July 3, 2007

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. 50-5/2007-201

Dear Dr. Pell:

On June 4, 6, & 7, 2007, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Pennsylvania State University Breazeale Research Reactor facility. The inspection included a review of activities authorized for your facility. The enclosed inspection report presents the results of that inspection.

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 activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact Mr. Kevin M. Witt at 301-415-4075.

Sincerely,

/RA/

Johnny Eads, Branch 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: NRC Inspection Report No. 50-5/2007-201
cc w/enclosure: See next page

cc:

Mr. Eric J. Boeldt, Manager of
Radiation Protection
The Pennsylvania State University
304 Old Main
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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

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ACCESSION NO.: ML071790474 **TEMPLATE #: NRR-106**

OFFICE	PRTB		PRTB:LA		PRTB:C	
NAME	KWitt		EHylton		JEads	
DATE	6 /29 /2007		6 /29 /2007		7/3 /2007	

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

Docket No:	50-5
License No:	R-2
Report No:	50-5/2007-201
Licensee:	Pennsylvania State University
Facility:	Breazeale Research Reactor Facility
Location:	State College, PA
Dates:	June 4, 6, & 7, 2007
Inspectors:	Kevin M. Witt Johnny Eads Patrick J. Isaac (In Training)
Approved by:	Johnny Eads, Branch Chief Research and Test Reactors Branch B Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Pennsylvania State University Breazeale Research Reactor facility
NRC Inspection Report No.: 50-5/2007-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects and activities since the last NRC inspection of the licensee's Class II non-power reactor safety programs including: organization and staffing, procedures, experiments, radiation protection program, design changes, committees, audits and reviews, inspection of transportation activities, and followup on previous open items.

The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organization and Staffing

- The organization and staffing were consistent with Technical Specification requirements.

Procedures

- The procedural review, revision, and implementation program satisfied Technical Specification requirements

Experiments

- The program for the control of experiments satisfied regulatory, procedural and Technical Specification requirements.

Health Physics

- Surveys were being completed and documented as required.
- Postings met regulatory requirements.
- Personnel dosimetry was being worn and recorded doses were within the NRC's regulatory limits.
- Radiation monitoring equipment was being maintained and calibrated as required.
- The Radiation Protection Program satisfied regulatory requirements.
- The radiation protection training program was being administered as required.
- Environmental monitoring satisfied license and regulatory requirements.

Design Changes

- Based on the records reviewed, the inspectors determined that the licensee's design change program was being implemented as required.

Committees, Audits and Reviews

- Review and oversight functions required by the Technical Specifications were acceptably completed by the Reactor Safeguards Committee.

Inspection of Transportation Activities

- The radioactive material shipments sent by the licensee were conducted in accordance with the applicable procedures and regulatory requirements.

REPORT DETAILS

Summary of Plant 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 full power for an operator licensing examination. The reactor was also operated at various times at full power to conduct sample irradiations.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure [IP] 69001)

The inspectors reviewed the following to verify compliance with the organization and staffing requirements in Technical Specification (TS) Section 6.1:

- staff qualifications and management responsibilities
- staffing requirements for the safe operation of the reactor
- selected portions of the operations logbooks for the past twelve months
- organizational structure and staffing
- administrative controls
- Reactor Safeguards Committee (RSC) meeting minutes, dated January 16 and April 17, 2007
- Pennsylvania State Breazeale Reactor (PSBR) Annual Operating Report for July 1, 2005 through June 30, 2006
- TS for the PSBR, Amendment No. 37, dated October 14, 2004
- Penn State Breazeale Reactor Technical Specification (TS 6.6.2.b.1) Special Report, Level 2 Change, dated April 2, 2007
- Administrative Procedure (AP) -1, "Personnel Requirements for Reactor Operations," Revision (Rev.) 2, dated December 23, 2003
- AP-2, "Regulations for Reactor Facility Keys," Rev. 3, dated October 14, 2005
- AP-6, "Penn State Reactor Safeguards Committee Charter and Operating Procedure," Rev. 4, dated April 20, 2006
- AP-11, "Administrative Responsibilities in the Absence of the PSBR Director," Rev. 4, dated March 10, 2004
- AP-12, "Change," Rev. 4, dated October 14, 2005
- AP-24, "Annual Operating Report to the NRC," Rev. 1, dated October 17, 2005

