

February 26, 2009

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

SUBJECT: OREGON STATE UNIVERSITY RADIATION CENTER TRIGA MARK-II
REACTOR - NRC INSPECTION REPORT NO. 50-243/2009-201

Dear Dr. Reese:

On January 26-29, 2009, 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. 50-243/2009-201). The enclosed report documents the inspection results, which were discussed on January 29, 2009, with you and other members of your staff, as well as Dr. Todd Palmer, Chair of the Reactor Operations Committee.

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, observation of activities, and interviews with 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/

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

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

Enclosure: NRC Inspection Report No. 50-243/2009-201

cc w/encl: See next page

Oregon State University

Docket No.: 50-243

cc:

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Test, Research, and Training
Reactor Newsletter
University of Florida
202 Nuclear Sciences Center
Gainesville, FL 32611

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

Docket No: 50-243

License No: R-106

Report No: 50-243/2009-201

Licensee: Oregon State University

Facility: TRIGA Mark-II Reactor Facility

Location: Corvallis, OR

Dates: January 26 – 29, 2009

Inspector: Craig Bassett

Accompanied by: Mike Morlang
Shungo Nakamura

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

EXECUTIVE SUMMARY

Oregon State University
TRIGA Mark-II Reactor Facility
Report No. 50-243/2009-201

The primary focus of this routine, announced inspection included onsite review of selected aspects of Oregon State University (OSU, the licensee) Class II research reactor safety program including: 1) organizational structure and staffing, 2) review and audit and design change functions, 3) radiation protection, 4) environmental protection, 5) procedures, and 6) transportation activities since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas in 2007. The licensee's program was acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements. No deviations or violations were identified.

Organizational Structure and Staffing

- The organizational structure and functions were consistent with Technical Specification (TS) requirements.

Review and Audit and Design Change Functions

- The review and audit program was being conducted acceptably by the Reactor Operations Committee as stipulated in Section 6.2 of the TS.
- Changes made at the facility since the last NRC inspection had been evaluated using the licensee's Title 10 of the Code of Federal Regulations (10 CFR) Part 50.59 safety evaluation process and had been reviewed and approved by the Reactor Operations Committee as required.

Operations

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

Radiation Protection

- Periodic surveys were completed and documented as required by procedure.
- Postings and signs met regulatory requirements.
- Personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits.
- Radiation survey and monitoring equipment were being maintained and calibrated as required.
- Radiation protection training was acceptable.
- The Radiation Protection and ALARA Programs satisfied regulatory requirements.

Environmental Protection

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.
- The environmental protection program satisfied NRC requirements.

Procedures

- The procedural change and control program satisfied the applicable TS and procedure requirements.
- Activities were conducted in accordance with the applicable procedures as required.

Transportation of Radioactive Material

- The program for transportation of radioactive materials satisfied NRC and Department of Transportation requirements.

REPORT DETAILS

Summary of Plant Status

The Oregon State University (OSU, the licensee) 1.1 megawatt (1.1 MW) TRIGA Mark-II research and test reactor (RTR) continued normal, routine operations in support of sample irradiations, laboratory testing, reactor system testing, and surveillance. During the inspection, the licensee's RTR was operated several hours per day at varying power levels for class tours and instruction as well as for an experiment and sample irradiations.

1. Organizational Structure and Staffing

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

The inspector reviewed the following regarding the licensee's Radiation Center organization and functions to ensure that the requirements of Section 6.1 of Technical Specifications (TS), Revision 0.J, (implemented by License Amendment No. 22, dated September 30, 2008), were being met:

- Management responsibilities and administrative controls
- OSU Radiation Center facility organizational structure and staffing
- OSU TRIGA Reactor Annual Reports for the periods of July 1, 2006 through June 30, 2007, and July 1, 2007 through June 30, 2008
- Administrative controls outlined in Oregon State TRIGA Reactor Operating Procedure (OSTROP) 6, "Administrative and Personnel Procedures," Revision (Rev.) LEU-1, reprinted November 2008
- Training requirements stipulated in ANSI/ANS 15.4 – 1988; R1999, "Standard for the Selection and Training of Personnel for Research Reactors"

b. Observations and Findings

The organizational structure and staffing with respect to the Health Physics organization had not changed since the last inspection in the area of radiation protection (refer to NRC Inspection Report No. 50-243/2007-201). The Reactor Operations organization and staffing remained unchanged as well. It was noted that there was one Senior Health Physicist and one Health Physicist on staff at the licensee's RTR facility.

