

February 2, 2006

Mr. S. J. LaFlamme, Director
Leslie C. Wilbur Nuclear Reactor Facility
Worcester Polytechnic Institute
100 Institute Road
Worcester, MA01609

SUBJECT: NRC INSPECTION REPORT NO. 50-134/2005-201

Dear Mr. LaFlamme:

This letter refers to the inspection conducted on December 13-15, 2005 at the Worcester Polytechnic Institute Leslie C. Wilbur Nuclear Reactor Facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concerns or noncompliance with Nuclear Regulatory Commission (NRC) requirements were identified. No response to this letter is required.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this inspection, please contact Mr. Kevin M. Witt at 301-415-4075.

Sincerely,

/RA/

Brian E. Thomas, Branch Chief
Research and Test Reactors Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-134
License No. R-61

Enclosures: NRC Inspection Report No. 50-134/2005-201

cc w/encl: Please see next page

Worcester Polytechnic Institute

Docket No. 50-134

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Leslie C. Wilbur Nuclear Reactor Facility
Worcester Polytechnic Institute
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U.S. NUCLEAR REGULATORY COMMISSION
OFFICE -OF NUCLEAR REACTOR REGULATION

Docket No: 50-134

License No: R-61

Report No: 50-134/2005-201

Licensee: Worcester Polytechnic Institute

Facility: Leslie C. Wilbur Nuclear Reactor Facility

Location: Worcester, Massachusetts

Dates: December 13 - 15, 2005

Inspector: Kevin M. Witt

Approved by: Brian E. Thomas, Branch Chief
Research and Test Reactors Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Worcester Polytechnic Institute
Leslie C. Wilbur Nuclear Reactor Facility
NRC Inspection Report No. 50-134/2005-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects and activities since the last NRC inspection of the licensee's Class II non-power reactor safety programs including: organization and staffing, operations logs and records, procedures, operator requalification, surveillance and limiting conditions for operations, experiments, radiation protection program, design changes, committees, audits and reviews, emergency preparedness, maintenance logs and records, and fuel handling.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organization and Staffing

- The organization and staffing were consistent with Technical Specification requirements.

Operations Logs and Records

- Operational activities were consistent with applicable Technical Specification and procedural requirements.

Procedures

- Procedural control and implementation program generally satisfied Technical Specification requirements.

Operator Requalification

- The Requalification Program was implemented satisfactorily, the program was up-to-date, and plan requirements were met.

Surveillance and Limiting Conditions for Operations

- The licensee's program for completing surveillance inspections and Limiting Conditions for Operation confirmations satisfied Technical Specification and licensee administrative controls.

Experiments

- The approval and control of experiments met Technical Specification and applicable regulatory requirements.

Radiation Protection Program

- Surveys were being completed and documented in an acceptable manner to permit evaluation of the radiation hazards present.

- Postings met the regulatory requirements specified in 10 CFR Parts 19 and 20.
- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels and NRC's regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- The Radiation Protection Program being implemented by the licensee satisfied regulatory requirements.
- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and Technical Specification limits.

Design Changes

- Based on the records reviewed, the inspector determined that the licensee's design change program was being implemented as required.

Committees, Audits and Reviews

- Review and oversight functions required by the Technical Specifications were acceptably completed by the Radiation, Health, and Safeguards Committee.

Emergency Preparedness

- The emergency preparedness program was conducted in accordance with the requirements stipulated in the Emergency Plan.

Maintenance Logs and Records

- Maintenance logs, records, and performance satisfied Technical Specification and procedure requirements.

Fuel Handling

- Fuel handling and inspection activities were completed and documented as required by Technical Specification and facility procedures.

