

April 6, 2016

Vito Nuccio, Reactor Administrator  
U.S. Geological Survey  
Denver Federal Center  
PO Box 25046 MS 911  
Denver, CO 80225-0046

SUBJECT: UNITED STATES GEOLOGICAL SURVEY – U.S. NUCLEAR REGULATORY  
COMMISSION NON-ROUTINE INSPECTION REPORT NO. 50-274/2018-201

Dear Mr. Nuccio:

From February 22 – March 1, 2018, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at your U.S. Geological Survey TRIGA Research Reactor Facility. The enclosed report documents the inspection results, which were discussed on March 1, 2018, with Mr. Brycen Roy, 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, 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 (240) 535-1842 or by electronic mail at [Craig.Bassett@nrc.gov](mailto:Craig.Bassett@nrc.gov).

Sincerely,

***/RA Elizabeth Reed for/***

Anthony J. Mendiola, Chief  
Research and Test Reactors Oversight Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

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

Enclosure:  
As stated

cc: See next page

U.S. Geological Survey

Docket No. 50-274

cc:

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

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

Mr. Brycen Roy, Reactor Supervisor  
U.S. Geological Survey  
P.O. Box 25046 – Mail Stop 974  
Denver Federal Center  
Denver, CO 80225

Test, Research and Training  
Reactor Newsletter  
P.O. Box 118300  
University of Florida  
Gainesville, FL 32611

SUBJECT: UNITED STATES GEOLOGICAL SURVEY – U.S. NUCLEAR REGULATORY  
COMMISSION NON-ROUTINE INSPECTION REPORT NO. 50-274/2018-201  
DATE: APRIL 6, 2018

**DISTRIBUTION:**

PUBLIC	RidsNrrDlpPrlb	RidsNrrDlpProb	PROB r/f
MCompton, NRR	MNorris, NISR	AAdams	LTran, NRR
GWertz, NRR	CBassett, NRR	AMendiola, NRR	NParker, NRR
STraiforos, NRR			

**ADAMS Accession No. ML18086A209; \*concurred via e-mail**

**NRC-002**

OFFICE	NRR/DLP/PROB*	NRR/DLP/PROB/LA*	NRR/DLP/PROB/BC
NAME	CBassett	NParker	AMendiola (EReed <i>for</i> )
DATE	4/3/18	4/3/18	4/6/18

**OFFICIAL RECORD COPY**

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

Docket No. 50-274

License No. R-113

Report No. 50-274/2018-201

Licensee: United States Geological Survey

Facility: U.S. Geological Survey TRIGA Research Reactor

Location: Building 15, Denver Federal Center  
Denver, Colorado

Dates: February 22 – March 1, 2018

Inspector: Craig Bassett

Accompanied by: Anthony Mendiola, Chief, PROB  
Beth Reed, Security Specialist, PROB

Approved by: Anthony J. Mendiola, Chief  
Research and Test Reactors Oversight Branch  
Division of Licensing Projects  
Office of Nuclear Reactor Regulation

Enclosure

## EXECUTIVE SUMMARY

United States Geological Survey  
U.S. Geological Survey TRIGA Research Reactor  
Report No. 50-274/2018-201

The primary focus of this non-routine, announced inspection was the on-site review of selected aspects of the U.S. Geological Survey (the licensee's) Class II research reactor safety program including: (1) organization and staffing, (2) review and audit functions and design change functions, (3) radiation protection, (4) effluents environmental monitoring, (5) procedures, (6) transportation of radioactive materials, and (7) material control and accounting 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 NRC requirements.

### Organization and Staffing

- The licensee's organization and staffing met the minimum requirements outlined in the technical specifications (TSs).

### Review and Audit Functions and Design Change Functions

- Audits and reviews were being conducted by the Reactor Operations Committee (ROC) as required by TSs.
- The licensee's design change process met NRC 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 (ALARA) met regulatory requirements.

### Effluents and Environmental Monitoring

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

- Procedures
- Procedures were being written, revised, approved, and maintained in accordance with TS Section 6.4 requirements.

