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

August 15, 2018

Vito Nuccio, Reactor Administrator
Department of the Interior
U.S. Geological Survey
P.O. Box 25046, MS 911
Denver, CO 80225

SUBJECT: UNITED STATES GEOLOGICAL SURVEY – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 50-274/2018-202

Dear Mr. Nuccio:

From June 25-28, 2018, the U.S. Nuclear Regulatory Commission (NRC) conducted an inspection at your U.S. Geological Survey TRIGA Reactor facility. The enclosed report documents the inspection results, which were discussed on June 28, 2018, with you and Mr. Brycen Roy, Reactor Supervisor.

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 various 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.

Sincerely,

/RA/

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

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SUBJECT: UNITED STATES GEOLOGICAL SURVEY – U.S. NUCLEAR REGULATORY COMMISSION ROUTINE INSPECTION REPORT NO. 50-274/2018-201 DATED AUGUST 15, 2018

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

Docket No.	50-274
License No.	R-113
Report No.	50-274/2018-202
Licensee:	United States Geological Survey
Facility:	U.S. Geological Survey TRIGA Reactor
Location:	Building 15, Denver Federal Center Denver, Colorado
Dates:	June 25-28, 2018
Inspector:	Craig Bassett
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 Reactor
NRC Inspection Report No. 50-274/2018-202

The primary focus of this routine, announced inspection was the on-site review of selected aspects of the U.S. Geological Survey (USGS, or the licensee's) Class II research and test reactor safety program including: (1) organization and staffing, (2) operations logs and records, (3) procedures, (4) requalification training, (5) surveillance and limiting conditions for operation (LCO), (6) experiments, (7) design changes, (8) committees, audits, and reviews, (9) emergency planning, (10) maintenance logs and records, and (11) fuel handling logs and records, 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 generally in compliance with NRC requirements. However, one unresolved item (URI) was identified dealing with the adequacy pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.59 review concerning adding fuel to the reactor core.

Organization and Staffing

- The organizational structure and staffing were consistent with the requirements specified in Section 6.1 of the technical specifications (TSs).

Operations Logs and Records

- Reactor operations and logs were acceptable and completed in accordance with procedural and TS requirements.

Procedures

- The procedural control and implementation program was acceptably controlled and maintained and met TS requirements.

Requalification Training

- The requirements of the Operator Requalification Program were being met; it was being acceptably implemented; and, the program was up to date.

- Medical examinations were being completed biennially as required.

Surveillance and Limiting Conditions for Operation

- The licensee's program for completing surveillance checks and tests and verifying Limiting Conditions for Operation satisfied TS requirements.

Experiments

- Conduct and control of experiments and irradiations met the requirements specified in the TS Section 6.5, the applicable experiment authorizations, and procedures.

Design Changes

- The licensee's design change protocol was being followed and design changes were generally conducted in accordance with 10 CFR 50.59.

- One URI was identified concerning the adequacy of the licensee's 10 CFR 50.50 review of the movement of lightly used fuel elements acquired from Department of Energy (DOE) and placing some of those elements in the core.

Committees, Audits, and Reviews

- Audits and reviews conducted by the Reactor Operations Committee (ROC) were in accordance with the requirements specified in TS Section 6.2 and Section 3 of the Reactor Operations Manual.

Emergency Planning

- The facility Emergency Plan was being reviewed by the ROC as required.

- Emergency response equipment was being maintained and alarms were tested at the required periodicity.

- Annual evacuation drills and biennial emergency drills were being conducted as required by the emergency plan.

- Emergency preparedness training for staff and first responders was being completed as required.

Maintenance Logs and Records

- The licensee's maintenance program was being implemented as required by facility procedures

Fuel Handling

- Fuel handling activities and documentation were as required by the TSs and facility procedures.

REPORT DETAILS

Summary of Plant Status

The USGS 1 megawatt TRIGA research and test reactor was typically operated in support of USGS programs directed at improving methods and techniques to enhance scientific knowledge about water and earth materials. The reactor was also used in support of research projects from the Colorado School of Mines and other institutions. During the inspection the reactor was operated to support ongoing experimental and research work.

