

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-182/83-01 (DRMSP); 70-152/83-01 (DRMSP)

Docket Nos. 50-182; 70-152

Licenses No. R-87, SNM-142

Licensee: Purdue University
West Lafayette, IN

Facility Names: Purdue University Reactor
Fast Breeder Blanket Facility

Inspection At: West Lafayette, IN

Inspection Conducted: August 3 and 4, 1983

Inspector: *McGregor for*
R. A. Paul

8/25/83
Date

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

8/25/83
Date

Inspection Summary

Inspection on August 3 and 4, 1983 (Reports No. 50-182/83-01(DRMSP),
70-152/83-01(DRMSP))

Areas Inspected: Routine, unannounced safety inspection including: Research Reactor (records, organization, review and audit functions, requalification training, procedures, surveillance, fuel handling); Fast Breeder Blanket Facility (organization, operation); radiation protection (organization, instrument calibration, surveys, external radiation control, air sampling, and radioactive waste management). The inspection required 13 inspector-hours onsite by one NRC inspector.

Results: No items of noncompliance were identified.

DETAILS

1. Persons Contacted

*Dr. G. S. Born, Acting Radiological Control Officer
E. C. Merritt, Reactor Technician
*E. S. Stansberry, Reactor Supervisor
*Dr. P. L. Ziemer, Chairman of Radiological Control Committee

*Denotes those present at the exit interview.

2. General

The inspection began at 10:00 a.m. on August 3, 1983. The inspection was conducted to determine compliance with the operation licenses for the Research Reactor and the Fast Breeder Blanket Facility (FBBF), and with the radiation protection requirements for these facilities.

RESEARCH REACTOR

3. Organization, Logs, and Records

The facility organization was reviewed and verified to be consistent with the technical specifications. The minimum staffing requirements were verified to be present during reactor operations. The responsibilities for operation of the research reactor and the function of the Radiological Control Committee are described in report Nos. 50-182/81-01 and 70-152/81-01.

Selected reactor logs and records were reviewed from July, 1982 through June, 1983 to verify that:

- a. Required entries were made.
- b. Significant problems or incidents were documented.
- c. The facility was being maintained properly.
- d. Records were available for inspection.

There are two licensed operators at the facility. Dr. G. S. Born is acting Radiological Control Officer in place of Dr. D. L. Ziemer. Dr. Born meets the qualification requirements of the recently changed technical specifications. The radiation control staff is operating without Assistant or Associate Radiological Control Officers, positions which had been filled in the past. This matter was discussed at the exit interview.

4. Review and Audits

The licensee's review and audit program records were examined by the inspector to verify that:

- a. Reviews of facility changes, operating and maintenance procedures, design changes, and unreviewed experiments had been conducted by a

safety review committee as required by technical specifications or Hazards Summary Report.

- b. The review committee and/or subcommittees were composed of qualified members and quorum requirements and frequency of meetings had been set.
- c. Required safety audits had been conducted in accordance with technical specification requirements and any identified problems were resolved.

The inspector examined the minutes of the Committee on Reactor Operations (CORO) meetings which were conducted in May and November, 1982, and June, 1983. Subcommittee meetings were held in March and September, 1982, and March, 1983. Meeting frequencies meet the technical specification requirements for the CORO or the subcommittee to meet quarterly, at intervals not to exceed 4 months, and the CORO to meet semi-annually at intervals not to exceed 7.5 months.

The audit required to be done annually, at intervals not to exceed 15 months, to determine conformance with technical specifications and applicable license conditions was conducted in May, 1982 for the period May 13, 1981 to May 12, 1982. The inspector reviewed the audit findings; no problems were identified. The next audit is scheduled to be performed in August, 1983.

5. Training

Students and authorized users are trained in accordance with 10CFR 19 requirements: Users are required to read the Purdue Radiological Control Handbook and receive instructions on prenatal exposure risks. Training for students includes a pamphlet on radiation awareness and protection. A selected review of the training records for these persons was performed. No problems were noted.

6. Instrumentation and Equipment

The inspector verified that the pool monitor, water process monitor, and console monitor alarm setpoints were set at their required alarm designation, and that each alarmed when a radiation source was used to test the monitors.

7. Surveillance

The inspector reviewed surveillance test schedules and test records, and discussed the surveillance program with responsible personnel to verify:

- a. That when necessary, procedures were available and adequate to perform the tests.
- b. That tests were completed within the required time schedule.

- c. Test records were available.
- d. Problems were noted.

8. Posting and Control

Posting and radiation signs required by regulations in the reactor building and FBBF were in place.