#### Transportation of Radioactive Materials

- Shipments of radioactive material made under the reactor license were in compliance with NRC and Department of Transportation regulations.
- The licensee received a shipment of slightly irradiated fuel from the Idaho National Laboratory (INL) and all proper actions were taken including radiation protection and security protocols.

#### Material Control and Accounting

- Special nuclear material (SNM) was acceptably controlled and tracked as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70.

## **REPORT DETAILS**

### **Summary of Facility Status**

The United States Geological Survey (USGS or the licensee) 1 megawatt training reactor and isotopes production, General Atomics (TRIGA) research reactor was typically operated in support of USGS programs directed at improving methods and techniques to enhance scientific knowledge about water and earth materials. During the first two days of the inspection the reactor was operated to support ongoing experimental and research work. During the remainder of the time the reactor was shutdown for receipt of slightly irradiated fuel from the INL.

### **1. Organization 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 6.1 of the facility TSs, implemented as Appendix A to the Facility Operating License, No. R-113, dated October 14, 2016, were being met:

- Current staff qualifications
- Staffing requirements for safe operation of the facility
- Organizational structure for the U.S. Geological Survey TRIGA Reactor (GSTR) Facility
- Reactor Operations Manual (ROM), Section 3, "Nuclear Center Organization," latest revision dated March 2017
- USGS TRIGA Reactor Annual Reports for January 1, 2016, through December 31, 2016, submitted to the NRC on January 9, 2017, with correction dated April 3, 2017
- USGS TRIGA Reactor Annual Reports for January 1, 2017, through December 31, 2017, submitted January 11, 2018
- American National Standards Institute/American Nuclear Society (ANSI/ANS) Standard 15.4-1977, "Selection and Training of Personnel for Research Reactors"

#### **b. Observations and Findings**

The organizational structure and staff responsibilities had not changed since the last NRC inspection (refer to NRC Inspection Report No. 50-274/2017-201). The facility remained under the direct control of the Reactor Supervisor (RS) and he was responsible to the Reactor Administrator for safe operation and maintenance of the reactor and its associated equipment. However, staffing levels had changed somewhat with the current operations staff being made up of the RS, the Reactor Health Physicist (RHP) for the GSTR, and one Nuclear Engineer; one person, who had worked at the facility for many years, had left. It was noted that all current staff members were senior reactor operators and worked full-time at the facility.



The organization and staff responsibilities were as specified in, and required by, Section 6.1 of the TSs, Section 3 of the ROM, and Figure 3.1 in the ROM. Section 3.4.1 of the ROM stated that the training and qualification requirements contained in ANSI/ANS 15.4-1977 were the minimum for USGS TRIGA Reactor Facility personnel. The inspector confirmed that the reactor staff met ANSI/ANS 15.4-1977 education, training, and experience requirements.

c. Conclusion

The licensee's organization and staffing were in compliance with the facility TS Section 6.1 and ROM Section 3.

**2. Review and Audit Functions and Design Change Functions**

a. Inspection Scope (IP 69001)

In order to verify that the licensee was completing the audits and reviews required by Section 6.2 of the facility TSs and had met the design change requirements of 10 CFR 50.59, the inspector reviewed selected aspects of:

- Safety review records and audit reports for the past 2 years
- Facility configuration control and design change records (including 10 CFR 50.59 reviews) for the past 2 years
- Annual ROC Operational Audits dated April 5, 2016, and March 27, 2017
- ROC meeting minutes for meetings held April 5, 2016, October 25, 2016, March 27, 2017, and October 20, 2017
- ROM Section 3, "Nuclear Center Organization," latest revision dated March 2017
- ROC charter, outlined in the USGS Manual, 308.44, "Reactor Operations Committee," dated February 5, 1999

b. Observations and Findings

(1) Review and Audit Functions

The ROC was meeting semiannually as required and the committee membership satisfied TS Section 6.2.4 the ROC charter, and ROM Section 3.8 requirements. Review of the meeting minutes for 2016 and 2017 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 at the required frequency for the functional areas specified by TS Sections 6.2.3, 6.2.4, and 6.5. The inspector noted that audit topics included reactor operations, maintenance and operations logs, facility procedures, the operator requalification program, fuel movement, physical security plan, and the radiation protection program. The inspector reviewed the results of the

audits that had been completed and determined that the audit findings, and licensee actions taken in response to the findings, were acceptable.

