



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

August 3, 2021

Mr. Corey Hines, Director  
Washington State University  
Nuclear Radiation Center  
50 Roundtop Drive  
Pullman, WA 99164-1300

SUBJECT: WASHINGTON STATE UNIVERSITY – U.S. NUCLEAR REGULATORY  
COMMISSION ROUTINE SAFETY INSPECTION REPORT  
NO. 05000027/2021201

Dear Mr. Hines:

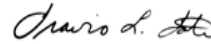
From June 22 – 24, 2021, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Washington State University Modified TRIGA Nuclear Reactor facility. The enclosed report presents the results of that inspection that were discussed on June 24, 2021, with you, and members of your staff.

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

In accordance with Title 10 of the *Code of Federal Regulations* 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 Publicly Available Records component of 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 Mr. Kevin Roche at 301-415-1554, or by electronic mail at [Kevin.Roche@nrc.gov](mailto:Kevin.Roche@nrc.gov).

Sincerely,



Signed by Tate, Travis  
on 08/03/21

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. 50-027  
License No. R-76

Enclosure:  
As stated

cc: See next page

Washington State University

Docket No. 50-027

cc:

Director  
Division of Radiation Protection  
Department of Health  
309 Bradley Boulevard  
Richland, WA 99352

Mr. Rey McGehee  
Radiation Safety Officer  
Washington State University  
P.O. Box 643143  
Pullman, WA 99164-3143

Mike Kluzik, Chair  
Washington State University  
Reactor Safeguards Committee  
Nuclear Radiation Center  
P.O. Box 643143  
Pullman, WA 99164-3143

Ms. Hillary Bennett, Reactor Supervisor  
Washington State University  
Nuclear Radiation Center  
P.O. Box 641300  
Pullman, WA 99164-1300

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

SUBJECT: WASHINGTON STATE UNIVERSITY – U.S. NUCLEAR REGULATORY  
 COMMISSION ROUTINE INSPECTION REPORT NO. 05000027/2021201  
 DATED: AUGUST 3, 2021

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

Docket No.: 50-027

License No.: R-076

Report No.: 05000027/2021201

Licensee: Washington State University

Facility: Washington State University Modified TRIGA Nuclear Reactor

Location: Pullman, Washington

Dates: June 22-24, 2021

Inspector: Kevin M. Roche

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

Washington State University  
Washington State University Modified TRIGA Nuclear Reactor  
Inspection Report No. 05000027/2021201

The primary focus of this routine, announced safety inspection was the onsite review of selected aspects of the Washington State University (WSU, the licensee's) Class II 1,000 kilowatt research reactor safety program, including: (1) operations logs and records; (2) requalification training; (3) surveillance and limiting conditions for operation (LCO); (4) experiments; (5) emergency planning; (6) maintenance logs and records; and (7) fuel handling logs and records. The U.S. Nuclear Regulatory Commission (NRC) staff determined that the licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

### Operation Logs and Records

- The operation logs and records were maintained in accordance with facility procedures and technical specifications (TSs).

### Requalification and Training

- The requalification program was conducted consistently with the TSs and licensee procedures.

### Surveillance and Limiting Conditions for Operation

- Operations followed the LCO and surveillance requirements as required in the TSs.

### Experiments

- Experiments and irradiations were performed in accordance with TSs, the applicable experiment irradiation authorizations, and associated licensee procedures.

### Emergency Planning

- The emergency plan (E-Plan), oversight, drills, and training were implemented as required by facility procedures and regulations.

### Maintenance Logs and Records

- The licensee maintained records documenting principal maintenance activities in compliance with TS requirements and facility procedures.

### Fuel Handling Logs and Records

- The licensee conducted and documented fuel handling activities in accordance with TS requirements and facility procedures.

## REPORT DETAILS

### Summary of Facility Status

The licensee's Class II 1,000 kilowatt modified Training, Research, Isotopes, General Atomics Mark-I (TRIGA) research reactor is operated in support of undergraduate instruction, laboratory experiments, reactor operator training, and various types of research. During the inspection, the reactor was started up, operated, and shut down as required and in accordance with applicable procedures to support these ongoing activities.

