

September 11, 2003

Dr. Andrew C. Klein, Director
Radiation Center and TRIGA Reactor
Oregon State University
Radiation Center, A100
Corvallis, OR 97331-5903

SUBJECT: NRC INSPECTION REPORT NO. 50-243/2003-201

Dear Dr. Klein:

This letter refers to the inspection conducted on August 25-27, 2003, at your Radiation Center TRIGA Mark-II Reactor Facility. The inspection included a review of activities authorized for your facility. The enclosed report presents the results of that inspection.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations of activities in progress. Based on the results of this inspection, no safety concerns or noncompliances of NRC requirements were identified. No response to this letter is required.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document 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 Craig Bassett at (404) 562-4712.

Sincerely,

/RA/

Patrick M. Madden, Section Chief
Research and Test Reactors Section
New, Research and Test Reactors Program (RNRP)
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report

cc w/encl: Please 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: 50-243/2003-201

Licensee: Oregon State University

Facility: TRIGA Mark-II Reactor Facility

Location: Radiation Center, Oregon State University
Corvallis, Oregon

Dates: August 25-27, 2003

Inspector: Craig Bassett

Approved by: Patrick M. Madden, Section Chief
Research and Test Reactors Section
New, Research and Test Reactors Program (RNRP)
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Oregon State University
Report No.: 50-243/2003-201

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the licensee's Class II research reactor safety programs including: organizational structure and staffing, design change and review and audit program, material control and accountability, and security since the last NRC inspection of these areas. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements.

Organizational Structure and Staffing

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

Design Change and Review and Audit Functions

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

Material Control and Accountability

- Special Nuclear Materials were acceptably tracked, controlled, and inventoried under the licensee's material control and accountability program.

Security

- Security activities and systems satisfied Physical Security Plan requirements.

REPORT DETAILS

Summary of Plant Status

The licensee's TRIGA Mark-II reactor continues to be operated in support of experiments, education, operator training, and surveillance activities. During the inspection, the reactor was operated on several occasions. Also during the inspection, a power outage occurred in the section of the city where the reactor is located. The situation was handled well by the staff and no problems were noted with the reactor or any of the related equipment.

1. Organizational Structure and Staffing

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

The inspector reviewed the following regarding the licensee's organizational structure and functions to ensure that the requirements of Section 6.1 of Technical Specifications (TS), Amendment No. 18, dated November 4, 1999, were being met:

- Oregon State University (OSU) Radiation Center facility organizational structure and staffing
- qualifications of recently appointed personnel
- management responsibilities and administrative controls
- OSU TRIGA Reactor Annual Reports for the periods July 1, 1999 through June 30, 2000, and July 1, 2000 through June 30, 2001
- administrative controls outlined in Oregon State TRIGA Reactor Operating Procedure (OSTROP) 6.0, "Administrative and Personnel Procedures," Revision (Rev) 9, dated May 2003

b. Observations and Findings

The Radiation Center organizational structure and the responsibilities of the reactor staff remained the same as noted during previous inspections. Management and reactor staffing levels also remained the same but a new person had assumed the position of Director of the Radiation Center. This was necessary because the person who had been the former Director had retired.

The organizational structure and staffing, with respect to the health physics organization, had changed since the last inspection. The former Senior Health Physicist had accepted employment elsewhere and the individual filling the facility Health Physicist (HP) was promoted to fill the Senior HP position. In addition, one HP position had been eliminated from the organization.

The organizational structure and staffing were consistent with the requirements of the TS. Qualifications of the staff met those recommended in ANSI Standard 15.4, "Standard for the Selection and Training of Personnel for Research Reactors." 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 TS requirements.

