August 28, 2002

Dr. Jack Higginbotham, Interim Director
Oregon State University
Radiation Center, A100
Corvallis, OR 97331-5903

SUBJECT: NRC INSPECTION REPORT NO. 50-243/2002-201

Dear Dr. Higginbotham:

This letter refers to the inspection conducted on August 12-15, 2002, 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.

Various aspects of your safety program were inspected including selective examinations of procedures and representative records, and interviews with personnel. Based on the results of this inspection, no significant safety issues were identified.

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/NRC/ADAMS/index.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
Operating Reactor Improvements Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

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

Enclosure: NRC Inspection Report No. 50-243/2002-201

cc w/encl: Please see next page

cc:

Mayor of the City of Corvallis
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U. S. NUCLEAR REGULATORY COMMISSION

Docket No:	50-243
License No:	R-106
Report No:	50-243/2002-201
Licensee:	Oregon State University
Facility:	TRIGA Mark-II Reactor Facility
Location:	Radiation Center, Oregon State University Corvallis, Oregon
Dates:	August 12-15, 2002
Inspector:	Craig Bassett
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section Operating Reactor Improvements Program Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

This routine, announced inspection included onsite review of various aspects of the licensee's programs concerning the conduct of operations and emergency preparedness as they relate to the licensee's one and one-tenth megawatt (1.1MW) research reactor. The licensee's programs were directed toward the protection of public health and safety and were in compliance with NRC requirements. No safety concerns or violations of regulatory requirements were identified.

Conduct of Operations

- Organizational structure and staffing were in accordance with requirements specified in Technical Specification Section 6.

- The Reactor Operations Committee was completing the review and oversight functions required by Technical Specification Section 6.2. Title 10 Code of Federal Regulations Part 50 Section 59 (10 CFR 50.59) changes were being reviewed and approved by the Reactor Operations Committee as required and none was determined to constitute a safety question.

- The requalification and training program was current and being acceptably maintained. Medical examinations were being completed biennially as required.

- Facility procedures and document reviews satisfied Technical Specification Section 6 requirements. Procedural compliance was observed and noted to be acceptable.

- Reactor fuel movements were being made and documented in accordance with procedure. The fuel was being inspected on an as-needed basis as allowed by Technical Specification Section 4.4.

- The program for surveillance and Limiting Conditions for Operation confirmations was being carried out in accordance with Technical Specification and procedural requirements. Maintenance was also being completed as required.

- The program for the control of experiments satisfied regulatory requirements and licensee commitments.

- Reactor operations were being completed in accordance with license, Technical Specification, and procedural requirements.

Emergency Preparedness

- The licensee's Emergency Response Plan was found acceptable by the NRC after the last major revision in February 2002.

- The Implementing Procedures were being updated as required and were acceptable to carry out the provisions of the Emergency Response Plan.

- Emergency response facilities and equipment were being maintained as required and responders were knowledgeable of proper actions to take in case of an emergency.

- The licensee maintained current Emergency Support Agreements with offsite agencies which indicated that support would be available in case of an emergency.

- Annual drills were being held and documentation was maintained concerning the follow-up critiques and subsequent corrective actions.

- Emergency preparedness training for staff and off-site personnel was being conducted as required.

Report Details

Summary of Plant Status

The licensee's 1.1 MW TRIGA Mark-II research reactor continued normal, routine operations. Observation of reactor operation and a review of the applicable records indicated that the reactor was typically operated approximately six hours per day, five days per week, in support of laboratory testing, reactor system testing, reactor surveillances, and sample irradiations. During this inspection, the reactor was started up and operated several hours a day at varying power levels for training and sample irradiation.

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), 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
- selected portions of the Reactor Console Logbooks for the past two years
- 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 University TRIGA Reactor Operating Procedure (OSTROP) 6, "Administrative and Personnel Procedures," Revision (Rev) 7, dated May 2002.

b. Observations and Findings

The Radiation Center organizational structure and the responsibilities of the reactor staff had not changed since the last inspection. However staffing levels had changed such that the current operational organization consisted of: an Interim Director of the Radiation Center, a Reactor Administrator, a Reactor Supervisor, a Senior Reactor Operator, a Scientific Instrument Technician, a Senior Health Physicist, and two Health Physicists. It should also be noted that the Reactor Administrator, Reactor Supervisor, and Scientific Instrument Technician were also qualified Senior Reactor Operators. This organization was consistent with that specified in the TS.

The reactor operations staff 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 showed that the logs were being maintained as required and problems were being documented acceptably. The logs and associated records confirmed that shift staffing met the minimum requirements for duty and on-call personnel. The annual reports summarized the required information and were issued at the frequency specified in the TS.

