June 16, 2015

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

SUBJECT: OREGON STATE UNIVERSITY – NRC INSPECTION REPORT NO. 50-243/2015-202

Dear Dr. Reese:

From June 1-3, 2015, the U.S. Nuclear Regulatory Commission (NRC or the Commission) conducted an inspection at the Oregon State University Radiation Center TRIGA Mark-II reactor facility (Inspection Report No. 50-243/2015-202). The enclosed report documents the inspection results, which were discussed on June 3, 2015, with members of your staff, as well as Dr. Andrew Klein, Chair of the Reactor Operations Committee.

This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and representative records, interviewed personnel, and observed activities in progress.

Based on the results of this inspection, the NRC has determined that one Severity Level IV violation of NRC requirements has occurred. This violation is being treated as a non-cited violation (NCV), consistent with Section 2.3.2.b of the NRC Enforcement Policy. The NCV 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 DC 20555-0001, with copies to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

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 Document Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at (the Public Electronic Reading Room) http://www.nrc.gov/reading-rm/adams.html.

Should you have any questions concerning this inspection, please contact Mr. Craig Bassett at (301) 466-4495 or by electronic mail at Craig.Bassett@nrc.gov.

Sincerely,

/RA/

Kevin Hsueh, 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. 50-243/2015-202

cc: See next page

cc:

Mayor of the City of Corvallis
Corvallis, OR 97331

David Stewart-Smith
Oregon Office of Energy
625 Marion Street, N.E.
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Dr. Ron Adams, Vice President for Research
Oregon State University
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Corvallis, OR 97331-5904

Mr. Todd Keller, Reactor Administrator
Oregon State University
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Dr. Andrew Klein, Chair
Reactor Operations Committee
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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	6/16/2015	6/16/2015

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

Docket No:	50-243
License No:	R-106
Report No:	50-243/2015-202
Licensee:	Oregon State University
Facility:	TRIGA Mark-II Reactor Facility
Location:	Corvallis, OR
Dates:	June 1-3, 2015
Inspector:	Craig Bassett
Approved by:	Kevin Hsueh, Chief Research and Test Reactors Oversight Branch Division of Policy and Rulemaking Office of Nuclear Reactor Regulation

ENCLOSURE

EXECUTIVE SUMMARY

Oregon State University
TRIGA Mark-II Reactor Facility
Report No. 50-243/2015-202

The primary focus of this routine, announced inspection included onsite review of selected aspects of Oregon State University's (the licensee's) Class II research reactor safety program, including: (1) organizational structure and staffing, (2) review and audit and design change functions, (3) reactor operations, (4) operator requalification, and (5) procedures 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 was generally in compliance with NRC requirements. One noncited violation (NCV) was identified.

Organizational Structure and Staffing

- The organizational structure and staffing were consistent with Technical Specifications (TS) requirements.

Review and Audit and Design Change Functions

- The review and audit program was being conducted acceptably and completed by the Reactor Operations Committee as stipulated in TS 6.2.

- Changes made at the facility were being evaluated using the licensee's Title 10 of the *Code of Federal Regulations* Section 50.59 safety evaluation process as required.

Reactor Operations

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

Operator Requalification

- Operator requalification was conducted as required and the program was up-to-date and being acceptably implemented.

- Medical examinations were being completed biennially for each operator as required.

Procedures

- Facility procedures were acceptable and procedure revisions were reviewed and approved in accordance with TS Section 6.4.

- Procedural compliance was observed and found to be acceptable.

REPORT DETAILS

Summary of Facility Status

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

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:

- Management responsibilities and administrative controls
- OSU Radiation Center facility organizational structure and staffing
- Administrative controls outlined in Oregon State TRIGA Reactor Operating Procedure (OSTROP) 6, "Administrative and Personnel Procedures," Revision (Rev.) LEU-3
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2012, through June 30, 2013, submitted to the NRC on October 29, 2013
- OSU Radiation Center and TRIGA Reactor Annual Report for the period from July 1, 2013, through June 30, 2014, submitted to the NRC on October 23, 2014
- Training requirements stipulated in American National Standards Institute/American Nuclear Society (ANSI/ANS) 15.4-1988, "American National Standard for the Selection and Training of Personnel for Research Reactors"

b. Observations and Findings

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. It was also noted that the Radiation 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.

