

September 11, 2015

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

SUBJECT: PENNSYLVANIA STATE UNIVERSITY – NRC SAFETY INSPECTION REPORT  
NO. 50-005/2015-201

Dear Dr. Unlu:

From August 10-12, 2015, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at the Pennsylvania State University Breazeale Nuclear Reactor facility (Inspection Report No. 50-005/2015-201). The enclosed report documents the inspection results which were discussed on August 12, 2015, with you and members of your staff.

This inspection was an examination of 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 activities, and interviewed personnel. Based on the results of this inspection, no findings of non-compliance 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).

K. Unlu

- 2 -

Should you have any questions concerning this inspection, please contact Mr. Ossy Font at (301) 415-2490 or by electronic mail at [Ossy.Font@nrc.gov](mailto:Ossy.Font@nrc.gov).

Sincerely,

**/RA/**

Kevin Hsueh, Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-005  
License No. R-2

Enclosure:  
NRC Inspection Report No. 50-005/2015-201

cc: See next page

Pennsylvania State University

Docket No. 50-005

cc:

Mark A. Trump  
Associate Director for Operations  
Breazeale Nuclear Reactor  
Radiation Science and Engineering Center  
The Pennsylvania State University  
University Park, PA 16802-1504

Mr. Jeffrey A. Leavey, Manager of  
Radiation Protection  
The Pennsylvania State University  
0201 Academic Projects Building  
University Park, PA 16802

Dr. Neil A. Sharkey  
Interim Vice President for Research  
of the Graduate School  
The Pennsylvania State University  
304 Old Main  
University Park, PA 16802-1504

Director, Bureau of Radiation Protection  
Department of Environmental Protection  
P.O. Box 8469  
Harrisburg, PA 17105-8469

Test, Research and Training  
Reactor Newsletter  
P.O. Box 118300  
University of Florida  
Gainesville, FL 32611-8300

K. Unlu

- 2 -

Should you have any questions concerning this inspection, please contact Mr. Ossy Font at (301) 415-2490 or by electronic mail at [Ossy.Font@nrc.gov](mailto:Ossy.Font@nrc.gov).

Sincerely,

**/RA/**

Kevin Hsueh, Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-005  
License No. R-2

Enclosure:  
NRC Inspection Report No. 50-005/2015-201

cc: See next page

**DISTRIBUTION:**

PUBLIC	PRTA Reading File	RidsNrrDprPrta
RidsNrrDprPrtb	OFont, NRR	RidsOgcMailCenter
XYin, NRR	MCompton (cover letter only)	(O13E19)

**ADAMS Accession No.:** ML15253A919

**NRC-002**

OFFICE	NRR/DPR/PROB: PM	NRR/DPR/PROB: BC
NAME	OFont	KHsueh
DATE	9/11/2015	9/11/2015

**OFFICIAL RECORD COPY**

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

Docket No: 50-005

License No: R-2

Report No: 50-005/2015-201

Licensee: Pennsylvania State University

Facility: Pennsylvania State Breazeale Nuclear Reactor

Location: State College, PA

Dates: August 10-12, 2015

Inspector: Ossy Font

Approved by: Kevin Hsueh, Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Enclosure

## EXECUTIVE SUMMARY

The Pennsylvania State University  
Pennsylvania State Breazeale Nuclear Reactor Facility  
NRC Inspection Report No. 50-005/2015-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Pennsylvania State University's (the licensee's) Class II research reactor facility safety program including: (1) experiments; (2) health physics; (3) design changes; (4) committees, audits, and reviews; and (5) transportation since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's program was acceptably directed toward the protection of public health and safety and in compliance with NRC requirements.

### Experiments

- The licensee's program for the control of experiments satisfied Technical Specifications (TS) and procedural requirements.

### Health Physics

- The radiation safety program was commensurate with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20 requirements, TS, and procedures.

### Design Changes

- The review and evaluation of changes to facilities and procedures satisfied NRC requirements specified in 10 CFR 50.59.

### Committees, Audits, and Reviews

- Review, audit, and oversight functions required by the TS were acceptably completed by the Reactor Safeguards Committee.

### Transportation

- Radioactive material was being shipped in accordance with applicable procedures and regulatory requirements.