b. Observations and Findings

The PSBR organizational structure and the responsibilities of the reactor management and staff had not changed since the last inspection (see NRC Inspection Report No. 50-5/2006-202). All positions were filled with qualified personnel and a review of the applicable records verified that staffing was as required by TS Section 6.1 and the licensee's procedures. The inspectors observed that there was a new person in the Associate Director for Operations (ADO) position. The qualifications and experience of the individual were

reviewed and found to be in compliance with TS 6.1.4. The inspectors noted that the staffing at the facility was acceptable to support the ongoing activities. During the inspection, the NRC conducted a licensing examination for four Senior Reactor Operator (SRO) candidates. A separate report will be sent to the licensee and the candidates summarizing the results of the examination.

c. Conclusion

The organization and staffing were consistent with TS requirements.

2. Procedures

a. Inspection Scope (IP 69001)

To verify that facility procedures were being reviewed, revised, and implemented as required by TS Section 6.3, the inspectors reviewed selected aspects of:

- procedure revision, review, and approval process
- AP-6, "Penn State Reactor Safeguards Committee Operating Procedure," Rev. 4, dated April 20, 2006
- AP-12, "Change," Rev. 4, dated October 14, 2005
- AP-18, "Radiation Protection Program," Rev. 3, dated July 28, 2005
- Checks and Calibrations Procedure (CCP) -18, "Review of Procedures," Rev. 4, dated October 17, 2005
- Standard Operating Procedure (SOP) -10, "Reactor Operations at the Fast Neutron Irradiator (FNI) and the Fast Flux Tube (FFT)," Rev. 1, dated March 13, 2007
- PSBR Annual Operating Report for July 1, 2005 through June 30, 2006

b. Observations and Findings

Procedures had been formulated for the safe, routine operation of the reactor. Records showed that procedures for potential malfunctions (e.g., radioactive releases and contaminations, and abnormal events) had also been developed and were available to be implemented as required. The inspectors noted that procedural changes were being reviewed and approved by the RSC as required by TS. Training of personnel on procedures and changes was acceptable. Through observation of various activities at the facility, including reactor operation and sample handling, the inspectors determined that licensee personnel conducted activities in accordance with applicable procedures.

Review of RSC meeting minutes and discussions with the licensee indicated the request and approval of a changed procedure for a particular experimental facility's operations. The procedure pertains to the handling of samples in the Fast Neutron Irradiator (FNI). The licensee stated that the procedure was changed in response to an evaluation of operations with this experimental facility. The inspectors noted that the new procedure lays out an effective method of ensuring the experiments utilizing this facility are carried out in a safe manner.

c. Conclusions

The procedural review, revision, and implementation program satisfied TS requirements.

3. Experiments

a. Inspection Scope (IP 69001)

To ensure that the requirements of TS Sections 3.7 and 4.7 were being met concerning experimental programs, the inspectors reviewed selected aspects and/or portions of:

- selected experiment forms
- selected irradiation request forms
- potential hazards identification
- Standard Operating Procedure (SOP) -5, "Experiment Evaluation and Authorization", Rev. 4, dated November 16, 2004
- SOP-6, "Experiment Encapsulation and Irradiations," Rev. 3, dated March 7, 2005
- SOP-8, "Release of Irradiated Experiments," Rev. 3, dated April 6, 2005
- SOP-9, "Pneumatic Transfer System (R1) Operation," Rev. 3, dated October 7, 2005
- SOP-10, "Reactor Operations at the FNI and the FFT," Rev. 1, dated March 13, 2007
- SOP-11, "Reactor Operations at the Beam Ports," Rev. 0, dated March 13, 2007
- Reactor Log Book entries from November 3, 2005 to present