The organizational structure and staffing were consistent with the requirements of the TS. Qualifications of the staff were adequate and met those recommended in ANSI Standard 15.4. Review of records verified that management responsibilities were administered as required by the TS and applicable procedures.

c. Conclusions

The organizational structure and functions were consistent with the TS requirements.

2. Review and Audit and Design Change Functions

a. Inspection Scope (IP 69001)

In order to ensure that the audits and reviews stipulated in the requirements of TS Section 6.2 were being completed and that facility changes were evaluated prior to implementation as required, the inspector reviewed the following:

- Reactor Operations Committee (ROC) meeting minutes and records from February 2007 to the present
- ROC safety review and audit records from February 2007 to the present
- Responses to the findings outlined in reviews and audits conducted by the ROC
- OSTROP 6, "Administrative and Personnel Procedures," Rev. LEU-1, reprinted October 2008
- Changes reviewed using the licensee's safety evaluation process outlined in OSTROP 6, and documented on forms:
 - Figure 6.2, "OSU TRIGA Reactor (OSTR) 10 CFR 50.59 Evaluation Form"
 - "Oregon State TRIGA Reactor (OSTR) 10 CFR 50.59 Screen Form"
- Radiation Center Health Physics Procedure (RCHPP) Number (No.) 1, "Guidelines for the Radiation Protection Program at the OSU Radiation Center," Rev. 8, dated March 2007

b. Observations and Findings

(1) Review and Audit Functions

Reactor Operations Committee (ROC) meeting minutes and associated records from February 2007 through the present were reviewed. The records showed that meetings were being held and safety reviews and audits were conducted by various members of the ROC or other designated persons as required and at the TS required frequency. Topics of these reviews were consistent with TS requirements to provide guidance, direction, and oversight, and to ensure acceptable use of the reactor and appropriate implementation of the radiation protection program. The inspector noted that the safety reviews and audits and the associated findings were acceptably detailed and that the licensee responded and took corrective actions as needed.

(2) Design Change Functions

Through interviews with licensee personnel, the inspector determined that various changes had been initiated and/or completed at the facility since the last NRC inspection. The inspector reviewed Oregon State TRIGA Reactor (OSTR) 10 CFR 50.59 Screen Forms numbered 07-01 through 07-05 and 08-01 through 08-12 and OSU TRIGA Reactor (OSTR) 10 CFR 50.59 Evaluation Forms numbered 08-01 through 08-04. It was noted that none of the screens that had been completed required that an evaluation be conducted. The evaluations that were conducted in 2008 were ones that were automatically required by OSTROP 6. No Evaluation Forms had been initiated or completed in 2007 or to date in 2009.

Review of these documents demonstrated that the facility changes had been "screened" (i.e., analyzed and reviewed) and evaluated using the licensee's 10 CFR 50.59 review process outlined in OSTROP 6. The appropriate forms had been completed as required and reviewed and signed by members and the Chairman of the ROC. It was also noted that none of the changes required NRC approval prior to implementation.

c. Conclusions

Review and oversight functions required by TS Section 6.2 were acceptably completed by the ROC. Changes made at the facility since the last NRC inspection had been evaluated using the 10 CFR 50.59 safety evaluation process and had been reviewed and approved by the ROC as required.

3. Operations

a. Inspection Scope (IP 69001)

The inspector reviewed selected portions and/or aspects of:

