

July 14, 2009

Mr. R. J. Agasie, Reactor Director
Nuclear Reactor Laboratory
University of Wisconsin – Madison
1513 University Avenue, Room 1215
Madison, WI 53706-1687

SUBJECT: UNIVERSITY OF WISCONSIN – NRC ROUTINE INSPECTION REPORT NO.
50-156/2009-201

Dear Mr. Agasie:

On June 22-25, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at your University of Wisconsin Nuclear Reactor Laboratory (Inspection Report No. 50-156/2009-201). The enclosed report documents the inspection results, which were discussed on June 25, 2009, with you and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, and requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Craig Bassett at (404) 358-6515 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/

Johnny H. Eads, Jr., Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-156
License No. R-74

Enclosure: NRC Inspection Report No. 50-156/2009-201

cc w/encl: Please see next page

University of Wisconsin

Docket No. 50-156

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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

Docket No: 50-156

License No: R-74

Report No: 50-156/2009-201

Licensee: University of Wisconsin

Facility: Nuclear Reactor Laboratory

Location: Madison, WI

Dates: June 22-25, 2009

Inspector: Craig Bassett

Approved by: Johnny H. Eads, Jr., Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Wisconsin
Nuclear Reactor Laboratory
Report No. 50-156/2009-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the University of Wisconsin (the licensee's) Class II research and test reactor safety program including: 1) organization and staffing, 2) review and audit and design change functions, 3) reactor operations, 4) operator requalification, 5) procedures, 6) fuel handling, 7) maintenance and surveillance, 8) experiments, and 9) emergency preparedness since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's program was acceptably directed toward the protection of public health and safety and in compliance with NRC requirements. No violations or deviations were identified.

Organizational Structure and Staffing

- The organizational structure and responsibilities were consistent with Technical Specifications requirements.
- Shift staffing met the requirements for duty, relief, and on-call personnel.

Review and Audit and Design Change Functions

- The review and audit functions required by Technical Specifications Section 6.2 were being acceptably completed by the Reactor Safety Committee.
- The 50.59 design change process at the facility was being followed as required and no recent changes required NRC approval.

Reactor Operations

- Reactor operations were conducted in accordance with Technical Specifications requirements and applicable procedures.

Operator Licenses, Requalification, and Medical Activities

- The operator requalification/training program was up-to-date and acceptably maintained.
- Medical examinations for facility operators were being completed biennially as required.

Procedures and Procedural Control

- Facility procedural review, revision, and control satisfied the requirements specified in Section 6.5 of the Technical Specifications.
- Procedural compliance was acceptable.

Fuel Handling

- Reactor fuel movements and inspections were completed and documented in accordance with procedure.
- The fuel was being inspected as specified by Technical Specifications Section 4.3 and the core was arranged as required in Technical Specifications Section 5.2.

Maintenance and Surveillance

- Maintenance logs and records were being kept and maintenance activities were being conducted in accordance with procedural requirements.
- The program for tracking and completing surveillance checks and Limiting Conditions for Operation verifications satisfied Technical Specifications requirements and licensee administrative and procedural controls.

Experiments

- Conduct and control of experiments and irradiations met the requirements specified in Technical Specifications Section 6.8, the applicable experiment and irradiation authorizations, and associated procedures.

Emergency Preparedness

- The Emergency Plan and Implementing Procedures were being reviewed annually as required and updated as needed.
- Emergency response facilities and equipment were being maintained as required.
- Emergency responders were knowledgeable of proper actions to take in case of an emergency.
- Off-site support was available and acceptable.
- Semiannual drills were being conducted as required by the Emergency Plan.
- Emergency preparedness training for staff personnel was being completed as required.

REPORT DETAILS

Summary of Plant Status

The University of Wisconsin (the licensee) one megawatt (1 MW) TRIGA conversion research and test reactor continued normal, routine operations. The reactor was operated as needed, typically two days per week, in support of laboratory experiments, reactor system testing, reactor maintenance and surveillance, and operator training. During this inspection, the reactor was operated on two separate days at various power levels up to 1 MW for physics experiments and to support research and training.

