

May 4, 2010

Dr. Tamara Dickinson, Reactor Administrator  
Department of the Interior  
U.S. Geological Survey  
12201 Sunrise Valley Dr., MS 911  
Reston, VA 20192

SUBJECT: UNITED STATES GEOLOGICAL SURVEY - NRC ROUTINE INSPECTION  
REPORT NO. 50-274/2010-201

Dear Dr. Dickinson:

On April 5-8, 2010, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at your U.S. Geological Survey, TRIGA Reactor facility. The enclosed report documents the inspection results which were discussed on April 8, 2010, with you, Mr. Tim DeBey, Reactor Supervisor, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations*, Section 2.390, "Public inspections, exemptions, and requests for withholding", a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Craig Bassett at (404) 358-6515 or by electronic mail at [Craig.Bassett@nrc.gov](mailto:Craig.Bassett@nrc.gov).

Sincerely,

***/RA by Patrick Isaac Acting For/***  
Johnny H. Eads, Jr., Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-274  
License No. R-113

Enclosure: NRC Inspection Report No. 50-274/2010-201

cc w/encl: See next page

cc:

Mr. Brian Nielsen  
Environmental Services Manager  
480 S. Allison Pkwy.  
Lakewood, CO 80226

Mr. Eugene W. Potter  
State of Colorado  
Radiation Management Program  
HMWM-RM-B2  
4300 Cherry Creek Drive South  
Denver, CO 80246

Mr. Timothy DeBey  
Reactor Director  
U.S. Geological Survey  
Box 25046 - Mail Stop 424  
Denver Federal Center  
Denver, CO 80225

Test, Research, and Training  
Reactor Newsletter  
University of Florida  
202 Nuclear Sciences Center  
Gainesville, FL 32611

May 4, 2010

Dr. Tamara Dickinson, Reactor Administrator  
Department of the Interior  
U.S. Geological Survey  
12201 Sunrise Valley Dr., MS 911  
Reston, VA 20192

SUBJECT: UNITED STATES GEOLOGICAL SURVEY - NRC ROUTINE INSPECTION  
REPORT NO. 50-274/2010-201

Dear Dr. Dickinson:

On April 5-8, 2010, the U.S. Nuclear Regulatory Commission (NRC, the Commission) conducted an inspection at your U.S. Geological Survey, TRIGA Reactor facility. The enclosed report documents the inspection results which were discussed on April 8, 2010, with you, Mr. Tim DeBey, Reactor Supervisor, and other members of your staff.

The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspector reviewed selected procedures and records, observed activities, and interviewed personnel. Based on the results of this inspection, no findings of significance were identified. No response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations*, Section 2.390, "Public inspections, exemptions, and requests for withholding", a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (Agencywide Documents Access and Management System (ADAMS)). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact Craig Bassett at (404) 358-6515 or by electronic mail at [Craig.Bassett@nrc.gov](mailto:Craig.Bassett@nrc.gov).

Sincerely,

***/RA by Patrick Isaac Acting For/***  
Johnny H. Eads, Jr., Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

Docket No. 50-274  
License No. R-113  
Enclosure: NRC Inspection Report No. 50-274/2010-201  
cc w/encl: See next page

**DISTRIBUTION:**

PUBLIC PROB r/f RidsNrrDprPrla Resource RidsNrrDprProb Resource  
MNorris (MS T3B 46M) MCompton (Ltr only O5-A4) GLappert, NRR  
LTran, NRR

**ACCESSION NO.:** ML101230468

**TEMPLATE #:** NRR-106

OFFICE	PROB:RI	PRPB:LA	PROB:BC
NAME	CBassett*	GLappert	JEads
DATE	4/13/2010	5/4/2010	5/4/2010

OFFICIAL RECORD COPY

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

Docket No: 50-274

License No: R-113

Report No: 50-274/2010-201

Licensee: Department of the Interior  
U.S. Geological Survey (USGS)