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 being met:

- Current staff qualifications
- Staffing requirements for safe operation of 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
- GSTR Quarterly (Operations) Reports for each quarter between April 1, 2016 through March 31, 2018
- USGS TRIGA Reactor Annual Report 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 Report for January 1, 2017, through December 31, 2017, submitted January 11, 2018
- ROC meeting minutes for meetings held from April 2016 to April 2018
- American National Standards Institute/American Nuclear Society (ANSI/ANS) 15.4, "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 in this area (refer to NRC Inspection Report No. 50-274/2016-201). 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.

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 were the minimum for GSTR facility personnel. The inspector confirmed that the reactor staff met ANSI/ANS 15.4 education, training, and experience requirements.

The inspector noted that staffing levels had changed somewhat since the previous inspection. One person, who had worked at the facility for many years as the RS, had left. The current operations staff was now made up of the RS, the Reactor Health Physicist for the GSTR, and one Nuclear Engineer. All current staff members were senior reactor operators (SROs) and worked full-time at the facility.

c. Conclusion

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

2. Operations Logs and Records

a. Inspection Scope (IP 69001, Section 02.02)

The inspector reviewed selected aspects of the following to verify operation of the reactor in accordance with TS Sections 3, 4, 5 and 6:

- Daily TRIGA Prestart Test data sheet printouts for 2016 to date
- ROM, Section 5, "Operating Procedures," Revision (Rev.) 5, dated March 2017
- Reactor Operations Logbooks Numbers (Nos.) 168 – 175, dated June 2016 to present
- Staffing for operations as required by Section 5.2 of the ROM, Rev. 5 dated March 2017
- Selected USGS TRIGA Reactor Facility Start-Up Checklists from the 2016 to the present
- Selected USGS TRIGA Reactor Facility Shutdown Checklists, Rev. 16, from 2016 to the present
- Selected USGS TRIGA Reactor Facility Monthly Checklists, Rev. 12, from 2016 to the present
- GSTR Procedures: No. 1, "Procedure for Reactor Startup, Operation, and Shutdown" and No. 3, "Procedure for Control Rod Calibration"
- GSTR Quarterly (Operations) Reports for each quarter between June 1, 2016 through March 31, 2018
- ROC meeting minutes for meetings held from April 2016 to April 2018
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

The inspector reviewed the operations logs from June 2016 through the present. The inspector also reviewed selected Daily Start-Up and Shutdown Checklists and Monthly Checklists. From the records reviewed the inspector determined that reactor operations were carried out in accordance with written procedures as required by TS Section 6.4. Information on the operational status of the facility was appropriately recorded in logbooks or on checklists as required by ROM Section 5. Scrams were identified in the logs and records, and were reported and resolved as required before the resumption of operations. Through interviews with operators and review of the logs, the inspector confirmed that shift staffing met the minimum

requirements of at least two reactor staff members on duty whenever the reactor was operating as required by ROM Section 5.2.4.

The inspector observed a reactor startup, the insertion of a sample into the reactor core for reactivity measurement, and subsequent irradiation at full power. All evolutions were conducted using approved procedures and in a safe manner.

c. Conclusion

Reactor operations and logs were acceptable and in accordance with procedural and TS requirements.

3. Procedures

a. Inspection Scope (IP 69001, Section 02.03)

To ensure that safety standards and written instructions for those activities specified in TS Section 6.4 were in effect, the inspector reviewed selected aspects of the following:

- Selected GSTR procedures
- Procedural implementation by the reactor staff
- Records of changes and temporary changes to procedures
- Various ROM Sections including: No. 4, “Administrative Procedures,” No. 5, “Operating Procedures,” which contained the various GSTR Procedures, and No. 8, “Radiation Protection Program”
- ROC meeting minutes for meetings held from April 2016 to April 2018
- The two most recent USGS TRIGA Reactor Annual Reports

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 administrative, operational, and health physics 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 reviewing the 2016 and 2017 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 and met TS requirements.

4. Requalification Training

a. Inspection Scope (IP 69001, Section 02.04)

To verify that the licensee was complying with the requirements of their NRC-approved Operator Requalification Program and 10 CFR Part 55, the inspector reviewed selected aspects of:

- Operator competence evaluation and written examination records for 2015, 2016, 2017, and to date in 2018
- Physical examination records documented on NRC Form 396 records
- Individual operator training records documented on "Geological Survey TRIGA Reactor (GSTR) Reactor Operator Requalification On the Job Training" forms for the periods from January 2015–December 2016 and January 2017–December 2018
- Appendix 3-1 (to ROM, Section 3), entitled "U.S. Geological Survey TRIGA Reactor Operator Requalification Program," latest Rev. dated April 2014 which included the "GSTR Fitness for Duty Policy for Licensed Reactor Operators," dated April 2010

b. Observations and Findings

There were three licensed SROs at the facility. The inspector reviewed the various operators' training records and confirmed they were being maintained as required. The records showed that the operators were knowledgeable of the appropriate subject material required by the program as demonstrated by successful completion of annual written examinations. Individual requalification records also showed that each operator demonstrated operational competence which was affirmed by the RS as required by the requalification program. The inspector further confirmed that all the operators had completed the required reactivity manipulations and the quarterly hours of operation required by the program. Requalification training lectures were documented for all operators.

