

February 20, 2018

Dr. Steven R. Reese, Director
Oregon State University
100 Radiation Center
Corvallis, OR 97331-5903

SUBJECT: OREGON STATE UNIVERSITY – NUCLEAR REGULATORY COMMISSION
ROUTINE INSPECTION REPORT NO. 50-243/2017-202

Dear Dr. Reese:

From December 11-13, 2017, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at the Oregon State University TRIGA Reactor facility. The enclosed report documents the inspection results which were discussed on December 13, 2017, with you and 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 various activities, and interviewed personnel.

Based on the results of this inspection, the has determined that one Severity Level IV violation of NRC requirements occurred. This violation is being treated as non-cited violation (NCV), consistent with Section 2.3.2 of the Enforcement Policy. This violation is described in the subject inspection report. If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to: (1) the Director, Office of Nuclear Reactor Regulation, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and (2) the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

In accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

S. Reese

- 2 -

If you have any questions concerning this inspection, please contact Anthony J. Mendiola at (301) 466-4495, or by electronic mail at Anthony.Mendiola@nrc.gov.

Sincerely,

/RA/

Anthony J. Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

cc: See next page

Oregon State University

Docket No. 50-243

cc:

Mayor of the City of Corvallis
Corvallis, OR 97331

Ken Niles
Assistant Director for Nuclear Safety
Oregon Department of Energy
550 Capitol Street N.E., 1st Floor
Salem, OR 97301

Dr. Cynthia Sagers
Vice President for Research
Oregon State University
A312 Kerr Administrative Services Bldg.
Corvallis, OR 97331-5904

Dr. Todd Keller
Reactor Administrator
Oregon State University
100 Radiation Center, A-100
Corvallis, OR 97331-5903

Mr. Daniel Harlan, Chairman
Reactor Operations Committee
Oregon State University
100 Oak Creek Building
Corvallis, OR 97331-5904

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

SUBJECT: OREGON STATE UNIVERSITY – NUCLEAR REGULATORY COMMISSION
ROUTINE INSPECTION REPORT NO. 50-243/2017-202
DATE: FEBRUARY 20, 2018

DISTRIBUTION:

PUBLIC	OFont, NRR
PROB r/f	STraiforos, NRR
RidsNrrDlp	NParker, NRR
RidsNrrDlpPr1b	MBalazik, NRR
RidsNrrDlpProb	XYin, NRR

ADAMS Accession No.: ML18043A170 *concurrence via email NRC-002

OFFICE	NRR/DLP/PROB/RI	NRR/DLP/PROB/LA*	NRR/DLP/PROB/ABC
NAME	OFont	NParker	AMendiola
DATE	2/14/18	2/14/18	20/20/18

OFFICIAL RECORD COPY

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

Docket No: 50-243

License No: R-106

Report No: 50-243/2017-202

Licensee: Oregon State University

Facility: Oregon State University TRIGA Reactor

Location: Radiation Center
Oregon State University
Corvallis, Oregon

Dates: December 11-13, 2017

Inspector: Ossy Font

Approved by: Anthony J. Mendiola, Chief
Research and Test Reactors Oversight Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Oregon State University
Oregon State University TRIGA Reactor
Nuclear Regulatory Commission
Inspection Report No. 50-243/2017-202

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 megawatts Class II research reactor safety program, including: (1) organization and staffing; (2) operations logs and records; (3) requalification training; (4) surveillance and limiting conditions for operation (LCO); (5) emergency planning; (6) maintenance logs and records, and (7) fuel handling logs and records 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. One non-cited violation (NCV) Severity Level IV of NRC requirements was identified.

Organization and Staffing

- The licensee's organization and staffing were in compliance with the requirements specified in the technical specification (TS).

Operations Logs and Records

- Operational activities were consistent with applicable TS and procedural requirements.

Requalification Training

- Operator requalification was being conducted and completed as required by the Operator Requalification Program.

Surveillance and Limiting Conditions for Operation

- The program for surveillance and LCO confirmation was implemented in accordance with TS requirements.

Emergency Planning

- The emergency preparedness program was generally conducted in accordance with the Emergency Plan. A minor violation was identified and an inspector follow-up item was opened for failure to properly implement the requirements for preparing and documenting emergency drills.

Maintenance Logs and Records

- Maintenance activities ensured that equipment remained consistent with the safety analysis report and TS requirements.

Fuel Handling Logs and Records

- Fuel movements and inspections were being completed and documented in accordance with the requirements specified in the TS and by procedure.

Non-Cited Violation and Requalification Program

- The licensee was issued a NCV for failure to follow TS requirements. The violation was closed as a result of the inspector's investigation of the incident as well as the corrective action completed and steps taken to prevent reoccurrence.