Facility: USGS TRIGA Reactor

Location: Denver Federal Center  
Denver, Colorado

Dates: April 5-8, 2010

Inspector: Craig Bassett

Approved by: Johnny H. Eads, Jr., Chief  
Research and Test Reactors Oversight Branch  
Division of Policy and Rulemaking  
Office of Nuclear Reactor Regulation

## EXECUTIVE SUMMARY

United States Geological Survey (USGS)  
USGS TRIGA Reactor Facility  
Report No. 50-274/2010-201

The primary focus of this routine, announced inspection was the onsite review of selected aspects of the United States Geological Survey (the licensee's) 1 Megawatt Class II research and test reactor safety program including: 1) organizational structure and staffing; 2) review and audit and design change functions; 3) procedures; 4) radiation protection; 5) environmental monitoring; and 6) transportation of radioactive material since the last U.S. Nuclear Regulatory Commission (NRC) inspection of these areas. The licensee's program was acceptably directed toward the protection of public health and safety, and in compliance with the NRC requirements. No violations or deviations were identified.

### Organizational Structure and Staffing

- The organizational structure and staffing were consistent with the requirements specified in Section H of the Technical Specifications and Chapter 3 of the Reactor Operations Manual.

### Review and Audit Functions and Design Change

- Reviews and audits were being conducted by the Reactor Operations Committee in compliance with the requirements specified in Chapter 3 of the Reactor Operations Manual and Section H of the Technical Specifications.
- The design change program was being implemented as required using the criteria specified in Section 50.59 of Title 10 of the *Code of Federal Regulations*, "Changes, Tests, and Experiments."

### Procedures

- The procedural control and implementation program met Technical Specifications requirements.

### Radiation Protection

- Periodic surveys were completed and documented as required by procedure.
- Postings and signs met regulatory requirements.
- Personnel dosimetry was being worn as required and recorded doses were well within the NRC's regulatory limits.
- Radiation survey and monitoring equipment was being maintained and calibrated as required.
- The Radiation Protection and As Low As Reasonably Achievable Programs met regulatory requirements.

- Radiation protection training was acceptable.

#### Environmental Protection

- Effluent monitoring was in accordance with license and regulatory requirements and releases were within the specified regulatory and Technical Specifications limits.
- The environmental protection program met NRC requirements.

#### Transportation of Radioactive Material

- Radioactive material was being shipped in accordance with the applicable regulations.

## REPORT DETAILS

### Summary of Plant Status

The United States Geological Survey (USGS, the licensee) continued to operate the 1 megawatt TRIGA Mark-II research and test reactor in support of USGS programs and non-USGS entities. Observation of reactor operation and a review of applicable records indicated that the reactor was typically operated six to eight hours per day during the week as needed. The reactor was started up and operated at full power on one day during the inspection to conduct irradiation work.

### 1. Organizational Structure and Staffing

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

The inspector reviewed selected aspects of the following regarding the licensee's organization and staffing to ensure that the requirements of Section H of Technical Specifications (TS), outlined in the most recent amendment to the facility license, License Amendment No. 11, dated January 30, 2006, were being met:

- Current staffing levels and staff qualifications
- Staffing requirements for safe operation of the facility
- Organizational structure for the USGS TRIGA Reactor (GSTR) Facility
- Reactor Operations Manual (ROM), Chapter 3, "Nuclear Center Organization," latest revision dated November 2004
- U.S. Geological Survey TRIGA Reactor Annual Report for the period from January 1, 2008, through December 31, 2008, submitted to the NRC January 15, 2009
- U.S. Geological Survey TRIGA Reactor Annual Reports for the period from January 1, 2009, through December 31, 2009, submitted to the NRC January 25, 2010

#### b. Observations and Findings

The organizational structure and functions at the facility had not changed since the last inspection (refer to U.S. Nuclear Regulatory Commission (NRC) Inspection Report No. 50-274/2009-201). Review of records indicated that management administrative requirements and responsibilities were fulfilled as required by TS and the ROM. Qualifications of the staff appeared to be adequate and met the requirements specified in American National Standards Institute, Standard 15.4, "Standards for Selection and Training of Personnel for Research Reactors" as required.

