

March 7, 2002

Ms. Diane Wells, Reactor Administrator  
U.S. Department of the Interior  
Geological Survey  
Denver Federal Center  
Box 25046, MS 915  
Denver, CO 80225-0046

SUBJECT: NRC INSPECTION REPORT NO. 50-274/2001-201

Dear Ms. Wells:

This letter refers to the inspection conducted on October 22-25, 2001, at your U.S. Geological Survey TRIGA Reactor facility. The enclosed report presents the results of that inspection.

Various aspects of your reactor operations and security programs were inspected, including selective examinations of procedures and representative records, interviews with personnel, and observations of the facility.

Based on the results of this inspection, no safety concern or noncompliance with Nuclear Regulatory Commission (NRC) requirements was 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. Stephen Holmes at 301-415-8583.

Sincerely,

*/RA/*

Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
Operating Reactor Improvements Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

Docket No. 50-274

License No. R-113

Enclosure: NRC Inspection Report No. 50-274/2001-201

cc w/enclosure: Please see next page



U.S. Geological Survey

Docket No. 50-274

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TEMPLATE #: NRR-106

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

Docket No: 50-274

License No: R-113

Report No: 50-274/2001-201

Licensee: U.S. Geological Survey

Facility: U.S. Geological Survey TRIGA Reactor

Location: Geological Survey TRIGA Reactor Facility  
Building 15, Federal Center, Denver Colorado

Dates: October 22-25, 2001

Inspector: Stephen W. Holmes, Reactor Inspector

Approved by: Patrick M. Madden, Section Chief  
Research and Test Reactors Section  
Operating Reactor Improvements Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

United States Geological Survey  
Report No. 50-274/2001-201

The primary focus of this routine, announced inspection was the on-site review of selected activities at the United States Geological Survey (USGS) TRIGA reactor facility. This facility is a One Megawatt Class II research reactor. The activities audited during this inspection included: organization and staffing; review and audit functions; plant operations; procedures; maintenance and surveillance; radiation protection program; effluent and environmental monitoring; the shipment of radioactive material; emergency preparedness; the safeguards and security program; the material control and accounting program; and training.

### Organizational and Staffing

- The organizational structure and functions were consistent with Technical Specifications, the Safety Analysis Report, and licensee requirements.

### Review and Audit Functions

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

### Plant Operations

- Reactor operations, shift turnover, and logs were acceptable.
- The control and performance of experiments were being performed in accordance with procedural requirements.
- Fuel handling activities and documentation were in accordance with procedural and Technical Specification requirements.

### Procedures

- Based on the procedures and records reviewed and observations of staff during the inspection, the procedural control and implementation program satisfied Technical Specification requirements

### Maintenance and Surveillance

- The USGS maintenance program was being implemented as required by USGS procedures.
- The licensee's program for surveillance and limiting conditions for operation confirmations satisfied Technical Specification requirements.
- The licensee's design change procedures were in place and were implemented as required.

### Radiation Protection Program

- The radiation protection program satisfied the requirements of 10 CFR 19.12, 10 CFR 20.1101, and licensee procedures.
- Radiological postings satisfied regulatory requirements.
- Surveys were performed and documented as required by 10 CFR Part 20 and licensee procedures.
- Portable survey meters, radiation monitoring, and counting lab instruments were being maintained according to Technical Specification and industry/equipment manufacturer standards and licensee procedures.
- USGS response to issuance of inadequate dosimetry by Landauer Inc. was acceptable and reasonable based on the information on hand. Overall, the personnel dosimetry program was acceptably implemented and doses were in conformance with licensee and 10 CFR Part 20 limits.

### Effluent and Environmental Monitoring

- Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and Technical Specification limits.

### Transportation of Radioactive Materials

- Radioactive material was transferred to the USGS materials license in accordance with 10 CFR 30.41-Transfer of Byproduct Material, Reactor License Section 2.C, and the USGS materials license.

### Emergency Preparedness

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

### Security

- Security facilities, equipment, and procedures satisfied the Physical Protection Plan requirements.

### Material Control and Accountability

- 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, and had effective control of licensed materials as required.

Training

- 10 CFR Part 19 training was performed as required by and in accordance with USGS procedures
- The Requalification program was being acceptably implemented and the Requalification plan requirements were met.