The inspector noted that the operators were also receiving biennial medical examinations as required by 10 CFR Part 55, Subpart C.

c. Conclusion

The requirements of the Operator Requalification Program were being met and the program was being acceptably implemented. Medical examinations were being completed biennially as required.

5. Surveillance and Limiting Conditions for Operation

a. Inspection Scope (IP 69001, Section 02.05)

To verify that the surveillance program was being conducted as required in TS Sections 3 and 4, the inspector reviewed selected aspects of the following:

- Reactor Activity Calendar maintained by the RS
- Surveillance, calibration, and test data sheets and related records
- Reactor Operations Logbooks Nos. 168 – 175, dated June 2016 to present
- Selected USGS TRIGA Reactor Facility Start-Up Checklists from the 2016 to the present
- Selected USGS TRIGA Reactor Facility Shutdown Checklists, Rev. 16, from 2016 to the present
- Selected USGS TRIGA Reactor Facility Monthly Checklists, Rev. 12, from 2016 to the present
- GSTR Quarterly (Operations) Reports for each quarter between June 1, 2016 through March 31, 2018
- Various GSTR Procedures including: No. 2, "Procedure for Reactor Power Calibration;" No. 3, "Procedure for Control Rod Calibration;" No. 7, "Procedure for Control Rod Measurement, Inspection, or Replacement;" No. 12, "Procedure for Changing Demineralizer Resin;" No. 13, "Procedure for Use of Leak Testing Device;" and, No. 21, "Procedure for Measuring Control Rod Drop Time"
- ROC meeting minutes for meetings held from April 2016 to April 2018
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

The inspector reviewed selected records of TSs required checks, tests, and LCO verifications performed since June 2016. These included the daily checklists that provided documentation of control rod scram, withdraw prevent, interlock functions, and weekly conductivity tests, as well as monthly surveillance checks of the reactor ventilation system, building alarms, radiological safety, and reactor water system. Other periodic surveillances and verifications were reviewed including power calibrations, control rod inspections, and fuel elements inspections. The review showed that the periodic checks, tests, and LCO verifications for TS required surveillances were completed as required. The results of these activities were within prescribed TS limits and procedure parameters and in agreement with the previous surveillance results.

The various surveillance checks, inspections, and verifications reviewed were being tracked through the Daily, Monthly Checklists, and equipment-specific surveillance forms. Documentation of completion of these activities was maintained in the appropriate Checklists or forms and in the Operations or Fuel Logbooks. This system was found to provide adequate control of the reactor operational tests and checks, and LCO verifications. Good correlation was noted between the console logs, checklists and other logbooks.

c. Conclusion

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

6. Experiments

a. Inspection Scope (IP 69001, Section 02.06)

The inspector reviewed selected aspects of the following to verify that experiments were conducted in compliance with TS Sections 3 and 4, and ROM, Section 4, and reviewed and approved as required by TS Section 6.5:

- Selected Experiment Authorizations, logs, and records
- Reactor Operations Logbooks Nos. 168 – 175, dated June 2016 to present
- Experiment program requirements contained in ROM Sections 4.5 through 4.8
- GSTR Experiment Authorization Forms including Parts I, II, and III for Experiment Nos. L-123, C-58, C-59, C-60, P-13, O-13, O-28, O-29, and O-30
- Selected GSTR Radioisotope Request and Receipt Forms which had been completed during June 2016 through the present
- ROC meeting minutes for meetings held from April 2016 to April 2018
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

The RS categorized experiments at the GSTR as either Class I or Class II experiments. Class I experiments were those that had been performed previously or were minor modifications to previous experiments. They were classified and approved by the RS. Class II experiments were new experiments or major modifications of previously existing ones. These were reviewed and approved by the ROC. All experiments that were currently used at the facility were also required to be reviewed on an annual basis by the RS.