The inspector noted that the staffing level at the facility was adequate for the current operational workload; however, there had been various changes in personnel. A Senior Reactor Operator, who had worked at the facility for several years, retired in January 2006. This had been anticipated by the licensee and an individual was hired and trained to fill the vacant operator position. But that person left the facility in July 2007. Since 2007 to the present, a total of five people have been hired and trained to become reactor operators. Four of the five have taken the NRC operator examination and subsequently received their licenses. Three of the individuals are currently Senior

Reactor Operator (SROs) and the other is a Reactor Operator. The fifth person is still in training but is expected to take the NRC operator examination in May 2010.

It was also noted that the facility health physics staff had changed as well. The person who had been serving as the reactor radiological health technician had retired in March 2009. In addition, the Reactor Health Physicist, who was also the Radiation Safety Officer (RSO) for all USGS organizations at the Denver Federal Center, had found other employment and left the facility in June 2009. The RSO duties were initially assumed by the Reactor Supervisor but were subsequently delegated to another USGS employee at the Denver Federal Center. The Reactor Health Physicist duties were assigned to one of the SROs. The duties of the reactor radiological health technician were distributed among the Reactor Health Physicist and the other reactor operators.

c. Conclusions

The licensee's organization and staffing were in compliance with Section H of the facility TS and Chapter 3 of the ROM.

**2. Review and Audit Functions**

a. Inspection Scope (IP 69001)

In order to verify that the licensee had established and conducted reviews and audits, and design change reviews, as required by TS Sections H.2, H.4, and H.5, and ROM Chapter 3, the inspector reviewed selected aspects of:

- Facility design change records for the past two years
- Safety review records and audit reports for the past two years
- Reactor Operations Committee (ROC) meeting minutes for 2008 through the present
- ROC Committee functions outlined in the U.S. Department of the Interior, U.S. Geological Survey Manual, Series/Chapter/Paragraph 308.44, "Reactor Operations Committee," dated February 5, 1999
- ROM, Chapter 3, "Nuclear Center Organization," latest revision dated November 2004

b. Observations and Findings

(1) Review and Audit Functions

The inspector verified that the ROC was meeting semiannually as required and that membership of the ROC met TS Section H.2, ROC charter, and ROM Chapter 3 requirements. Review of the meeting minutes for the past two years indicated that the committee provided guidance, direction, and oversight for the reactor and ensured suitable and safe reactor operations.

The ROC minutes and audit records showed that safety reviews and individual audits had been completed for the functional areas specified by TS Sections H.3, H.4, and H.5, and at the frequency specified in Section 3.8 of Chapter 3 of the ROM. The inspector noted that the audits included a review of reactor operations,

maintenance and operations logs, fuel movement, facility procedures, the operator requalification program, and various aspects of the Radiation Protection Program. The audits had been conducted by various members of the ROC and were documented in reports dated April 22, 2008, and May 17, 2009. The inspector determined that the review and audit program, the findings noted, and licensee actions taken in response to the findings, were acceptable.

(2) Design Change

The inspector determined that design changes at the GSTR required a facility staff evaluation followed by an ROC review and subsequent approval if all was in order. One change had been proposed and processed recently. The change involved replacing the chart recorder of the Continuous Air Monitor (CAM) with a new paperless recorder. The inspector reviewed the records of the "50.59 Review for USGS TRIGA Facility" and determined that the appropriate evaluations had been performed and the package had been referred to the ROC for approval. From the review, the inspector also determined that the ROC review, which was focused on safety and licensee program requirements, had been completed and the project was approved.

c. Conclusions

Audits and reviews conducted by the ROC were in accordance with the requirements specified in Section H of the TS and Chapter 3 of the ROM. The licensee's design change program was being implemented as required using the criteria specified in Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.59 with the required acceptance reviews and approvals.

