United States Department of the Interior

GEOLOGICAL SURVEY
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IN REPLY REFER TO:

January 10, 2006

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 O-11-D-19

ADD

U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 2005 - DECEMBER 31, 2005

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

I. **Personnel Changes**: One personnel change occurred in CY 2005 with the hiring of Paul Lietz as a reactor operator trainee.

II. **Operating Experience**

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 2005. 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 Discipline – INAA	960
Geologic Discipline - Geochronology	565
Non-USGS affiliated	764
Total	2716

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

B. During the report period, 160 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 545.

III. Tabulation of Energy Generated

	MWH operated	Critical hours	Pulses
Jan	15.016	16h 57m	0
Feb	25.818	26h 12m	0
Mar	27.850	28h 46m	0
Apr	61.050	62h 44m	0
May	34.687	35h 58m	0
June	38.450	39h 36m	0
July	57.797	64h 48m	0
Aug	38.980	40h 04m	0
Sept	42.792	43h 56m	0
Oct	92.673	98h 03m	0
Nov	15.380	16h 02m	0
Dec	20.638	22h 05m	0
Totals	471.131	495h 11m	0

IV. Unscheduled Shutdowns

Number	Date	Cause
1005	2/28/05	DAC DIS064 timeout
1006	7/27/05	DAC DIS064 timeout
1007	7/28/05	Loss of building AC power
1008	12/15/05	Building evacuation alarm

V. Significant Maintenance Operations

1. The ion exchange resin was replaced in January.
2. The main exhaust fan and motor were replaced in October.
3. The secondary sump covers were replaced in December.
4. A ¾" secondary pipe drain was plugged in December. This pipe was unplugged and a section of it was replaced along with a new gate valve.

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)	**Ar-41 License Allowable** (Ci) (R-113)	Tritium (HTO) (mCi) *	**10CFR20 Allowable H-3** (mCi)
January	0.054	5.8	0.063	124
February	0.071	5.8	0.076	124
March	0.643	5.8	0.164	124
April	0.361	5.8	0.067	124
May	0.127	5.8	0.067	124
June	0.122	5.8	0.056	124
July	0.167	5.8	0.164	124
August	0.095	5.8	0.067	124
September	0.058	5.8	0.067	124
October	0.417	5.8	0.055	124
November	0.398	5.8	0.067	124
December	0.048	5.8	0.055	124
Total	2.993	69.6	0.968	1488
% of Allowable	4.3%	————	0.065%	————

* **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 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. Thirteen 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 x 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. Two areas were identified greater than 30 pCi/100 cm^2 beta contamination. One was near the decon sink in room 151 @ 53 pCi/100 cm^2; the other @ 48 pCi/100 cm^2 was near the east exit door of Building 10. 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. TLD dosimeters were used at four outdoor environmental stations. Reactor facility visitors are issued self-reading dosimeters. Reactor staff personnel are issued beta/gamma/neutron badges.

Table 2. Personnel Monitoring Results (12/1/04 – 11/30/05)

	Deep Dose Equivalent	Shallow Dose Equivalent	
Name	Whole Body (Rem)	Whole Body (Rem)	Extremity (Rem)
DeBey, T	0.180	0.362	1.883
Lightner,G	0.236	0.348	0.503
Liles, D	0.131	0.259	0.608
Perryman, R	0.110	0.798	0.539

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 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	0.0015	0.00	0.017	0.031	0.0495
Cooling Tower Fence	0.00	0.00	0.002	0.011	0.013
West Vehicle Gate	0.00	0.00	0.009	0.014	0.023
West Room 151 Gate	0.00	0.00	0.014	0.014	0.028
Southwest Light Pole	0.00	0.00	0.004	0.004	0.008
Control (background)	0.0268	0.0203	0.029	0.037	0.1131
Southeast Light Pole	0.00	0.00	0.00	0.001	0.001

Note: Above totals (except control) have the background subtracted (see control). The environmental TLDs were supplied and evaluated by Global Dosimetry.

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. Soil and water samples are taken every two years and were not taken in 2005.