

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-199/94-01
Docket No. 50-199
License No. R-94
Licensee: Manhattan College Corporation
Mechanical Engineering Department
Riverdale, New York 10471
Facility Name: Zero Power Reactor
Inspection At: Riverdale, New York
Inspection Conducted: April 12-15, 1994

Inspector: *Stephen W. Holmes* 13 MAY 94
Stephen Holmes, Radiation Specialist, Effluents date

Approved By: *James V. Payne* May 15, 1994
Acting Chief date
Effluents Radiation Protection Section

Areas Inspected: The areas examined included status of previously identified items; reactor staffing; reactor logs; operating procedures; operator requalification program; surveillances; control of experiments; maintenance and design changes; oversight by Reactor Operations Committee; radiation worker training; radiation postings surveys; portable survey meter, counting lab, and radiation monitoring instruments; personnel dosimetry; emergency planning; procedures and policy; and new 10 CFR 20 implementation.

Results: Staff was well qualified and, with new instrumentation, Technical Specification surveys were now performed in-house. The previous commitment to submit an accelerated requalification plan, commensurate with the facility, to the NRC for approval prior to reloading the core and bringing the reactor to power was reconfirmed. All requirements of the new 10 CFR 20 audited by the inspector were being complied with. Revision of written procedures and documentation to implement the new 10CFR20 requirements was still underway. The reactor administrator and supervisor committed to complete the revisions and to forward to NRC Region I a copy of the final updated manual prior to reloading the core and commencing power operations.

DETAILS

1.0 Persons Contacted

- * R. Berlin, Senior Reactor Operator
 - * W. Duggan, Reactor Administrator
 - L. Luckett, CHP
 - J. Mernin, Graduate Assistant
 - C. Stanton, Chief Reactor Supervisor
- * Attended the Exit meeting on 15 April 1994.

2.0 Status of Previously Identified Items

(Closed) Inspector Followup Item (93-01-01) The licensee committed to use new survey reporting forms for showing compliance with regulatory requirements for the semiannual surveys. The inspector confirmed that the new forms were being used as committed by the licensee. This item is closed.

3.0 Staffing

Technical Specification (TS) Section 6.1.3 requires a minimum staffing of a licensed reactor operator (RO) in the control room, a licensed senior reactor operator (SRO) present in the Leo Engineering Building and a Health Physicist qualified individual contactable by phone during periods when the reactor is not secured. Present staff consist of the Reactor Administrator (RA), the designated Chief Reactor Supervisor (CRS), and a professor (the former RA). The present and former RAs hold SRO licenses, and the CRS was undergoing training for an SRO license. Since the last inspection, a part time student operator had graduated and terminated his license. Due to the death of the previous contract health physicist (HP), the facility was presently assessing a Certified Health Physicist to provide HP support. The inspector interviewed the prospective facility health physicist and determined that he would meet the requirements of the TS for HP support. The operations staff as noted above satisfied TS Section 6.1.3, was qualified, and possessed the technical expertise to perform the duties required by the license. No safety concerns or violations of regulatory requirements were identified.

4.0 Reactor Logs

Reactor operating records are required by Section 6.7 of the TS. The inspector audited these records and interviewed operators. Records of power level, operating periods, experiment information, calibrations, surveillances and start-up and shut-down checks were being kept. Separate maintenance and health physics logs were also being kept. The reactor operating records and logs were being maintained as required by TS. Within the scope of this inspection, no safety concerns or violations of regulatory requirements were identified.

5.0 Operating Procedures

Written reactor operations procedures are required by Section 6.3 of the TS, and are required to be reviewed and approved by the Reactor Operations Committee (ROC). The inspector reviewed the operational procedures and interviewed staff members. Written procedures were available for those activities required by TS. A majority of the procedures were contained in the Manhattan College Zero Power Reactor Laboratory Manual (RLM) or the TS approved teaching experiments, presently being assembled to be incorporated into a separate manual. Overall, the licensee maintained acceptable written procedures. No safety concerns or violations of regulatory requirements were identified.

6.0 Operator Requalification Program

The inspector reviewed the requalification program, examined training records and examinations, and interviewed operators. A formal tracking/record system for the documentation of the individual operator's requalification was being developed. The RA stated that this would be completed before implementation of the accelerated requalification program. All operators were participating in the requalification program as required. However, as the reactor was still undergoing repair, no power operations had been performed since the last inspection. The operators were, therefore, unable to fulfil the requirement of bringing the reactor critical at least once per quarter. The RA was aware of this and reconfirmed a previous commitment to submit an accelerated requalification plan, commensurate with the facility, to the NRC for approval prior to reloading the core and bringing the reactor to power (Report No. 50-199/93-02). No safety concerns or violations of regulatory requirements were identified.