## REPORT DETAILS

### Summary of Plant Status

During the inspection the reactor was operated at full power three days a week in support of U.S. Geological Survey programs.

### 1. Changes, Organization, and Staffing

#### a. Inspection Scope (Inspection Procedure (IP) 69001)

The inspector reviewed selected aspects of:

- organizational structure
- staffing requirements for safe operation of the research reactor facility
- qualifications
- administrative controls

#### b. Observations and Findings

The health physics (HP) organizational structure and staffing had not functionally changed since the last inspection. The reactor HP staff consisted of one full time health physicist who also functioned as the radiation safety officer (RSO) for all USGS elements at the Denver Federal Center (DFC). The RSO is also a member of the Reactor Operations Committee (ROC) as required by TS Section H.2. Review of the RSO's education and experience confirmed that the individual assigned to this position had received the training required by Section 9.3.4 of the Safety Analysis Report (SAR).

The operations organizational structure had not functionally changed since the last inspection. Senior Reactor Operators (SRO) included the Reactor Supervisor (RS), and three other SROs. Section 3.4.1 of the licensee's Reactor Operations Manual (ROM) states that the training and qualifications contained in the American National Standards Institute (ANSI) Standard 15.4 "Standards for Selection and Training of Personnel for Research Reactors" are the minimum for USGS Triga Reactor Facility personnel. The inspector's review of the staffs' education, training, and experience confirmed that the reactor staff met ANSI 15.4 requirements. Operation logs and records confirmed that shift staffing met the duty and on-call personnel requirements of Section 5.2.4 of the ROM.

#### c. Conclusions

The licensee's organization and staffing remain in compliance with the plant TS Section H, amendment 8, dated March 18, 1998, SAR, and ROM Section 3.

### 2. Review and Audit Functions

#### a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- ROC minutes
- safety review and audit records
- May 1, 2001 reactor audit
- experiment authorization records

b. Observations and Findings

The ROC committee's semiannual meeting schedule and membership satisfied TS Section H.2 requirements and the Committee's charter. Review of the minutes indicated the committee provided guidance, direction, and oversight, and ensured suitable use of the reactor. The minutes provided a record of the safety oversight of reactor operations.

The ROC minutes and audit records showed that safety reviews and individual audits had been completed at the required frequency for the functional areas specified by TS Section H.2 and ROM Section 3.8. Audits were tracked using a computer spreadsheet that included the assigned auditor, date due, etc. The inspector noted that the licensee conducted an audit of reactor operations, maintenance and operations logs, fuel movement, facility procedures, the operator requalification program and documented the results in a report dated May 1, 2001. The inspector's follow up review determined that the audit findings and licensee's actions in response to the findings were acceptable. The ROC records also showed that procedure changes had been reviewed as required by TS Section H.2 and licensee procedures.

The inspector reviewed three new class I experiment approvals, (L-111, C-28, and O-20) and the design change package for the console computer. The inspector determined that the ROC review and approval of experiments and facility changes were acceptable.

c. Conclusions

Audits conducted by the ROC were in accordance with the requirements specified in TS Section H2.

**3. Plant Operations**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- operational logs and records
- staffing for operations
- selected operational, startup, or shutdown activities
- experimental program requirements
- experiment approval and operations procedures
- experiment logs and records
- approved reactor experiments

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

b. Observations and Findings

(1) Reactor Operations

The inspector reviewed 175 operation logs since July 1999. Additionally, the inspector observed selected reactor startups, shutdowns, and steady state operations. Reactor operations were carried out following written procedures as required by TS Section H.3. Information on operational status of the facility was recorded clearly in log books or checklists as required by Section 3.C. of the License and ROM Section 5. Scrams were identified in the logs and records, and were reported and resolved as required before the resumption of operations. The Inspector's observation of operator turnovers confirmed that oncoming staff was briefed on the status of the reactor, maintenance, and HP operations. Operation logs and records confirmed that shift staffing met the minimum requirements for duty and on-call personnel as required by ROM Section 5.2.4.

(2) Experiments

Experiments at the USGS reactor are considered either a Class I or Class II experiment. Class I experiments are those performed previously or are minor modifications to previous experiment. They may be approved by the RS. Class II experiments are new ones or major modifications of previous experiments. They must be reviewed and approved by the ROC.