REPORT DETAILS

Summary of Plant Status

The licensee's research reactor, licensed to operate at a maximum steady-state thermal power of ten kilowatts (10 kW), continues to be operated in support of operator training, surveillance, and minor utilization. During the inspection, the reactor was operated on Wednesday at 10 kW for a demonstration of reactor operations. The licensee indicated that transportation of radioactive materials has not been conducted since the previous inspection.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure (IP) 69001)

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Chapter 5 of the Technical Specifications (TS), Amendment No. 10, dated September 1988, were being met:

- Worcester Polytechnic Institute (WPI) organizational structure and staffing
- management responsibilities and staff qualifications
- staffing requirements for the safe operation of the facility

b. Observations and Findings

The WPI Leslie C. Wilbur Nuclear Reactor Facility (LCWNRF) organizational structure and the responsibilities of the reactor management and staff had not changed since the last inspection (see NRC Inspection Report No. 50-134/2004-201). Current licensed staff consisted of the facility director and three other facility staff members. The director of the facility and two of the staff members are qualified Senior Reactor Operators (SROs) and the other staff member is a qualified Reactor Operator (RO). Two of the operators are currently enrolled at WPI as full-time students. One of the SRO's is the campus Assistant Radiation Safety Officer (ARSO) who performs operator duties in addition to the other functions that the ARSO position requires. The inspector observed that the facility staffing situation is tenuous with low man-power levels. The inspector has not observed any safety issues associated with the staffing problems, but there is the possibility of the current staff being over utilized resulting in potential safety issues. The NRC will continue to monitor the situation at the LCWNRF in order to evaluate whether further regulatory oversight is necessary.

The reactor operations staff's qualifications satisfied the training and experience requirements stipulated in the TS. The operations log and associated records confirmed that shift staffing met the minimum requirements for duty personnel. Review of records verified that management responsibilities were administered as required by TS and applicable procedures.

c. Conclusions

The organization and staffing were consistent with TS requirements.

2. Operation Logs and Records

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that selected records were maintained as required by TS Sections 5.6 and 5.8:

- Licensee Annual Reports, dated March 29, 2004 and March 29, 2005
- WPI Nuclear Reactor Facility Log Book XII and XIII for the period January 20, 2004 - present
- WPI Open Pool Training Reactor Pre-Critical Checklists for 2004 - present
- WPI Open Pool Training Reactor Shutdown Checklists for 2004 - present
- C Procedure OP-01, "Check-out and Operation", Revision 3, dated October 2001

b. Observations and Findings

Reactor operations were carried out following written procedures and TS requirements. The inspector verified that reactor operating characteristics, and other TS and procedure required entries, were logged in the operating log and cross-referenced with other logs and checklists as required. A review of the logs and records indicated that TS operational limits had not been exceeded. The inspector verified that annual reports contained the data required to be recorded by the TS. Operations records confirmed that shift staffing met the minimum requirements for duty personnel. The inspector determined that reactor operations were carried out following written procedures.

Scrams that occurred during reactor operations were recorded in the back of the reactor operations log. Scrams that occurred during the inspection period did not indicate problems with the reactor safety systems and were typically caused by operator/trainee error. All scrams were resolved before the resumption of operations under the authorization of the LCWNRF director.

The inspector conducted observations of the reactor staff operating the reactor on December 14, 2005, and reviewed the Preliminary Checklist, Control Room Data Sheet and Operation Record forms. The inspector noted that the licensed operators on duty were knowledgeable and competent. Observation of operational activities also confirmed that reactor operations were carried out in accordance with written procedures and TS requirements.

c. Conclusions

Operational activities were consistent with applicable Technical Specification and procedural requirements.

3. Procedures

a. Inspection Scope (IP 69001)

The inspector audited the following to ensure that the requirements of TS Section 5.5 were being met concerning written procedures:

- C administrative controls
- C procedural implementation

b. Observations and Findings

The inspector determined that written procedures were available for the activities delineated in TS Section 5.5 and were generally approved by the Radiation, Health, and Safeguards Committee (RHSC) before they were implemented. The clarity and detail in the procedures was acceptable. Temporary changes to the procedures can be authorized by two staff members and must be subsequently reviewed by the RHSC. LCWNR staff members conducted TS activities in accordance with applicable procedures. No permanent nor temporary changes have been made to the procedures since the previous inspection.

