January 29, 2004

Mr. Stephen G. Frantz, Director
Reed Reactor Facility
Reed College
3203 S.E. Woodstock Boulevard
Portland, OR 97202-8199

SUBJECT: NRC INSPECTION REPORT NO. 50-288/2003-201

Dear Mr. Frantz:

This letter refers to the inspection conducted on December 1-4, 2003, at your Reed 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
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 50-288

License No. R-112

Enclosure: NRC Inspection Report 50-288/2003-201

cc w/eccl.: Please see next page

cc:

Mayor of the City of Portland
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Reed College
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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

Docket No:	50-288
License No:	R-112
Report No:	50-288/2003-201
Licensee:	Reed College
Facility:	Reed Reactor Facility
Location:	3203 S.E. Woodstock Boulevard Portland, OR 97202-8199
Dates:	December 1-4, 2003
Inspector:	Craig Bassett
Approved by:	Patrick M. Madden, Section Chief Research and Test Reactors Section New, Research and Test Reactors Program Division of Regulatory Improvement Programs Office of Nuclear Reactor Regulation

EXECUTIVE SUMMARY

Reed College
Report No: 50-288/2003-201

The primary focus of this routine, announced inspection included 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 functions; radiation protection and ALARA programs; environmental monitoring program; procedural controls; transportation of radioactive material program; the physical security program; and the material control and accounting program 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

- Facility organization and staffing remain in compliance with the requirements specified in the Technical Specifications.

Design Change and Review and Audit Functions

- Audits were being conducted by the Reactor Operations Committee and the Radiation Safety Committee in compliance with the requirements specified in the Technical Specifications.

- Changes made at the facility since the last NRC inspection had been evaluated using the 10 CFR 50.59 safety evaluation process and had been reviewed and approved by the Reactor Operations Committee as required.

Radiation Protection Program

- Signs, notices and postings met the regulatory requirements.

- Personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels, and NRC's regulatory limits.

- Surveys were completed and documented acceptably to permit evaluation of the radiation hazards present.

- Radiation survey and monitoring equipment was being maintained and calibrated acceptably.

- Radiation protection training was acceptable and was being conducted as required.

- The Radiation Protection and ALARA Programs satisfied regulatory requirements.

Environmental Monitoring Program

- Effluent monitoring satisfied licensee procedural and regulatory requirements and releases were calculated to be within the specified regulatory and Technical Specification limits.

Procedures

- Facility procedures were acceptably reviewed, approved, and implemented.

Transportation of Radioactive Materials

- The program for shipping radioactive material satisfied regulatory requirements.

Physical Security

- The NRC-approved security program at the facility was acceptably carried out.

Material Control and Accountability

- Special Nuclear Materials were acceptably stored, controlled, and inventoried.

REPORT DETAILS

Summary of Plant Status

The licensee's two hundred and fifty-kilowatt (250 kW) TRIGA Mark-I research reactor continued to be operated in support of undergraduate instruction and laboratory experiments, reactor operator training, and various types of research. During the inspection, the reactor was operated for a laboratory experiment.

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 the Technical Specification (TS), Section 1, Amendment No. 7, dated March 11, 2003, were being met:

- current facility organization and staffing
- management responsibilities as outlined in the applicable procedures
- Reed Reactor Facility (RRF) Administrative Procedures, revision dated October 2003

b. Observations and Findings

The organizational structure had not changed since the last NRC inspection which occurred in December 2002 (Inspection Report No. 50-288/2002-201). However, the previous Associate Director at the facility had graduated and the former Training Supervisor had been promoted to the Associate Director position. Radiation protection duties were being completed by a contract Health Physicist. The campus Environmental Director was the Radiation Safety Officer for the facility. The organizational structure and staffing at the facility were as required by the TS. Review of records verified that management and staff responsibilities were carried out as required by the TS and applicable procedures.

c. Conclusions

The licensee's organization and staffing remain in compliance with the requirements specified in the TS, Section 1.