The inspector reviewed selected experiment authorizations and three new experiment approvals, L-111 Sodium 22 tracer production, C-28, Argon 41 production, and O-20, environmental sample activation. This review confirmed that experiments were reviewed and approved by the RS or referred to the ROC as required. The inspector's review of current experiment authorizations, procedures, and related reactor log book entries and observation of two activation runs, confirmed that experiments were installed, performed, and removed as outlined in the approved experiment authorizations.

The inspector did a review of the evaluation and approval of experiment C-28, Argon-41 production. The inspector confirmed that the facility authorization approval had been performed as required by TS Section I.1, and ROM Sections 4.5-10 and 5.10.7.

(3) Fuel Handling

The inspector reviewed USGS procedures for refueling, fuel shuffling, and TS Section D.6 required inspections/surveillances as well as fuel movement logs and inspection records. The fuel related procedures were found to be part of sufficient detail to ensure appropriate fuel handling operations. Fuel movement, inspection, log keeping, and data recording followed the facility's procedures and met TS Sections D.6 and G requirements. Data recorded for fuel movement was clear and cross referenced in fuel and operations logs.

Through review of the fuel related procedures, fuel movement and inspection records, and interviews with operations staff, the inspector verified that fuel is moved according to established procedures and in accordance with TS requirements.

c. Conclusions

Based on the procedures and records reviewed and observations made during the inspection, the inspector determined that reactor operations, shift turnover, and logs; the control and performance of experiments; and fuel handling activities and their associated documentation were acceptable and in accordance with procedural and TS requirements.

#### **4. Procedures**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

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

b. Observations and Findings

The inspector reviewed ROM Sections 4, 5, and 8. These ROM Sections contain the administrative, operations and HP procedures for the facility.

The inspector confirmed that written HP and operation procedures were available for those tasks and items required by TS Section H.3 and facility directives. The licensee controlled changes and temporary changes to procedures, and associated review and approval processes by use of administrative procedures.

After review of the 2001 training records and interviews with staff, the inspector determined that the training of personnel on procedures was adequate. During tours of the facility, the inspector observed that personnel performed radiation surveys, instrument calibrations, reactor operations, and a monthly reactor check in accordance with applicable procedures.



c. Conclusions

Based on the procedures and records reviewed and observations of staff during the inspection, the inspector determined that the procedural control and implementation program was acceptably maintained.

**5. Maintenance and Surveillance**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- maintenance procedures
- equipment maintenance records
- surveillance and calibration procedures
- surveillance, calibration, and test data sheets and records
- reactor operations, periodic checks, tests, and verifications were observed.
- facility design changes and records
- facility configuration

b. Observations and Findings

(1) Maintenance

The inspector reviewed the maintenance implementing procedures. Additionally, the inspector interviewed USGS staff and performed a review of two individual maintenance activities; reactor tank annulus water level check and water pump lubrication.

This review showed that routine/preventive maintenance was controlled and documented in the maintenance or operations log consistent with licensee procedures. Verifications and operational systems checks were performed to ensure system operability before return to service. Unscheduled maintenance or repairs were reviewed to determine if they required a 50.59 evaluation.

(2) Surveillance

A chart board was used to track surveillances, checks, and inspections. This included the date last performed, date due, and surveillance description. This system was found to provide adequate control of the reactor operational tests and surveillances.

The inspector noted that the licensee's chart board showed that all TS required surveillances and LCO verifications for 2000 and 2001 had been performed as required by TS 4.0. The inspector reviewed the records of all TS required surveillances and LCO verifications performed

since July 1999 and performed an in-depth audit of the annual power calibration and rod drop time surveillances. Additionally, the inspector observed the safety surveillances incorporated into the daily checkouts that provide control rod scram, withdraw prevent, and interlock functions. The inspector also observed reactor vent, building alarm, radiological safety, and reactor water system surveillances performed during the monthly checkout. This review showed that the periodic checks, tests, and verifications for TS required LCOs were completed as required. The results of these surveillances were within prescribed TS limits and procedure parameters and in close agreement with the previous surveillance results.

(3) Design Control

Design related changes required a facility staff review, a committee review, and were recorded and stored individually. Questions from the ROC and replies from the reactor and HP staffs were documented and incorporated into the modification packages.