REPORT DETAILS

Summary of Plant Status

Oregon State University, (OSU) (the licensee) continued to operate the 1.1 megawatts TRIGA Mark-II research reactor in support of laboratory demonstrations, reactor surveillances, and sample irradiations. 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. **Organization and Staffing**

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

To ensure that the requirements of the technical specification (TS) 6.1, "Organization," were being met, the inspector reviewed:

- OSU Radiation Center and Oregon State TRIGA Reactor (OSTR) facility organizational structure and staffing
- Reactor Console Logbooks entries from August 17, 2016 (#167) to present

b. Observations and Findings

The inspector determined that the organizational structure at the OSU Radiation Center facility had not changed since the previous U.S. Nuclear Regulatory Commission (NRC) inspection. The inspector noted that the Director of the Radiation Center continued to report to the President of the University through the Vice President for Research.

The inspector noted that there were eight reactor operators (ROs) and six senior reactor operators (SROs). Staffing levels remained consistent with those noted during the last inspection of this facility and determined that the minimum shift staffing composition for operation, including on-call personnel, is consistent with the TS.

c. Conclusion

The licensee's organization and staffing qualifications remain in compliance with the requirements specified in the TS.

2. **Operations Logs and Records**

a. Inspection Scope (IP 69001)

To ensure that the requirements of TS 6.4, "Procedures," and TS 6.8, "Records," were being met, the inspector reviewed:

- OSTR Operating Procedures (OSTROP) 2, "Reactor Startup Checklist Procedures"
- OSTROP 3, "Reactor Shutdown"
- OSTROP 4, "Reactor Operating Procedures"
- OSTROP 5, "Procedures for Maintaining Reactor Operations Records"

- OSTR Reactor Daily Power Log
- Console logbooks #167-169 (August 17, 2016 – October 27, 2017)
- Reactor Supervisor's (RSs) Log, Volume 15, for the past two years
- OSU Radiation Center and TRIGA Reactor Annual Reports for the past two years

b. Observations and Findings

The inspector reviewed selected log book entries, request for operations, and pre-start and post-shutdown forms and determined that logs and records are maintained as required by the licensee's administrative procedures. Records also showed that operational conditions and parameters were consistent with the license and TS requirements. The inspector also observed the reactor staff perform the required pre-start, post-shutdown, and area radiation survey checkout and a reactor startup and shutdown and the completion of the associated records and logs. The inspector determined that reactor operations were carried out following written procedures as required by TS 6.4 and TS 6.8.

c. Conclusion

Operational activities were consistent with applicable TS and procedural requirements.

3. Requalification Training

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:

- "Requalification Program for Licensed Operators of the Oregon State TRIGA Reactor," Revision 1, reprinted September 30, 2004
- Console logbooks #167-169 (August 17, 2016 – October 27, 2017)
- Operator physical examination records for the past two years
- OSTR operator requalification training sessions for the past two years
- Operator physical examination records for the past two years
- OSTR operator requalification operational examination records for the past two years
- OSTR operator requalification written examination records for the past two years
- OSTR console operating experience records for the past two years

b. Observations and Findings

As of the date of the inspection, all the operators' licenses were current. All operators were enrolled in the licensee's NRC-approved requalification and training program and had completed a minimum of four hours of shift functions per quarter. The inspector noted that operators were receiving the required biennial medical examinations.

A review of the logs and records showed that training was being conducted in accordance with the program. Requalification program data such as completion of written examinations and operation tests was documented as required. Records of reactivity manipulations, and other operations activities were being maintained throughout the year. The inspector observed an operations test and found the questions acceptable and the operator knowledgeable.

c. Conclusion

Operator requalification was being conducted and completed as required by the Operator Requalification Program.

4. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001)

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

- OSTROP 16, "Annual Surveillance and Maintenance Procedures," low-enriched uranium (LEU) 2, January 2014
- OSTROP 15, "Semi-Annual Surveillance and Maintenance Procedures," LEU-4, October 2017
- OSTROP 14, "Quarterly Surveillance and Maintenance Procedures," LEU-5, July 2017
- OSTROP 13, "Monthly Surveillance and Maintenance Procedures," LEU-6, September 2016
- Reactor Supervisor's Log, Volume 15, for the past two years
- Console logbooks #167-169 (August 17, 2016 – October 27, 2017)
- Selected surveillance and calibration test data sheets and records maintained in the Surveillance and Maintenance Records Notebook
- OSU Radiation Center and TRIGA Reactor Annual Reports for the past two years

b. Observations and Findings

The inspector performed a random sampling of the daily, weekly, monthly, quarterly, semi-annual, and other periodic checks, tests, and verifications for TS required LCOs and determined that they were completed in the specified time frame and in accordance with licensee procedures. The records and logs reviewed were complete and were being maintained as required. The inspector noted that the licensee maintained an effective record keeping system that helped ensure that all required tests, LCO verifications, and calibrations were completed in a timely manner.

