

October 17, 2003

Dr. Michael D. Slaughter
Director of CENTER
122 S. Central Campus Drive, Room 104
University of Utah
Salt Lake City, UT 84112

SUBJECT: NRC INSPECTION REPORT NO. 50-407/2003-201

Dear Dr. Slaughter:

This letter refers to the inspection conducted on September 22-25, 2003, at your TRIGA Mark-I Research 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 by Warren Eresian Acting for/

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. 50-407

License No. R-126

Enclosure: NRC Inspection Report No. 50-407/2003-201

cc w/encl.: Please see next page

University of Utah

Docket No. 50-407

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Test, Research, and Training
Reactor Newsletter
Universities 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: 50-407

License No: R-126

Report No: 50-407/2003-201

Licensee: University of Utah

Facility: Center for Excellence in Nuclear Technology,
Energy, and Research (CENTER)

Location: Merrill Engineering Building
Salt Lake City, UT

Dates: September 22-25, 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

University of Utah
Report No.: 50-407/2003-201

The primary focus of this routine, announced inspection included onsite review of selected aspects of the licensee's Class II research and test reactor safety programs including: organizational structure and staffing, design control and review and audit activities, operator requalification, facility procedures, fuel handling, maintenance and surveillance, experiments, and emergency preparedness since the last NRC inspection of these areas. The licensee's programs were acceptably 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.

Organizational Structure and Staffing

- The organizational structure, and personnel qualifications and responsibilities, met the requirements specified in Technical Specifications Sections 6.1, 6.2, and 6.3.

Review and Audit Functions and Design Control

- Review and oversight functions required by Technical Specifications Section 6.5 were acceptably completed by the Reactor Safety Committee. Changes made at the facility had been reviewed and approved in accordance with 10 CFR 50.59.

Operator Requalification Program

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

Procedures

- Facility procedures and document reviews satisfied Technical Specifications Section 6.8 requirements.
- Procedural compliance was acceptable.

Fuel Handling

- Reactor fuel movements and inspections were made and documented in accordance with procedure.
- Fuel elements were being inspected on a biennial basis as specified by Technical Specifications Section 4.4.

Maintenance and Surveillance

- Maintenance was being completed as required.
- The program for surveillance and Limiting Conditions of Operation confirmations was being implemented in accordance with Technical Specifications requirements.

Experiments

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

Emergency Preparedness

- The Emergency Plan and Implementing Procedures were being reviewed and updated biennially as required and were acceptable.
- Emergency response facilities and equipment were being maintained as required and responders were knowledgeable of proper actions to take in case of an emergency.
- Off-site support was acceptable and communications capabilities were adequate.
- Annual drills were being conducted and critiques were being held as required by the Emergency Plan.
- Emergency preparedness training for staff and off-site personnel was being completed as required.

REPORT DETAILS

Summary of Plant Status

The licensee's one hundred kilowatt (100 kW) TRIGA type non-power reactor (NPR) continued normal, routine operations. A review of the applicable records indicated that the reactor was typically operated in support of laboratory experiments, reactor system testing, reactor surveillances, and operator training. During this inspection, the reactor was not operated due to ventilation system redesign and construction.

1. Organization Structure and Staffing

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

The inspector reviewed the following to verify that staffing requirements and personnel qualifications and responsibilities specified in Sections 6.1, 6.2, and 6.3 of the licensee's Technical Specifications (TS), Amendment No. 7, dated June 23, 1999, were being met, maintained, and/or fulfilled:

- Description of Operations Procedure Manual, Section 1, "Organization and Responsibilities"
- organization and staffing for the facility
- administrative controls and management responsibilities
- TRIGA Operations Logs Numbers (Nos.) 34 and 35

b. Observations and Findings

Through discussions with licensee representatives, the inspector determined that management responsibilities and the organization at the University of Utah TRIGA Reactor Facility had not changed since the previous NRC inspection in May 2002 (Inspection Report No. 50-407/2002-201). The Reactor Supervisor retained direct control and overall responsibility for safe operation and maintenance of the facility as specified in the TS. The Reactor Supervisor reported to the President of University of Utah through the Director, Nuclear Engineering Laboratory/Reactor Administrator.

The licensee's current operational organization consisted of the Reactor Administrator, a Reactor Supervisor, and one other person. All three of these individuals are qualified Senior Reactor Operators (SROs). In addition, there are two student SROs; no one is currently in training to become a Reactor Operator (RO). The Reactor Administrator and the Reactor Supervisor positions are full-time positions while all the others are part-time.

