U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-166/83-01

Docket No. 50-166

License No. R-70 Priority -- Category G

Licensee: University of Maryland

College Park, Maryland 20742

Facility Name: Maryland University Training Reactor

Inspection At: College Park, Maryland 20742

Inspection Conducted: May 25-27, 1983

Inspector: J. Higgins for 6/21/83
W. M. Kinney, Project Engineer date

Approved by: T. C. Elsasser 6/21/83
T. C. Elsasser, Chief, Reactor Projects date
Section No. 1B

Inspection Summary: Inspection on May 25-27, 1983 (Report No. 50-166/83-01)
Areas Inspected: Routine, unannounced inspection by a region-based inspector (17 hours) of organization, facility operations, separation of potentially contaminated water from water supply, logs and records, reviews and audits, procedures, surveillance activities, radiation control, and gaseous and liquid radioactive effluents.

Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

*Dr. F. J. Munno, Director, Nuclear Engineering Programs
*Dr. R. L. Belcher, Director, Nuclear Reactor
*Mr. D. Marksberry, Assistant Director, Nuclear Reactor
Mr. S. Shanks, Assistant Radiation Safety Officer

*denotes those present at the exit interview

2. Organization

The incumbents of the organizational positions addressed in Technical Specification 6.1, Organization, as of May 27, 1983, are given below.

Position	Incumbent
Chancellor, University of Maryland	Dr. J. Slaughter
Provost, Division of Mathematics and Physical Sciences and Engineering	Dr. F. Kerr
Dean, College of Engineering	Dr. G. Dieter, Jr.
Chairman, Department of Chemical and Nuclear Engineering	Dr. T. Cadman
Director, Nuclear Reactor	Dr. R. Belcher
Radiation Safety Officer	Mr. E. Blackburn
Senior Reactor Operators	Mr. D. Marksberry
	Dr. F. Munno
	Mr. R. Lee
	Dr. R. Belcher
Reactor Operator	Dr. T. Andreadis

The Reactor Safety Committee as of May 27, 1983, has the following members.

Dr. Y. Y. Hsu, Chairman (Nuclear Engineering)
Dr. T. Cadman (ex officio as Chairman of Department of Chemical and Nuclear Engineering)
Dr. R. Belcher (ex officio as Director of Nuclear Reactor)
Mr. E. Blackburn (Radiation Safety Officer)
Mr. S. Shanks (Assistant Radiation Safety Officer)
Dr. F. Munno (Nuclear Engineering)
Dr. J. Silverman (Nuclear Engineering)
Dr. M. Modarres (Nuclear Engineering)
Dr. M. Roush, (Physics)
Mr. D. Marksberry (Nuclear Engineering)

This Committee membership and the qualifications of the members meet the requirements of Technical Specification 6.3, Reactor Safety Committee.

No violations were identified.

3. Facility Tour

The inspector inspected the Maryland University Training Reactor (MUTR) with the Nuclear Reactor Director immediately after the entrance interview. The housekeeping of the facility was good.

No violations were identified.

4. Facility Operation

The MUTR is an open pool 250 KW TRIGA reactor which is used for nuclear engineering courses, in-house training of reactor operators, and irradiation of samples for activation analyses.

The licensee plans to shut the reactor down for a two week preventative maintenance program starting on June 20, 1983.

No violations were identified.

5. Separation of Potentially Contaminated Water from Water Supply

The city water supply is connected to the reactor coolant system at two locations: makeup water to the primary coolant water and the open loop secondary water to the two heat exchangers used for cooling the primary coolant water. There are three manual valves in the primary coolant water makeup supply line, and there is one manual valve before the heat exchanger in each of the secondary water lines to the two heat exchangers. Also, the pressure of the city water supply is greater than the pressure in the primary coolant water system. However, none of the connections between the potentially contaminated water and the city water supply had any positive means such as a check valve or an air break to prevent the backflow of potentially contaminated water into the city water supply. The licensee agreed to install check valves in these two connections. The check valve in the primary water makeup water supply line is to be installed by June 3, 1983, and the check valve in the heat exchanger secondary water supply line will be installed during the summer of 1983. The installation of these check valves will be inspected during a future inspection (83-01-01).

No violations were identified.