FAST BREEDER BLANKET FACILITY

9. FBBF Operation

The Nuclear Engineering Laboratory Director continues to be responsible for operation of the FBBF and for devising the experiments performed by a small group of approved graduate students.

The operation and function of the FBBF remains as described in previous reports (Report Nos. 50-182/81-01; 70-152/81-01 and 50-182/82-02; and 70-152/82-02). No significant functional or operational changes have taken place. During the inspection of the FBBF, the following problems were identified:

- a. The end window counter used for detecting personal contamination was being used with a cap over the end window such that low level beta radiation will not be detected.
- b. Surgeons gloves used for handling uranium in the ventilation hood are reused without being surveyed.
- c. The upstream HEPA filter air sampler on the hood exhaust system was not operational while the hood was in use.
- d. Local hood and hood exhaust (upstream and downstream of HEPA filter) air samples are not counted at sufficient frequencies to detect changes in hood airborne concentrations.
- e. No formal radiation safety audit is performed.
- f. The radiological control office routinely changes the FBBF exhaust pre-filter air samples and performs monthly smear and direct radiation surveys outside the FBBF. More surveillance and formal audits are desirable.

These matters were discussed at the exit interview.

RADIATION PROTECTION

10. Organization

The Radiological Control Officer and his staff are responsible for radiation protection at the reactor and FBBF. The program includes periodic smear

surveys, calibration of fixed and portable instruments, personal and area dosimeter measurements, air sampling, and waste management. There is no bioassay program, although the licensee has the capability for performing urinalyses.

11. Instrument Calibration

Records indicated that portable survey instruments used in the FBBF and reactor areas received multipoint calibrations in October, 1982 and March, 1983. The three area radiation monitors and the continuous air monitor in the reactor room were also calibrated during the last six months. All instruments examined by the inspector bore stickers indicating the most recent calibration dates.

12. Surveys

Smear surveys for alpha and beta contamination are conducted monthly in the FBBF and reactor areas. Records indicated no significant problems in 1982 or 1983 to date.

13. External Radiation Control

Film badges supplied by a contractor service are required for individuals frequenting the reactor and FBBF. Records indicated that less than 50 mrem was the maximum whole body dose to any individual in 1982. Finger badges, required during fuel handling, indicated a maximum individual extremity exposure of about 400 mrem for the year.

14. Air Sampling

Exhaust air from the reactor room is sampled with a continuous air sampler located near the pool. Records indicate the concentrations are usually about $1\text{E-}15$ uCi/ml. The air exhausted from the reactor room passes through a HEPA filter. The HEPA filter and two prefilters are periodically checked and changed when reduced flow rates are noted.

In the FBBF area, air is sampled upstream and downstream of the HEPA filters in the exhaust ducts from the FBBF and the ventilated hood. A sampler is also located in the hood. The air samples from the ventilated hood and the HEPA filters in the hood exhaust are taken only when work in the hood is in progress. The sample from the upstream side of the HEPA filter on the FBBF exhaust system is routinely changed and counted. Records indicate the concentrations range between $1\text{E-}12$ and $1\text{E-}13$ uCi/ml; the other air samples are not routinely counted. The licensee stated that based on previous results of an extensive air sample program of these systems, some sampling and analyses were discontinued. This matter was discussed at the exit interview.

15. Transportation Activities

No radioactive material has been shipped from the reactor facility since the last inspection. No spent reactor fuel has been shipped since the

early sixties. The licensee maintains current copies of DOT and NRC regulations concerning the transportation of radioactive materials.

16. Radiation Protection Procedures

The inspector reviewed the following procedures: SOP 77-1 - Radiation Survey Instrument Calibration Laboratory Procedure - Calibration of Fast Neutron Survey Meters.

No problems were noted.

17. Radioactive Waste Management

No significant amounts of airborne radioactive effluents were released from the FBBF or the reactor during 1982. No liquids were released. Small quantities of contaminated and potentially contaminated solid waste are collected by the radiological control staff and packaged for offsite burial under the licensee's materials license.

18. Exit Interview

The inspector met with the licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on August 4, 1983. The inspector summarized the scope and findings of the inspection. The licensee:

- a. Acknowledged the need for additional radiation control personnel to better implement radiation coverage at the FBBF. (Section 9)
- b. Stated that the end window counter in the FBBF will be used without a cap for personal monitoring. (Section 9)
- c. Stated that the air sample in the hood and on the hood ventilation system will be changed routinely. (Section 14)
- d. Stated that a review would be made to determine if a routine audit program for the FBBF is necessary and if additional radiation safety coverage is required. (Section 9)
- e. Acknowledged the need for better control for the reuse of used surgeons gloves. (Section 9)