The inspector reviewed several procedures that are used at the facility and determined that one of the Health Physics (HP) procedures is out of date. HP Procedure 20, "RSO Reactor Facility Inspection" Revision 1, dated October 1993, specifies that the Radiation Safety Officer (RSO) facility inspections shall occur on a weekly basis. The licensee believes that this procedure has been changed such that the inspections are required to be completed on a monthly basis, which is what the licensee currently practices. The inspector reviewed the procedure records and found that the licensee was using a procedure dated October 1996, but could not find the RHSC approval that was associated with that form. The online version of this procedure was dated October 1993, and the licensee could show that the RHSC approved that version of the procedure. The inspector communicated to the licensee that the RHSC needs to review and approve all of the procedures currently being used at the facility. The licensee agreed to work with the RHSC in updating this procedure in addition to others that needed to be updated. This issue will be considered by the NRC as an Inspector Follow-up Item (IFI) and will be reviewed during the next inspection at the facility (IFI 50-134/2005-201-01).

c. Conclusions

Procedural control and implementation generally satisfied Technical Specification requirements.

4. Operator Requalification

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements in 10 CFR Part 55:

- status of operator licenses
- operator active duty confirmation
- operator training and examination records
- operator physical examination records
- Appendix F to License No. R-61 Requalification Program for the WPI Reactor, dated September 1990
- WPI Open Pool Training Reactor Shutdown Checklists for 2004 - present

b. Observations and Findings

The licensee's requalification program is described in the program submitted to the NRC. There are currently three SROs and one RO employed at the facility. The inspector verified that all of the operators' licenses were current. While reviewing the license conditions of each operator, the inspector noted that the licensee had requested permission from the RHSC to deviate from the operating hours requirement in the requalification program for the second quarter of 2004 and the third quarter of 2005. The facility director noted that an electronics component failure had prevented the reactor from operating and several operators were unable to perform at least four hours of licensed activities. The licensee's requalification program states that the RHSC may excuse licensed operators from meeting this requirement. The inspector confirmed that the situation was valid and that there was no reasonable method for each operator to conduct licensed activities for four hours. The facility director ensured that all operators were maintaining their proficiency while the reactor was inoperable.

Records showed that operators were given written examinations biennially and annual operations tests as required. The inspector verified that physical examinations of the operators were conducted biennially as required. The inspector also verified that the operators were reviewing the contents of all abnormal and emergency procedures on an annual basis. The number of operating hours were tallied on the shutdown checklists to ensure that all operators met the required minimum number of hours operating the reactor. The inspector confirmed that the requalification program was being administered in a manner that sufficiently maintains the effectiveness of all licensed operators.

c. Conclusions

The Requalification Program was implemented satisfactorily, the program was up-to-date, and plan requirements were met.

5. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the surveillance requirements and limiting conditions for operations (LCO) specified in TS Sections 2.0 and 3.0 were met:

- surveillance, calibration, and test data sheets and records
- C Console Log, dated January 23, 2002 to March 2, 2004
- C Maintenance log, dated January 23, 2002 to March 2, 2004
- C RHSC records book for 2004 - present
- Procedure SP-01, "Regulating Blade Worth and Excess Reactivity Measurement", Revision 1, April 1998
- Procedure SP-02, "Power Level Calibration", Revision 1, dated April 1998
- Procedure SP-03, "Rod Drop-Time Measurement", Revision 1, dated April 1998
- Procedure SP-04, "Rod Withdrawal-Time Measurement", Revision 1, dated April 1998