The inspector reviewed various Class I Experiment Authorization Forms. The authorization forms listed a description of the experiment, the experiment class, limiting conditions for reactor operations, personnel authorized to deliver and/or pick up samples, and the license number of the authorized recipient. All of the experiments had the proper classification and review as required.

The review of current experiment authorizations, radioisotope request and receipt (RR&R) forms, and related reactor logbook entries, also confirmed that experiments were installed, performed, and removed as outlined in the approved experiment authorizations. The inspector also verified that the various RR&R forms were used to list the radioisotopes produced during the irradiation and the disposition thereof. The inspector determined that the resulting radioisotopes were appropriately controlled and held for decay or transferred as required. This information was documented on the RR&R forms.

During the inspection, the inspector observed the insertion of a sample into the core and irradiation of the sample as noted previously. All documentation for the experiment reviewed by the inspector appeared to be completed correctly.

c. Conclusion

The control and performance of experiments were acceptable and in accordance with the applicable Experiment Authorizations and TS Section 6.5 requirements.

7. Design Changes

a. Inspection Scope (IP 69001, Section 02.08)

In order to verify that the licensee had met the design change requirements of 10 CFR 50.59 and TS Section 6.2, the inspector reviewed selected aspects of:

- Facility configuration records
- GSTR Experiment Review Checklist
- Facility design change (10 CFR 50.59) records for the past 2 years
- ROC meeting minutes for meetings held from April 2016 to April 2018
- ROM, Section 3, "Nuclear Center Organization," latest revision dated March 2017, detailing ROC responsibilities including review of 10 CFR 50.59 records
- ROM, Section 4, "Administrative Procedures," latest revision dated March 2017, containing ROC charter, outlined in the U.S. Geological Survey Manual, 308.44, "Reactor Operations Committee," dated February 5, 1999
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

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.

Four facility changes had been proposed during the period from 2016 to the present, all of which followed the facility design change protocol. The design change review process included a "screening" review to determine if a 10 CFR 50.59 evaluation was necessary. From the review of these changes, as well as through interviews with licensee personnel, the inspector determined that a 10 CFR 50.59 design change screening had been completed for each. According to the licensee, all the changes had "screened-out" and did not require an evaluation using the criteria listed in 10 CFR 50.59(c)(1) and (2). The NRC inspector noted from past experience that items that typically do not screen-out include: (1) changes to the facility as described in the safety analysis report (SAR), (2) changes to procedures governing safety-related equipment as described in the SAR, and (3) conduct of tests or experiments not described in the SAR.

However, upon reviewing the latest 10 CFR 50.59 design change, the inspector noted that it involved relocating fuel elements within the reactor core and adding additional fuel elements to the reactor core. The licensee completed a screening form for the proposed change which indicated that the fuel movement and addition to the core "screened-out" and thus did not require any further evaluation

in accordance with the criteria of 10 CFR 50.59. The licensee's screening review indicated that the primary document used for the review was the safety evaluation report (SER) that had been written by the NRC to support the 2016 USGS license renewal review. The licensee indicated that they had completed a separate Monte Carlo N-Particle Transport (MCNP) code calculation before replacing some of the fuel elements in the core with "lightly used" elements acquired from the DOE Idaho National Laboratory. Despite doing their own MCNP calculations, the licensee relied on the information and conclusions in the SER in reaching their conclusion that no further evaluations were needed before loading the lightly used fuel into their core. The NRC inspector was not clear how a proposed facility change (i.e., core reconfiguration) that "screened-out" would need to be supported by new or additional MCNP analyses.

Furthermore, the inspector observed that the ROC did not agree with the 10 CFR 50.59 screening by indicating that the licensee's SAR did not align with the NRC SER. Also, the ROC (and the NRC inspector) had questions about the thermo-hydraulic analysis for the limiting core configuration. Because of all these issues, the NRC questioned whether the licensee's screening of the fuel move and addition constituted a sufficient review on their part and finds that further evaluation is needed to completely characterize the effectiveness of the licensee's design control process. The licensee was informed that this issue would be considered an URI which would require further consideration and review (URI 50-274/2018-202-01).

c. Conclusion

The licensee's design change protocol was being followed and design changes were generally conducted in accordance with 10 CFR 50.59. One URI was identified concerning the adequacy of the 10 CFR 50.59 review of the movement of lightly used fuel elements acquired from DOE and placing some of those elements in the core.

