

February 23, 2010

Dr. Steven Reese, Director
Radiation Center and TRIGA Reactor
Oregon State University
Radiation Center, A100
Corvallis, OR 97331-5903

SUBJECT: OREGON STATE UNIVERSITY - NRC ROUTINE INSPECTION REPORT NO.
50-243/2010-201

Dear Dr. Reese:

On January 25-28, 2010, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at the Oregon State University Radiation Center TRIGA Mark-II Reactor facility (Inspection Report No. 50-243/2010-201). The enclosed report documents the inspection results which were discussed on January 28, 2010, with you, Mr. Todd Keller, Reactor Administrator, and other 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 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, and 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).

Should you have any questions concerning this inspection, please contact Craig Bassett at (404) 358-6515 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA By Patrick Isaac Acting For/
Johnny H. Eads, Jr., Chief
Research and Test Reactors Oversight Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No.: 50-243
License No.: R-106

Enclosure: NRC Inspection Report No. 50-243/2010-201
cc w/encl.: Please see next page

Oregon State University

Docket No. 50-243

cc:

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Corvallis, OR 97331

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Dr. Todd Palmer, Chairman
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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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DATE	1/30/2010	2/23/2010	2/23/10

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

Docket No: 50-243

License No: R-106

Report No: 50-243/2010-201

Licensee: Oregon State University

Facility: TRIGA Mark-II Reactor Facility

Location: Radiation Center
Oregon State University
Corvallis, Oregon

Dates: January 25-28, 2010

Inspector: Craig Bassett

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

EXECUTIVE SUMMARY

Oregon State University
TRIGA Mark-II Reactor Facility
Report No: 50-243/2010-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the Oregon State University (the licensee's) 1.1 Megawatt Class II research and test reactor safety program including: 1) organization and staffing, 2) review and audit and design change functions, 3) reactor operations, 4) operator requalification, 5) procedures, 6) fuel movement, 7) maintenance and surveillance, 8) experiments, and 9) emergency preparedness 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. No violations or deviations were identified.

Organization and Staffing

- The licensee's organization and staffing were in compliance with the requirements specified in Section 6 of the Technical Specifications.

Review and Audit Functions and Design Change Control

- Review, audit, and oversight functions required by Technical Specification Section 6.2 were acceptably completed by the Reactor Operations Committee.
- Modifications or changes to the facility procedures, experiments, and structures, systems, and components had undergone the required screenings and evaluations and had been reviewed and approved by the Reactor Operations Committee.

Reactor Operations

- Reactor operations were conducted and documented in accordance with Technical Specification and applicable procedural requirements and guidance.

Operator Licenses, Requalification, and Medical Activities

- Operator requalification was conducted as required and the program was up-to-date and being acceptably maintained in accordance with the Operator Requalification Program.
- Medical examinations were being completed biennially for each operator as required.

Procedures

- Facility procedures were acceptable and satisfied Technical Specification Section 6.4 requirements for being revised by the licensee and reviewed and approved by the Reactor Operations Committee.
- Procedural compliance was observed and found to be acceptable.

Fuel Movement

- Fuel handling activities were conducted in accordance with facility procedures and fuel inspections were completed and documented as required by Technical Specification Sections 4.1.e and 5.3.

Maintenance and Surveillance

- Maintenance was being completed in accordance with Technical Specification and procedural requirements.
- The program for surveillance verifications and calibrations was being implemented in accordance with Technical Specification requirements.

Experiments

- The program for conducting and controlling experiments satisfied regulatory and Technical Specification requirements specified in Sections 3.8 and 4.8.

Emergency Preparedness

- Emergency response facilities and equipment were being maintained as required and responders were knowledgeable of proper actions to take in case of an emergency.
- The licensee maintained current Emergency Support Agreements with offsite agencies which indicated that support would be available in case of an emergency.
- Annual drills were being held and documentation was maintained concerning the follow-up critiques and any needed corrective actions.
- Emergency preparedness training for staff and off-site personnel was being conducted as required.

REPORT DETAILS

Summary of Plant Status

Oregon State University (the licensee) continued to operate the 1.1 megawatt TRIGA Mark-II research and test reactor in support of laboratory demonstrations, reactor surveillances, and sample irradiations. Observation of reactor operation and a review of applicable records indicated that the reactor was typically operated approximately six hours per day, five days per week. During this inspection, the reactor was started up and operated several hours per day at varying power levels for sample irradiation and engineering class laboratories.