1. Organization and Staffing

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

To verify that the organization and staffing requirements specified in Section 6.1 of the facility Technical Specifications (TS), as implemented by License Amendment Number (No.) 16, dated August 30, 2006, and associated procedures were being met, the inspector reviewed:

- Management responsibilities stipulated in the TS
- Staffing requirements for safe operation of the reactor facility
- Organizational structure for the Nuclear Reactor Laboratory
- Selected Operations Log Sheets, checklists, and associated forms and records for 2008 and to date in 2009
- University of Wisconsin Nuclear Reactor (UWNR) Procedure No. 001, "Standing Operating Instructions," Revision (Rev.) 14, Reactor Safety Committee approval dated May 14, 2009
- UWNR Procedure No. 112, "Operating Log Sheet," Rev. 8, Reactor Safety Committee approval dated May 14, 2009
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2006 – 2007 Annual Operating Report," for the period from July 2006 through June 2007," submitted to the NRC on August 23, 2007
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2007 – 2008 Annual Operating Report," for the period from July 2007 through June 2008," submitted to the NRC on July 31, 2008
- American National Standards Institute/American Nuclear Society (ANSI/ANS) Standard 15.4, "Standards for Selection and Training of Personnel for Research Reactors," dated June 9, 1988

b. Observations and Findings

Through discussions with licensee representatives, it was noted that management responsibilities and the organization at the University of Wisconsin Nuclear Reactor Laboratory had not changed since the previous NRC inspection in June 2008 (Inspection Report No. 50-156/2008-201). The Reactor Supervisor retained direct control and overall responsibility for safe operation and maintenance of the facility as specified in the TS. The Reactor Supervisor

reported to the Chancellor of University of Wisconsin-Madison through the Reactor Director and the Dean of Engineering as required.

The licensee's current operational organization consisted of the Reactor Director, the Reactor Supervisor, a Reactor Research Manager, a Reactor Instrumentation Specialist, and various reactor operators. The Reactor Director, Supervisor, Research Manager, and Instrumentation Specialist positions were full-time positions. It was noted that all of these individuals were also qualified Senior Reactor Operators (SROs). The other individuals who worked at the facility, did so on a part-time basis. One of these individuals was an SRO and was a member of the administrative staff in the department. Three other part-time personnel were students and qualified Reactor Operators (ROs). This organization was consistent with that specified in the TS.

A review of selected reactor Operating Log Sheets and the associated records for the past two years showed that the logs were being maintained as required. The logs and records confirmed that shift staffing met the requirements for duty, relief, and on-call personnel.

c. Conclusions

The licensee's organization and staffing met the requirements specified in the TS and applicable procedures.

2. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69001)

In order to verify that the audits stipulated in TS Section 6.1.c had been conducted by University Safety Department personnel and that reviews required by TS Section 6.2 had been completed by the Reactor Safety Committee (RSC), and to determine whether modifications to the facility were consistent with 10 CFR 50.59, the inspector reviewed:

- RSC meeting minutes from May 2007 through the present
- TS duties specified for the RSC including review and oversight functions
- Selected Operations Log Sheets, checklists, and associated forms and records for 2008 and to date in 2009
- Charter of the Reactor Safety Committee of the University of Wisconsin Nuclear Reactor, revised May 14, 2009
- Records of design changes and/or modifications to the facility documented on forms entitled, "UWNR Modification Checklist"
- Audits completed by Safety Department staff personnel documented in monthly reports submitted to the RSC entitled "Nuclear Reactor Audit and Report" for 2007, 2008, and to date in 2009
- Audits completed by operations staff personnel documented in monthly reports submitted to the RSC entitled "Monthly Operations Summary" for 2007, 2008, and to date in 2009
- UWNR Procedure No. 005, "UWNR Administrative Guide," Rev. 50, RSC

- approval dated May 14, 2009
- UWNR Procedure No. 020, "UWNR Modification Checklist," Rev. 2, RSC approval dated May 14, 2009
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2006 – 2007 Annual Operating Report," for the period from July 2006 through June 2007," submitted to the NRC on August 23, 2007
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2007 – 2008 Annual Operating Report," for the period from July 2007 through June 2008," submitted to the NRC on July 31, 2008

b. Observations and Findings

(1) Review and Audits Functions

The inspector reviewed the RSC's meeting minutes from May 2007 to the present. These meeting minutes demonstrated that the RSC had met at the required frequency and that a quorum was present. The minutes also indicated that the RSC was completing reviews of those items and documents required by the TS. Through these reviews, the RSC was providing appropriate oversight and direction for reactor operations to ensure suitable use of the reactor.

The inspector noted that various audits had been conducted of the facility in the areas of reactor operations, radiation protection, the safety program, and procedures. The inspector noted that the RSC reviewed these audits as required. The audits were structured so that the various aspects of the licensee's operations and safety program were reviewed on a monthly basis. Major facility documents and plans were reviewed annually, as were the facility procedures. The inspector noted that the audits and the resulting findings were adequately documented and that the licensee responded and took corrective actions to the findings as needed.

(2) Design Control Functions

Through review of applicable records and interviews with licensee personnel, the inspector determined that various modifications and design changes had been initiated at the facility since the last NRC operations inspection. Some of the recent changes involved such issues as the installation of a programmable evacuation countdown timer following a high radiation alarm, installation of a facility air pressure monitor, installation of a "System Temperature Low" annunciator in the control console, and installation of an air valve in the "Whale System" air line.

