July 15, 2004

Mr. R. J. Agasie, Director
University of Wisconsin Nuclear Reactor Laboratory
Room 141 Mechanical Engineering
1513 University Avenue
Madison, WI 53706-1687

SUBJECT: NRC INSPECTION REPORT NO. 50-156/2004-201

Dear Mr. Agasie:

This letter refers to the inspection conducted on June 21-24, 2004, at your University of Wisconsin Nuclear Reactor Laboratory. 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 of 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 letter, please contact Craig Bassett at 404-562-4712.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report
cc w/encl: Please see next page

cc:

University of Wisconsin
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Radiation Safety Officer
Chemical and Radiation Protection
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Commission of Wisconsin
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Madison, WI 53702

Test, Research and Training
Reactor Newsletter
202 Nuclear Sciences Center
University of Florida
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:	50-156/2004-201
Licensee:	University of Wisconsin
Facility:	University of Wisconsin Nuclear Reactor Laboratory
Location:	Madison, WI
Dates:	June 21-24, 2004
Inspector:	Craig Bassett
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section New, Research and Test Reactors Program Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

University of Wisconsin
Nuclear Reactor Laboratory
Report No: 50-156/2004-201

The primary focus of this routine, announced inspection included onsite review of selected aspects of the licensee's Class II research reactor safety programs including: organizational structure and staffing, design control and review and audit functions, procedures, radiation protection, environmental protection, and transportation of radioactive materials since the last NRC inspection of these areas. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organizational Structure and Staffing

- The facility organization and staffing remain in compliance with the requirements specified in the Technical Specifications.

Review and Audit and Design Control Functions

- The review and audit program was being conducted acceptably by the Reactor Safety Committee.
- The latest change completed by the licensee was reviewed using the criteria specified in 10 CFR 50.59, reviewed by the Reactor Safety Committee, and determined to be acceptable.

Procedures

- Facility procedural review, revision, control, and implementation satisfied Technical Specification requirements.

Radiation Control

- Surveys were being completed and documented acceptably.
- Postings met the regulatory requirements.
- Personnel dosimetry was being worn as required and doses were well within NRC regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- Acceptable radiation protection training was being provided to staff members.
- The Radiation Protection and ALARA Programs were being acceptably implemented.

Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements.

- Releases were within the specified regulatory and Technical Specification limits.

Transportation of Radioactive Materials

- Radioactive material produced in the reactor was transferred to the campus broad scope license and shipped under the auspices of that license, transferred to other authorized users on campus, or maintained at the reactor facility for use in labs in accordance with procedure.

REPORT DETAILS

Summary of Plant Status

The University of Wisconsin's one megawatt research and test reactor continued to be operated in support of education, research, operator training, and various experiments. During this inspection, the reactor was operated two 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)

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Technical Specification (TS), Section 6.1, last updated by Amendment No. 13 to Facility License No. R-74 dated September 14, 1978, were being met:

- organizational structure
- management responsibilities
- staffing requirements for the research reactor facility
- University of Wisconsin Nuclear Reactor (UWNR) Procedure Number (No.) 001, "Standing Operating Instructions," Revision (Rev) 13, Reactor Safety Committee (RSC) approval dated May 14, 2004

b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that management responsibilities and the organization at the UWNR Laboratory had not changed since the previous NRC inspection in the area of health physics in May 2002 (Inspection Report No. 50-156/2001-201). However, since that inspection, it was noted that the facility had hired an individual who was assigned the position of Reactor Research Manager.

Through review of records and logs and through discussions with licensee personnel, the inspector determined that the staffing at the facility was acceptable to support the current workload and ongoing activities. The staffing met the requirements of the TS.

c. Conclusions

The licensee's organization and staffing remain in compliance with the requirements specified in the TS.