The current reactor operations organization consisted of the Director of the Radiation Center, the Reactor Administrator, the Reactor Supervisor, a Reactor Engineer, and a Development Engineer. It was noted that the person previously filling the Reactor Supervisor (RS) slot had retired at the end of March 2015, and one of the other full-time staff members had been selected to fill that vacant position. There were four staff members who were licensed senior reactor

operators (SROs). The current RS recently took the NRC examination to be upgraded from a Reactor Operator (RO) to an SRO. In addition, the former RS, who continued to work at the facility on a part-time basis, also retained an SRO license. The full-time staff members were assisted by five part-time reactor operators (ROs), who were students. This organization was as required and was 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. Conclusion

The organizational structure and staffing 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 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 August 2014 to the present
- ROC safety review and audit records from April 2014 to the present
- OSTROP 6, "Administrative and Personnel Procedures," Rev. LEU-3
- Various changes completed during 2014 and 2015 and reviewed using the licensee's safety evaluation process outlined in OSTROP 6, and documented on forms:
  - Figure 6.1, "Oregon State TRIGA Reactor (OSTR) 10 CFR 50.59 Screen Form"
  - Figure 6.2, "OSU TRIGA Reactor (OSTR) 10 CFR 50.59 Evaluation Form"
- OSTROP 31, "Scanning Documents for Permanent Archival Storage and Retrieval," Rev. 1, approval dated November 24, 2014

b. Observations and Findings

(1) Review and Audit Functions

ROC meeting minutes and associated records from August 2014 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 the licensee's Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59 screen forms numbered 15-01 and 15-02 and the licensee's one 10 CFR 50.59 evaluation form completed in 2015. It was noted that none of the screenings that had been completed required that an evaluation be conducted based on the criteria in 10 CFR 50.59. The one evaluation that was conducted this year was one automatically required by licensee procedure OSTROP 6 because it dealt with a newly developed procedure.

Review of these documents indicated that 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. The screen forms had been reviewed and signed by all licensed operators, the Senior Health Physicist, the Reactor Administrator, and the Director. The evaluation form had been reviewed and signed by ROC members, including the Chair, as required. It was also noted that none of the changes required NRC approval prior to implementation.

c. Conclusion

Review and audit functions required by TS 6.2 were acceptably completed by the ROC. Changes made at the facility were being reviewed and evaluated using the 10 CFR 50.59 safety evaluation process.

3. Reactor 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

- Licensed Operator Time Log Sheets for the past 18 months
- Selected portions of the Reactor Supervisor's Log, Volume 15
- Selected OSU TRIGA Reactor Daily Power Log Sheets for the past 6 months
- Reactor operations documented in Reactor Console Logbooks, Nos. 163 and 164
- Observation of operations and shutdown activities on June 2 and 3, 2015
- Start-up activities documented on selected OSTROP 2 forms entitled "OSU TRIGA Reactor Startup Checklist," from January through May 2015
- Shut down activities documented on selected OSTROP 3 forms entitled "Reactor Shutdown Checklists," from January through May 2015
- OSU Radiation Center and TRIGA Reactor Annual Reports for the last two reporting periods

b. Observations and Findings

The inspector observed the reactor staff during reactor operations on June 2 and 3, and reviewed Reactor Console Logbooks and associated records. The inspector noted that the reactor operators were knowledgeable and competent. Observation of facility activities also confirmed that reactor operations were carried out in accordance with written procedures and TS requirements. Adherence to procedures was acceptable.

