U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION

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| Docket No: | 50-274 |
| License No: | R-113 |
| Report No: | 50-274/99-201 |
| Licensee: | U.S. Geological Survey |
| Facility: | U.S. Geological Survey TRIGA Reactor |
| Location: | Geological Survey TRIGA Reactor Facility<br>Building 15, Federal Center, Denver Colorado |
| Dates: | July 13-16, 1999 |
| Inspector: | Stephen W. Holmes, Reactor Inspector |
| Approved by: | Ledyard B. Marsh, Chief<br>Events Assessment, Generic Communications and Non-Power Reactors Branch<br>Division of Regulatory Improvement Programs<br>Office of Nuclear Reactor Regulation |

## EXECUTIVE SUMMARY

This routine, announced inspection consisted of the review of selected conditions and records since the last inspection, verification of corrective actions previously committed to by the licensee, and related discussions with licensee personnel. The inspection was conducted following the guidance of the NRC Inspection Manual.

### ORGANIZATIONAL STRUCTURE AND FUNCTIONS

Reactor operations staffing and organizational structure and functions satisfied technical specification (TS) requirements.

### EXPERIMENTS

Licensee control and performance of experiments met TS and regulatory requirements.

### OPERATIONS

Operational activities were consistent with applicable requirements.

### FUEL HANDLING

Fuel handling activities and documentation were as required by TS and facility procedures. No safety concerns were identified.

### SAFEGUARDS

The licensee was in compliance with the possession and use limits of the research reactor license, acceptably tracked burn-up and production of special nuclear material (SNM), and had effective control of licensed materials as required.

### PROCEDURES

Facility procedures and use satisfied TS requirements. Reactor operating records and logs were being maintained as required by TS.

### OPERATOR REQUALIFICATION

The requalification program was being acceptably implemented. TS and NRC-approved requalification plan requirements were met.

### REVIEW AND AUDIT

The Reactor Operations Committee (ROC) performed its safety duties as required by TS and administrative criteria.

## SURVEILLANCE

The licensee's program for surveillance and limiting conditions for operation (LCO) confirmations satisfied TS requirements.

## MAINTENANCE

Maintenance logs, records, performance, and reviews satisfied TS and procedure requirements. Facility condition was well maintained for its intended function and use.

## DESIGN CONTROL

Design change procedures were in place and implemented as required.

## ENVIRONMENTAL PROTECTION

Environmental monitoring satisfied the radiation protection program requirements.

## RADIOACTIVE MATERIAL TRANSFER AND DISPOSAL

Radioactive material was transferred and disposed of following facility procedures, TS, and regulatory requirements.

## Report Details

### Summary of Plant Status

The reactor was being operated a few days per week at full power in support of U.S. Geological Survey programs.

### 1. ORGANIZATIONAL STRUCTURE AND FUNCTIONS

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- organization and staffing
- qualifications
- management responsibilities
- administrative controls

b. Observations and Findings

Licensed staff consisted of the Reactor Supervisor (RS), reactor health physicist, and two Senior Reactor Operators (SROs). The reactor staff satisfied the training and experience required by the TS.

Since the last inspection no functional changes in the management organization or administrative controls have been made.

c. Conclusions

Reactor operations staffing, organizational structure, and functions satisfied TS requirements.

### 2. EXPERIMENTS

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- experimental program requirements
- procedures
- logs and records
- experimental administrative controls and precautions

b. Observations and Findings

New experiments or major changes to experiments (Class II) must be reviewed by the committee prior to initiation while others (Class I) may be approved by the RS. Record reviews and interviews substantiated that experiment approvals satisfied license and TS requirements.

Review of the experiment data in the reactor log and observations by the inspector indicated that experiments were constrained as required by the TS and experiment authorization, and were installed, performed, and removed as outlined in the experiment authorization and licensee's procedures.

c Conclusions

Licensee control and performance of experiments met TS and regulatory requirements.

## 3. OPERATIONS

a Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- operational logs and records
- staffing for operations
- selected operational, startup, or shutdown activities

b Observations and Findings

Reactor operations were carried out following written procedures and TS. Information on operational status of the facility was recorded in log books and checklists as required by procedures and TS. Use of maintenance and repair logs satisfied pertinent requirements. Significant problems and events noted in the operations log were reported and quickly resolved as required by TS and administrative procedures.

The inspector verified that TS and procedure required items were logged and cross referenced with other logs and checklists as required, and that TS operational limits had not been exceeded. Start-up, steady state power operation, a shutdown, and several facility checks and tests were observed by the inspector with no problems noted.