## REPORT DETAILS

### Summary of Facility Status

The Pennsylvania State University's (the licensee's) 1,000 kilowatt research reactor was operated in support of routine experiments, reactor operator training, and periodic equipment surveillances.

#### 1. Experiments

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

The inspector reviewed the following to verify that the requirements of Technical Specifications (TS) Sections 3.7, "Limitations on Experiments," and 6.4, "Review and Approval of Experiments," were being met:

- Various active experiments for 2013 to present
- SOP-5, "Experiment Evaluation and Authorization," Rev. 4, dated November 16, 2004
- Westinghouse Neutron Detector Testing (January 29-30, 2015)

##### b. Observations and Findings

The inspector reviewed a random sampling of forms for experiments performed since the previous inspection, and found that experiments were generally being reviewed, updated, and performed in accordance with TS requirements and the licensee's written procedures. Some experiments were monitored by Environmental Health and Safety if they were new or had a potential for a dose and which require roping off areas of potential exposure, such as the neutron detector testing.

##### c. Conclusion

Experiments were being reviewed and approved as required. The licensee's program for the control of experiments satisfied TS and procedural requirements.

#### 2. Health Physics

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

The following items were reviewed to verify compliance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20 and TS Sections 3.6 and 4.6 requirements:

- Annual Operating Report for the PSBR, FY 12-13 and 13-14
- PSBR Radiation Dosimetry Records, from 2013 to present
- Environmental Dosimeter Data, from 2013 to present
- Radiation Training Records from 2013 to present
- Various Weekly and Quarterly Radiation and Contamination Surveys from 2013 to present

- Portable Monitor Calibration Records from 2013 to present
- "Rules and Procedures for Users of Radioactive Material at the Pennsylvania State University," revised 2010
- AP-18, "Radiation Protection Program (RPP)," Rev. 4, dated September 1, 2008
- AOP-4, "Daily Contamination Check Procedure," Rev. 9, dated January 12, 2012
- CCP-8, "Calibration of Air Monitors," Rev. 6, dated March 18, 2013
- CCP-10, "Calibration of Area Radiation Monitors," Rev. 3, dated December 15, 2005
- CCP-12, "Calibration of Portable Survey Instruments and Pocket Dosimeters," Rev. 3, dated January 11, 2005

b. Observations and Findings

Licensee personnel were interviewed and observed by the NRC inspector. Specifically, the inspector observed practices regarding the use of dosimetry, radiation monitoring equipment, and placement of radiological postings and barriers and determined that they were appropriate.

The licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor to process personnel dosimetry. The inspector reviewed dosimetry from 2013 to present and noted that doses were well within the regulatory limits and consistent with the operations of the PSBR. Through direct observation, the inspector determined that dosimetry was acceptably used by facility personnel. Copies of current notices to workers were posted in the facility.

The calibration of portable survey meters and friskers was completed by radiation protection personnel at the Environmental Health and Safety office while fixed radiation detectors and air monitoring instruments were calibrated by PSBR personnel at the facility. The calibration records were reviewed and calibration frequency was being maintained as required.

The Environmental Health and Safety health physics group monitored and observed new experiments and sample removal until it became routine. They also provided training. Initial training was completed online, then hands on survey meter use, and contamination and spill cleanup. Annual refresher training was performed via a newsletter where the staff signed as having read. Additional training was provided by the operations group.

Current emission records, environmental monitoring (including dosimetry and tritium release records), and the two most recent annual operating reports were reviewed with no liquid radioactive effluent releases during those periods. Liquid waste analysis for disposal of aqueous waste to the sewer was performed on February 10, 2015. No detectable radiation activity was recorded. This activity was performed infrequently, with the last one performed on September 23, 2011.



c. Conclusion

The radiation safety program was commensurate with 10 CFR Part 20 requirements, TS, and procedures.

