facility, the inspectors used licensee and NRC survey meters to perform surveys at selected locations. Posting and labeling of the areas conformed with regulatory requirements except as noted in Section 9. Areas visited during the tours included the Medi-Physics Hot Cell area, all levels of the containment building, laboratories located throughout the reactor facility, and the Sinclair Farm radwaste storage area.

3. Licensee Action on Previous Inspection Findings

(Closed) Commitment (50-186/77-04): Evaluation of collection efficiency of the charcoal sampler due to high flow rate. The licensee has recently completed a two-year investigation concerning improving the monitoring for radioactive iodine. The efficiency of collection for iodine has been determined and a correction factor will be applied. The results of the investigation are documented in a thesis titled, "Investigation into the Improvement of Monitoring Gaseous Effluents for Radioactive Iodine."

4. Organization

The Reactor Health Physics Group (manager, three technicians, and one part-time laboratory assistant) is responsible for health physics activities at the Reactor Facility. Independent oversight of health physics operations is the responsibility of the University Radiation Safety Office. This oversight includes all NRC licensed activities. No problems were noted.

5. Licensee Audits

Reactor Advisory Committee meetings were held at the required frequency. The inspectors reviewed the minutes of these meetings and noted that some health physics related topics were discussed including: radwaste storage problems and the health physics audit performed December 30, 1981, by the University Radiation Safety Office. The findings and corrective actions of this audit were reviewed; no problems were noted.

The licensee performed an audit of radwaste transportation activities in June 1981. The results of this audit were reviewed during a previous inspection¹. No radwaste shipments have been made since July 1980.

No items of noncompliance were identified.

6. Training

Training records indicate that the Reactor Health Physics Group provides and documents radiation protection training for experimenters and other personnel new to the facility. It appears that the requirements of 10 CFR 19.12 are met.

The video cassette indoctrination was reviewed by the inspectors. The indoctrination includes sections on security, emergency preparedness, and health physics. No problems were noted.

Health Physics Standard Operating Procedures are issued to research groups, reactor chemistry personnel, reactor management, and all health physics staff. Health physics technicians and other selected groups receive periodic training from the Manager, Reactor Health Physics. Records of this training are maintained.

No items of noncompliance were identified.

7. Procedures

The licensee has developed or revised five Health Physics Standard Operating Procedures (SOP) since the last inspection².

SOP HP-11	Revision 1	Environmental Sampling
SOP HP-16	Revision 2	Surveying Containers of Radioactive Material for Transport by Common Carrier
SOP HP-24	Revision 2	Issuing Radiation Dosimeters at MURR Reception Desk
SOP HP-27	Revision 1	Calibration of Baird-Atomic Sampling Counting System

¹ Inspection Report No. 50-186/81-01

² Ibid.

These procedures appear consistent with 10 CFR 20, 49 CFR, and good health physics practices.

No items of noncompliance were identified.

8. Exposure Control

a. External

The vendor's film badge reports for the period January 1981 through July 1982 were reviewed. No problems were noted.

b. Internal

The licensee routinely performs tritium analysis on urine samples collected from persons who work in containment. The results of these samples from January 1981 to date were reviewed; no problems were noted. Daily tritium air samples, continuous air samples, and routine contamination surveys were conducted in containment and used to define problem areas. Records of these indicators were reviewed; no problems were noted.

9. Posting, Labeling, and Control

During facility tours, the inspectors reviewed the licensee's compliance with posting and labeling requirements specified in 10 CFR 19.11 and 10 CFR 20.203.

While at Beam port E, the inspectors surveyed the area using a Xetex Model 305B and Victoreen 471. The radiation level between the beam's two exit points and the beam stops was as high as 230 mrem/hr, gamma plus neutron. The beam port area was not posted, nor was access to the area controlled. Although accessible, the beam's cross-sectional area is only 0.25 square inches. It was concluded that because of the small cross-sectional area, the beam did not meet the definition of a high radiation area, however, additional access controls appear needed to maintain radiation exposures ALARA. This matter was discussed during the exit meeting and will be reviewed during a future inspection.

Licensee personnel apparently did not conduct a survey of the E-beam port area which was accessible to personnel between the beam exit points and the beam stops. By letter dated October 15, 1980, Keppler to George, the licensee was cautioned of the possible existence of uncontrolled high radiation areas and of the need to evaluate the radiation hazard directly in the beam (if accessible). Failure to evaluate the radiation hazard present is considered noncompliance with 10 CFR 20.201(b).

Additional posting problems are discussed in Section 13.c.

The inspectors reviewed several RWPs issued since July 1981. No problems were noted.

10. Survey

The inspectors reviewed records of radiation, contamination, and air activity surveys conducted since January 1981. Observed results were comparable to those obtained during facility tours.

Containment air samples are analyzed for tritium daily by health physics and chemistry personnel. Results of samples taken from January 1981 to date were reviewed. Concentrations normally ranged from $9.0E-8$ to $2.9E-7$ uCi/cc.

No items of noncompliance were identified.

