



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

June 1, 2022

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

SUBJECT: UNIVERSITY OF WISCONSIN – U.S. NUCLEAR REGULATORY
COMMISSION ROUTINE INSPECTION REPORT NO. 05000156/2022201

Dear Mr. Agasie:

From April 4 - 7, 2022, the U.S. Nuclear Regulatory Commission (NRC or Commission) staff conducted a routine inspection at the University of Wisconsin's Nuclear Reactor Laboratory. The enclosed report documents the inspection results discussed on April 7, 2022, with you, the Reactor Supervisor, and members of the College of Engineering and Environmental Health and Safety Department.

This inspection examined activities conducted under the license for the University of Wisconsin as it relates to the safety and compliance under the Commission's rules and regulations as well as the conditions of the license. The inspector reviewed selected procedures and records, observed activities, and interviewed various personnel. Based on the results of this inspection, no findings of significance were identified. Therefore, no response to this letter is required.

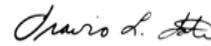
In accordance with Title 10 of the *Code of Federal Regulations*, Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and a response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the 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).

R. Agasie

- 2 -

If you have any questions concerning this inspection, please contact Craig Bassett at (240) 535-1842, or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,



Signed by Tate, Travis
on 06/01/22

Travis L. Tate, Chief
Non-Power Production and Utilization
Facility Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

cc: See next page

University of Wisconsin

Docket No. 50-156

cc:

Mayor of Madison
City Hall
210 Martin Luther King Jr. Boulevard
Room 403
Madison, WI 53703

Chairman, Public Service
Commission of Wisconsin
610 North Whitney Way
Madison, WI 53707-7854

Paul Schmidt, Manager
Radiation Protection Section
Division of Public Health
Wisconsin Dept of Health Services
P.O. Box 2659
Madison, WI 53701-2659

Test, Research and Training
Reactor Newsletter
Attention: Amber Johnson
Dept of Materials Science and Engineering
University of Maryland
4418 Stadium Drive
College Park, MD 20742-2115

Jason Timm, Assistant Director
& Radiation Safety Officer
University of Madison - Wisconsin
Department Environmental Health & Safety
Environmental Protection and Safety Bldg.
30 E. Campus Mall
Madison, WI 53715

SUBJECT: UNIVERSITY OF WISCONSIN – U.S. NUCLEAR REGULATORY COMMISSION
ROUTINE INSPECTION REPORT NO. 05000156/2022201
DATED: JUNE 1, 2022

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

Docket No.: 50-156

License No.: R-74

Report No.: 05000156/2022201

Licensee: University of Wisconsin

Facility: University of Wisconsin Nuclear Reactor

Location: Madison, Wisconsin

Dates: April 4 - 7, 2022

Inspector: Craig Bassett

Approved by: Travis L. Tate, Chief
Non-Power Production and Utilization
Facility Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

University of Wisconsin
Nuclear Reactor Laboratory
Inspection Report No. 05000156/2022201

The primary focus of this routine, announced inspection included the onsite review of the selected aspects of the University of Wisconsin (UW, licensee) 1-megawatt Class II research reactor safety program including: (1) organization and staffing; (2) procedures; (3) health physics, (4) design changes; (5) committees, audits and reviews; (6) emergency planning; and (7) transportation activities since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The NRC staff determined that the licensee's program was acceptably directed toward the protection of public health and safety, and in compliance with the NRC's requirements.

Organization and Staffing

- The facility organization was in compliance with the requirements in the technical specifications (TSs), and the staffing was adequate to support the present operations.

Procedures

- Procedural control, review, revision, and approval satisfied the requirements specified in Section 6.4, "Procedures," of the TSs.

Health Physics

- The Radiation Protection and As Low As Reasonably Achievable (ALARA) Programs were established and implemented in accordance with TS and regulatory requirements.

Design Changes

- The Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59, "Changes, tests and experiments," modification process at the facility was implemented and followed.

Committees, Audits and Reviews

- The review and audit functions required by TS Section 6.2, "Review and Audit," were acceptably completed by the Reactor Safety Committee (RSC).

Emergency Planning

- Facility emergency preparedness was maintained through implementation of the Emergency Plan (E-Plan) and Implementing Procedures.