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

c. Conclusions

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

2. Review, Audit, and Design Change Functions

a. Inspection Scope (IP 69001)

In order to verify that the licensee had established and conducted reviews and audits as required and to determine whether modifications to the facility were consistent with 10 CFR 50.59 and TS Section 6.2, the inspector reviewed:

- Charter of the Reactor Operations Committee last reviewed August 2001
- Reactor Operations Committee meeting minutes from August 2000 through the date of the inspection
- responsibilities of the Reactor Operations Committee and design change functions outlined in OSTROP 6
- safety audit and review records for the past two years
- responses to the safety audits and reviews
- design/facility change evaluations conducted under and documented in accordance with OSTROP 6, Figure 6.2 entitled, “OSU TRIGA Reactor (OSTR) Changes, Tests, and Experiments Evaluated Under the Provisions of 10 CFR 50.59,” Numbers 00-11, -12, -13, -14; 01-01, -02, -03, -04, -05, -06, -09; 02-01, -02, -05, and -07
- Forms which document approval of items by the ROC between scheduled meetings entitled “Reactor Operations Committee Approval Sheets (ROCAS),” Numbers 01-03, -04; 02-01, -02, and -03.

b. Observations and Findings

Minutes of the Reactor Operations Committee (ROC) showed that the committee was meeting at the required frequency and that a quorum was present at each meeting. The topics considered during the meetings were appropriate and as stipulated in TS Section 6.2. The ROC conducted audits and reviews quarterly as required. Problems noted during the audits were discussed with the licensee and recommendations for improvements were made. The licensee then implemented improvements as necessary.

The inspector reviewed recent 10 CFR 50.59 evaluations and interviewed licensee personnel concerning facility changes. As a result, the inspector determined that all changes that had been initiated at the facility since the last NRC operations inspection had undergone a review by the licensee staff who then wrote proposals outlining the changes. These were presented to the ROC for review and approval in accordance with

OSTROP 6. It was noted that none of the changes constituted a safety question or required a change to the facility Technical Specifications.

c. Conclusions

Review and oversight functions required by TS Section 6.2 were acceptably completed by the ROC. 10 CFR 50.59 changes were being reviewed and approved by the ROC as required and none was determined to constitute a safety question.

3. Operator Licenses, Requalification, and Medical Activities

a. Inspection Scope (IP 69001)

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

- OSU Radiation Center Operator Requalification Program dated May 3, 1988
- effective dates of current operator licenses
- logs and records of reactivity manipulations maintained in the Operator Time Log and associated manual
- biennial written examination records
- operator training records documented in the Operator Requalification Manual
- medical examination records
- active duty status and Annual Reactor Operating Test results noted and maintained in the Operator Time Log and associated manual.

b. Observations and Findings

At the time of the inspection, there were four qualified senior reactor operators (SROs) working at the facility. All the operators' licenses were current.

A review of the logs and records showed that training had been conducted in the areas outlined in the licensee's requalification and training program. It was noted that lectures had been given as stipulated and that training reviews and examinations had been documented. Records of quarterly reactor manipulations, other operations activities, and Reactor Supervisor activities were being maintained, as were records of the Annual Operations Tests.

Operators were receiving the required medical examinations at the frequency specified in the requalification program.

c. Conclusions

The requalification and training program was up-to-date and acceptably maintained. Medical examinations were being completed as required.

4. Procedures

a. Inspection Scope (IP 69001)

To determine whether facility procedures met the requirements outlined in TS Section 6.5, the inspector reviewed:

- selected operating procedures including: OSTROP 2, "Reactor Startup Checklist Procedures," Rev 5, dated May 2002; OSTROP 3, "Reactor Shutdown Checklist Procedures," Rev 3, dated February 2002; and OSTROP 4, "Reactor Operation Procedures," Rev 5, dated May 2002
- administrative procedures including: OSTROP 5, "Procedures for Maintaining Reactor Operational Procedures," Rev 5, dated February 2002, and OSTROP 6
- procedural reviews and updates documented in ROC meeting minutes.

b. Observations and Findings

Operating procedures were acceptable for the facility and specified the responsibilities of the various members of the staff. The procedures were being reviewed annually by members of the ROC and updated by the licensee as needed. The operations observed during this inspection were completed in accordance with the applicable procedures.

c. Conclusions

Facility procedures and document reviews satisfied TS Section 6 requirements. Procedural compliance was acceptable.

