United States Department of the Interior

U. S. GEOLOGICAL SURVEY
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Denver Federal Center
Denver, Colorado 80225

IN REPLY REFER TO

January 22, 2003

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,

Tim DeBey

Timothy M. DeBey
Reactor Supervisor

Enclosure

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

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U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 2002 - DECEMBER 31, 2002

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

I. **Personnel Changes**: No personnel changes occurred in CY 2002.

II. **Operating Experience**

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 2002. 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	1391
Geologic Division - Geochronology	1569
Non-USGS affiliated	736
Total	3696

A Thermal power calibrations were performed in February, May and November and minor adjustments were made.

B. One new Class II experiment (bromine tracer production) was approved during this period.

C. During the report period, 183 daily checklists and 12 monthly checklists were completed in compliance with technical specifications requirements for surveillance of the reactor facility.

D. Tours were provided to individuals and groups during the year for a total visitor count of approximately 380.

E. Two fuel movements were performed during the year for the purposes of increasing reactivity and performing the 60-month fuel element inspection.

III. Tabulation of Energy Generated

	MWH operated	Critical hours	Pulses
Jan	55.399	57.750	0
Feb	52.351	56.683	0
Mar	105.503	111.467	0
Apr	58.033	59.133	0
May	55.430	56.767	0
June	81.033	82.417	0
July	88.032	100.133	0
Aug	46.688	48.900	0
Sept	79.751	81.217	0
Oct	54.665	56.833	0
Nov	45.717	47.233	0
Dec	99.129	101.633	0
Totals	821.731	860.167	0

IV. Unscheduled Shutdowns

Number	Date	Cause
988	3/6/02	Manual scram due to building evacuation alarm
989	5/10/02	NPP 1000 high power scram due to console computer being "locked up".
990	6/5/02	Manual scram due to insufficient underpressure in reactor room (loss of power to exhaust fan)
991	12/5/02	NPP high power scram during square wave operations for training
992	12/5/02	NPP high power scram during square wave operations for training

V. Major Maintenance Operations

The primary coolant ion exchange resin was replaced on 4/16/02.

The cooling tower was refurbished in August. This included regalvanizing of the interior, conformal coating of the interior, replacement of the fill, cleaning of the spray nozzles, replacement of the fan shaft and bearings, and replacement of 50% of the drift eliminators. Subsequent operations have shown that the cooling efficiency of the cooling tower has increased by about 25%.

Several hardware improvements were made to the facility security system during the fall. These were reviewed and approved by the Reactor Operations Committee and then detailed in a revision of the security plan that was submitted to the NRC on 12/19/02.

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	0.180	5.833	0.114	124
February	0.166	5.833	0.065	124
March	0.401	5.833	0.160	124
April	0.166	5.833	0.091	124
May	0.185	5.833	0.129	124
June	0.157	5.833	0.155	124
July	0.374	5.833	0.138	124
August	0.069	5.833	0.079	124
September	0.212	5.833	0.079	124
October	0.169	5.833	0.054	124
November	0.176	5.833	0.094	124
December	0.187	5.833	0.121	124
Total	2.442	70.00	1.279	1488
% of Allowable	3.49%	----------	0.09%	----------

* **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 values (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 two highest had beta activity of 110 and 52 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. 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 (12/1/01 – 11/30/02)

	Deep Dose Equivalent	Shallow Dose Equivalent	
Name	Whole Body (Rem)	Whole Body (Rem)	Extremity (Rem)
Aakhus-Witt A.	0.000	0.000	0.098
DeBey, T	0.037	0.053	0.084
Helfer, P	0.023	0.023	0.083
Liles, D	0.014	0.014	0.000
Perryman, R	0.173	0.195	0.411

Note: December's personnel dosimetry results are not available at this time.

Reactor visitors and occasional experimenters wore pocket dosimeters that resulted in no individual reading that was greater than three (3) 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	0.0031	0.0029	0.0079	0.0023	0.0162
Cooling Tower Fence	0.0097	0.0023	0.0000	0.0000	0.012
West Vehicle Gate	0.0095	0.0048	0.005	0.004	0.0233
West Room 151 Gate	0.0068	0.0078	0.0000	0.0000	0.0146
Southwest Light Pole	0.0034	0.0042	0.0029	0.0000	0.0105
Control (background)	0.022	0.0267	0.0253	0.0316	0.1057
Southeast Light Pole	0.0000	0.0000	0.0000	0.0045	0.0045

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

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.