



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

October 21, 2020

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 – REGULATORY AUDIT REPORT RE:
PROPOSED LICENSE AMENDMENT NO. 14 TO INCREASE THE SPECIAL
NUCLEAR MATERIAL POSSESSION LIMIT (EPID L-2020-LLA-0201)

Dear Mr. Horton:

By letter dated October 1, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20275A267), U.S. Geological Survey (USGS) staff applied for an amendment to Renewed Facility Operating License No. R-113 for the USGS Training, Research, Isotopes, General Atomics (TRIGA) Research Reactor. The license amendment request proposes to increase the special nuclear material possession limit of the license to receive, possess, but not use or separate, in connection with the operation of the facility, up to 4 kilograms of contained uranium-235 enriched to less than 20 percent in the form of TRIGA-type reactor fuel.

Enclosed is a report on the regulatory audit conducted by staff of the U.S. Nuclear Regulatory Commission (NRC) on October 15, 2020, in connection with its review of the application. The audit will continue remotely via teleconference until the NRC staff concludes its review. The audit report does not make any licensing conclusions or findings, but it is part of the administrative record of the NRC staff's review of the application and may provide information supporting the NRC staff's safety evaluation. The audit followed the plan provided by letter dated October 6, 2020 (ADAMS Accession No. ML20279A591), unless otherwise noted in the enclosed report.

R. Horton

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If you have any questions regarding the NRC staff's audit, please contact me at 301-415-0893, or by electronic mail at Geoffrey.Wertz@nrc.gov.

Sincerely,

/RA/

Geoffrey A. Wertz, Project Manager
Non-Power Production and Utilization Facility
Licensing Branch
Division of Advanced Reactors and Non-Power
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Office of Nuclear Reactor Regulation

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

Enclosure:
As stated

U.S. Geological Survey

Docket No. 50-274

cc:

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Test, Research and Training
Reactor Newsletter
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 DATED: OCTOBER 21, 2020

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*concurring via email

NRR-106

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DATE	10/21/2020	10/21/2020	10/21/2020	10/21/2020

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OFFICE OF NUCLEAR REACTOR REGULATION
REGULATORY AUDIT REPORT
REGARDING PROPOSED AMENDMENT NO. 14 TO
RENEWED FACILITY OPERATING LICENSE NO. R-113
U.S. GEOLOGICAL SURVEY
U.S. GEOLOGICAL SURVEY TRIGA RESEARCH REACTOR
DOCKET NO. 50-274

Location: U.S. Geological Survey Reactor Facility, Lakewood, Colorado

Date: October 15, 2020

Audit Team Members: Geoffrey Wertz (Audit Leader)
Molly-Kate Gavello (Technical Reviewer)

Licensee Representatives: Mr. Robert Horton, Reactor Administrator
Mr. Jonathan Wallick, Reactor Supervisor
Mr. Christopher Farwell, Senior Reactor Operator
Mr. Clayton Manning, Senior Reactor Operator

Background

The U.S. Nuclear Regulatory Commission (NRC) staff is continuing its review of the U.S. Geological Survey (USGS) Training, Research, Isotopes, General Atomics (TRIGA) Research Reactor license amendment request (LAR), provided by letter dated October 1, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20275A267). The LAR proposes to increase the special nuclear material (SNM) possession limit of the license to receive and possess, but not to use or separate, in connection with the operation of the facility, up to 4 kilograms of contained uranium-235 enriched to less than 20 percent in the form of TRIGA-type reactor fuel from the VTT Technical Research Centre of Finland FiR1 reactor.

This report summarizes the on-site portion of the regulatory audit conducted by the NRC staff on October 15, 2020, in connection with its review of the application. The audit will continue remotely via teleconference until the NRC staff concludes its review. The audit report does not make any licensing conclusions or findings, but it is part of the administrative record of the NRC staff's review of the application and may provide information supporting the NRC staff's safety evaluation. The audit followed the plan dated October 6, 2020 (ADAMS Accession No. ML20279A591), unless otherwise noted in this report.

Enclosure

Regulatory Bases for the Audit

The purpose of this audit is to determine if the licensee's proposed LAR requesting an increase in the SNM possession limit meets all the applicable regulatory requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) and addresses applicable guidance provided in NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors," Part 1, "Format and Content," and Part 2, "Standard Review Plan and Acceptance Criteria" (ADAMS Accession Nos. ML042430055 and ML042430048, respectively).

Audit Activities

The following activities were performed during the on-site audit:

1. Entrance Briefing

The NRC staff discussed the goals and objectives of the audit at the entrance briefing, which focused on gaining a better understanding of the proposed storage locations of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," licensed materials (TRIGA fuel elements) needed to support the SNM possession increase in the NRC 10 CFR Part 50 license for the USGS TRIGA Research Reactor. The NRC staff stated that an audit report would be issued summarizing the results of the on-site review, as stated in the October 6, 2020, audit letter, but that the audit would remain open to assist with additional information exchange. Further, the NRC staff indicated that the information gained from the audit review would assist the NRC staff to better focus any requests for additional information (RAIs) needed to support the review.