2. Design Change and Review and Audit 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 to verify that any modifications to the facility were consistent with 10 CFR 50.59 and were reviewed as stipulated in TS Section 6.2, the inspector reviewed the following:

- Reactor Operations Committee (ROC) meeting minutes and records
- ROC safety review and audit records from August 2001 to the present
- responses to safety reviews and audits
- OSTROP 6.0, "Administrative and Personnel Procedures," Rev. 9, dated May 2003
- changes reviewed using the licensee's safety evaluation process entitled: "Oregon State TRIGA Reactor (OSTR) Changes, Tests, and Experiments Evaluated Under the Provisions of 10 CFR 50.59"
- minor and substantive procedural changes and the associated Reactor Operations Committee Approval Sheets

The inspector also attended a meeting of the ROC which was held on August 27, 2003.

b. Observations and Findings

ROC meeting minutes and records from August 2001 through the present were reviewed. The records, as well as direct observation, showed that 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. 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.

Through review of applicable records and 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 following evaluations were reviewed: Number (No.) 01-08, "Radiation Center Public Address System Modification and Elimination of the Evacuation Horn System," dated October 9, 2001; No. 01-09, "Removal of Fuel Element in Grid Position F28," dated October 9, 2001; No. 02-03, "Installation of a Primary Tank Camera," dated March 19, 2002; No. 02-08, "Insertion of a Bismuth Filter into Beam Port #3," dated July 12, 2002; No. 03-03, "Removal of the Beam Port #3 Radiography Blockhouse," dated January 3, 2003; and, No. 03-05, "Creation of Experiment B-33 - Irradiation of Combustible Liquids in the Rotating Rack," dated May 7, 2003.

The inspector verified that the changes had been evaluated using the licensee's 10 CFR 50.59 review process and were then reviewed by the ROC as required. It was noted that one change did require NRC approval prior to implementation. It dealt with elimination of one of three systems used to initiate an evacuation of the Radiation Center. The change had been submitted to the NRC for review and approval and approval had been given prior to implementation of the change by the licensee.

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 reviewed using the 10 CFR 50.59 safety evaluation process and had been reviewed and approved by the ROC as required.

3. Material Control and Accountability

a. Inspection Scope (IP 85102)

The inspector reviewed selected aspects of the licensee's material control and accountability program including:

- nuclear material control and accountability forms (DOE/NRC Forms 741, 742, and 742C) for the past 24 months
- fuel storage records
- physical inventory of spent and unirradiated fuel
- OSTROP 20.0, "Special Nuclear Material Control and Accounting Procedures," Rev. 4, dated July 2001, and the associated forms documenting fuel movements entitled "Master Special Nuclear Material Inventory" sheets, "OSTR Fuel Element History File Cards," and "Fuel Element Transfer Sheet"

b. Observations and Findings

The inspector verified that the licensee's material control and accountability program, using OSTROP 20.0, tracked locations and content of fuel, fission detectors, and other special nuclear material (SNM) maintained under the R-106 license. Possession and use of SNM was limited to those purposes authorized by the license. The appropriate material control and accountability forms (DOE/NRC Forms 741 and 742) were being prepared and submitted in the time frame required by the regulations. The inspector also verified that the licensee was conducting annual inventories of the SNM at the facility as required.

During the inspection, the inspector toured the facility, observed the SNM and fuel storage areas, and verified that the licensee was using and storing SNM in the designated areas. The inspector also witnessed an inventory of the unirradiated fuel elements, Exxon fuel pins, and fission chambers in one storage pit which demonstrated that the fuel and SNM were in the locations specified and that records documenting the storage and transfers were accurate.

c. Conclusions

Special Nuclear Materials were acceptably tracked, controlled, and inventoried under the licensee's material control and accountability program.