The inspector verified that the licensee was following the established design change program and that the required reviews and approvals of the changes had been completed by the RSC prior to implementation. The RSC determined that none of the changes that had been proposed to date met the criteria of 10 CFR 50.59(c)(2) paragraphs (i) through (viii) and, thus, no NRC approval of the changes was required.

c. Conclusions

Review and audit functions required by TS Section 6.2 were acceptably completed by the RSC. The 50.59 process for reviewing and approving design changes at the facility was being followed as required and no recent changes required NRC approval.

3. Reactor Operations

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to ensure that actions taken during routine operations or during abnormal occurrences were in compliance with TS Sections 6.3 and 6.4, and with the procedures specified in TS Section 6.5:

- UWNR Special Orders which were currently in effect including Nos. 2006-02, 2006-03, 2008-01, 2008-02, 2008-03, and 2009-01
- UWNR Operators Turn-Over Log maintained on the computer in the Control Room
- Selected Operations Log Sheets, checklists, and associated forms and records for 2008 and to date in 2009
- Selected audits completed by Safety Department staff personnel documented in monthly reports submitted to the RSC entitled "Nuclear Reactor Audit and Report" for 2007, 2008, and to date in 2009
- Various reviews completed by operations staff personnel documented in monthly reports submitted to the RSC entitled "Monthly Operations Summary" for 2007, 2008, and to date in 2009
- UWNR Procedure No. 001, "Standing Operating Instructions," Rev. 14, RSC approval dated May 14, 2009
- UWNR Procedure No. 110, "Daily Reactor Pre-Startup Check List," Rev. 51, RSC approval dated May 14, 2009
- UWNR Procedure No. 111, "Reactor Startup Check Sheet," Rev. 43, RSC approval dated May 14, 2009
- UWNR Procedure No. 112, "Operating Log Sheet," Rev. 8, RSC approval dated May 14, 2009
- UWNR Procedure No. 114, "Reactor Shutdown Checklist," Rev. 17, RSC approval dated May 14, 2009
- UWNR Procedure No. 115, "SCRAM," Rev. 5, RSC approval dated May 14, 2009
- UWNR Procedure No. 155, "Abnormal Operating Procedure," Rev. 22, RSC approval dated May 14, 2009
- UWNR Procedure No. 156, "Reactivity and/or Power Level," Rev. 2, RSC approval dated December 8, 2008
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2006 – 2007 Annual Operating Report," for the period from July 2006 through June 2007," submitted to the NRC on August 23, 2007
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year

2007 – 2008 Annual Operating Report,” for the period from July 2007 through June 2008,” submitted to the NRC on July 31, 2008

b. Observations and Findings

The inspector observed various activities and operations on Thursday, June 25, 2009. The operations included reactor start-up, full power operation, and shut down. The inspector also observed the preparation of various samples, as well as the insertion and removal of the samples from irradiation facilities in the reactor. It was noted that the appropriate forms and checklists were completed and that the appropriate data were recorded as required.

The inspector reviewed selected Daily Reactor Pre-Startup Check Lists, Reactor Startup Check Sheets, Operating Log Sheets, and Reactor Shutdown Checklists from February 2008 through the date of this inspection. The forms were color coded to facilitate location of the recorded data and to ensure proper usage of the forms. Through this review and first hand observation, the inspector determined that reactor operations were carried out following written procedures as required by the TS. Any problems or abnormal events noted during operation, were documented in the operations log, reported, reviewed, and the problems resolved as required by TS and the procedures. Scrams were identified on specific forms in the logs and records, reported as required, and their cause(s) resolved before the resumption of operations under the authorization of a licensed SRO.

The inspector verified that TS and procedure required items were logged and cross referenced with other logs and/or forms, as required, and that TS operational limits had not been exceeded. As noted above, shift staffing was adequate and satisfied the requirements for duty and on-call personnel.

c. Conclusions

Reactor operations were conducted in accordance with TS requirements and applicable procedures.

4. Operator Requalification

a. Inspection Scope (IP 69001)

To determine that operator requalification activities and training were conducted in accordance with UWNR Procedure No. 004, “University of Wisconsin Nuclear Reactor Operator Proficiency Maintenance Program,” Rev. 4, RSC approval dated May 14, 2009 (the licensee’s operator requalification plan) and 10 CFR Part 55, and that medical requirements were met, the inspector reviewed:

- Active operators’ license status
- Written examination records for 2007 and 2008
- Operator medical examination records from 2006 to the present
- Selected Operations Log Sheets, checklists, and associated forms and records for 2008 and to date in 2009