- Staffing during routine reactor operations
- Selected OSU TRIGA Reactor Daily Power Log Sheets
- Operations records documented in the Reactor Console Logbook, Nos. 149 - 150
- Observation of startup, operations, and shutdown activities on January 26 – 28, 2009
- Start-up activities documented on OSTROP 2 forms entitled "OSU TRIGA Reactor Startup Checklists," Rev. 12, dated April 2008
- Shut down activities documented on OSTROP 3 forms entitled "Reactor Shutdown Checklists," Rev 10, dated April 2008
- Selected records of console instrumentation readings documented on Control Room Log Sheets
- OSU TRIGA Reactor Annual Reports for the period from July 1, 2006 through June 30, 2007, and the period from July 1, 2007 through June 30, 2008
- OSTROP 2, "Reactor Startup Checklist Procedures," Rev. 12, reprinted April 2008
- OSTROP 3, "Reactor Shutdown Checklist Procedures," Rev. LEU-1, reprinted November 2008
- OSTROP 4, "Reactor Operation Procedures," Rev. LEU-1, reprinted November 2008
- OSTROP 5, "Procedure for Maintaining Reactor Operational Records," Rev. LEU-1, reprinted November 2008
- OSTROP 25, "Reporting Requirements," Rev. LEU-1, reprinted November 2008
- OSTROP 27, "Procedures to Follow in the Event of a Commercial Electrical Power Failure," Rev. 3, reprinted December 2005

b. Observations and Findings

(1) Routine Operations

The inspector conducted observations of the reactor staff on January 26-28, 2009, 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.

These observations and reviews 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 supplemental records, also documented abnormal events that occurred and measures that had been taken to track and resolve the events.

(2) Thermocouple Issue

One item that had been noted by the licensee during recent operations was a continuing problem with thermocouple #3 of one of the instrumented fuel elements. The indicated temperature matched the two other thermocouple readings at low power levels but fluctuated by as much as 100 degrees Celsius during high power operations. The licensee had verified proper installation and wiring but the problem persisted. Additionally, the licensee had contacted General Atomics technical support but had not received any further information concerning the problem. The licensee was informed that this issue will be considered an Inspector Follow-up Item (IFI) and will be reviewed during subsequent inspections (IFI-50-243/2009-201-01).

c. Conclusions

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

4. Radiation Protection

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with 10 CFR Parts 19 and 20 and licensee administrative requirements:

- OSU Radiation Center Radiation Protection Program
- As Low As Reasonably Achievable (ALARA) reviews
- Radiological signs and postings in various areas of the facility
- Maintenance and calibration of radiation monitoring equipment
- Dosimetry/exposure records for January 2007 through December 2008
- Training records for Radiation Center staff, HP Monitors, and facility users
- Radiation Center TRIGA Mark-II Reactor Facility Radiation Protection Program

- Occupational exposure records documented on forms entitled, "GDS Form 5: Occupational Exposure Record for a Monitoring Period" for licensee employees for 2007 (forms for 2008 were not yet available)
- Various Health Physics (HP) Notebooks entitled:
 - HP Notebook - Surveys, Volume I, "Daily/Weekly/ Monthly/Neutron Generator/and Semi-Annual Floor Surveys"
 - HP Notebook - Surveys, Volume II, "Special Surveys"
 - HP Notebook - Surveys, Volume IV, "Work Surveillance Reports"
- Routine periodic surveys documented on the following forms:
 - Form RCHPP-24A, "Daily Routine Radiation Survey Record," latest revision dated October 2004
 - Form RCHPP-24B, "Weekly Routine Radiation Survey Record," latest revision dated July 2005
 - Form RCHPP-24C, "Monthly Routine Radiation Survey Record," latest revision dated October 2004
 - Form RCHPP-24D, "Non-Routine (Special) Radiation Survey Record," latest revision dated January 2000
 - Form RCHPP-27, "Semi-Annual Floor Survey For Fixed and Removable Radiation Contamination - Part I Direct and Gross Floor Smear," latest revision dated March 2007
 - Form RCHPP-27, "Semi-Annual Floor Survey For Fixed and Removable Radiation Contamination - Part II Worksheet," latest revision dated March 2007
- Calibration records documented on the following forms:
 - "Calibration Results for the Tracerlab Dual-Channel Reactor Facility Continuous Stack-Effluent Monitor"
 - "Calibration Results for the NMC AM-22BF Dual-Channel Reactor Top Continuous Air Monitor (CAM)"
 - "Calibration Results for the Area Radiation Monitoring Systems Located Throughout the TRIGA Reactor Facility and in the Pneumatic Transfer (PT) Rabbit Laboratory"
 - Calibration Results for various portable instruments generated by the Scientific Instrument Technician
- RCHPP No. 1, "Guidelines for the Radiation Protection Program at the OSU Radiation Center," Rev. 8, dated March 2007
- RCHPP No. 18, "Maintenance and Calibration Procedures for Radiation Protection Instrumentation (Including Operator Training Manual and Operating Procedures for the Radiation Center Gamma Instrument Calibration Facility)," Rev. 10 dated September 2008
- RCHPP No. 20, "Radiation Survey Procedures for the Release of Items for Unrestricted Use," Rev. 3, dated July 2001
- RCHPP No. 24, "Procedures for Performing Routine (Daily, Weekly, Monthly, and Annual) Radiation Surveys and Non-Routine (Special) Radiation Surveys," Rev. 10, dated October 2004
- RCHPP No. 27, "Procedure for Performing the Semi-Annual Floor Survey for Fixed and Removable Radioactive Contamination," Rev. 6, dated March 2007
- RCHPP No. 34, "Orientation and Training Program for the OSU Radiation Center," Rev. 18, dated October 2007