- Procedure SP-05, "Minimum Shutdown Margin Measurement", Revision 1, dated April 1998
- Completed Report Form 1's, "Area Monitor and Pool Level Monitor Calibration", dated February 4, 2004 - October 27, 2005
- Completed Report Form 10's, "Annual Blade Inspection Report, Rod Drop-Time Measurement, and Rod Withdrawal Time Measurement", dated December 19, 2003 - November 15, 2005

b. Observations and Findings

The inspector noted that selected daily, quarterly, semiannual, and annual checks, tests, and/or calibrations for TS-required surveillance and LCO verifications were completed as required. The LCO verifications were completed on schedule and in accordance with licensee procedures. All of the recorded results were within the TS and procedurally prescribed parameters. The records and logs were noted to be complete and were being maintained as required. The licensee submitted all of the completed surveillances to the RHSC to ensure that there was effective oversight of facility operations. The checklists for each of the surveillances provided clear and concise documentation and control of reactor operational tests and surveillances.

The inspector observed the licensee completing part of the daily surveillance checklist for TS required items on December 14, 2005. All of the items on the checklist were carried out appropriately and the personnel conducting the tests did so in a safe and knowledgeable manner. The inspector verified that all of the checks conducted were in compliance with TS required values and parameters.

c. Conclusions

The licensee's program for completing surveillance inspections and Limiting Conditions for Operation confirmations satisfied TS and licensee administrative controls.

6. Experiments

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS Section 2.3:

- experimental program requirements
 - experimental administrative controls and precautions
 - WPI Nuclear Reactor Facility Log Book XII and XIII for the period January 20, 2004 - present
- C Procedure OP-02, "Routine Experiments and Samples Irradiation Procedure", Revision 0, dated April 1998

b. Observations and Findings

There has been one type of experiment conducted at the LCWNR since the previous inspection, which is the routine irradiation of various materials. The most frequently

used experimental facility is the sample irradiation position, which consists of a sample holder on a track which must be manually inserted and removed. Samples can be loaded and unloaded from the sample irradiation position while the reactor is at power. Samples that have been irradiated at the LCWNRF include foils and river sediment samples. There were no experiment authorization approvals for this experiment since the experimental facility has been used for almost 40 years. The facility director approves all samples to be irradiated in accordance with the TS limitations. No new experiments had been initiated, reviewed, or approved since the previous inspection at the facility. If any experiments were to be initiated, they would be reviewed and approved by the facility director and the RHSC. The inspector confirmed that all of the experiments conducted were in accordance with TS limits and procedural requirements.

c. Conclusions

The approval and control of experiments met TS and applicable regulatory requirements.

7. Radiation Protection Program

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Part 19 and Part 20 and TS Sections 3.3 and 5.5:

- WPI RHSC Radiation Regulations Memorandum, dated January 1994
- C Health Physics Procedure 01, "Area Monitors and Pool Level Monitor Calibration", Revision 1, dated July 1996
- C Health Physics Procedure 03, "Survey Instrument Calibration", Revision 4, dated July 1996
- C Health Physics Procedure 04, "Campus Wipe Test", Revision 2, dated July 1996
- Health Physics Procedure 06, "Activities and Releases", Revision 2, dated July 1996
- Health Physics Procedure 07, "Pool Water and Hold-up Tank Water Analysis", Revision 1, dated July 1996
- Health Physics Procedure 08, "RSO Quarterly Report", Revision 1, dated July 1996
- Health Physics Procedure 10, "Radiation Surveys", Revision 1, dated July 1996
- Health Physics Procedure 17, "Personnel and Area Monitoring", Revision 0, dated October 1993
- Health Physics Procedure 20, "RSO Reactor Facility Inspection", Revision 1, dated October 1996
- Personnel dosimetry results for 2004 and 2005
- WPI Internal Audit (For the Radiation Protection Program) for 2004 and 2003, dated April 20, 2005 and January 26, 2004

b. Observations and Findings

The RSO and the ARSO applies the radiation protection program uniformly to the two licensed activities on campus (broad scope and the reactor). The licensee's program

for radiological health and safety related to the reactor license was evaluated during this inspection.

