



Department of the Interior
US Geological Survey
Box 25046 MS-974
Denver CO, 80225
April 21, 2020

50-274

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington DC 20555

Add subject to this and address the ML number

Dear NRC staff,

Enclosed is the corrected 2019 annual report (Original submission - Accession number ML20087H019) for the U.S. Geological Survey TRIGA non-power reactor facility. The Ar-41 effluent release for Oct, Nov, and December was incorrectly listed as 0.056, 0.873, and 0.022 but the actual effluent is 0.0056, 0.0873, and 0.0029 Ci.

The facility docket number is 50-274.

Sincerely,

4/21/2020

X *Christopher Farwell*

Christopher Farwell
Acting Reactor Supervisor
Signed by: CHRISTOPHER FARWELL

Enclosure

Copy to:
Geoffrey Wertz OWFN 12 D20

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U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 2019 - DECEMBER 31, 2019

NRC LICENSE No. R-113

DOCKET NO. 50-274

I. Personnel Changes:

Brycen Roy resigned from the facility effective 7/15/2019. Christopher Farwell remains the acting Reactor Supervisor.

II. Operating Experience

The Geological Survey TRIGA Reactor (GSTR) remains in an administratively- limited state of operations until staffing levels can be restored. A synopsis of irradiations performed during the year is given below, listed by the organization submitting the samples to the reactor staff:

<u>Organization</u>	<u>Number of Samples</u>
USGS – INAA	64
USGS – Geochronology	0
USGS – other	0
Non-USGS	<u>0</u>
Total	64

A. A thermal power calibration was performed in November, with adjustments made to the instrumentation as required.

B. During the report period, 67 daily checklists and 12 monthly checklists were completed in compliance with technical specifications requirements for surveillance of the reactor facility.

C. Tours were provided to individuals and groups during the year for a total visitor count of approximately 131.

III. Tabulation of Energy Generated

	<u>MWh operated</u>	<u>Critical hours</u>	<u>Pulses</u>
<u>Jan</u>	00.000	00h 00m	0
<u>Feb</u>	00.000	00h 00m	0
<u>Mar</u>	00.000	04h 07m	0
<u>Apr</u>	00.000	00h 00m	0
<u>May</u>	00.000	00h 00m	0
<u>June</u>	00.000	04h 56m	0
<u>July</u>	00.000	00h 00m	0
<u>Aug</u>	00.000	00h 00m	0
<u>Sept</u>	00.000	07h 19m	0
<u>Oct</u>	3.272	09h 59m	0
<u>Nov</u>	5.999	12h 26m	10
<u>Dec</u>	2.560	09h 16m	1
<u>Totals</u>	11.831	48h 03m	11

IV. Unscheduled Shutdowns

One (1) unscheduled shutdowns occurred in 2019. These were:

<u>Number</u>	<u>Date</u>	<u>Cause</u>
1144	11/4/2019	NPP Percent High SCRAM; all detectors were operating stably around 750 kW before suddenly SCRAMing and showed no trend of increasing towards the SCRAM setpoint. History traces confirm that a valid actuation of the SCRAM with the reactor exceeding the power setpoint is very unlikely. Thus, this SCRAM is believed to be spurious and not indicative of an actual reactor power in excess of the setpoint.

V. Significant Maintenance Operations

- 2/12/2019 Replaced resin in IX Tank in Reactor Bay and in Rm 151. No leaks detected.
- On 3/28/2019 the discriminator-R304 on the NM was adjusted to correct the indicated power with the source in the core when the reactor was shut down. It was corrected from a power of 15mW to 18mW. An ops test was performed, the results were satisfactory.
- On 5/17/2019 NP1000 potentiometer R23, a gain potentiometer, was adjusted so the prestarts could pass the 110% prestart tests.
- On 6/13/2019 NP1000 potentiometer R23 was adjusted with an input current to bring the NP1000 reading into agreement with the input source.
- On 6/20/2019 the discriminator-R304 on the NM was adjusted to correct the indicated power with the source in the core when the reactor was shut down. It was corrected from a power of 14mW to 18mW. An operational test was performed, the results were satisfactory.
- On 7/31/2019 the potentiometer for mode 5 was adjusted to bring indicated a calibrated input within the correct range.

- On 10/29/2019 the NP and NPP R29 potentiometer was adjusted. This potentiometer is connected to the scram set point. The ROC instructed the facility to adjust the scram setpoints from 110% power to the administrative power restriction of 880kW. The operational test was performed by injecting a current into the detector circuitry and was satisfactory for both detectors.
- 10/31/2019 Performed annual surveillance on TR Drive IAW Procedure 28. Appearance and function OK; lubrication adequate; drop time 0.584 s.

VI. Summary of 10 CFR 50.59 changes

No 50.59 changes were made to the facility in CY 2019.