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 1.3 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 1.4, the inspector reviewed the following:

- safety review and audit records for 2002 and 2003 as documented on RRF Standard Audit Forms
- Reactor Operations Committee (ROC) meeting minutes from September 2001 to the present
- Radiation Safety Committee (RSC) meeting minutes from September 2001 to the present
- Reactor Review Committee meeting minutes from September 2001 to the present (this was a committee composed of both the ROC and the RSC)
- TS responsibilities specified for the ROC and the RSC
- RRF Administrative Procedures, revision dated October 2003
- changes reviewed using the licensee's RRF 10 CFR 50.59 Review Forms
- minor and substantive procedural changes

b. Observations and Findings

1) Review and Audit Functions

The inspector reviewed the ROC and RSC meeting minutes from September 2001 to the present. These meeting minutes showed that each committee met as required by the TS with a quorum being present. Records showed that the safety reviews and audits conducted by the committees were completed at the TS required frequency. Topics of these reviews were also 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.

2) Design Change

Through review of the ROC and RSC meeting minutes, and 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 following evaluations were reviewed: "Multitrend Recorder," dated October 28, 2002, "Count Rate Meter," dated October 28, 2002, and "Console Arrangement and Automatic Rod Control," dated April 1, 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 of the changes required NRC approval prior to implementation. That change dealt with permanently removing the count rate channel from service. The change had been submitted to the NRC for review and approval and approval was pending.

c. Conclusions

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

3. Radiation Protection Program

a. Inspection Scope (IP 69001)

The inspector reviewed the following to verify compliance with 10 CFR Parts 19 and 20 and TS Sections G requirements:

- radiological signs and posting
- routine surveys and monitoring records
- personnel dosimetry records for 2002 and to date in 2003
- Radiation Work Permit Notebook
- records of maintenance and calibration of radiation monitoring instruments
- Radiation Protection and As Low As Reasonably Achievable (ALARA) Programs
- RRF Standard Operating Procedure (SOP) 20, "General Health Physics," revision dated November 2000
- RRF SOP 21, "High Radiation Areas," revision dated October 2002
- RRF SOP 22, "Decontamination," revision dated April 2000
- RRF SOP 23, "Wipe Tests," revision dated October 2003
- RRF SOP 25, "Portable Radiation Monitor Calibration," revision dated June 2001
- RRF SOP 27, "Waste Handling and Disposal," revision dated October 2003
- RRF SOP 28, "Radiation Work Permits," revision dated November 2000
- RRF SOP 30, "RAM Calibration," revision dated June 2001
- RRF SOP 31, "CAM Calibration," revision dated July 2003
- RRF SOP 70, "Weekly Checklist," revision dated February 2003
- RRF SOP 71, "Bimonthly Checklist," revision dated July 2003
- RRF SOP 73, "Annual Checklist," revision dated January 2003

The inspector also observed the use of dosimetry and radiation monitoring equipment during tours of the facility and conducted a radiation survey using NRC equipment.

b. Observations and Findings

(1) Postings and Notices

Copies of current notices to workers were posted inside the Reactor Control Room at RRF. Radiological signs were typically posted at the entrances to controlled areas as well. The copy of NRC Form-3, "Notice to Employees," observed at the facility was the latest issue, as required by 10 CFR Part 19.11, and was also posted in the Control Room.

Caution signs, postings, and controls for radiation areas were as required in 10 CFR Part 20, Subpart J. The inspector verified that licensee personnel observed the precautions for access to radiation areas.

(2) Dosimetry

The inspector determined that the licensee used optically stimulated luminescent (OSL) dosimeters for whole body monitoring of beta and gamma radiation exposure (with an additional component to measure neutron radiation for certain individuals). The licensee also used thermoluminescent dosimeter (TLD) finger rings for extremity monitoring. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited vendor. An examination of the OSL and TLD results indicating radiological exposures at the facility for the past two years showed that the highest occupational doses, as well as doses to the public, were well within 10 CFR Part 20 limitations. The records showed that the highest annual whole body exposure received by a single individual for 2002 was approximately 22 millirem deep dose equivalent. The highest annual extremity exposure for the past year was approximately 60 millirem shallow dose equivalent.

