

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

REGION III

Report No. 50-294/80-01

Docket No. 50-294

License No. R-114

Licensee: Michigan State University
East Lansing, MI 48823

Facility Name: TRIGA Reactor

Inspection At: TRIGA Reactor Site
East Lansing, MI

Inspection Conducted: March 24-26, 1980

Inspector: *R. A. Paul*
R. A. Paul

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

4/14/80

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Inspection Summary

Inspection on March 24-26, 1980 (Report No. 50-294/80-01)

Areas Inspected: Routine, unannounced inspection of radiation protection and radwaste management program, including: qualification; Reactor Safety Committee audits; training; procedures; instruments and equipment; exposure control; posting, labeling, and control; surveys; notifications and reports; effluent releases; records and reports of effluents; effluent control instrumentation; respirator program; solid radwaste; and environmental monitoring. The inspection involved 16 inspector-hours on site by one NRC inspector.

Results: Of the thirteen areas inspected, no items of noncompliance or deviations were found in twelve areas; one item of noncompliance was found in the remaining area (Infraction) - Technical Specification H.2 - Failure of Reactor Safety Committee to meet at a required frequency.

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DETAILS

1. Persons Contacted

*J. Carrick, Reactor Supervisor
*B. Wilkinson, Ph.D., Faculty Advisor
*W. Malchman, University Radiation Safety Officer
*J. Hoffman, Acting Director of the Division of Engineering Research

*Denotes those present at the exit interview.

2. General

This inspection, which began with a visual observation of the reactor facility and associated labs at 12:30 p.m. on March 24, 1980, was conducted to examine the radwaste management and radiation protection programs at the Michigan State University TRIGA Reactor. A detailed tour observing facilities and equipment, posting, labeling, and material control was conducted at this time. Additional tours were made of the facility. Records, logs, instrument calibrations, and area radiation monitoring tests were found to be current. The reactor did not operate during the inspection.

3. Qualification and Training

All members of the reactor staff are licensed operators or senior reactor operators and have received radiation protection training and training under 10 CFR 19.12 as part of their licensing process. Other workers or experimenters are given training that fulfills 10 CFR 19.12 requirements by either the University's Radiation Safety Officer (RSO) or the Reactor Supervisor. This training is documented by signatures on attendance logs. The licensee has no specific mechanism to assure the Reactor Operator Supervisor that certain students have received the RSO's more extensive training lectures prior to working in the reactor area. The licensee will evaluate the need for attendance at these lectures, in addition to the training received by the Reactor Supervisor, as a condition for approval to work in the reactor area. This matter will be reviewed at a later inspection.

No items of noncompliance or deviations were noted.

4. License Audits

The licensee has no formal audit program. The Reactor Safety Committee (RSC) is required, by Technical Specification H.2., to meet quarterly, and not to exceed a four month period to review reactor operations with concern for the general health and safety of the public and employees. Minutes of the meetings held on four occasions in 1979 indicated that the committee did not meet between May 7 and November 19, 1979, a period in excess of four months. This is an item of noncompliance with Technical Specification H.2. The minutes of the meetings

indicated that followup action had been taken on items of concern identified by the licensee.

5. Radiation Protection Procedures

Procedures required by the Technical Specifications are included in the Nuclear Reactor Operations and Training Manual or the Operations Maintenance and Calibration Procedures Manual. The campus Radiation Safety Manual is also included in the Training Manual. All reactor operators and regular workers either have access to or are issued these manuals.

No items of noncompliance or deviations were identified.