- RCHPP No. 37, "Dosimetry," Rev. 3, dated December 2006

b. Observations and Findings

(1) Surveys

Selected daily, weekly, monthly, semiannual, and annual radiation and/or contamination surveys were reviewed by the inspector. The surveys had been completed by Health Physics (HP) staff members or students who had received the appropriate training. Any contamination detected in concentrations above established action levels was noted and the area was decontaminated. Results of the surveys were acceptably documented.

During the inspection the inspector accompanied a licensee representative during completion of a Weekly Radiation and Contamination Survey. Areas surveyed at the facility included the Reactor Bay and associated laboratories, and the Heat Exchanger Room. The techniques used during the survey were adequate and the survey was conducted and documented in accordance with the guidance specified by procedure.

The inspector conducted a radiation survey along with the licensee representative. The radiation levels noted by the inspector were comparable to those found by the licensee and no anomalies were noted.

(2) Postings and Notices

Radiological signs were typically posted at the entrances to controlled areas. Other postings also showed the industrial hygiene hazards that were present in the areas as well. Caution signs, postings, and controls for radiation areas were as required in 10 CFR Part 20, Subpart J. The inspector noted that licensee personnel observed the signs and postings and the precautions for access to radiation areas.

Copies of current notices to workers were posted in appropriate areas in the facility. The copies of NRC Form-3, "Notice to Employees," noted at the facility were the latest issue and were posted in various areas throughout the facility as required by 10 CFR Part 19.11. These locations included on the main bulletin board in the hallway by the front office, in the corridor leading to the Reactor Building, and in the Reactor Control Room.

(3) Dosimetry

The inspector determined that the licensee used pocket ion chambers and thermoluminescent dosimeters (TLD) for whole body monitoring of beta and gamma radiation exposure, as well as track-etch/albedo neutron dosimeters to measure neutron radiation. The licensee also used TLD finger rings for extremity monitoring. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited vendor, Global Dosimetry Solutions, Inc. An examination of the TLD results indicating radiological exposures

at the facility for the past two years showed that the highest occupational doses, as well as doses to the public, were within 10 CFR Part 20 limitations. The records showed that the highest annual whole body exposure received by a single reactor staff member for 2007 was 239 millirem (mr) deep dose equivalent (DDE) and 286 mr shallow dose equivalent (SDE). The highest annual extremity exposure for an individual for 2007 was 478 mr SDE. The records also showed that the highest annual whole body exposure received by a single staff member for 2008 was 142 mr DDE and 143 mr SDE. The highest annual extremity exposure for 2008 was 517 mr SDE.

Through direct observation the inspector determined that dosimetry was acceptably used by facility personnel and exit frisking practices were in accordance with facility radiation protection requirements.

(4) Radiation Monitoring Equipment

Examination of selected radiation monitoring equipment indicated that the instruments had the acceptable up-to-date calibration sticker attached. The instrument calibration records indicated the calibration of portable survey meters was typically completed by licensee staff personnel. However, some instruments were shipped to vendors for calibration. The inspector verified that the instruments were calibrated annually which met procedural requirements and calibration records were maintained as required. Area Radiation Monitors and stack monitors were also being calibrated annually as required. These monitors were typically calibrated by licensee staff personnel as well.

