

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-225/94-01

Docket No. 50-225

License No. CX-22

Licensee: Rensselaer Polytechnic Institute
Department of Nuclear Engineering and Engineering Physics
Troy, New York 12180-3590

Facility: L. David Walthousen Critical Experiments Facility

Inspection at: Schenectady, New York and Troy, New York

Inspection Conducted: May 23-27, 1994

Inspector:

Stephen W. Holmes
Stephen W. Holmes, Radiation Specialist,
Effluents Radiation Protection
Section (ERPS), Facilities Radiological
Safety and Safeguards Branch (FRSSB)

July 8, 94
Date

Approved By:

Jason C. Jang
Jason C. Jang, Chief, ERPS, FRSSB,
Division of Radiation Safety and
Safeguards

7/18/94
Date

Areas Inspected: Areas examined included staffing, procedures and policy, revised 10 CFR 20 implementation, reactor logs, operating procedures, operator requalification program, surveillances, maintenance and design changes, reactor oversight, radiation worker training, radiation postings, surveys, portable survey meter, laboratory measurement and radiation monitoring instruments, personnel dosimetry, effluent releases, and radiation safety oversight.

Results: Commitments were made for additional actions to ensure that all requirements of the revised 10 CFR 20 were fulfilled. Weaknesses regarding staffing of the radiation safety and reactor operations organizations were discussed with the licensee and the licensee was requested to initiate an evaluation of the adequacy of the proposed radiation safety staffing. The licensee reconfirmed their commitment to ensure that adequate numbers of licensed operators would be available as required by the Technical Specifications. No current safety concerns or violation of regulatory requirements were identified, but one unresolved item was identified in Section 7.3 of the inspection report.

Details

1.0 Individuals Contacted

*R. Block, Associate Dean of Engineering
*S. Bucher, former Reactor Critical Facility Supervisor
*M. Galayda, Reactor Critical Facility Supervisor
*D. Harris, Director, Reactor Critical Facility
*J. Lawler, Vice President of Finance
F. Mastrianni, Assistant Director, Office of Radiation and Nuclear Safety
*I. Preiss, Chair, Radiation and Nuclear Safety Committee
*B. Podowski, Head, Department of Nuclear Engineering and Engineering Physics
*R. Ryan, Director, Office of Radiation and Nuclear Safety
J. Westhead, LINAC Supervisor

*Attended the Exit Interview on May 27, 1994

2.0 Status of Previously Identified Items

2.1 (Closed) Inspector Followup Item (93-02-02) The licensee was unaware that there was a formal NRC-Approved Requalification Program for reactor operators at the facility. They committed to acquiring a copy of the plan and formally implementing it. The inspector verified that the licensee had obtained a copy of the NRC-approved program and fully implemented and documented it as required. This item is closed.

2.2 (Open) Inspector Followup Item (93-02-01) Reactor staffing was at the minimum required by Technical Specifications (TS) for operations with an anticipated loss in the near future. The Reactor Director committed to ensure that two operators would be available as required by TS 6.1.3 for any reactor operations. Reactor staff was still at the minimum with an anticipated short term loss (See Section 3.1 of this inspection report for details). This item remains open.

2.3 (Open) Inspector Followup Item (92-01-01) The licensee had no calibration procedure for the continuous air monitor (CAM) required by TS 3.3(c) to monitor airborne activity during reactor operation. The licensee stated that an appropriate calibration procedure would be developed. The inspector found that although the CAM was being calibrated, a formal written procedure was not in place at the time of the inspection. This matter remains open.

2.4 (Closed) Inspector Followup Item (91-02-01) A roof leak, noted during inspection, could introduce corrosive chemicals into the open reactor tank or cause minor reactivity changes by changing the water level during an experiment. The Maintenance Supervisor stated that additional inspection and repair of the roof would be done. The inspector confirmed that the inspection and repair had been performed and that there was no evidence of a recurrence of the leak. This item is closed.