6. Instruments and Equipment

a. Portable Survey Instruments

The licensee maintains operable and calibrated instruments capable of detecting beta and gamma radiation. The instruments were calibrated semiannually in 1979 by the RSO. Additional equipment is available from the Radiation Safety Office. The Radiation Safety Office stated that a neutron detector is available to the reactor facility when needed. At present, the survey instruments are calibrated up to 1 R/hr. The Radiation Safety Officer indicated he is still developing procedures to calibrate beta-gamma survey instruments to greater than 1 R/hr.

b. Area Radiation Monitors

The licensee has two area radiation monitors (ARM) which were calibrated more frequently than technical specification requirements. A review of Daily Check Lists for 1979 and the first two months of 1980 indicates that the alarm point set at 50 mR/hr was verified daily.

c. Continuous Air Monitor (CAM)

The CAM was calibrated in March, September, and December 1979 by the RSO, thereby complying with the annual frequency required by the technical specifications. The alarm point setting of 10,000 counts per minute is verified daily.

d. Gaseous Effluent Monitor

A review of the gaseous effluent monitor calibration records indicated the monitor was calibrated on several occasions since the last inspection and calibrations were in accordance with the procedures.

No items of noncompliance or deviations were identified.

7. Exposure Control

a. External

Beta, gamma, and neutron dosimeters are worn routinely by all regular reactor staff members and students. In addition, a gamma criticality monitor and area badges are placed in different locations within the reactor room. A criticality foil is placed inside the control room. Ring badges for extremity monitoring are available for jobs in which higher radiation exposures would be expected. Film badge records reviewed for the period January through December 1979 and January 1980 indicated all whole body exposures were normally minimal. The highest whole body and extremity doses for 1979 were 60 mrem and 30 mrem, respectively. Forms NRC-4 are not kept by this licensee.

It was noted during a review of the January 1980 film badge results that a person's extremity exposure was considerably below the whole body exposure during a period of higher than normal irradiated sample radiation levels. A licensee representative stated that finger badges are not always worn during transfer operations because of the low radiation levels of the sample holder and the time it takes to transfer the sample; however, the licensee agreed to use finger badges for all handling operations over a sufficient period to establish compliance with 10 CFR 20.102. This matter will be reviewed at the next routine inspection.

b. Internal

The licensee has no routine bioassay program and relies on the monthly air samples to comply with the requirements of 10 CFR 20.103(a). Air sample records for January 1979 through December 1979 reviewed by the inspector were considerably less than 10 CFR 20 MPC limits.

No items of noncompliance were identified.

8. Posting and Labeling

During the facility tours, the inspector reviewed the licensee's compliance with posting and labeling requirements of 10 CFR 19 and 20.

No items of noncompliance or deviations were identified.

9. Material

The licensee stated that no radioactive material had been received at the facility during 1979. Radioactive material used or material that is irradiated at the reactor facility is covered under the University Broad License (21-00021-29). There were 1602 samples irradiated in 1979, many of which were transferred to authorized

users on campus. The Irradiation Request Log and the Radioisotope Production Log were reviewed for concurrence. No problems were noted.

All irradiated samples are surveyed at the surface of the sample upon removal from the reactor and prior to transferring to the shipping container. No samples are allowed to be transferred to an authorized user unless the reading at the surface of the transfer container is less than 2 mR/hr. All packages and containers are labelled with radiation labels stating the date of shipment, isotope, and amount. A review of the Radiation Safety Office materials records indicates that irradiated material is being accounted for. No problems were noted.

No items of noncompliance or deviations were identified.

10. Surveys

a. Area Surveys

Routine radiation field and contamination surveys are conducted monthly. Surveys are also conducted by request from the Reactor Supervisor. Surveys for 1979 were reviewed and it was noted that neutron surveys had not been made during the period examined. Licensee representatives stated that no significant neutron levels had been observed in the past, but agreed to make such surveys. This matter will be reviewed at the next routine inspection.

b. Sealed Source Surveys

Leak tests of the Am-Be start-up source were performed within the required frequency and the records indicate the removable contamination to be within the required limit of 0.005 microcuries.

c. Air Samples

Filters from the CAM are collected and analyzed biweekly by the RSO using a Beckman Low Beta counter. A review of the 1979 records indicate a concentration of approximately $2E-14$ microcuries per cubic centimeter. Argon 41 is detected by this monitor, but there is no quantitative evaluation of argon 41 in the reactor room. If there were significant releases in the reactor room the licensee would quantitate the concentrations by using the gaseous effluent monitors. A licensee representative stated there is very little occupancy time in the reactor room while the reactor is operating and therefore no exact occupancy time accounting system has been developed. The licensee agreed to determine if a procedure is necessary to account for occupancy times to assure compliance with 10 CFR 20.103. This matter will be reviewed during a future inspection.

