

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-182/88001(DRSS); 70-152/88001(DRSS)

Docket Nos. 50-182; 70-152

Licenses No. R-87; SNM-142

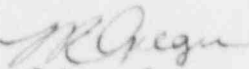
Licensee: Purdue University

Facility Name: Purdue University Reactor  
Fast Breeder Blanket Facility

Inspection Conducted: April 11-14, 1988

Inspector:   
Kenneth R. Ridgway

5-2-88  
Date

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

5-2-88  
Date

Inspection Summary

Inspection on April 11-14, 1988 (Reports No. 50-182/88001(DRSS);  
No. 70-152/88001(DRSS))

Areas Inspected: Routine, unannounced inspection of records, logs, and organization; review and audit functions; requalification training; procedures; surveillance and maintenance; fuel handling activities; radiation protection; radwaste management; transportation activities; and emergency planning.

Results: No violations or significant safety issues were identified in the areas inspected.

## DETAILS

### 1. Persons Contacted

- \*Dr. G. S. Born, Chairman, Radiological Control Committee
- \*Dr. F. M. Clikeman, Acting Head, School of Nuclear Engineering,  
Director of Laboratories
- E. S. Stansberry, Reactor Supervisor
- \*Dr. J. Schweitzer, Radiological Control Officer

\* Indicates those present at the exit interview.

### 2. General

This inspection was conducted to examine the research reactor and Fast Breeder Blanket Facility (FBBF) programs at the Purdue University. The reactor facility was toured shortly after arrival. The inspector observed portions of a reactor startup during the inspection. The general housekeeping of the facilities remains satisfactory.

On July 2, 1986, the licensee submitted a timely renewal application for the reactor, License R-87, which had an expiration date of August 7, 1986. The renewal is expected in the near future.

The FBBF License, SNM-142, was renewed June 6, 1987, for a five-year period.

Activities conducted under both licenses remain the same. The reactor is used primarily for instructional purposes, occasionally with outside schools. The FBBF was reconfigured without problems in 1987. The new configuration was reviewed by both the FBBF Subcommittee and the Radiological Control Committee (RCC).

### RESEARCH REACTOR

### 3. Organization, Logs and Records

The facility organization was reviewed and verified to be consistent with the Technical Specifications (TS) and Safety Analysis Report (SAR). The minimum staffing requirements were verified to be present during reactor and fuel handling operations.

The reactor logs and records were reviewed to verify that:

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

The staffing for reactor operations remains at two licensed Senior Reactor Operators, Dr. Clikeman, whose license was renewed for six years on July 19, 1987, and Mr. Stansberry, whose license was renewed for two years on September 27, 1986. Dr. Clikeman has assumed the position of Acting Head of the School of Nuclear Engineering in addition to Director of the reactor and FBBF facilities.

On December 11, 1987, the Radiological Control Committee approved Dr. J. Schweitzer as Radiological Control Officer (RCO) replacing Dr. G. S. Born. Dr. Born remains as Chairman of the Radiological Control Committee. Dr. Schweitzer had been the assistant RCO since September 1987.

No violations were identified.

#### 4. Reviews 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 the Committee on Reactor Operations (CORO) as required by TS or SAR.
- b. That the CORO and subcommittee were composed of qualified members and that quorum requirements and frequency of meetings had been met.
- c. Required safety audits had been conducted in accordance with Technical Specification requirements and that any identified problems were resolved.

The CORO Subcommittee, which by TS is permitted to meet in place of the CORO on alternate calendar quarters, has been used to review ongoing and future programs. The inspector determined that there is no charter and/or procedures for the CORO or the CORO Subcommittee. Although the CORO reporting requirements, membership, qualifications, meeting frequency, quorum requirements and review functions have been defined in TS, appointment authority for CORO and Subcommittee members has not been defined, nor has any other CORO Subcommittee requirements been defined. The Subcommittee is composed of three members, all are members of the CORO including the Chairman. During the last several meetings, the Subcommittee has only reviewed ongoing and future reactor programs and has not taken any approval actions. The lack of a charter/procedures governing the activities of the CORO and the CORO Subcommittee is considered to be an Open Inspection Item (50-182/88001-01).

The inspector's review of CORO activities indicated that all other requirements were being met.

Annual audits of the reactor facility activities had been conducted on July 28, 1986 and October 6, 1987, by the Chairman of the RCC.

No violations were identified.

5. Requalification Training

The inspector reviewed procedures, logs, and training records; and interviewed personnel to verify that the requalification training program was being carried out in conformance with the facility's approved plan and NRC regulations. The licensee has been exempted from conducting the biennial lecture training series and written examinations since both licensed Senior Reactor Operators (SRO) are actively engaged as university instructors or professors and regularly give instructions in the topics specified. Both SROs have met the operator performance requirements of 10 CFR 55.53(e), passed annual proficiency exams, and made annual reviews of procedures and TS.

No violations were identified.

6. Procedures

The inspector reviewed the licensee's procedures to determine if procedures were issued, reviewed, changed or updated, and approved in accordance with TS and SAR requirements. This review also verified:

- a. That procedure content was adequate to safely operate, refuel and maintain the facility.
- b. That responsibilities were clearly defined.
- c. That required checklists and forms were used.

The licensee's procedure system contains 69 procedures many of which are obsolete and never used. Several of the older procedures have no dates or author names through which to trace CORO approval. This is considered to be an open Inspection Item (50-182/88001-02).