Transportation Activities

- Radioactive materials were either transferred to the campus's broad scope license and shipped under that license or transferred to other authorized users on campus.

REPORT DETAILS

Summary of Facility Status

The UW continued to operate the 1-megawatt TRIGA conversion reactor as needed in support of laboratory and lecture courses, research in neutron irradiation, and the Reactor Sharing Program. During this inspection, the reactor was operated on various days for course work and operator training.

1. **Organization and Staffing**

a. Inspection Scope (Inspection Procedure [IP] 69001, Section 02.01)

To verify that the organization and staffing requirements specified in TS Section 6.1, "Organization," and associated procedures were met, the inspector reviewed:

- staffing during reactor operations;
- organizational structure for the Nuclear Reactor Laboratory;
- selected "Operations Log Sheets," checklists, and associated forms and records for 2020 through the present;
- UW Nuclear Reactor (UWNR) Procedure Number (No.) 001; and
- The University of Wisconsin Nuclear Reactor Laboratory Annual Operating Reports for the periods from July 2019, through June 2020, and July 2020, through June 2021.

b. Observations and Findings

The inspector confirmed that management responsibilities and the organizational structure at the UWNR Laboratory had not changed since the previous NRC inspection of radiation protection in September 2020. The inspector noted that there were currently two full-time staff members working at the facility, the Reactor Director and the Reactor Supervisor. The inspector confirmed there were also four student reactor operators and three reactor operator trainees working part-time at the facility. The inspector verified that the staffing at the facility during reactor operation was as stipulated in the TSs.

c. Conclusion

The inspector determined that the licensee's organization and staffing were in compliance with the requirements specified in the TSs.

2. Procedures

a. Inspection Scope (IP 69001, Section 02.03)

To verify that facility procedures met the requirements outlined in TS Section 6.4, the inspector reviewed:

- UWNR Administrative Procedure No. 005;
- procedure reviews and updates as documented in the RSC meeting minutes;
- selected operating procedures and associated forms and checklists; and
- UWNR annual operating reports for the past two reporting periods.

b. Observations and Findings

The inspector noted that the licensee had developed procedures for the operations and tasks listed in Section 6.4 of the TSs. The inspector confirmed that the procedures were audited and/or reviewed annually and were updated as needed. The inspector verified that the latest revisions of the selected procedures and forms went through the review and approval process as required by UWNR procedures.

c. Conclusion

The inspector determined that the facility procedures satisfied the TS Section 6.4 requirements and the procedure reviews were completed annually.

3. Health Physics

a. Inspection Scope (IP 69001, Section 02.07)

The inspector reviewed the following to verify compliance with 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," and 10 CFR Part 20, "Standards for Protection against Radiation," and as well as with TS Section 3.7, "Radiation Monitoring Systems and Effluents," and TS Section 4.7, "Radiation Monitoring Systems and Effluents":

- radiological signs and posting in various areas of the facility;
- various records during calendar year 2020, through the present including: "Monthly Operation Summary Reports"; UWNR dosimetry records; annual ALARA/annual radiation safety audits; "Monthly Health Physics Nuclear Reactor Audits and Reports"; calibration records and periodic checks for radiation monitoring instruments; liquid release and airborne release records; and solid waste disposal records;

- UW Environmental Health and Safety (EH&S) department manual entitled “Radiation Safety for Radiation Workers”;
- various UWNR Procedure Forms including Nos. 031 and 100;
- various UWNR Procedures including Nos. 100C, 109, 117, 118, 171, and 177;
- documentation of atmospheric dose calculations using the Environmental Protection Agency COMPLY program Version 1.6; and
- UWNR annual operating reports for the past two reporting periods.

b. Observations and Findings

(1) Surveys, Postings, and Notices

The inspector verified that periodic contamination and radiation surveys were completed within the prescribed time frame required by the procedures. The inspector also confirmed that survey results were evaluated to ensure that established action levels were not exceeded. In addition, the inspector accompanied reactor staff members during a routine contamination survey of the controlled areas of the facility. No anomalies or problems were noted.