The organizational structure and staffing were as required by TS and were consistent with that specified in the ANSI Standard ANS 15.1, "Development of Technical Specifications for Research Reactors." Qualifications of the staff met TS requirements and were consistent with those specified in the ANSI Standard ANS 15.4, "Selection and Training of Personnel for Research Reactors."

c. Conclusions

The organizational structure, and personnel qualifications and responsibilities, met the requirements specified in TS Sections 6.1, 6.2, and 6.3.

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 6.5, the inspector reviewed:

- Completed audits and reviews as noted on Form CENTER-033R1, "Audit and Review Program Checklist," Reactor Safety Committee (RSC) approval dated June 9, 1993 - checklists for audits conducted January 00 - January 02 and January 02 - December 03
- Description of Operations Procedure Manual, Section 1, "Organization and Responsibilities"
- Reactor Safety Committee meeting minutes
- Reactor Safety Committee Charter, dated June 11, 1997 and reviewed June 3, 1999
- Audit and Review Plan for the University of Utah TRIGA Reactor
- Authorization for Modification to the Reactor Facility Log with emphasis on Modification Authorization, MA-8, "Fluke Data Acquisition Unit," (initiated in 2000)
- 10 CFR 50.59 Review, "Review of the Upgrade of Roof-Section of Ventilation System," dated November 12, 2001 and related Piping and Instrumentation Diagrams (P&IDs)

b. Observations and Findings

The inspector reviewed the Reactor Safety Committee's (RSC's) meeting minutes from March 2001 to the present. These meeting minutes showed that the RSC had met at the required frequency and had considered the types of topics outlined by the TS.

The inspector noted the RSC or a subcommittee completed audits of the facility operations, programs, and procedures. Since the last NRC inspection, audits had been completed by the RSC in those areas outlined in the TS. The audits were structured so that the various aspects of the licensee's operations and safety programs were reviewed semiannually. Major facility documents and plans, including the facility procedures, were reviewed biennially. The inspector noted that the audits and the resulting findings were detailed and that the licensee responded and took corrective actions as needed.

The inspector reviewed the recent changes made at the facility. Records of the change made in 2000 and observations of the steps taken to implement the change showed that the design control program at the facility was being followed. Two SROs evaluated the proposed modification and made a recommendation to proceed. Subsequently, the Reactor Supervisor reviewed the proposed modification and determined that no unreviewed safety or TS concern existed. The inspector noted that the 2001 design

change also had been acceptably documented in accordance with 10 CFR 50.59 and applicable licensee requirements. The change resulted in a redesign of the roof-section portion of the ventilation from a one to a two-motor system with increased efficiency. Due to the minor nature of the changes, they were not required to be reviewed and approved by the RSC. None of the recent changes constituted a safety question nor required a change to the facility Technical Specifications.

c. Conclusions

Review and oversight functions required by TS Section 6.5 were acceptably completed by the RSC. Changes made at the facility had been reviewed and approved in accordance with the guidance of 10 CFR 50.59.

3. Operator Licenses, Qualification, and Medical Activities

a. Inspection Scope (IP 69001)

To determine that operator requalification activities and training were conducted as required by the University of Utah Center for Excellence in Nuclear Technology Engineering and Research Reactor Operator Requalification Plan, Rev 3, dated February 1996, and that medical requirements were met, the inspector reviewed:

- license status of those operators who routinely operated the reactor
- logs and records of reactor operations documented on Form CENTER-025, "University of Utah Nuclear Engineering Laboratory Requalification Program Progress Checklist," (no RSC approval date listed) which included reactivity manipulations, written examinations, training and lectures, and SRO duty
- TRIGA Operations Logs Numbers (Nos.) 34 and 35
- medical examination records

b. Observations and Findings

As noted previously, there were five qualified SROs at the facility. All of the operators' licenses were found to be current. A review of facility logs and records showed that training had been conducted in accordance with the licensee's requalification and training program. Lectures had been given as stipulated and that training reviews and examinations had been completed and documented. Records of quarterly reactor operations, reactivity manipulations, other operations activities, and Reactor Supervisor activities were maintained. Records indicating the completion of the annual operations tests and supervisory evaluations were also maintained.

The inspector also noted that operators were also receiving the required biennial medical examinations as specified by the program.

c. Conclusions

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

4. Procedures and Procedural Compliance

a. Inspection Scope (IP 69001)

To verify that facility procedures were being reviewed, revised, and implemented as required by TS Section 6.8, the inspector reviewed selected aspects of:

- Reactor Safety Committee meeting minutes
- Description of Operations Procedure Manual
- selected operating and administrative procedures and logs
- selected forms and checklists
- procedural reviews and updates

b. Observations and Findings

The licensee's procedures were found to be acceptable for the current facility status and staffing level. The inspector noted that the procedures specified the responsibilities of the various members of the staff as well as the RSC. The procedures were being audited/reviewed biennially, as noted earlier, and were updated as needed. It was also noted that substantive revisions to checklists and forms were routinely presented to the RSC for review and approval as required by TS. The inspector verified that the latest revisions to various procedures and forms had been through this review and approval process as required.