All the recorded results for the activities reviewed by the inspector were within the TS required parameters.

c. Conclusion

The program for Surveillance and LCO confirmation was implemented in accordance with TS requirements.

5. Emergency Planning

a. Inspection Scope (IP 69001)

To ensure that the requirements of emergency plan (E-Plan) were being met, the inspector reviewed:

- “Oregon State University Radiation Center and Oregon State TRIGA Reactor (OSTR) Emergency Response Plan,” Revision 7, dated December 2016
- “Oregon State University Radiation Center and Oregon State TRIGA Reactor (OSTR) Emergency Response Implementing Procedures (ERIP),” Nos. 0–9, latest revision dated September 2014
- OSTROP 1, “Emergency Operating Procedures,” Revision LEU-2, reprinted August 2012
- Emergency support agreements and training records
- “Record of Emergency Response Plan Coordination with Support Agency”
- Fire Department Operating Guidelines
- Annual Records from for the past two years
 - E-Plan Training
 - Emergency Drill and Critique
 - Plan Review
 - Inventory of emergency supplies

b. Observations and Findings

The inspector reviewed the new version of the E-Plan and determined that the effectiveness was not reduced.

The inspector confirmed that the E-Plan was being audited and reviewed annually as required. Implementing procedures were reviewed and revised as needed to effectively implement the E-Plan. Emergency preparedness and response training for reactor staff was completed during operator requalification and documented in the program’s records. Emergency equipment (meters, supplies, communications, security, and alarms) was being maintained and inventoried annually as required in the E-Plan.

The inspector visited the Corvallis Fire Department and discussed there interaction with the facility. They participate in annual facility tours and training. The inspector found that they are prepared to respond to an event at the facility.

Emergency drills had been conducted annually as required by the E-Plan. The E-Plan Section 10.2b states, “Annual action drills will employ the use of written scenarios to more effectively fulfill their functions.” Contrary to this, the inspector noted that no written scenarios were developed for the drills held during the past two years. Additionally, there was no documentation on drill critiques and recommendations. Although this issue is required to be corrected, it constitutes

a violation of minor significance that is not subject to enforcement action in accordance with Section 2 of the Enforcement Policy. The inspector opened an inspector follow-up item (IFI) 50-243/2017-202-01 in order to follow up on the implementation of the licensee's NRC-approved E-Plan and correction of this violation.

c. Conclusion

The emergency preparedness program was generally conducted in accordance with the E-Plan. A minor violation was identified and an IFI was opened for failure to properly implement the requirements for preparing and documenting emergency drills.

6. Maintenance Logs and Records

a. Inspection Scope (IP 69001)

To ensure that maintenance activities associated with the requirements of TS 3, "Limiting Conditions for Operation," and TS 4, "Surveillance Requirements," were being completed, the inspector reviewed:

- Reactor Supervisor's Log, Volume 15, for the past two years
- Console logbooks #167-169 (August 17, 2016 – October 27, 2017)
- OSU Radiation Center and TRIGA Reactor Annual Reports for the past two years

b. Observations and Findings

The inspector reviewed the records regarding scheduled and unscheduled preventive and corrective maintenance activities the past two years. The records contained thorough documentation describing the maintenance activity and the repair setup. These records were controlled and maintained in the maintenance and/or operations log as required. After completion of maintenance activities, system operational checks were performed to ensure that the affected systems functioned properly before returning them to service.

c. Conclusion

Maintenance activities ensured that equipment remained consistent with the safety analysis report and TS requirements.

7. Fuel Handling Logs and Records

a. Inspection Scope (IP 69001)

To ensure that the fuel handling and inspection requirements specified in TS 4.1, "Reactor Core Parameters," TS 4.2, "Reactor Control and Safety Systems," TS 5.3, "Reactor Core and Fuel," TS 5.4, "Fuel Storage," TS 6.1.3, "Staffing," and TS 6.4, "Procedures," were being met, the inspector reviewed:

- Fuel handling equipment and instrumentation
- Reactor Supervisor's Log, Volume 15, for the past two years
- Console logbooks #167-169 (August 17, 2016 – October 27, 2017)
- OSU Radiation Center and TRIGA Reactor Annual Reports for the past two years
- OSTROP 11, "Fuel Element Handling Procedures," Revision LEU-3, dated July 2017
- OSTROP 12, "Control Rod Maintenance, Removal, and Replacement Procedures," Revision LEU-1, November 2008

b. Observations and Findings

The licensee maintained a fuel element record of all their elements. The inspector reviewed selected records for fuel movements conducted for the periodic surveillance measurements and inspection of the reactor fuel and the biennial inspection of all control rods. The movements of elements and their position in the core were maintained and tracked. All fuel movements were noted in the appropriate console logbook. The inspector also verified that the fuel handling tool was secured.

c. Conclusion

Fuel movements and inspections were being completed and documented in accordance with the requirements specified in the TS and by procedure.