**3. Procedures**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to ensure that safety standards and written instructions for those activities specified in TS Sections H.2 and H.3 were in effect:

- Observation of procedural implementation
- Selected ROM Chapters and GSTR procedures
- Records of changes and temporary changes to procedures
- ROC meeting minutes documenting procedure change reviews and approvals
- ROM, Chapter 4, "Administrative Procedures," latest revision dated November 2004
- ROM, Chapter 5, "Operating Procedures," Revision 4, dated October 1995, which contained the various GSTR Procedures
- ROM, Chapter 8, "Radiation Protection Program," latest revision dated November 9, 2009

b. Observations and Findings

The inspector reviewed ROM Chapters 4 and 8, and selected GSTR procedures contained in ROM Chapter 5. These ROM Chapters and GSTR procedures provided

guidance for the administrative, operations, and health physics (HP) functions of the facility. The inspector confirmed that written procedures were available for those tasks and items required by TS Sections H.2 and H.3. The licensee controlled changes to procedures and the ROC conducted the review and approval process as required. The inspector noted that the GSTR procedures were reviewed biennially as required by the ROM.

After reviewing the 2008 and 2009 training records and interviewing staff members, the inspector determined that the training of personnel on procedures was adequate. During tours of the facility, the inspector observed that personnel performed facility operations and tasks in accordance with applicable procedures.

c. Conclusions

The procedural control and implementation program was acceptably conducted and maintained.

**4. Radiation Protection**

a. Inspection Scope (IP 69001)

The inspector reviewed selected aspects of the following to verify compliance with 10 CFR Parts 19 and 20 and TS Section F requirements:

- GSTR HP Logbooks #40 and #41
- Radiological signs and posting in various areas of the facility
- Training records for GSTR staff and various support personnel
- HP Quarterly Reports for 2008 through 2010 to date
- USGS TRIGA Reactor Quarterly Reports for 2008 through 2010 to date
- U.S. Geological Survey TRIGA Reactor Monthly Checklists for the past two years
- GSTR Annual Audit of Radiation Exposures and Radioactive Material Releases for 2008 and 2009
- Routine periodic survey and monitoring records for the past year documented on Radiological Survey maps and USGS TRIGA Reactor Facility Start-Up Checklists
- Maintenance and calibration records of radiation monitoring equipment for the past two years documented in the Instrument Calibration Log
- GSTR Radiation Protection Program as outlined in ROM, Chapter 8, "Radiation Protection Program," latest revision dated November 9, 2009, including the following:
  - Section 8.1, "Radiation Protection Policy"
  - Section 8.2, "Health Physics Training"
  - Section 8.3, "Radioactive Material Control"
  - Section 8.4, "Radiation Monitoring"
  - Section 8.5, "Instrumentation"
  - Section 8.6, "Records"
  - Section 8.7, "Emergency Response and Exposure Guidelines"
  - Section 8.8, "Declared Pregnant Woman Guidelines"
  - Section 8.9, "Planned Special Exposures"
- ROM GSTR Procedure No. 15, "Pocket Dosimeter Drift Check Procedure," latest revision dated April 1994 and last review dated April 21, 2008

- ROM GSTR Procedure No. 16, "Pocket Dosimeter Calibration Procedure," latest revision dated October 2009 and last review dated November 9, 2009
- ROM GSTR Procedure No. 20, "Procedure for Radiation Instrument Calibrations," latest revision dated October 2008, and last review dated October 16, 2008
- U.S. Geological Survey TRIGA Reactor Annual Report for the period from January 1, 2008, through December 31, 2008, submitted to the NRC January 15, 2009
- U.S. Geological Survey TRIGA Reactor Annual Reports for the period from January 1, 2009, through December 31, 2009, submitted to the NRC January 25, 2010
- The ALARA [As Low As Reasonably Achievable] Program outlined in ROM, Chapter 8, dated October 1994, and recent ALARA reviews
- Memorandum from the Reactor Supervisor to the Director, U.S. Geological Survey affirming USGS commitment to ALARA, dated January 5, 2009
- Memorandum from the Reactor Administrator to the Director, U.S. Geological Survey stating that the USGS TRIGA Reactor Facility maintains a Safety Conscious Work Environment Policy, dated January 5, 2009

b. Observations and Findings

(1) Surveys

Selected start-up and monthly radiation and/or contamination surveys were reviewed by the inspector. The surveys had been completed by staff members as required. Any contamination detected in concentrations above established action levels was noted and the area was decontaminated. Results of the surveys were documented so that facility personnel would be knowledgeable of the radiological conditions that existed in the controlled areas of the facility.