- Audits completed by operations staff personnel documented in monthly reports submitted to the RSC entitled "Monthly Operations Summary" for 2007, 2008, and to date in 2009
- "Individual Record Sheet - UWNR Operator Proficiency Maintenance Program" for the past three years
- "UWNR Proficiency Maintenance Course Operator Evaluation Check Sheet" for the past three years
- "UWNR Operator Proficiency Maintenance Program - Class Record Sheets" for the past three years
- Logs and records of reactivity manipulations documented on forms associated with UWNR Procedure No. 112, "Operating Log Sheet," Rev. 8, RSC approval dated May 14, 2009
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2006 – 2007 Annual Operating Report," for the period from July 2006 through June 2007," submitted to the NRC on August 23, 2007
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2007 – 2008 Annual Operating Report," for the period from July 2007 through June 2008," submitted to the NRC on July 31, 2008
- ANSI/ANS Standard 15.4, "Standards for Selection and Training of Personnel for Research Reactors," dated June 9, 1988

b. Observations and Findings

As noted above, there are currently five qualified SROs at the facility and three ROs. All of the operators' licenses were verified to be current. It was noted that there were no people in training to become qualified operators as of the date of the inspection.

A review of facility logs and training records showed that training and classroom instruction had been conducted in accordance with the licensee's requalification and training program. It was noted that annual written examinations had been given as stipulated and the results documented. A review of the records of quarterly reactor operations, reactivity manipulations, other operations and supervisory activities, indicated that these required activities were being completed by each licensed operator. Records indicating the completion of the quarterly performance evaluations were also maintained. The inspector noted that the licensee's training program appeared to be comprehensive and was well documented.

During the inspection the inspector was able to observe the quarterly oral examination and performance evaluation of two operators. The evaluations were conducted by the Reactor Research Manager, an SRO, as required. Each operator was knowledgeable of reactor systems and operation and completed various reactivity manipulations as required without any problems.

Through discussions with licensed operators and a review of records, the inspector also verified that each operator was receiving a biennial medical examination as required.

c. Conclusions

The requirements of the Operator Requalification Program were being met and the program was being acceptably implemented. Medical examinations for facility operators were being completed biennially as required.

5. Procedures and Procedural Control

a. Inspection Scope (IP 69001)

To determine whether facility procedures met the requirements outlined in TS Section 6.5, the inspector reviewed:

- Selected operating procedures and administrative logs
- Selected forms and checklists associated with current procedures
- Procedural reviews and updates as documented in RSC meeting minutes
- UWNR Procedure No. 001, "Standing Operating Instructions," Rev. 14, RSC approval dated May 14, 2009
- UWNR Procedure No. 005, "UWNR Administrative Guide," Rev. 50, RSC approval dated May 14, 2009
- UWNR Procedure No. 021, "UWNR Quality Assurance Program for Spent Nuclear Fuel Shipments," Rev. 0, RSC approval dated May 14, 2009
- UWNR Procedure No. 144, "Load NAC LWT Cask for Shipment of Spent Fuel," Rev. 0, RSC approval dated May 14, 2009
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2006 – 2007 Annual Operating Report," for the period from July 2006 through June 2007," submitted to the NRC on August 23, 2007
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2007 – 2008 Annual Operating Report," for the period from July 2007 through June 2008," submitted to the NRC on July 31, 2008

b. Observations and Findings

The inspector determined that the licensee had developed procedures for the items and conditions listed in Section 6.5 of the TS. The inspector noted that procedure UWNR Procedure No. 001, "Standing Operating Instructions," specified the responsibilities of the various members of the staff and the role and use of procedures at the facility. The licensee's procedures and checklists were found to be acceptable for the current facility status, staffing, and operations level. The procedures were being audited and/or reviewed annually, as noted earlier, and were updated as needed. Minor changes of some types of procedures were allowed to be reviewed and approved by two SROs. These types of items were presented to the RSC for information and were reviewed by that committee. Major changes to the procedures were required to be reviewed and approved by the RSC prior to implementation.

The inspector determined that substantive revisions to checklists and forms were also routinely presented to the RSC for review and approval. The inspector verified that the latest revisions to selected procedures and forms had been

through this review and approval process as required. It was also noted that, since the previous inspection, two new procedures had been developed, submitted to the RSC, and approved.

Through observation of various activities during this inspection, the inspector noted that operations were completed in accordance with the applicable checklists and procedures as required. Adherence to procedure was acceptable.

The inspector also noted that the licensee had developed many "non controlled procedures" (NCPs) to capture some of the "corporate" knowledge that was not documented in any other manner. These NCPs were helpful but were not part of the official UWNR series of RSC-reviewed and -approved procedures. Thus they were not required to be reviewed annually and any changes were not subject to RSC review and approval. The licensee was aware of the need to review these NCPs and to consider whether or not they needed to be incorporated into the UWNR series of procedures. The licensee was informed that the issue of completing a review of the NCPs to determine whether or not they should be incorporated into the official UWNR, RSC-approved series of procedures would be followed by the NRC as an Inspector Follow-up Item (IFI) and would be reviewed during a future inspection (IFI 50-156/2009-201-01).

c. Conclusions

Facility procedures satisfied TS Section 6.5 requirements and procedure reviews were being completed annually. Procedural compliance was acceptable.