(5) Work Surveillance Report Program

The inspector determined that Work Surveillance Reports (WSRs) had been written and used during 2004 and 2005 but none had been issued in 2006, 2007, or 2008. (WSRs are similar to Radiation Work Permits but are used by the licensee mainly in situations involving non-routine maintenance or other work being performed at the facility on highly contaminated structures, systems, or components [SSCs] or work on SSCs with elevated radiation levels.) The inspector verified that, if WSRs were needed, they would be prepared in accordance with the requirements specified on the WSR form, including work controls, protective clothing requirements, and dose tracking and limits.

(6) Radiation Protection Training

The inspector reviewed the radiation worker (or rad worker) training given to Radiation Center staff members, to those who are not on staff but who are authorized to use the experimental facilities of the reactor, and to student assistants working as part-time HP Monitors. The training program was outlined in RCHPP 34. It included initial rad worker training for those new to the facility and refresher training for faculty and staff. The appropriate training was required to be completed before a person was allowed unescorted access to various restricted areas of the Radiation Center. The type of initial training given was based upon the position and/or duties of the person. Initial training was divided into the

following categories: General Orientation, Radiation/Radioactive Material User Orientation, Reactor Bay Unescorted Access Orientation, Student Orientation, Visitor Orientation, and/or Radiation Center Non-Resident Worker Orientation. Refresher training was divided into two categories, training for Non-Radioactive Material Users and training for Radioactive Material Users.

As noted above, initial training was provided when a person first started work or classes at the facility. Refresher training was given on a 3-year cycle. The last rad worker refresher training for Radiation Center personnel had been completed in 2007. The next refresher training is scheduled for September 2010. Training records showed that personnel were acceptably trained in radiation protection practices. The training program was acceptable.

(7) Facility Tours

The inspector toured the Reactor Bay, the Heat Exchanger Room, and selected support laboratories with licensee representatives on various occasions. The inspector noted that facility radioactive material storage areas were properly posted. No unmarked radioactive material was noted. Radiation Areas and Radioactive Material Storage Areas were posted as required.

(8) Radiation Protection Program

The licensee's Radiation Protection and ALARA programs were established and described in the RCHPP No. 1 and through associated HP procedures that had been reviewed and approved. The programs contained instructions concerning organization, training, monitoring, personnel responsibilities, audits, record keeping, reports, and maintaining doses ALARA. The programs, as established, appeared to be acceptable. The ALARA program provided guidance for keeping doses as low as reasonably achievable which was consistent with the guidance in 10 CFR Part 20.

The licensee did not have a respiratory protection program or planned special exposure program; neither were required.

c. Conclusions

The inspector determined that the Radiation Protection and ALARA Programs, as implemented by the licensee, satisfied regulatory requirements because: 1) periodic surveys were completed and documented acceptably to permit evaluation of the radiation hazards present; 2) postings and signs met regulatory requirements; 3) personnel dosimetry was being worn as required and recorded doses were within the NRC's regulatory limits; 4) radiation survey and monitoring equipment was being maintained and calibrated as required; and 5) the radiation protection training program was acceptable.

5. Environmental Protection

a. Inspection Scope (IP 69001)

To determine that the licensee was complying with the requirement of the regulations and TS Section 6.7.e, the inspector reviewed selected aspects of:

- OSU Radiation Safety Radioactive Waste Tag forms for 2007 and 2008
- OSU TRIGA Reactor Annual Reports for the periods of July 1, 2006 through June 30, 2007, and July 1, 2007 through June 30, 2008
- Environmental monitoring release records documented in various notebooks including:
 - HP Notebook - Environmental Monitoring, Volume I, "Airborne Gamma Emitters TLD Reports/Ion Chamber, TE and FE Results"
 - HP Notebook - Environmental Monitoring, Volume II, "Soil, Water, and Vegetation Data"
 - HP Notebook - Environmental Monitoring, Volume III, "Solid and Liquid Waste, Hold-up Tank"
 - HP Notebook - Environmental Monitoring, Volume IV, "Gaseous Waste Discharge Summary"
- Selected forms documenting environmental data and analysis' results completed in 2007 and 2008 including:
 - "Environmental Soil, Water, and Vegetation Sample Report"
 - "Monthly TRIGA Reactor Gaseous Waste Discharges and Analysis"
- Records of waste transferred from the reactor facility's NRC license to the State license for the past two years documented on forms issued by the OSU Radiation Safety Office and entitled:
 - "Oregon State University, Radiation Safety Radioactive Waste Tag"
 - "Solid Waste"
- RCHPP No. 1, "Guidelines for the Radiation Protection Program at the OSU Radiation Center," Rev. 8, dated March 2007
- RCHPP No. 8, "Water Analysis," Rev. 8, dated February 2008
- RCHPP No. 13, "Procedures for Collection and Biological Analysis of Environmental Soil, Water, and Vegetation Samples," Rev. 5, January 2007
- RCHPP No. 15, "Operating Procedures for the Environmental Thermoluminescent Dosimetry (TLD) Program," Rev. 4, February 2004
- RCHPP No. 31, "Procedure for Sampling and Pumping the Liquid Waste Hold-up Tank," Rev. 5, dated September 2008
- RCHPP No. 32, "Stack Gas Effluent Analysis," Rev. 2, dated June 2000

b. Observations and Findings

Soil, water, and vegetation environmental samples were collected, prepared, and analyzed annually in accordance with procedural requirements. On-site and off-site gamma radiation monitoring was completed using the reactor stack effluent monitor and various environmental monitoring station TLDs as required by the applicable procedures as well. Data indicated that there were no measurable doses above natural background radiation.

The inspector determined that gaseous releases continued to be monitored as required, were calculated according to procedure, and were acceptably documented in the annual reports. The airborne concentrations of the gaseous releases were within the concentrations stipulated in 10 CFR Part 20, Appendix B, Table 2. Also, the dose rate to the public, as a result of the gaseous releases, was well below the dose constraint specified in 10 CFR 20.1101 (d) of 10 millirem per year (mr/yr). This was acceptably demonstrated by the licensee through COMPLY code calculations. These calculations indicated an effective dose equivalent to the public of 1.1 mr/yr for the year 2006 and 1.5 mr/yr for the year 2007. The results for 2008 were still pending at the time of the inspection. The principles of ALARA were acceptably implemented to minimize radioactive releases. Monitoring equipment was acceptably maintained and calibrated. Records were current and acceptably maintained. Observation of the facility by the inspector indicated no new potential release paths.

The program for the monitoring, storage, or transferring of radioactive liquid and solid waste was consistent with applicable procedural requirements. There were no radioactive liquid waste releases from the reactor facility to the environment in 2007 or 2008. Liquid and solid radioactive waste was transferred to the OSU Waste Processing Facility under the State of Oregon broad-scope license (ORE-90005) for processing and disposal. This process was acceptably documented on the appropriate OSU Radiation Safety Office forms in accordance with the requirements of RCHPP 1.

c. Conclusions

Effluent releases were within the specified regulatory and Technical Specification limits. The environmental protection program satisfied NRC requirements.

6. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS Section 6.2.d:

- Procedural implementation
- Selected RCHPP procedures
- Records of changes to RCHPP procedures
- Records of ROC review and approval of procedures documented in the ROC meeting minutes for 2007 and 2008
- RCHPP No. 1, "Guidelines for the Radiation Protection Program at the OSU Radiation Center," Rev. 8, dated March 2007

b. Observations and Findings

Administrative controls of changes to procedures and the associated review and approval processes were as stipulated by procedure. The inspector verified that procedure changes were being reviewed and approved by the ROC as required by TS 6.2.d. Training of personnel on procedures and changes was acceptable. The

inspector verified that licensee personnel conducted activities in accordance with applicable procedures. Records showed that procedures for potential malfunctions (e.g., radioactive material ingestion and contaminations) were available for implementation as needed. The inspector also determined that all RCHPP procedures were being reviewed annually as required.

c. Conclusions

The procedural change and control program satisfied the applicable TS and procedure requirements. Activities were conducted in accordance with the applicable procedures as required.