1. Organizational Structure and Staffing

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

The inspector reviewed the following regarding the licensee's organization and staffing to ensure that the requirements of Section 6 of the Technical Specifications (TS), revised through Amendment No. 22 of the facility operating license, dated September 30, 2008, were being met:

- Oregon State University (OSU) Radiation Center and TRIGA Reactor facility organizational structure and staffing
- Selected portions of the Reactor Console Logbooks for the past two years which indicated staffing levels during routine reactor operations
- Oregon State University TRIGA Reactor Operating Procedure (OSTROP) 6, "Administrative and Personnel Procedures," Revision (Rev.) LEU-1, reprinted November 2008, which outlined various administrative controls
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2007 through June 30, 2008, submitted to the NRC on October 27, 2008
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2008 through June 30, 2009, submitted to the NRC on October 27, 2009
- American National Standard ANSI/ANS 15.4-1988; R1999, "Selection and Training of Personnel for Research Reactors," dated 1999

b. Observations and Findings

The inspector noted that the Director of the Radiation Center (Rad Center) continued to report to the President of the University through the Vice President for Research. It was also noted that the Rad Center organizational structure and the responsibilities of the reactor staff were as outlined in TS Section 6 and OSTROP 6 and had not changed since the last inspection.

Staffing levels remained consistent with those noted during the last inspection of this facility. The current reactor operations organization consisted of the Director of the Radiation Center, the Reactor Administrator, the Reactor Supervisor, and a Scientific Instrument Technician. It was noted that all these individuals were qualified Senior Reactor Operators (SROs). The staff also included another full-time SRO and a part-time Reactor Operator (RO) as well. This organization was as required and consistent with that specified in the TS.

The inspector reviewed the qualifications of the reactor staff. All personnel satisfied the training and experience requirements stated in ANSI/ANS 15.4, "Standard for the Selection and Training of Personnel for Research Reactors," as stipulated in the TS. A review of the Reactor Console Logbooks and associated records confirmed that shift staffing met the minimum requirements for duty and on-call personnel.

c. Conclusions

Organizational structure and staffing were in compliance with the requirements specified in TS Section 6.

2. Review and Audit, and Design Change Functions

a. Inspection Scope (IP 69001)

In order to verify that the licensee had established and conducted reviews and audits as required by TS Section 6.2 and to determine whether modifications to the facility had been reviewed in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59, the inspector reviewed:

- OSU 50.59 Screen Logbook
- OSU 50.59 Evaluation Logbook
- Design change functions outlined in OSTROP 6
- Reactor Operations Committee (ROC) meeting minutes from November 2007 to the present
- ROC Quarterly and Annual Audit and review records for the past two years
- Change screen reviews conducted under and documented in accordance with OSTROP 6, Figure 6.1 entitled, "Oregon State TRIGA Reactor (OSTR) 10 CFR 50.59 Screen Form," Numbers (Nos.) 08-01 through 08-12, 09-01 through 09-05, and 10-01
- Change evaluations conducted under and documented in accordance with OSTROP 6, Figure 6.2 entitled, "OSU TRIGA Reactor (OSTR) 10 CFR 50.59 Evaluation Form," Nos. 08-01 through 08-04 and 09-01 through 09-03
- OSTROP 6, "Administrative and Personnel Procedures," Rev. LEU-1, reprinted November 2008, which also contained further examples of the responsibilities of the Reactor Operations Committee
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2007 through June 30, 2008, submitted to the NRC on October 27, 2008
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2008 through June 30, 2009, submitted to the NRC on October 27, 2009

b. Observations and Findings

(1) Review and Audit Functions

The inspector reviewed the ROC meeting minutes from November 2007 to the present. These meeting minutes showed that the committee met quarterly and had considered the types of topics outlined by the TS Section 6.2. Review of the committee meeting minutes also indicated that the ROC provided appropriate guidance and direction for reactor operations, and ensured suitable use and oversight of the reactor.