4. Security

a. Inspection Scope (IPs 81401, 81402, 81403, 81431, and 82810)

To verify compliance with the licensee's NRC-approved Physical Security Plan (PSP) and to assure that changes, if any, to the plan had not reduced its overall effectiveness, the inspector reviewed:

- Oregon State TRIGA Reactor Physical Security Plan, Revision No. 11, dated October 2002
- security logs, records, and reports
- key accountability records
- security systems and equipment checks
- OSTROP 6.0, "Administrative and Personnel Procedures," Rev. 9, dated May 2003
- OSTROP 14.0, "Quarterly Surveillance and Maintenance Procedures," Rev. 6, dated June 2003
- OSTROP 24.0, "Physical Security System Functional Checks and Control Room Exit Procedures," Rev. 1, dated July 1999
- selected records of personnel granted access to the Radiation Center complex by management as documented on Authorization List A and on Entry List B

b. Observations and Findings

(1) Program Review

The PSP in use at the facility was the same as the latest revision approved by the NRC. Various OSTROP procedures were consistent with, and adequately implemented, the PSP. The inspector verified that the PSP was being reviewed annually as required. It was also noted that the licensee was properly controlling and protecting the PSP and other safeguards information as required by the regulations.

Through records review and interviews with licensee personnel, the inspector verified that there had been no safeguards events at the facility since the last inspection. Also, although no new fuel had been received by the licensee recently, the PSP contained provisions to establish and maintain protection of such fuel and other SNM.

Physical protection systems (barriers, alarms, and equipment) were reviewed and observed by the inspector and were determined to be in accordance with the PSP. Access control was being implemented as stipulated in the PSP and OSTROP 6.0. Acceptable security response and training of the staff were demonstrated through alarm response and drill participation in accordance with procedures. Annual

security training was being provided to the staff, as well as OSU security personnel, as required. The inspector also verified that the physical protection systems were being maintained and tested in accordance with the PSP.

(2) Event Review

Section 5.5.1 of the PSP requires that keys issued for use at the Radiation Center/OSTR facility be inventoried on a periodic basis.

The inspector reviewed a letter submitted by the licensee to the NRC dated February 28, 2003. The letter detailed the circumstances of an event that occurred in February concerning key control at the facility. The licensee had reviewed the results of key inventories that had been conducted for the past several years. The licensee found that, during that period, two of the periodic key inventories had not been performed as required by the PSP.

The inspector reviewed the event and the corrective actions taken by the licensee. The immediate corrective action was to conduct an inventory of the keys to ensure that all were accounted for and in the possession of the proper person. The licensee also added this inventory to the checklist of items to be done so that it would be tracked appropriately and would not be missed in the future. The checklist was maintained in OSTROP 14, "Quarterly Surveillance and Maintenance Procedures." In addition, the licensee reviewed the PSP and the Emergency Plan to ensure that all required surveillances were on or would be placed on the tracking list. The inspector verified that the actions described had been completed by the licensee.

As indicated above, the inspector determined that the problem had been identified and reviewed by the licensee and reported to the NRC. Corrective actions had been identified and completed as well. As a result, the licensee was informed that this licensee-identified and corrected violation would be treated as a Non-Cited Violation (NCV), consistent with section VII.B.1 of the NRC Enforcement Policy (NCV 50-243/2003-201-01). This issue is considered closed.

c. Conclusions

Security activities and systems satisfied Physical Security Plan requirements.

5. Follow-up on Previous Inspection Items

a. Inspection Scope (IP 92701, 92702)

The inspector reviewed the licensee's actions taken in response to previously identified inspection items including an Inspector Follow-up Item (IFI) and a Violation (VIO).

b. Observation and Findings

- (1) (Closed) IFI 50-243/2001-201-01 - During an NRC inspection in August 2001, the inspector noted that radiation protection training records indicated that personnel were generally acceptably trained in radiation protection practices. However, it was noted that the last biennial training completed at the facility was in 1999. During this current inspection, the inspector again reviewed the radiation protection training given by the licensee. The inspector noted that training in question during the previous inspection had been conducted in November 2001 (biennially) as required. It was also noted during this inspection that, by revision of Radiation Center Health Physics Procedure (RCHPP) No. 34, "Orientation and Training Program for the OSU Radiation Center," Rev. 15, revision dated July 2003, the licensee had changed from a biennial to a triennial refresher training cycle. This item is considered closed.