(1) Surveys

The inspector reviewed semiannual radiation and contamination surveys of the licensee's controlled areas as well as radiation wipe surveys completed by the ARSO. The surveys had been completed in accordance with the applicable procedure. The results were documented on the appropriate forms, evaluated as required, and corrective actions taken when readings or results exceeded set action levels. One instance of elevated contamination readings on the reactor bridge was discovered during the inspection period, and the contamination was promptly mitigated by the ARSO. The survey also included a checklist of items to be verified such as the adequacy of warning signs and postings in the area. The number and location of survey points was adequate to characterize the radiological conditions. Surveys by the ARSO were conducted in accordance with the appropriate procedure and logged on the appropriate forms. These surveys were generally completed twice a year and reviewed on a semiannual basis by the RHSC.

Primary coolant water samples are evaluated for radioactivity and pH levels semiannually as required by the TSs. Monitoring of the reactor water did not indicate abnormal readings. The samples that were taken indicate that the reactor integrity has not been compromised and shows no trend of breakdown, release, or degradation.

(2) Postings and Notices

The inspector reviewed the postings at the entrances to various controlled areas including the Reactor Bay, and radioactive material storage areas. The postings were acceptable and indicated the radiation and contamination hazards present. The facility's radioactive material storage areas were noted to be properly posted. No unmarked radioactive material was found in the facility. A copy of current notices to workers required by 10 CFR Part 19 was posted at the entrance to the Reactor Cell as well.

(3) Dosimetry

The licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor, Landauer, to process personnel dosimetry. Through direct observation, the inspector determined that dosimetry was used in an acceptable manner by facility personnel. For visitors to the facility, an electronic dosimeter is generally issued to each individual. Records indicate that no abnormal readings were obtained.

An examination of the records for the inspection period showed that all exposures were well within NRC limits and within licensee action levels. There are currently four people at the LCWNRF that are being monitored by Optically Stimulated Luminescence Dosimeters (OSLD). Extremity monitoring, accomplished through

the use of finger rings, also showed relatively low doses to the hands of staff members. All of the personnel associated with the facility received an annual deep dose exposure less than 10 millirem (mrem) for 2004. Current exposure records for 2005 indicate no increased levels in exposures. The licensee investigates any dosimetry readings that indicate an exposure above background levels.

(4) Radiation Monitoring Equipment

The calibration of portable survey meters and friskers was typically completed by a company that specializes in calibrations while fixed radiation detectors were calibrated at the facility using a portable source. The calibration records of portable survey meters and fixed radiation detectors in use at the facility were reviewed. Calibration frequency met the requirements established in the applicable procedures while records were being maintained as required. The inspector observed that proper precautions are always used to maintain doses for calibrations as low as reasonably achievable (ALARA). The inspector observed that the electronic dosimeters have not been calibrated since the year 2000. The licensee communicated that the manufacturers guidelines specify that the initial factory calibration is valid for 10 years. The licensee has conducted a drift check to ensure operability on a biennial basis.

(5) Radiation Protection Program

The inspector verified that the radiation protection program was being reviewed annually as required. No issues related to the radiation protection program at the LCWNRF were identified in the audit of the program.

RHSC Radiation Regulations Memorandum requires that all personnel who have unescorted access to the LCWNRF (a radiation area) receive training in radiation protection, policies, procedures, requirements, and the facilities prior to entry. The facility director is responsible for conducting the training and the inspector noted that the licensee considers radiation safety to be of the highest importance. The training covered the topics required to be taught in 10 CFR Part 19 and the review of a typical examination indicated that the staff were examined on the appropriate materials.

(6) Facility Tours

The inspector toured the LCWNRF and the accompanying utilization facilities. Control of radioactive material and control of access to radiation and high radiation areas were acceptable. The postings and signs for these areas were appropriate. The inspector also determined that there were no measurable releases of gaseous or liquid radioactive material from the research reactor facility.