7.0 Surveillances

The inspector reviewed selected records and procedures for the conduct of surveillances required by TS Section 4.0. As a teaching reactor, many of the TS required surveillances were completed as student experiments and recorded in the laboratory log book. Others were documented in the operation and maintenance log books. The reactor has been in an extended shutdown since June 1992, awaiting the repair, cleaning, and subsequent coating of the reactor tank and components due to corrosion. When the reactor is shut down, surveillances not specifically required for safety may be deferred. Therefore only TS Section 4.7 safety surveillances have been required. The inspector verified that all of the safety surveillances had been performed as required by TS. No safety concerns or violations of regulatory requirements were identified.

8.0 Control of Experiments

The licensee's program for the control of experiments was reviewed with respect to the requirements in TS Sections 3.8 and 6.2, and the Final Safety Analysis Report (FSAR). The experiments presently being performed with the Manhattan College Zero Power Reactor were those authorized under TS Section 6.8.3.G. The experimental procedures had been consolidated into one file and were to be incorporated into an individual manual. The staff was knowledgeable of the TS limitations on experiments and the requirement for ROC approval of experiments not specifically defined in Section 3.8 of the TS. No safety concerns or violations of regulatory requirements were identified.

9.0 Maintenance and Design Changes

Section 5.0 of the RLM delineated the facility maintenance program. Additionally an individual log book was kept of maintenance activities. The inspector examined the procedures, reviewed the maintenance log book, and interviewed staff. Maintenance was being accomplished as required. No design changes had been made since the last inspection. The RA stated that, since new reactor console equipment had been procured through the DOE upgrade program, they would formulate a written design change review/implementation program to insure the equipment upgrade would be performed as required by the TS and applicable regulatory requirements. No safety concerns or violations of regulatory requirements were identified.

10.0 Oversight By Reactor Operations Committee

Since the last inspection there had been no change in the ROC's membership or meeting schedule. The ROC's meeting schedule and membership satisfy TS and the Committee's procedural rules. Due to the brief time since the last inspection, there were no new ROC minutes to review. Previous review of the ROC minutes indicated the committee was active in providing appropriate guidance, direction and oversight to the safety program and ensured suitable use of the reactor. No safety concerns or violations of regulatory requirements were identified.

11.0 Radiation Worker Training

The Manhattan College Zero Power Reactor Laboratory Manual, which implemented the reactor program, was reviewed and approved by the ROC on November 13, 1991. Together with class course work, the manual provides adequate guidance and instruction to radiation workers, i.e. students, and fulfills the requirements of an ALARA (As Low As Reasonably Achievable) program. Based on the facility's low power level and limited use, the licensee has implemented an adequate training program appropriate for the hazards present. No safety concerns or violations of regulatory requirements were identified.

12.0 Radiation Postings

General housekeeping of the facility was good. The warning signs and postings properly reflected the radiological conditions in the facility. With one exception, the reactor facility and radioactive material storage areas were secured and properly posted. Due to their recent acquisition of three fission chambers, the inspector requested that the licensee determine if counting room 107 should be posted as a radioactive material area. The RA calculated that, with the addition of these chambers, the room was now required to be posted as a radioactive material area. The entrance to the room was promptly posted. All radioactive material and storage cabinets within the room were already properly marked and labeled as required. NRC Forms 3 were conspicuously posted in appropriate areas throughout the facility. The radiological posting program was adequate. No safety concerns or violations of regulatory requirements were identified.

13.0 Surveys

The licensee is required by 10CFR20.1501 to perform such surveys as required to comply with its license and applicable regulations and ensure that these surveys are reasonable to evaluate the radiation hazards that may be present. The Manhattan College Zero Power Reactor is a light water pool-type using low-enriched uranium fuel with a maximum design power level of only 100 milliwatts. It is therefore used solely for teaching and training. The inspector reviewed the procedures and records of the semi-annual smear, radiation area, and air sampling surveys. The re-smear of a semi-annual survey, committed to during the last inspection (Report No. 50-199/93-02), had been completed. All surveys were now being performed in-house. New survey reporting forms were used for the last two surveys. Use of these forms was good. The surveys were being performed in a manner appropriate and sufficient to evaluate the radiation hazards that might exist, considering the facility's low level of hazard. No safety concerns or violations of regulatory requirements were identified.