During tours of the facility, the inspector verified that restrictions established for the controlled areas were appropriate for the hazards involving radiation, high radiation, and contamination and were posted as required by the regulations. The inspector also confirmed that copies of current notices to workers were posted conspicuously in various areas in the facility. The copies of NRC Form 3, “Notice to Employees,” noted at the facility were verified to be the latest issue and were posted as required by the regulations.

(2) Dosimetry and Radiation Monitoring Equipment

The inspector verified that the licensee used optically-stimulated luminescent dosimeters (OSLs) for whole body monitoring and thermoluminescent dosimeter (TLD) finger rings for monitoring of the extremities. The inspector confirmed that dosimetry was acceptably used by facility personnel in accordance with facility radiation protection requirements. Through an examination of the OSL and TLD results, the inspector verified that facility personnel occupational doses were well within 10 CFR Part 20 limits.

The inspector verified that the calibration frequency of fixed and portable radiation monitoring equipment met procedural and TS requirements and records were maintained as required.

(3) Radiation Protection and ALARA Programs and Training

The inspector confirmed that the licensee's Radiation Protection and ALARA Programs were established in the UW EH&S Department manual entitled "Radiation Safety for Radiation Workers," 2005 Edition, and were implemented through UWNR Laboratory guidance documents and procedures. The ALARA program provided guidance for keeping doses as low as possible and was consistent with the guidance in 10 CFR Part 20.

The inspector verified that those who handled radioactive material, including licensee personnel and students, were required to receive training in radiation protection. The inspector confirmed that the completion of this training, by reactor staff personnel, was verified by EH&S Department personnel as well as by the Reactor Director and/or the Reactor Supervisor. The inspector verified that radiation protection refresher training was conducted annually, and all reactor staff members have completed the initial and subsequent training.

(4) Effluent and Environmental Monitoring

The inspector confirmed that liquid releases to the sanitary sewer met regulatory requirements for discharge. The inspector also confirmed that solid waste was transferred to the UW EH&S Radiation Safety Unit for disposal. The inspector noted that releases and transfers were accomplished in accordance with the procedures and the results of the releases and waste transfers were documented in the operating log records as well as in the Annual Operating Reports.

The inspector verified that on-site and off-site gamma radiation monitoring was accomplished using various environmental OSL dosimeters in accordance with the applicable procedures. The inspector confirmed the OSL dosimetry results indicated that doses to the public did not exceed any regulatory limits and were also acceptably reported in the facility annual operating reports.

c. Conclusion

The inspector determined that the Radiation Protection and ALARA Programs were established and implemented in accordance with regulatory requirements.

4. Design Changes

a. Inspection Scope (IP 69001, Section 02.08)

In order to verify that the reviews required by TS Section 6.2 were completed by the RSC, and to determine whether modifications to the facility were consistent with 10 CFR 50.59 guidance, the inspector reviewed:

- RSC meeting minutes from May 2020, through the present;

- records of changes and/or modifications to the facility, experiments, and procedures;
- UWNR Procedures Nos. 005, 019, and 020;
- various “Experiment Modification Questionnaire” forms documenting proposed changes to experiments; and
- UWNR annual operating reports for the past two reporting periods.

b. Observation and Findings

The inspector confirmed that various modifications and new or modified experiments were forwarded to the RSC for approval since the last NRC inspection. The inspector verified that the licensee followed its established change control and modification program and that the required reviews and approvals of the changes or modifications were completed by the RSC prior to implementation. No recent changes required NRC approval.

c. Conclusion

The inspector determined that the licensee’s process for reviewing and approving changes was followed and no recent changes required NRC approval.

5. Committees, Audits and Reviews

a. Inspection Scope (IP 69001, Section 02.09)

In order to verify that the reviews and audits required by TS Section 6.2 were completed by the RSC, the inspector reviewed:

- RSC meeting minutes from May 2020, through the present;
- records of changes and/or modifications to the facility, experiments, and procedures;
- audits completed by the Radiation Safety Office staff and the operations staff for calendar years 2020 and 2021;
- annual ALARA/Radiation Safety Audits of the facility Radiation Protection Program; and
- UWNR annual operating reports for the past two reporting periods.

b. Observations and Findings

The inspector verified that the RSC met at the required frequency and that a quorum was present. The inspector noted that the RSC, or a designated subcommittee, completed reviews of those items and documents required by the

TSs. The inspector confirmed that the RSC provided oversight and direction for the reactor.