(7) Environmental Monitoring

The licensee ensures compliance with NRC regulations for environmental monitoring by ensuring that all doses inside of the facility are less than the applicable limits at the site boundary. Several OSLDs have recently been placed in strategic locations around the reactor facility and radiation dose measurements are monitored while the reactor is operating. Records show that projected annual doses from the reactor are generally minimal. Liquid releases from the facility are generally minimal and a review of measurements indicates that there was no measurable amount of radiation in the water released to the sanitary sewers. Radiation surveys of the reactor facility show that doses within the site boundary are less than the regulatory limit for environmental exposure rates.

All gaseous releases from the facility are shown to be less than the applicable limits using a conservative estimate. The inspector verified that this calculation is very conservative and the facility operates much less than what is assumed in the estimate. The licensee uses the Environmental Protection Agency computational code "COMPLY," which shows that the licensee is in compliance with 10 CFR 20.1301(a)(1).

c. Conclusions

The inspector determined that : (1) surveys were being completed and documented acceptably to permit evaluation of the radiation hazards present, (2) postings met the regulatory requirements specified in 10 CFR Parts 19 and 20, (3) personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels and NRC's regulatory limits, (4) radiation monitoring equipment was being maintained and calibrated as required, (5) the Radiation Protection Program being implemented by the licensee satisfied regulatory requirements, and (6) effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits

8. Design Changes

a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with 10 CFR 50.59, the inspector reviewed selected aspects of:

- facility design changes and records for the past two years
- facility configuration and associated records
- WPI Nuclear Reactor Facility Log Book XII and XIII for the period January 20, 2004 - present
- Maintenance Log for the period February 16, 2004 - present
- Licensee Annual Reports, dated March 29, 2004 and March 29, 2005
- Safety Evaluation Determination For Replacement of the Rod Position Display Totalizers, dated January 28, 2005

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspector determined that no significant changes had been initiated and/or completed at the facility since the last inspection. The inspector verified that administrative controls were in place that required the appropriate review and approval of all changes prior to implementation. Forms are also completed to inform operations personnel of operating information. The inspector reviewed one evaluation submitted to the RHSC seeking approval to replace the rod position display totalizers. From this review, the inspector determined that the facility design change evaluations had adequate supporting documentation and information. Post installation verification testing of the system was thorough and adequately documented.

c. Conclusions

Based on the records reviewed, the inspector determined that the licensee's design change program was being implemented as required.

9. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in TS Section 5.2 and 10 CFR 50.59 were being completed by the RHSC:

- WPI RHSC Radiation Regulations Memorandum, dated January 1994
- WPI RHSC Radiation Regulations Memorandum Appendix B, "RHSC Procedural Rules", dated April 1994
- WPI RHSC Radiation Regulations Memorandum Appendix C, "Reports and Meetings Relative to the Nuclear Reactor Facility", dated April 1994
- RHSC membership, dated June 9, 2004
- RHSC meeting minutes for meetings held February 4, April 27, July 29, and October 27, 2004, and January 28, March 8, April 21, and July 28, 2005

b. Observations and Findings

The RHSC is defined in the WPI RHSC Radiation Regulations Memorandum and the inspector verified that the committee is following all aspects of the memorandum. The RHSC membership satisfied the committee's procedural rules and the TSs. The RHSC had quarterly meetings and a quorum was always present as required. Review of the minutes indicated the RHSC provided guidance, direction and oversight, and ensured suitable use of the reactor in addition to all other use of radioactive material on campus. The minutes provided an acceptable record of RHSC review functions and of RHSC safety oversight of reactor operations. Operations audits were performed and met the TS requirements. The audits appeared to be acceptable. During review of the audits, the inspector noted that there were no minor nor significant issues discovered

c. Conclusions

Review and oversight functions required by the TSs were acceptably completed by the RHSC.