6. Logs and Records

The inspector reviewed the Control Room Log Book for the period of September 2, 1981, through May 25, 1983. The log included information and data concerning reactor operations, surveillance activities, and maintenance activities. The operational information and data included personnel on duty; run numbers; purpose of runs; dates, times, and power levels of runs; experiments performed; and experimental data. The log book

entries were signed by responsible personnel. Maintenance activities recently significantly increased. In March 1983 the licensee experienced problems with the regulating rod drive system, the exhaust radiation monitor, and the primary water conductivity measurement system. The licensee indicated that the equipment had given relatively trouble free service until the occurrence of these recent problems.

The inspector reviewed the startup checklists for Run Nos. 1154 through 1212, conducted May 22, 1982, through May 25, 1983. The checklists were comprehensive. The licensee properly completed the checklists in most cases; however, the "Water Room" section of the checklist was often not filled in. The licensee explained that the primary coolant often was not circulated and not cooled using the heat exchangers; therefore, the equipment in the water room was not always used. The inspector also discussed with the licensee that the checklist (and the operating procedure) did not specify when and how the primary coolant was to be circulated and cooled. The licensee indicated that it was their intent that the "Water Room" section of the checklist be completed in the future and that they would address the operation of the reactor coolant and purification systems in the operating procedures. Licensee actions with regard to these two matters will be reviewed during a future inspection (83-01-02).

No violations were identified.

7. Reviews and Audits

The inspector reviewed the minutes of the 1978 through first quarter 1983 meetings of the Reactor Safety Committee. The committee met quarterly as required by Technical Specification 6.3, Reactor Safety Committee. The Reactor Safety Committee reviewed operational and maintenance problems with the safety system and measuring channels equipment, especially the radiation monitoring equipment; reviewed and approved operating, surveillance, maintenance, and emergency procedures; and reviewed the license renewal application and security plans.

The licensee arranged with a four member team of auditors from the Armed Forces Radiobiology Research Institute (AFRRI) in Bethesda, Maryland, to audit the operation of the MUTR in June 1981. The licensee took appropriate actions on the findings and recommendations of the audit team. The licensee has made arrangements with AFRRI and the National Bureau of Standards (NBS) at Gaithersburg, Maryland, to participate in a "round-robin" audit program. The licensee is currently arranging the schedule for these audits. This will be reviewed during a future inspection (83-01-03).

No violations were identified.

8. Procedures

The inspector examined the following procedures:

Procedure Number	Title	Revision No	Approval Date
100 Series - Operating Procedure			
OP 101	Startup Instrument Checklist	0	12/20/82
OP 102	Reactor Shutdown Checklist	0	3/28/83
OP 103	Reactor Startup	0	12/20/82
OP 104	Reactor Operations	0	12/20/82
OP 105	Installation of Experiments	-	2/17/78
200 Series - Surveillance Procedures			
SP 200	Inspection and Calibration	0	12/20/82
SP 201	Fuel and Control Rod Inspection	0	3/28/83
300 Series - Maintenance Procedures			
MP-301	Dismantling and Reassembling Fuel Bundle	0	12/20/82
MP-302	Setting the Flux Controller	0	12/20/82
MP-303	Fuel Movement	0	3/28/83
MP-304	Control Rod Removal	0	3/28/83
400 Series - Emergency Procedures			
EP-401	Reactor Evacuation Procedure	0	12/20/82
EP-402	Primary Coolant Leaks	0	12/20/82
EP-403	Abnormal Reactivity Changes	0	12/20/82
EP-404	Release of Radioactivity	0	12/20/82
EP-405	Security	0	12/20/82

With the exception of OP-105, Installation of Experiments, all the procedures listed above were just recently revised by the Assistant Nuclear Reactor Director, reviewed and recommended for approval by the Nuclear Reactor Director, and reviewed and approved by the Reactor Safety Committee. The Assistant Nuclear Reactor Director is currently revising OP-105 and the surveillance procedures for measuring control and drop times, determining the reactivity worth of each control rod, and calibrating each power level monitoring channel.

As mentioned in paragraph 6, the licensee indicated they would address the operation of the reactor coolant and purification systems in the operating procedures.

During the examination of the surveillance activities, the inspector noted that the procedures and checklists do not specifically address the performance of channel checks of the power level measuring channels and fuel element temperature measuring channels during each day of operation. Discussion with the licensee and review of the Control Record Log Book disclosed that these surveillance activities were performed as required by Technical Specifications 4.3.c and 4.3.d. The licensee stated they would address the performance of the channel checks in their procedures and would provide for the recording the performance of these channel checks. This will be reviewed during a future inspection (83-01-04).