b. Observations and Findings

One of the many uses for the PSBR is the irradiation of various materials. The most frequently used experimental facilities are the FFT, the FNI and the pneumatic transfer system facility. Samples that have been irradiated at PSBR include various materials such as semiconductors, biological tissues, geological samples, and various other materials. All experiments conducted are in accordance with approved authorization requests. The ADO reviews and approves all routine samples to be irradiated in accordance with the TS limitations for each sample to be irradiated in the core. No new experiments had been initiated, reviewed, or approved since the previous inspection at the facility. If any new experiments were to be initiated, they would be reviewed and approved by the RSC. The inspectors confirmed that all of the experiments conducted were in accordance with TS limits and procedural requirements.

The inspectors observed the licensee conduct operations for an experiment utilizing the FNI on June 7, 2007. All of the procedures required for loading and extracting the samples were strictly followed and the personnel conducting the operation did so in a safe and knowledgeable manner. The inspectors verified that all of the checks conducted were in compliance with TS required values and parameters.

c. Conclusions

The program for the control of experiments satisfied regulatory, procedural and TS requirements.

4. Health Physics

a. Inspection Scope (IP 69001)

The inspectors reviewed the following to verify compliance with 10 CFR Parts 19 and 20, and the requirements outlined in TS Sections 3.3, 3.6, and 4.6:

- radiological signs and posting in various areas of the facility
- facility and equipment during tours
- organization and staffing
- radiation protection training records
- instrument calibration records
- Auxiliary Operating Procedure (AOP) -4, “Daily Smear Surveys,” Rev. 6, dated June 15, 2006
- AOP-5, “Water Collection and Analysis,” Rev. 5, dated November 15, 2005
- AOP-9, “Operating Procedure for the Evaporator System,” Rev. 5, dated June 28, 2004
- AOP-11, “Use of Frisker,” Rev. 4, dated June 7, 2005
- AP-8, “Radiation Protection Orientation Requirements,” Rev. 5, dated February 21, 2005
- AP-16, “PSBR ALARA Procedure,” Rev. 3, dated March 7, 2005
- AP-17, “RWP Procedure,” Rev. 3, dated March 7, 2005
- AP-18, “Radiation Protection Program,” Rev. 3, dated July 28, 2005
- Checks and Calibrations Procedures (CCP) -8, “Calibration of Air Monitors,” Rev. 4, dated February 13, 2006
- CCP-10, “Calibration of Area Radiation Monitors,” Rev. 3, dated December 15, 2005
- CCP-12, “Calibration of Portable Survey Instruments and Functional Check of Pocket Dosimeters,” Rev. 3, dated January 11, 2005
- CCP-33, “Annual Review of AP-8,” Rev. 3, dated January 23, 2002
- CCP-36, “Air Monitor Preventive Maintenance (PM),” Rev. 4, dated April 15, 2005
- Memorandum entitled, “CCP-33, Annual Review of Ap-8,” dated March 10, 2006 and May 7, 2007
- Memorandum to the RSC from the RSO entitled, “Failure to Wear Dosimetry and Procedures,” dated April 17, 2007
- Memorandum to the RSC from the RSO entitled, “Dosimetry Results and Argon Production Exposures,” dated April 17, 2007
- Radiation Science and Engineering Center Fast Neutron Irradiation Operations Causal Analysis, dated May 31, 2007
- facility daily, monthly, quarterly, and other periodic contamination and area radiation surveys from 2006 to present
- Quarterly dosimetry records for January 1, 2006 to present

- PSBR Visitor Dosimetry Logs
- Completed AP-18 Form, "RSEC RPP Audit," dated December 31, 2006
- Completed CCP-8 Forms, "Calibration of Air Monitors," dated January 19, 2007 and February 1, 2007
- Completed CCP-10 Forms, "Calibration of Area Radiation Monitors," dated from January 1, 2006 to present
- Completed CCP-12 Forms, "Calibration of Portable Survey Instruments and Pocket Dosimeters," dated from January 1, 2006 to present
- Completed CCP-36 Forms, "Air Monitor Preventative Maintenance," dated from March 17, 2006 to present
- 2007 Radiation Protection Program Review, dated May 2, 2007
- Radionuclide Emissions Analysis for Calendar Year 2006, dated March 2, 2007
- Rules and Procedures for the Use of Radioactive Material at the Pennsylvania State University, undated