Through these direct observations and document 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 associated records and 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.

c. Conclusion

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

4. Operator Requalification

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 3 years

- Operator training records documented in the Operator Requalification Manual
- TRIGA Reactor Operator Requalification Exam Results forms for 2013 and 2014
- Reactor operations documented in Reactor Console Logbooks, Nos. 163 and 164
- "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," and related log sheets
- Selected portions of the Reactor Supervisor's Log, Volume 15
- Selected OSU TRIGA Reactor Daily Power Log Sheets for the past 6 months
- Start-up activities documented on selected OSTROP 2 forms entitled "OSU TRIGA Reactor Startup Checklist," from January through May 2015
- Shut down activities documented on selected OSTROP 3 forms entitled "Reactor Shutdown Checklists," from January through May 2015

b. Observations and Findings

(1) Operator Requalification Program

At the time of the inspection, there were five licensed SROs (including one part-time individual), one SRO upgrade pending, and five ROs working at the facility. One of the five ROs was in an inactive status as of April 15, 2015, because the appropriate paperwork had not been submitted to the NRC. The licensee was aware that this paperwork would need to be submitted to the NRC and remedial training completed before that person could be placed back in an active status. The inspector verified that all the licenses of the active status operators were current.

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 2 year period. It was noted that lectures had been given as stipulated, training reviews had been documented, and written examinations had been completed. An annual operating test had been conducted for each operator 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. Records of these reactor manipulations, other operational activities, and/or reactor supervisor activities were being maintained, as were records of the

annual operating tests. The program was up-to-date and training was current. The inspector noted that appropriate remedial actions were required to be taken in the event of examination failures.

In addition to the above, the inspector verified that medical examinations were being completed biennially for each operator as required, and that medical conditions that could impact an operator's ability to comply with license conditions were appropriately addressed by the licensee.

(2) Operator Licenses - Failure to Comply with TS Section 6.1.3.a.1

Oregon State University TS Section 1.21 states that the reactor is operating whenever it is not secured or shut down.

TS Section 1.23.b.2 states that the reactor is secured when (four conditions exist including) the reactor is shut down.

TS Section 1.24.b states that the reactor is shut down when (two conditions exist including) the console key switch is in the "off" position and the key is removed from the console.

TS Section 6.1.3.a.1 requires that the minimum staffing when the reactor is operating shall be a reactor operator or the Reactor Supervisor in the control room.

TS Section 6.7.2.a.8 states that the licensee must submit a report not later than the following working day by telephone and confirmed in writing by facsimile to the NRC Operations Center, to be followed by a written report that describes the circumstances of the event within 14 days to the NRC Document Control Desk of an observed inadequacy in the implementation of administrative or procedural controls such that the inadequacy causes or could have caused the existence or development of an unsafe condition with regard to reactor operations.

On January 14, 2015, the Reactor Supervisor submitted paperwork to the Director of the facility for the license renewal of an SRO. The Director subsequently signed the paperwork. The Reactor Supervisor assumed that the license renewal paperwork had been copied and sent to the NRC for processing. Unfortunately the paperwork was not submitted to the NRC as required.

On March 10, 2015, the SRO's license expired. This fact was not recognized by the reactor facility staff. On March 19, 2015, the SRO completed the Control Room portion of the startup checklist in preparation for reactor startup. This included some manipulation of the console controls and putting the reactor key in the console and placing the reactor in an "operating" condition. No other actions were performed by the SRO nor did he perform the actual reactor startup.

On March 25, 2015, the licensee staff determined that the license renewal for this SRO had not been issued and that the SRO was not authorized to perform any licensed functions. Therefore the reactor had been placed in an operating condition without a licensed operator at the console. It was also determined that no other staff members were present in the control room during the performance of the startup checklist on March 19. Reactor operations were suspended until an investigation of the occurrence could be conducted.

On March 26, 2015, the licensee notified the NRC Operations Center that they were reporting a violation in accordance with Section 6.7.2.a.8 of their TS. The licensee also initiated an investigation of the event. It was determined that, after the paperwork was signed by the Director, it had mistakenly been placed in the Reactor Supervisor's mail slot. The paperwork was then filed by the RS. Because of this mistake, the paperwork was never submitted to the NRC for proper renewal action. With respect to the SRO involved, the licensee determined that no other licensed duties had been performed during the period when they were unaware of the situation.

The SRO was restricted from performing licensed duties pending proper renewal of his license and the licensee promptly submitted the paperwork to the NRC. After receiving the proper paperwork, the NRC issued a new license on April 2, 2015, and the SRO was allowed to resume licensed activities. The licensee took corrective actions by placing a tracking item in the facility maintenance and surveillance checklist to verify that: 1) a license renewal is submitted at least 2 months prior to an operator's current license expiration date, and 2) a license renewal is received at least one month prior to the license expiration date.

