



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

August 1, 2022

Dr. Ayman I. Hawari, Director
Nuclear Reactor Program
Department of Nuclear Engineering
North Carolina State University
Campus Box 7909
2500 Stinson Drive
Raleigh, NC 27695-7909

SUBJECT: NORTH CAROLINA STATE UNIVERSITY – U.S. NUCLEAR REGULATORY
COMMISSION SAFETY INSPECTION REPORT NO. 05000297/2022202

Dear Dr. Hawari:

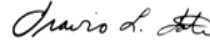
From June 21-23, 2022, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the North Carolina State University PULSTAR Nuclear Research Reactor. The enclosed report documents the inspection results, which were discussed on June 23, 2022, with you and members of your staff.

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 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 Publicly Available Records component of the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <https://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

If you have any questions concerning this inspection, please contact Andrew Waugh at (301) 415-0230, or by email to Andrew.Waugh@nrc.gov.

Sincerely,



Signed by Tate, Travis
on 08/01/22

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. 50-297
License No. R-120

Enclosure:
As stated

cc: See next page

North Carolina State University

Docket No. 50-297

cc:

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Test, Research and Training
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SUBJECT: NORTH CAROLINA STATE UNIVERSITY – U.S. NUCLEAR REGULATORY
COMMISSION SAFETY INSPECTION REPORT NO. 05000297/2022202
DATED: AUGUST 1, 2022

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OFFICE	NRR/DANU/UNPO	NRR/DANU/UNPO/LA	NRR/DANU/UNPO/BC
NAME	AWaugh	NParker	TTate
DATE	7/5/2022	7/6/2022	8/1/2022

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

Docket No.: 50-297

License No.: R-120

Report No.: 05000297/2022202

Licensee: North Carolina State University

Facility: PULSTAR Nuclear Research Reactor

Location: Raleigh, NC

Dates: June 21-23, 2022

Inspectors: Andrew Waugh
Juan Arellano

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

North Carolina State University
PULSTAR Nuclear Research Reactor
Inspection Report No. 05000297/2022202

The primary focus of this routine announced inspection was the onsite review of selected aspects of the North Carolina State University's (NCSU, the licensee's) Class II research reactor facility program, including: (1) organization and staffing; (2) operations logs and records; (3) requalification training; (4) surveillance and limiting conditions for operation (LCO); (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 program was acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organization and Staffing

- The inspector determined that the organization and staffing were in compliance with the technical specification (TS) requirements.

Operations Logs and Records

- The inspector determined that the operations logs and records were maintained in accordance with the applicable TS and the licensee's procedural requirements.

Requalification Training

- The inspector determined that the operator requalification program was conducted and completed in accordance with the NRC-approved program and regulatory requirements.

Surveillance and Limiting Conditions for Operation

- The inspector determined that surveillances were conducted and LCO were maintained in accordance with TS requirements.

Emergency Planning

- The inspector determined that the emergency preparedness program was conducted in accordance with the emergency plan.

Maintenance Logs and Records

- The inspector determined that the maintenance activities were performed and documented in accordance with TS requirements.

Fuel Handling Logs and Records

- The inspector determined that the fuel movements and inspections were conducted in accordance with TS and the licensee's procedural requirements.

REPORT DETAILS

Summary of Facility Status

The NCSU 1,000 kilowatt PULSTAR nuclear research reactor continued to be operated in support of graduate and undergraduate research and laboratory instruction, service irradiations, reactor operator training, and periodic surveillance. During the inspection, the reactor was started up, operated, and shut down to support these ongoing activities.

1. Organization and Staffing

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

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of TS 6.1 and 6.7.2 were met:

- "Appendix A Technical Specifications for the North Carolina State University PULSTAR Reactor," dated September 8, 2008
- select "PULSTAR reactor log book" entries, 2020-present

b. Observations and Findings

The inspector found that the licensee's organization was consistent with that specified in the TS, and that the NRC was made aware of the personnel changes in accordance with TS requirements.

The inspector found the minimum shift staffing for reactor operations continued to meet the TS requirement.

c. Conclusion

The inspector determined that the organization and staffing were in compliance with the TS requirements.

2. Operations Logs and Records

a. Inspection Scope (IP 69001, Section 02.02)

The inspector observed completion of a reactor startup checklist and a reactor startup. The inspector also reviewed the following to ensure that logs and records were maintained as required by the licensee's administrative procedures and TS 6.8:

- operations procedure (OP) 103, "Reactor Operation," dated July 26, 2021
- PULSTAR reactor annual reports for 2020 and 2021
- select "PULSTAR reactor log book" entries, 2020-present

- select startup checklists, 2020-present
- unscheduled SCRAM and shutdown log, 2020-present

b. Observations and Findings

The inspector found that the licensee's operation logs and records were maintained as required by the licensee's TS and administrative procedures.