(2) Design Change Functions

The inspector determined that design changes at the GSTR were initiated by a facility staff review followed by a ROC review and subsequent approval of the changes. The inspector determined that all staff members were familiar with the design change procedure and would follow it if a change to the facility or to an experiment were proposed.

No facility changes had been suggested in 2016 but three changes were proposed in 2017. From review of the proposals, as well as through interviews with licensee personnel, the inspector determined that the steps required to be taken by the facility change procedure had been completed. Each 10 CFR 50.59 design change had been screened and a determination had been made that they did not meet the criteria for further review or evaluation. The changes had been presented to the ROC for information.

c. Conclusion

Audits and reviews conducted by the ROC were in accordance with the requirements specified in TS Section 6.2.4 and Section 3 of the ROM. The licensee's design change procedure was being followed and design changes were conducted in accordance with 10 CFR 50.59.

**3. 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 3.7 requirements:

- Facility Maintenance Log
- Health Physics (HP) Log
- Dosimetry records for facility staff for 2016 and 2017
- Visitor's Register Log for 2017 and to date in 2018
- Radiological signs and posting in various areas of the facility
- HP Quarterly Reports for 2016 through 2017
- Training records for GSTR staff and various support personnel
- USGS TRIGA Reactor Facility Operations Quarterly Reports for 2016 through 2017
- GSTR Annual Audit of Radiation Exposures and Radioactive Material Releases for 2016 and 2017 conducted by the RS, dated January 9, 2017, and January 11, 2018, respectively
- Routine monthly survey records for the past 2 years documented on radiological survey maps
- Non-routine survey records for the past 2 years documented on radiological survey maps

- Maintenance and calibration records of radiation monitoring equipment for the past 2 years documented in the instrument calibration log
- GSTR Radiation Protection Program as outlined in ROM, Section 8, "Radiation Protection Program," latest revision dated March 2017
- ROM GSTR Procedure No. 20, "Procedure for Radiation Instrument Calibrations," latest revision dated March 2017
- The ALARA Program outlined in ROM Section 8, latest revision dated March 2017 and recent ALARA reviews
- USGS TRIGA Reactor Annual Reports for the past two reporting periods

b. Observations and Findings

(1) Surveys

Selected monthly radiation and/or contamination surveys were reviewed by the inspector. The surveys had been completed by the RHP or other 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. Surveys and shipments were tracked in the facility HP Log.

(2) Postings and Notices

Radiological signs were 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. 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 posted in various areas throughout the facility but were not the current version, as required by 10 CFR 19.11. The posting 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. When the issue of the outdated Form 3's was mentioned to the licensee, the forms were replaced by copies of the latest version. 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. An examination of the TLD results, indicating exposure to radiation at the facility for the past

2 years, showed that all occupational doses, as well as doses to the public, were within 10 CFR Part 20 limits.

(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.

(5) Radiation Protection and ALARA Programs

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 ALARA and was consistent with regulations in 10 CFR Part 20.

The inspector also determined that the licensee had conducted an annual review of the Radiation Protection Program for 2015 and 2016 in accordance with 10 CFR 20.1101(c). This had been completed by the RS. In addition, annual audits of the ALARA Program had been conducted by USGS Radiation Safety Committee.

(6) Airborne Monitoring Within the Facility

The Security Specialist and the inspector reviewed the results of the analyses of various continuous air monitor (CAM) filters taken in the Reactor Bay and in the sample processing area. On various occasions the analyses indicated the presence of Sodium-24 (Na-24) or Bromine-82 (Br-82). The USGS TRIGA Reactor Annual Reports for the past two reporting periods also stated that Na-24 and Br-82 had been detected on the CAM filters. The report also gave the amount of the isotopes released (as measured on the filters) compared to the allowable limit as a small percentage of that limit. When asked, the licensee indicated that they did not have a respiratory protection program at the facility.