The licensee subsequently reviewed their initial determination concerning the severity of the violation and the need for a report to the NRC. They determined that the event did not warrant a report to the NRC and they retracted their initial self-reporting of a potential violation.

The inspector reviewed the self-reported TS violation, discussed the issue with various licensee personnel, and reviewed the licensee's corrective actions. After a thorough review of the various records (i.e., console logs, start-up and shutdown records, and operator requalification records), the inspector determined that the SRO's license renewal paperwork was forwarded by the Reactor Supervisor to the Director for signature in a timely manner. The paperwork was mistakenly placed in the Reactor Supervisor's "in box" and then taken and filed away without being sent to the NRC. Since the paperwork was not available to be processed by the NRC, a license renewal was not issued. Therefore, on March 19, 2015, the reactor was placed in an operational status by an individual who did not have a currently approved and issued NRC license. The inspector

agreed that the event did not rise to the significance of requiring a report to the NRC but that a violation had occurred.

The licensee was informed that the issue of the reactor being placed in "operation" by an individual who did not have a currently approved and issued NRC license was a Severity Level IV violation of TS Section 6.1.3.a.1. However, the potential safety consequence was low because the individual had been a Senior Reactor Operator for six years, had completed the requalification program requirements, and had a current medical examination as required. The license renewal paperwork had been completed but, due to an oversight, the materials were not mailed to the NRC for processing as required. As indicated above, the inspector determined that the problem had been identified and reviewed by the licensee and initially reported to the NRC. Corrective actions had been identified and implemented. As a result, the licensee was informed that this non-repetitive, licensee-identified and corrected violation would be treated as a noncited violation (NCV), consistent with Section 2.3.2.b of the NRC Enforcement Policy (NCV 50-243/2015-202-01). This issue is considered closed.

c. Conclusion

The requalification and training program was up-to-date and acceptably implemented and maintained. One noncited violation was reviewed and is considered closed.

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 procedures, including OSTROP 31
- 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. 14-01 through 14-06 and 15-01 through 15-02
- 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," No. 13-01 and 15-01

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. 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 activities observed by the inspector during this inspection were completed in accordance with the applicable procedures. These activities included reactor operation and shut down, equipment maintenance, and routine surveys.

c. Conclusion

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.

5. Exit Interview

The inspection scope and results were summarized with licensee representatives at the conclusion of the inspection on June 3, 2015. The inspector discussed the findings for each area reviewed. The licensee acknowledged the inspection findings presented and did not identify as proprietary any of the material provided to or reviewed by the inspectors during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

T. Keller	Reactor Administrator
S. Menn	Senior Health Physicist
C. Olney	Reactor Supervisor
S. Reese	Director, Radiation Center
R. Schickler	Reactor Engineer
S. Smith	Development Engineer

Other Personnel

A. Klein	Chair, Reactor Operations Committee
G. Wachs	Part-time consultant

INSPECTION PROCEDURES USED

IP 69001	Class II Non-Power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-243/2015-202-01	NCV	Failure to comply with TS 6.1.3.a.1 which requires that, when the reactor is in operation (i.e., not secured), the minimum staffing shall be a licensed reactor operator or Reactor Supervisor in the control room.

Closed

50-243/2015-202-01	NCV	Failure to comply with TS 6.1.3.a.1 which requires that, when the reactor is in operation (i.e., not secured), the minimum staffing shall be a licensed reactor operator or Reactor Supervisor in the control room.

LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
ANSI/ANS	American National Standards Institute/American Nuclear Society
IP	Inspection Procedure
NRC	Nuclear Regulatory Commission
NCV	Noncited Violation
OSU	Oregon State University
OSTR	Oregon State University TRIGA Reactor
OSTROP	Oregon State University TRIGA Reactor Operating Procedure
RO	Reactor Operator

ROC	Reactor Operations Committee
SRO	Senior Reactor Operator
SSC	Structures, systems, and components
TS	Technical Specifications