U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 050-186/79-03

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

Licensee: University of Missouri
Columbia, MO 65201

Facility Name: Research Reactor Facility

Inspection At: Research Reactor Site, Columbia, MO

Inspection Conducted: May 14-17, 1979

Inspector: for N. E. DuBry 6/6/79

Approved By: W. L. Fisher, Chief 6/6/79
Fuel Facility Projects and
Radiation Support Section

Inspection Summary

Inspection on May 14-17, 1979 (Report No. 50-186/79-03)
Areas Inspected: Routine, unannounced inspection of radiation protection and radwaste management programs, including: qualification; training; radiation protection procedures; instruments and equipment; audits; posting, labeling, and control; exposure control; surveys; notifications and reports; effluent releases; effluent control instrumentation; records of effluents; reactor coolant water quality; leak test records; byproduct materials records of receipt and transfer; previous items of noncompliance and commitments; and facility changes and modifications. The inspection involved 27 inspector-hours on site by one NRC inspector.
Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

*R. Brugger, Director, Research Reactor Facility
*P. Keenan, Assistant to the Vice President-Research
*O. Olson, Manager, Reactor Health Physics
*N. Sunderland, Assistant Campus Radiation Safety Officer
*C. Tompson, Chairman, Reactor Advisory Committee
S. Morris, Reactor Radiochemist
D. James, Senior Research Scientist
G. Schlapper, Senior Research Scientist
S. Stewart, H.P. Technician

The inspector also interviewed other licensee employees, including facility researchers and licensed operators.

*Denotes those attending the exit interview.

2. General

This inspection, which began with visual observation of facilities which included equipment, posting-labeling, and access controls, the hot cell areas, the beam port floor, waste tank areas, the reactor control room, and laboratories in the reactor building, at 1:00 p.m. on May 14, 1979, was conducted to examine the routine operational radiation protection and radwaste management programs. During subsequent tours the inspector, using a licensee's survey meter, performed surveys at selected locations and found the levels comparable to those noted on the licensee's survey records. The inspector also attended a pre-shutdown maintenance meeting in preparation for a refueling.

No items of noncompliance were noted.

3. Previous Items of Noncompliance and Commitments

The following item of noncompliance, detailed in IE Report No. 78-01 and 78-05, was reviewed:

(Open) The development of health physics procedures. (Paragraph 7)

The following licensee commitments resulting from previous IE inspections were reviewed:

(Open) The evaluation of the collection efficiency of the charcoal samples due to high flow rate. The research project to determine the efficiency at various flow rates is continuing.

(Open) The calculation of the amount of tritium being released from the secondary system to the sanitary sewer during blowdown of the secondary system. (Paragraph 14b)

These matters were discussed at the exit interview.

4. Qualifications

Since the last radiation protection inspection, one full time health physics technician quit, reducing the number of full time technicians. The licensee's present program consists of the Manager, Reactor Health Physics, two full time technicians, and two part time laboratory assistants. This shortage of manpower is of concern, because it appears that it is resulting in a deterioration of the licensee's health physics program (see paragraphs 5, 6, 7, 8b, and 14b).

In a telephone conversation on May 22, 1979, the Director, Research Reactor Facility, indicated that an additional health physics technician would be employed within the next three months.

No items of noncompliance or deviations were noted.

5. Licensee Audits and Reports

The licensee's internal audit report, conducted by the Campus Radiation Safety Office in December 1978, was reviewed. The internal audit identified a number of items needing corrective action. A review of the corrective actions being taken appeared adequate, but because of the reduced health physics staff a number of items still remain outstanding.

Minutes of the Reactor Advisory Committee meetings held in December 1978 and March 1979, and of the Safety Subcommittee meeting of March 1979 were reviewed. The Health Physics monthly reports for January 1979 to April 1979 were also reviewed.

No items of noncompliance or deviations were identified.

6. Training

The Manager, Reactor Health Physics, is providing radiation protection orientation to experimenters and other personnel new to the facility. Documentation of those receiving training is provided on file cards. Theoretical and practical health physics training is provided to new technicians by the Manager. The weekly one-hour lecture topics for the health physics staff were reviewed.

The implementation of retraining lectures to separate work groups (e.g., operators, reactor services, experimenters) has not been accomplished because Health Physics does not have the manpower available. 1/

No items of noncompliance or deviations were found.

