

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No.: 50-20/91-03
Docket No.: 50-20
License No.: R-37
Licensee: Massachusetts Institute of Technology
138 Albany Street
Cambridge, Massachusetts
Facility Name: MIT Research Reactor
Inspection At: Cambridge, Massachusetts
Inspection Conducted: September 30 to October 2, 1991

Inspector: Thomas Dragoun 10/15/91
Thomas Dragoun, Project Scientist, Effluents
Radiation Protection Section (ERPS), Facilities
Radiological Safety and Safeguards Branch (FRSSB)
date

Approved By: Robert J. Bores 10/16/91
Robert J. Bores, Chief, ERPS, FRSSB,
Division of Radiation Safety and Safeguards
date

Inspection Summary: Inspection on September 30 to October 2, 1991 (Report No. 50-20/91-03)

Areas Inspected: Reactor operations program including: staffing, reactor operations, configuration control, operator requalification, Safeguards Committee oversight, and surveillances.

Results: There were no safety concerns and the no observed violations of NRC requirements.

DETAILS

1.0 Individuals Contacted

L. Andexler, Shift Supervisor
*J. Bernard, Director of Reactor Operations
*O. Harling, Director of Nuclear Reactor Laboratory
*K. Kwok, Superintendent
*E. Lau, Shift Supervisor
*F. Massé, Institute Radiation Protection Officer
*F. McWilliams, Reactor Radiation Protection Officer
*T. Newton, Shift Supervisor
*A. Sanentz, Shift Supervisor
F. Warmsley, Shift Supervisor

*Denotes those present at the Exit Interview on October 2, 1991. The inspector also interviewed other personnel during the inspection.

2.0 Facility Staffing

The inspector reviewed the facility staffing and organizational structure with respect to the requirements in Technical Specification (TS) 7.1, "Responsibility", and section 7.2, "Reactor Staff Organization". The inspector observed that shift turnovers were well conducted and noted that the operations crew sizes were adequate on all three shifts. Although the supervisory positions of Assistant Superintendent and Senior Shift Supervisor were vacant, the oversight and control of activities provided by the Superintendent and Shift Supervisors, who worked extra hours on the day shift, were found to be excellent. The reactor startups required two operators several hours to complete the two precritical equipment checklists, each of which is seventeen pages long, due to the large number of systems checked and the attention to detail in the checklists. With the level of effort needed by the operations staff to support changes to experimental apparatus, collateral duties, and routine personnel absences, the overall staffing level was judged to be just adequate.

3.0 Reactor Operations

The inspector toured the major equipment areas inside and outside the building accompanied by the Superintendent. All equipment was found to be in good condition with good attention to maintenance and repair. No leaks of potentially contaminated water were noted around the reactor primary and secondary water systems. Housekeeping was very good and no fire hazards or trash accumulations were observed. Experimental apparatus that was no longer used had been removed from the vicinity of the beam ports. The office area was in the process of being redecorated during this inspection indicating good management support for the physical condition of the facility. The Reactor Safeguards Committee had also given specific direction to the staff in regards housekeeping.

The inspector observed two reactor start-ups, one from a xenon-free condition and the second during a xenon transient and one controlled reactor shutdown. In all cases, the operators at the control console demonstrated good attention to safety and responded properly to alarms and abnormal conditions. The inspector noted that during one reactor start-up the Senior Operator/Shift Supervisor entered the words 'not applicable' for several sections of the detailed precritical checklist. The Superintendent stated that, since the procedure includes all requirements for start-up from any initial conditions, such operator discretion is allowed. Any deviations from the full requirements are documented on the checklist and later reviewed and approved by the Superintendent. The inspector stated that this policy was generally acceptable under Section 4.0 of ANSI Standard ANS-15.18 but that other situations involving the use of procedures would be reviewed in future inspections.

The licensee utilizes some unique equipment to aid the reactor operators. An audio tone generator is attached to the logarithmic reactor power channel such that the pitch rises along with the neutron flux. This helps the operator to identify the point at which the reactor is critical. A galvanometer reflects a spot of light onto a two-foot long scale in the center of the control console. The galvanometer is connected to the power range instrumentation so that minor changes in power level are easily seen when operating under steady state conditions.

