USGS
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Department of the Interior
US Geological Survey
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April 8, 2005

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

Dear NRC staff:

The attached CY2003 annual report of the U.S. Geological Survey TRIGA non-power reactor facility is submitted as a replacement for the original submission of January 14, 2004. The original submission was missing the environmental monitoring information given on page 6 of this report.

The facility docket number is 50-274.

Sincerely,

Timothy M. DeBey
Reactor Supervisor

Enclosure

A020

Copy to:
Al Adams, MS O-11-D-19

U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 2003 - DECEMBER 31, 2003

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

I. **Personnel Changes**: One personnel change occurred in CY 2003 when Paul Helfer, a SRO contractor, completed his contract.

II. **Operating Experience**

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 2003. No major facility changes were made during the year.

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 Division – INAA	909
Geologic Division - Geochronology	1352
Non-USGS affiliated	801
Total	3062

A. Thermal power calibrations were performed in May and November, with minor adjustments made to the instrumentation.

B. During the report period, 173 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 400.

D. Three fuel movements were performed during the year for the purposes of increasing reactivity and performing the biennial control rod inspection.

III. Tabulation of Energy Generated

	MWH operated	Critical hours	Pulses
Jan	56.400	58.70	0
Feb	27.400	28.22	0
Mar	61.645	63.02	0
Apr	62.519	64.63	0
May	82.055	87.83	0
June	45.116	46.22	0
July	32.143	35.13	0
Aug	43.285	44.97	0
Sept	106.917	109.50	0
Oct	73.667	79.10	0
Nov	26.800	29.50	0
Dec	51.201	53.47	0
Totals	669.148	699.76	0

IV. Unscheduled Shutdowns

Number	Date	Cause
993	5/1/03	DAC DIS064 Timeout scram (cause unknown)
994	8/8/03	DAC DIS064 Timeout scram (cause unknown)
995	10/30/03	NP1000 high power scram while adjusting rod positions (operator in training)
996	12/2/03	NPP 1000 high power scram while increasing power in automatic control.

V. Major Maintenance Operations

1. The primary coolant ion exchange resin was replaced on July 9, 2003.
2. The GM detector in the continuous air monitor was replaced on July 30, 2003, and the instrument was recalibrated.
3. A new conductivity system (Foxboro) was installed on October 16, 2003.

4. The Campbelling unit was replaced in the NM1000 wide range power instrument on November 3, 2003. The instrument was calibrated and functionally verified to be operating properly after the replacement.

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	0.192	5.833	0.184	124
February	0.016	5.833	0.070	124
March	0.148	5.833	0.083	124
April	0.164	5.833	0.060	124
May	0.179	5.833	0.146	124
June	0.210	5.833	0.080	124
July	0.164	5.833	0.100	124
August	0.150	5.833	0.075	124
September	0.403	5.833	0.075	124
October	0.338	5.833	0.157	124
November	0.135	5.833	0.059	124
December	0.190	5.833	0.078	124
Total	2.289	70.00	1.167	1488
% of Allowable	3.27%	----------	0.08%	----------

* **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 are being performed by Hazen Research.

B. One 55-gallon drum of low-level radioactive solid waste was shipped for burial in Washington State during the year.

Note: The principal radioactive waste generated at the reactor facility is the demineralizer resin. Used resin with small quantities of rinse water was de-watered by evaporation and placed in a 55-gallon drum.

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) samples 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 value (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. Six contaminated areas were noted during routine wipe surveys with contamination above 30 pCi/100 cm^2 beta. The three highest had beta activity of 239 pCi/100 cm^2 and two had 40 pCi/100 cm^2. Soap and water were used to remove the contamination. All other areas were less than 30 pCi/100 cm^2 beta and 15 pCi/100 cm^2 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. Personnel, X and gamma, beta and neutron film badges are assigned to all permanent occupants of the Nuclear Science Building. LiF TLD dosimeters were used at four outdoor environmental stations. Reactor facility visitors are issued self-reading dosimeters. Reactor staff personnel are issued albedo neutron badges.

Table 2. Personnel Monitoring Results (12/1/02 – 11/30/03)

	Deep Dose Equivalent	Shallow Dose Equivalent	
Name	Whole Body (Rem)	Whole Body (Rem)	Extremity (Rem)
Aakhus-Witt A.	0.010	0.016	0.081
Aspey, N.	0.0	0.0	Not monitored
DeBey, T	0.052	0.056	0.093
Helfer, P	0.0	0.0	0.0
Hutchings, R.	0.0	0.0	Not monitored
Liles, D	0.069	0.070	0.177
Perryman, R	0.050	0.056	0.252

Note: Personnel dosimetry results from December 2003 are not available at this time.

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	0.0	0.0047	0.0001	0.0011	0.0059
Cooling Tower Fence	0.0	0.0	0.0	0.0	0.0
West Vehicle Gate	0.0064	0.0026	0.0031	0.0036	0.0157
West Room 151 Gate	0.0	0.0020	0.0	0.0	0.002
Southwest Light Pole	0.0	0.0	0.0108	0.0	0.0108
Control (background)	0.0312	0.0277	0.0266	0.0302	0.1157
Southeast Light Pole	0.0000	0.0	0.0	0.0	0.0

Note: Above totals have the background subtracted (see control). Control is an average.

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.