7. Procedures

In response to an item of noncompliance identified in IE Report No. 78-01, the licensee stated that eight procedures would be developed by August 31, 1979. The item of noncompliance will remain open until these procedures are implemented. Since the last radiation protection inspection (December 1978) only the following three procedures have been written and approved:

HP-1 "Request for Radiation Safety Evaluation"

HP-15 "Medi-Physics Hot Cell"

HP-16 "Surveying Containers of Radioactive Material for Transport by Common Carrier"

The procedures were reviewed by the inspector; no problems were noted. However, the importance of meeting the above commitment was discussed with the licensee representatives. Again the underlying problem seems to be the lack of available time the Manager has to write procedures because of understaffing. This matter was discussed at the exit interview.

No items of noncompliance were noted.

8. Exposure Control

a. External

The vendor's film badge reports, which are equivalent to Form NRC-5, were reviewed from September 1978 to April 1979. Badges are processed weekly for individuals working in the containment and monthly for other employees. The licensee also issues ring badges to reactor operators and experimenters working with the P-tube system. The greatest whole body doses recorded for the fourth quarter of 1978, CY 1978, first quarter 1979, and CY 1979 to date were about 700 mrem, 2700 mrem, 1000 mrem, and 1200 mrems, respectively. The extremity exposures for the same periods of time were 2400 mrem, 6900 mrem, 1700 mrem, and 2300 mrems, respectively. The licensee does not maintain Form NRC-4.

1/ IE Inspection Report No. 50-186/78-05.

b. Internal -

The licensee conducted one thyroid scan since the previous radiation protection inspection. Urine samples collected from reactor operators are analyzed routinely for tritium. While reviewing the results of this sampling, the inspector noted that no analyses were performed in January, February, and April 1979, and two of four samples were missed for December 1978. Further investigation revealed the samples had been drawn but the analyses had not been done. The samples were processed during the inspection; no problems were noted.

Because of the personnel shortage, the health physics staff had been unable to ensure timely analyses. This was discussed at the exit interview.

During a maintenance operation, one individual was exposed to airborne tritium. Initial urinalysis results indicated about 7.1 μCi/l. Subsequent analysis results concurred with the expected elimination rate estimates.

No whole body counting is performed; however, review of the licensee's continuous air monitors, daily tritium air samples, and smear survey records revealed no problems.

No items of noncompliance or deviations were found.

9. Posting, Labeling, and Control

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

Nine radiation work permits (RWP's) issued from December 1978 through May 1979 were reviewed. RWP's are written for a limited number of jobs (e.g., handling resin, filter changes). A standard operating procedure which will specify when an RWP is required has not been written. 2/ (Paragraph 7)

No items of noncompliance or deviations were identified.

10. Radiation Surveys

Selected direct radiation, swipes, and air sample survey records since the last inspection (December 1978) and the posted survey frequency check sheets were reviewed; no problems were found.

2/ IE Inspection Rpt No. 50-186/78-05.

Daily tritium air samples taken in containment are independently analyzed by both the health physics and reactor radiochemistry sections. Results of both groups were compared; no major discrepancies were noted. A review of the December 1978 to May 1979 results revealed an average concentration of 1.5 E-7 microcuries per cubic centimeter with one major spike of about 2.8 E-6 microcuries per cubic centimeter during maintenance operation (paragraph 8b). The spike was below the licensee's authorized technical specification.

Particulate and gaseous continuous air monitors (CAM's) are located in containment on the beam port floor and the control room level. Audible alarms are sounded if alarm setpoints are exceeded.

The inspector reviewed the records for the sealed source leak checks done in March 1979.

No items of noncompliance or deviations were identified.

11. Instruments and Equipment

a. Portable Survey Instruments

Records of calibrations done since December 1979 were reviewed. Instruments in service are calibrated at six month intervals by the licensee. The licensee has been sending high range instruments to a contractor annually for calibration. Due to the long turnaround time the licensee is starting to calibrate some of his high range instruments using a State CD facility.

b. Area Radiation Monitoring Systems (ARMS)

The system was calibrated in December 1978 and is checked for operability and alarm response before reactor startups. A review of logs and startup checklists for December 1978 to May 1979 found no problems.

c. Stack Monitor System

The particulate, gaseous, and iodine monitors were calibrated in February 1979, using sources traceable to NBS. Records of the calibration were reviewed; no problems were found.

The isokinetic sampling probe was installed April 9, 1979.[3/]

No items of noncompliance or deviations were identified in these areas.