10. Emergency Preparedness

a. Scope (IP 69001)

The inspector reviewed selected aspects of:

- Emergency Preparedness Plan for the Worcester Polytechnic Institute Nuclear Reactor Facility (E-Plan), dated February 1994
- Letters of Agreement (LOA) with support agencies
- Critiques of biannual emergency drills held January 30, and July 30, 2003, January 28, and August 1, 2002, and February 7, and July 23, 2001

b. Observations and Findings

The inspector reviewed the E-Plan in use at the LCWNRF and verified that the E-Plan was being properly implemented at the facility. The inspector reviewed the emergency facilities, instrumentation, and equipment and verified that the off-site emergency response equipment was as described in the E-Plan. The inspector verified that LOA had been established with the City of Worcester Police Department and Fire Department, University of Massachusetts Medical School, and University of Massachusetts Lowell Radiation Laboratory.

Through direct observation, records review, and interviews with emergency organization personnel, the inspector determined that they were capable to respond, and knowledgeable of the proper actions to take in case of an emergency. The LCWNRF staff is responsible for responding to an emergency during all hours and making initial assessment and corrective and protective actions. The responsibility and authority for directing and coordinating emergency response activities are assigned to the facility director, acting as the emergency director. All LCWNRF staff receive annual emergency response training.

Emergency evacuation drills had been conducted semi-annually as required by the E-Plan. All drills held were simple evacuations of the Stoddard-Washburn building. Critiques were written and discussed following the drills to document any problems identified during the exercises. The licensee has conducted orientation tours for the WPI Campus Police and the Worcester Fire Department.

The inspector visited the University of Massachusetts Medical Center in Worcester, MA on December 14, 2005, and observed the supplies and equipment at this support site that would be available in case of an emergency. There appeared to be a good working relationship between the licensee and this support organization. The inspector confirmed that the hospital was well prepared to handle a variety of injuries that could happen at the LCWNRF.

c. Conclusions

The emergency preparedness program was conducted in accordance with the requirements stipulated in the Emergency Plan.

11. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

To verify that the licensee was meeting the requirements of their Preventive Maintenance Program and complying with TS Section 5, the inspector reviewed selected aspects of:

- Licensee Annual Reports, dated March 29, 2004 and March 29, 2005
- Maintenance Log for the period February 16, 2004 - present
- Email from Stephen LaFlamme to RHSC Members detailing problem with scram circuit power supplies, entitled, "Reactor Operation", dated July 15, 2004
- Procedure MP-1, "Demineralizer Regeneration", no revision, dated April 1996
- Procedure MP-2, "Procedure for Replacing Resin in Ion Exchange Column", no revision, dated November 1983
- Procedure MP-3, "Control Blade and Drive Inspection Procedure", no revision, dated October 1992
- Procedure MP-4, "U-V Sterilizer and Cartridge Filter Maintenance Procedure", no revision, dated June 1992
- Procedure MP-5, "Diatomaceous Earth (DE) Filter System Procedure", no revision, dated July 1992

b. Observations and Findings

The inspector reviewed the maintenance records related to 2004 and 2005 scheduled and unscheduled preventive and corrective maintenance activities. Routine/preventive maintenance was controlled and documented in the Maintenance Log. This review indicated that all maintenance activities were controlled and documented in the maintenance and/or operations log consistent with the requirements in 10 CFR 50.59.

All maintenance of reactor systems were reviewed by the facility director. Implementation of changes to equipment, systems, tests or experiments are generally done by the facility director. After all maintenance items are completed, system operational checks are performed to ensure the affected systems function before returning them to service. This included a statement signed by the facility director indicating that the system had been tested for operation and that the reactor was approved for operation. The inspector noted that a majority of maintenance entries were related to aging of non-safety related reactor system components.