8. Committees, Audits, and Reviews

a. Inspection Scope (IP 69001, Section 02.09)

In order to verify that the licensee had established and conducted reviews and audits as required by TS Section 6.2, the inspector reviewed selected aspects of:

- Safety review records and audit reports for the past 2 years
- Responses to the safety reviews and audit reports for the past 2 years
- ROC meeting minutes for meetings held from April 2016 to April 2018
- ROM, Section 3, "Nuclear Center Organization," latest revision dated March 2017, detailing ROC jurisdiction, structure, quorum, meetings, and responsibilities
- ROM, Section 4, "Administrative Procedures," latest revision dated March 2017, containing ROC charter, outlined in the U.S. Geological Survey Manual, 308.44, "Reactor Operations Committee," dated February 5, 1999

- ROC Operational Audits dated April 5, 2016, March 27, 2017, and April 27, 2018
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

The ROC was meeting semiannually as required and committee membership satisfied TS Section 6.2.1, the ROC charter, and ROM Section 3.8 requirements. Review of the meeting minutes from April 2016 through April 2018 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 and 6.2.4. The inspector noted that audit topics included reactor operations, maintenance and operations logs, facility procedures, the operator requalification program, fuel movement, the radiation protection program, emergency preparedness, and the physical security plan. 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.

c. Conclusion

Audits and reviews conducted by the ROC were in accordance with the requirements specified in TS Section 6.2 and Section 3 of the ROM.

9. Emergency Planning

a. Inspection Scope (IP 69001, Section 02.10)

To verify compliance with the facility Emergency Plan entitled, “Emergency Plan for the U.S. Geological Survey TRIGA Reactor Facility,” Rev. 16, dated October 2017, the inspector reviewed selected aspects of:

- Training records for the past 2 years
- Emergency drills and critiques for 2016 and 2017
- GSTR Emergency Call List, last updated April 2018
- Offsite support agreement and related information
- Emergency response facilities, supplies, equipment, and instrumentation
- Emergency Plan implementing procedures contained in ROM Section 7, “Emergency Procedures,” revision dated October 2017
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

The inspector verified that the emergency plan (EP) in use at the facility was the same as the version most recently submitted to the NRC. The EP was audited and reviewed at least biennially (typically done annually) by the ROC as required

by TS Section 6.2.4. The implementing procedures were reviewed and revised as needed.

The inspector verified that annual evacuation drills, and biennial emergency exercises were being conducted as required. Critiques were held following the drills and exercises and strengths, as well as areas for improvement, were identified and discussed. The inspector also determined that the emergency equipment and portable detection instrumentation listed in the emergency procedures were available and being tested and maintained as required by the EP and various GSTR procedures.

The inspector reviewed the letter of agreement (LOA) that had been established with the offsite medical support organization, St. Anthony Lakewood Hospital. . The LOA was required to be updated biennially. The most recent version was dated February 21, 2017, and indicated that the hospital would assist in case of medical emergencies.

Through reviews of training records and interviews with GSTR personnel, the inspector confirmed that emergency response review and training was completed as required by the EP and the Operator Requalification Plan. Emergency responders were knowledgeable of the proper actions to take in case of an emergency. Fire Department personnel were being trained biennially as required by the plan.

The EP also required the reactor staff personnel to contact the local DOE Radiological Assistance Program team and verify their contact information. This was being done as required. In addition, the facility emergency call list was required to be reviewed and updated at least biennially. The call list had been updated in April 2018.

c. Conclusion

The inspector concluded that the emergency preparedness program was conducted in accordance with the EP. Specifically, (1) the EP and implementing procedures were being reviewed biennially as required; (2) emergency response equipment was being maintained and alarms were being tested as required; (3) a LOA with offsite support organization was being maintained; (4) drills were being conducted as required; and (5) emergency preparedness training was being completed.