No violations were identified.

9. Surveillance Activities

The inspector reviewed the performance of the following surveillance requirements:

Tech Spec	Description	Frequency	Time Period
4.1.a	Visually inspect 4 fuel element clusters for damage or deterioration	biennially	10/79 - 12/82
4.2.a	Determine the reactivity worth of each control rod	annually	10/80 - 4/83
4.2.b	Determine rod drop times	annually	4/81 - 5/83
4.2.c	Visually inspect control rods for deterioration	biennially	10/79 - 12/82
4.3.a	Perform channel test of each reactor instrumentation and safety system channel	prior to each operation	3/22/82 - 5/25/83

4.3.b.	Perform calibration of power level monitoring channel	annually	4/82 - 4/83
4.3.c	Perform channel check of power level measuring channels	daily during operation	
4.3.d	Perform channel check of the fuel element temperature measuring channels	daily during operation	
4.4	Verify alarm set points for the radiation monitoring instruments	prior to each operation	3/22/82 - 5/25/83

The performance of the surveillance activities was recorded in the Control Room Log Book.

The licensee did not have a schedule which summarized when the required activities were due to be performed and when they were actually performed. The licensee is currently establishing such an information and scheduling system, which will help the licensee assure that the required surveillance activities are performed at the required frequency.

As mentioned in paragraph 8, the licensee will address the channel checks of power level and fuel element temperature measuring channels, as required by Technical Specifications 4.3.c and 4.3.d, in their procedures. Also, the performance of these channel checks will be recorded.

No violations were identified.

10. Radiation Control

a. Area Radiation Monitors

There are three radiation monitors located in the water room, on the reactor bridge, and next to an exhaust fan. Technical Specification 3.2, Reactor Instrumentation, requires that at least two of these monitors must be operable during reactor operation. According to the Control Room Log Book, the exhaust fan monitor ceased to function on March 30, 1983. The licensee has been operating the reactor with the minimum number of operable monitors since that time.

The exhaust fan area radiation monitor initiates the isolation of the reactor building upon sensing radiation above its set point. Even though this system is not addressed in the Technical Specifications, it would appear that this area radiation monitor should be operable.

According to the licensee, they have had problems maintaining these area radiation monitors in operable condition for years, and these monitors have been a Reactor Safety Committee topic since 1978. The licensee has been attempting to install replacement area radiation monitors for over a year. Since the malfunction of the exhaust fan monitor, the licensee has attempted to expedite this installation and plans to have the replacement system operable by the end of July 1983. This will be inspected during a future inspection (83-01-05).

No violations were identified.

b. Glovebox for Rabbit Tube

The pneumatic transfer system is loaded and unloaded in a glovebox located in the sample preparation laboratory located on the west balcony. The glovebox has a small blower to reduce the air pressure in the glovebox so that any air leakage will be into, rather than out from, the glovebox; and any radioactive contaminants would not leak from the glovebox. At the inspector's request, the blower was turned on. It was evident that the blower did not create a significant vacuum in the glovebox. The licensee stated that, although it isn't necessary to operate the blower for contamination control, they would replace the blower.

No violations were identified.

c. Personnel Radiation Exposure

The inspector examined the yearly 1982 exposure records for personnel associated with the MUTR. The maximum yearly exposure was 80 millirems.

No violations were identified.

d. Smear Data

The licensee took between 30 and 40 smears of the facility on a monthly frequency and counted the smear sample for beta and gamma radioactive contamination. The location where the smear samples were taken and the counting results were recorded. The records for January 1982 through April 1983 showed that no removable radioactivity was detected on any smear.

No violations were identified.

e. Posting of Radiation Areas

The inspector observed that the radiation areas of the MUTR facility were properly posted.

No violations were identified.

11. Gaseous and Liquid Radioactive Effluents

The licensee took monthly one-hour samples of the particulate matter in the air being released from a roof vent. The samples taken from January 1982 through April 1983 all had no detectable particulate radioactivity.

The licensee takes samples of the liquid in the sump prior to release to the sewer. The licensee also takes monthly samples of the sump and the reactor pool. There was no detectable radioactivity in any of these samples taken from January 1982 thorugh April 1983.

No violations were identified.

12. Exit Interview

The inspector met with the licensee representatives (listed in Paragraph 1) at the conclusion of the inspection on May 27, 1983. The inspector presented the scope and findings of the inspection.