

September 3, 2009

Dr. Eva J. Pell
Vice President for Research
Dean of the Graduate School
The Pennsylvania State University
304 Old Main
University Park, PA 16802-1504

SUBJECT: PENNSYLVANIA STATE UNIVERSITY - NRC ROUTINE INSPECTION
REPORT NO. 50-5/2009-201

Dear Dr. Pell:

On August 10-14, 2009, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at the Pennsylvania State University Breazeale Research Reactor facility (Inspection Report No. 50-5/2009-201). The enclosed report presents the results of that inspection.

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. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concern or noncompliance with NRC requirements was identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* Part 2.390 a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (Agencywide Document Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) <http://www.nrc.gov/reading-rm/adams.html>.

Should you have any questions concerning this inspection, please contact Greg Schoenebeck at 301-415-6345 or by electronic mail at Greg.Schoenebeck@nrc.gov.

Sincerely,

/RA/

Johnny H. Eads, Jr., Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No. 50-5
License No. R-2

Enclosure:
As stated

cc: See next page

The Pennsylvania State University

Docket No. 50-5

cc:

Mr. Eric J. Boeldt, Manager of
Radiation Protection
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
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

Dr. Kenan Unlu, Director
Radiation Science and
Engineering Center (RSEC)
Breazeale Nuclear Reactor
University Park, PA 16802-2301

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DATE	8/17/2009	8/25/2009	9/3/2009

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

Docket No: 50-5

License No: R-2

Report No: 50-5/2009-201

Licensee: The Pennsylvania State University

Facility: Breazeale Research Reactor Facility

Location: University Park, Pennsylvania

Dates: August 10-14, 2009

Inspector: Gregory M. Schoenebeck

Observers: Johnny Eads
Yakov Barnea, Israeli Atomic Energy Commission

Approved by: Johnny Eads, Chief
Research and Test Reactors Branch B
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

The Pennsylvania State University
Pennsylvania State University Breazeale Research Reactor facility
NRC Inspection Report No. 50-5/2009-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Pennsylvania State University (the licensee) Class II research reactor facility safety programs including: organization and staffing, procedures, experiments, health physics, design changes, committees, and audits and reviews. The licensee's programs were acceptably directed toward the protection of public health and safety, and were in compliance with the U.S. Nuclear Regulatory Commission (NRC) requirements.

Organization and Staffing

- The organization and staffing was consistent with TS requirements.

Procedures

- Procedure administrative review, revision, adherence to, and implementation satisfied Technical Specification requirements.

Experiments

- Experiments were being reviewed and performed in accordance with Technical Specification requirements and the licensee's written procedures.

Health Physics

- The radiation safety program is commensurate with 10 CFR 20 requirements, Technical Specifications, 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

- The Reactor Safeguards Committee provided the oversight required by the Technical Specifications.

REPORT DETAILS

Summary of Facility Status

The licensee's 1 Megawatt (MW) Training, Research, and Isotope Production, General Atomics (TRIGA) research reactor at the Pennsylvania State University (PSU) has been operated in support of experiments, reactor operator training, and periodic equipment surveillances. During the inspection the reactor was operated at 800 kW for a thermal calibration and to conduct irradiation experiments.

1. Procedures

a. Inspection Scope (IP 69001-02.03)

The inspectors reviewed the following to ensure that the requirements of Technical Specification (TS) Section 6.3, Operating Procedures, were being met concerning written procedures:

- Technical Specifications for Penn State Breazeale Reactor dated October 2004
- Checks and Calibration Procedure (CCP)-2, "Reactor Thermal Power Calibration", Rev. 2 dated August 6, 2008
- CCP-2 "Reactor Thermal Power Calibration Check-Off List", for August 11, 2009
- CCP-18, "Review of Procedures", Rev. 4 dated October 17, 2005
- Standard Operating Procedure (SOP)-1, "Reactor Operating Procedure", Rev. 15, March 2, 2007
- SOP-2, "Daily Checkout Procedure", Rev. 20, September 15, 2008
- Reactor Logbook #86

b. Observations and Findings

Oversight and review of procedure implementation was provided by licensee management and the Reactor Safeguards Committee. All procedures are current. During a reactor startup, procedure implementation was conducted satisfactorily, and was adhered to properly. Shift turnover between Reactor Operators and Senior Reactor Operators was in accordance with procedures.

c. Conclusions

Procedure administrative review, revision, adherence to, and implementation satisfied Technical Specification requirements.

2. Experiments

a. Inspection Scope (IP 69001-02.06)

The inspectors reviewed the following to verify that the requirements of TS Sections 3.7, Limitations on Experiments, and 6.4, Review and Approval of Experiments, were being met:

- Technical Specifications for Penn State Breazeale Reactor dated October 2004
- SOP-5, Experiment and Evaluation for "Neutron Transmission and Neutron Radioscopy Measurements of Borated Aluminum, Glass, or Steel Products" Rev.4, approved June 30, 2009
- SOP-5, Experiment and Evaluation for "Silicon Wafers and Sulfur Pellets" Rev. 4, Approved June 30, 2009
- NBL Data Sheet (Generic for Beam Port Operators), dated September 7, 2007
- FNI Data Sheets, dated June 29, 2007

b. Observations and Findings

The licensee maintained a file of existing experiments which had been approved by the Reactor Safeguards Committee.