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

(3) Surveys

Selected daily, weekly, biweekly, bimonthly, semiannual, and annual radiation and/or contamination surveys and related tests and checks were reviewed by the inspector. The surveys, tests, and checks had been completed by staff members as required. Any contamination detected in concentrations above the established action level was noted and the area was decontaminated. Results of the surveys were documented so that facility personnel would be knowledgeable of the radiological conditions that existed therein.

During the inspection the inspector conducted a radiation survey along side a licensee representative. Areas surveyed at the facility included the Reactor Room and the Mechanical Room. The radiation levels noted by the inspector were comparable to those found by the licensee and no anomalies were noted.

(4) Radiation Monitoring Equipment

Examination of selected radiation monitoring equipment indicated that the instruments had an acceptable up-to-date calibration sticker attached. The instrument calibration records indicated calibration of portable survey meters was typically completed by licensee staff personnel and/or a contractor who was the Reactor Health Physicist (RHP). Calibration frequency met procedural requirements and records were maintained as required. Area Radiation Monitors and stack monitors were also being calibrated as required. These monitors were also typically calibrated by licensee staff personnel and/or the RHP.

During the inspection the inspector observed the use of the calibration range at the facility and the calibration of an instrument by the contract RHP. The

calibration was completed using the appropriate techniques and according to procedure. Proper precautions were used to maintain doses ALARA.

(5) Radiation Protection and ALARA Programs

The licensee's Radiation Protection and ALARA programs were established and described in the Reed Reactor Facility Radiation Protection Plan, revision dated August 1994, and through associated SOPs that had been properly reviewed and approved. The programs contained instructions concerning organization, training, monitoring, personnel responsibilities, audits, record keeping, reports, and maintaining doses ALARA. The programs, as established, appeared to be acceptable. The ALARA program provided guidance for keeping doses as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20.

The inspector determined that the licensee had completed an annual review of the radiation protection program as required by 10 CFR 20.1101(c). However, the review appeared to be more a review of the plan itself instead of a review of the program implementation. The licensee acknowledged this but indicated that various portions of the program had been reviewed through separate audits however no comprehensive report documenting the review had been written. The issue of completing and documenting a comprehensive review of the radiation protection program and the implementation thereof was identified as an Inspector Follow-up Item (IFI) and will be reviewed during a future inspection (IFI 50-288/2003-201-01).

The licensee did not require or use a respiratory protection program or planned special exposure program.

(6) Radiation Work Permits (RWPs)

The inspector reviewed the RWPs that had been written and used during the past several years as stipulated in RRF SOP 28. It was noted that the controls specified in the RWPs were acceptable and applicable for the types of work being done. The RWPs had been initiated, reviewed, and approved as indicated on the forms.

(7) Radiation Protection Training

The inspector reviewed the radiation worker (or rad worker) training given to RRF staff members, to student operators, to those who were not on staff but who were authorized to handle radioactive material (Principal Users), and to students who worked with/for the Principal Users (Authorized Users). The licensee indicated that rad worker training for staff members was given upon initial entry into the RRF program and then reiterated during Operator Requalification training. Training records showed that personnel were acceptably trained in radiation protection practices. The training program was acceptable.