6. Fuel Handling

a. Inspection Scope (IP 69001)

In order to verify adherence to fuel handling and inspection requirements specified in TS Sections 3.7, 4.3, 5.2 and 5.5, the inspector reviewed:

- UWNR Standard TRIGA Fuel Record Books
- UWNR FLIP Fuel Record Books (both of which were designated as Volume III)
- Core Status Boards located at the reactor pool top and in the Control Room
- Operator Information Book which included core loading diagrams and standard fuel loading instructions
- Selected Operations Log Sheets, checklists, and associated forms and records for 2008 and to date in 2009
- Selected forms and records associated with the procedures UWNR listed below including forms entitled, "Specific Core Component Handling Step for XXX (number or title filled in by operator) For Critical Experiment"
- UWNR Procedure No. 140, "Procedure for Disassembly of Four-Element Fuel Bundles," Rev. 5, RSC approval dated May 14, 2009
- UWNR Procedure No. 141, "Procedure for Reassembling Fuel Elements into Four-Element Bundles," Rev. 3, RSC approval dated May 14, 2009

- UWNR Procedure No. 142, "Procedure for Measuring Fuel Element Bow and Growth," Rev. 14, RSC approval dated May 14, 2009
- UWNR Procedure No. 143, "Procedure for Fuel Handling and Core Arrangements," Rev. 1, RSC approval dated May 14, 2009
- UWNR Procedure No. 143A, "Core Design," Rev. 2, RSC approval dated May 14, 2009
- UWNR Procedure No. 169, "Annual Maintenance Procedure," Rev. 8, RSC approval dated December 8, 2008
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2006 – 2007 Annual Operating Report," for the period from July 2006 through June 2007," submitted to the NRC on August 23, 2007
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2007 – 2008 Annual Operating Report," for the period from July 2007 through June 2008," submitted to the NRC on July 31, 2008

b. Observations and Findings

The inspector verified that the reactor fuel bundles in the core and in storage were being inspected annually as required by TS. The results of the inspections were recorded as required and comments on the condition of each fuel bundle were noted on the appropriate pages in the Fuel Records Books. The procedures and the controls specified for these operations were acceptable.

The inspector determined that the licensee was maintaining the required records of the various fuel movements that had been completed and this information was routinely stored with the facility Operating Log Sheets. The inspector verified that the movements were conducted and recorded in compliance with procedure. Fuel locations were recorded on the UWNR 169 forms and in the respective UWNR TRIGA Fuel and the UWNR FLIP Fuel Record Books. Current fuel bundle locations were also maintained on the Fuel Status Boards, one of which was located at the top of the reactor pool and the other in the Control Room.

It was noted that most of the TRIGA fuel that had been used in the past, and which had been in storage for many years at the facility, had been shipped off site to Idaho. A small amount of TRIGA fuel and the FLIP fuel remained on site. Only the FLIP fuel was being used in the core. The inspector also noted that the latest core configuration, I23-R10, had not been changed for several years

c. Conclusions

Reactor fuel movements and inspections were completed and documented in accordance with procedure. The fuel was being inspected as specified by TS Section 4.3, and the core was arranged as required in TS Section 5.2.

7. Maintenance and Surveillance

a. Inspection Scope (IP 69001)

To determine that surveillance and Limiting Conditions of Operation activities and verifications were being completed as required by TS Sections 3 and 4, and that maintenance activities were being conducted, the inspector reviewed:

- Selected preventive maintenance records for 2008 and to date in 2009
- Open Pool Reactor Manual (OPRM) referenced in UWNR Procedure No. 100A
- Selected forms and records associated with the procedures UWNR listed below
- UWNR Procedure No. 002, "Experiment Standing Operating Instructions," Rev. 12, RSC approval dated May 14, 2009
- UWNR Procedure No. 100, "Surveillance Activities," Rev. 47, RSC approval dated May 14, 2009, associated forms, and related manuals
- UWNR Procedure No. 100A, "PM Services - Definitions," Rev. 37, RSC approval dated May 14, 2009
- UWNR Procedure No. 120, "After Maintenance Checks," Rev. 18, RSC approval dated May 14, 2009
- UWNR Procedure No. 143, "Procedure for Fuel Handling and Core Arrangements," Rev. 1, RSC approval dated May 14, 2009
- UWNR Procedure No. 167, "Safety Blade and Transient Rod Fall Time Measurement Procedures," Rev. 16, RSC approval dated December 8, 2008
- UWNR Procedure No. 169, "Annual Maintenance Procedure," Rev. 8, RSC approval dated December 8, 2008
- UWNR Procedure No. 170, "Power Level Calibration Procedure," Rev. 25, RSC approval dated December 8, 2008
- UWNR Procedure No. 173, "Fuel Temperature Channel Calibration Procedure," Rev. 14, RSC approval dated December 8, 2008
- UWNR Procedure No. 200, "Maintenance and Trouble Shooting," Rev. 16, RSC approval dated May 14, 2009
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2006 – 2007 Annual Operating Report," for the period from July 2006 through June 2007," submitted to the NRC on August 23, 2007
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2007 – 2008 Annual Operating Report," for the period from July 2007 through June 2008," submitted to the NRC on July 31, 2008