The inspector reviewed change packages for the reactor console upgrade and the DAC and CSC computer replacement. From these reviews, the inspector determined that change evaluations were technically complete and adequately documented. Additionally, the inspector determined that ROC 10 CFR 50.59 reviews and approvals were focused on safety, and met licensee program requirements.

c. Conclusions

The licensee's program for surveillance and limiting conditions for operation confirmations satisfied TS requirements. The licensee's maintenance and design change programs were in place and were being implemented as required by USGS procedures.

**6. Radiation Protection**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the radiation protection program (RPP):

- radiation protection training
- radiological signs and posting
- facility and equipment during tours
- routine surveys and monitoring
- survey and monitoring procedures
- dosimetry records
- maintenance and calibration of radiation monitoring equipment
- periodic checks, quality control, and test source certification records

- event/incident records

b. Observations and Findings

(1) Radiation Protection Program

Although individual procedures had been revised, the RPP had not appreciably changed since the last inspection. The licensee reviewed the RPP at least annually in accordance with 10 CFR 20.1101(c). This review was provided by the RSO as required by ROM Section 8.

Review of procedure change records, experiment authorizations, and radiation protection records confirmed that the RSO specifically reviewed and approved RPP changes, experiments, and radiation protection related events/conditions as required by TS Section H.2 and 3.8 of the ROM.

The inspector reviewed individual training records and interviewed two staff members and determined that radiation workers and other personnel were trained in radiation protection practices commensurate for the facility and their work as required by 10 CFR 19.12 and ROM Section 8.6.

(2) Radiation Protection Postings

The inspector observed that caution signs, postings and controls to radiation, high radiation, and contaminated areas at the USGS were acceptable for the hazards involved and were being implemented as required by 10 CFR Part 20, Subpart J. The inspector observed licensee personnel and verified that they complied with the indicated precautions for access to these areas. The inspector confirmed that current copies of NRC Form-3 and notices to workers were posted in appropriate areas of the facility as required by 10 CFR Part 19.

(3) Radiation Protection Surveys

The inspector audited the daily, weekly, monthly, quarterly, and other periodic contamination and radiation surveys and observed a routine radiation area and contamination survey performed by the RSO. Monthly, quarterly, and other periodic contamination and radiation area surveys were performed and documented as required by ROM Section 8.4 and 10 CFR Part 20 Subpart F, Surveys and Monitoring. Results were evaluated and corrective actions taken and documented when contamination readings/results exceeded the action levels in ROM Sections 8.1.1 or 8.4.3. The inspector's review of the survey records since July 1999 confirmed that contamination in the facility was infrequent and the results from most of the surveys were indistinguishable from background. The inspector did not identify any missed surveys.

(4) Dosimetry

The inspector reviewed the facility dosimetry records, issued since July 1999, and observed and interviewed staff.

The inspector confirmed that dosimetry was being issued to staff and visitors as outlined in ROM Section 8.4.1. Issuing criteria met the requirements of 10 CFR 20.1502 for individual monitoring. Self reading pocket dosimeters (SRD) and finger ring dosimeters were used to supplement body badging. SRDs were also issued to visitors to monitor their exposures. During the inspection the inspector observed that visitors and staff wore their dosimetry including extremity dosimeters, as required.

The licensee used a National Voluntary Laboratory Accreditation Program accredited vendor to process personnel thermoluminescent dosimetry monthly. The RSO investigated doses above USGS administrative limits and performed a review of the occupational exposures, quarterly, as required by their ALARA program. The licensee's dosimetry program for declared pregnant women satisfied 10 CFR 20.1208 requirements. The inspector's review of 12 dosimetry records for 2000 and 2001 verified that occupational doses to the staff and visitors were within 10 CFR Part 20 limitations.

On October 15, 2001, the RS of the USGS reactor reported a possible violation of 10 CFR 20.1502(a)(1), in that, from October 2000 through June 2001, five reactor and two USGS research personnel were only monitored for neutron radiation.