2. Review and Audit and Design Control Functions

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in the requirements of TS Sections 6.1 and 6.2 were being completed:

- Reactor Safety Committee (RSC) meeting minutes for 2002 to date
- TS duties specified for the RSC including review and audit functions
- Audits and reviews completed by Campus Safety Department and operations staff personnel and documented in the Health Physics Monthly Nuclear Reactor Audit and Report and in the Monthly Operation Summary respectively
- UWNR Procedure No. 005, “UWNR Administrative Guide,” Rev 41, RSC approval dated May 14, 2004
- UWNR Procedure No. 020, “UWNR Modification Checklist,” Rev 1, RSC approval dated May 14, 2004

b. Observations and Findings

(1) Review and Audit Functions

The inspector reviewed the RSC's meeting minutes from 2002 to the present. The meeting minutes showed that the committee met at the semiannual frequency required by the TS with a quorum being present. The inspector also noted that the RSC had considered the types of topics outlined by the TS. Review of the committee meeting minutes indicated the RSC provided appropriate guidance and direction for reactor operations, and ensured suitable use and oversight of the reactor.

It was noted that personnel from the Campus Safety Department and operations personnel completed audits and reviews of the radiation protection and security programs and that the audits were completed within the time frame stipulated by TS. These audits and reviews were submitted to the RSC for review as required. The inspector noted that the audits and reviews, and the resulting findings, were acceptable. If the findings contained recommendations for possible changes, the licensee responded and took corrective actions as deemed necessary.

(2) Design Change

Records and observations showed that the changes that had been proposed during 2003 and to date at the facility were acceptably reviewed in accordance with 10 CFR 50.59 and applicable administrative controls. These changes were then reviewed by the RSC, if required, determined to be acceptable, and approved when all RSC questions were resolved. None of the changes constituted a safety question or required a change to the TS.

Several facility modifications had been completed since the last inspection, many due to the current Mechanical Engineering Building renovation that was in progress. The last one involved replacing the reactor console recorder with a Honeywell Multitrend Plus V5 Paperless Recorder. The UWNR Modification Checklist was followed and completed as required. The licensee considered the criteria included in the revised 10 CFR 50.59 and concluded that the change was an acceptable change under the regulations. The RSC reviewed the change, even though it was not required. The change review and approval process appeared to be acceptable.

c. Conclusions

The review and audit program was being conducted acceptably by the RSC. The latest change completed by the licensee was reviewed using the criteria specified in 10 CFR 50.59, reviewed by the RSC, and determined to be acceptable.

3. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify that the licensee was complying with the requirements of TS Sections 6.5 and 6.6:

- records for procedure changes and temporary changes
- observation of procedure implementation
- related logs and records documenting procedure implementation
- selected administrative and standard operating procedures
- UWNR Procedure No. 001, “Standing Operating Instructions,” Rev 13, RSC approval dated May 14, 2004
- UWNR Procedure No. 005, “UWNR Administrative Guide,” Rev 41, RSC approval dated May 14, 2004

b. Observations and Findings

Procedures were available for those tasks and items required by the TS and facility directives. Written changes were reviewed and approved by the RSC as required. The procedures were reviewed annually as required by procedure with the last review being completed November 12, 2003, for UWNR Procedures numbered 150 - 200 and May 14, 2004, for UWNR Procedures numbered 001 - 149.

Training of personnel on procedures and changes was acceptable. Through observation of reactor operations and health physics functions, the inspector verified that personnel conducted TS related activities in accordance with applicable procedures. Records showed that procedures for potential malfunctions and emergencies (e.g., radioactive releases, contaminations, and reactor equipment problems) had been developed and were implemented as required.

c. Conclusions

Procedural review, revision, control, and implementation satisfied TS requirements.

4. Radiation Protection

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Part 20, TS Sections 4.2.3, 6.6, and 6.7.2 and the applicable procedural requirements:

- health physics survey records as documented in accordance with form UWNR No. 100, “Surveillance Activities,” Rev 38, RSC approval date May 7, 2001
- radiological signs and posting
- UWNR dosimetry records for 2002 through the present
- calibration and periodic check records for radiation monitoring instruments
- the Radiation Protection and ALARA Programs
- UW Safety Department Certificates documenting completion of the Radiation Worker training course
- UWNR Procedure No. 117, “Air Monitor Operating Procedure,” Rev 16, RSC approval dated May 14, 2004
- UWNR Procedure No. 118, “Area Radiation Monitor Operating Checks,” Rev 1, RSC approval dated May 14, 2004
- UWNR Procedure No. 171, “Air Monitor Calibration and Records,” Rev 22, RSC approval dated November 12, 2003
- UWNR Procedure No. 172, “Sampling and Calculation Procedure - Air Particulate Activity Samples,” Rev 12, RSC approval dated November 12, 2003
- UWNR Procedure No. 177, “Procedure for Use and Calibration of Health Physics Instruments,” Rev 19, RSC approval date May14, 2004