b. Observations and Findings

(1) Surveys

The inspectors reviewed daily, monthly and quarterly radiation and contamination surveys of the reactor building, which were conducted by radiation protection office (RPO) personnel. The licensee also conducted daily swipe surveys of the commonly used areas of the facility. The results were documented on the appropriate forms, evaluated as required, and corrective actions taken when readings or results exceeded set action levels. The number and location of survey points was adequate to characterize the radiological conditions. The licensee investigates any readings above background levels. The licensee has a tracking program for ensuring the surveys are completed in the appropriate time frame. The inspectors verified that the Radiation Safety Officer (RSO) reviews all of the survey records. No abnormal readings were discovered.

(2) Postings and Notices

The inspectors reviewed the postings required by 10 CFR Part 19 at the entrances to various controlled areas including the Reactor Bay, and radioactive material storage areas. The postings were acceptable and indicated the radiation and contamination hazards present. The facility's radioactive material storage areas were found to be properly posted. No unmarked radioactive material was found in the facility.

(3) Dosimetry

The licensee used a National Voluntary Laboratory Accreditation Program-accredited vendor to process personnel dosimetry. Through direct observation, the inspectors determined that dosimetry was used in an acceptable manner by facility personnel. For visitors to the facility, a direct read pocket dosimeter is issued to individuals for general tours.

Records indicate that no abnormal readings were obtained.

An examination of the records for the inspection period showed that all exposures were well within NRC limits and within licensee action levels. All of the staff and researchers associated with the facility wear Optically Stimulated Luminescense Dosimeter (OSLD) badges and minimal doses were recorded for 2006 through present. The licensee investigates any dosimetry readings that indicate a monthly exposure above typical levels for a reactor staff member. The as low as reasonably achievable (ALARA) goal specified in the radiation safety procedures is to keep exposures to less than 10% of the applicable NRC requirements and the licensee consistently meets this goal.

The licensee indicated that through a review of dosimetry reports, an abnormality was noted in the levels of exposure between some of the operators. The licensee identified several situations where the proper dosimetry was not being worn by the operators while handling radioactive materials in the FNI experimental facility. The licensee immediately investigated any potential exposures and determined that normal exposures were received by the operators. The licensee committed to corrective actions in order to ensure that a similar incident will not occur in the future. The inspectors verified that the licensee is following all of the actions which will ensure continued compliance with all applicable requirements.

(4) Radiation Monitoring Equipment

The calibration of portable survey meters, friskers, fixed radiation detectors, and air monitors were calibrated at the calibration lab using a Cs-137 source. The calibration records of portable survey meters, friskers, fixed radiation detectors, and air monitoring equipment in use at the facility were reviewed. Calibration frequency met the requirements established in the applicable procedures while records were being maintained as required. The inspectors reviewed the licensee's tracking system for ensuring the instrument calibrations are completed on time and found it to be useful.

During the inspection, the inspectors visited the calibration range located in the basement of the academic projects building. The RPO personnel described the equipment in the facility for the inspectors. The calibration records reviewed were thorough and were completed using the appropriate techniques and according to procedure. The inspectors observed that proper precautions are always used to maintain doses ALARA.

(5) Radiation Protection Program

The licensee's Radiation Protection Program (RPP) was established through the procedures. The RPP provides guidance for keeping doses ALARA and is consistent with the guidance in 10 CFR Part 20. The

inspectors verified that the RPP was being reviewed annually as required by 10 CFR 20.1101(c). No issues related to the RPP were identified in the review of the program. The RSC reviews the overall implementation of the radiation protection program at the PSBR.

The RPP requires that all personnel who work with radioactive materials receive training in radiation protection, policies, procedures, requirements, and the facilities prior to having unescorted access at the facility. The RPO personnel is responsible for conducting the training and all of the training is typically conducted with the RSO. A test is administered at the end of the training to verify that the individuals understood the material presented. The training covered the topics required to be taught in 10 CFR Part 19 and the review of training materials and tests indicated that the staff were instructed on the appropriate subjects.