(2) Postings and Notices

Radiological signs were typically posted at the entrances to controlled areas. Caution signs, postings, and controls for radiologically controlled areas were as required in 10 CFR Part 20, Subpart J. Licensee personnel observed the precautions for access to radiation areas. Other postings at the facility showed the industrial hygiene hazards that were present in the areas as well.

Copies of NRC Form-3, "Notice to Employees," noted at the facility were the latest version, as required by 10 CFR 19.11, and were posted in various areas throughout the facility. These locations included the bulletin boards in the hallways by each entrance to the facility Protected Area and in the hallway by the facility calibration range. Copies of other notices to workers were posted in appropriate areas in the facility.

(3) Dosimetry

The inspector determined that the licensee used thermoluminescent dosimeters (TLDs) for whole body monitoring of beta and gamma radiation exposure with an additional component to measure neutron radiation. The licensee used TLD finger rings for extremity monitoring. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program accredited vendor (Mirion

Technologies). An examination of the TLD results, indicating exposure to radiation at the facility for the past two years, showed that the highest occupational doses, as well as doses to the public, were within 10 CFR Part 20 limits. The records showed that the highest annual whole body exposure received by a single individual for 2008 was 46 millirem (mr) deep dose equivalent (DDE). The highest annual extremity exposure for 2008 was 89 mr shallow dose equivalent (SDE) and the highest skin or other shallow dose was 46 mr SDE. The highest annual whole body exposure received by a single person for 2009 was 198 mr Total Effective Dose Equivalent (165 mr DDE plus 33 mr Committed Effective Dose Equivalent – see the paragraph below for further explanation). The highest annual extremity exposure for 2009 was 315 mr SDE and the highest skin or other shallow dose was 166 mr SDE.

The inspector noted that there had been a contamination event on October 22, 2009. The event occurred when a cork came out of the lazy susan loading tube while samples were being unloaded pneumatically. As a result three individuals who were in the reactor room at the time of the event were slightly contaminated, as were various items in the room. The licensee identified the isotopes present through gamma spectrometry of the CAM filter and contaminated items. Decontamination actions were initiated and numerous swipes were taken during the clean up to ensure that all the activity was removed. All three individuals were decontaminated as well and all received whole body counts as soon as possible following the event. Because of the event, one individual received an internal committed dose or CEDE of 33 mr. Another received a CEDE of 10 mr and a skin dose of 1 mr. The third person received a CEDE of 3 mr and a skin dose of 1 mr. To prevent this problem in the future, the lazy susan load tube cap was replaced with a mechanical stop.

The inspector verified that NRC Form-5 reports had been completed and provided to each employee who received an exposure at the facility during 2008 and 2009 above the specified limit.

(4) Radiation Monitoring Equipment

Examination of selected radiation monitoring equipment indicated that the instruments had the acceptable up-to-date calibration sticker attached. The instrument calibration records indicated that calibration of portable survey meters was typically completed by licensee staff personnel. However, some instruments, including the neutron detection instruments, were shipped to vendors for calibration. Calibration frequency met procedural requirements and records were maintained as required. Area Radiation Monitors and stack monitors were also being calibrated as required. These monitors were also typically calibrated by licensee staff personnel.

(5) Radiation Protection Program

The licensee's Radiation Protection and ALARA programs were established and described in ROM Chapter 8 and through associated GSTR procedures that had been reviewed and approved. The programs contained instructions concerning organization, training, monitoring, personnel responsibilities, audits, record keeping, and reports. The ALARA program provided guidance for keeping doses

as low as reasonably achievable and was consistent with the guidance in 10 CFR Part 20. The programs, as established, appeared to be acceptable.

The inspector also determined that the licensee had conducted an annual review of the radiation protection program for 2008 and 2009 in accordance with 10 CFR 20.1101(c). This had been completed by the Reactor Supervisor. In addition, annual audits of the ALARA program had been conducted by USGS Radiation Safety Committee.