It was noted that ROC members completed quarterly audits of reactor operations and related records, as well as, annual reviews of the reactor operator requalification, emergency preparedness, and security programs. The inspector noted that the audits and the resulting findings were acceptable and the audits were generally completed within the time frame stipulated by the TS.

(2) Design Control

The inspector reviewed recent 10 CFR 50.59 screen and evaluation forms and interviewed licensee personnel concerning proposed changes to facility procedures, tests, experiments, and/or structures, systems, and components (SSC). As a result, the inspector determined that screenings had been conducted as required and some mandated the completion of evaluations in accordance with the requirements of OSTROP 6. The screenings and evaluations had been documented as required, had been reviewed and approved by the ROC as needed, and had been signed off by the appropriate personnel. None of the evaluations were found to require a license amendment.

c. Conclusions

Review, audit, and oversight functions required by TS Section 6.2 were acceptably completed by the ROC. Modifications or changes to the facility procedures, experiments, and SSC had undergone the required screenings and evaluations and had been reviewed and approved by the ROC.

3. Operations

a. Inspection Scope (IP 69001)

To verify that the licensee was operating the reactor in accordance with TS Sections 2 and 3 and the applicable procedures, the inspector reviewed selected portions and/or aspects of:

- Staffing during routine reactor operations
- Selected portions of the Supervisor Log #12 - #14
- Licensed Operator Time Log Sheets for the past two years

- Selected OSU TRIGA Reactor Daily Power Log Sheets for the past six months
- Reactor operations documented in various Reactor Console Logbooks, Nos. 150 – 152
- Observation of startup, operations, and/or shutdown activities on January 26, 27, and 28
- Start-up activities documented on selected OSTROP 2 forms entitled “OSU TRIGA Reactor Startup Checklist,” from January through December 2009
- Shut down activities documented on selected OSTROP 3 forms entitled “Reactor Shutdown Checklists,” from January through December 2009
- Selected records of console instrumentation readings documented on OSU TRIGA Reactor Daily Power Log Sheets for the past year
- OSTROP 2, “Reactor Startup Checklist Procedures,” Rev. 12, reprinted April 2008
- OSTROP 3, “Reactor Shutdown Checklist Procedures,” Rev. 10, reprinted April 2008
- OSTROP 4, “Reactor Operation Procedures,” Rev. LEU-1 reprinted November 2008
- OSTROP 5, “Procedure for Maintaining Reactor Operational Records,” Rev. 9, reprinted November 2008
- OSTROP 25, “Reporting Requirements,” Rev. 3, reprinted December 2000
- OSTROP 27, “Procedures to Follow in the Event of a Commercial Electrical Power Failure,” Rev. 3, reprinted December 2005
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2007 through June 30, 2008, submitted to the NRC on October 27, 2008
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2008 through June 30, 2009, submitted to the NRC on October 27, 2009

b. Observations and Findings

The inspector conducted observations of the reactor staff on January 26 and 27, 2010, and reviewed Reactor Console Logbooks and associated records. The inspector noted that the licensed reactor operators were knowledgeable and competent. Observation of operational activities also confirmed that reactor operations, including start-ups, routine operations, and shutdowns, were carried out in accordance with written procedures and TS requirements. Adherence to procedures was acceptable.

Through these observations and reviews the inspector also confirmed that shift staffing during reactor operation met the TS requirements for duty and on-call personnel. The inspector noted that the logs were being maintained as required by procedure and the records and associated forms provided an acceptable indication of operational activities. The logs indicated that the recorded operational conditions were within the limits specified in the license and TS. The Reactor Console Logbooks, as well as other associated records, also

documented abnormal events that occurred and measures that had been taken to track and resolve the events.

c. Conclusions

Reactor operations were being completed and documented in accordance with TS and procedural requirements.