b. Observations and Findings

(1) Maintenance

The inspector reviewed the maintenance and repair logs for 2008 and to date in 2009 that were maintained as required by UWNR Procedure No. 100 and UWNR Procedure No. 169. The records indicated that maintenance was conducted annually (typically every January) as required. Also, preventive maintenance activities were tracked and conducted as scheduled and any problems found were addressed in accordance with the TS, applicable procedures, the OPRM, or other

equipment manuals. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements. Unscheduled maintenance or repairs were reviewed to determine if they required 50.59 evaluations. Verifications and operational systems checks were performed to ensure system operability before the equipment involved was returned to service.

(2) Surveillance

The inspector determined that selected daily, weekly, monthly, semiannual, and annual checks, tests, and verifications for required Limiting Conditions of Operation (LCO) and surveillance activities were completed as stipulated. Those surveillance and LCO verifications reviewed were completed on schedule and in accordance with licensee procedures. All the recorded results were within the TS and procedurally prescribed parameters. The records and logs reviewed appeared to be complete and were being maintained as required.

c. Conclusions

Maintenance logs and records were being maintained and maintenance activities were being conducted in accordance with procedural requirements. The program for surveillance and LCO verifications was being carried out in accordance with TS requirements.

8. Experiments

a. Inspection Scope (IP 69001)

In order to verify that experiments were being conducted in accordance with TS Section 6.8 and within approved guidelines, the inspector reviewed:

- Control of irradiated items and potential hazards identification
- Records of recently proposed experiments and/or changes to approved experiments documented on forms entitled, "Experiment Review Questionnaire"
- Selected forms and records associated with those procedures UWNR listed below
- UWNR Procedure No. 002, "Experiment Standing Operating Instructions," Rev. 12, RSC approval dated May 14, 2009
- UWNR Procedure No. 030, "Experiment Review Questionnaire," Rev. 6, RSC approval dated May 14, 2009
- UWNR Procedure No. 130, "Request for Isotope Production," Rev. 17, RSC approval dated May 14, 2009
- UWNR Procedure No. 131, "Production of Radioisotopes in Nuclear Reactor," Rev. 21, RSC approval dated May 14, 2009
- UWNR Procedure No. 132, "Pneumatic Tube Operating Procedure," Rev. 14, RSC approval dated May 14, 2009
- UWNR Procedure No. 134, "Request and Authorization for Services of the

University of Wisconsin Reactor," Rev. 3, RSC approval dated May 14, 2009

- UWNR Procedure No. 135, "Rotator Operating Procedure," Rev. 2, RSC approval dated May 14, 2009
- UWNR Procedure No. 136, "Procedure for Beam Port or Thermal Column Irradiations," Rev. 8, RSC approval dated May 14, 2009

b. Observations and Findings

In accordance with the licensee's TS, experiments were classified as "routine," "modified routine," or "special." Routine experiments were those which had previously been performed at the facility. Modified routine experiments were those that had not been performed previously but were similar to the routine experiments in that the hazards were neither greater nor significantly different than those for the corresponding routine experiments. Routine and modified routine experiments were only required to be reviewed by one SRO and approved by a separate SRO. Special experiments were any other experiments that were not routine or modified routine experiments. Special experiments were required to be reviewed by the RSC and possibly were of such a nature that they could require review and approval by the NRC. It was noted that the experiments that were currently being conducted at the facility were classified as modified routine.

The inspector determined that no new experiments had been initiated since the last inspection in this area in August 2007. The inspector reviewed those experiments that had been approved in the past and verified that they had been reviewed and approved by the Reactor Director as required. Copies of the Experiment Review Questionnaires had also been forwarded to the RSC for information and the RSC had reviewed them as well. Irradiation authorizations, documented on UWNR 134 forms, had also been reviewed and approved as required.

The conduct and results of the experiments and irradiations were documented on the Operations Log Sheets and on the irradiation request forms, UWNR Procedure No. 130, "Request for Isotope Production." The inspector verified that experiments and irradiations were conducted, and the material produced was controlled, as required in the TS, the applicable questionnaires or authorizations, and the associated procedures.

c. Conclusions

Conduct and control of experiments and irradiations met the requirements specified in the TS Section 6.8, the applicable experiment and irradiation authorizations, and associated procedures.

