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Department of the Interior
US Geological Survey
Box 25046 MS-974
Denver CO, 80225
January 18, 2008

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

Dear NRC staff:

The attached annual report of the U.S. Geological Survey TRIGA non-power reactor facility is submitted in accordance with license conditions. The facility docket number is 50-274.

Sincerely,

Timothy M. DeBey
Reactor Supervisor

Enclosure

Copy to:
Al Adams, MS 12 G-13

A020
NRR

U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 2007 - DECEMBER 31, 2007

NRC LICENSE NO. R-113 - DOCKET NO. 50-274

I. Personnel Changes:

Paul Lietz resigned from his position at the facility, effective June 7, 2007.
Paul Lietz's operator license was terminated as a result of his resignation.
Alex Buehrle was hired as a student employee and began working on June 11, 2007.
Brycen Roy was hired as a student employee and began working on July 23, 2007.

II. Operating Experience

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 2007. No major facility changes were made during the year. A nuclear engineering laboratory course was held at the facility as part of the curriculum of the Colorado School of Mines. This course is expected to be provided on an annual basis.

A synopsis of irradiations performed during the year is given below, listed by the organization submitting the samples to the reactor staff:

Organization	Number of Samples
Geologic Discipline – INAA	1044
Geologic Discipline - Geochronology	1158
Non-USGS	1452
Total	3654

A. Thermal power calibrations were performed in January and July, with no adjustments made to the instrumentation.

B. During the report period, 182 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 350.

III. Tabulation of Energy Generated

	MWH operated	Critical hours	Pulses
Jan	63.705	80h 20m	0
Feb	58.217	59h 45m	0
Mar	50.394	54h 24m	0
Apr	61.249	61h 19m	0
May	67.983	69h 51m	0
June	24.793	29h 01m	0
July	43.413	55h 58m	5
Aug	81.475	85h 01m	0
Sept	70.600	72h 15m	0
Oct	77.341	80h 16m	0
Nov	35.900	37h 47m	0
Dec	10.212	11h 41m	0
Totals	645.282	697h 38m	5

IV. Unscheduled Shutdowns

Number	Date	Cause
1022	03/15/07	DAC DIS064 timeout
1023	03/23/07	DAC DIS064 timeout
1024	06/26/07	DAC DIS064 timeout
1025	07/20/07	DAC DIS064 timeout
1026	08/27/07	NP1000 hi power while going to full power
1027	09/04/07	NP1000 hi power due to noise spike
1028	09/04/07	NP1000 hi power; bad HV connector
1029	12/07/07	DAC DIS064 timeout

V. Significant Maintenance Operations

1. The ion exchange resin and filters were replaced in January.
2. The lithium battery in the NM1000 microprocessor was replaced in January.

3. Fittings at the conductivity meter probes were leaking; replaced in January.
4. The Tektronix hi-resolution console monitor was replaced in April.
5. The ion exchange resin and filters were replaced in May.
6. Lead shielding was added around the demineralizer tank in June.
7. A 10 kΩ resistor in the NP1000 was replaced in July.
8. The primary pump motor/pump shaft was aligned in August.
9. The signal lead on the NP1000 was rebuilt in August.
10. A dry tube in a reflector-mounted position had a water leak. The tube was drained, inverted and reinstalled in October.
11. The console ACKNOWLEDGE switch was replaced in December.
12. During routine rod inspection testing of SHIM1 drive in December, it was discovered that the dashpot piston assembly had become disconnected. Holes were re-tapped, new screws were installed and the drive was returned to service.

VI. Summary of 10 CFR 50.59 changes

No 50.59 changes were made during this year.

VII. Radioactivity Releases

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

Table 1. Gaseous Effluents Released to the Environment

Month	**Argon-41** (curies)	**License Allowable** (Ci) (R-113)	Tritium (HTO) (mCi) *	**10CFR20 Allowable** (mCi)
January	0.338	5.833	0.044	124
February	0.459	5.833	0.080	124
March	0.174	5.833	0.0	124
April	0.635	5.833	0.0105	124
May	0.463	5.833	0.058	124
June	0.399	5.833	0.047	124
July	0.255	5.833	0.0	124
August	0.655	5.833	0.071	124
September	0.244	5.833	0.0	124
October	0.637	5.833	0.077	124
November	0.320	5.833	0.0	124
December	0.088	5.833	0.088	124
Total	4.67	70.00	0.570	1488
% of Allowable	6.67%	----------	0.04%	----------

* **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 Severn Trent Laboratories.

B. One solid, low-level waste shipment of 7.5 cu. ft. was made this calendar year.

VIII. Radiation Monitoring

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

1. Fifteen gamma-sensitive area monitors 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.

2. One Continuous Air Monitor (CAM) provides sampling of the air in the reactor bay. An equilibrium concentration of about 1×10^{-8} μCi/ml present for two minutes will result in an increase of 400 cpm above background. There are two alarm setpoints. A low-level alarm is set at 3000 cpm and the high level alarm is set at 10000 cpm. Reactor bay air is sampled during all reactor operations. The fixed particulate air filter is changed each week and counted on a HPGE gamma spectrometer counting system. The charcoal filter, fitted behind the air filter, is also changed and counted weekly. In all instances, sample data were less than airborne concentration values in 10 CFR Part 20, Appendix B, Table 2 for all particulate radioisotopes produced by the reactor.

3. Contamination wipe surveys and radiation surveys with portable survey instruments are performed at least once a month. All portable instruments are calibrated with a 3-Curie (initial activity) Cs-137 source traceable to NBS, and wipes are counted on a Gamma Products G5000 low level counting system. All areas were less than 30 pCi/100 cm^2 beta and 15 pCi/100 cm^2 alpha contamination.

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. LiF TLD dosimeters were used at four outdoor environmental stations. Reactor facility visitors are issued self-reading dosimeters. Reactor staff personnel are issued beta, gamma, albedo neutron badges.

Table 2. Personnel Monitoring Results (1/1/07 – 12/31/07)

	Deep Dose Equivalent	Shallow Dose Equivalent	
Name	Whole Body (Rem)	Whole Body (Rem)	Extremity (Rem)
Buehrle, A	0.021	0.049	0.102
DeBey, T	0.121	0.220	0.236
Lightner, G	0.260	0.362	1.270
Liles, D	0.212	0.220	0.556
Roy, B	0.000	0.000	0.046

Reactor visitors and occasional experimenters wore pocket dosimeters that resulted in no individual reading that was greater than one (1) mrem.

Table 3. Environmental Dose Results

Location	**Dose Jan-Mar** (RAD)	**Dose Apr-June** (RAD)	**Dose July-Sept** (RAD)	**Dose Oct- Dec** (RAD)	**Total** (RAD)
Exhaust Stack	0.044	0.033	0.037	0.033	0.147
Cooling Tower Fence	0.007	0.004	0.000	0.008	0.019
West Vehicle Gate	0.017	0.012	0.019	0.020	0.068
West Room 151 Gate	0.067	0.046	0.022	0.023	0.158
Southwest Light Pole	0.008	0.001	0.008	0.010	0.027
Control (background)	0.036	0.032	0.038	0.041	0.147
Southeast Light Pole	0.001	0.002	0.000	0.001	0.004

Note: Above totals have the background subtracted (see control). Environmental TLDs were supplied and analyzed by Global Dosimetry Solutions.

X. Environmental Monitoring

There have been no uncontrolled radioactivity releases from the reactor to the present date. Thus, the data on file from past years to the present are considered to be background information.