



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

July 10, 2024

Dr. Kenan Unlu, Director  
Breazeale Nuclear Reactor  
Radiation Science and Engineering Center  
The Pennsylvania State University  
University Park, PA 16802-2301

SUBJECT: PENNSYLVANIA STATE UNIVERSITY – U.S. NUCLEAR REGULATORY  
COMMISSION ROUTINE SAFETY INSPECTION REPORT  
NO. 05000005/2024201

Dear Dr. Unlu:

On March 13 and from May 6-9, 2024, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at the Pennsylvania State University Breazeale Reactor facility. The enclosed report presents the inspection results, which were discussed on May 9, 2024, 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.

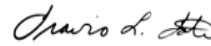
In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC website at <https://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

K. Unlu

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If you have any questions concerning this inspection, please contact Michael Balazik at (301) 415-2856, or by email to [Michael.Balazik@nrc.gov](mailto:Michael.Balazik@nrc.gov).

Sincerely,



Signed by Tate, Travis  
on 07/10/24

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. 50-005  
License No. R-2

Enclosure:  
As stated

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SUBJECT: PENNSYLVANIA STATE UNIVERSITY – U.S. NUCLEAR REGULATORY  
COMMISSION ROUTINE SAFETY INSPECTION REPORT  
NO. 05000005/2022201 DATED: JULY 10, 2024

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

Docket No.: 50-005

License No.: R-2

Report No.: 05000005/2024201

Licensee: Pennsylvania State University

Facility: Penn State Breazeale Reactor

Location: University Park, PA

Dates: March 9 and May 6-9, 2024

Inspector: Michael F. Balazik

NRC Staff: Bradley Stamler (for training)

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

Pennsylvania State University  
Penn State Breazeale Reactor Inspection Report  
No. 05000005/2024201

The primary focus of this routine announced inspection was the onsite review of selected aspects of the Pennsylvania State University (PSU, the licensee) Class II research reactor facility safety 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 PSU continues to operate the Penn State Breazeale Reactor (PSBR), a 1-megawatt Training, Research, Isotopes, General Atomics (TRIGA) research reactor in support of education, research, and service. During the inspection the reactor was started up, operated, and shut down as required to support these ongoing activities. The PSU staff also conducted fuel movement and inspection 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, "Organization," were met:

- reactor operations logbooks 111, 112, 113, and 114
- notice of staffing change, dated June 9, 2023
- staffing contact list, dated December 7, 2023
- annual operating reports, fiscal years (FY) 2021-2022, and FY 2022-2023
- standard operating procedures (SOP)-1, "Reactor Operator Procedure," Revision 26

##### 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. The inspector observed that a list of facility personnel is posted in the control room in accordance with TS 6.1.3, "Staffing," item b.

##### 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 pre-startup checklist, a reactor startup, and a reactor shutdown. The inspector also reviewed the following to ensure that logs and records were maintained as required by the licensee's administrative procedures and TS 6.7, "Records":

- various completed SOP-2, "Daily Checkout Procedure," dated 2022 to present
- reactor operations logbooks 111, 112, 113, and 114

- various completed administrative procedure (AP)-4, “Identification, Evaluation and Documentation of Safety System Failures, Abnormal Events, and Operational Events, Appendix A - Event Documentation Forms,” dated 2022 to present
- annual operating reports, FY 2021-2022, and FY 2022-2023

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:

- AP-3, “Operator and Senior Operator Requalification,” dated October 10, 2005
- reactor operations logbooks 111, 112, 113, and 114
- external audit of requalification program, dated December 2022
- various operational examination records, dated 2022 to present
- various written examination records, dated 2022 to present
- console operating experience records for 2022 to present
- select medical records, dated 2022 to present

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, medical examinations were completed every 2 years, and that the license operator’s 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 regulatory requirements.

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

##### **a. Inspection Scope (IP 69001, Section 02.05)**

The inspector observed completion of a reactor pre-startup checklist, reactor startup, and reactor shutdown. The inspector observed the condition of the fire hose, tools, and connections used for emergency fill of the reactor pool. The inspector also reviewed the following to verify compliance with TS 3.0, "Limiting Conditions for Operation," and to determine if surveillance tests were performed as required by TS 4.0, "Surveillance Requirements":

- various maintenance logbook entries, dated 2022 to present
- reactor operations logbooks 111, 112, 113, and 114
- checks and calibration procedures (CCP)-2, "Reactor Thermal Power Calibration," performed in 2023 and 2024
- various completed SOP-2, "Daily Checkout Procedure", dated 2022 to present
- completed CCP-25, "Emergency-Fill Fire Hose Inspection," performed in 2022 and 2023
- completed CCP-6, "Calibration of RBHVES D/P Sensors," performed in 2022 and 2023

##### **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 toured the PSU Police operations center and the emergency support center. The inspector also 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:

- "Penn State Breazeale Reactor (PSBR) Emergency Preparedness Plan," dated April 23, 2021
- select training records, dated 2022 to present
- emergency drill records, dated 2022 to present
- emergency plan review records, dated 2022 to present
- emergency equipment inventory checklists, dated 2022 to present



- current memorandum of understandings with PSU Police Department, Alpha Fire Company, and Mount Nittany Medical Center
- staffing contact list, dated December 7, 2023
- completed equipment check semi-annual surveillance forms, dated 2022 to 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 6.7.1.c and 6.7.1.g:

- completed SOP-2, dated 2022 to present
- completed AP-4, dated 2022 to present
- completed AP-13, "Maintenance/Repair," dated 2022 to present
- reactor operations logbooks 111, 112, 113, and 114
- annual operating reports, FY 2021-2022, and FY 2022-2023
- tagout logbook

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 observed fuel movement and inspection performed in March 2024. The inspector reviewed the following fuel handling logs, procedures, and activities to verify compliance with TS requirements:

- TRIGA Framatome standard 12 percent fuel element certificate
- drawing number 2717-301 for TRIGA standard fuel elements
- fuel element inspection results for CCP-16, "Inspection of Fuel Elements," performed in September 2023 and March 2024
- SOP-3, "Core Loading and Fuel Handling," Revision 9
- core load 61 movement data, performed in March 2024
- current fuel element storage location map
- reactor operations logbooks 111, 112, 113, and 114

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 May 9, 2024, with members of licensee management. The inspector described the areas inspected and discussed the inspection results.

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee Personnel

K. Unlu	Director of Radiation Science and Engineering Center
J. Geuther	Associate Director for Operations
S. Herrmann	Senior Reactor Operator
A. Tong	Research and Development Engineer
M. Baney	PSU Police Dispatch

**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