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

June 2, 2021

Mr. Robert J. 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. 05000156/2021201

Dear Mr. Agasie:

From May 10 - 13, 2021, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the University of Wisconsin Nuclear Reactor. The enclosed report documents the inspection results, which were discussed on May 13, 2021, with you, Corey Edwards, Reactor Supervisor; Dr. Douglass Henderson, Chair of the Engineering Physics Department; and Dr. Paul Wilson, Reactor Safety Committee member.

This 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 observed various activities in progress, interviewed personnel, and reviewed selected procedures and records. 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, 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 240-535-1842, or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

O'Bryan, Philip signing on behalf of Tate, Travis
on 06/02/21

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

cc:

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Test, Research and Training
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Attention: Amber Johnson
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Jason Timm, Assistant Director
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SUBJECT: UNIVERSITY OF WISCONSIN – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 05000156/2021201
DATED: June 2, 2021

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

Docket No.:	50-156
License No.:	R-74
Report No.:	05000156/2021201
Licensee:	University of Wisconsin
Facility:	University of Wisconsin Nuclear Reactor
Location:	Madison, WI
Dates:	May 10-13, 2021
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
University of Wisconsin Nuclear Reactor
Inspection Report No. 05000156/2021201

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) operations logs and records; (3) procedures; (4) requalification training; (5) surveillance and limiting conditions for operation (LCOs); (6) design changes; (7) committees, audits and reviews; (8) emergency planning; (9) maintenance logs and records; and (10) fuel handling logs and records. The U.S. Nuclear Regulatory Commission (NRC) staff determined the licensee's program was acceptably directed toward the protection of public health and safety and in compliance with NRC requirements.

Organization and Staffing

- The organizational structure and staffing were consistent with technical specifications (TSs) requirements.

Operations Logs and Records

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

Procedures

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

Requalification Training

- The operator requalification/training program was up-to-date and maintained.

Surveillance and Limiting Conditions for Operation

- The program for tracking and completing surveillance checks and LCO verifications satisfied TS requirements and licensee administrative and procedural controls.

Design Changes

- The licensee's design change protocol was followed and design changes were reviewed and/or evaluated in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, tests and experiments."

Committees, Audits and Reviews

- Audits and reviews conducted by the Reactor Safety Committee (RSC) were in accordance with TS Section 6.2 and the RSC met at the required periodicity.

Emergency Planning

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

Maintenance Logs and Records

- Maintenance logs and records were kept and maintenance activities were conducted in accordance with procedural requirements.

Fuel Handling Logs and Records

- Fuel handling activities and documentation were completed in accordance with TS Sections 3.1, 4.1, 5.3, and 5.4, and facility procedures.

REPORT DETAILS

Summary of Plant Status

The University of Wisconsin (UW) continued to operate their one megawatt TRIGA [Training, Research, Isotopes, General Atomics] conversion reactor as needed in support of laboratory and lecture courses, research in various areas including neutron irradiation, and reactor operator training. During this inspection, the reactor was operated on various occasions at varying power levels for training and to support research.

1. Organization and Staffing

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

To verify that the organization, responsibility, and staffing requirements specified in Section 6.1 of the facility TSs (designated as Appendix A of the UW Nuclear Reactor renewed license, dated March 25, 2011) were met, the inspector reviewed selected aspects of the following:

- management responsibilities stipulated in the TSs
- staffing requirements for operation of the reactor facility
- organizational structure of the Nuclear Reactor Laboratory
- selected operating records for 2020 through the present
- UW Nuclear Reactor (UWNR) Procedure Number (No.) 001, "Standing Operating Instructions," Revision (Rev.) 17
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2018 – 2019 Annual Operating Report," for the period from July 2018 through June 2019, submitted to the NRC on December 6, 2019
- "The University of Wisconsin Nuclear Reactor Laboratory Fiscal Year 2019 – 2020 Annual Operating Report," for the period from July 2019 through June 2020, submitted to the NRC on September 25, 2020

b. Observations and Findings

Through discussions with licensee representatives, the inspector noted that management responsibilities and the organization at the UWNR Laboratory had not changed since the previous NRC inspection of this material in September 2020 (Inspection Report No. 05000156/2020202).

The inspector noted that the licensee's current operational organization consisted of a Reactor Director, a Reactor Supervisor, and five reactor operators (ROs). In addition to their administrative duties, the Director and Supervisor were qualified senior reactor operators (SROs). The inspector confirmed that the organization was consistent with that specified in the TSs.