The inspector reviewed the following four procedures for content:

No. 64, Inspection of Control Rods, 5/15/77

No. 64B, Inspection of Control Rods, 4/28/78

No. 59, Core Disassembly-Reassembly, 3/3/72

No. 69, Measuring Worth of Rotating Fuel Element, 2/11/88

It was noted that neither Procedure 64 or 64B contained instructions that a control rod drop test was required following control rod inspections. Other than this, the content of the above procedures appeared to be adequate. Procedure 69 had been reviewed and approved by the CORO.

No violations were identified.

7. Surveillance

The inspector reviewed procedures, 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 tests.
- b. That tests were completed within the required time schedule.
- c. That test records were available.

The licensee's surveillance program appeared to be satisfactory.

No violations were identified.

8. Experiments

The inspector verified by reviewing experiment records and other reactor logs that:

- a. Experiments were conducted using approved procedures and under approved reactor conditions.
- b. New experiments or changes in experiments were properly reviewed and approved.
- c. The experiments did not involve an unreviewed safety question, i.e., 10 CFR 50.59 requirements regarding experiments were met.
- d. Experiments involving potential hazards or reactivity changes were identified in procedures.
- e. Reactivity limits were not or could not have been exceeded during an experiment.

Only one new experiment, described in Procedure 69, Measuring Worth of Rotating Fuel Element, had been approved by CORO since the last inspection. Other routine experiments performed were covered by existing procedures.

The inspector noted that there has been no transfer of irradiated materials from the reactor facility. All irradiated foils are retained.

No violations were identified.

9. Fuel Handling

The facility fuel handling program was reviewed by the inspector. The review included the verification of approved procedures for fuel handling and their technical adequacy in the areas of radiation protection, criticality safety, TS, and security plan requirements. The inspector determined by records review and discussions with personnel that the only fuel handling operations during the inspection period were for fuel and control rod inspections and these were carried out in conformance with the licensee's procedures.

No violations were identified.

FAST BREEDER BLANKET FACILITY (FBBF)

10. FBBF Operation

The Nuclear Engineering Laboratory Director is responsible for the operation of the FBBF Subcritical Facility and personally directs the activities of a small group of graduate students. The RCO is responsible for the control of radiological activities at the FBBF, and the RCC has overall radiation safety review responsibilities.

The configuration of fuel and blanket was significantly modified in 1987 to study fast neutron reactions in stainless steel, sodium and boron carbide. Operations are conducted as described in Inspection Reports 70-152/82-02 and 70-152/82-01.

No violations were identified.

RADIATION CONTROL

11. Radiation Protection

The inspector reviewed the radiation protection activities at the reactor and FBBF facilities since the last inspection. Records were reviewed, personnel were interviewed, and observations were made to verify that radiation controls were being carried out in accordance with license and NRC regulations. The areas inspected were:

- a. Posting and labeling of restricted areas and radioactive materials.
- b. Control of irradiated samples.
- c. Calibration of radiation detection instruments.
- d. Required periodic dose rate and contamination surveys.
- e. Exposure records of personnel.
- f. Posted areas of the facility.
- g. Personnel training.

The inspector determined that the above areas were being adequately addressed. The maximum whole body doses to personnel in these programs were 40 mrem in 1986 and 70 mrem in 1987.

The Radiation Control Officer, a member of the RCC, has been delegated responsibility through the Committee for the overall administrative direction of the reactor and FBBF radiation safety programs.

No violations were identified.

## 12. Radwaste Management

### a. Gaseous Radwaste

Air in the reactor room is sampled by a continuous air sampler near the pool. Records indicate the typical concentrations are about  $1\text{E}-15$  uCi/ml. The air is exhausted through a HEPA filter.

The FBBF air is sampled upstream and downstream of the HEPA filters in the duct from the ventilated hood. A sampler is also placed over open doors in the hood and samples are taken when the work is progressing in the hood. Typical concentrations range between  $1\text{E}-12$  and  $1\text{E}-13$  uCi/ml.

### b. Liquid Wastes

There are no liquid wastes from either the reactor or FBBF facilities. Water is added to the reactor pool to maintain the pool level. Approximately 50 gallons a week are added to replace evaporated water. A two-week leak test of the tightly covered pool was conducted five years ago without loss of water indicating that the water loss is by evaporation and not by pool leakage.

### c. Solid Wastes

Solid wastes such as potentially contaminated paper, wipes, and gloves are collected by the radiation control staff and disposed of under the by-product materials license. Pool water cleanup resins are held to decay for about three years, surveyed for unconditional release, and regenerated by a private water softener company.

No violations were identified.

## 13. Emergency Planning

The inspector reviewed records and interviewed personnel to determine that the approved emergency plan was being carried out by verifying:

- a. That procedures were in place and required records were being kept.
- b. That required drills were conducted and evaluated.
- c. That required training had been conducted.



The inspector noted that incident scenario training sessions had been conducted annually and the last emergency drill, conducted January 21, 1988, had been critiqued and documented.

No violations were identified.

14. Transportation

No transportation activities have been conducted since the last inspection.

15. Review of Periodic and Special Reports

The inspector reviewed the following reports for timeliness of submittal and adequacy of information submitted:

- a. Annual Report, 1986
- b. Annual Report, 1987

No violations were identified.

16. Open Items

Open Items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 4 and 6.

17. Exit Interview

The inspector met with the licensee representatives (listed in paragraph 1) at the conclusion of the inspection on April 14, 1988, and summarized the scope and findings of the inspection. The licensee acknowledged that the information reviewed was not proprietary.

The licensee acknowledged the following remarks by the inspector at the meeting:

- a. The need to develop a charter for the CORO indicating who appoints the members and describing the membership and activities of the CORO Subcommittee (Paragraph 4).
- b. The need to update the reactor procedure system, deleting obsolete procedures and standardizing those retained (Paragraph 6).