11. Instruments and Equipment

a. Portable Survey Instruments

Records of instrument calibrations since January 1981 were reviewed. Calibration dates are listed on file cards maintained for each instrument and on status charts posted in the Health Physics Office. Instruments that are out of calibration or in need of repair are removed from service. No problems were noted.

b. Hand and Foot Monitors

Hand and foot monitors are used for detection of personnel contamination. Personnel are instructed to use the monitors before eating or leaving the facility. No problems were noted.

c. Respirators

The licensee does not make allowance for using respirators in estimating exposure to individuals as indicated in 10 CFR 20.103(c). Three full-face and eight half-face respirators are maintained for general use by the Health Physics Office. Also, two full-face and five half-face respirators are maintained for emergency use and are kept in the emergency cabinet. All respirators appeared to be in good condition.

d. Area Radiation Monitoring System (ARMS)

The seven area monitors are calibrated semiannually and are checked for operability and alarm response before reactor startup. The inspectors reviewed the calibration records. No problems were noted.

e. Stack Monitoring System

The particulate, gaseous, and iodine monitors were last calibrated in June 1982. The calibration data were reviewed. No problems were noted.

No items of noncompliance were identified.

12. Primary Coolant Activity

Records of primary coolant sampling and analyses were reviewed from January 1981 to date. Technical specification requirements for sampling frequency and maximum permissible concentration were met.

No items of noncompliance were identified.

13. Radwaste Management

a. Liquid Radwaste

Liquid radwaste discharges remain as described in Inspection Report No. 50-186/80-04. Since July 1981, there have been 72 releases to the sanitary sewer totaling 900 mCi, and 3 releases to the cooling tower totaling 743 mCi. No problems were noted.

b. Gaseous Radwaste

Daily grab samples taken from the stack are analyzed for argon-41. Graphs of the daily sample results were reviewed for January 1981 to date. The average annual concentration of argon-41 discharged to the environment was about 70 percent of the technical specification limit (350 MPC annual average). The graphs also indicated that the instantaneous limit had not been exceeded (3500 MPC).

c. Solid Radwaste

The licensee has not shipped any solid radwaste since 1980. As noted during the last inspection³, the licensee's onsite radwaste storage area is filled to capacity. To relieve the problem, the licensee has moved some radwaste into a semi-trailer and a small warehouse located offsite on University property known as Sinclair Farm. A previous question concerning unlimited liability for radwaste shipped to a waste burial site has been resolved. However, the licensee is now considering volume reduction in an attempt to cut the cost of disposal of the approximately 2700 cubic feet of radwaste that has accumulated. The licensee has not made any radwaste shipments for approximately two years.

³ Ibid.

Sinclair Farm is located several miles away from the reactor site, which is described in the Hazards Summary Report as a 7.5 acre lot known as the Research Reactor Facility. The reactor license does not authorize offsite storage of radwaste nor was a safety evaluation conducted to determine if offsite storage constituted an unreviewed safety question as required by 10 CFR 50.59(b). Storage of reactor radwaste at Sinclair Farm is therefore considered an item of noncompliance.

The inspectors toured and surveyed the radwaste storage area at Sinclair Farm. During this tour, it was noted that the fence surrounding the area was similar to other farm type fences in the area and was not posted to indicate the presence of radioactive material. Radiation surveys conducted inside the fenced area indicated accessible radiation levels of about 15 mR/hr in the vicinity of a large, empty tank. The area was not posted as a radiation area nor was the tank labeled to indicate the presence of radioactive material. Failure to post the radiation area and radioactive materials area is considered an item of noncompliance.

14. Transportation Activities

The inspectors reviewed the licensee's records of transfer of licensed byproduct material for the period July 1, 1981 to June 30, 1982. For that period, a total of 114,872 curies were shipped. No problems were noted.

The Reactor Services Group is responsible for all packaging and transportation of radioactive materials (except radwaste) from the facility. The inspectors reviewed the use of type B packages with the Reactor Service Engineer. No problems were noted.

No items of noncompliance were identified.

15. Notification and Reports

A review of records and discussions with licensee representatives indicated that the licensee has complied with 10 CFR 19 and 10 CFR 20 reporting requirements.

No items of noncompliance were identified.

16. Independent Measurements

The inspectors performed a direct radiation survey of containment, the hot cell area, laboratory areas, and the Sinclair Farm radwaste storage facility. With the exception of those areas identified in Section 13c, no problems were noted.

No items of noncompliance were identified.

17. Exit Meeting

The inspectors met with licensee representatives (denoted in Section 1) at the conclusion of the inspection on August 17, 1982. The inspectors summarized the scope and finding of this inspection. Also, further discussions concerning the inspection findings were conducted during telephone conversations with a licensee representative on August 31 and September 7, 1982. In response to certain items discussed the licensee:

- a. Stated that barricades and warning signs would be utilized to control access into beam paths where the radiation levels are greater than 100 mrem/hr. (Section 9)
- b. Acknowledged the items of noncompliance. (Sections 9 and 13.c)