The inspector also toured the licensee's facility and observed the use of dosimetry and radiation monitoring equipment. Licensee personnel were interviewed as well.

b. Observations and Findings

(1) Surveys

The inspector reviewed monthly radiation and contamination surveys of licensee controlled areas completed by Campus Safety Department personnel. The inspector also reviewed various weekly monitor checks and monthly general area radiation and contamination surveys conducted by staff personnel. The surveys were of the Reactor Bay and other controlled and uncontrolled areas at the facility for the period from 2003 to date. The various periodic contamination and radiation surveys had been completed within the prescribed time frame required by procedure. Survey results were evaluated to ensure that established action levels had not exceeded . When readings or results were above these set levels, the licensee took the appropriate corrective actions.

During the inspection, the inspector conducted a radiation survey of the Reactor Bay area and other laboratory and storage areas and compared the readings detected with those found by the licensee. The results were comparable and no anomalies were noted.

(2) Postings and Notices

The inspector reviewed the postings at the entrances to selected controlled areas including the Control Room, the Reactor Bay, and various other areas in the Nuclear Reactor Laboratory. The postings were acceptable and indicated the radiation and contamination hazards present. Other postings also showed the industrial hygiene hazards present in the areas. The facility’s radioactive material

storage areas were properly posted. No unmarked radioactive material was noted. Copies of current notices to workers required by 10 CFR Part 19, including NRC Form-3, were posted in numerous locations in the facility including the Control Room, entrances/exits to the Reactor Bay, and in hallways.

(3) Dosimetry

The licensee used a National Voluntary Laboratory Accreditation Program (NVLAP) accredited vendor to process dosimeters monitoring exposure to the whole body from beta, gamma, and neutron radiation. The licensee used UW Personnel Radiation Dosimetry finger ring thermoluminescent dosimeters to monitor exposure to the extremities. (The UW Personnel Radiation Dosimetry Program was also NVLAP certified.) Through direct observation, the inspector noted that dosimetry was acceptably used by facility personnel. An examination of the records for the past two years through April of 2004 showed that all exposures were well within NRC regulatory limits. The highest annual whole body exposure received by a single individual for the year 2002 was 30 millirem deep dose equivalent (mr DDE). The highest annual extremity exposure for 2002 was 105 mr shallow dose equivalent (SDE). The highest annual whole body exposure received by a single individual for the year 2003 was 19 mr DDE. The highest annual extremity exposure for 2003 was 70 mr SDE.

(4) Radiation Monitoring Equipment

The calibration of portable survey meters, as well as area radiation monitors, was typically completed by reactor staff personnel. About half of the portable instruments were also taken to a high range facility, operated by the UW Radiation and Calibration Laboratory, for calibration of the upper ranges. Calibration frequency met procedural and/or TS requirements and records were maintained as required.

The inspector visited and observed the high range calibration facility on campus. It appeared to be properly posted, with adequate precautions and interlocks installed to provide for personnel safety during instrument calibration.

(5) Radiation Protection Program

The licensee's Radiation Protection Program was set forth in the University of Wisconsin manual entitled "Radiation Safety for Radiation Workers," Rev 0, dated July 2003. The program included requirements that all personnel who performed work in association with radioactive material were to receive training in radiation protection, policies, procedures, requirements, and facilities. The program appeared to be acceptable and was being reviewed annually as required.

(6) ALARA Program

The ALARA Program was also outlined and established in the University of Wisconsin manual "Radiation Safety for Radiation Workers" and in various UWNR guidance documents and procedures. The ALARA program provided

guidance for keeping doses as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20.