The inspector reviewed selected reactor operating records for the past 2 years and found that they were maintained as required by facility procedures. The inspector verified that shift staffing met the requirements for duty, relief, and on-call personnel.

c. Conclusion

The inspector determined that the licensee's organization and staffing met the requirements specified in the TSs and applicable procedures.

2. Operations Logs and Records

a. Inspection Scope (IP 69001, Section 02.02)

The inspector reviewed selected aspects of the following to ensure that actions taken during routine operations were in accordance with TS Sections 3 and 4, and that actions following abnormal occurrences, were in compliance with TS Sections 6.6 and 6.7, and with the procedures specified in TS Section 6.4:

- selected operating records for 2020 through the present
- UWNR operators turn-over log maintained on the computer in the control room
- selected audits completed by Radiation Safety Department staff personnel and reviews completed by operations staff personnel documented in monthly reports for 2020 and to date in 2021
- various UWNR Procedures including Procedure No. 001, "Standing Operating Instructions," Rev. 18; Procedure No. 110, "Daily Reactor Pre-Startup Checklist," Rev. 54; Procedure No. 111, "Reactor Startup Check Sheet," Rev. 48; Procedure No. 112, "Operating Log Sheet," Rev. 10; Procedure No. 114, "Reactor Shutdown Checklist," Rev. No 20; and, Procedure No. 115, "Scram," Rev. 7
- the two most recent Annual Operating Reports issued by the facility

b. Observations and Findings

The inspector observed reactor operations during the inspection. The inspector verified that these operations were conducted in accordance with TS requirements and the applicable procedures. The inspector also reviewed selected records, checklists and forms from 2020 through the present. The inspector noted that scrams were identified on specific forms in the logs and records, reported as required by procedure, and their cause(s) resolved before operations were resumed under the authorization of a licensed SRO. The inspector verified that the information required to be recorded by the TSs and various procedures was logged on the appropriate forms.

c. Conclusion

The inspector determined that reactor operations and other required actions were completed in accordance with TS requirements and applicable procedures.

3. Procedures

a. Inspection Scope (IP 69001, Section 02.03)

To determine whether facility procedures met the requirements outlined in TS Section 6.4, 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. 005, "UWNR Administrative Guide," Rev. 61
- the two most recent Annual Operating Reports issued by the facility

b. Observations and Findings

The inspector determined that the licensee developed procedures for the operations, tasks, and conditions listed in Section 6.4 of the TSs. The inspector noted that UWNR Procedure No. 001 specified the role and use of procedures at the facility. The inspector verified that the licensee's procedures, forms, and checklists were appropriate for the current facility status and level of operations, and that the procedures were audited and reviewed annually as required by the TSs and were updated as needed.

c. Conclusion

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

4. Requalification Training

a. Inspection Scope (IP 69001, Section 02.04)

To determine that operator requalification activities and training were conducted in accordance with the licensee's operator requalification program and 10 CFR Part 55, "Operators' Licenses," and that medical requirements were met, the inspector reviewed:

- active operators' license status
- written examination records for 2019 and 2020
- operator medical examination records from 2018 to the present
- The UWNR operator requalification program outlined in UWNR Procedure No. 004, "University of Wisconsin Nuclear Reactor Operator Proficiency Maintenance Program," Rev. 4
- selected operating records for 2019 through the present including reactivity manipulations documented on forms associated with UWNR Procedure No. 112, "Operating Log Sheet," Rev. 10
- audits completed by operations staff personnel documented in monthly reports submitted to the RSC entitled "Monthly Operations Summary," for 2020 and to date in 2021
- training status record forms for selected individuals for 2019 and 2020

- UWNR operator evaluation check sheet records for the past 2 years
- UWNR operator proficiency maintenance program - class record sheets for the past 2 years
- the two most recent Annual Operating Reports issued by the facility

b. Observations and Findings

The inspector verified there were two qualified SROs who were full-time university employees working at the facility as well as five part-time student ROs. The inspector confirmed that all of the operators' licenses were current. The inspector noted that there were two full-time university employees in training to become qualified operators to be available in case of medical or other emergency.

Through a review of facility logs and records, the inspector confirmed that training and lectures were conducted in accordance with the licensee's requalification program. The inspector also noted that annual written examinations were administered to operators as stipulated in the requalification program. The inspector verified that activities, such as reactivity manipulations, various supervisory activities, quarterly performance evaluations, and semiannual drill participation were completed by each licensed operator as required by the requalification program. Through discussions with licensed operators and a review of records, the inspector also verified that each operator received a biennial medical examination.

c. Conclusion

The inspector determined that the requirements of the operator requalification program were met and the program was implemented.

5. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001, Section 02.05)

To determine that surveillance and LCO activities and verifications were completed as required by TS Sections 3 and 4, the inspector reviewed:

- selected preventive maintenance records for 2020 and to date in 2021
- selected forms and records associated with various procedures UWNR including UWNR Procedure No. 100, "Surveillance Activities," Rev. 58 and Procedure No. 169, "Annual Maintenance Procedure," Rev. 17
- the two most recent Annual Operating Reports issued by the facility

b. Observations and Findings

The inspector verified that daily, weekly, monthly, semiannual, and annual checks, tests, and verifications for selected surveillance and LCO activities were completed as stipulated by procedure. The inspector also confirmed that surveillance and LCO verifications were completed on schedule. All the recorded results reviewed by the inspector were within the TSs and procedurally

prescribed parameters. The inspector noted that records and logs were maintained as required facility procedures.

c. Conclusion

The inspector determined that the program for surveillance and LCO verifications was carried out in accordance with TSs and facility procedural requirements.

6. Design Changes

a. Inspection Scope (IP 69001, Section 02.08)

In order to determine whether modifications to the facility were consistent with 10 CFR 50.59, the inspector reviewed:

- RSC meeting minutes from May 2019 through the present
- records of design changes and/or modifications to the facility documented on forms entitled, "UWNR Modification Checklist," "Safety Screening," and "Safety Evaluation"
- UWNR Procedure No. 005, "UWNR Administrative Guide," Rev. 61
- UWNR Procedure No. 019, "Changes, Tests, and Experiments," Rev. 4
- the two most recent Annual Operating Reports issued by the facility

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspector found that the licensee was reinstalling a neutron collimator that was used previously. The inspector verified that the licensee followed the established design change control program and conducted an evaluation as required by procedure. The evaluation indicated no increase in the likelihood of any of the criteria listed in 10 CFR 50.59 and therefore no approval by the RSC was needed prior to implementation. The inspector noted that the design change procedure was followed and used properly.

c. Conclusion

The inspector determined that the licensee followed the 10 CFR 50.59 process for reviewing and approving design changes at the facility.

7. Committees, Audits and Reviews

a. Inspection Scope (IP 69001, Section 02.09)

In order to verify that reviews required by TS Section 6.2.3 were completed by the RSC and that the audits stipulated in TS Section 6.2.4 were conducted by the Radiation Safety office and the RSC, the inspector reviewed:

- the current RSC charter dated May 25, 2016
- RSC meeting minutes from May 2019 through the present
- selected operating records for 2020 and to date in 2021

- selected audits completed by Radiation Safety Department staff personnel and reviews completed by operations staff personnel
- audits of the facility Requalification Plan, the E-Plan, and the Security Plan
- UWNR Procedure No. 005, "UWNR Administrative Guide," Rev. 61
- the two most recent Annual Operating Reports issued by the facility

b. Observations and Findings

The inspector reviewed the RSC's meeting minutes from May 2019 to the present. These meeting minutes demonstrated that the RSC met at the required frequency and that a quorum was present. The inspector noted that the minutes also indicated that the RSC, or a designated subcommittee, was completing reviews of those items and documents required by the TSs. The inspector confirmed that the RSC was providing oversight for reactor operations.

The inspector noted that various audits were conducted at the facility in the areas of reactor operations, radiation protection, emergency preparedness, security, requalification of operators, and procedures. The inspector noted that the RSC reviewed these audits as required by the TSs. The inspector also verified that the licensee took corrective actions for findings as needed.

c. Conclusion

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

8. 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 facility staff
- various UWNR Procedures including: Procedure No. 150, "Reactor Accident, Fission Product Release, or Major Spill of Radioactive Materials," Rev. 22, Procedure No. 152, "Suspected Fission Product Leak," Rev. 15, and Procedure No. 157, "Fire; Radioactive Material Spills; Radioactive Dust, Fumes, and Gases; Personnel Injuries Involving Radioactivity; Personnel Overexposures," Rev. 13

b. Observations and Findings

The inspector noted that the E-Plan in use at the UWNR Laboratory was the facility procedure, UWNR Procedure No. 006, "University of Wisconsin Nuclear Reactor Emergency Plan," Rev. 7. The inspector verified that the E-Plan was audited and reviewed annually. The inspector found that the E-Plan

Implementing Procedures, UWNR Procedure Nos.150-154, 156 and 157, were also reviewed annually and revised as needed.