It was noted that the Na-24 and Br-82 were produced in the reactor and transferred to a fume hood for processing. The Security Specialist and the inspector noted that there was no CAM filtered intake in the breathing zone near the fume hood as is standard practice at many facilities that process radioactive materials in fume hoods. When questioned whether or not there had been an evaluation of the need for a bioassay program at

the facility, the licensee stated that one evaluation had been conducted at some point in the past which indicated that no significant amount of material was escaping the fume hood. This appeared to be a limited amount of data on which to base the determination on the need for a bioassay program to ensure that personnel were not inhaling/ingesting radioactive material. The licensee was asked to provide appropriate justification as to whether or not a program was actually needed. The licensee was informed that the issue of determining whether or not a bioassay program was needed at the facility would be considered an inspector followup item (IFI) and would be reviewed during a future inspection (IFI 50-274/2018-201-01).

c. Conclusion

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

**4. Effluents and Environmental Monitoring**

a. Inspection Scope (IP 69001)

To determine that the licensee was complying with the requirements of 10 CFR Part 20 and TS Section 3.7, the inspector reviewed selected aspects of:

- Facility Maintenance Log
- GSTR "Argon-41 [Ar-41] Record," logbook
- Environmental monitoring release records
- GSTR "Environmental TLD," results logbook
- GSTR "H-3 in Reactor Water and Well Water," logbook tracking gross alpha and beta activity in reactor cooling water and well water
- ROM GSTR Procedure No. 17, "Procedure for Determining Argon-41 Release," latest revision dated April 2016
- ROM GSTR Procedure No. 22, "Procedure for Analysis of Stack Gas Radionuclides," latest revision dated March 2017
- Calibration records for the Ar-41 monitor (stack), area monitors, and the CAM for the past 2 years
- USGS TRIGA Reactor Annual Reports for the last two reporting periods
- GSTR Annual Audit of Radiation Exposures and Radioactive Material Releases for 2016 and 2017 conducted by the RS, dated January 9, 2017, and January 11, 2018, respectively

b. Observations and Findings

(1) Routine Monitoring Program

On-site and off-site gamma radiation monitoring was accomplished 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.

Except as noted in the next paragraph, 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 millirem stipulated in 10 CFR 20.1101(d), 10 CFR Part 20, Appendix B concentrations, and TS limits. Environmental Protection Agency code calculations indicated that the facility was in compliance with effluent emissions.

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 2016 and 2017. Solid radioactive material was monitored and released when below acceptable limits or was shipped to a waste processing facility for disposal. The principles of ALARA were acceptably implemented to minimize radioactive releases. Monitoring equipment was acceptably maintained and calibrated. Records were current and acceptably maintained.

(2) Technical Specification Violation of Minor Safety Significance

TS Section 3.7.1 requires that “[t]he reactor shall not be operated unless the minimum number of radiation monitoring channels listed in Table 3.4 is operating.” Table 3.4 includes four radiation monitoring channels including an Ar-41 monitor sampling the stack exhaust. A footnote to Table 3.4 states, in part, that “[c]alculations may be performed to determine <sup>41</sup>Ar releases as a function of reactor operating history as a temporary substitute for the required <sup>41</sup>Ar monitor for a period up to 60 days.”

While reviewing the Facility Maintenance Log, the inspector found that a four-inch hole in the sample tube from the facility exhaust leading to the Ar-41 monitor was noted and subsequently repaired on June 7, 2017. The log also indicated that the hole in the tube was likely caused by a hail storm which had occurred in the area on May 8, 2017. When the licensee was asked about this incident, it was acknowledged that the hole had been noted and repaired. It was not known for certain how long the hole had been there but the dates of May 8 through June 7, 2017, seemed reasonable. Because there was a hole in the sampling line leading to the Ar-41 monitor, the licensee was asked about calculations performed to determine the total amount of Ar-41 release as a function of operating

the reactor. The licensee indicated that none had been completed for that period at that time. The licensee used the results from the Ar-41 monitor as the indication of what was released.