The inspector reviewed maintenance on the Scram circuit, where the scram due to picoammeter channel 1 would not reset. The failed components were replaced with updated components, and the same components in the other channel were also replaced. Following repairs, the licensee determined that the transformer in the power supply for picoammeter channel 2 had also failed, most likely during the testing of the original failure. The power supplies for both picoammeter channels were replaced

with new power supplies. The licensee evaluated the replacement parts for the console and determined that the change in power supplies did not require prior NRC approval. The inspector reviewed the evaluation and noted that the licensee assessed the situation in accordance with 10 CFR 50.59.

During a facility tour, the inspector noted that Control Room and Reactor Room equipment was operational. No missing or malfunctioning equipment was noted. Equipment, and the facility in generally, appeared to be well maintained.

c. Conclusions

Maintenance logs, records, and performance satisfied TS and procedure requirements.

12. Fuel Handling

a. Inspection Scope (IP 69001)

To verify that TS and procedural requirements were being met, the inspector reviewed selected aspects of:

- WPI Nuclear Reactor Facility Log Book XII and XIII for the period January 20, 2004 - present
- Fuel Logbook
- fuel handling equipment and instrumentation
- fuel movement and inspection records
- C Procedure OP-03, "Fuel Unloading Procedure", Revision 2, dated July 2001
- C Procedure OP-04, "Standard Core Configuration Reload" with "Fuel Loading Sequence Guide", Revision 2, dated July 2001
- Procedure SP-01, "Regulating Blade Worth and Excess Reactivity Measurement", Revision 1, April 1998
- Completed Annual Control Blade and Drive Inventory Forms, dated September 14, 2005 and September 13, 2004

b. Observations and Findings

The inspector determined that the licensee was maintaining the required records of the various fuel movements that had been completed and verified that the movements were conducted and recorded in compliance with procedure. All fuel movements were noted in the operation log book and generally included removal of all fuel elements from the core annually for the control blade inspections. All of the fuel in the core was last removed for the control blade inspection on September 14, 2005. Inspections of the control blades showed consistency with accepted values and did not indicate any deterioration of cladding. Log entries in the operations logs clearly identified, as required by procedure, that a minimum of two persons were present when fuel was being moved. The inspector determined that the procedures and the controls specified for these operations were acceptable.

c. Conclusions

Fuel handling and inspection activities were completed and documented as required by TS and facility procedures.

13. Exit Meeting

The inspector presented the inspection results to licensee management at the conclusion of the inspection on December 15, 2005. The licensee acknowledged the findings presented.

PARTIAL LIST OF PERSONS CONTACTED

S. Abdollahzadeh, Radiation Safety Officer, University of Massachusetts Medical School
D. Adams, Radiation Safety Officer
S. LaFlamme, Director, Nuclear Reactor Facility
D. Messier, Chairman, Radiation, Health, and Safeguards Committee
M. Restuccia, Director, Emergency Medical Services, UMass Memorial Medical Center
C. Smith, Reactor Operator
R. Steele, Assistant Radiation Safety Officer
S. Thomas, Senior Reactor Operator

INSPECTION PROCEDURES USED

IP 69001 CLASS II NON-POWER REACTORS

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-134/2005-201-01 IFI	Follow-up to verify that the licensee receives RHSC approval for the current version of the Health Physics procedures that are being used.
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Closed

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Document Access and Management System
ALARA	As Low As Reasonably Achievable
ARSO	Assistant Radiation Safety Officer
CFR	Code of Federal Regulations
E-Plan	Emergency Preparedness Plan
HP	Health Physics
IFI	Inspector Follow-up Item
IP	Inspection Procedure
kW	kilowatts
LCO	Limiting Conditions for Operations
LCWNR	Leslie C. Wilbur Nuclear Reactor Facility
LOA	Letter of Agreement
NRC	Nuclear Regulatory Commission
OSLD	Optically Stimulated Luminescence Dosimeter
PARS	Publicly Available Records
RHSC	Radiation, Health, and Safeguards Committee
RSO	Radiation Safety Officer
RO	Reactor Operator
SRO	Senior Reactor Operator
TS	Technical Specifications
WPI	Worcester Polytechnic Institute