The inspector observed that the measured parameters for several reactor operations met the TS requirements.

c. Conclusion

The inspector determined that the operations logs and records were maintained in accordance with the applicable TS and the licensee's procedural requirements.

3. **Requalification Training**

a. Inspection Scope (IP 69001, Section 02.04)

The inspector reviewed the following aspects of the licensee's requalification program to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 55, "Operators' Licenses," and the licensee's NRC-approved operator requalification program:

- special procedure 2.6, "PULSTAR Operator Requalification Plan," dated November 1, 2018
- medical records for select licensed operators
- requalification records for select licensed operators
- select lecture attendance records, 2020-present
- 2020 requalification exam

b. Observations and Findings

The inspector found that the licensee's training was conducted and documented in accordance with their NRC-approved requalification and training program, and that the license operators requalification training and medical records were maintained.

c. Conclusion

The inspector determined that the operator requalification program was conducted and completed in accordance with the NRC-approved program and that the medical evaluations were completed in accordance with regulatory requirements.

4. **Surveillance and Limiting Conditions for Operation**

a. Inspection Scope (IP 69001, Section 02.05)

The inspector reviewed the following to verify compliance with TS 3.0 and to determine if surveillance tests were performed as required by TS 4.0:

- "Appendix A Technical Specifications for the North Carolina State University PULSTAR Reactor," dated September 8, 2008
- OP 101, "Reactor Startup and Shutdown," dated December 8, 2021
- event notification #55747
- "Report for Event Number 55747: Technical Specification Violation," dated March 1, 2022
- select startup checklists, 2020-present
- select PULSTAR operating parameters, 2020-present
- PULSTAR surveillance procedure (PS) 4-1-2:A1, "Control Rod Calibration," dated June 1, 2015
- PS 4-1-2:B1, "Control Rod Inspection," dated June 1, 2015
- select surveillance records for control rod calibrations, inspections, and drop times, 2020-present
- nitrogen-16 channel calibration records, 2020-present

b. Observations and Findings

The inspector found that surveillance tests were completed as required by the TS and LCO verifications were completed on schedule and in accordance with the licensee's procedures.

c. Conclusion

The inspector determined that the surveillances were conducted and LCO were maintained in accordance with TS requirements.

5. Emergency Planning

a. Inspection Scope (IP 69001, Section 02.10)

The inspector reviewed the following selected portions of the licensee's emergency preparedness program to verify compliance with Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," and the licensee's emergency plan:

- "PULSTAR Reactor Emergency Plan," dated March 29, 2017
- emergency procedure (EP) 1, dated September 28, 2020
- EP 2, dated January 5, 2021
- EP 4, dated October 1, 2017
- EP 6, dated October 1, 2017
- emergency locker inventory forms, 2020-present
- emergency drill records, 2020-present
- select emergency preparedness training records, 2020-present
- select off-site agreements, 2020-present

b. Observations and Findings

The inspector found that the emergency plan training was conducted, drills were performed, emergency response call lists were maintained and posted, and emergency equipment was maintained and available as required by the emergency plan and licensee procedures.

c. Conclusion

The inspector determined that the emergency preparedness program was conducted in accordance with the emergency plan.

6. Maintenance Logs and Records

a. Inspection Scope (IP 69001, Section 02.11)

The inspector reviewed the following selected maintenance logs and records to verify compliance with the requirements of TS:

- select "PULSTAR reactor log book" entries, 2020-present
- select maintenance log items, 2020-present
- PULSTAR reactor annual reports for 2020 and 2021
- select primary water inventory records, 2020-present

b. Observations and Findings

The inspector found that the scheduled and unscheduled preventive and corrective maintenance activities were performed and documented in accordance with TS requirements and the licensee's administrative procedures.

c. Conclusion

The inspector determined that the maintenance activities were performed and documented in accordance with TS requirements.

7. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001, Section 02.12)

The inspector reviewed the following fuel handling logs and activities to verify compliance with TS requirements:

- OP 301, "Reactor Fuel Handling," dated November 1, 2014
- PULSTAR surveillance procedure (PS) 4-7:B1, "Fuel Inspection," dated June 1, 2015
- fuel handling records, 2020-present
- fuel inspection records, 2020-present

b. Observations and Findings

The inspector found that the fuel handling activities were conducted and documented in accordance with TS requirements and the licensee's procedural requirements.

c. Conclusion

The inspector determined that the fuel movements and inspections were conducted in accordance with TS and the licensee's procedural requirements.

8. Exit Interview

The inspection scope and results were summarized on June 23, 2022, with members of licensee management and staff. The inspector described the areas inspected and discussed the inspection results.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

C. Fleming	Manager of Engineering and Operations
K. Kincaid	Chief of Reactor Maintenance
G. Wick	Reactor Health Physicist
A. Hawari	Director, Nuclear Reactor Program
M. Barber	Reactor Operator

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors
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ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

Discussed

None