

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-186/84-01 (DPRP)

Docket No. 50-186

License No. R-103

Licensee: University of Missouri

Facility Name: University of Missouri Research Reactor Facility

Inspection Conducted: August 27--30, 1984

Inspector: J. E. Hyder
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Inspection Summary

Inspection on August 27--30, 1984 [Reports No. 50-186/84-01 (DPRP)]
Areas Inspected: Routine, unannounced inspection of records, logs, and organization; review and audit functions; requalification training; procedures; surveillance activities; experiments; fuel-handling activities; environmental monitoring; radiation control practices; radwaste management program; transportation activities; and follow-up of licensee event reports. The inspection involved 56 inspector-hours onsite by 2 NRC contractor inspectors, and 28 inspector-hours onsite by 1 NRC inspector, including no inspector-hours onsite during off-shifts.

Results: No items of noncompliance were identified in the areas inspected.

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1. Persons Contacted

- * D. Alger, Associate Director, Research Reactor Facility
- * J. Tolan, University Radiation Safety Officer
- * O. Olson, Manager, Reactor Health Physics
- * J. McKibben, Reactor Manager
- * R. Hultsch, Reactor Physicist
- * C. Edwards, Reactor Plant Engineer
- * W. Meyers, Jr., Reactor Operations Engineer
- V. Jones, Senior Reactor Operator
- S. Gunn, Service Engineer

* Indicates those present at the exit interview.

2. General

This inspection, which began at 8:30 a.m. on August 27, 1984, was conducted to examine the overall program at the University of Missouri Research Reactor. However, the security and material accountability and control activities were not inspected. The facility was toured shortly after arrival. The conditions of the facility were found to be acceptable, but the housekeeping was not as good as that noted during the last operations inspection (October 26--30, 1981).

The inspection team observed a reactor refueling. The operations staff performed in a professional manner with each individual carrying out his duties as a member of a well-organized team.

3. Organization, Logs, and Records

The facility organization was reviewed and verified to be consistent with the Technical Specifications and the Hazards Summary Report. The minimum staffing requirements were verified to be present during reactor operation and fuel handling or refueling operations.

The reactor logs and records were reviewed to verify that

- a. required entries were made,
- b. significant problems or incidents were documented,
- c. the facility has been maintained properly, and
- d. records were available for inspection.

The inspection team reviewed the reactor logs and records generated since the last operations inspection [Report 50-186/81-06 (DPRP)] on October 26--30, 1981. The review of startup check sheets indicated that a very limited number of the check sheets were not completed properly (Item 50-186/84-01-01). The licensee indicated that this would be brought to the attention of all reactor operators and shift supervisors.

It was noted that Sec. 6.1 of the Technical Specifications contained references to the Atomic Energy Commission (AEC) (Item 50-186/84-01-02). The licensee indicated that this would be corrected when the section is revised.

No items of noncompliance or deviations were identified.

4. Reviews and Audits

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

- 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 the Technical Specifications.
- b. The review committee and/or subcommittees were composed of qualified members, and quorum and frequency of meeting requirements had been met.
- c. Safety audits had been conducted in accordance with Technical Specifications requirements, and any identified problems were resolved.

In the latter case, audits are not addressed in the Technical Specifications. However, the Reactor Advisory Committee has developed an audit program of four major categories with an audit performed about every 6 months and with each major area reviewed every 2 yr. The Health Physics Program was audited in January 1982 and March 1984; Reactor Operations was audited in September 1982, Transportation Activities were audited in March 1983, and the Safeguards Program was audited in December 1983. Reactor Operations is to be audited again during the fall of 1984.

The last operational inspection [Report 50-186/81-06 (DPRD)] noted that the Reactor Procedure Review Committee (RPRS) of the Reactor Advisory Committee was not performing timely reviews of procedure revisions (Item 50-150/81-06-01). During the period from October 1981 until March 1983 the RPRS met frequently to review procedure revisions. However, the committee has not met since March 1983; thus, this matter continues as an open item.

No items of noncompliance or deviations were identified during this portion of the inspection.