5. Fuel Movement

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify adherence to fuel handling and inspection requirements specified in TS Section 4.4:

- OSTROP 11, "Fuel Element Handling Procedures," Rev 2, dated February 2002
- OSTROP 20, "Special Nuclear Material Control and Accounting Procedures," Rev 4, dated July 2001
- fuel handling equipment and instrumentation
- fuel handling and examination records for the past two years documented on "Oregon State University TRIGA Reactor Fuel Element History File" cards and on "Fuel Transfer Sheet" forms

b. Observations and Findings

The inspector noted that the licensee is currently operating with FLIP Core No.10. It was also noted that the reactor can be operated in different configurations depending upon what equipment is installed in the B-1 position of the core. The actual configuration is tracked via markers in the Reactor Console Logbook.

The inspector determined that the licensee was maintaining the required records of the various fuel movements that were completed and verified that the movements were conducted in compliance with procedure. The reactor fuel was being inspected upon initial receipt and on an as-needed basis as allowed by TS Section 4.4. The procedures used were acceptable and the precautions that were required to be established during such movements and inspections were acceptable. Specific fuel element locations were being tracked by log book and on a chart maintained in the Reactor Control Room. The inspector noted that improvements could be made in the current fuel element location and verification system.

c. Conclusions

Reactor fuel movements were made and documented in accordance with procedure. The fuel was being inspected on an as-needed basis as allowed by TS Section 4.4.

6. Maintenance and Surveillance

a. Inspection Scope (IP 69001)

To determine that surveillances and Limiting Conditions for Operations (LCO) verifications were being completed as required by TS Sections 3 and 4, the inspector reviewed:

- OSTROP 13, “Monthly Surveillance and Maintenance Procedures,” Rev 5, dated February 2002 and related log sheets
- OSTROP 14, “Quarterly Surveillance and Maintenance Procedures,” Rev 4, dated May 2002 and related log sheets
- OSTROP 15, “Semi-Annual Surveillance and Maintenance Procedures,” Rev 6, dated November 2001 and related log sheets
- OSTROP 16, “Annual Surveillance and Maintenance Procedures,” Rev 4, dated May 2002 and related log sheets
- OSTROP 19, “Equipment Maintenance and Calibration Procedures,” Rev 0, dated February 2002
- selected surveillance and calibration test data sheets and records maintained in the Surveillance and Maintenance Logbook
- selected portions of the Reactor Console Logbooks for the past two years.

b. Observations and Findings

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

The maintenance logs and records indicated that problems were addressed and preventive maintenance operations completed as required by procedure. Records

showed that routine maintenance activities were conducted at the required frequency and in accordance with the TS and/or the applicable procedure. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements. Further, maintenance activities were consistent with the requirements of 10 CFR 50.59.

c. Conclusions

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

7. Experiments

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify that experiments were being conducted within approved guidelines specified in TS Sections 3.8 and 4.3:

- OSTROP 10, "Operating Procedures for Reactor Irradiation Facilities," Rev 7, dated May 2002
- OSTROP 18, "Procedures for the Approval and Use of Reactor Experiments," Rev 5, dated February 2002
- selected OSU TRIGA Reactor Irradiation Request forms for the past two years
- selected Standard Form Irradiation Request forms for the past two years
- selected Pneumatic Transfer Irradiation Request forms for the past two years
- documentation of experiment review and approval by the ROC
- potential hazards identification and control of irradiated items
- OSU Radiation Center TRIGA User's Certification Form
- General Limitations of Experiments Performed Using the OSU TRIGA Reactor
- Approved Experiments No. A-1, "Normal TRIGA Operations," Rev dated July 1992; No. B-3, "Irradiation of Materials in the Standard OSTR Irradiation Facilities," Rev dated December 1999; No. B-12, "Exploratory Experiments," Rev dated January 1994; and No. B-23, "Studies Using the Thermal Column," Rev dated March 1992.

b. Observations and Findings

The inspector noted that all the experiments conducted were well-established procedures that have been in place for many years. No new experiments had been initiated, reviewed, or approved since the last inspection. Experiments were completed under the cognizance of the Reactor Supervisor as required. The results of the experiments were documented in the reactor operations log book.

Irradiation Request forms, required for reactor use, were also reviewed. The forms were being completed as required. The forms documented the individual users, the required approvals and licenses, the length of the irradiations, and the ultimate disposition of the material following the irradiations.