3.0 Staffing

3.1 Reactor Critical Facility

There had been no structural change in the organization since the last inspection. However as previously discussed (see reports 50-225/90-03 and 93-02), the TS require the availability of two operators as a minimum for reactor operations. Recently two graduate students took an NRC Senior Reactor Operator (SRO) licensing exam for the facility, with one, the new Critical Facility Supervisor (CFS), passing. Combined with the loss of the former CFS, this left the Reactor Critical Facility (RCF) with two licensed SRO's: the new CFS and a consultant. Additionally, the consultant, who had also been serving as a licensed SRO, reconfirmed his intention to resign as of July 1, 1994. Upon the loss of either of these remaining SRO's, RCF operations and training classes utilizing the reactor will not be able to be performed. The RCF Director stated that, after coordination with the NRC Licensing Exam Section, the trainee who failed the written portion of the exam would be able to retake that part of the exam at NRC Region I. If he passed, this would provide the second licensed staff required for operations. Alternately, the former CFS could be brought back on a consulting basis as needed to provide the second operator. The inspector stated that this would be acceptable as long as he continued to participate in the operator requalification program. The RCF Director stated that two operators would be available as required by TS 6.1.3 for any reactor operations. This will continue to be reviewed in a future inspection (IFI 93-02-01). No current safety concern or violations of regulatory requirements were identified.

3.2 Radiation Safety

TS Section 6.1.1 requires a health physicist who is organizationally independent of the RCF staff to provide advice, with interdiction responsibility and authority, to the CFS. The 1983 facility Safety Analysis Report (SAR) and Safety Evaluation Report for the renewal of the operating license delineates a staff of two health physicists, two students, and secretarial support. The Office of Radiation and Nuclear Safety (ORNS), which also supported the state byproduct licenses on campus, consisted of two health physicists (HP), one to three students, and administrative support. Both HPs had been on staff for over thirty years and provided excellent support and guidance to the RCF. However, both HPs had accepted early retirement offered by Rensselaer and would be departing by the end of June 1994. The Chairman of Radiation and Nuclear Safety Committee (RNSC) stated that the outgoing Director of ORNS who was also the Radiation Safety Officer (RSO), had accepted an offer to provide HP and RSO services as a consultant two days a week until his replacement was hired. Two qualified members of the RNSC had committed one full day a week each to radiation safety support to the campus and RCF. The inspector determined that these measures would provide adequate coverage

for the near term and that there were no immediate safety concerns. However, the Vice President of Finance, within whose purview the radiation safety program lies, stated that under this retirement program only one of the two vacated positions would be filled. The inspector stated that, since this would be less staff than had been committed to by the licensee to the NRC for licensing renewal, the licensee would be requested to evaluate the adequacy of the proposed staffing and report the results and any actions taken or to be taken to improve staffing, or provide justification to show that the proposed staffing is adequate to provide support to the RCF and the campus. This will be reviewed in a future inspection (IFI 94-01-01). No current safety concern or violations of regulatory requirements were identified.

4.0 Procedures and Policy

As noted in Section 7 of this report, the Radiation Safety Program and staff cover both the RCF and the campus. This has been a standard practice for a majority of institutions with research reactors, including those in Agreement States, where radioactive material use on campus is under state jurisdiction. Normally this has posed no problem. However, revision of the State of New York regulation on ionizing radiation implementing the revised 10 CFR 20 requirements was delayed and was not received by the licensee until the late March - early April 1994 time frame. Since then ORNS and RNSC had been updating the Radiation Safety Regulation and Procedures (RSRP) manual and other procedures implementing the formal radiation safety program and other criteria required by the revised 10 CFR 20. Although the update had not been completed at the time of this inspection, all provision of the revised regulations were being complied with. The Director of ORNS and the Chairman of RNSC committed to continue to update this and other relevant procedures on a continuing basis and to forward to NRC Region I a copy of the final revision of the RSRP manual when completed. This manual and appropriate written procedures fulfilled the requirement for formal documented radiation safety and ALARA programs. 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.

As a program enhancement, the departing Director of ORNS committed to providing written guidance on the radiation safety program at the RCF and Rensselaer campus to the incoming Director. No safety concerns or violations of regulatory requirements were identified.

5.0 Revised 10 CFR 20 Implementation

In general, the implementation of the revised 10 CFR 20 requirements had not been functionally difficult for the facility to implement. Dosimetry, surveys, postings, calibrations, and training continued to be performed as normal. Personnel exposures, effluent releases, 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. The actual impact had been on written procedures and program guidance. As mentioned in Section 4 of this report, the RSRP manual was being updated to comply with the new regulatory requirements. The licensee had been performing ongoing reviews of the procedures to insure they adequately implemented the revised 10 CFR 20 requirements. No safety concerns or violations of regulatory requirements were identified.