(7) Radiation Protection Training

As noted above, people who handled radioactive material, including licensee personnel, were required to receive training in radiation protection. This was accomplished by staff members attending a class, reading the manual, and successfully passing a written examination. The class consisted of a 1-hour lecture, a 2-hour demonstration/laboratory, and a 1-hour open-book multiple-choice test. Those who successfully completed the course were given a certificate by the Campus Safety Department. Completion of this training by reactor staff personnel was verified by Safety Department personnel as well as by the Reactor Director and/or the Reactor Manager.

The inspector reviewed documentation of the training provided to licensee staff members, including the certificates of completion. The documents indicated that all current staff members had received the required training. The inspector determined that the personnel training program satisfied requirements in 10 CFR 19.12. The training manual appeared to be very useful in helping people understand various concepts of radiation protection and the content and periodicity of training were acceptable.

(8) Facility Tours

The inspector toured the Control Room, Reactor Bay, adjacent laboratories, and support areas. Control of radioactive material and control of access to radiation areas were acceptable. As noted above, the inspector also conducted an independent radiation survey in various areas of the facility and determined that radiation levels recorded on licensee survey maps were representative and accurate.

c. Conclusions

The inspector determined that the Radiation Protection and ALARA Programs satisfied regulatory requirements because: 1) surveys were being completed and documented acceptably, 2) postings met regulatory requirements, 3) personnel dosimetry was being worn as required and doses were well within the NRC's regulatory limits, 4) radiation monitoring equipment was being maintained and calibrated as required, and, 5) acceptable radiation protection training was being provided.

5. Effluent and Environmental Monitoring

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with the requirements of 10 CFR Part 20 and TS Sections 3.4, 4.2.3, 5.4, and 6.6:

- airborne release records documented in the UWNR Monthly Operations Summary reports provided to the RSC for the period from 2003 to the present
- liquid release records documented on the forms UWNR 109 Calculations, UWNR 100, and summarized the in licensee's Annual Reports for the period from 2002 to 2003
- licensee Annual Reports for reporting periods: July 2001 - June 2002, and July 2002 - June 2003
- UWNR Procedure No. 100C, "Procedure for Gross Gamma Counting of Water Samples," Rev 16, RSC approval dated May 14, 2004
- UWNR Procedure No. 109, "Procedure for Liquid Waste Disposal," Rev 22, RSC approval dated May 14, 2004
- UWNR Procedure No. 117, "Air Monitor Operating Procedure," Rev 16, RSC approval dated May 14, 2004
- UWNR Procedure No. 118, "Area Radiation Monitor Operating Checks," Rev 1, RSC approval dated May 14, 2004
- UWNR Procedure No. 171, "Air Monitor Calibration and Records," Rev 22, RSC approval dated November 12, 2003
- UWNR Procedure No. 172, "Sampling and Calculation Procedure - Air Particulate Activity Samples," Rev 12, RSC approval dated November 12, 2003

b. Observation and Findings

The inspector reviewed the calibration records of the area and stack monitoring systems. These systems had been calibrated annually according to procedure. The weekly start-up check records for the monitoring equipment were also reviewed. Corrective actions were required if there were problems with the monitoring system start-up checks.

The inspector also reviewed the records documenting liquid and airborne releases to the environment for the past two years. The inspector determined that gaseous releases continued to be monitored and calculated as required by procedure and were adequately documented. The releases were determined to be within the annual dose constraints of 10 CFR 20.1101 (d), 10 CFR Part 20 Appendix B concentrations, and TS limits. Liquid releases were approved by the Senior Reactor Operator after analyses indicated that the releases would meet regulatory requirements for discharge into the sanitary sewer. This was in accordance with procedure and the results of the gaseous and liquid releases were acceptably documented in the Annual Operating Reports.