The licensee communicated to the inspectors an abnormal event which occurred with the Argon-41 production facility. The licensee was irradiating Argon-40 in accordance with the established procedure and upon completing the shutdown of the Argon system, the staff working at the facility noted that the air radiation monitor system was indicating an abnormal response. Upon further investigation, the staff determined that the system was not functioning as expected and some radioactive Argon-41 had been released to the reactor bay. The licensee immediately implemented a response plan which included ventilating the reactor bay to provide as much fresh air as possible. The licensee could not determine how much Argon-41 was released to the environment, but initial estimates are that there were as much as one Curie released to the reactor bay after the incident occurred. The licensee confirmed that the personnel involved did not receive abnormal exposures due to the event. The licensee has initiated an abnormal event investigation and will soon be completing the report with the root cause of the incident and corrective actions to prevent further occurrences.

(6) Facility Tour

The inspectors toured the reactor facility, the radiation detector calibration room and accompanying facilities. Control of radioactive material and control of access to radiation and high radiation areas were observed to be acceptable. The postings and signs for these areas were appropriate. Licensee personnel followed the indicated precautions for access to controlled areas.

(7) Environmental Monitoring

Several thermo-luminescent dosimeters (TLDs) are placed around the outside of the facility and at different locations around the city. Records show that there was minimal exposure to the environment during the previous year. Doses immediately surrounding the facility were less than 50 mrem for 2006. There was no liquid effluent discharged from the

facility. The licensee indicated that there was no liquid waste released from the reactor license. The licensee also indicated that gaseous releases from the facility were minimal.

c. Conclusions

The inspectors determined that: (1) surveys were being completed and documented as required, (2) postings met regulatory requirements (3) personnel dosimetry was being worn and recorded doses were within the NRC's regulatory limits, (4) radiation monitoring equipment was being maintained and calibrated as required, (5) the RPP satisfied regulatory requirements, 6) the radiation protection training program was being administered as required, and 7) environmental monitoring satisfied license and regulatory requirements.

5. Design Changes

a. Inspection Scope (IP 69001)

In order to verify that any modifications to the facility were consistent with 10 CFR 50.59, the inspectors reviewed selected aspects of:

- facility design changes and records
- facility configuration and associated records
- RSC meeting minutes, dated January 16 and April 17, 2007
- PSBR Annual Operating Report for July 1, 2005 through June 30, 2006
- AP-6, "Penn State Reactor Safeguards Committee Charter and Operating Procedure," Rev. 4, dated April 20, 2006
- AP-12, "Change," Rev. 4, dated October 14, 2005

b. Observations and Findings

Through review of applicable records and interviews with licensee personnel, the inspectors determined that no changes related to the RPP had been initiated and/or completed at the facility in the previous year. The inspectors verified that any changes or modifications to the facility would be analyzed by the staff, presented to and reviewed by the RSC, determined to be acceptable, and approved as required.

c. Conclusions

Based on the records reviewed, the inspectors determined that the licensee's design change program was being implemented as required.

6. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001)

The inspectors reviewed the following to ensure that the audits and reviews stipulated in TS Section 6.2 were being completed by the RSC:

- safety review records and audit reports since June 2001
- responses to the review and audit reports
- PSBR RSC Member List, dated January 3, 2006
- RSC meeting minutes, dated January 16 and April 17, 2007
- Memorandum to the RSC from the RSO entitled, "Failure to Wear Dosimetry and Procedures," dated April 17, 2007
- Report of 2006 Audit of the Penn State Breazeale Nuclear Reactor, dated October 2, 2006
- AP-6, "Penn State Reactor Safeguards Committee Charter and Operating Procedure," Rev. 4, dated April 20, 2006

b. Observations and Findings

The RSC is defined in the TSs and the inspectors verified that the committee is following all aspects of the requirements. The RSC had quarterly meetings and a quorum was always present as required. Review of the minutes indicated the RSC provided guidance, direction and oversight, and ensured suitable use of the reactor. The minutes provided an acceptable record of RSC review functions and of their safety oversight of reactor operations.