(8) Facility Tours

The inspector toured the Control Room, the Reactor Room, the Mechanical Room, and the support laboratories and adjacent areas. Control of radioactive material and control of access to radiation areas were acceptable.

c. Conclusions

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

4. Environmental Monitoring Program

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following:

- the environmental monitoring program as outlined in RRF SOP 24, "Environmental Sampling," revision dated April 2000
- release calculation records maintained by the RRF Director
- counting and analysis records documented in Health Physics Logbook 3B
- RRF Annual Reports for September 1, 2001 through August 31, 2002, and September 1, 2002 through August 31, 2003
- RRF SOP 32, "APM Calibration," revision dated July 2003
- RRF SOP 30, "GSM Calibration," revision dated July 2003
- RRF SOP 70, "Weekly Checklist," revision dated February 2003
- RRF SOP 71, "Bimonthly Checklist," revision dated July 2003
- RRF SOP 72, "Semiannual Checklist," revision dated June 2001
- RRF SOP 73, "Annual Checklist," revision dated January 2003

b. Observation and Findings

Environmental soil and water samples were collected, prepared, and analyzed consistent with procedural requirements. Radiation monitoring inside the Reactor Room and outside the facility was completed using TLDs placed in accordance with the applicable procedures as well. The data, along with licensee records and calculations, indicated that the air emissions of radioactive material to the environment were below the 10 millirem constraint specified in 10 CFR 20.1101(d). Data also indicated that there was no activity above background noted. This was outlined in the RRF Annual Reports. The inspector found no new potential release paths following observation of the facility.

The program for the monitoring, storage, or transferring of radioactive liquid, gases, and solids was consistent with applicable regulatory requirements. Items/materials

that were radioactive or potentially contaminated or radioactive were monitored and released when below acceptable limits or were acceptably disposed of as radioactive waste. The principles of ALARA were acceptably implemented to minimize radioactive releases. Monitoring equipment was acceptably maintained and calibrated. Records were current and acceptably maintained.

c. Conclusion

Effluent monitoring satisfied procedural and regulatory requirements and releases were within the specified regulatory and TS limits.

5. Procedures

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with TS Section 1.5:

- selected SOP procedures and procedure changes
- procedural implementation
- ROC and RSC meeting minutes for 2001 through the present
- administrative controls specified in RRF Administrative Procedures, revision dated October 2003
- RRF SOP 72, “Semiannual Checklist,” revision dated June 2001

b. Observations and Findings

The inspector verified that facility procedures were being reviewed biennially as required and upgraded/revised as needed. Administrative control of changes to procedures, and the associated review and approval process, were as stipulated by procedure. Training of personnel on procedures and changes was acceptable. Through observation of activities in progress, the inspector verified that licensee personnel conducted operations in accordance with applicable procedures. Observation and review also showed that procedures for instrument calibration, reactor operation, maintenance, and emergency conditions were available and implemented as required.

c. Conclusions

Facility procedures were acceptably reviewed, approved, and implemented.

6. Transportation

a. Inspection Scope (IP 86740)

To verify compliance with 10 CFR Part 71.5 and procedural requirements for the transfer or shipment of licensed radioactive material, the inspector reviewed the following:

- selected records of various types of radioactive material shipments
- training records of staff members responsible for shipping licensed radioactive material
- RRF SOP 27, "Waste Handling and Disposal," revision dated October 2003
- RRF SOP 54, "Shipping Radioactive Material," revision dated October 2003

b. Observations and Findings

Through records reviews and discussions with licensee personnel, the inspector determined that various shipments of licensed material had been made since the last inspection. Appropriate shipment records had been completed and were being maintained as required. The records showed that the material generally had been described and classified properly, that the correct labeling had been provided, and that the contamination and radiation levels of the packages shipped had been recorded acceptably. With minor exceptions, all radioactive material shipment records reviewed by the inspector had been completed in accordance with Department of Transportation and NRC regulatory requirements. As noted above, any errors noted were minor and generally conservative in nature.

c. Conclusions

The program for shipments of radioactive material satisfied regulatory requirements.