3/ IE Inspection Rpt No. 50-186/78-05.

12. Primary Coolant Activity

Records of primary coolant water sampling and analysis were reviewed for the period December 1978 through May 15, 1979. The technical specification requirements for sampling frequency and maximum permissible I-131 concentration were met.

No items of noncompliance were identified.

13. Reactor Building Isolation Functional Testing

During reactor startup checks the reactor bridge monitor, building exhaust plenum monitor, and backup building exhaust monitor are exposed to an external source and building ventilation isolation is verified. Startup check sheets were reviewed for the period December 1978 through May 15, 1979. The building leak test records of April 22-23, 1979, were also reviewed by the inspector. Tritium concentrations in air which ranged from 5E-9 to 7E-8 microcuries per milliliter were noted.

No problems were identified.

14. Radwaste Management

a. Solid Radwaste

There have been three shipments of solid waste in CY 1979 to date totaling about 81 millicuries in 120 cubic feet of material to a licensed burial facility. A review of the records of these shipments found no problems.

The licensee has submitted a cask certification amendment to the Transportation Branch, USNRC, for spent fuel shipments. The licensee intends to ship spent fuel about June 1979. Conversations with the licensee's representatives emphasized that an approved cask certification had to be in hand before such a shipment. The inspector also reviewed a letter from a licensed facility stating they would accept the spent fuel.

No items of noncompliance or deviations were identified.

b. Liquid Radwaste

Records for liquid discharge to the sanitary sewer and to the atmosphere from the cooling tower were reviewed for the period December 1978 through April 1979. During the period reviewed, there have been 18 discharges to the sanitary sewer, totaling about 0.08 curies (about 90% is tritium) and three discharges to the cooling tower basin, totaling about 0.05 curies of tritium. (Liquids containing isotopes other than tritium are not discharged to the cooling tower basin.)

The inspector discussed with the licensee his commitment to calculate the amount of tritium being released from the secondary system to the sanitary sewer during blowdown of the secondary system. This commitment has not been addressed yet; the health physics staff has not been able to allot the time for calculations because of other duties. This matter was discussed at the exit interview.

c. Gaseous Radwaste

The concentration of Ar-41 per megawatt day is calculated based on results of grab samples. The total amount released is obtained by multiplying the average concentration of Ar-40 per megawatt day by the megawatt days of operation. During the period July 1, 1979, through February 9, 1979, approximately 1100 curies of Ar-41 was released. The licensee also has a method to estimate the actual concentration of Ar-41 being released at any time by using the Ar-41 stack monitor strip chart.

No items of noncompliance were identified.

15. Materials

The inspector reviewed the licensee's records of receipt and transfer of licensable byproduct material for the period of January 1979 through April 1979. The licensee appears to be satisfying the requirements of 10 CFR 30 and 10 CFR 71. For the period reviewed, there have been 303 shipments totaling about 80,000 curies of off-campus users (89% as Mo-99) and forty-five shipments totaling 0.03 curies to campus users.

No items of noncompliance or deviations were noted.

16. Notifications and Reports

A review of records and discussions with licensee representatives indicated that there were no problems in the licensee's compliance with 10 CFR 19 and 10 CFR 20 requirements.

No items of noncompliance or deviations were found.

17. Facility Changes and Modifications

During the inspection tours, the inspector observed modifications being done in the Medi-Physics hot cell area. The inspector also reviewed the building addition, started in April 1979, which is being joined to the Research Reactor facility. Conversations

with the Manager and records verified that radiation safety orientation had been held for the builders. The manager also indicated that after maintenance, clean-up, and some modifications the MURR hot cell will be returned to service.

No items of noncompliance or deviations were noted.

18. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on May 17, 1979. The following matters were discussed:

a. The purpose and scope of the inspection.

b. The status of the previous commitments made by the licensee. (Paragraphs 3, 7, and 14b)

c. The manpower demands on the health physics section which is a concern because there is an indication of program deterioration. There appears to be insufficient time for continued training, program improvement, special projects, and routine work. (See paragraphs 5, 6, 7, 8b, and 14b.)

The licensee acknowledged the inspector's comments.

The inspector contacted the licensee on May 22, 1979, concerning Health Physics staffing. (Paragraph 4)

The licensee contacted the inspector on May 29, 1979, informing him that a HP technician was hired and would start work on June 4, 1979.