- (2) (Closed) VIO 50-243/2001-201-02 - During the inspection noted above, an event was reviewed that was reported by the licensee to the NRC in a letter dated September 8, 1999. The event involved a radiation survey on the OSTR top on August 13, 1999, which identified a high radiation area (HRA) that was not marked or controlled. After some investigation, the licensee determined that a highly collimated radiation beam extended above the reactor top grating and produced an HRA when the reactor was operating at one megawatt (1 Mw) with the In-Core Irradiation Tube (ICIT) installed in the reactor. Through further investigation the licensee concluded that no abnormal personnel doses had been received or recorded because of the high radiation area.

Following discovery of the problem, the licensee took various corrective actions. In a letter to the NRC dated November 20, 2001, the licensee indicated that the ICIT, and all in-core irradiation tubes, were redesigned to reduce the radiation levels that would exist above the core with the tubes in place. Extensive radiation surveys were conducted after the installation of each redesigned tube to characterize the radiation levels produced. No beams were found emanating from the reactor top. The licensee initially controlled the reactor top as an HRA but, following the extensive surveys, reduced those controls to (and currently controls the reactor top as) a radiation area. The inspector reviewed the event and the corrective actions and determined that the licensee had completed all actions specified. This item is considered closed.

c. Conclusions

A violation and an Inspector Follow-up Item identified during a previous inspection were reviewed and closed during this inspection.

6. Exit Interview

The inspection scope and results were summarized on August 27, 2003, with licensee representatives. The inspector discussed the findings for each area reviewed. No dissenting comments were received from the licensee. Although safeguards information was reviewed during the inspection no such material is included in this report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

A. Klein, Director, Radiation Center and Principal Security Officer
S. Menn, Senior Health Physicist
S. Reese, Reactor Administrator
S. Smith, Scientific Instrument Technician and Senior Reactor Operator
G. Wachs, Reactor Supervisor and Senior Reactor Operator

Other Personnel

L. Cole, Sergeant, Assistant Station Commander, Oregon Department of State Police
B. DeBauw, University Locksmith, Facility Services Department, OSU
J. Nowak, University Locksmith, Facility Services Department, OSU
P. Ratchford, Manager, OSU Department of Public Safety
J. Ringle, Chairman, Reactor Operations Committee
M. Simmons, Dispatcher, OSU Department of Public Safety

INSPECTION PROCEDURES USED

IP 69001 Class II Non-Power Reactors
IP 81401 Plans, Procedures, and Reviews
IP 81402 Reports of Safeguards Events
IP 81403 Receipt of New Fuel at Reactor Facilities
IP 81431 Fixed Site Physical Protection of Special Nuclear Material of Low Strategic Significance
IP 81810 Protection of Safeguards Information
IP 85102 Material Control and Accounting - Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-243/2003-201-01 NCV Failure to conduct a quarterly key inventory as required by the Physical Security Plan.

Closed

50-243/2001-201-01 IFI Follow-up on the licensee's actions to complete required biennial retraining for staff members in the area of radiation protection.

50-243/2001-201-02 VIO Failure to conduct an adequate survey of the installation of the ICIT.

50-243/2003-201-01 NCV Failure to conduct a quarterly key inventory as required by the Physical Security Plan.

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
ICIT	In-Core Irradiation Tube
IFI	Inspector Follow-up Item
IP	Inspection Procedure
Mw	Megawatt
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OSU	Oregon State University
OSTR	Oregon State University TRIGA Reactor
OSTROP	Oregon State University TRIGA Reactor Operating Procedures
PSP	Physical Security Plan
RCHPP	Radiation Center Health Physics Procedures
ROC	Reactor Operations Committee
SNM	Special Nuclear Material
VIO	Violation