The licensee did not require or have a respiratory protection program.

(6) Radiation Protection Training

The inspector reviewed the radiation worker (or rad worker) training given to staff members, to those who are not on staff but who are authorized to use the experimental facilities of the reactor, and to support personnel. Initial rad worker training was given to everyone before they started work in the facility. Refresher training for reactor staff was given every two years; everyone else received refresher training every three years. The inspector noted that the last refresher training had been conducted in February 2009.

The initial and refresher training covered the topics specified in 10 CFR Part 19 as required. Training records showed that personnel were acceptably trained in radiation protection practices. The training program was acceptable.

(7) Facility Tours

The inspector toured the Reactor Control Room, the Reactor Room, and selected support laboratories and rooms with licensee representatives on various occasions. No unmarked radioactive material was noted. Radiation Areas and Radioactive Material Storage Areas were posted as required.

c. Conclusions

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

**5. Environmental Protection**

a. Inspection Scope (IP 69001)

To determine that the licensee was complying with the requirements of 10 CFR Part 20 and TS Section B, the inspector reviewed selected aspects of:

- GSTR "Argon-41 Record" Logbook

- Environmental monitoring release records
- GSTR "Environmental TLD" (Results) Logbook
- GSTR "H-3 in Reactor Water" Logbook tracking gross alpha and beta activity in reactor water and cooling water
- ROM GSTR Procedure No. 17, "Procedure for Determining Argon-41 Release," latest revision dated April 2009 and last review dated May 15, 2009
- ROM GSTR Procedure No. 20, "Procedure for Radiation Instrument Calibrations," latest revision dated October 2008 and last review dated October 16, 2008
- ROM GSTR Procedure No. 22, "Procedure for Analysis of Stack Gas Radionuclides," latest revision dated April 2009 and last review dated May 15, 2009
- Calibration records for the Ar-41 monitor (stack), area monitors, and the CAM for the past two years
- U.S. Geological Survey TRIGA Reactor Annual Report for the period from January 1, 2008, through December 31, 2008, submitted to the NRC January 15, 2009
- U.S. Geological Survey TRIGA Reactor Annual Reports for the period from January 1, 2009, through December 31, 2009, submitted to the NRC January 25, 2010

b. Observations and Findings

On-site and off-site gamma radiation monitoring was completed using the reactor facility stack effluent monitor, various environmental monitoring TLDs, and area monitors in accordance with the applicable procedures. Data indicated that there were no measurable doses above any regulatory limits. Biennial environmental soil and water samples were taken and analyzed. No reactor-produced isotopes were identified in the samples.

The inspector determined that gaseous releases continued to be monitored and calculated as required, were acceptably documented, and were within the annual dose constraint of 10 mr stipulated in 10 CFR 20.1101 (d), 10 CFR Part 20, Appendix B concentrations, and TS limits. No new potential release paths were noted following observation of the facility by the inspector.

Environmental Protection Agency COMPLY code calculations indicated that the facility was in compliance with effluent emissions at Level 1 (no mr value given) for 2008 and in compliance at Level 2 with an effective dose equivalent to the public of 1.4E-9 mr per year for 2009.

The program for the monitoring, storage, or transfer of radioactive liquid and solids was consistent with applicable regulatory requirements. No liquid discharges had been made during 2008 and 2009. Solid radioactive material was monitored and released when below acceptable limits or was shipped to a waste processing facility for disposition. The principles of ALARA were acceptably implemented to minimize radioactive releases. Monitoring equipment was acceptably maintained and calibrated. Records were current and acceptably maintained.

c. Conclusions

Effluent releases were within the specified regulatory and TS limits. The environmental protection program was in accordance with NRC requirements.

