



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

March 12, 2021

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

**SUBJECT: U.S. GEOLOGICAL SURVEY – U.S. NUCLEAR REGULATORY COMMISSION
NON-ROUTINE INSPECTION REPORT NO. 05000274/2021201**

Dear Mr. Horton:

From January 21 – 23, 2021, the U.S. Nuclear Regulatory Commission (NRC) staff conducted an inspection at your U.S. Geological Survey TRIGA Research Reactor facility. The enclosed report documents the inspection results, which were discussed on January 23, 2021, with you, Mr. Jonathan Wallick, 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 <https://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

R. Horton

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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.

Sincerely,

Travis L. Tate, Chief
Non-Power Production and Utilization Facility
Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
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:

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

James Grice
Colorado Department of Public Health
and Environment
HMWM-RAD-B2
4300 Cherry Creek Drive South
Denver, CO 80246

Jonathan Wallick, Reactor Supervisor
U.S. Geological Survey
P.O. Box 25046, MS 974
Denver Federal Center
Denver, CO 80225

Test, Research and Training
Reactor Newsletter
Attention: Ms. Amber Johnson
Dept of Materials Science and Engineering
University of Maryland
4418 Stadium Drive
College Park, MD 20742

SUBJECT: UNITED STATES GEOLOGICAL SURVEY – U.S. NUCLEAR REGULATORY
COMMISSION NON-ROUTINE INSPECTION REPORT NO. 05000274/2021201
DATED: March 12, 2021

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

Docket No. 50-274

License No. R-113

Report No. 05000274/2021201

Licensee: U.S. Geological Survey

Facility: U.S. Geological Survey TRIGA Research Reactor

Location: Building 15, Denver Federal Center
Denver, Colorado

Dates: January 21 – 23, 2021

Inspector: Craig Bassett

Approved by: Travis L. Tate, Chief
Non-Power Production and Utilization
Facility Oversight Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Enclosure

EXECUTIVE SUMMARY

U.S. Geological Survey
U.S. Geological Survey TRIGA Research Reactor
Inspection Report No. 05000274/2021201

The primary focus of this non-routine, announced inspection was the on-site review of selected aspects of the U.S. Geological Survey (USGS, the licensee's) Class II research reactor safety program including: (1) organization and staffing, (2) procedures, (3) health physics, (4) material control and accounting, and (5) transportation activities during the receipt of fuel from the "VTT Technical Research Centre of Finland Ltd." The U.S. Nuclear Regulatory Commission (NRC) staff determined that 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).

Procedures

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

Health Physics

- Surveys were completed and documented as required by procedure.
- Postings and signs met regulatory requirements.
- Personnel dosimetry was worn as required and recorded doses were well within the NRC's regulatory limits.

Material Control and Accounting

- Special nuclear material (SNM) was controlled and tracked as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 70, "Domestic Licensing of Special Nuclear Material," and 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material."

Transportation Activities

- The licensee received a shipment of slightly irradiated fuel from Finland and all proper actions were taken including radiation protection and security protocols.

REPORT DETAILS

Summary of Facility Status

The USGS 1 megawatt Training, Research, Isotopes , General Atomics (TRIGA) research reactor has operated in support of USGS programs directed at improving methods and techniques to enhance scientific knowledge about water and earth materials. During the inspection the reactor was not operated to enable the USGS staff to receive slightly irradiated fuel from the VTT Technical Research Centre of Finland Ltd.

1. Organization and Staffing

a. Inspection Scope (Inspection Procedure [IP] 69001, Section 02.01)

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 met:

- current staff qualifications
- staffing requirements for fuel handling at the facility
- organizational structure for the USGS TRIGA Reactor (GSTR) Facility
- Reactor Operations Manual (ROM), Section 3, "Nuclear Center Organization," latest revision dated March 2017

b. Observations and Findings

The inspector determined that the organizational structure and staff responsibilities have not changed since the last NRC inspection (refer to NRC Inspection Report No. 50-274/2020-201). The facility remained under the direct control of the Reactor Supervisor (RS) who was responsible to the Reactor Administrator for safe operation and maintenance of the reactor and its associated equipment. The inspector confirmed that the current operations staff was made up of the RS, the Reactor Health Physicist for the GSTR, and one Nuclear Engineer. The inspector verified that the USGS staff members were senior reactor operators and worked full-time at the facility.