The inspector observed the completion of the Monthly Inspection Checklist. It was noted that the checks and verifications were completed in accordance with the applicable procedure.

c. Conclusions

Facility procedures and document reviews satisfied TS Section 6.8 requirements. Procedural compliance was acceptable.

5. Fuel Movement and Handling

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following in order to verify adherence to fuel handling and inspection requirements specified in TS Section 4.4 and the applicable procedures:

- Fuel Procedures and Log
- Core Procedures and Log
- TRIGA Operations Logs Nos. 34 and 35
- Form CENTER-018, "Fuel Element Inventory Sheet," RSC approval dated May 25, 1988
- Form CENTER-004R1, "Biennial Fuel Rod Inspection," RSC approval dated December 17, 1997

b. Observations and Findings

The inspector determined that the licensee was maintaining the required records of the various fuel movements that had been completed and verified that the movements were conducted and recorded in compliance with procedure. The latest core reconfiguration was completed in December 2001 and the resulting University of Utah TRIGA core and fuel positioning continued to be designated as Core Configuration 24.

Core loading procedures provided a prescribed method to move and handle fuel consistent with the requirements and provisions of the TS Section 4.4 and the licensee safety analyses. Fuel movement and fuel examination records showed that the fuel of the current core was moved in accordance with procedures and examined biennially as required. It was noted that fuel handling tools were controlled and secured by means of a chain and lock when not in use. The procedures and the controls specified for these operations were acceptable.

c. Conclusions

Reactor fuel movements and inspections were completed and documented in accordance with applicable procedures and the fuel was being inspected as specified by TS Section 4.4.

6. Maintenance and Surveillance

a. Inspection Scope (IP 69001)

To determine that Limiting Conditions of Operation and surveillance activities were being completed as stipulated by TS Sections 3 and 4, and that maintenance was being conducted as required, the inspector reviewed:

- selected Surveillance Procedures and Logs
- Maintenance Procedures and Maintenance Log
- selected surveillance data sheets, records, and tests
- calibration procedures and records
- Startup and Termination Procedures Log
- TRIGA Operations Logs Nos. 34 and 35

b. Observations and Findings

The inspector determined that selected daily, monthly, semiannual, annual, and biennial checks, tests, and verifications for TS-required Limiting Conditions of Operation (LCOs) and surveillances were completed as stipulated. Surveillance and LCO verifications reviewed were being completed on schedule and in accordance with licensee procedures. All the recorded results reviewed by the inspector were within the TS and procedurally prescribed parameters. Several of the surveillances were being completed more frequently than required by the TS. The records and logs reviewed were complete and were being maintained as required.

A review of the reactor console and maintenance logs showed that they were being maintained as required and problems, if any, were being documented. This review also demonstrated that maintenance was being conducted consistent with the TS and applicable procedures. Maintenance activities ensured that equipment remained consistent with the Safety Analysis Report and TS requirements.

c. Conclusions

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

7. Experiments

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following in order to verify that experiments were being conducted within approved guidelines,:

- Experimental Procedures and Log
- completed Reactor Experiment Authorization forms
- selected Routine and Modified Routine Experiments
- selected Irradiation Request and Performance Forms
- potential hazards identification
- control of irradiated items
- TRIGA Operations Logs Nos. 34 and 35

b. Observations and Findings

The inspector noted that the experiments currently being conducted at the facility were those classified as routine or modified routine (formerly routine experiments were classified as Class I and new experiments were classified as Class II). These experiments had been reviewed and approved by the Reactor Supervisor as required and were conducted under the cognizance of the Reactor Supervisor as well. The results of the experiments were documented in the TRIGA Operations Log book and on the irradiation request forms.

No new experiments had been initiated, reviewed, or approved since the last inspection. However, one recent experiment involved a procedure that had not been conducted in several years. The Reactor Supervisor required the experimenter to review the previous procedure, analyze the method to be used, and calculate the reactivity of the materials expected to be produced.