10. Maintenance Logs and Records

a. Inspection Scope (IP 69001, Section 02.11)

To verify that the maintenance program was being conducted as required in TS Sections 3, 4 and 5, the inspector reviewed selected aspects of:

- USGS TRIGA Reactor Maintenance Log
- Various GSTR Procedures including: No. 12, “Procedure for Changing Demineralizer Resin;” No. 13, “Procedure for Use of Leak Testing Device;”

No. 19, “Procedure for Test Equipment Calibration;” and, No. 21, “Procedure for Measuring Control Rod Drop Time”
- Facility design change (10 CFR 50.59) records for the past 2 years
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

The inspector reviewed selected maintenance guidance documents and records, including the maintenance log. This log was used effectively to document detailed maintenance activities completed on specific items of equipment including the primary and secondary pumps, exhaust fans, the cooling tower, and electronic equipment. The records reviewed indicated that routine and preventive maintenance was controlled, conducted, and documented in the maintenance or operations log consistent with licensee procedures. Verifications and operational systems checks were performed to ensure system operability before an item of equipment or a system was returned to service. Unscheduled maintenance or repairs were reviewed to determine if the situation required a 10 CFR 50.59 evaluation.

c. Conclusion

The licensee’s maintenance program was being implemented as required by GSTR procedures

11. Fuel Handling

a. Inspection Scope (IP 69001, Section 02.12)

To verify that reactor fuel was handled, moved, inspected, and stored in compliance with TS Sections 4.1, 5.3, and 5.4, the inspector reviewed selected aspects of the following:

- Fuel movement and examination records
- Fuel handling equipment and instrumentation
- Fuel Element Location Board maintained in the Reactor Room
- GSTR Fuel Books containing the various USGS TRIGA Reactor Fuel Element History sheets for all the elements at the facility, Fuel Movement sheets, and Fuel Inspection forms and information
- Reactor Operations Logbooks Nos. 168 – 175, dated June 2016 to present
- Various GSTR Procedures including: No. 4, “Procedure for Fuel Loading and Unloading;” No. 8, “Procedure for Measuring Fuel Elements;” No. 9, “Procedure for Locating Fuel Element Cladding Failure;” and, No. 25, “Procedure for Visual Verification of (1) Aluminum-Clad Fuel Element Locations and (2) number of Fuel Elements in Reactor Core
- GSTR Quarterly (Operations) Reports for each quarter between April 1, 2016 through March 31, 2018
- ROC meeting minutes for meetings held from April 2016 to April 2018
- The two most recent USGS TRIGA Reactor Annual Reports

b. Observations and Findings

The inspector reviewed fuel handling at the facility and found that the appropriate fuel logs and inspection records were being maintained. It was noted that fuel movements were planned and a written sequence developed prior to completing the actual transfers and were documented in the console logbook and appropriate fuel logbook. Log entries were as specified in the facility procedures and fuel inspection met TS Section 4.1 requirements. Through review of the fuel movement and inspection records and interviews with operations staff, the inspector verified that fuel was moved and controlled according to established procedure. The inspector verified that the fuel was being inspected every 5 years as required. The inspector also verified that fuel was being stored in the locations indicated by licensee records and as required in TS Sections 5.3 and 5.4.

c. Conclusion

Fuel handling activities and the documentation thereof were acceptable and in accordance with procedural and TS requirements.

12. Exit Meeting Summary

The inspector reviewed the inspection results with members of licensee management at the conclusion of the inspection on June 28, 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

V. Nuzzio	Reactor Administrator
B. Roy	Reactor Supervisor and Senior Reactor Operator
C. Manning	Reactor Health Physicist and Senior Reactor Operator

Other Personnel

D. Young	Operations Supervisor, Mega Center Dispatch, Denver Federal Center

INSPECTION PROCEDURE (IP) USED

IP 69001	Class II Research and Test Reactors

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-274/2018-202-01	URI	Review the adequacy of the licensee's 10 CFR 50.59 review concerning movement of the lightly used fuel acquired from DOE and placing some of the elements into the core.

Closed

None.

PARTIAL LIST OF ACRONYMS USED

10 CFR	Title 10 of the *Code of Federal Regulations*
DOE	Department of Energy
GSTR	(United States) Geological Survey TRIGA Reactor
URI	Unresolved Item
IP	Inspection Procedure
LCO	Limiting Conditions for Operation
LOA	Letter of Agreement
MCNP	Monte Carlo N-Particle Transport (code)
No(s).	Number(s)
NRC	U.S. Nuclear Regulatory Commission
Rev.	Revision
ROC	Reactor Operations Committee
ROM	Reactor Operations Manual
RR&R	Radioisotope Request and Receipt (form)
RS	Reactor Supervisor
SAR	Safety Analysis Report
SER	Safety Evaluation Report
SRO	Senior Reactor Operator
TS	Technical Specification
USGS	United States Geological Survey