4. Operator Licenses, Requalification, and Medical Activities

a. Inspection Scope (IP 69001)

The inspector reviewed the following in order to determine that operator training and requalification activities were conducted as required by the requalification program and that medical requirements were met:

- Effective dates of current operator licenses
- Reactor operators' medical examination records for the past three years
- Operator training records documented in the Operator Requalification Manual
- TRIGA Reactor Operator Requalification Exam Results forms for 2007, 2008, and 2009
- Reactor operations documented in various Reactor Console Logbooks, Nos. 150 – 152
- Memorandum from T. Keller to T. Palmer and S. Reese dated November 23, 2009, discussing the 2009 Operator Requalification Program
- "Requalification Program for Licensed Operators of the Oregon State TRIGA Reactor," Rev. 1, reprinted September 30, 2004
- Logs and records of the number of hours spent operating the reactor maintained in the Operator Time Log and associated manual
- Active duty status and OSTR Annual Requalification Operating Test results documented in the Operator Time Log and associated manual
- OSTROP 16, "Annual Surveillance and Maintenance Procedures," Rev. LEU-1, reprinted November 2008 and related log sheets

b. Observations and Findings

At the time of the inspection, there were five qualified SROs and one RO working at the facility. The inspector verified that all the operators' licenses were current. It was noted that one operator's license was due to expire in March 2010 but the licensee was aware of this and had prepared a license renewal application which was forwarded to the NRC in early January.

A review of the logs and records showed that training had been conducted in the areas stipulated in the licensee's requalification and training program such that all the material was covered within a two-year period. It was noted that lectures had been given as stipulated, that training reviews had been documented, and that written examinations had been completed. An annual operating test had been

conducted for each SRO by the Reactor Supervisor as required by the program as well. It was also verified that each operator had completed the required number of hours of reactor operations each calendar quarter as required. Records of these reactor manipulations, other operational activities, and/or Reactor Supervisor activities were being maintained, as were records of the Annual Operations Tests. The program was up-to-date and training was current.

The inspector verified that medical examinations were being completed biennially for each operator as required.

c. Conclusions

The requalification and training program was up-to-date and acceptably maintained.

5. Procedures

a. Inspection Scope (IP 69001)

To determine whether facility procedures were being audited annually and whether the procedures met the requirements outlined in TS Section 6.4, the inspector reviewed:

- Selected operating (OSTROP) procedures
- Procedural reviews and updates documented in ROC meeting minutes.
- Change screen reviews conducted under and documented in accordance with OSTROP 6, Figure 6.1 entitled, "Oregon State TRIGA Reactor (OSTR) 10 CFR 50.59 Screen Form," Nos. 08-01 through 08-12, 09-01 through 09-05, and 10-01
- Change evaluations conducted under and documented in accordance with OSTROP 6, Figure 6.2 entitled, "OSU TRIGA Reactor (OSTR) 10 CFR 50.59 Evaluation Form," Nos. 08-01 through 08-04 and 09-01 through 09-03
- OSTROP 5, "Procedure for Maintaining Reactor Operational Records," Rev. 9, reprinted April 2008
- OSTROP 6, "Administrative and Personnel Procedures," Rev. LEU-1, reprinted November 2008

b. Observations and Findings

The licensee's procedures were found to be acceptable for the facility's current operating status and staffing level. It was noted that the procedures specified the responsibilities of the various members of the staff. The inspector determined that the procedures were being audited and reviewed annually by the ROC as required and revised as needed.

Changes to procedures were screened according to OSTROP 6. If the changes did not result in a change to the intent of the procedure, they were routed to all licensed SROs, the Senior Health Physicist, the Reactor Administrator, and the

Director who signed and dated the change indicating review and concurrence. Substantive changes to procedures, checklists, and forms were required to undergo a 10 CFR 50.59 Evaluation. They were then presented to the ROC for review and approval as required by TS.

The operations observed by the inspector during this inspection were completed in accordance with the applicable procedures.

c. Conclusions

Facility procedures were being reviewed and audited annually as required by TS Section 6 and procedure revisions were reviewed and approved by the ROC. Procedural compliance was acceptable.

6. Fuel Movement

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify adherence to fuel handling, positioning, and inspection requirements specified in TS Sections 4.1.e and 5.3:

- Fuel handling equipment and instrumentation
- Selected portions of the Reactor Supervisor Log Nos. #12 & 14
- Reactor operations documented in various Reactor Console Logbooks, Nos. 150 – 152
- Fuel handling and examination records for the past two years documented on “Oregon State University TRIGA Mark II Research Reactor Fuel Element History File” cards maintained in the LEU Fuel Element History Logbook and on “Fuel Element Transfer Index Sheet” forms maintained in a separate notebook
- OSTROP 11, “Fuel Element Handling Procedures,” Rev. LEU-1, reprinted November 2008
- OSTROP 16, “Annual Surveillance and Maintenance Procedures,” Rev. LEU-1, reprinted November 2008 and related log sheets
- OSTROP 20, “Special Nuclear Material Control and Accounting Procedures,” Rev. 6, reprinted July 2004

b. Observations and Findings

The inspector noted that the licensee was operating with LEU Core No.1. It was also noted that the reactor could be operated in different configurations depending upon what equipment was installed in the B-1 or G-14 position of the core. The actual configuration was noted in the Reactor Console Logbook by using colored markers to mark the edge of each applicable logbook page.