Eberline Dosimetry Services under contract had provided dosimetry to USGS personnel since January 1999. The services included monthly Beta-Gamma/neutron albedo badges for the seven monitored personnel and four fixed area locations within the reactor facility. In September 2000, USGS received notification from Landauer, Inc. that they had purchased Eberline and would begin supplying Landauer dosimetry under the terms of the current contract. The first Landauer Neutrak ER badges arrived mid-October. The results for October showed zero exposure, which was not unusual as it was for only half a month and reactor power operations were minimal. However, it was considered unusual when the November results, received December 19, also show zero exposure. The RSO called Landauer customer services in January 2001, to discuss the exposure results. The customer service representative referred USGS's concern to their health physicist. The Landauer health physicist contacted the reactor in March 2001. As all ER badge results were still zero, the Landauer health physicist seemed to be concerned and stated that he would investigate the problem and inform USGS of his findings.

In April 2001, the USGS decided to cancel Landauer's service for numerous problems, including the unusual dosimetry results. The Landauer health physicist never responded after the original conversation with the RSO. All Neutrak ER badges showed zero for all months. Finger ring dosimetry during the same period showed staff extremity doses were zero to 240 mRem. This is normal for USGS personnel, whose exposures are historically quite stable. Results from ICN Dosimetry badges, starting July 2001, returned to historically normal levels.

On October 12, 2001, while preparing a report concerning the Neutrak ER badge performance, USGS personnel discovered that the badges were neutron-sensitive only. They notified the NRC as stated above, verified that ICN Dosimetry monitors are sensitive to beta-gamma/neutron radiation, and submitted a 10 CFR Part 21 report on the event. The USGS RSO determined, through use of finger ring results, electronic dosimeter readings, operation records, and historical data, that monitored personnel had not received exposures exceeding 10 CFR Part 20 limits. The RSO subsequently evaluated and assigned appropriate doses to the affected personnel.

The inspector reviewed the licensee's actions, including an in-depth assessment of their determination that personnel had not received any exposures exceeding 10 CFR Part 20 limits and their evaluation and assignment of dose to personnel. The inspector determined that their response to this event was acceptable and reasonable based on the information on hand.

The inspector also contacted Landauer, Inc. about their issuance of neutron sensitive only badges in replacement for beta-gamma/neutron ones. Landauer stated the conversion from Eberline badge type to Landauer's was performed by a computer program. They confirmed that the badging issued was only neutron sensitive. Landauer's representative stated that they would contact those Eberline customers who were issued Neutrak ER neutron sensitive only dosimetry to see if they needed beta-gamma sensitive dosimetry also.

(5) Radiation Monitoring Equipment

The inspector reviewed the instrument calibrations for the past two years, observed the calibration of the facility hand and foot monitor, and interviewed staff.

The calibration and periodic checks of the portable survey meters, radiation monitoring, and counting lab instruments were performed in-house by the licensee's staff or offsite by certified vendors. Calibration procedures and annual and semiannual calibration frequencies satisfied TS Section F, Radiation Monitoring, 10 CFR 20.1501(b) requirements, ANSI N323 Radiation Protection Instrumentation Test and Calibration,

and manufacturers' recommendations. Calibration and check sources were traceable to the National Institute of Standards and Technology. The sources' geometry matched those used in actual analyses.

The inspector randomly checked the calibration of a number of count rate meters and ion chambers, one constant air monitor, and the hand and foot monitor. All instruments checked had current calibrations. The calibrations for the instruments checked were appropriate for the radiation types and energies they detect or measure. No uncalibrated instruments were identified.

c. Conclusions

The inspector determined that, because: 1) surveys were being completed and documented acceptably to permit evaluation of the radiation hazards that might exist; 2) postings met regulatory requirements; 3) personnel dosimetry was being worn as required and doses were well within the licensee's procedural action levels and the NRC's regulatory limits; 4) USGS response to issuance of inadequate dosimetry by Landauer, Inc. was acceptable; and 5) radiation monitoring equipment was being maintained and calibrated as required, the RPP being implemented by the licensee satisfied regulatory requirements.

**7. Effluent and Environmental Monitoring**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- release records
- counting and analysis program
- annual reports
- environmental monitoring records
- procedures

b. Observations and Findings

The inspector audited the weekly integrated Ar-41 and the annual integrated gaseous releases and calculations for 2000 and 2001. Gaseous releases were monitored with a Sodium Iodide detector feeding an integrating single channel analyzer. The results were calculated using the Environmental Protection Agency COMPLY code. The inspector's review of these releases confirmed that they met both the annual dose constraint specified by 10 CFR 20.1101(d) and Appendix B concentration limits.