On-site and off-site gamma radiation monitoring was accomplished using various environmental optically stimulated luminescent dosimeters in accordance with the applicable procedures. The data indicated that there were no measurable doses above any regulatory limits. These results were also acceptably reported in the Annual Operating Reports for Fiscal Years 2001-2002 and 2002-2003. Through observation of the facility, the inspector found no new potential release paths.

c. Conclusions

Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

6. Transportation

a. Inspection Scope (IP 86740)

The inspector reviewed the following to verify compliance with regulatory and procedural requirements for shipping or transferring licensed material:

- selected records of radioactive material transfers for 2002 and to date
- UWNR Procedure No. 005, “UWNR Administrative Guide,” Rev 41, RSC approval dated May 14, 2004
- UWNR Procedure No. 023, “Procedure for Receipt of Radioactive Material Shipments,” Rev 4, RSC approval dated May 14, 2004
- Form UWNR 130, “Request for Isotope Production,” Rev 14, RSC approval dated May 14, 2004
- UWNR Procedure No. 131, “Production of Radioisotopes in Nuclear Reactor,” Rev 18, RSC approval dated May 14, 2004
- Form UWNR 134, “Request and Authorization for Services of the UW Reactor,” Rev 3, RSC approval dated May 14, 2004

b. Observations and Findings

Records showed that radioactive material produced in the reactor, and destined to be shipped off site, was transferred to UW Central Ordering, Receiving, and Distribution Office (CORD) through the Campus Safety Office. Material transfers were documented on Form UWNR 130, “Request for Isotope Production.” These radioactive materials were then shipped by CORD under the campus broad scope license, UM Material License No. 48-09843-18. Material to be used by UW authorized personnel was also transferred to the broad scope license and distributed by CORD. A list of UW authorized personnel was maintained by the licensee and documented on Form UWNR 134, “Request and Authorization for Services of the UW Reactor.” The program for radioactive material transfer and transport was consistent with license and procedural requirements. The documents indicated the transfer of material had been signed for by Campus Safety Department personnel and distributed to authorized individuals as required.

The other radioactive materials produced in the reactor were maintained under the reactor license for use in labs, used for re-irradiation, or held for decay.

c. Conclusions

Radioactive material produced in the reactor was transferred to the campus broad scope license and shipped under the auspices of that license, transferred to other authorized users on campus, or maintained at the reactor facility for use in labs in accordance with procedure.

7. Follow-up On Previous Inspection Findings

a. Inspection Scope

The inspector reviewed the actions taken by the licensee following identification of an Inspector Follow-up Item (IFI) during a previous inspection in May of 2002 and documented in NRC Inspection Report No. 50-156/2002-201.

b. Observations and Findings

IFI 50-156/2002-201-01- Follow-up on resolution of the problems noted with the current system of tracking personal exposure for licensee personnel.

During a previous inspection, the inspector had noted that various vendors had been used to process the licensee's dosimetry and track personnel exposure. This often led to different "tracking numbers" being assigned to each individual and consequently to some confusion about the total dose received by each person monitored. While a careful review of the records indicated that no licensee personnel received more than the above mentioned doses per year, it was not easily discernible from the records who had received what dose. This was noted as an area for improvement and as an IFI.

During the current inspection, the inspector noted that the issue of having various tracking numbers per individual had been resolved. One dosimetry vendor had been used consistently and the individually assigned numbers and whole body doses were more readily tracked. The aforementioned IFI is considered closed.

c. Conclusions

One previously identified IFI was reviewed and closed.

8. Exit Meeting Summary

The inspection scope and results were summarized on June 24, 2004, with licensee representatives. The inspector discussed the findings for each area reviewed. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Agasie, Reactor Director
M. Blanchard, Reactor Research Manager
M. Corradini, Chairman, Department of Engineering Physics
S. Matusewic, Reactor Supervisor
J. Murphy, Senior Reactor Operator

Safety Department

A. Ben-Zikri, Alternate Radiation Safety Officer/Advanced Health Physicist
R. Bresell, Associate Director, Chemical and Radiation Protection Safety Department - FP&M and Radiation Safety Officer

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors
IP 86740	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

50-156/2002-201-01	IFI	Follow-up on resolution of the problems noted with the current system of tracking personal exposure for licensee personnel.

LIST OF ACRONYMS USED

ALARA	As low as reasonably achievable
CFR	Code of Federal Regulations
CORD	UW Central Ordering, Receiving, and Distribution Office
IFI	Inspector Follow-up Item
IP	Inspection Procedure
HP	Health physics
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
RSC	Reactor Safety Committee
RTR	Research and Test Reactor
TS	Technical Specifications
UW	University of Wisconsin
UWNR	University of Wisconsin Nuclear Reactor