

August 20, 2007

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

SUBJECT: NRC INSPECTION REPORT NO. 50-156/2007-201

Dear Mr. Agasie:

This letter refers to the inspection conducted on August 6-9, 2007, at your University of Wisconsin Nuclear Reactor Laboratory. The enclosed report documents the inspection results, which were discussed on August 9, 2007, with you and other members of your staff, as well as Andy Garcia-Rivera, Director, Environmental Health and Safety Department, University of Wisconsin.

The inspection examined activities conducted under your license as they relate to safety and compliance with the NRC'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.

In accordance with Section 2.390, "Public inspections, exemptions, and requests for withholding," of Title 10 of the *Code of Federal Regulations*, 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 Publicly Available Records component of NRC's 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.

Sincerely,

/RA/

Johnny H. Eads, Jr., Branch 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  
cc w/encl.: Please see next page

University of Wisconsin

Docket No. 50-156

cc:

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**ACCESSION NO.: ML072280504**

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

Docket No: 50-156

License No: R-74

Report No: 50-156/2007-201

Licensee: University of Wisconsin

Facility: Nuclear Reactor Laboratory

Location: Madison, WI

Dates: August 6-9, 2007

Inspector: Craig Bassett

Approved by: Johnny H. Eads, Jr., Branch 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: 50-156/2007-201

The primary focus of this routine, announced inspection included onsite review of selected aspects of the University of Wisconsin Nuclear Reactor Laboratory TRIGA Conversion research reactor safety program including: organizational structure and staffing, review and audit and design change functions, reactor operations, operator requalification, facility procedures, fuel handling, maintenance and surveillance, experiments, and emergency preparedness since the last NRC inspection of these areas. The licensee's safety program was acceptably directed toward the protection of public health and safety and was in compliance with NRC requirements. No safety concerns or violations of regulatory requirements 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 program required by Technical Specifications Section 6.2 was being conducted acceptably 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 requalification/training program was up-to-date and acceptably maintained.
- Medical examinations 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 maintained 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's one megawatt (1 MW) TRIGA conversion research and test reactor continued normal, routine operations. A review of the applicable records indicated that 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. Organizational Structure 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) and associated procedures were being met, the inspector reviewed:

- management responsibilities stipulated in the TS
- organizational structure at the Nuclear Reactor Laboratory
- staffing requirements for the research reactor current operations
- selected Operations Log Sheets, checklists, and associated forms and records for 2006 and to-date in 2007
- University of Wisconsin Nuclear Reactor (UWNR) Procedure No. 001, "Standing Operating Instructions," Revision (Rev.) 14, Reactor Safety Committee approval dated May 30, 2007
- UWNR Procedure No. 112, "Operating Log Sheet," Rev. 8, Reactor Safety Committee approval dated May 30, 2007

#### b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that the current version of the TS had been revised by License Amendment Number (No.) 16, dated August 30, 2006. 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 2006 (Inspection Report No. 50-156/2006-201). 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 Director, Supervisor, Research Manager, and Instrumentation Specialist positions were full-time positions. Three of these individuals were also qualified Senior Reactor Operators (SROs), while the Instrumentation Specialist was a qualified Reactor Operator (RO). 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. Two other part-time personnel were students and were ROs. It was noted that two other student ROs who had worked at the facility had left or were leaving by the end of the summer. This organization was consistent with that specified in the TS.

A review of the reactor selected Operating Log Sheets and associated records for the past twelve months 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 organization and staffing met the requirements specified in the TS and applicable procedures.

**2. Review and Audit Functions and Design Control**

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 November 2005 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 2006 and to date in 2007
- Charter of the Reactor Safety Committee of the University of Wisconsin Nuclear Reactor, revised December 6, 2006
- records of design changes and/or modifications to the facility documented on forms entitled, "UWNR Modification Checklist"
- records of newly proposed experiments and/or changes to approved experiments documented on forms entitled, "Experiment Review Questionnaire"
- audits completed by Safety Department staff personnel documented on monthly reports submitted to the RSC entitled "Nuclear Reactor Audit and Report"
- audits completed by operations staff personnel documented on monthly reports submitted to the RSC entitled "Monthly Operations Summary"
- UWNR Procedure No. 005, "UWNR Administrative Guide," Rev. 46, RSC approval dated May 30, 2007
- UWNR Procedure No. 020, "UWNR Modification Checklist," Rev. 2, RSC approval dated May 30, 2007

b. Observations and Findings

(1) Review and Audit Functions



The inspector reviewed the RSC's meeting minutes from November 2005 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 guidance and direction for reactor operations to ensure suitable use and oversight of the reactor.