7. Transportation

a. Inspection Scope (IP 86740)

To verify compliance with regulatory and procedural requirements for the transfer or shipment of licensed radioactive material, the inspector reviewed the following:

- Selected records of various types of radioactive material shipments in 2007 and 2008
- Radioactive waste records documented in HP Notebook - Environmental Monitoring, Volume III, "Solid and Liquid Waste, Hold-up Tank"
- Training records of staff members responsible for shipping licensed radioactive material
- Records of waste transferred from the reactor facility's NRC license to the State license for the past two years documented on forms issued by the OSU Radiation Safety Office and entitled:
 - "Oregon State University, Radiation Safety Radioactive Waste Tag"
 - "Solid Waste"
- Radioactive material transfer records documented in various notebooks including:
 - HP Notebook - Radioactive Material Transfer, Volume I, "Procedure - RCHPP6, General Shipping Forms, Training Records, and Audit Records"
 - HP Notebook - Radioactive Material Transfer, Volume II, "Shipping Container Tests"
 - HP Notebook - Radioactive Material Transfer, Volume III, "Radioactive Material Transfer Records"
 - HP Notebook - Radioactive Material Transfer, Volume IV, "Shipment Analysis"
- RCHPP No. 1, "Guidelines for the Radiation Protection Program at the OSU Radiation Center," Rev 8, dated March 2007
- RCHPP No. 5, "Procedures for Receipt Radiation Surveys and Unpacking of Packages Containing Radioactive Material," Rev. 5, dated September 2008
- RCHPP No. 6, "OSU Procedures for Transfer, Packaging, and Transport of Radioactive Materials Other Than Radioactive Waste," Rev. 12, dated February 2007
- RCHPP No. 11, "Procedures for Testing and Certification of OSU Radioactive Materials Shipping Containers," Rev. 4, dated April 2006

b. Observations and Findings

As noted above, records showed that radioactive liquid and solid waste was transferred to the OSU Radiation Safety Office for packaging, shipment, and disposal in accordance with licensee requirements and the applicable procedures. This program for radioactive material transfer was consistent with the requirements specified in RCHPP No. 1.

The transport of other radioactive material was also reviewed. Through records reviews and various discussions with licensee personnel, the inspector determined that the licensee had shipped various types 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. The records also indicated that the shipping containers were appropriate and had been labeled as required. All radioactive material shipment records reviewed by the inspector had been completed in accordance with Department of Transportation (DOT) and NRC regulatory requirements.

The inspector verified that the licensee maintained copies of the recipients' licenses to possess radioactive material as required and that the licenses were verified to be current prior to initiating a shipment.

On Wednesday, January 28, during the inspection, the inspector observed the preparation of a sample of radioactive material for shipment. The material was properly packaged and surveyed and placed in the appropriate shipping container. Then the applicable labels were filled out with the required information and attached to the shipping container. The shipping paperwork was completed in accordance with the regulatory requirements. No problems or deficiencies were noted.

The training of the staff members responsible for shipping the material was reviewed. Training had been conducted annually according to licensee procedure which exceeded the requirements specified in the regulations.

c. Conclusions

The program for transportation of radioactive materials satisfied NRC and DOT requirements.

8. Exit Interview

The inspection scope and results were summarized on January 29, 2009, with licensee representatives. The inspector discussed the findings for each area reviewed. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

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

Other Personnel

T. Palmer Chairman, Reactor Operations Committee

INSPECTION PROCEDURES USED

IP 69001 Class II Non-Power Reactors
IP 86740 Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

IFI 50-243/2009-201-01 Follow-up on the licensee actions to resolve the issue regarding the temperature fluctuations noted for thermocouple #3 compared to the other two thermocouples in the core during high power operations.

Closed

None

LIST OF ACRONYMS USED

ALARA As Low As Reasonably Achievable
CFR Code of Federal Regulations
DDE Deep dose equivalent
HP Health Physics
IP Inspection Procedure
mr millirem
mr/yr millirem per year
NRC U.S. Nuclear Regulatory Commission

NVLAP	National Voluntary Laboratory Accreditation Program
OSU	Oregon State University
OSTROP	Oregon State University TRIGA Reactor Operating Procedure
RCHPP	Radiation Center Health Physics Procedure
Rev.	Revision
ROC	Reactor Operations Committee
RTR	Research and Training Reactor
SSCs	Structures, Systems, and Components
SDE	Shallow dose equivalent
TLD	Thermoluminescent dosimeter
TS	Technical Specifications
WSR	Work Surveillance Report