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

Through records review and interviews with licensee personnel, the inspector confirmed that emergency responders were knowledgeable of the proper actions to take in case of an emergency. The inspector noted 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 2 years and were maintained as required by the E-Plan. The inspector also found that communications capabilities with these support groups were tested periodically and were acceptable. The inspector verified that training for reactor staff personnel in emergency response was conducted and documented through the operator requalification program.

c. Conclusion

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

9. Maintenance Logs and Records

a. Inspection Scope (IP 69001, Section 02.011)

To determine that maintenance activities were conducted in accordance with facility requirements, the inspector reviewed:

- computer files documenting equipment history records for the facility
- selected preventive maintenance records for 2019 through 2021
- selected forms and records associated with various UWNR Procedures including Procedure No. 100, “Surveillance Activities,” Rev. 58, and Procedure No. 169, “Annual Maintenance Procedure,” Rev. 18
- the two most recent Annual Operating Reports issued by the facility

b. Observations and Findings

The inspector reviewed the maintenance that was completed for 2020 and to date in 2021. The inspector verified that various maintenance activities were conducted monthly and others annually as required by facility procedures. The inspector noted that the majority of the annual maintenance was completed in June each year. The inspector noted that annual maintenance activities included fuel inspection; reflector, control blades, and transient rod inspection; fuel temperature monitor calibration; core inlet monitor calibration; and, reactor

ventilation operation. The inspector confirmed that preventive maintenance items were also tracked and conducted as scheduled. Any problems found were addressed in accordance with the TSs, applicable procedures, or equipment manuals. The inspector verified that unscheduled maintenance or repairs were reviewed to determine if they required a 10 CFR 50.59 evaluation.

c. Conclusion

The inspector determined that maintenance logs and records were maintained and maintenance activities were conducted in accordance with procedural requirements.

10. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001, Section 02.012)

In order to verify adherence to fuel handling, use, and inspection requirements specified in TS Sections 3.1.6 and 4.1.5, the inspector reviewed:

- core status boards located at the reactor pool top and in the control room and the associated fuel element/bundle map
- selected operating records for 2020 and to date in 2021
- various UWNR Procedures including: Procedure No. 142, “Procedure for Measuring Fuel Element Bow and Growth,” Rev. 16; Procedure No. 143, “Procedure for Fuel Handling and Core Arrangements,” Rev. 3 (including “Fuel Movement Log Sheet” forms); and Procedure No. 143A, “Core Loading Diagram,” Rev. 4

b. Observations and Findings

The inspector confirmed that procedures and controls specified for fuel handling operations were established and followed. The inspector verified that the fuel elements in the core and in storage were inspected annually as required by TSs. The results of the inspections were recorded as required and comments on the condition of each element were noted. The inspector also confirmed that the various fuel movements were completed using Fuel Movement Log Sheets. The current core was designated as Core K21-R6.

c. Conclusion

The inspector determined that the reactor fuel movements and inspections were completed and documented in accordance with procedure and TS Sections 3.1.6 and 4.1.5.

11. Exit Meeting Summary

The inspection scope and results were summarized on May 13, 2021, with licensee management and staff. 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 and Senior Reactor Operator
A. Bolling	Reactor Operator
N. Boyd	Reactor Operator
C. Edwards	Reactor Supervisor and Senior Reactor Operator
Z. Helgert	Reactor Operator
B. Johnson	Reactor Operator
J. Rusch	Reactor Operator Trainee
A. Strzelec	Reactor Operator Trainee

Other Personnel

J. Decker	Director of Safety, College of Engineering, University of Wisconsin-Madison
D. Henderson	Chair, Reactor Safety Committee
P. Wilson	Chair of the Department of Engineering Physics, College of Engineering, University of Wisconsin-Madison
O. Schmitz	Associate Dean, College of Engineering for Research, University of Wisconsin-Madison
J. Timm	Campus Radiation Safety Officer, University of Wisconsin-Madison

INSPECTION PROCEDURES USED

IP 69001	Class II Research and Test Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ANSI/ANS	American National Standards Institute/American Nuclear Society
E-Plan	Emergency Plan
IP	Inspection Procedure
LCO	Limiting Conditions for Operation
No.	Number
NRC	U.S. Nuclear Regulatory Commission
Rev.	Revision
RO	Reactor Operator

RSC	Reactor Safety Committee
SRO	Senior Reactor Operator
TS(s)	Technical Specifications
UW	University of Wisconsin
UWNR	University of Wisconsin Nuclear Reactor