5. Requalification Training

The inspectors 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. A biennial requalification examination had been

conducted in 1983. Sixteen individuals are taking part in the current (1984--1985) requalification program.

The inspection team noted that the evaluation performance forms were not completed consistently by all evaluators (Item 50-186/84-01-03). There had been a substantial improvement with regards to this in the past 10 to 12 months. The licensee indicated that all evaluators would be reminded of the necessity of completing all the items on the evaluation performance form.

The change documentation system is being used for all new or revised procedures and provides documentation of the review of procedure revision and special procedures by members of the staff. This action closes an open inspection item (50-186/81-06-02) previously reported [50-186/81-06 (DPRP)].

No items of noncompliance or deviations were identified.

6. Procedures

The inspection team reviewed the licensee's procedures to determine if procedures were issued, reviewed, changed or updated, and approved in accordance with Technical Specifications requirements.

This review also verified that

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

The inspection team determined that the required procedures were available and that the contents of the procedures were adequate.

In conversations with members of the reactor operation staff, one of the inspectors determined that the licensee has included a definition of the bounds of the control room in operator training and has emphasized this information to all operations personnel. This action closes an open inspection item (50-186/81-06-03) previously reported [50-186/81-06 (DPRP)].

The modification record check list was revised on October 15, 1980. This action closes an open inspection item (50-186/80-05-01) previously reported (50-186/80-05).

No items of noncompliance or deviations were identified during this portion of the inspection.

7. Surveillance Activities

The inspection team reviewed procedures, surveillance test schedules, and test records and discussed the surveillance program with responsible personnel to verify that

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

The review of the licensee's compliance (surveillance) procedures indicated that in at least one case (CP-16) the reference section of the procedure was in error and that some procedures did not provide references in that section, although the procedures included specific references (Item 50-186/84-01-04). The licensee indicated they would correct this situation.

No items of noncompliance or deviations were identified in this portion of the inspection.

8. Experiments

The inspectors verified the following by reviewing experiment records and other reactor logs.

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

Only four new experiments have been approved since the last inspection. Their titles are as follows.

1. "Measure Yields of Short-Lived Fission Products"
2. "Up-Grade of Capability of Neutron Radio-Graphic System"
3. "Produce Radio Isotopes and Measure Elemental Abundance"

4. "Fluorescence Experiments"

No items of noncompliance or deviations were identified during these reviews.

9. Fuel Handling Activities

The facility refueling (fuel handling) program was reviewed by the inspectors. The review included the verification of approved procedures for fuel handling and their technical adequacy in the areas of radiation protection, criticality safety, Technical Specifications, and security plan requirements. The inspectors determined by records review and discussions with personnel that fuel-handling operations and startup tests were carried out in conformance with the proper procedures.

The inspectors observed a fuel exchange (the entire core was removed and eight different elements were installed) on the morning of August 30, 1984. The appropriate written procedures were followed by the reactor operating crew with only one element moved at a time following a movement "road map" prepared before the task was started. The ID number of each element was verified as it was moved.

No items of noncompliance or deviations were identified.

10. Transportation (Fuel Shipping)

The inspector reviewed records of the three spent fuel shipments made in January 1982 to Savannah River, the two shipments made in January/February 1983 to Idaho Falls, and the three shipments made in November 1983, also to Idaho Falls. The review determined that the conditions of the Certificate of Compliance for the General Electric shipping cask and appropriate DOT regulations were followed.

No items of noncompliance or deviations were identified.

11. Radiation Control

The inspectors reviewed records, interviewed personnel, and made observations to verify that radiation controls were being carried out in accordance with the license and NRC regulations. The areas covered were

- a. posting and labeling of areas and radioactive materials,
- b. control of irradiated samples,
- c. calibration of radiation-detection instruments,
- d. required periodic dose and contamination surveys,
- e. exposure records of personnel,
- f. posted areas of the facility, and
- g. personnel training.

The current Health Physics coverage for the reactor facility is one full-time professional, three full-time technicians, and two part-time student technicians.