9. Emergency Preparedness

a. Inspection Scope (IP 69001)

To ensure that the licensee's emergency response program was being conducted in accordance with UWNR Procedure No. 006, "University of Wisconsin Nuclear Reactor Emergency Plan," Rev. 4, RSC approval dated May 14, 2009 (the licensee's Emergency Plan), the inspector reviewed:

- Offsite support for the UWNR facility
- Records of emergency drills and critiques
- Training records regarding emergency response
- Emergency response supplies, equipment, and instrumentation
- UWNR Procedure No. 005, "UWNR Administrative Guide," Rev. 50, RSC approval dated May 14, 2009
- UWNR Procedure No. 150, "Emergency Procedure - Reactor Accident, Fission Product Release, or Major Spill of Radioactive Materials," Rev. 20, RSC approval dated December 8, 2008
- UWNR Procedure No. 151, "Emergency Procedure - Leak Resulting in Draining of Reactor Pool," Rev. 19, RSC approval dated December 8, 2008
- UWNR Procedure No. 152, "Emergency Procedure - Suspected Fission Product Leak," Rev. 14, RSC approval dated December 8, 2008
- UWNR Procedure No. 153, "Emergency Procedure - Threat to Security of Reactor Laboratory (Riot, Civil Disturbance, Unauthorized Entry, or Bomb Threat)," Rev. 10, RSC approval dated December 8, 2008
- UWNR Procedure No. 154, "Emergency Procedure - Theft or Threat of Theft of SNM: Breaching of Security of Reactor Laboratory," Rev. 9, RSC approval dated December 8, 2008
- UWNR Procedure No. 156, "Reactivity and/or Power Level," Rev. 2, RSC approval dated December 8, 2008
- UWNR Procedure No. 157, "Emergency Procedure - Fire, Radioactive Material Spills, Radioactive Dust, Fumes, and Gases; Personnel Injuries Involving Radioactivity; Personnel Overexposures," Rev. 11, RSC approval dated May 14, 2009
- Emergency response requirements stipulated in ANSI/ANS 15.16 – 1982 (R1988), "Emergency Planning for Research Reactors"
- County of Dane MMRS (Metropolitan Medical Response System) Radiological Emergencies Response Plan, dated July 2007

b. Observations and Findings

The emergency plan in use at the UWNR Laboratory was the facility procedure, UWNR Procedure No. 006, "University of Wisconsin Nuclear Reactor Emergency Plan." The Emergency Plan (E-Plan) was audited and reviewed annually as required. E-Plan Implementing Procedures, UWNR Procedure Numbers 150-154, 156 and 157, were also reviewed annually and revised as needed. The inspector, accompanied by licensee personnel, reviewed the contents of the

emergency decontamination kit at the facility. The inspector verified that the required supplies, instrumentation, and equipment were being maintained, controlled, and inventoried annually as stipulated by one of the NCPs mentioned earlier.

Through records review and interviews with licensee and support personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. One agreement with an off-site response organization, the University of Wisconsin Hospital and Clinics, was updated every two years and was being maintained as detailed in the facility E-Plan. Other agreements were not needed because the fire department and police force were under statutory requirements to respond to the UWNR in case of an emergency. Communications capabilities with these support groups were acceptable.

Emergency drills for operations personnel were conducted semiannually as required by the E-Plan. One of the semiannual drills was required to include a practice evacuation of the facility. The other drill involved reviewing the emergency procedures and discussing what actions to take. The results of the drills were documented and filed.

Training for reactor staff personnel in emergency response was conducted and documented through the Operator Requalification Program. The inspector verified that the E-Plan and implementing procedures were reviewed annually by UWNR staff as a part of their training as required. As noted earlier, a review of facility logs and training records showed that other training and classroom instruction had also been conducted as required.

The inspector toured the University of Wisconsin Hospital and Clinics Emergency Room (ER) area with the UWNR Reactor Director and a hospital representative on June 24, 2009. It was noted that the room and equipment set aside for use during a radiological event appeared to be adequate and in a state of readiness. During the tour the inspector asked about the hospital staff response capabilities in case of an event at the Nuclear Reactor Laboratory. The hospital representative stated that they had the training needed to provide whatever support the UWNR might need in an emergency. The representative also showed the inspector the new emergency decontamination facility that had been added to the ER since the last inspection in this area. It was well suited to process scores of contaminated individuals without any problem. The inspector also noted that there appeared to be a good working relationship between the licensee and the hospital staff.

c. Conclusions

The inspector concluded that the emergency preparedness program was being conducted in accordance with the Emergency Plan because: 1) The Emergency Plan and Implementing Procedures were being reviewed annually as required and updated as needed; 2) emergency response facilities and equipment were being maintained as required; 3) emergency responders were knowledgeable of

proper actions to take in case of an emergency; 4) off-site support was acceptable; 5) semiannual drills were being conducted as required by the E-Plan; and 6) emergency preparedness training for staff personnel was being completed as required.