14.0 Portable Survey Meter, Counting Lab and Radiation Monitoring Instruments

The inspector reviewed the use, stockpile, and calibration of the portable survey and counting lab equipment. Sufficient amounts and appropriate types of portable survey equipment were available. Counting lab equipment consisted of portable survey equipment with pulse height analysis and digital counting capabilities. Calibrations were performed off-site by a certified vendor using National Institute of Standards and Technology (NIST)-traceable radiation sources and American National Standards Institute (ANSI) or manufacturer accepted techniques. All instruments checked were in calibration. Calibration of the area radiation monitors was not required due to the fact that the reactor has been shut down. Calibration records were in order. No safety concerns or violations of regulatory requirements were identified.

15.0 Personnel Dosimetry

Although not required by 10 CFR 20.1502 to monitor individuals' occupational exposure, the licensee administratively requires monitoring for individuals working with radioactive materials. The licensee uses a NVLAP-accredited vendor to process personnel thermoluminescent dosimetry. A review of records indicated that all exposures were within NRC limits with most showing no exposure above background. These results were consistent with the facility's normal low radiation exposure levels. The dosimetry results were reviewed by the RA and reported to the ROC. The review includes action levels for investigation of elevated exposure and procedures for requesting previous exposures and responding to such requests. No safety concerns or violations of regulatory requirements were identified.

16.0 Emergency Planning

The inspector reviewed elements of the licensee's emergency preparedness program that were required by the NRC-approved Emergency Plan (EP). The plan is being updated periodically as indicated by current updated call and hospital response rosters. Police and fire department personnel toured the reactor facility in conjunction with inspections/tours of other on-campus radiological areas. The reactor facility and emergency equipment were as described in the plan. Interviews with the RA and CRS showed that they were knowledgeable of the emergency plan and could properly implement the plan. Due to the facility's low power level, no annual drills were required. Within the scope of this review, no safety concerns or violations of regulatory requirements were identified.

17.0 Procedures and Policy

The Manhattan reactor is used as a training and teaching device for students. Also, with occasional exceptions, the licensed operators are the professors who teach the courses involving the reactor. The Reactor Laboratory Manual, therefore, has to serve two functions. It first combines in an instructional/teaching format the procedures, training, maintenance, oversight, and most other requirements mandated by the TS, license, and applicable regulations. Second, it goes into detail and covers subjects outside the regulatory requirements to provide the information needed for use as a class/course manual. The manual is continually updated and, during the inspection, was being revised to include the definitions, numbers, and requirements of the new 10 CFR 20 before being used for upcoming classes. Although summarized in the RLM, the EP is contained in a separate document; as is the Operator Requalification Program. The inspector determined, based on the type and use of the reactor and the small highly trained professional staff, that the licensee's use of procedures and policies was adequate. No safety concerns or violations of regulatory requirements were identified.

18.0 New 10 CFR 20 Implementation

In general, the actual implementation of the new 10 CFR 20 requirements had not been difficult for the facility to implement. Dosimetry, surveys, postings, calibrations, and training continued to be performed as previously. Personnel exposures, and area radiation levels at the facility were extremely low or consistent with background. No internal exposures or planned special exposures would normally occur. The new public and fetal exposure limits were already being complied with. All requirements of the new 10 CFR 20 audited by the inspector were being complied with by the facility staff. The actual impact was on written procedure and program guidance documentation. The inspector identified some oversights with written procedure changes in implementing requirements of the new 10 CFR 20. The items were minor and of the type expected during such a conversion of written procedures and policy documents (i.e, using MPC limits, inadvertently referencing an old 10 CFR 20 table, etc). This updating with the new definitions, numbers, and other requirements was still underway. Both the RA and CRS committed to completing the revisions to the RLM and other documents and to forwarding to NRC Region I a copy of the final updated RLM prior to reloading fuel into the reactor and commencing power operations. No safety concerns or violations of regulatory requirements were identified.

19.0 Exit Interview

The inspector met with the licensee representatives listed in Section 1.0 of this report on April 1, 1994, and discussed the scope and findings of this inspection. The licensee acknowledged the inspection findings and commitments.