Several of the Health Physics procedures were reviewed and found to be adequate. These Health Physics procedures consist of 2 sections, 26 SOPs that address Health Physics interactions with (support of) other operating personnel and 6 internal procedures that detail specific duties of the Health Physics staff.

A review of instrument calibration records revealed that all Health Physics radiation instrumentation is calibrated annually or removed from service until new calibration can be performed. This action closes an open inspection item (50-186/81-06-03) previously reported [50-186/81-06 (DPRP)].

A number of maintained activities described in the reactor operations log were cross-checked in the Health Physics files. Records of the Health Physics coverage detailing the prescribed ALARA procedures and estimated personnel exposure were found for all activities.

Personnel radiation exposures were reviewed for 1983 and the first 6 months of 1984. Approximately 100 persons assigned to the reactor facility are badged. During 1983 all exposures were <3 rem. A total of 8 individuals received exposure of between 2 and 3 rem and another 12 persons received whole-body exposures of between 1 and 2 rem. The early part of 1984 shows a similar pattern with seven individuals having exposures between 1 and 1.5 rem during the first half of the year.

No items of noncompliance or deviation were identified in this part of the inspection.

12. Radwaste Management

a. Liquids

The liquids produced during the regeneration of the ion beds is now flocculated and the flocculant is allowed to settle to the bottom of the tank. The supernatant is filtered as it is transferred to another tank for sampling and analysis before release to the sanitary sewer. The dried filters and solidified sludge (floc) is processed as solid waste.

Liquid radwaste records indicate that less than 1 Ci of radioactive material was released to the sanitary sewer between July 1, 1983, and June 30, 1984. Over 50% of this activity was ^{35}S ($T_{1/2} = 87\text{d}$), and about 10% was ^3H (tritium).

b. Airborne

Airborne releases during the July 1, 1983--June 30, 1984, period total less than 1265 Ci total activity. Approximately 99% of this effluent was ^{41}Ar and almost 1% was ^3H . These discharges were within the Technical Specification limits.

c. Solid

Records of the individual waste containers previously moved to the University's Sinclair Farm site have been noted as having been administratively transferred to the University Broad License.

The Facility (Reactor Health Physics staff) has initiated a segregation/volume reduction program for the accumulated solid radwaste. Combustible waste is being segregated for eventual incineration under the Broad License. Metal containers (aluminum) are being melted and solidified, and other compaction techniques are being examined.

The above steps have been taken in lieu of transferring solid waste to the University's broad license and subsequent storage at Sinclair Farm. This action closes an open inspection item (50-186/83-03-1) previously reported [50-186/83-03 (DRMSP)].

Nine drums of resins, filters, and solidified sludge were transferred to a licensed disposal firm in June 1984. Although space for waste storage is still limited, the Reactor Health Physicist expressed the belief that "light could be seen at the end of the tunnel."

No items of noncompliance were identified in this portion of the inspection.

13. Environmental Monitoring

In addition to monitoring all effluents as they are released to the environment, the licensee collects and analyzes soil, vegetation, and water samples twice a year from numerous specified locations for contained radioactive materials. The levels of gross alpha, gross gamma, and tritium have been less than the detection limits. The low, but positive, gross beta activities have been at the levels found in the general environment nationwide.

14. Licensee Event Report Followup

Using direct observations, discussions with licensee personnel, and review of records, the seven event reports were reviewed to determine that reportability requirements were fulfilled, immediate corrective action was accomplished, and corrective action to prevent recurrence had been accomplished in accordance with Technical Specifications.

Event reports 81-08, 82-01, 82-02, 83-01, and 83-02 deal with either failure of the emergency generator to start, failure of the emergency generator to automatically assume full load, or a protection circuit trip. In all cases the inspection team concluded that the licensee's actions and remedial measures were proper. The inspection team also concluded that the five events were unrelated and do not indicate a generic problem with the emergency generator. It also is noted that the reactor can be maintained in a safe shutdown condition in the absence of electric power. The inspection team's review of these events closes them.

