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Department of the Interior
US Geological Survey
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January 19, 2007

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

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U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 2006 - DECEMBER 31, 2006

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

I. **Personnel Changes**: One Senior Reactor Operator staff member retired on January 20, 2006 after about 37 years of service at the facility.

II. **Operating Experience**

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 2006. 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	944
Geologic Discipline - Geochronology	351
Non-USGS	941
Total	2236

A. Thermal power calibrations were performed in February and August, 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 300.

III. Tabulation of Energy Generated

	MWH operated	Critical hours	Pulses
Jan	26.428	30h 35m	0
Feb	30.494	44h 46m	2
Mar	30.337	32h 36m	1
Apr	34.700	36h 21m	0
May	61.167	62h 02m	0
June	49.422	51h 51m	0
July	24.846	27h 19m	0
Aug	47.433	49 00m	0
Sept	53.766	55h 21m	0
Oct	29.950	31h 20m	0
Nov	39.082	40h 12m	0
Dec	21.794	26h 47m	0
Totals	449.419	488h 10m	3

IV. Unscheduled Shutdowns

Number	Date	Cause
1009	2/1/06	NP1000 hi power during square wave training
1010	2/8/06	DAC DIS064 timeout
1011	3/2/06	DAC DIS064 timeout
1012	3/30/06	NP1000 hi power during square wave training
1013	5/18/06	Network fault
1014	5/18/06	DAC DIS064 timeout
1015	5/30/06	DAC DIS064 timeout
1016	5/30/06	DAC DIS064 timeout
1017	9/27/06	NPP low high voltage
1018	9/27/06	DAC DIS064 timeout
1019	9/28/06	NPP 1000 hi power while going to full power
1020	11/17/06	NPP1000 hi power; transient rod UP switch failed shut and caused continuous rod withdrawal
1021	12/8/06	DAC DIS064 timeout

V. Significant Maintenance Operations

1. The two console cooling fans were replaced in April.
2. The secondary cooling pump shaft packing was replaced in April.
3. The magnet for the Shim 1 rod drive was replaced in July.
4. The ion exchange resin was replaced in July.
5. The transient rod UP switch was replaced in November.

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	0.307	5.833	0.060	124
February	0.036	5.833	0.049	124
March	0.047	5.833	0.060	124
April	0.095	5.833	0.0	124
May	0.130	5.833	0.075	124
June	0.181	5.833	0.0	124
July	0.155	5.833	0.098	124
August	0.091	5.833	0.0	124
September	0.165	5.833	0.0	124
October	0.351	5.833	0.074	124
November	0.293	5.833	0.0	124
December	0.195	5.833	0.079	124
Total	2.046	70.00	0.495	1488
% of Allowable	2.96%	----------	0.03%	----------

* **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. No solid waste shipments were 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) 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 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. Three areas were identified greater than 30 pCi/100 cm^2 beta contamination. One 71.3 pCi/100 cm^2 was near the large cave in the reactor bay, 55.2 pCi/100 cm^2 was near the walk thru on the east side of the reactor console, and 45.9 pCi/100 cm^2 was near the middle of building 10. One area that was identified greater then 15 pCi/100 cm^2 alpha was near the walk thru on the east side of the reactor console. 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 beta, gamma, albedo neutron badges.

Table 2. Personnel Monitoring Results (12/1/05 – 11/30/06)

	Deep Dose Equivalent	Shallow Dose Equivalent	
Name	Whole Body (Rem)	Whole Body (Rem)	Extremity (Rem)
DeBey, T	0.237	0.261	0.430
Lightner,G	0.117	0.165	0.211
Liles, D	0.122	0.134	0.295
Lietz, P	0.073	0.074	0.231
Perryman, R	0.040	0.054	0.128

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	0.014	0.017	0.017	0.030	0.078
Cooling Tower Fence	0.004	0.005	0.000	0.001	0.010
West Vehicle Gate	0.017	0.007	0.007	0.016	0.047
West Room 151 Gate	0.019	0.016	0.030	0.061	0.126
Southwest Light Pole	0.006	0.005	0.000	0.003	0.014
Control (background)	0.039	0.031	0.039	0.038	0.147
Southeast Light Pole	0.005	0.001	0.000	0.000	0.006

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.

Environmental soil and water samples were taken and analyzed. No elevated readings or reactor-produced isotopes were identified (fallout Cs-137 was identified).