### 1. Operations Logs and Records

#### a. Inspection Scope (IP 69001-02.02)

To ensure that the requirements of TS 6.2 were met, the inspector reviewed the following:

- standard operating procedure (SOP) - 1, "Use of the Reactor," Revision 0.5
- SOP-2, "Standard Procedures for Startup, Operation, and Shutdown of the Reactor," Revision 0.5
- completed sheets of Nuclear Science Center (NSC) Form No. 22, "WSU Nuclear Science Center O.1, Reactor Log," Revision May 2018, from July 2019 to present
- SCRAM Summary Log (S.1) from July 2019 to present
- Pulsing Summary Log (S.2) from July 2019 to present
- WSU Annual Report entitled, "Annual Operations Report: Washington State University TRIGA Reactor," for the period from July 1, 2018, through June 30, 2019
- WSU Annual Report entitled, "Annual Operations Report: Washington State University TRIGA Reactor," for the period from July 1, 2019, through June 30, 2020

#### b. Observations and Findings

The inspector observed that logbook entries were maintained in accordance with approved procedures. The inspector reviewed selected logbook entries, request for operations, and pre-start and post-shutdown forms and determined that logs and records are maintained as required by the licensee's administrative procedures. The inspector verified that records also showed that operational conditions and parameters were consistent with the license and TS requirements.

#### c. Conclusion

The inspector determined the licensee's logbook records and record keeping programs were maintained as required by WSU procedures and met the retention requirements of the TSs.

## 2. Requalification Training

### a. Inspection Scope (IP 69001-02.04)

To ensure that the requalification training requirements of TSs 6.1.4, and 6.8.2, and, Title 10 of the *Code of Federal Regulations* (10 CFR) 55.53, "Conditions of licenses," paragraphs (e) and (h), were met, the inspector reviewed the following:

- WSU NSC reactor staff requalification program, last revised August 2, 2018
- operator requalification schedule (A.3) for 2019, 2020, and 2021
- logs and records of reactivity manipulations maintained in the quarterly reactor operator/senior reactor operator activity reports (O.14) notebook and documented on forms, "Quarterly Operations Summary Checklist"
- operation and emergency procedures exam results from 2019 to present
- requalification training records from 2019 to present
- written requalification exams from 2019 to present

### b. Observations and Findings

The inspector found that the requalification plan contains annual on-the-job training, oral test, and operational test requirements. The inspector verified that training requirements in the areas required were performed throughout the training cycle. The inspector found that written, operations, and emergency preparedness exams were completed during the training cycle, as required. The inspector verified that a sample of licensed operators performed the required quarterly hours of reactor operations. Further, the inspector confirmed by record review that all active operators completed a biennial medical examination.

### c. Conclusion

The inspector determined that the WSU requalification program was conducted as required by NRC regulations, WSU TSs, and procedures with the exception noted above.

## 3. Surveillance and Limiting Conditions for Operation

### a. Inspection Scope (IP 69001-02.05)

To ensure that the requirements of TSs 3 and 4 were met, the inspector reviewed the following:

- monthly core reactivity parameters log (O.7) for 2019 through the present
- preventative maintenance checklists (O.2) for 2019 through the present
- power calibration log forms (also in O.2) for 2019 through the present
- monthly console and auxiliary equipment checklist log (O.9) containing documentation of equipment maintenance as indicated on the WSU NSC Form No. 40, entitled, "Console Auxiliary Equipment Maintenance Checklist"
- completed sheets of NSC Form No. 22, "WSU Nuclear Science Center O.1, Reactor Log," Revision May 2018 from July 2019 to present
- WSU NSC Administrative Procedure - 5, "Surveillance Documentation Review," Revision 0.1



- SOP 20, "Standard Procedure for Reactor Power Calibrations," Revision 0.5
- SOP 5, "Standard Procedure for Performing Preventative Maintenance," Revision 0.5

b. Observations and Findings

The inspector selected a sample of the TS-required surveillances to verify implementation and determined that the frequency and outcome met TS requirements. The inspector verified surveillance results were retained as required by TS 6.8.1 and licensee's procedural requirements.

c. Conclusion

The inspector determined that operations followed the LCOs and surveillance requirements as stated in the TSs.

#### 4. Experiments

a. Inspection Scope (IP 69001-02.06)

The inspector reviewed the following to verify compliance with TS 3.6 and 6.4:

- WSU NSC Irradiation data log sheets for the period from 2019 to the present
- completed sheets of NSC Form No. 22, "WSU Nuclear Science Center O.1, Reactor Log," Revision May 2018, from July 2019 to present
- recent experiment approvals documented on WSU NSC Form No. 1, entitled, "Project Initiation Request Form," with the associated experiment overviews, safety reviews and analyses, isotope production data, accident analyses, and approvals

b. Observations and Findings

The inspector found that the various experiments conducted at the facility were reviewed and approved. The inspector also noted that no new experiments were proposed in the past several years.

Through a review of console logs and various irradiation request forms, the inspector noted that irradiations were conducted under the cognizance of the Reactor Supervisor. The inspector verified that irradiations were documented in the console logs. The inspector also verified that the resulting radioactive material was transferred to an authorized user, disposed of as stipulated by procedure, or held for decay.

c. Conclusion

The inspector concluded that experiments were reviewed and performed in accordance with the TS requirements and the licensee's written procedures.