From a random sampling of forms for experiments performed since the previous inspection the inspectors found that experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

The inspector observed the process for an irradiation experiment performed on August 11, 2009, and determined that it was congruent with established facility protocol.

c. Conclusions

Experiments were being reviewed and performed in accordance with TS requirements and the licensee's written procedures.

3. Health Physics

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Part 20 requirements:

- Radiation Dosimetry Reports, various 2007, 2008, 2009
- Weekly RSEC Radiation and Contamination Survey, various 2008 and 2009

- Quarterly RSEC radiation and Contamination Survey of Room 009, various 2007, 2008, 2009
- Rules and Procedures for the use of Radioactive Material at the Pennsylvania State University, "The Pennsylvania State University's Policy Towards Exposure to Radiation", dated April 12, 2001
- PSBR ALARA Procedure AP-16 Rev. 4, dated June 11, 2007
- Environmental Dosimeter Data, for 2007, 2008, and 2009
- Exposure Review for Ar-41 irradiation container fill and transfer, dated August 17, 2004
- Argon Production Exposures Report, dated April 17, 2007
- Air Emission Survey for Ar-41, various 2008 and 2009
- Annual Operating Report, FY 07-08

b. Observations and Findings

The inspector toured the facility in order to interview and observe licensee personnel practices with regards to the use of dosimetry, radiation monitoring equipment, placement of radiological postings and barriers, use of protective clothing, practices for handling and storing radioactive material or contaminated equipment. In one instance, an observed smear survey, performed by the licensee, was conducted in accordance with procedures. Additionally, the inspector independently verified radiation surveys to be consistent with posting requirements and with the levels documented within the periodic surveys.

A copy of the current NRC Form 3, "Notice to Radiation Workers" required by 10 CFR Part 19 was posted at various locations throughout the reactor facility.

Dosimetry results were reviewed by the inspector, most staff member doses being minimal, however during periods of Argon production personal exposure to handlers increased.

The inspectors reviewed current emission records and the annual report for the July 1, 2007 to June 30, 2008 period, as the current year's annual report was not completed. There were no liquid radioactive effluent releases during the period. The Ar-41 release for the period was within limits of 10 CFR 20.

Several thermo-luminescent dosimeters (TLDs) are placed around the outside of the facility and at different locations around the town. Records show that there was minimal exposure to the environment during the year.

c. Conclusions

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

4. Design Changes

a. Inspection Scope (IP 69001-02.08)

The inspector reviewed the following to ensure that if design changes were made, they were reviewed and approved in accordance with 10 CFR 50.59, the TS, and the licensee's administrative procedures:

- AP-12, "Change", Rev.5, dated June 12, 2008
- AP-12 Work Package #2009-002, "Replacement of Heat Exchanger Primary Loop Pump"
- AP-12 Work Package #2008-004, "Addition of Skimmers to the Reactor Recirculation System Outlets and Inlet Filter"
- Technical Specifications for the Penn State University Breazeale Reactor dated October 2004
- RSC Meeting Minutes for 2008, 2009

b. Observations and Findings

The licensee had performed a 10 CFR 50.59 evaluation for several facility modifications, including: the primary loop coolant pump removal and replacement, addition of skimmers, and the addition of 10 graphite reflector elements to the reactor core. The modifications had no safety implications for the public or the facility. It was determined that the licensee reviewed change requests related to modified systems in accordance with TS and established procedures.

c. Conclusions

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

5. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001-02.09)

The inspectors reviewed the following to ensure that the audits and reviews stipulated in TS were met by the Reactor Safeguards Committee (RSC):

- Penn State Reactor Safeguards Committee Meeting, July 7, 2009
- Penn State Reactor Safeguards Committee Meeting, April 21, 2009
- Penn State Reactor Safeguards Committee Meeting, January 13, 2009
- 2008 Audit of Penn State Breazeale Reactor (PSBR), dated December 3, 2008
- CCP Matrix for 2008 and 2009

b. Observations and Findings

The inspectors verified that the RSC conducted meetings at the required frequency with a quorum present, pursuant to TS requirements. An independent audit was conducted, by a staff member from the University of Massachusetts-Lowell, in accordance with TS and procedures.

c. Conclusions

The RSC provided the oversight required by the TS.

6. Exit Interview

The inspector presented the inspection results to licensee management at the conclusion of the inspection on August 14, 2009. The inspector described the areas inspected and discussed in detail the inspection observations. No dissenting comments were received from the licensee. The licensee acknowledged the observations presented and did not identify as proprietary, any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

E. Boeldt Manager, Radiation Protection
M. Bryan, Research Engineer
R. Buratti, RO Intern
C. Davison, Research and Education Specialist
C. Flores, RO Intern
B. Heidrich, Senior Research Assistant
A. Portanova, SRO Staff
B. Schmoke, SRO Intern
M. Trump, Associate Director for Operations
A. Umali, RO Intern
K. Unlu, Director, Radiation Science & Engineering Center

Other Personnel

None

INSPECTION PROCEDURES USED

IP 69001 Class II Research and Test Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED

None

CLOSED

None

DISCUSSED

None

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ADAMS	Agency-wide Document Access Management System
ALARA	As Low As Reasonably Achievable
CCP	Checks and Calibrations Procedures
IP	Inspection Procedure
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PSBR	Penn State Breazeale Reactor
PSU	Penn State University
Rev.	Revision

RO	Reactor Operator
RSC	Reactor Safeguards Committee
RSEC	Radiation Science and Engineering Center
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TRIGA	Training, Research, and Isotope Production, General Atomics
TS	Technical Specifications