During the inspection, the inspector reviewed the effluent release data for the period from May 8 to June 7, 2017, with the licensee. Calculations of the amount of Ar-41 released during that period indicated that the release was within the limits established in the regulations. The inspector concluded that, while TS 3.7.1 did not appear to have been followed because calculations of the Ar-41 released during the period in question were not completed at the time, follow-up calculations indicated that no release above the regulatory limit occurred. Therefore, although this issue was detected and corrected, it constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section 2 of the NRC Enforcement Policy.

c. Conclusion

Effluent monitoring satisfied license and regulatory requirements and releases were within the specified regulatory and TS limits.

**5. 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 Section 6.4 were in effect:

- Observation of procedural implementation
- Records of changes and temporary changes to procedures
- ROC meeting minutes documenting procedure change reviews and approvals
- ROM, Section 4, "Administrative Procedures," latest revision dated March 2017
- ROM, Section 5, "Operating Procedures," latest revision dated March 2017 which contained the various GSTR Procedures
- ROM, Section 8, "Radiation Protection Program," latest revision dated March 2017

b. Observations and Findings

The inspector reviewed ROM Sections 4 and 8, and selected GSTR procedures contained in ROM Section 5. These ROM Sections and GSTR procedures provided guidance for the administrative, operations, and HP functions of the facility. The inspector confirmed that written procedures were available for those tasks and items required by TS Section 6.4. 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 observing various ongoing activities and interviewing staff members, the inspector determined that the training of personnel on procedures was adequate. The inspector observed that personnel performed facility operations and tasks in accordance with applicable procedures.

c. Conclusion

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

**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:

- HP Logbook
- Training records of staff members responsible for shipping and receiving licensed radioactive material
- ROM GSTR Procedure No. 23, "Procedure for Receipt of Radioactive Material Shipments," latest revision dated October 2017
- ROM GSTR Procedure No. 29, "Procedure for Fuel Unloading Operations at the USGS TRIGA Facility," latest revision dated February 2018

b. Observations and Findings

(1) Routine Transportation Activities

The inspector verified that those facility personnel designated as "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.

(2) Receipt of Slightly irradiated fuel from Idaho National Laboratory

During this inspection, the inspector, the Security Specialist, and the Research and Test Reactors Oversight Chief closely observed the preparations for unloading a shipment of slightly irradiated fuel received from the INL. When the tractor and trailer containing the fuel shipping cask arrived at the licensee's building on the Denver Federal Center, the street where the trailer was located was blocked off with barricades. Surveys of the shipping cask, as well as the unloading and transfer



equipment, were conducted. Proper techniques were followed in conducting surveys of the package. Low radiation levels were detected on the cask and no contamination was found. The licensee reviewed the shipping papers for the shipment. The inspector also reviewed the shipping papers to ensure that they contained the appropriate information and were in compliance with NRC and DOT regulations. The shipping cask was observed to verify that the appropriate markings were placed on the outside of the package.

When the job of unloading the contents of the shipping cask began, a temporary controlled access area was established around the shipping cask which was posted as a Radiation Area as well as an area designated for use only by authorized personnel. Radiation protection controls were implemented for the area including a personnel frisking station.

Following completion of those preparations, the NRC representatives observed the unloading and the subsequent storage of the slightly irradiated fuel. Proper handling procedures were used and adequate radiological controls maintained. The area was also maintained in a secure state by licensee staff during the day and by Federal Protective Service personnel at night.

During the aforementioned observations, the NRC representatives also verified that the licensee had received the authorization to receive and possess the amount of radioactive material involved in the shipment. The NRC representatives also observed the training provided to the staff members and to those who were transporting and helping unload the slightly irradiated fuel, i.e., all personnel working on the project. The training appeared to be appropriate for the work being performed.