It was noted that the TS and the applicable procedural guidance required that the RSC review and approve any experiment classified as new. Licensee representatives said that this was the process that has been and would continue to be followed.

c. Conclusions

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

8. Emergency Preparedness

a. Inspection Scope (IP 69001)

To verify that the licensee was implementing and complying with the University of Utah Center for Excellence in Nuclear Technology, Engineering, and Research Emergency Plan, Rev 5, dated December 31, 2001, as approved by the NRC, the inspector reviewed selected aspects of:

- the Emergency Plan and implementing procedures
- emergency response supplies, equipment, and instrumentation
- training records for staff and offsite support personnel
- offsite support groups
- emergency drills and critiques

b. Observations and Findings

The Emergency Plan (E-Plan) in use at the reactor and emergency facilities was the same as the version most recently approved by the NRC (a revised version of the E-Plan was being finalized and was to be submitted to the NRC for approval). The E-Plan was audited and reviewed biennially as required. Implementing procedures were reviewed and revised, most recently on December 31, 2001. Facilities, supplies, instrumentation and equipment were generally being maintained, controlled, and inventoried as required in the E-Plan.

Through records review and interviews with licensee personnel, emergency responders were determined to be knowledgeable of the proper actions to take in case of an emergency. According to the licensee, agreements with outside response organizations were maintained between the various groups and the University. Communications capabilities with these support groups were acceptable.

Emergency drills had been conducted annually as required by the E-Plan except for 2002. The drill was suspended due to the extensive amount of construction that was underway in the entire Engineering Building. This drill suspension was documented with a memo to file.

Critiques were typically held following the drills to discuss the strengths and weaknesses identified during the exercise and to develop possible solutions to any problems identified. The results of these critiques were documented and filed. Training for off-site and reactor staff personnel was acceptable and was conducted and documented as required. However, the training for 2002 had been postponed because of the reasons noted above.

The inspector visited the University Hospital and observed the supplies and equipment at this support site that would be available in case of an emergency. There appeared to be a good working relationship between the licensee and this support organization.

Because of the suspension of the drill and training in 2002, the inspector requested that the licensee conduct training and hold a drill within the next six months. The licensee committed to this time frame and indicated that the required training and drill would be conducted. This issue will be followed by the NRC and reviewed during future inspections as an Inspector Follow-up Item (IFI) (IFI 50-407/2003-201-01).

c. Conclusions

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

9. Follow-up on Previously Identified Items

a. Inspection Scope (IP 92701)

The inspector reviewed the licensee's actions taken in response to a previously identified Inspector Follow-up Item.

b. Observation and Findings

Inspector Follow-up Item (IFI) 50-407/2001-201-01 - Follow-up on the licensee's actions to perform periodic checks of the First-Aids kits at the facility and revise the Emergency Plan.

During a previous inspection in May 2001, it was noted that the Appendix to the E-Plan required a monthly check of the First-Aid kits in 1205-D, 1205-E, and 1208. The licensee indicated that these checks were not being completed and that the locations were not the correct ones because the First-Aid kits were actually located in 1205-F and 1205-K, as well as 1205-D (the Control Room) and 1208.

The inspector followed up on the actions taken by the licensee to correct the problem of conducting and documenting periodic checks of the First-Aid kits. The inspector noted that the licensee had changed the inventory frequency to semi-annual and that these had been completed for 2002 and to date in 2003. The inspector also verified that the kits were in the locations specified and contained the required materials. This item is considered closed.

c. Conclusions

One IFI (open item) identified during a previous inspection was closed.

10. Exit Interview

The inspection scope and results were summarized on September 25, 2003, 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

D. Choe, Senior Reactor Operator
M. Krahenbuhl, Reactor Supervisor
R. Pugmire, Associate Vice President for Research
D. Slaughter, Reactor Administrator and CENTER Director
J. Wilde, Senior Reactor Operator

Other Personnel

C. Connelly, Emergency Management Director, University Hospital, University of Utah
P. Jenkins, Health Physicist, Radiological Health Department
K. Langley, Radiological Safety Officer and Director, Radiological Health Department

INSPECTION PROCEDURE USED

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

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

| | | |
|--------------------|-----|--|
| 50-407/2003-201-01 | IFI | Follow-up on the licensee's actions to conduct emergency training and hold a drill within the next six months (from the end date of the inspection). |
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Closed

| | | |
|--------------------|-----|--|
| 50-407/2001-201-01 | IFI | Follow-up on the licensee's actions to perform periodic checks of the First-Aids kits at the facility and revise the Emergency Plan. |
|--------------------|-----|--|

LIST OF ACRONYMS USED

| | |
|--------|----------------------------------|
| CFR | Code of Federal Regulations |
| E-Plan | Emergency Plan |
| IFI | Inspector Follow-up Item |
| IP | Inspection Procedure |
| kW | Kilowatt |
| LCO | Limiting Conditions of Operation |
| NPR | Non-Power Reactor |
| NRC | Nuclear Regulatory Commission |
| RO | Reactor operator |
| RSC | Reactor Safety Committee |
| SRO | Senior reactor operator |
| TS | Technical Specifications |