7. Physical Security

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

To verify compliance with the licensee's NRC-approved Physical Security Plan (PSP), revision dated November 2002 and to assure that changes, if any, to the plan had not reduced its overall effectiveness, the inspector reviewed:

- Reed College and RRF security organization
- security logs, records, and reports
- lock and key control documented in the RRF Security Log
- intruder detection and physical barriers
- access controls and procedures
- Reed College Community Safety Dispatch Logs for October and November 2003
- RRF SOP 12, "Security," revision dated October 2003

b. Observations and Findings

The PSP in use at the facility was the same as the latest revision approved by the NRC. Various licensee procedures were consistent with, and adequately implemented, the PSP. The inspector verified that the PSP was being reviewed biennially 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. A bomb threat had been received on October 5, 2002, and Reed College Community Safety personnel responded but found nothing. A subsequent search by the licensee also indicated that no bomb had been planted at the facility and there were no problems. It was noted that no Notification of Unusual Event (NOUE) was declared as a result of this event. However, a review of the incident by the licensee, by Community Safety, and subsequently by the Reactor Review Committee, determined that the call was a hoax, was not credible, and therefore did not require a NOUE to be declared nor the event reported. (The inspector noted that the NRC Project Manager was given a courtesy telephone call concerning the incident the next day following the prank call.)

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 RRF SOP 12. This included maintaining entry lists and proper lock and key control. 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 and Reed College security personnel, as well as to Portland Fire Bureau and Portland Police Bureau personnel as required. The inspector also verified that the physical protection systems were being maintained and tested in accordance with the PSP. In addition, the inspector observed a test of the systems and alarms installed at the facility. The test was completed acceptably and in accordance with procedure. No problems were noted.

The records reviewed by the inspector indicated that Reed College security personnel conducted random patrols of the campus and the RRF on back shifts, weekends, and holidays. The frequency of the patrols was increased on weekends and on holidays as required.

c. Conclusion

The NRC-approved security program at the facility was being carried out acceptably.

8. Material Control and Accounting

a. Inspection Scope (IP 85102)

To verify compliance with 10 CFR Part 70 and licensee procedures, the inspector reviewed:

- storage areas
- tracking the quantity, identity, and location of Special Nuclear Material (SNM)
- annual inventory results
- accountability forms, records and reports

b. Observations and Findings

The inspector verified that the licensee's material control and accountability system tracked locations and content of fuel, fission chambers, and other special nuclear material (SNM) maintained under the R-112 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 those unirradiated fuel elements which were not in the core but which were stored in the reactor pool. The elements were maintained in the appropriate locations as indicated on the fuel handling records and on the Fuel Status Board in the Reactor Room. This demonstrated that the fuel and SNM were in the locations specified and that records documenting the storage and transfers were accurate.

c. Conclusion

Special Nuclear Materials were acceptably stored, controlled, and inventoried.

10. Exit Interview

The inspection scope and results were summarized on December 4, 2003, with members of licensee management. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. Although proprietary material was reviewed by the inspector during the inspection, none is included in this report.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Barnett, Assistant Director, Reactor Facility
L. Cool, Training Supervisor
S. Frantz, Director, Reactor Facility and Acting Radiation Safety Officer
M. Othus, Operations/Reactor Supervisor
M. Parrott, Reactor Health Physicist

Other Personnel

K Fisher, Radiation Safety Officer and Campus Environmental Director
M. O'Brien, Director of Community Safety, Reed College

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 85102:	Material Control and Accounting - Reactors
IP 86740:	Inspection of Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-288/2003-201-01	IFI	Follow-up on the licensee's actions to conduct and document an annual review of the facility Radiation Protection Program and the implementation thereof.

Closed

None

LIST OF ACRONYMS USED

ALARA	As low as reasonably achievable
CFR	Code of Federal Regulations
IFI	Inspector Follow-up Item
IP	Inspection Procedure
kW	kilowatt
NOUE	Notification of Unusual Event
NRC	Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OSL	Optically stimulated luminescent (dosimeter)
PSP	Physical Security Plan
RHP	Reactor Health Physicist
ROC	Reactor Operations Committee
RRF	Reed Reactor Facility
RSC	Radiation Safety Committee
RWP	Radiation Work Permit
SNM	Special Nuclear Material
SOP	Standard Operating Procedure
TLD	Thermoluminescent dosimeter
TS	Technical Specification