## 5. Emergency Planning

### a. Inspection Scope (IP 69001-02.10)

To verify compliance with the NSC E-Plan, the inspector reviewed selected aspects of the following:

- NSC E-Plan, dated April 2020
- safety analysis for WSU NSC E-Plan Revision April 2020
- safety analysis for WSU NSC E-Plan, Revision January 2020
- NSC implementing procedures, dated March 2021
- offsite support as documented in the letter of agreement with the Pullman Regional Hospital
- 2019 emergency drill final report, dated March 19, 2020
- 2020 emergency drill final report, dated October 28, 2020
- training records for licensee staff and support personnel

### b. Observations and Findings

The inspector reviewed the E-plan and implementing procedures to verify they were current, approved by management, and readily available in several locations for use as required by the E-Plan. The inspector reviewed the equipment check semi-annual surveillance completed forms for the emergency supply cabinets located in the facility to ensure the availability and operability of emergency equipment.

The inspector confirmed through document review that the licensee continues to maintain a current memorandum of understanding with the Pullman Regional Hospital to support both onsite and offsite emergency response. The inspector reviewed training records for reactor staff and verified training was completed annually, as required by the E-Plan. Additionally, the facility is required to perform an annual emergency drill in accordance with NSC E-Plan. The inspector verified that emergency drills for calendar year 2019 and 2020 were conducted resulting in evacuations of the facility and participation of offsite organizations. The inspector noted the facility considered actual events (e.g. medical emergency) and incorporated lessons learned into emergency planning.

### c. Conclusion

Based upon the review of emergency response documents, facility walkdowns, and interviews of licensee personnel, the inspector concluded that the licensee met the requirements of the approved NSC E-Plan.

## 6. Maintenance Logs and Records

### a. Inspection Scope (IP 69001-02.11)

To ensure that the maintenance requirements of TSs 6.8.2. and 6.9.1 were met, the inspector reviewed the following:

- reactor operations summary sheets from 2019 to present
- control element inspection log (O.5) from 2019 to present

- monthly core reactivity parameters log (O.7) from 2019 to present
- preventative maintenance checklists (O.2) from 2019 to present
- monthly console and auxiliary equipment checklist Log (O.9) containing documentation of equipment maintenance as indicated on the WSU NSC Form No. 40, entitled, "Console Auxiliary Equipment Maintenance Checklist"
- WSU NSC reactor operating log (O.1) sheets from January 2017 to date in 2019

b. Observations and Findings

The inspector reviewed a selection of maintenance logs and console logbooks. The inspector determined that the selected significant maintenance items reviewed were documented and resolved as required by the licensee's administrative procedures. Additionally, the inspector verified by document review that maintenance records were retained for at least 5 years as required by TS 6.9.1.

c. Conclusion

The inspector determined the licensee maintained records documenting maintenance activities in compliance with TS requirements and procedures.

## 7. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001-02.12)

To ensure that the requirements of TSs 3.1.6 and 4.1.6 were met, the inspector reviewed the following:

- completed sheets of NSC Form No. 22, "WSU Nuclear Science Center O.1, Reactor Log," Revision May 2018, from July 2019 to present
- SOP 23, "Standard Procedure for Annual Fuel Inspections," Revision 0.5
- core 35-A Cumulative Inspection Summary, dated January 17, 2020
- core 35-A Cumulative Inspection Summary, dated January 14, 2021
- Administrative Procedure-7, "Material Control & Accountability Plan," Revision 0.1

b. Observations and Findings

The inspector reviewed the fuel movement and surveillance records and determined that two fuel inspections have occurred since this module was previously inspected. The inspector confirmed that during the January 2020 and 2021, fuel inspections, approximately 20 percent of the fuel elements were inspected in accordance with TSs 3.1.6 and 4.1.6. The inspector reviewed the results and verified that all fuel elements met the TS requirements.

The inspector reviewed core configuration changes. The inspector verified changes were documented and followed established procedures.

c. Conclusion

The inspector determined that the licensee conducted and documented fuel handling activities in accordance with TS requirements and licensee procedures.

**8. Exit Interview**

The inspector reviewed the inspection results with members of licensee management at the conclusion of the inspection on June 24, 2021. The licensee acknowledged the results and conclusions presented by the inspector.

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee

C. Hines	Facility Director
H. Bennett	Reactor Supervisor
M. Heine	Senior Reactor Operator

**INSPECTION PROCEDURES USED**

IP 69001	Class II Research and Test Reactors
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**ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

None

Closed

None

Discussed

None