The inspector determined that the licensee was maintaining the required records of the various fuel movements that were completed and verified that the movements were conducted in compliance with procedure. The procedures used for fuel movement and inspection were acceptable, as were the precautions that

were required to be established during fuel movements and inspections. Fuel element locations were being tracked by annotations to the applicable fuel element forms in the log book and on a Fuel Status Board maintained in the Reactor Control Room.

The inspector noted that new reactor fuel was inspected upon initial receipt. Thereafter, twenty percent (20%) of the elements were inspected each year such that the entire core would be inspected over a five year period. The elements were visually inspected to check for damage and deterioration and measured to check for concentric or other swelling. The results of these inspections were being documented in the Reactor Console Logbook and on the applicable fuel element history forms as required.

c. Conclusions

Reactor fuel movements were made and documented in accordance with procedure. The fuel was being inspected as stipulated by TS Section 4.1.e and 5.3.

7. Maintenance and Surveillance

a. Inspection Scope (IP 69001)

To determine that surveillance requirements and Limiting Conditions for Operation (LCO) verifications were being completed as required by TS Sections 3 and 4, and that maintenance activities were conducted when required, the inspector reviewed:

- Selected portions of the Supervisor Log #12 - #14
- Reactor operations documented in various Reactor Console Logbooks, Nos. 150 – 152
- Selected surveillance and calibration test data sheets and records maintained in the Surveillance and Maintenance Records Notebook
- OSTROP 8, "Reactor Power Calibration Procedures," Rev. 6, reprinted October 2005
- OSTROP 9, "Control Rod Calibration Procedures," Rev. LEU-1, reprinted November 2008
- OSTROP 12, "Control Rod Maintenance, Removal, and Replacement Procedures," Rev. LEU-1, reprinted November 2008
- OSTROP 13, "Monthly Surveillance and Maintenance Procedures," Rev. LEU-1, reprinted November 2008 and related log sheets
- OSTROP 14, "Quarterly Surveillance and Maintenance Procedures," Rev. LEU-1, reprinted November 2008 and related log sheets
- OSTROP 15, "Semi-Annual Surveillance and Maintenance Procedures," Rev. LEU-1, reprinted November 2008 and related log sheets
- OSTROP 16, "Annual Surveillance and Maintenance Procedures," Rev. LEU-1, reprinted November 2008 and related log sheets
- OSTROP 19, "Equipment Maintenance and Calibration Procedures," Rev. 1, reprinted July 2004

- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2007 through June 30, 2008, submitted to the NRC on October 27, 2008
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2008 through June 30, 2009, submitted to the NRC on October 27, 2009

b. Observations and Findings

The inspector noted that selected daily, monthly, quarterly, semiannual, and annual checks, tests, verifications, and/or calibrations for TS-required surveillances and LCO verifications were being completed as stipulated. All the surveillances and LCO verifications reviewed were completed on schedule and in accordance with licensee procedures. All the recorded results were within the TS and procedurally prescribed parameters. The records and logs reviewed were complete and being maintained as required.

The maintenance logs and records indicated that problems were addressed and preventive maintenance operations completed as required by procedure. Records showed that routine maintenance activities were conducted at the required frequencies and in accordance with the TS and/or the applicable procedure. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements.

The Reactor Supervisor maintained a schedule for reactor operations and tracked the completion of maintenance and surveillance activities. This practice ensured that the staff was aware of upcoming activities and helped ensure good administrative control over operational aspects of the facility.

c. Conclusions

The program for surveillance and LCO confirmations was being carried out in accordance with TS and procedural requirements. Maintenance was also being completed as required.