The inspector noted that various audits had been conducted of the facility in the areas of operations, safety programs, 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 programs 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 new building Reactor Evacuation Alarm System, installation of a Fire Detection and Suppression System, installation of an Uninterruptible Power Supply, and installation of new reactor Stack Air and Continuous Air Monitors.

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 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 design change at the facility was being followed as required and no recent changes required NRC approval.

**3. 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 Operators Turn-Over Log maintained on the computer in the Control Room
- UWNR Special Orders Numbers 86-01 & -02, 93-01, 2004-01 & -02, and 2006-01 through -04
- selected Operations Log Sheets, checklists, and associated forms and records for 2006 and to date in 2007
- selected audits completed by Safety Department staff personnel documented on monthly reports submitted to the RSC entitled "Nuclear Reactor Audit and Report"
- various reviews completed by operations staff personnel documented on monthly reports submitted to the RSC entitled "Monthly Operations Summary"
- UWNR Procedure No. 001, "Standing Operating Instructions," Rev. 14, RSC approval dated May 30, 2007
- UWNR Procedure No. 110, "Daily Reactor Pre-Startup Check List," Rev. 47, RSC approval dated May 30, 2007
- UWNR Procedure No. 111, "Reactor Startup Check Sheet," Rev. 39, RSC approval dated May 30, 2007
- UWNR Procedure No. 112, "Operating Log Sheet," Rev. 8, RSC approval dated May 30, 2007
- UWNR Procedure No. 114, "Reactor Shutdown Checklist," Rev. 16, RSC approval dated May 30, 2007
- UWNR Procedure No. 115, "SCRAM," Rev. 5, RSC approval dated May 30, 2007
- UWNR Procedure No. 155, "Abnormal Operating Procedure," Rev. 20, RSC approval dated May 30, 2007
- UWNR Procedure No. 156, "Reactivity and/or Power Level," Rev. 2, RSC approval dated December 6, 2006

b Observations and Findings

The inspector observed various operations on Tuesday and Thursday during this inspection. These operations included such activities as reactor start-up, full power operation, and shut down. It was noted that the appropriate forms and checklists were completed and that the appropriate data were recorded as required. Also, operations were conducted in accordance with the appropriate procedures as noted above.

The inspector reviewed selected Daily Reactor Pre-Startup Check Lists, Reactor Startup Check Sheets, Operating Log Sheets, and Reactor Shutdown Checklists from February 2006 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. As noted above, the inspector determined that reactor operations were carried out following written procedures as required by the TS. Use of maintenance and repair logs satisfied procedural requirements. Significant problems and events noted during operation, and documented in the operations log, were reported, reviewed, and the problems resolved as required by TS and the appropriate 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 Licenses, Requalification, and Medical Activities**

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 30, 2007 (the licensee's operator requalification plan), and that medical requirements were met, the inspector reviewed:

- active operator license status
- written examination records for 2005 and 2006
- operator medical examination records from 2004 to the present
- selected Operations Log Sheets, checklists, and associated forms and records for 2006 and to date in 2007
- Memoranda concerning removal from and restoration to active licensed status for one operator issued by the Reactor Supervisor
- audits completed by operations staff personnel documented on monthly reports submitted to the RSC entitled "Monthly Operations Summary"
- "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 30, 2007
- ANSI/ANS Standard 15.4, "Selection and Training of Personnel for Research Reactors," dated June 9, 1988

b. Observations and Findings

As noted above, there are currently four qualified SROs at the facility and three ROs. All of the operators' licenses were found to be current. It was noted that there were no people in training to become qualified operators as of the date of the inspection but a training class was scheduled to start in the fall.

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 was rigorous, comprehensive, and well documented.