The inspector observed the removal and insertion of samples from and into the reactor Thermal Column Irradiation Facility. It was noted that licensee personnel followed procedure and established protocol. Accepted health physics controls were used to maintain exposures ALARA. Contamination controls were used effectively as well.

c. Conclusions

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

8. Operations

a. Inspection Scope (IP 69001)

The inspector reviewed selected portions and/or aspects of:

- start-up activities documented on OSTROP 2 forms entitled "OSU TRIGA Reactor Startup Checklists"
- shut down activities documented on OSTROP 3 forms entitled "Reactor Shutdown Checklists"
- OSTROP 4, "Reactor Operation Procedures," Rev 5, dated May 2002
- operations records documented in the Reactor Operations Logbook commonly known as the Reactor Console Logbook, Nos. 131-136
- observation of startup, operations, and shutdown activities on August 13 and 14, 2002
- staffing during routine reactor operations
- selected OSU TRIGA Reactor Daily Power Log Sheets for the past two years
- selected records of console instrumentation readings documented on Control Room Log Sheets for the past two years
- Licensed Operator Time Log Sheets for the past two years.

b. Observations and Findings

The inspector conducted observations of the reactor staff on August 13 and 14, 2002, and reviewed Reactor Console Logbooks and associated records. These activities 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. The inspector also noted that the licensed reactor operators were knowledgeable and competent.

Observation of these operational activities also confirmed that reactor operations, including start-up, routine operation, and shut down, were carried out following written procedures and TS requirements. The operating logs were clear and provided an acceptable indication of operational activities. The records showed that operational conditions and parameters were consistent with license and TS requirements. The Reactor Console Logbooks, as well as other supplemental records, documented abnormal events that occurred and measures that had been taken to resolve or track the events.

c. Conclusions

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

9. Emergency Preparedness

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- Oregon State University TRIGA Reactor (OSAR) Emergency Response Plan and Emergency Response Implementing Procedures
- OSTROP 1, "Emergency Operating Procedures," Rev 5, May 2002
- emergency response facilities, supplies, equipment, and instrumentation
- training and emergency drill records for the past two years
- offsite support as documented in Emergency Support Agreements.

b. Observations and Findings

The Emergency Plan (E-Plan) in use at the facility was the same as the version most recently approved by the NRC and was last revised February 2002. The E-Plan was audited and reviewed annually by the ROC as required. Implementing procedures were also reviewed annually and revised by the licensee as needed to implement the E-Plan effectively.

Through records review and through interviews with licensee personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. Emergency response facilities and equipment were being maintained as required. An Emergency Support Agreement with the Good Samaritan Hospital in Corvallis, to treat potential victims of a radiological event, had been updated and maintained as necessary. Agreements were also being maintained with the City of Corvallis Fire and Police Departments. Communications capabilities were acceptable with the support groups. Personnel from these off-site support organizations visited the facility periodically and were familiar with the facility and what would be required during a response. The inspector visited the City of Corvallis Fire Department (downtown) facility and the Good Samaritan Hospital and observed the equipment staged in those locations for response to an emergency at the Radiation Center. The inspector determined that the licensee was maintaining a good working relationship with these organizations.

Emergency preparedness and response training for staff personnel was being completed annually as required. Evacuation drills had been conducted each year as well. The licensee was also conducting drills annually as stipulated in the E-Plan in order to test communications procedures and check on the response of facility personnel to a simulated radiological or industrial hazards problem. The inspector verified that every two years the drills were structured to involve and require the participation of off-site support agencies and personnel. Critiques were conducted following the drills to discuss and identify any strengths or weaknesses noted.

Emergency response equipment was being maintained and inventoried at the licensee's facility, as well as at the Fire Department and at the Good Samaritan Hospital, as required. Some minor problems were noted by the inspector with the equipment at these locations but they were remedied before the inspector left the site.

c. Conclusions

The emergency preparedness program was conducted in accordance with the Emergency Plan.

10. Exit Interview

The inspection scope and results were summarized on August 15, 2002, with licensee representatives. The inspector discussed the findings for each area reviewed. The licensee acknowledged the findings and did not identify as proprietary any of the material provided to or reviewed by the inspector during the inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel

J. Higginbotham, Interim Director, Radiation Center
T. Keller, Senior Reactor Operator
S. Reese, Reactor Administrator
G. Wachs, Reactor Supervisor

Other Personnel

C. Boos, Emergency Room Coordinator, Good Samaritan Hospital
D. Campbell, Fire Chief, City of Corvallis Fire Department
J. Ringle, Chairman, Reactor Operations Committee

INSPECTION PROCEDURE USED

IP 69001 Class II Non-Power Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
IP	Inspection Procedure
LCO	Limiting Condition for Operations
MW	Megawatt
NRC	Nuclear Regulatory Commission
OSU	Oregon State University
OSTR	Oregon State University TRIGA Reactor
OSTROP	Oregon State University TRIGA Reactor Operating Procedure
ROC	Reactor Operations Committee
ROCAS	Reactor Operations Committee Approval Sheets
SRO	Senior reactor operator
TS	Technical Specifications