The inspector verified that the organization and staff responsibilities were as specified in, and required by, Section 6.1 of the TSs and Section 3 and Figure 3.1 in the ROM.

c. Conclusion

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

2. Procedures

a. Inspection Scope (IP 69001, Section 02.03)

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
- various ROM Sections including: Nos. 4, 5, and 8
- USGS TRIGA Reactor Special Procedure, "Site Specific Plan, Fuel Receipt from VTT 2021," dated January 15, 2021
- USGS TRIGA Reactor Special Procedure, "Radiation Protection Plan, Fuel Receipt from VTT 2021," dated January 15, 2021
- USGS TRIGA Reactor Special Procedure, "SNM Handling Plan, Fuel Receipt from VTT 2021," dated October 1, 2020

b. Observations and Findings

The inspector reviewed ROM Sections 4, 5, and 8 which provided guidance for the administrative, operations, and health physics functions of the facility. The inspector verified that the licensee has prepared special procedures, specifically for the receipt and control of the fuel they were to receive from Finland. The inspector confirmed that the special procedures were reviewed and approved as required by GSTR administrative procedures.

After observing various ongoing activities and interviewing USGS staff members, the inspector determined that the training of personnel on procedures was adequate. The inspector observed that USGS staff and contractor personnel performed fuel unloading and handling operations and tasks in accordance with the applicable procedures. The inspector confirmed that the Reactor Administrator assisted in the control and supervision of the fuel handling operations.

c. Conclusion

The inspector determined that the procedural control and implementation program was conducted and maintained.

3. Health Physics

a. Inspection Scope (IP 69001, Section 02.07)

The inspector reviewed selected aspects of the following to verify compliance with 10 CFR Part 19, "Notices, Instructions and Reports To Workers: Inspection And Investigations," and 10 CFR Part 20, "Standards for Protection against Radiation," and TS Section 3.7 requirements:

- HP log
- visitor's register log for 2021

- radiological signs and posting in various areas of the facility
- non-routine survey records for the fuel receipt operations documented on radiological survey maps
- GSTR Radiation Protection Program as outlined in ROM, Section 8, "Radiation Protection Program," latest revision dated March 2017
- USGS TRIGA Reactor Special Procedures including: "Site Specific Plan, Fuel Receipt from VTT 2021," dated January 15, 2021; "Radiation Protection Plan, Fuel Receipt from VTT 2021," dated January 15, 2021; and, "SNM Handling Plan, Fuel Receipt from VTT 2021," dated October 1, 2020

b. Observations and Findings

(1) Receipt of Slightly irradiated fuel – Postings

During this inspection, the inspector closely observed the preparations for unloading a shipment of slightly irradiated fuel received from the VTT Technical Research Centre of Finland Ltd. When the tractor and trailer containing the fuel shipping cask initially arrived at the licensee's building on the Denver Federal Center (DFC), the truck was directed to the licensee's parking lot where the trailer was left for unloading. The inspector verified that the parking lot where the trailer was located was blocked off with barricades as required by the special procedures. A crane and various other casks and equipment were also located within the barricades to assist in the unloading process.

(2) Receipt of Slightly irradiated fuel – 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. In addition, licensee personnel used TLD finger rings for extremity monitoring. The dosimetry was supplied and processed by a National Voluntary Laboratory Accreditation Program accredited vendor. The inspector verified that all licensee and vendor personnel were assigned and wearing the temporary electronic dosimeters as required by procedure. An examination of the electronic dosimeter reading results, indicating exposure to radiation during the fuel operations, showed that all occupational doses were within 10 CFR Part 20 limits.