No items of noncompliance or deviations were identified.

11. Notifications and Reports

A review of records and discussions with the licensee revealed no problems of compliance with 10 CFR 19 and 20 notification and reporting requirements during 1979.

No items of noncompliance or deviations were identified.

12. Radwaste Management

a. Liquid Radwaste

According to the licensee, no liquid releases have been made since the last radwaste inspection. Records of three pool water samples taken in 1979 were reviewed. Alpha, beta-gamma, and tritium analyses are performed on each sample; the approximate activities were $1.8\text{E-}10$, $1.0\text{E-}8$, and $1.6\text{E-}4$ microcuries per milliliter, respectively.

b. Gaseous Radwaste

Gaseous releases, primarily argon-41, are monitored by the gaseous effluent monitor in an area next to the reactor room. A continuous tape printout which is located at the control panel records any change in count rate. The record indicated that about 2200 curies were released during 1979. This resulted in a yearly average concentration of $1.88\text{E-}10$ microcuries per cubic centimeter, approximately 0.47% of the 10 CFR 20 limit. The largest release, about 669 microcuries, occurred on February 2, 1979.

The licensee attempted to develop a more sensitive argon-41 detector system, did not succeed, and has abandoned the project.

c. Solid Radwaste

Solid waste disposal is handled by the Radiation Safety Office under the university broad license, stored in an interim facility and transferred to a commercial firm for disposal at a licensed facility. The licensee responded to IE Bulletin 79-19 on September 24, 1979, and the RSO certified in a letter to Region III dated September 27, 1979, that certain persons were trained in the DOT and NRC regulations. The licensee's response to IE Bulletin 79-19 will be reviewed during a future inspection of the University broad license.

IE Information Notice 79-08 was not reviewed with the licensee, in that they do not use service air systems as a source of breathing air.

The licensee's only air cleaning system is an absolute particulate filter in the reactor room fume hood ductwork. The filter is only used when automatically activated when the air particulate monitor

exceeds 10,000 cpm. This condition did not occur during 1979. The filter was taken out of line service for examination on two occasions in 1979; no problems were noted.

No items of noncompliance or deviations were identified.

13. Respirators

The licensee does not use respirators on a routine basis. The only respirators which the licensee would use in the case of an emergency are approved self-contained breathing apparatus, one unit of which is stored in the emergency kit located in another area of the building.

The licensee does not use the self contained breathing apparatus described in IE Circular No. 79-15; therefore they did not institute the measures recommended by the bulletin.

14. Radioactive Material Shipping

The licensee has not submitted their quality assurance program (10 CFR 71.51) in that they have not shipped fuel and are not planning to ship fuel in the near future.

No items of noncompliance or deviations were identified.

15. Environmental

The licensee collects monthly water samples from on campus and off campus locations which are analyzed for gross beta activity. Records for the period January through November 1979 were reviewed. All concentrations ranged between 1.2 to 8.7E-9 microcuries per milliliter. These samples have not been analyzed for tritium concentrations in the past; however, the licensee indicated they will do periodic analyses for tritium during 1980.

TLD dosimeters are placed at different on site and off site locations to determine radiation fields, if any, caused by any of the licensee facilities. A review of these records for 1979 indicated background radiation between 50 and 60 mrem per year for these dosimeters.

16. Exit Interview

The inspection findings were discussed with the licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on March 26, 1980. The purpose, scope, and findings of the inspection were discussed. The item of noncompliance is referenced in Paragraph 4.

The licensee agreed to:

- a. Wear finger dosimeters for a sufficient time when handling irradiated samples to determine typical extremity exposure for this function. (Paragraph 7).

- b. Determine if a procedure is necessary to account for occupancy time in the reactor room during operation. (Paragraph 10).
- c. Make neutron surveys in the reactor room on a more routine basis. (Paragraph 10).
- d. Review the need for attendance at certain training lectures by some students who work in the reactor area. (Paragraph 3).