No radioactive liquids were released during the past two years.

ALARA principles were acceptably implemented to minimize radioactive effluent releases. Monitoring equipment was acceptably maintained and calibrated.

Records were current and acceptably maintained. The program for the monitoring, storage and release of radioactive liquid and gases was consistent with 10 CFR 20.1302.

The environmental monitoring program consists of quarterly TLD dosimeters placed at selected locations next to the building and background TLDs at remote locations on the Denver Federal Center. Biennially soil and water samples are taken from location around the facility and analyzed for contamination. The inspector's review of the 2000 and 2001 TLD data and the last two soil and water sample results verified that offsite doses met the requirements of 10 CFR 20.1301(a)(1) and 1302 and ROM Section 8.4.6.

c. Conclusions

Based on the records reviewed, the effluent monitoring and release program and the environmental monitoring program satisfied 10 CFR 20.1101(d), 10 CFR 20.1302, Appendix B requirements, and ROM Section 8.4.6.

**8. Transportation of Radioactive Materials**

a. Inspection Scope (IP 86740)

The inspector reviewed selected aspects of:

- radioactive materials shipping procedures
- radioactive materials transfer records for 2000-2001
- interviewed staff

b. Observations and Findings

Production of solid radioactive waste at the facility was minimal. The amount produced was transferred to the USGS materials license and handled under its waste disposal program. All transfers were documented and recorded on the appropriate forms. Radioactive materials produced by the reactor for use by the USGS staff or outside organizations were also transferred to the users under the materials license. Transfer documentation for solid radioactive waste and material produced by the reactor was kept on file at the reactor.

c. Conclusions

Radioactive material was transferred to the USGS materials license in accordance with 10 CFR 30.41-Transfer of Byproduct Material, Reactor License Section 2.C, and the USGS materials license.

**9. Emergency Preparedness**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of:

- the emergency plan
- implementing procedures
- emergency response facilities, supplies, equipment and instrumentation
- training records
- offsite support
- emergency drills and exercises

b. Observations and Findings

The inspector reviewed the Emergency Plan (E-Plan) dated June 2001, in use at the reactor and emergency facilities. The E-Plan was the same as the version most recently approved by the NRC. The E-Plan was audited and reviewed annually as required. The licensee also reviewed the implementing procedures annually and revised them as needed to ensure the effectiveness of the E-Plan. Through random checks of the emergency equipment inventories, and portable detection instrumentation, the inspector determined they were being maintained as required by the E-Plan. Through reviews of training and drill records and interviews with USGS personnel, the inspector confirmed that emergency response training was given as required by the E-Plan and that emergency responders were knowledgeable of the proper actions to take in case of an emergency. Current E-plan support agreements with outside response organizations (e.g., West Metro Fire Department, Federal Protective Services) were reviewed by the inspector and determined adequate. Emergency drills had been conducted as required by the E-Plan. The last was a decontamination drill involving all available West Metro firefighters, as requested by the fire department. This required multiple drills given on August 29, and September 4 and 11, 2001. The drills provided a practical, reasonable, and an effective test of the participants. 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.

c. Conclusions

Based on the audit of the E-Plan and the emergency drills, the inspector confirmed that the licensee's emergency preparedness program was being satisfactorily implemented.

## 10. Security

a. Inspection Scope (IP 81401 and 81421)

The inspector reviewed selected aspects of:

- the Physical Protection Plan
- security systems, equipment and instruments
- interviews with Federal Protective Services staff

- security audits
- viewed an emergency evacuation drill
- observed security alarm check

b. Observations and Findings

The Physical Protection Plan (PPP) was the same as the latest revision approved by the NRC. The inspector toured the facility and confirmed that the physical protection systems (barriers and alarms), equipment, and instrumentation were as required by the PPP. The inspector also confirmed that the security checks, tests, verifications, and periodic audits were performed and tracked as required by the PPP. Corrective actions were taken when required. Access control was implemented as required by the PPP and ROM Section 3 and 5. Response rosters were current and posted as required.