8. Experiments

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify that experiments were being conducted within approved guidelines specified in TS Sections 3.8 and 4.8:

- Irradiation Request (IR) Index #3
- OSU Radiation Center TRIGA User's Certification Form
- Potential hazards identification and control of irradiated items
- Documentation of experiment review and approval by the ROC
- General Limitations of Experiments Performed Using the OSU TRIGA Reactor

- Selected OSU TRIGA Reactor Irradiation Request Information Sheet forms for the past year
- Reactor operations documented in various Reactor Console Logbooks, Nos. 150 – 152
- Selected Irradiation Request Pneumatic Transfer Sample Information Forms for the past year
- OSU Approved Experiments including the following:
 - No. A-1, “Normal TRIGA Operations,” Rev. 1, approval dated July 17, 1992
 - No. B-3, “Irradiation of Materials in the Standard OSTR Irradiation Facilities,” Rev. 5, approval dated December 16, 2008
 - No. B-33, “Irradiation of Combustible Liquids in the Rotating Rack,” Rev. 0, approval dated August 27, 2003
 - No. B-35, “Irradiation of Enriched Uranium Materials in the Prompt Gamma Neutron Activation Analysis (PGNAA),” Rev. 0, approval dated April 29, 2009
- OSTROP 10, “Operating Procedures for Reactor Experimental Facilities,” Rev. LEU-2, reprinted January 2010
- OSTROP 18, “Procedures for the Approval and Use of Reactor Experiments,” Rev. 8, reprinted March 2005
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2007 through June 30, 2008, submitted to the NRC on October 27, 2008
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2008 through June 30, 2009, submitted to the NRC on October 27, 2009

b. Observations and Findings

The licensee had three types of experiments at the facility based generally on the reactivity, amount of shielding required, and the amounts of radioisotopes produced. Class A experiments were those that involved small changes in reactivity, required no external shielding, and/or produced limited amounts of radioisotopes. Class B experiments involved larger changes in reactivity, required external shielding, and/or produced larger amounts of radioisotopes. Class C experiments were special experiments involving unusual experimental setups, the irradiation of special materials such as explosives, unusual fuel element arrangements, large in-core experimental facilities, etc. Currently one Class A experiment and nine Class B experiments were considered active. The inspector verified that all the active experiments had been reviewed and approved by the ROC as required.

Most of the experiments conducted at the facility were well-established procedures that have been in place for many years. Nevertheless, it was noted that one new experiment had been initiated in 2009. The planned experiment involved irradiation of enriched uranium foil in the licensee’s Prompt Gamma Neutron Activation Analysis (PGNAA) Facility with the intention of monitoring radiation signatures produced during and shortly after fission. The inspector verified that it had been approved by the Reactor Supervisor, the Senior HP, and

finally by the ROC as required. Also, a 10 CFR 50.59 Evaluation had been completed for the experiment.

A review of the records maintained by the licensee indicated that all experiments were completed under the cognizance of the Reactor Supervisor as required. The results of the experiments were documented in the reactor operations log book. Irradiation Request (IR) forms, required for reactor use, were also reviewed. The IR forms were being completed as required. The forms documented the individual users, the required approvals and licenses, the length of the irradiations, the expected resulting radionuclides that would be produced, and the ultimate disposition of the material following the irradiations.

c. Conclusions

The license's program for the control of experiments satisfied regulatory and TS requirements.

9. Emergency Preparedness

a. Inspection Scope (IP 69001)

To verify proper implementation of the licensee's Emergency Preparedness Program, the inspector reviewed selected aspects of:

- Training and emergency drill records for the past two years
- Offsite support as documented in Emergency Support Agreements
- Emergency response facilities, supplies, equipment, and instrumentation
- Oregon State University Radiation Center and Oregon State TRIGA Reactor (OSTR) Emergency Response Plan and Emergency Response Implementing Procedures (ERIP), originally approved May 17, 1984, and last revised November 2009, Rev. 4, including in Appendix C:
 - ERIP 0, "Emergency Procedures for Emergency Response Personnel – Class 0 Emergency - Personnel and Operational Events," no revision number or date listed
 - ERIP 1, "Emergency Procedures for Emergency Response Personnel – Class 1 Emergency - Notification of Unusual Events," no revision number or date listed
 - ERIP 2, "Emergency Procedures for Emergency Response Personnel – Class 2 Emergency - Alert," no revision number or date listed
 - ERIP 3, "OSTROP 1, 'Emergency Operation Procedures,'" no revision number or date listed
 - ERIP 4, "RCHPP 34, 'Orientation and Training Programs for the OSU Radiation Center,'" no revision number or date listed
 - ERIP 5, "Radiation Center Complex Evacuation Procedures," no revision number or date listed
 - ERIP 6, "Emergency Procedures to Follow on Receipt of a Bomb Threat," no revision number or date listed