Operation logs and records confirmed that shift staffing met the minimum requirements for duty and on-call personnel.

c Conclusions

Operational activities were consistent with applicable requirements.

## 4. FUEL HANDLING

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- fuel handling procedures
- fuel handling equipment and instrumentation
- fuel handling and examination records

b. Observations and Findings

Procedures for refueling, fuel shuffling, and TS required inspections/surveillances were thorough and detailed, ensuring controlled operations. Fuel movement, inspection, log keeping, and data recording followed the facility's procedures. Data recorded for fuel movement was clear and cross referenced in fuel and operations logs. Radiological controls and procedures conformed to health physics ALARA principles. Log entries clearly identified, as required by procedure, the minimum two persons present when moving fuel. Observation by the inspector of movement of a C-ring element confirmed fuel movement and operations, and fuel log recording was performed as required.

c. Conclusions

Fuel handling activities and documentation were as required by TS and facility procedures. No safety concerns were identified.

## 5. SAFEGUARDS

a. Inspection Scope (Inspection Procedure 85102)

The inspector reviewed selected aspects of:

- nuclear material inventory and locations
- accountability records and reports
- nuclear material accountability program

b. Findings and Observations

The semiannual inventory of SNM was reviewed and verified. The material control and accountability program tracked locations and content of fuel under the research reactor license. Fuel burn-up-related measurements and calculations were performed on the total core inventory using megawatt-hours produced and industry standard factors. The possession and use of SNM were limited to the locations and purposes authorized under the license. The material control and accountability forms (DOE/NRC Forms 741 and 742) were prepared and transmitted as required. Fuel inventory and movement records were cross referenced and matched.

The facility representative located and the inspector verified two randomly selected items listed on the SNM inventory.

The RS stated they were aware that, although tracking fuel burn-up and production on a total core basis was acceptable for operations, for shipping spent fuel, individual element isotopic inventories would be required.

c Conclusions

The licensee was in compliance with the possession and use limits of the research reactor license, acceptably tracked burn-up and production of SNM, and had effective control of licensed materials as required.

## 6 PROCEDURES

a Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- administrative controls
- records for changes and temporary changes
- procedural implementation
- logs and records

b Observations and Findings

Written procedures required by the TS were available and used by the staff. The inspector observed procedure use during operations. Implementation of and adherence to the procedures was acceptable. Procedures were routinely updated as needed. Review of Procedure H-19 verified that changes had been evaluated and approved by the RS or ROC as required.

Records of power level, operating periods, unusual events, calibration and maintenance procedures, installed experiments, and start-up and shut-down checks were being kept as required by the TS and procedures.

c Conclusions

Facility procedures and use satisfied TS requirements. Reactor operating records and logs were being maintained as required by TS.

## 7. OPERATOR REQUALIFICATION

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- the Requalification Program
- operator licenses
- operator training records
- operator physical examination records
- operator examination records
- operator active duty status

b. Observations and Findings

All currently licensed SROs were successfully completing the emergency procedure and abnormal events training, reactivity manipulations, and participating in the ongoing training as required by the NRC-approved requalification plan. Review of records indicated that operator performance and competence evaluations had been given as required. Past test questions covered the material prescribed by the program and demonstrated technical depth. Required quarterly operation hours, as SROs, were being tracked. Biennial medical exams had been performed as required.

Training was provided to the reactor operators on maintenance operations and 10 CFR 50.59 design changes and evaluations.

c. Conclusions

The requalification program was being acceptably implemented. TS and NRC-approved requalification plan requirements were met.

## 8 REVIEW AND AUDIT

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- safety review records
- audit records
- responses to safety reviews and audits

b. Observations and Findings

The ROC meeting schedule and membership satisfied TS requirements and the Committee's procedural rules. Review of the minutes indicated the ROC provided appropriate guidance, direction and oversight, and ensured suitable use of the reactor. The minutes were clear and provided a record of the safety oversight of reactor

operations. Audits were direct and practical with follow-up on findings. Review and approval of emergency, security, and requalifications plans, procedures, experiments, and subsequent changes as well as year 2000 concerns were being performed.

The ROC had reviewed and approved an upgrade and change to the continuous air monitor (CAM) electronics as required.

c. Conclusions

The ROC performed its safety duties as required by TS and administrative criteria.

9. **SURVEILLANCE**

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- surveillance and calibration procedures
- surveillance, calibration, and test data sheets and records

b. Observations and Findings

Daily and other periodic checks, tests, and verifications for TS required LCOs were completed as required. All surveillance and LCO verifications were completed on schedule as required by TS and in accordance with licensee procedures. A number of the surveillances and LCO verifications were performed at intervals more frequent than required by TS. All were within prescribed TS and procedure parameters and in close agreement with the previous surveillance results.