The inspector contacted the Federal Protective Services that provided periodic patrols and initial response to events at the reactor, and interviewed three officers. They were knowledgeable of the reactor and their responsibilities.

c. Conclusions

Based on the observations, the inspector found that the physical protection features of the USGS facility, the equipment, and procedures satisfied PPP.

## 11. **Material Control and Accountability**

a. Inspection Scope (IP 85102)

The inspector reviewed selected aspects of:

- SNM accountability program
- SNM inventory and locations
- accountability records and reports

b. Observations and Findings

The inspector reviewed the semiannual inventory of material. The inspector confirmed that the material control and accountability program tracked locations and content of SNM against the operating license possession limits. Fuel burn-up and related measurements/calculations were found by the inspector to be acceptable and properly documented. The material control and accountability forms (DOE/NRC Forms 741 and 742) were properly prepared and fuel inventory and movement records were cross referenced and matched to operations logbooks.

c. Conclusions

Based on the inspector's review of the USGS safeguards program, the possession and use of SNM were limited to the locations and purposes authorized under the license.

## 12. Training

### a. Inspection Scope (IP 69003)

The inspector reviewed selected aspects of:

- training records and rosters
- radiation protection training procedures
- the operator requalification program
- operators licenses
- operator training records
- operator physical examination records
- operator examination records
- operator active duty status

### b. Observations and Findings

#### (1) Radiation Protection

The 10 CFR Part 19 training requirements at USGS are specified in ROM Section 8.2. The training is focused on what is required based on the individuals status and need (e.g., staff, visitor, investigator, fire or police department, escorted, unescorted).

The inspector's review of these records for 2000 and 2001 confirmed that 10 CFR Part 19 and specific training appropriate to individual status and work requirements had been provided to staff and visitors. The inspector determined, by interviewing and observing staff performing reactor operations, experiments, calibrations, and surveys, that the training was effective. Additionally, the inspector specifically verified the initial training of the two newest facility employees. All training records reviewed were current and acceptably maintained.

#### (2) Operator Requalification

The inspector reviewed the operator requalification plan and performed an individual review of three operator requalification records.

The requalification program master record showed that all currently licensed SROs had successfully completed their emergency procedure and abnormal events training, the reactivity manipulations, and were participating in the ongoing training as required by the plan. The inspector reviewed training records and confirmed that licensed operators attended lectures on the appropriate subject material required by the program and that annual operator performance exams, and biennial comprehensive requalification exams had been given as required by the plan. The inspector confirmed that: 1) past test questions covered the subject matter specified by the program and

demonstrated technical depth; 2) required quarterly operation hours for ROs and SROs were performed; 3) biennial medical exams had been performed and certified as required by 10 CFR 55 Subpart C; and 4) training was provided to the reactor operators on maintenance operations and 10 CFR 50.59 design changes and evaluations.

c. Conclusions

The 10 CFR Part 19 training was performed in accordance with established procedures. The requalification program was being acceptably implemented.

**13. Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on October 25, 2001. The licensee acknowledged the findings presented 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

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

\* Attended Exit Meeting

## INSPECTION PROCEDURE (IP) USED

IP 69001	CLASS II NON-POWER REACTORS
IP69003	OPERATOR LICENSEE, REQUALIFICATION AND MEDICAL ACTIVITIES
IP 81401	PLANS, PROCEDURES, AND REVIEWS
IP 81421	FIXED SITE PHYSICAL PROTECTION OF SPECIAL NUCLEAR MATERIAL OF MODERATE STRATEGIC SIGNIFICANCE
IP 85102	MATERIAL CONTROL AND ACCOUNTING
IP 86740	TRANSPORTATION ACTIVITIES

## ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

None

### Closed

None

## PARTIAL LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
CAM	Continuous Air Monitor
EMP	Environmental monitoring program
E-Plan	Emergency Plan
HP	Health Physics
LCO	Limiting Conditions for Operation
NRC	Nuclear Regulatory Commission
ROC	Reactor Operations Committee
ROM	Reactor Operations Manual
RS	Reactor Supervisor
RSO	Radiation Safety Officer
RPP	Radiation Protection Program
SNM	Special Nuclear Material
SRD	Self reading pocket dosimeters
SRO	Senior Reactor Operator
TS	Technical Specifications