The inspector interviewed the UW Registered Nurse who was responsible for coordinating the physical examinations for the facility reactor operators. After the meeting, and through discussions with licensed operators and a review of the protocol used by the medical doctors to complete the examinations, the inspector concluded that they were being conducted in accordance with ANSI/ANS Standard 15.4 as required. The inspector also verified that facility operators were receiving biennial medical examinations as required.

c. Conclusions

The requalification/training program was up-to-date and acceptably maintained. Medical examinations 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 30, 2007
- UWNR Procedure No. 002A, "Square Wave Curve Checklist," Rev. 0, RSC approval dated May 30, 2007
- UWNR Procedure No. 005, "UWNR Administrative Guide," Rev. 46, RSC approval dated May 30, 2007
- UWNR Procedure No. 031A, "Procedure for Facility Familiarization - Instructor," Rev. 0, RSC approval dated May 30, 2007

b. Observations and Findings

The inspector determined that the licensee had procedures in effect for the items and conditions listed in Section 6.5 of the TS. The licensee's procedures and checklists were found to be acceptable for the current facility status, staffing, and operations level. 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 procedures were being audited/reviewed annually, as noted earlier, and were updated as needed. Minor changes and 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.

c. Conclusions

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

**6. Fuel Movement**

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, Volumes I - 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 2006 and to date in 2007
- 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. 4, RSC approval dated May 30, 2007
- UWNR Procedure No. 141, "Procedure for Reassembling Fuel Elements into Four-Element Bundles," Rev. 3, RSC approval dated May 30, 2007
- UWNR Procedure No. 142, "Procedure for Measuring Fuel Element Bow and Growth," Rev. 14, RSC approval dated May 30, 2007
- UWNR Procedure No. 143, "Procedure for Fuel Handling and Core Arrangements," Rev. 1, RSC approval dated May 30, 2007
- UWNR Procedure No. 143A, "Core Design," Rev. 2, RSC approval dated May 30, 2007
- UWNR Procedure No. 169, "Annual Maintenance Procedure," Rev. 8, RSC approval dated May 30, 2007

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 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. 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 2006 and to date in 2007
- 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 30, 2007
- UWNR Procedure No. 100, "Surveillance Activities," Rev. 44, RSC approval dated May 30, 2007, associated forms, and related manuals
- UWNR Procedure No. 100A, "PM Services - Definitions," Rev. 34, RSC approval dated May 30, 2007
- UWNR Procedure No. 120, "After Maintenance Checks," Rev. 18, RSC approval dated May 30, 2007
- UWNR Procedure No. 143, "Procedure for Fuel Handling and Core Arrangements," Rev. 1, RSC approval dated May 30, 2007
- UWNR Procedure No. 167, "Safety Blade and Transient Rod Fall Time Measurement Procedures," Rev. 16, RSC approval dated December 6, 2006
- UWNR Procedure No. 169, "Annual Maintenance Procedure," Rev. 8, RSC approval dated May 30, 2007

- UWNR Procedure No. 170, "Power Level Calibration Procedure," Rev. 25, RSC approval dated May 30, 2007
- UWNR Procedure No. 173, "Fuel Temperature Channel Calibration Procedure," Rev. 14, RSC approval dated December 6, 2006
- UWNR Procedure No. 200, "Maintenance and Trouble Shooting," Rev. 13, RSC approval dated May 30, 2007

b. Observations and Findings

(1) Preventive Maintenance

The inspector reviewed the logs that were maintained as required by UWNR Procedure No. 100 and UWNR Procedure No. 169 for 2006 and to date in 2007. The records indicated that 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 Activities

The inspector determined that selected daily, weekly, monthly, semiannual, and annual checks, tests, and verifications for required Limiting Conditions of Operation (LCOs) and surveillance activities were completed as stipulated. Those surveillance and LCO verifications reviewed were completed on schedule and in accordance with licensee procedures or were completed after construction activities had been finished and conditions permitted. All the recorded results were within the TS and procedurally prescribed parameters. The records and logs reviewed were 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
- potential hazards identification

- 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 30, 2007
- UWNR Procedure No. 030, "Experiment Review Questionnaire," Rev. 6, RSC approval dated May 30, 2007
- UWNR Procedure No. 130, "Request for Isotope Production," Rev. 15, RSC approval dated May 30, 2007
- UWNR Procedure No. 131, "Production of Radioisotopes in Nuclear Reactor," Rev. 21, RSC approval dated May 30, 2007
- UWNR Procedure No. 132, "Pneumatic Tube Operating Procedure," Rev. 13, RSC approval dated May 30, 2007
- UWNR Procedure No. 134, "Request and Authorization for Services of the University of Wisconsin Reactor," Rev. 3, RSC approval dated May 30, 2007
- UWNR Procedure No. 135, "Rotator Operating Procedure," Rev. 2, RSC approval dated May 30, 2007
- UWNR Procedure No. 136, "Procedure for Beam Port or Thermal Column Irradiations," Rev. 8, RSC approval dated May 30, 2007

b. Observations and Findings

The licensee's TS classified experiments 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 two new experiments had been initiated since the last inspection in this area in May 2005. The experiments were entitled, "Radiolysis Measurements in Whale Tube Using MV," and "Beam Port Irradiator." The inspector verified that the experiments 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 30, 2007 (the licensee's Emergency Plan), the inspector reviewed:

- offsite support 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. 46, RSC approval dated May 30, 2007
- UWNR Procedure No. 150, "Emergency Procedure - Reactor Accident, Fission Product Release, or Major Spill of Radioactive Materials," Rev. 19, RSC approval dated December 6, 2006
- UWNR Procedure No. 151, "Emergency Procedure - Leak Resulting in Draining of Reactor Pool," Rev. 19, RSC approval dated December 6, 2006
- UWNR Procedure No. 152, "Emergency Procedure - Suspected Fission Product Leak," Rev. 14, RSC approval dated December 6, 2006
- 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 6, 2006
- 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 6, 2006
- UWNR Procedure No. 156, "Reactivity and/or Power Level," Rev. 2, RSC approval dated December 6, 2006
- UWNR Procedure No. 157, "Emergency Procedure - Fire, Radioactive Material Spills, Radioactive Dust, Fumes, and Gases; Personnel Injuries Involving Radioactivity; Personnel Overexposures," Rev. 10, RSC approval dated December 6, 2006
- 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, observed the contents of one of the supply cabinets at the facility. The inspector verified that supplies, instrumentation, and equipment were being maintained, controlled, and inventoried annually as required in the E-Plan.

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 being maintained. 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 always included 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. 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 (IFI) and would be reviewed during a future inspection (IFI 50-156/2007-201-01).

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 met with the Population Protection Planner for Dane County in Wisconsin to discuss emergency response to the UWNR in case of an emergency. The Dane County representative outlined the communications interface that existed between the county and the various university and city agencies when an emergency is reported. Also discussed was the support that would be provided by the City of Madison, Dane County, and the State of Wisconsin. The inspector concluded that the support needed in case of a serious problem at the reactor facility would be readily provided by the University Police and Madison Fire Department and that backup support would be available from the city and county if needed. There appeared to be a good working relationship between the licensee and Dane County.

The inspector and the UWNR Reactor Facility Director visited the Madison Fire Department (MFD), Station No. 4, and met with members of that "first responder" organization. In addition, the inspector and Reactor Director visited the MFD Station No. 6 and met with representatives from that station as well. Station No. 6 housed one of the city's Hazardous Incident Teams (HIT). In speaking with MFD first

responders and HIT team members it was evident that they were very knowledgeable and well equipped to handle medical, fire, and radiological emergencies at the Nuclear Reactor Laboratory. The inspector noted that there had been, and continued to be, good interaction between the personnel at the fire stations and the licensee 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 and training were being conducted as required by the E-Plan; and 6) emergency preparedness training for staff personnel was being completed as required.

**10. Exit Meeting Summary**

The inspection scope and results were summarized on August 9, 2007, with licensee representatives. The inspector discussed the findings for each area reviewed. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspector during this inspection.

## **PARTIAL LIST OF PERSONS CONTACTED**

### Licensee Personnel

R. Agasie, Reactor Director  
K. Austin, Reactor Research Manager  
M. Blanchard, Reactor Manager  
C. Edwards, Reactor Instrumentation Specialist  
A. Lee, Reactor Operator  
J. Prazak, Reactor Operator

### Other Personnel

A. Garcia-Rivera, Director, Environmental Health and Safety, University of Wisconsin  
T. Kenney, Occupational Health Officer, Environment, Health & Safety, University of Wisconsin  
P. Komarck, Lieutenant, Madison Fire Department, Station No.4  
L. Langer, Lieutenant, Madison Fire Department, Station No. 6 (HIT Team Unit)  
J. McLellan, Population Protection Planner, Dane County Emergency Management

## **INSPECTION PROCEDURES USED**

IP 69001      Class II Non-Power Reactors

## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

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.

### Closed

None

## **LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents and Management System
CFR	Code of Federal Regulations
E-Plan	Emergency Plan
IFI	Inspector Follow-up Item
IP	Inspection Procedure
LCO	Limiting Conditions of Operation
MFD	Madison Fire Department
MW	Megawatt
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