Some of the daily and periodic checks of equipment operability included recording system parameters such as temperature, pressure, and flow. All values checked by the inspector satisfied the limits/parameters listed in the procedure or checklist.

c. Conclusions

The licensee's program for surveillance and LCO confirmations satisfied TS requirements.

10. **MAINTENANCE**

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- maintenance procedures
- equipment maintenance records

b. Observations and Findings

Reactor maintenance was noted in a maintenance log and the reactor logbook as required by procedures. Maintenance was performed and documented consistent with the TS and licensee procedures. Maintenance procedures made staff aware that repair or maintenance beyond a certain point could become a facility change requiring an evaluation under 10 CFR 50.59.

During a facility tour it was noted that control and reactor room equipment was operational. No missing or malfunctioning equipment was noted.

c. Conclusions

Maintenance logs, records, performance, and reviews satisfied TS and procedure requirements. Facility condition was well maintained for its intended function and use.

11. **DESIGN CONTROL**

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- facility design changes and records
- facility configuration

b. Observations and Findings

Since the last inspection an upgrade and change was made to the CAM electronics. The 10 CFR 50.59 change package included new updated procedures, the manufacture's manual for the upgrade instrument package, and the review and approval by the ROC. The inspector confirmed that the operation tests of the CAM verified that it met TS requirements and was operational.

c. Conclusions

The licensee's design change procedures were in place and were implemented as required.

12. **ENVIRONMENTAL PROTECTION**

a. Inspection Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- the environmental monitoring program
- environmental records
- procedures

b. Observations and Findings

The environmental monitoring consists of direct radiation measurements at selected locations at the facility using thermoluminescent dosimeters (TLD) and biennial analyses of soil and water samples. Results in unrestricted areas were not statistically different from background readings, and environmental soil and water results were consistent with historical background averages.

The licensee stated that they were considering using more than one background TLD and placing them in more representative locations than present. This would be a reasonable enhancement to their monitoring program.

c. Conclusions

Environmental monitoring satisfied the radiation protection program requirements.

13. **RADIOACTIVE MATERIAL TRANSFER AND DISPOSAL**

a. Scope (Inspection Procedure 69001)

The inspector reviewed selected aspects of:

- radioactive material transfer documentation
- shipping and disposal records

b. Observations and Findings

Production of radioactive waste at the facility was minimal. With one exception, transfers were recorded on applicable forms, and documentation kept on file as required.

Reactor waste is transferred to the byproduct license and is disposed of when enough waste has been collected for shipment. On June 16, 1998, the resins were changed, as annotated in the reactor log, however, no transfer documentation could be found. Transfer to the byproduct license is normally done on the radioisotope request and receipt form. Since the resins were not irradiated as an experiment, no radioisotope request and receipt form was available, and since they are changed so infrequently, no formal written method of license transfer had been deemed necessary for resins.

The licensee stated that, after the resins were dried, they were physically moved from the reactor to the byproduct license storage area and then added to its inventory. This was confirmed by the inspector. The licensee stated that in the future, besides recording in the reactor log the date of the resin change, the actual date of physical transfer to the byproduct license would also be recorded. This would acceptably document such an internal transfer.

c. Conclusions

Radioactive material was transferred and disposed of following facility procedures, TS, and regulatory requirements.

## 14. EXIT MEETING SUMMARY

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on July 15, 1999. The licensee acknowledged the findings presented and did not identify as propriety any of the material provided to or reviewed by the inspector during the inspection.

## PARTIAL LIST OF PERSONS CONTACTED

Licensee

*T. DeBey, Reactor Supervisor
*P. Helfer, Senior Reactor Operator
*D. Liles, Reactor Health Physicist
*R. Perryman, Senior Reactor Operator

* Attended exit meeting

## INSPECTION PROCEDURES USED

| | |
|---|---|
| IP 69001: | CLASS II NON-POWER REACTORS |
| IP 85102 | MATERIAL CONTROL AND ACCOUNTING |

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

NONE

Closed

NONE

## PARTIAL LIST OF ACRONYMS USED

| | |
|---|---|
| CAM | continuous air monitor |
| LCO | limiting conditions for operation |
| NRC | Nuclear Regulatory Commission |
| ROC | Reactor Operations Committee |
| RS | Reactor Supervisor |
| SNM | special nuclear material |
| SRO | Senior Reactor Operator |
| TLD | thermoluminescent dosimeters |
| TS | technical specification |