8. Non-Cited Violation

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to review the self-identified violation:

- OSTROP 14, "Incorporation of 50.59 Data Into Permanent Documentation"
- Letter to the NRC, "Self-reporting of a Potential Violation of a Technical Specification Involving Updates on Procedures," dated September 1, 2017

b. Observations and Findings

The inspector followed up on a licensee's self-identified violation of failure to incorporate changes to procedures that had previously been approved as required by TS. TS 6.4, "Procedures," states, in part, that "Except for radiation protection procedures, unsubstantive changes shall be approved prior to implementation by the Reactor Administrator and documented by the Reactor Administrator within 120 days of implementation."

Contrary to the TS requirement, the licensee identified that changes to procedures, which are controlled pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59, "Changes, tests and experiments," process, were not incorporated. In other words, the control room copy did not have the previously approved changes in them. The identification was a result of a recent update to OSTROP 14, where ROs and SROs are required to perform a

quarterly internal audit of all OSTROPs. Further review of all approved changes dating back to 2008 identified that on five occasions approved changes to the procedures were not implemented. This procedures were updated or will be during the next audit cycle.

As stated in the TS, the Reactor Administrator is responsible for ensuring that changes to the procedures are incorporated. Additionally, the Reactor Supervisor has a quarterly surveillance requirement to determine if procedural changes have been implemented for the quarter. Also, the Reactor Operations Committee audits the 10 CFR 50.59 screens, the procedures, and quarterly surveillance log.

An investigation did not determine a definite root cause for the failure, but it is believed that a misunderstanding between the Reactor Administrator and Reactor Supervisor as to what was meant by implemented. And, as for the Reactor Operations Committee, there was never an emphasis to determine if the 10 CFR 50.59 changes they reviewed were actually implemented.

During the inspector investigation, a review of the documentation also revealed that one procedure was still not incorporated. Through interviews it was determined that the procedure applied to a piece of equipment that was not in use. The licensee stated that if the equipment were to be used, a new procedure will be developed and implemented.

The violation is a Severity Level IV violation of example 6.1(d). This non-repetitive, licensee-identified and corrected violation is being treated as a NCV, consistent with Section 2.3.2.b of the Enforcement Policy (NCV 50-243/2017-202-02).

Corrective actions included a complete review of all 50.59 screenings going back to 2008. To review procedures annually on a quarterly schedule. This was the OSTROP 14 update that identified the violation. Also, during an all SRO meeting, the expectation of the meaning of implementation was it relates to procedural changes was made clear. Additionally, the Reactor Operations Committee will be prompted to check perhaps one procedure change per quarter for implementation.

The inspector finds the corrective action appropriate for the violation and closed NCV 50-243/2017-202-02.

c. Conclusion

The licensee was issued a NCV for failure to follow TS requirements. The violation was closed as a result of the inspector's investigation of the incident as well as the corrective action completed and steps taken to prevent reoccurrence.

9. Exit Interview

The inspection scope and results were summarized on December 13, 2017, with members of licensee management and staff. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

S. Reese	Director, OSU Radiation Center
T. Keller	Reactor Administrator
C. Oney	Reactor Supervisor
S. Menn	Senior Health Physicist

Other Personnel

D. Bailey	Training Coordinator, Corvallis Fire Department
D. Harlan	Chairman, Reactor Operations Committee

INSPECTION PROCEDURE USED

IP 69001	Class II Non-Power Reactors
IP 92701	Review of Previously Identified Items

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

IFI	50-243/2017-202-01 follow-up on the licensee's E-Plan requirements for preparing and documenting emergency drills.
NCV	50-243/2017-202-02 failure to follow TS requirements for the implementation of changes to procedures.

Closed

NCV	50-243/2017-202-02 failure to follow TS requirements for the implementation of changes to procedures.
-----	---

Discussed

IFI	50-243/2016-201-01 follow-up on the issue of proper documentation of audits of the Operator Requalification Program by the ROC.
-----	---

LIST OF ACRONYMS USED

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
IFI	Inspector Follow-Up Item
E-Plan	Emergency Plan
IP	Inspection Procedure
LCO	Limiting Conditions for Operation
LEU	Low-Enriched Uranium
NRC	Nuclear Regulatory Commission
OSU	Oregon State University
OSTR	Oregon State University TRIGA Reactor
OSTROP	Oregon State University TRIGA Reactor Operating Procedure
RO	Reactor Operator
SRO	Senior Reactor Operator
TS	Technical Specification