As noted above, in the evenings, the cask and materials were secured and the area guarded by Federal Protective Service personnel. Proper and adequate security measures were implemented by the licensee.

c. Conclusion

The fuel shipment was completed in accordance with the applicable regulations, then transferred to the licensee, and placed in storage as required.

**7. Material Control and Accounting**

a. Inspection Scope (IP 85102)

To verify compliance with 10 CFR Parts 70 and 74, as well as, licensee procedures, the inspector reviewed:

- Accountability forms, records, and reports
- SNM storage locations and inventory results
- GSTR "Fuel Book," documenting fuel movements and inventories

- Accountability records (Department of Energy (DOE) NRC Forms 741 and 742) for the past 2 years
- GSTR program for tracking the quantity, identity, and location of SNM at the facility
- ROM GSTR Procedure No. 25, "Procedure for Visual Verification of Aluminum-Clad Fuel Element Locations and Number of Fuel Elements in Reactor Core," latest revision dated October 2016

b. Observations and Findings

The inspector determined that possession and use of SNM was limited to those purposes authorized by the license. The inspector verified that the licensee maintained an amount of SNM that was less than that authorized by the license. Fuel burn-up and related measurements and calculations were found to be acceptable and properly documented. Fuel inventory and movement forms kept in the GSTR Fuel Book were properly prepared and maintained. Observations and record reviews also showed that the licensee was maintaining control of SNM storage areas as required.

Physical inventories were conducted at least annually as required by 10 CFR 74.31(c)(5). The inspector noted that Nuclear Material Transaction Reports (DOE/NRC Form 741), Material Balance Reports (DOE/NRC Form 742), and Physical Inventory Listings (DOE/NRC Form 742C) had been completed semiannually and submitted by the licensee in a timely manner. This was more often than required by 10 CFR 74.13(a).

During the inspection, the inspector toured the facility, examined the SNM and fuel storage areas, and verified that the licensee was storing SNM only in those areas authorized.

c. Conclusion

The licensee's program for controlling and tracking SNM as required by 10 CFR Parts 70 and 74 was being implemented acceptably.

**8. Exit Interview**

The inspector reviewed the inspection results with members of licensee management at the conclusion of the inspection on March 1, 2018. 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**

C. Farwell	Nuclear Engineer and Senior Reactor Operator
B. Roy	Reactor Supervisor
C. Manning	Reactor Health Physicist and Senior Reactor Operator
V. Nunzio	Reactor Administrator

### **Other Personnel**

R. Boyd	President, Secured Transportation Services
M. King	Project Engineer, Secured Transportation Services
D. Morrell	Project Manager, Research Reactor Infrastructure, Idaho National Laboratory

## **INSPECTION PROCEDURE (IP) USED**

IP 69001	Class II Research and Test Reactors
IP 86740	Transportation of Radioactive Material

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

### **Opened**

50-274/2018-201-01	IFI	Follow-up on the the licensee's actions taken to determine whether or not a bioassay program is needed at the facility.
--------------------	-----	---

### **Closed**

None

## **PARTIAL LIST OF ACRONYMS USED**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
Ar-41	Argon-41
ALARA	As Low As Reasonably Achievable
ANSI/ANS	American National Standards Institute/American Nuclear Society
Br-82	Bromine-82
CAM	Continuous Air Monitor
DOE	Department of Energy
DOT	Department of Transportation
GSTR	U.S. Geological Survey TRIGA Reactor
HP	Health Physics
IFI	Inspector Followup Item
INL	Idaho National Laboratory
IP	Inspection Procedure
Na-24	Sodium-24

NRC	U.S. Nuclear Regulatory Commission
RHP	Reactor Health Physicist
RS	Reactor Supervisor
ROC	Reactor Operations Committee
ROM	Reactor Operations Manual
SNM	Special Nuclear Material
TLD	Thermoluminescent Dosimeter
TSs	Technical Specifications
USGS	United States Geological Survey