VII. Radioactivity Releases

- A. Listed below are the total amounts of radioactive gaseous effluents released to the environment beyond the effective control of the reactor facility

Table 1. Gaseous Effluents Released to the Environment in CY 2019

Month	Argon-41 (Ci)	R-113 License Allowable (Ci)	Tritium -HTO (mCi) *	10CFR20 Allowable (mCi)
January	0.000	5.833	0.000	124
February	0.000	5.833	0.115	124
March	0.000	5.833	0.000	124
April	0.000	5.833	0.102	124
May	0.000	5.833	0.000	124
June	0.000	5.833	0.068	124
July	0.000	5.833	0.000	124
August	0.000	5.833	0.059	124
September	0.000	5.833	0.000	124
October	0.0056	5.833	0.106	124
November	0.0873	5.833	0.000	124
December	0.0029	5.833	0.064	124
Total	0.0951	70.000	0.515	1488
% of Allowable	0.1 %	-----	0.035%	-----

* **Note:** The tritium concentrations are estimates based on the amount of water lost by evaporation from the reactor multiplied by the concentration of tritium as HTO. Tritium sample analyses were performed by ALS Laboratories.

- B. No liquid releases were made during the 2019 calendar year.

VIII. Radiation Monitoring

Our program to monitor and control radiation exposures included the four major elements below during the operating year.

1. Ten (10) gamma-sensitive area monitors, and one (1) neutron-sensitive area monitor, are located throughout the Nuclear Science Building. A remote readout panel is located in the reactor health physics office. High alarm set points range from 2 mR/hr to 50 mR/hr. High level alarms are very infrequent and due to sample movements. These monitors are calibration-checked annually.
2. One Continuous Air Monitor (CAM) samples air in the reactor bay. An equilibrium concentration of about 1.5×10^{-8} $\mu\text{Ci/ml}$ present for two minutes will result in an increase of about 500 cpm above background. Two alarm setpoints are a low-level alarm set at 5,000 cpm and a high level alarm set at 10,000 cpm. Reactor bay air is sampled during all reactor operations. The fixed particulate air filter is normally changed each week and counted on a HPGE gamma spectrometer. The charcoal filter, positioned behind the particulate air filter, is also normally changed and counted weekly. Filter data showed radioisotope concentrations less than allowable airborne concentration limits given in 10 CFR Part 20, Appendix B, Table 2 for all particulate radioisotopes produced by the reactor.
3. Contamination wipe surveys and portable instrument radiation surveys are performed at least once a month. The portable instruments are calibrated with a 3-Curie (initial activity) Cs-137 source traceable to NBS, and wipes are counted on a Gamma Products G5000W low-level counting system. The highest removable contamination found was during the November surveys, at 218 pCi/100 cm² beta-gamma, located in the reactor bay at the rear table. This contamination likely occurred as a result of removing activated sample containers from the core. No other beta-gamma contamination above 61.4 pCi/100 cm² was detected. No areas were greater than 9.3 pCi/100 cm² alpha contamination, which does not require decontamination as it is well below the limit of 90 pCi/100 cm² alpha. The roof area over the reactor tank is roped off and posted as a radiation area (averaging 2.5 mR/hr) during 1 MW operations.
4. TLD dosimeters were used at seven outdoor environmental stations. Reactor facility visitors are issued self-reading electronic dosimeters. Reactor staff personnel are issued beta, gamma, albedo neutron badges. (NOTE: Neutron exposure was less than the minimum reportable doses for the badges throughout this time frame)

Table 3. Personnel Monitoring Results (12/1/18 – 11/30/19)

Employee code	Whole Body (Rem) Deep Dose Equiv.	Whole Body (Rem) Shallow Dose Equiv.	Extremity (Rem)
E0707	0.000	0.000	0.000
E0908	0.013	0.039	0.147
E0715	0.004	0.033	0.023

Reactor visitors and visiting experimenters wore electronic pocket dosimeters which showed that no individual's reading greater than 3.0 mRem in a single visit or as a cumulative annual dose.

Table 4. Environmental Dose Results (Oct 2018 through Sept 2019)

Location	Dose Oct.- Dec. (REM)	Dose Jan-Mar (REM)	Dose Apr-June (REM)	Dose July-Sept. (REM)	Total (REM)
Control (Background)	0.062	0.063	0.053	0.050	0.228
Main Exhaust	0.015	0.011	0.028	0.000	0.054
West Vehicle Gate	0.012	0.016	0.000	0.000	0.028
West Room 151 Gate	0.033	0.031	0.039	0.014	0.117
Cooling Tower	0.000	0.012	0.000	0.000	0.012
SE Light Pole	0.000	0.000	0.000	0.000	0.000
SW Light Pole	0.000	0.000	0.000	0.000	0.000
Rx Fence Loading Dock	0.023	0.024	0.012	0.017	0.076
Tunnel	0.029	0.033	0.034	0.017	0.113

***Note:** Above totals have the background subtracted (see control badge). All TLDs were supplied and analyzed by Mirion Technologies.

IX. Environmental Monitoring

Biennial soil samples are due to be collected in summer 2020.

X. Fuel Inspection results

No fuel inspections occurred in CY19