Audits of the items required by TS 6.2.4 were completed by members of the RSC. Minor issues that were not safety related were noted in the audit reports and meeting minutes and the inspectors observed that any safety related items were properly controlled. The inspectors noted that the safety reviews and audits, and the associated findings, were acceptably detailed. The licensee immediately responded to all audit findings and ensured that the corrective actions were properly completed.

c. Conclusions

Review and oversight functions required by the TSs were acceptably completed by the RSC.

7. Inspection of Transportation Activities

a. Inspection Scope (IP 86740)

To verify compliance with regulatory and procedural requirements for transferring or shipping licensed radioactive material, the inspectors reviewed the following:

- selected records of various types of radioactive material shipments
- Radiation Protection Procedure RP-Shipping-10, "Radioactive Material Receipt and Shipment Procedure," latest rev. dated January 2007

- Completed RP-Shipping-10 Appendix B Forms, “Shipment Checklist for a Limited Quantity of Radioactive Material,” dated from January 2006 to present
- Completed RP-Shipping-10 Appendix C Forms, “Type A Quantities Only,” dated from January 2006 to present

b. Observations and Findings

Through records review and discussions with licensee personnel, the inspectors determined that the licensee had shipped various packages of radioactive material since the previous inspection in this area. The records indicated that the radioisotope types and quantities were calculated and dose rates measured as required. All radioactive material shipment records reviewed by the inspectors had been completed in accordance with Department of Transportation (DOT) and NRC regulations.

The inspectors verified that the licensee maintained copies of shipment recipients’ licenses to possess radioactive material as required and that the licenses were verified to be current prior to initiating a shipment. The training of the staff members responsible for shipping the material was also reviewed. The inspectors verified that the shippers’ training met DOT requirements.

c. Conclusions

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

8. Exit Meeting

The inspectors presented the inspection results to licensee management at the conclusion of the inspection on June 7, 2007. The inspectors discussed the findings for each area reviewed. The licensee acknowledged the findings and did not identify as proprietary any of the material provided to or reviewed by the inspectors during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

E. Boeldt, Manager, Radiation Protection
M. Bryan, Research Engineer
L. Burton, Associate Dean of Engineering
M. Claver, Director, Environmental Health and Safety
C. Davison, Research and Education Specialist/Reactor Supervisor
T. Flinchbaugh, Former Associate Director for Operations
B. Heidrich, Senior Research Assistant
M. Linzey, Associate Radiation Safety Officer
E. Pell, Vice President for Research and Dean of the Graduate School
M. Trump, Associate Director for Operations
F. Sears, Director, Radiation Science & Engineering Center

INSPECTION PROCEDURES USED

IP 69001	CLASS II NON-POWER REACTORS

ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED:

None

CLOSED:

None

DISCUSSED:

None

LIST OF ACRONYMS USED

ADAMS	Agencywide Documents Access and Management System
ADO	Associate Director for Operations
ALARA	As Low As Reasonably Achievable
AOP	Auxiliary Operating Procedure
AP	Administrative Procedure
CCP	Checks and Calibrations Procedure
CFR	Code of Federal Regulations
DOT	Department of Transportation
FNI	Fast Neutron Irradiator
IP	Inspection Procedure
MW	Megawatt
NRC	Nuclear Regulatory Commission
OSLD	Optically Stimulated Luminescense Dosimeter
PSBR	Pennsylvania State Breazeale Reactor

PSU	Pennsylvania State University
Rev.	Revision
RPO	Radiation Protection Office
RPP	Radiation Protection Program
RSC	Reactor Safeguards Committee
RSEC	Radiation Science and Engineering Center
RSO	Radiation Safety Officer
SOP	Standard Operating Procedure
SRO	Senior Reactor Operator
TS	Technical Specification
TRIGA	Training, Research, and Isotope Production, General Atomics