6.0 Reactor Critical Facility

6.1 Reactor Logs

Operating records are required by Section 6.6 of the RCF TS. The inspector audited these records and interviewed operations, maintenance, and health physics staff. Records of power level, operating periods, experiment information, calibrations, surveillances, surveys, and start-up and shut-down checks were being kept. Due to the frequent turnover of CFS, the records were scattered and difficult to locate. Nevertheless, the inspector was able to audit these records during the inspection. The new CFS stated that, over the summer, the files would be consolidated and appropriately filed. Overall, the reactor operating records and logs were being maintained as required by TS. No safety concerns or violations of regulatory requirements were identified.

6.2 Operating Procedures

Written operations procedures are required by Section 6.5.1 of the RCF TS, and are required to be reviewed and approved by the Nuclear Safety Review Board (NSRB) prior to implementation of new or revised procedures. The inspector reviewed the procedures and interviewed staff members. Written procedures were available for those activities required by TS. They had been reviewed and approved by the NSRB, as required. The procedures reviewed by the inspector were functional. The licensee maintained acceptable written procedures. No safety concerns or violations of regulatory requirements were identified.

6.3 Operator Requalification Program

The inspector reviewed the operator requalification program, examined training records and examinations, and interviewed operators. The licensee had obtained a copy of the NRC-approved program and fully implemented and documented it as required. All operators were participating in the requalification program as required. No safety concerns or violations of regulatory requirements were identified.

6.4 Surveillances

The inspector reviewed selected records and procedures for the conduct of surveillances required by TS Section 4.0. The inspector verified that, since the last inspection, the surveillances had been performed as required by TS and in accordance with licensee procedures. No safety concerns or violations of regulatory requirements were identified.

6.5 Maintenance and Design Changes

The inspector examined maintenance and design change records. No design changes had been made since the last inspection. Procedures and documentation logs for both changes and maintenance were adequate. Changes were reviewed by the facility director or, if of safety significance, referred to the NSRB. No safety concerns or violations of regulatory requirements were identified.

6.6 Reactor Oversight

TS Section 6.1.5 delineates the requirement for the NSRB and its duties. The inspector reviewed the board minutes since the last inspection. Meetings were held semiannually, consisted of at least a quorum, and minutes were kept as required by TS. The NSRB had reviewed and approved procedures, TS changes, and new experiments, and performed its audit function as required. No safety concerns or violations of regulatory requirements were identified.

7.0 Radiation Safety

7.1 Radiation Worker Training

Radiation worker training was reviewed with respect to requirements specified in 10 CFR 19. Training was provided annually to graduate students, public safety personnel, and the operations staff. Training consisted of lectures and video tape presentations. Additionally, undergraduate nuclear engineers were required to take health physics courses. No safety concerns or violations of regulatory requirements were identified.

7.2 Radiation Postings

General housekeeping of the facility was good. The warning signs and postings properly reflected the radiological conditions in the facility. The RCF and radioactive material storage areas were secured and properly posted. 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.

7.3 Surveys

Radiation surveys are required to be performed monthly by ORNS when the facility is in use and quarterly when not being run. Both smear surveys for surface contamination and area surveys for radiation levels due to beta, gamma, and neutrons were performed. Data were recorded on detailed floor map sheets. The inspector verified, with one exception, that the surveys were being performed and documented as required to evaluate the potential radiation hazards that might exist. The inspector could not determine if a survey had been performed during the third quarter of 1993 when the reactor had not operated. The Director of ORNS stated that they would attempt to locate the documentation of the survey and would ensure that, in the future, surveys would be performed at least quarterly when the reactor is not operating. This item is unresolved (URI 94-01-01) pending further efforts by the licensee to locate the required survey documentation. Airborne activity surveys were provided by the use of a CAM, as required by Technical Specification 3.3(c). Review of the chart recorder and observation of CAM operation indicated that adequate airborne surveys were being performed. The inspector noted that few HP procedures were written or formalized. Never the less, due to the knowledge and expertise of the ORNS staff, appropriate surveys were being performed. The RNSC stated that an evaluation would be made to determine if additional formalized written procedures would be required. No safety concerns or violations of regulatory requirements were identified.

