

May 31, 2001

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. 50-407/2001-201

Dear Dr. Slaughter:

This refers to the inspection conducted on April 30 - May 3, 2001, at your TRIGA Mark-I Research Reactor 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 violations 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/NRC/ADAMS/index.html>.

Should you have any questions concerning this inspection, please contact Mr. Craig Bassett at 404-562-4712.

Sincerely,

*/RA/*

Ledyard B. Marsh, Chief  
Events Assessment, Generic Communications  
and Non-Power Reactors Branch  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-407  
License No. R-126

Enclosure: NRC Inspection Report No. 50-407/2001-201

cc w/encl: Please see next page

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Test, Research, and Training  
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U. S. NUCLEAR REGULATORY COMMISSION

Docket No: 50-407

License No: R-126

Report No: 50-407/2001-201

Licensee: University of Utah

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

Location: Merrill Engineering Building  
Salt Lake City, Utah

Dates: April 30 - May 3, 2001

Inspector: Craig Bassett

Approved by: Ledyard B. Marsh, Chief  
Events Assessment, Generic Communications and  
Non-Power Reactors Branch  
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 Class 2 non-power 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

- Staffing, reporting, and record keeping met requirements specified in Technical Specifications (TS) Section 6.2. Maintenance was being completed as required.
- Review and oversight functions required by TS Section 6.5 were acceptably completed by the Reactor Safety Committee. Changes made at the facility had been reviewed and approved as required.
- The requalification/training program was up-to-date and acceptably maintained. Medical examinations were being completed as required.
- Facility procedures and document reviews satisfied TS Section 6.8 requirements. Procedural compliance was acceptable.
- Reactor fuel movements and inspections were made and documented in accordance with procedure and the fuel elements were being inspected on a biennial basis as specified by TS Section 4.4.
- The program for surveillance and Limiting Conditions of Operation confirmations was being implemented in accordance with TS requirements.
- The program for the control of experiments satisfied regulatory requirements and license commitments.

### Emergency Preparedness

- The last major revision to the facility Emergency Plan was completed in 1996. The Implementing Procedures were being updated as needed and were acceptable to implement the provisions of the Emergency Plan.
- Emergency response facilities and equipment were generally being maintained as required and responders were knowledgeable of proper actions to take in case of an emergency.
- Off-site support was acceptable as were communications capabilities.

- 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 started and operated at 90 percent power for training purposes.

#### 1. Organization, Operations, and Maintenance Activities (Inspection Procedure [IP] 69001)

##### a. Inspection Scope

To verify staffing, reporting, and record keeping requirements specified in Technical Specifications (TS) Section 6.2 were being met, the inspector reviewed:

- organization and staffing for the facility
- administrative controls and management responsibilities
- selected Operations Logs
- the Maintenance Procedure and Log

##### 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 July 2000 (Inspection Report No. 50-407/2000-201). 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 Reactor Administrator and the Associate Vice President for Research.

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 and one person is in training to become a Reactor Operator (RO). The Reactor Administrator and the Reactor Supervisor are full-time positions while all the others are part-time. This organization was consistent with that specified in the ANSI Standard ANS 15.1.

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.

##### c. Conclusions

Staffing, reporting, and record keeping met the requirements specified in TS Section 6.2. Maintenance was being completed as required.





2. Review, Audit, and Design Change Functions (IP 69001)

a. Inspection Scope

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 the TS Section 6.5, the inspector reviewed:

- Reactor Safety Committee meeting minutes
- Audit and Review Plan for the University of Utah TRIGA Reactor
- completed audits and reviews
- changes reviewed under 10 CFR 50.59

b. Observations and Findings

The inspector reviewed the Reactor Safety Committee's (RSC's) meeting minutes from December 1997 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.

Through review of applicable records and interviews with licensee personnel, the inspector determined that all changes that had been initiated and/or completed at the facility since the last NRC operations inspection had undergone an appropriate review as required.

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 as required.