A review of the written log maintained at the control console showed that appropriate entries were being recorded. Management reviews and initials the log daily. The first entry of the week always records the core configuration (fuel loading, dummy cells, and experiments). The midnight shift always records all equipment abnormalities. These detailed entries are a good practice.

4.0 Configuration Controls

In the area of configuration control the inspector reviewed the licensee's programs for the control of maintenance, experiments, reactor refueling, and daily equipment checks. The inspector observed the removal and replacement of an experimental apparatus in the active core region called the Pressurized Coolant Corrosion Loop (PCCL). A formal procedure was used for the work. The Radiation Protection Officer, Health Physics Technician, Shift Supervisor, and lead experimenter were present at the reactor top to oversee the work. No deficiencies were observed. The inspector reviewed the authorizations issued by the Superintendent for movement of the PCCL and repositioning of dummy cells in the core. The inspector also reviewed refueling records for the past year for compliance with requirements of TS 3.1 and TS 3.9. No deficiencies were observed.

Each day a checklist is used to record the status of certain plant equipment and perform chemical analysis of water samples. This is a good practice. The inspector observed a reactor operator trainee perform parts of this tour including the chemical analysis. The inspector noted that the

tap water and cooling tower water pH appeared high at about pH=8.3. The licensee analyzed a second sample on a different pH meter and obtained the same result. The readings were attributed to treatment chemicals that were added to the municipal water supply by the local authorities.

The reactor is normally run for three shifts each day and shutdown for the weekends. Each Monday, the operators conduct a thorough tour of the facility to observe equipment status and complete a checklist. This is done prior to beginning the precritical checklist for reactor startup. The inspector concluded that the licensee's programs to control the equipment status was excellent.

5.0 Regualification Training

The licensee's retraining program was reviewed with respect to the requirements in TS 7.4, 10 CFR 55, and the NRC approved regualification program. The licensee's program consists of annual written exams, reactor manipulations, lectures regarding emergency response and medical plan, and remedial training for technical weakness identified by the examinations. The inspector reviewed selected training records for Reactor Operators and Senior Reactor Operators including the written exams for both classes of license for 1990. No deficiencies were observed. The licensee has a "Senior Review Board" composed of senior staff who perform annual reviews of the regualification program. This is a good practice.

6.0 Reactor Safeguards Committee

The requirements for the Reactor Safeguards Committee are described in TS 7.5.2. The inspector reviewed the composition and qualifications of the Committee and the transactions as recorded in the minutes of meeting for 1989 and 1990. The 18-member Committee meets annually, usually in December, to act on recommendations from its ad hoc subcommittees and to assign new tasks for the coming year. The Superintendent stated that the full committee may meet more frequently due to an increased workload such as the reviews of the boron capture therapy project. Within the scope of this review, the inspector determined that the Committee was providing the oversight required by the Technical Specifications.

7.0 Equipment Surveillances

The licensee's program for the conduct of surveillance on safety-related equipment was reviewed with respect to requirements in TS 4.0. The licensee does not have individual procedures or data forms for each required surveillance. For example, the monthly surveillance on the siphon breakers and natural circulation valves are done as part of the precritical checks prior to reactor startup. Those surveillances that are not incorporated in a routine checklist are individually scheduled in the reactor operations plan (activities schedule). To ensure that all

surveillances are done, the licensee completed the precritical checklist even on days when the reactor remains shutdown. Although no deficiencies were observed, the inspector stated a concern that since some surveillances were 'buried' in various procedures, a procedural change could unknowingly eliminate a required surveillance. The licensee responded that the Quality Assurance Supervisor reviews all procedure changes to ensure that this does not happen. The inspector had no further questions.

8.0 Exit Interview

The inspector met with the licensee representatives indicated in Section 1.0 on October 2, 1991 and summarized the scope and findings of this inspection.