**6. Transportation**

a. Inspection Scope (IP 86740)

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

- GSTR HP Logbooks #40 and #41
- Training records of staff members responsible for shipping licensed radioactive material
- ROM GSTR Procedure No. 18, "Instructions for Packaging Limited Quantities of Radioactive Materials," latest revision dated November 2009 and last review dated May 15, 2009
- ROM GSTR Procedure No. 23, "Procedure for Receipt of Radioactive Material Shipments," latest revision dated February 2002 and last review dated April 23, 2007
- Selected US Geological Survey TRIGA Reactor forms, "Radioisotope Request and Receipt Form," for 2009 and 2010 to date

b. Observations and Findings

In the past, no radioactive material was shipped from the facility under the reactor license, License No. R-113. All reactor-produced radioactive material was transferred to the licensee's NRC Materials License, License No. 05-01399-08, expiration date February 28, 2015, for packaging, shipment, and/or disposal in accordance with licensee requirements. This was documented on the Radioisotope Request and Receipt forms and in the HP Logbooks as required.

In July 2009, the licensee amended their indemnity agreement (required by their reactor license) to include all the spaces within the reactor facility designated as protected and vital areas, the counting lab (adjacent to the Reactor Room), and the reactor hallway. As a result, the licensee began maintaining all reactor-produced isotopes on the reactor license (instead of transferring them to the Materials License) until they needed to be transferred to another licensee. Thus, all shipments of reactor-produced material made after August 24, 2009, were shipped under the reactor license.

During this inspection, the inspector closely observed the preparations for a shipment of Lexan samples from the facility. After the samples were placed in the shipping container, the container was surveyed and placed in a Type A package. Surveys were then completed, labels were applied to the package, and the package was placed in an overpack. The licensee then prepared shipping papers for the shipment. The inspector verified that the shipping papers contained the appropriate information and that the appropriate markings were placed on the outside of the package. Proper techniques were followed in conducting surveys of the package and the staff member conducting the shipment was knowledgeable of his duties and conducted a thorough

review of all documentation.

During the aforementioned observations, the inspector also verified that the licensee maintained copies of consignees' licenses to possess radioactive material and that the licenses were verified to be current prior to initiating a shipment. The training of the staff members responsible for shipping the material was also reviewed. The inspector verified that the shippers had received training covering the various requirements of the Department of Transportation (DOT) and the International Air Transport Association and that the training was current.

Through records review and discussions with licensee personnel, the inspector determined that the licensee had shipped radioactive waste and various other types of radioactive material since the previous inspection in this area. The records indicated that the radioisotope types and quantities were calculated and dose rates measured as required. The radioactive material shipment records reviewed by the inspector had been completed in accordance with DOT and NRC regulations.

c. Conclusions

Radioactive material was being shipped in accordance with the applicable regulations.

**7. Exit Meeting Summary**

The inspector reviewed the inspection results with members of licensee management at the conclusion of the inspection on April 8, 2010. 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 Personnel**

B. Boyle      Reactor Operator  
A. Buehrle    Senior Reactor Operator and Reactor Health Physicist  
T. DeBey     Manager, GSTR and Reactor Supervisor  
T. Dickinson   Reactor Administrator  
C. Farwell    Senior Reactor Operator  
K. Frank      Reactor Operator Trainee  
B. Roy        Senior Reactor Operator

### **Other Personnel**

A. Mullin      Interim USGS Radiation Safety Officer for the Denver Federal Center

## **INSPECTION PROCEDURES USED**

IP 69001      Class II Research and Test Reactors  
IP 86740      Inspection of Transportation Activities

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

### **Opened**

None.

### **Closed**

None.

## **LIST OF ACRONYMS USED**

ALARA	As low as reasonably achievable
CAM	Continuous Air Monitor
CEDE	Committed Effective Dose Equivalent
CFR	Code of Federal Regulations
DDE	Deep dose equivalent
DOT	Department of Transportation
GSTR	Geological Survey TRIGA Reactor
HP	Health physics
IFI	Inspector Follow-up Item
IP	Inspection Procedure
mr	millirem
NRC	Nuclear Regulatory Commission
ROC	Reactor Operations Committee
ROM	Reactor Operations Manual
RSO	Radiation Safety Officer
SDE	Shallow dose equivalent
TLD	Thermoluminescent dosimeter
TS	Technical Specifications
USGS	United States Geological Survey