**3. Design Changes**

a. Inspection Scope (IP 69001)

To ensure that facility changes were reviewed and approved as required by TS Section 6.2 and 10 CFR 50.59, the inspector reviewed selected aspects of:

- AP-12, "Change", Rev. 6, dated June 17, 2011
- AP-12 Work Package #2015-01, "Confinement Improvement," dated January 14, 2015
- AP-12 Work Package #2015-03, "Transient Rod Shock Absorber Rebuild," dated May 6, 2015
- Annual Operating Report for the PSBR, FY 12-13 and 13-14
- Pennsylvania State Reactor Safeguards Committee (RSC) Meeting Minutes from August 2013 to February 2015

b. Observations and Findings

The inspector reviewed several changes to the facility during the past two years that were reviewed and approved under the 10 CFR 50.59 screening process. The procedure in use was noted as being comprehensive and all of the changes to the facility were well documented with a thorough evaluation. The modifications had no safety implications for the public or the facility. It was noted that the RSC reviewed the series of documents listed above as required in the facility TS.

c. Conclusion

Records indicated that changes at the facility were acceptably being reviewed and approved in accordance with 10 CFR 50.59 and applicable licensee administrative controls.

**4. Committees, Audits, and Reviews**

a. Inspection Scope (IP 69001)

The inspector reviewed the following to ensure that the audits and reviews stipulated in TS Section 6.2 were being implemented as required:

- Pennsylvania State RSC Meeting Minutes from August 2013 to February 2015
- External Audit Report for the PSBR, dated November 2014
- AP-6, "Pennsylvania State Reactor Safeguards Committee Charter and Operating Procedure," Rev. 4, dated April 20, 2006
- AP-4 Event Evaluation #2014-15

b. Observations and Findings

The inspector verified that the RSC was composed of at least five members and met at least once per calendar year as required by Section 6.2 of the facility TS, but typically met quarterly. The inspector reviewed the RSC meeting minutes for the past two years and found that the RSC provided appropriate guidance and direction for reactor operations, and ensured acceptable use and oversight of the reactor. Additionally, comprehensive audits were being performed annually by non-reactor staff.

c. Conclusion

RSC review functions required by the TS were being implemented and documented; the annually required audit was thorough and complete.

**5. Transportation**

a. Inspection Scope (IP 86740)

To verify compliance with 10 CFR Part 71 and 49 CFR Parts 100–185 and procedural compliance for transporting or shipping licensed radioactive material, the inspector reviewed the following:

- Selected records of various types of radioactive material shipments
- Environmental Health and Safety Training Records for Limited Quantity Shipments
- Radiation Protection Procedure RP-Shipping-10, "Radioactive Receipt and Shipping Procedure," (February 2013)
- Training records and certificates for authorized shippers

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspector noted that low level (Limited Quantity of Radioactive Material Shipping) was done by the reactor facility staff whereas the high radioactive material (Type A shipments) were completed by Environmental Health and Safety staff. The inspector determined that the licensee had shipped various packages of radioactive material since the previous inspection. The records indicated that the radioisotope types and quantities were calculated and dose rates measured as required. The radioactive material records reviewed by the inspector had been completed in accordance with the Department of Transportation (DOT) and NRC regulations.

The inspector verified that the licensee maintained copies of shipment recipients' licenses to possess radioactive material as required and that the licensees were verified prior to shipment. The training of staff members responsible for shipping material was also reviewed and noted to be completed every two years (more frequent than the three year requirement) and up-to-date. The shippers' training met NRC and DOT requirements.

c. Conclusion

Radioactive material shipments by the licensee were conducted in accordance with applicable procedures and regulatory requirements.

**6. Exit Interview**

The inspection scope and results were summarized on August 12, 2015, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. The licensee acknowledged the results of the inspection.

**PARTIAL LIST OF PERSONS CONTACTED**

Licensee

K. Ünlü	Director, Radiation Science & Engineering Center
M. Trump	Associate Director for Operations
A. Thong	Research and Development Manager
J. Leavy	Radiation Safety Officer
D. Bertocchi	Health Physics Technician
G. Herman	Health Physics Technician
T. Daubenspeck	Low Level Shipper

**INSPECTION PROCEDURES USED**

IP 69001	Class II Research and Test Reactors
IP 86740	Inspection of Transportation Activities

**ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

Closed

**PARTIAL LIST OF ACRONYMS USED**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agencywide Document Access Management System
ALARA	As Low As Reasonably Achievable
DOT	Department of Transportation
IP	Inspection Procedure
NRC	U. S. Nuclear Regulatory Commission
PSBR	Pennsylvania State Breazeale Reactor
PSU	Pennsylvania State University
Rev.	Revision
RSC	Reactor Safeguards Committee
TS	Technical Specifications
VIO	Violation