3. Operator Licenses, Requalification, and Medical Activities (IP 69001)

a. Inspection Scope

To determine that operator requalification activities and training were conducted as required and that medical requirements were met, the inspector reviewed:

- active license status
- logs and records of reactivity manipulations
- written examinations
- training lectures and records

- medical examination records

b. Observations and Findings

As noted above, there are currently five qualified SROs at the facility and one person in training. All of the operators' licenses were current. A review of facility logs and records showed that training had been conducted in accordance with 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 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 medical examinations at the frequency specified by the program.

c. Conclusions

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

4. Procedures and Procedural Compliance (IP 69001)

a. Inspection Scope

To determine whether facility procedures met the requirements outlined in TS Section 6.8, the inspector reviewed:

- Description of Operations procedure manual
- selected operating and administrative logs
- selected forms and checklists (procedures)
- 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 various operations during this inspection including a reactor start up, steady state operation, and shut down. It was noted that the operations were completed in accordance with the applicable checklists and procedures.

c. Conclusions

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

5. Fuel Movement (IP 69001)

a. Inspection Scope

In order to verify adherence to fuel handling and inspection requirements specified in TS Section 4.4, the inspector reviewed:

- Procedures and Log
- TRIGA Operations logs and records

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 1999 and the current University of Utah TRIGA Core has been designated as Core Configuration 24.

The inspector verified that the reactor fuel was being inspected biennially as required by TS. 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 procedure and the fuel was being inspected as specified by TS Section 4.4.

6. Surveillance (IP 69001)

a. Inspection Scope

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

- selected Surveillance Procedures and Logs
- selected surveillance data sheets, records, and tests
- calibration procedures and records
- Startup and Terminations Log
- TRIGA Operations Logs Numbers 32-34

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 generally completed on schedule and in accordance with licensee

procedures. All the recorded results 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.

c. Conclusions

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

7. Experiments (IP 69001)

a. Inspection Scope

In order to verify that experiments were being conducted within approved guidelines, the inspector reviewed:

- 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

b. Observations and Findings

The inspector noted that the experiments currently being conducted at the facility were those classified as routine or modified routine. 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. It was noted that the TS and the applicable procedural guidance required the RSC to 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 (IP 69001)

a. Inspection Scope

The inspector reviewed selected aspects of:

- the Emergency Plan and implementing procedures

- emergency response supplies, equipment, and instrumentation
- training records
- offsite support
- 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. The E-Plan was audited and reviewed biennially as required. Implementing procedures were reviewed and revised as needed. 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. Agreements with outside response organizations had been reviewed as necessary. Communications capabilities with these support groups were acceptable. Emergency drills had been conducted annually as required by the E-Plan and off-site support organization participation was acceptable. Critiques were 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.

In reviewing the Appendix to the E-Plan, the inspector noted that the Appendix required a monthly check of the First-Aid kits in 1205-D, 1205-E, and 1208 (various rooms in the facility). 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 licensee was informed that the issue of conducting and documenting periodic checks of the First-Aid kits would be followed by the NRC as an Inspector Follow-up Item (IFI) and would be reviewed during a subsequent inspection (IFI 50-407/2001-201-01).

c. Conclusions

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

9. Follow-up on Previously Identified Items (IP 92701)

a. Inspection Scope

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) 50-407/98-201-02 - Follow-up on the licensee's actions to formalize the calibration of the high purity Germanium (HPGe) multichannel analyzer.

During a previous inspection in January 1998 it was noted that the licensee did not have a formal calibration procedure for the HPGe multichannel analyzer and did not have the manufacturer's instructions concerning calibration of the equipment. Since that time the licensee purchased new software for the system and obtained the applicable calibration instructions as well. The licensee now follows the manufacturer's established calibration procedure. This item is considered closed.

c. Conclusions

One open item identified during a previous inspection was closed.

10. Exit Interview

The inspection scope and results were summarized on May 3, 2001, 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  
B. Shelkey, Senior Reactor Operator  
D. Slaughter, Reactor Administrator and CENTER Director  
J. Wilde, Senior Reactor Operator

### Other Personnel

J. Thompson, Radiological Safety Officer, University of Utah  
D. Reeves, Captain, Salt Lake City Fire Department, Station 4

## **INSPECTION PROCEDURE USED**

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

## **ITEMS OPENED, CLOSED, AND DISCUSSED**

### Opened

50-407/2001-201-01	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.
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### Closed

50-407/98-201-02	IFI	Follow-up on the licensee's actions to formalize the calibration of the high purity Germanium (HPGe) multichannel analyzer.
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## **LIST OF ACRONYMS USED**

CFR	Code of Federal Regulations
E-Plan	Emergency Plan
HPGe	High purity Germanium (multichannel analyzer)
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