- ERIP 7, “Emergency Activation and Notification Procedures,” no revision number or date listed
- ERIP 8, “News Release Policy and Guidelines – OSU Radiation Center,” no revision number or date listed
- OSTROP 1, “Emergency Operating Procedures,” Rev. LEU-1, reprinted November 2008

b. Observations and Findings

The Emergency Plan (E-Plan) in use at the facility was the same as the version approved by the NRC and was last revised November 2009. The E-Plan was audited and reviewed annually by the ROC as required. Implementing procedures were also reviewed annually and revised by the licensee as needed to implement the E-Plan effectively. It was also noted that emergency response equipment at the Radiation Center was being maintained and inventoried at the frequencies required in the E-Plan.

Through records review and interviews with licensee personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Emergency response facilities and equipment were being maintained as required. An Emergency Support Agreement with the Good Samaritan Hospital in Corvallis had been updated and maintained as necessary. Agreements were also being maintained with the City of Corvallis Fire and Police Departments as required. Communications capabilities were acceptable with these support groups and were tested periodically. Various crews and/or personnel from these off-site support organizations visited the facility periodically and were familiar with the facility and what would be required during a response.

Emergency preparedness and response training for staff and specific support group personnel was being completed annually as required. The licensee continued to conduct drills annually as stipulated in the E-Plan in order to test communications procedures and ensure proper response of facility personnel to simulated radiological, industrial, or security problems. The inspector verified that every two years the drills were structured to involve, and require the participation of, off-site support agencies and personnel. Critiques were conducted following the drills to discuss and identify any strengths and/or weaknesses noted. Evacuation drills had been conducted each year as well.

The inspector visited the Corvallis Fire Department (CFD) and observed the equipment maintained by the CFD for response to an emergency at the Radiation Center. From this visit and as a result of reviewing the licensee’s records documenting drills and training, the inspector verified that CFD personnel were well trained, properly equipped, and knowledgeable of the actions to take in case of an emergency at the reactor facility. The inspector determined that the licensee was maintaining a good working relationship with this support group.

c. Conclusions

Emergency response facilities and equipment were being maintained as required and responders were knowledgeable of proper actions to take in case of an emergency. Emergency Support Agreements were being maintained with appropriate offsite agencies. Annual drills were being held and the appropriate documentation was maintained. Emergency preparedness training for staff and off-site personnel was being conducted as required.

10. Exit Interview

The inspection scope and results were summarized on January 28, 2010, with licensee representatives. The inspector 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 inspector during the inspection of these program areas.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

T. Keller	Reactor Administrator
S. Menn	Senior Health Physicist
S. Reese	Director, OSU Radiation Center
R. Schickler	Senior Reactor Operator
S. Smith	Scientific Instrument Technician
G. Wachs	Reactor Supervisor

Other Personnel

D. Baily	Battalion Commander, Corvallis Fire Department
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INSPECTION PROCEDURE USED

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

Opened

None

Closed

None

LIST OF ACRONYMS USED

CFD	City of Corvallis Fire Department
10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ERIP	Emergency Response Implementing Procedure
IP	Inspection Procedure
IR	Irradiation Request
LCO	Limiting Conditions for Operation
LEU	Low Enriched Uranium
No.	Number
NRC	Nuclear Regulatory Commission
OSU	Oregon State University
OSTR	Oregon State University TRIGA Reactor
OSTROP	Oregon State University TRIGA Reactor Operating Procedure
PGNAA	Prompt Gamma Neutron Activation Analysis
Rev.	Revision
RO	Reactor Operator
ROC	Reactor Operations Committee
SRO	Senior reactor operator
SSC	Structures, systems, and components
TS	Technical Specifications