The inspector noted that various audits were conducted as required by the TSs and the RSC reviewed the results. The inspector confirmed that the audits and the resulting findings were documented, and the licensee took actions to correct the findings as needed. The inspector verified that major facility documents and plans were reviewed annually.

c. Conclusion

The inspector determined that the review and audit functions required by TS Section 6.2 were acceptably completed by the RSC.

6. **Emergency Planning**

a. Inspection Scope (IP 69001, Section 02.10)

To ensure that the licensee's emergency response program was conducted in accordance with the facility E-Plan, the inspector reviewed:

- offsite support for the UWNR facility;
- records of emergency and evacuation drills;
- training records regarding emergency response for the facility staff; and
- various UWNR Procedures including Procedures Nos. 150, 152, and 157.

b. Observations and Findings

The inspector verified that the E-Plan was audited and reviewed annually. The inspector confirmed that the E-Plan Implementing Procedures, i.e., UWNR Procedure Nos. 150-154, 156 and 157, were also reviewed annually and revised as needed.

The inspector verified that the licensee maintained the specified materials in the Emergency Support Center at the facility and noted that the required supplies, instrumentation, and equipment were inventoried annually as required by the E-Plan. The inspector confirmed that emergency drills for operations personnel were conducted semiannually as required by the E-Plan. The inspector confirmed that a critique was held following each drill and the results were documented.

The inspector confirmed that emergency responders were knowledgeable of the proper actions to take in case of an emergency. The inspector verified that two agreements, one with an on-site support group (UW Engineering External Relations) and one with an offsite response organization (the UW Hospital and Clinics), were updated every two years and were maintained as required by the E-Plan. The inspector verified that emergency response training for reactor staff

personnel was conducted and documented through the operator requalification program.

c. Conclusion

The inspector determined that the emergency preparedness program was conducted in accordance with the E-Plan and implementing procedures.

7. Transportation Activities

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 during calendar year 2020, to the present;
- various UWNR Procedures including Nos. 005, 023, 100 B, and 131; and
- various UWNR Procedure Forms including Nos. 100B, 130, and 134.

b. Observations and Findings

The inspector confirmed that the radioactive material, which was produced in the reactor and destined to be shipped off site, was transferred to the campus Radiation Safety Officer in the UW EH&S Department. The inspector verified that this radioactive material was then shipped by the reactor staff but under the campus's State broad scope license. The inspector reviewed the shipping forms for various shipments and found that they were filled out correctly. The inspector verified that both the Reactor Director and the Reactor Supervisor were qualified shippers. The inspector confirmed that they had received the appropriate training and the training was current.

The inspector found that, if radioactive waste was to be shipped from the reactor, the material was transferred to the UW EH&S Office of Radiation Safety and then shipped by that group for disposal under the broad scope license.

c. Conclusion

The inspector determined that radioactive material produced in the reactor was transferred to the campus broad scope license and shipped under that license.

8. Exit Meeting Summary

The inspection scope and results were summarized on April 6, 2022, with various members of licensee management. The inspector discussed the findings for each area reviewed. The licensee acknowledged the results of the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

R. Agasie Reactor Director
N. Bolling Reactor Operator
A. Boyd Reactor Operator
C. Edwards Reactor Supervisor
Z. Helgert Reactor Operator

Other Personnel

J. Decker Director of Safety, College of Engineering, UW
J. Haas Associate Radiation Safety Officer, Radiation Safety Office, Environmental,
Health, and Safety Department, UW
D. Miron Health Physicist, Radiation Safety Office, Environmental Health, and Safety
Department, UW
I. Robertson Dean, College of Engineering, UW
O. Schmitz Associate Dean for Research, College of Engineering, UW
C. Strang Assistant Vice Chancellor, Environmental Health and Safety
J. Timm Radiation Safety Officer, Radiation Safety Office, Environmental, Health, and
Safety Department, UW
P. Wilson Chair, Engineering Physics Department, College of Engineering, UW and
Member of the Reactor Safety Committee

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

None