7.4 Portable Survey Meter, Laboratory Measurement, and Radiation Monitoring Instruments

The inspector reviewed the use, stockpile, and calibration of the portable survey and laboratory measurement equipment. Sufficient amounts and appropriate types of portable survey equipment were available. Calibrations were performed on-site by RPI staff or off-site by a certified vendor using National Institute of Standards and Technology traceable radiation sources and American National Standards Institute or manufacturer accepted techniques. Laboratory measurement equipment was also used during graduate and undergraduate training in health physics course laboratories, and thus was continually being appropriately calibrated, QC'd, and maintained. The inspector interviewed the new Associate Engineer for the RCF, who was responsible for maintenance and calibration at the facility. As the present Director of the LINAC and former SRO on the reactor, he had the expertise, training, and resources to provide excellent support to the RCF.

The engineer stated that formal written procedures would be developed for calibration of equipment which did not presently have such. This will include the RCF CAM. All instruments checked were in calibration. Calibration records were in order. No safety concerns or violations of regulatory requirements were identified.

7.5 Personnel Dosimetry

ORNS maintained the dosimetry records of both the RCF and campus staffs. The licensee used a thermoluminescence dosimeter (TLD) containing lithium fluoride chips to monitor personnel exposures from beta, gamma, and neutron radiation. The TLDs were processed monthly. The inspector determined that the licensee's program used generally accepted techniques and hardware.

Exposure records were maintained on campus in a computer file and hard copy. The records were well maintained. 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 RSO review of the monthly exposures included investigation of elevated exposures. The Radiation Safety Committee reviewed all exposure records each semester and checked any anomalous reports which exhibited any exposures higher than expected.

As noted in a previous inspection (Report No. 50-225/92-01), the licensee's dosimetry system was not accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) and, since the licensee controlled exposures to less than 25% of the quarterly limits specified in 10 CFR 20, this accreditation was not required. As of January 1, 1994 the requirement changed to 10% of the annual dose specified in the revised 10 CFR 20. The inspector verified that the licensee was still controlling exposures to these new levels and thus NVLAP accreditation was not presently required. In discussion with the inspector, Director of ORNS stated that the licensee was aware of the new dose limits for the embryo/fetus and would control both occupational and embryo/fetal exposures to 10% of the annual/gestation limit or would monitor with NVLAP-certified dosimetry as required. Additionally, if any planned special exposures would be required at the RCF, the NSRB and RNSC would provide the required direction and oversight for that operation. No safety concerns or violations of regulatory requirements were identified.

7.6 Effluent Releases

Tables two and three of Appendix B, of the revised 10 CFR 20, provide the limits for release of liquid and gaseous radioactive effluents. The inspector reviewed the release records for both liquids and gases for the past two years, interviewed the staff, and toured related facility areas. All liquid effluents were collected in the RCF room sump. Samples from the sump were analyzed by the ORNS for gamma, beta and alpha emitters. Calibration factors for various isotopes were available for each liquid sample configuration. All liquid releases were within regulatory requirements, with most having no detectable activity. Due to the low power and configuration of the reactor, gaseous releases were essentially zero. The inspector noted that the licensee maintained environmental monitoring devices on the facility boundary fence. The exposures to these monitors, which were essentially background, confirmed that both gaseous releases and exposure to the public were within regulatory limits. No safety concerns or violations of regulatory requirements were identified.

7.7 Radiation Safety Oversight

The oversight and auditing of the radiation safety program by the RNSC was reviewed by discussions with the committee chairman and through the examination of minutes of meetings. Meetings were held at least twice during the Spring and Fall semesters as required to review changes to procedures, policies and facilities. An annual walk-through inspection of the RCF was conducted for compliance with the RSRP manual requirements. The inspector determined that the Committee was effective. No safety concerns or violations of regulatory requirements were identified.

8.0 Exit Interview

The inspector met with the licensee representatives listed in Section 1.0 of this report on May 27, 1994, and discussed the scope and findings of this inspection. The licensee acknowledged the inspection findings and commitments.