2. Facility Tour

The licensee provided the NRC staff with a comprehensive facility tour. The NRC staff observed the fuel storage locations for both the reactor pool and the storage pits. The NRC staff observed the location and configuration of the proposed hexagonal storage racks, pit racks, and the shield plugs to be installed above the storage pits.

3. Review of the Audit Information

The following information, as listed in the audit plan dated October 6, 2020, was reviewed:

- Discussion on USGS compliance with 10 CFR 70.24, "Criticality accident requirements."

The licensee indicated that the amount of material not to be stored under water (i.e., the damaged TRIGA fuel which will be stored in the storage pits and not in the reactor pool) was less than the amount specified in 10 CFR 70.24. The licensee will provide a statement to indicate that 10 CFR 70.24 was not applicable based on the amount of SMN contained in the damaged TRIGA fuel, by supplemental letter.

- Effective Neutron Multiplication Factor (K_{eff}) information on the proposed fuel storage configurations.

The K_{eff} information on the hexagonal racks is consistent with the information summarized in the "Safety Evaluation Report – Renewal of the Facility Operating License for the

United States Geological Survey TRIGA Research Reactor” (ADAMS Accession No. ML16074A152). The licensee indicated that the new racks that will contain the damaged fuel elements (ten fuel elements total) in canisters and stored in the pits will contain an amount of material that is less than a critical mass of SNM.

The licensee indicated that it will provide information demonstrating adequate separation of the hexagonal racks in the reactor pool by supplemental letter.

- Certificate of Compliance No. 9225, revision 69, docket 71-9225, package ID USA/9225/B(U)F-96

NRC staff reviewed the document listed above for the proposed fuel transfer. No additional information was needed.

- Nuclear Assurance Corporation drawings 315-40-086, 087, and 088

NRC staff reviewed the document listed above for the proposed fuel transfer. No additional information was needed.

- USGS safety analysis report (SAR), Section 3.3

The licensee explained that the SAR Section 3.3 was provided in the LAR to highlight groundwater information. No additional information was needed.

- “Benchmarking criticality analysis of TRIGA fuel storage racks,” Applied Radiation and Isotopes, issue 119 (2017)

NRC staff reviewed the document listed above for the proposed fuel transfer. No additional information was needed.

- TRIGA Fuel Element Examination sheet, FRM-898

NRC staff reviewed the document listed above for the proposed fuel transfer. The NRC staff found the examination form, FRM-898, provided a comprehensive record of the condition of the TRIGA fuel elements. No additional information was needed.

Requests for Additional Information/Supplemental Letter to License Amendment Request

The NRC audit team discussed the need for RAIs to capture the information on the docket consistent with the requirements in 10 CFR 50.9, “Completeness and accuracy of information,” and 10 CFR 50.90, “Application for amendment of license, construction permit, or early site permit.” However, due to the time constraints needed to support the completion of the LAR by the end of calendar year 2020, the NRC staff indicated its plan to maintain the open audit period until completion of the LAR, and any additional requests for information will be performed within the audit process.

The NRC staff discussed the need to obtain the following information in support of its review of the LAR during the audit meeting.

- A request to modify proposed license condition 2.B.2.f to add the specific name of the facility that previously used the TRIGA fuel.
- A request to add two (2) additional license conditions to specify the receipt, possession, but not the use or separation of SNM and byproduct material, in the form of TRIGA fuel, produced by the operation of the fuel at the facility that previously used the fuel.
- A statement that any expected reactor parts or components (i.e., baskets) received with the proposed fuel shipment will be within the requirements of the current license condition 2.B.3.e., and thus, no change to license condition 2.B.3.e is needed. Also, a statement on the applicability of 10 CFR Part 37, "Physical Protection of Category 1 and Category 2 Quantities of Radioactive Material," to any expected reactor parts or components received with the fuel shipment.
- A statement that the amount of material not stored under water (i.e., the damaged TRIGA fuel which will be stored in the storage pits and not in the reactor pool) is less than the amount specified in 10 CFR 70.24.
- A statement providing additional information or demonstrating that the proposed spacing between the hexagonal fuel element storage racks in the reactor pool (i.e., 15 inches) is adequate for ensuring that each rack is unaffected by neutrons from any adjacent storage racks.
- A summary or description useful to understand the results of the cases provided in the LAR, Attachment 6.
- Unredacted versions of Attachments 4 through 6 of the LAR (note; this information may need to be submitted in accordance with the requirements of 10 CFR 2.390, "Public inspections, exemptions, requests for withholding," as determined by the licensee).
- Any other applicable information.

Exit Briefing

On October 15, 2020, the audit team held an exit briefing with the licensee representatives listed above. No issues or concerns were identified by the licensee during the on-site audit exit briefing. The NRC staff indicated the on-site audit was concluded but the audit would continue until the NRC staff determined that it had sufficient information to complete its review of the LAR.

Deviations from the Audit Plan

No deviations from the audit plan occurred during the site visit.