Event report 82-03 deals with the improper installation of the flux trip sample hold-down device, causing samples in the center test hole to not be rigidly held in place during reactor operations. The event was analyzed by the licensee and by K. R. Ridgway of NRC, Region III. The analysis concluded that there was minor safety significance to the event. The corrective actions taken by the licensee were deemed by the inspection team to be adequate to prevent recurrence of the event, thus closing the event.

Event report 84-01 deals with the personnel airlock doors operating out of sequence, resulting in both the inner and outer doors being open at the same time. The reactor was immediately shutdown by manual rod run in. The gasket on the outer door was pulled partially from its seat. The licensee repaired the gasket and tested the doors for safe operation. The inspection team reviewed this event and concluded that, because of the timely shutdown of the reactor, the event did not pose a threat to the health and safety of the staff or the public and therefore closes this event.

No items of nonconformance or deviations were identified in this section of the inspection.

15. Review of Periodic and Special Reports

The inspection team reviewed the following reports for timeliness of submittal and adequacy of information submitted.

Monthly Reports for January 1983--February 1984
Annual Report for July 1, 1981--June 30, 1982
Annual Report for July 1, 1982--June 30, 1983
Annual Report for July 1, 1983--June 30, 1984

16. Exit Interview

The inspection team met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on August 30, 1984, and summarized the scope and findings of the inspection.

The licensee acknowledged the following comments of the inspection team.

- a. The need for more timely reviews of procedure revisions by the Reactor Procedure Review Subcommittee (Paragraph 4).
- b. The need to assure that startup check sheets and evaluation procedure forms are completed (Paragraphs 3 and 5).
- c. The need to assure that the reference sections in the procedures are complete and correct (Paragraph 7).
- d. The need to update Technical Specification 6.1, replacing AEC with NRC (Paragraph 3).

UNIVERSITY OF MISSOURI RESEARCH REACTOR (UMRR)

Reactor Advisory Committee Membership (8/84)

- A. Bolon, Chairman, Nuclear Engineering, University Missouri-Rolla
- R. Brugger, Director, UMRR, Ex-Officio
- T. Collins, Associate Vice President, Ex-Officio
- D. Alger, Associate Director, UMRR
- S. Howkey, Risk Management
- A. Ehrhardt, Radiochemistry
- A. Drawitz, Mechanical Engineering
- P. Lee, Health Physics Service
- W. Miller, Nuclear Engineering
- F. Moss, Physics, University Missouri - St. Louis
- R. Murphy, Physics, University Missouri - Kansas City
- O. Olson, Reactor Health Physics
- E. Schlemper, Chemistry
- T. Storvick, Chemical Engineering
- C. Tompson, Physics

US NUCLEAR REGULATORY COMMISSION
OPERATOR LICENSING STATUS (AUGUST 1984)

UNIVERSITY OF MISSOURI-COLUMBIA

<u>NAME</u>	<u>LICENSE TYPE</u>	<u>LICENSE NUMBER</u>	<u>LICENSE EFFECTIVE DATE</u>
Herleth, William S.	RO	30081	08/19/82
Newton, James C.	RO	30112-1	11/29/84
Wallis, Michael L.	RO	30271	05/23/84
Zychewicz, William J.	RO	30286	08/13/84
Anderson, Charles M.	SRO	3316-3	08/28/84
Berkley, Terry L.	SRO	30290	01/05/84
Bezenek, Barry C.	SRO	2074-5	03/22/84
Edwards, Jr., Chester B.	SRO	1123-7	12/19/82
Gunn, Gregory F.	SRO	30288	01/05/84
Jones, Vermon L.	SRO	30069-1	08/19/84
Kilfoil, James M.	SRO	30363	05/23/84
McKibben, James C.	SRO	2710-4	06/03/84
Meyer, Jr., Walter A.	SRO	2862-3	01/24/83
Schoone, Anthony R.	SRO	30379	08/13/84
Swallow, James R.	SRO	30289	01/05/84
Tritschler, Nolan E.	SRO	2863-3	01/05/83