(3) Receipt of Slightly irradiated fuel – Surveys and Radiation Monitoring Equipment

During the entire unloading and transfer process, the inspector verified that surveys of the shipping cask, as well as the unloading and transfer equipment, were conducted as required by special procedures. Proper techniques were followed in organizing these surveys. Low radiation levels were detected on the cask and transfer equipment and no contamination was found.

The inspector examined selected radiation monitoring equipment used by the licensee and determined that they have the up-to-date calibration sticker attached.

(4) Receipt of Slightly irradiated fuel – Postings and Controls

When the job of unloading the contents of the shipping cask began, the inspector verified that a temporary controlled access area was established around the entire parking lot containing the shipping and transfer casks. The area 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 personnel frisking stations.

The inspector observed the unloading and subsequent transfer and storage of the slightly irradiated fuel. The inspector confirmed that proper handling procedures were used and adequate radiological controls maintained.

The inspector confirmed that, in the evenings, the cask and materials were secured and the area guarded by Federal Protective Service personnel from the DFC. During the daytime, the licensee provided security for the cask and fuel. The inspector verified that proper and adequate security measures were implemented by the licensee as required by the special procedures that were established.

c. Conclusion

The inspector determined that the radiation protection program, as implemented by the licensee, was in accordance with regulatory requirements.

4. Material Control and Accounting

a. Inspection Scope (IP 81606)

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

- SNM storage locations and inventory results
- accounting records (Department of Energy (DOE)/NRC) DOE/NRC Forms 741, "Nuclear Material Transaction Report," for the fuel shipment and receipt
- GSTR program for tracking the quantity, identity, and location of SNM at the facility
- USGS TRIGA Reactor Special Procedure, "SNM Handling Plan, Fuel Receipt from VTT 2021," dated October 1, 2020

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 inventory and movement forms were prepared and maintained. The

inspector confirmed that the licensee maintained control of SNM storage areas as required by the physical security plan (PSP).

The inspector verified that the licensee received the authorization to receive and possess the amount of radioactive material involved in the shipment. During and following the inspection, the inspector reviewed the documentation that accompanied the fuel shipment including the DOE/NRC Forms 741. The inspector confirmed that they were filled out and completed as required by the regulations. During the inspection, the inspector toured the facility and observed the handling and storage of the fuel. The inspector verified that the fuel was examined and verified, then stored in the fuel storage areas as required by special procedure. The inspector confirmed that the licensee was storing SNM only in those areas authorized by the license and the PSP.

c. Conclusion

The inspector determined that the licensee's program for controlling and tracking SNM as required by 10 CFR Parts 70 and 74 was implemented.

5. Transportation Activities

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
- USGS TRIGA Reactor Special Procedures including: "Site Specific Plan, Fuel Receipt from VTT 2021," dated January 15, 2021; "Radiation Protection Plan, Fuel Receipt from VTT 2021," dated January 15, 2021; and, "SNM Handling Plan, Fuel Receipt from VTT 2021," dated October 1, 2020

b. Observations and Findings

The inspector reviewed the shipping papers for the shipment. The inspector verified that the shipping papers contained the appropriate information and were in compliance with NRC and DOT regulations. The inspector observed the shipping containers and cask to verify that the appropriate markings were placed on the outside of these items. No problems were noted.

c. Conclusion

The inspector determined that the fuel shipment was completed in accordance with the applicable regulations, then transferred to the licensee, and placed in storage as required by special procedures.

6. Exit Interview

The inspector reviewed the inspection results with members of licensee management at the conclusion of the inspection on January 23, 2021. 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
R. Horton Reactor Administrator
C. Manning Reactor Health Physicist and Senior Reactor Operator
J. Wallick Reactor Supervisor

Other Personnel

D. Kurtz Project Engineer, Nuclear Assurance Corporation International

INSPECTION PROCEDURE (IP) USED

IP 69001 Class II Research and Test Reactors
IP 81606 Material Control and Accounting
IP 86740 Transportation Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Closed

None