10. Follow-up on Previously Identified Items

a. Inspection Scope (IP 92701)

The inspector reviewed the licensee's actions taken in response to a previously identified Inspector Follow-up Item (IFI).

b. Observation and Findings

Inspector Follow-up Item (IFI) - 50-156/2007-201-01 – Follow-up on the possibility of having drills in the future that included challenging scenarios and involved offsite support groups to provide everyone involved more experience in dealing with such situations.

During an inspection of the facility in 2007, the subject of holding more extensive and more challenging drills was discussed. The inspector indicated that it might be beneficial for the facility and support organizations alike to consider arranging a drill involving a simulated contaminated injured person, or some other problem, to give everyone more experience in handling emergency situations. The Reactor Director was informed that the issue of having drills that included challenging scenarios and that involved offsite support groups would be followed by the NRC as an Inspector Follow-up Item.

During this inspection, it was noted that the licensee had taken various steps to more fully involve offsite groups in their emergency drills and training. For the past two years all of the crews at the Madison Fire Department (MFD), Stations 4 and 6, have participated in training given at the UWNR facility. UW Police Department (UWPD) and security personnel have also been invited to participate in the evacuation drills at the facility. In addition, licensee personnel participated in a tabletop exercise held by the Madison and Metro Area Metropolitan Medical Response System in November 2007. In a further effort to involve offsite personnel, licensee staff visited the University of Wisconsin Hospital and toured the ER and Decontamination Area.

Although no drills have been held that directly involve the UWNR and offsite groups, the licensee has helped train MFD personnel and participated in training with the County as noted above. Also, UWPD personnel have been invited to participate in the evacuation drills at the facility. Because the licensee has made an extensive effort to involve offsite groups with the emergency training and exercises at the facility, this issue is considered closed.

c. Conclusions

One IFI identified during a previous inspection was closed.

11. Exit Meeting Summary

The inspector reviewed the inspection results with members of licensee management at the conclusion of the inspection on June 25, 2009. The licensee acknowledged the findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

| | |
|--------------|---|
| R. Agasie | Reactor Director |
| K. Austin | Reactor Research Manager |
| M. Blanchard | Reactor Supervisor |
| M. Corradini | Chairman, Department of Engineering Physics |
| C. Edwards | Reactor Instrumentation Specialist |
| S. Grutzik | Reactor Operator |
| C. Martin | Chancellor, University of Wisconsin – Madison |
| E. Nygaard | Reactor Operator |
| M. Pagel | Reactor Operator |

Other Personnel

| | |
|--------------|---|
| T. Buchman | Safety and Hazard Control Manager, University of Wisconsin Hospital and Clinics |
| V. Goretsky | Assistant Director, Environmental Health and Safety and Radiation Safety Officer, University of Wisconsin – Madison |
| A. Ben-Zikri | Health Physicist, Environment, Health & Safety, University of Wisconsin – Madison |

INSPECTION PROCEDURES USED

| | |
|----------|---------------------------------------|
| IP 69001 | Class II Non-Power Reactors |
| IP 92701 | Review of Previously Identified Items |

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

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|--------------------|-----|---|
| 50-156/2009-201-01 | IFI | Follow-up on the licensee's actions to complete a review of the NCPs to determine whether or not they should be incorporated into the official UWNR, RSC-approved series of procedures. |
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Closed

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| 50-156/2007-201-01 | IFI | Follow-up on the possibility of having drills in the future that included challenging scenarios and involved offsite support groups to provide everyone involved more experience in dealing with such situations. |
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LIST OF ACRONYMS USED

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| ADAMS | Agencywide Documents and Management System |
| CFR | <i>Code of Federal Regulations</i> |
| E-Plan | Emergency Plan |
| IFI | Inspector Follow-up Item |
| IP | Inspection Procedure |
| LCO | Limiting Conditions of Operation |
| MFD | Madison Fire Department |
| MW | Megawatt |
| NCP | Non controlled procedure |
| No. | Number |
| NRC | Nuclear Regulatory Commission |
| OPRM | Open Pool Reactor Manual |
| PARS | Publicly Available Records |
| Rev. | Revision |
| RO | Reactor Operator |
| RSC | Reactor Safety Committee |
| SRO | Senior Reactor Operator |
| TS | Technical Specifications |
| UWNR | University of Wisconsin Nuclear Reactor |
| UWPD | University of Wisconsin Police Department |