Department of the Interior
US Geological Survey
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January 15, 2009

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

Dear NRC staff,

The 2008 annual report is herein submitted for the U.S. Geological Survey TRIGA non-power reactor facility. This report is generated in compliance with our license conditions.

The facility docket number is 50-274.

Sincerely,

Timothy M. DeBey
Reactor Supervisor

Enclosure

Copy to:
Al Adams, MS 12 G-13

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NRR

U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 2008 - DECEMBER 31, 2008

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

I. Personnel Changes:

Dr. Tamara Dickinson became the Reactor Administrator on February 1, 2008, replacing Dr. Warren Day. At the same time, the reactor facility was administratively transferred from the USGS Central Region Geologic Discipline to the USGS National Headquarters Geologic Discipline due to restructuring within the USGS.

Alex Buehrle was transitioned from a part-time student employee to a full-time, permanent employee in June 2008.

Christopher Farwell was hired as a student employee and began working on September 29, 2008.

II. Operating Experience

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 2008. 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	1070
Geologic Discipline - Geochronology	1124
Non-USGS	1551
Total	3745

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

B. During the report period, 175 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	**35.437**	41h 21m	0
Feb	**58.090**	62h 20m	0
Mar	**58.086**	62h 17m	0
Apr	**66.172**	72h 6m	4
May	**50.217**	51h 42m	0
June	**23.800**	26h 18m	0
July	**43.168**	49h 24m	0
Aug	**27.102**	30h 19m	0
Sept	**25.679**	29h 1m	0
Oct	**113.962**	117h 56m	0
Nov	**70.622**	76h 37m	0
Dec	**33.656**	37h 27m	0
Totals	605.991	656h 48m	4

IV. Unscheduled Shutdowns

Number	Date	Cause
1030	02/11/08	DAC DIS064 timeout
1031	02/27/08	NP1000 hi power during sample unloading
1032	03/27/08	DAC DIS064 timeout
1033	04/17/08	DAC DIS064 timeout
1034	05/28/08	DAC DIS064 timeout
1035	06/19/08	NPP1000 hi power due to operator trainee error
1036	08/26/08	DAC DIS064 timeout
1037	08/28/08	DAC DIS064 timeout
1038	10/31/08	DAC DIS064 timeout
1039	11/04/08	DAC DIS064 timeout
1040	11/04/08	DAC DIS064 timeout
1041	12/16/08	DAC DIS064 timeout
1042	12/18/08	NM1000 communication fault scram
1043	12/23/08	DAC DIS064 timeout

V. Significant Maintenance Operations

1/08 Shim 2 rod up position indicating relay repaired
1/08 Replaced light bulb in reactor tank light
1/08 Replaced high resolution monitor power supply
3/08 Replaced NM1000 -15 vdc power supply and fixed bad wiring connections
5/08 Cleaned Shim 1 rod drive assembly barrel and dashpot to resolve inadvertent dropping of rod problem
9/08 Performed routine DOP test of HEPA filter in reactor room
10/08 Replaced the rest of the reactor tank light bulbs
11/08 Replaced the demineralizer resin
11/08 Cleaned the reactor tank
12/08 Calibrated the conductivity instrument
12/08 Replaced cracked fan pulley on the reactor room main exhaust fan
12/08 Replaced power filter capacitors (C1-C4) and potentiometer R27 in NM1000 Campbelling module

VI. Summary of 10 CFR 50.59 changes

There was one 10CFR50.59 change performed this year. The chart recorder in the Continuous Air Monitor (CAM) was replaced. The original chart recorder was an ink pen and paper recorder that was part of the original equipment installed almost 40 years ago. The replacement chart recorder is a paperless, digital recorder. The new chart recorder displays approximately 6 hours of data and digitally records all data to a compact flash storage card which is periodically backed up to a computer hard drive. This change was reviewed and approved by the facility staff and the Reactor Operations Committee.

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)	**R-113 License Allowable** (Ci)	Tritium (HTO) (mCi) *	**10CFR20 Allowable** (mCi)
January	0.203	5.833	0.0	124
February	0.510	5.833	0.104	124
March	0.440	5.833	0.0	124
April	0.370	5.833	0.092	124
May	0.282	5.833	0.0	124
June	0.103	5.833	0.098	124

Month	Argon-41 (curies)	R-113 License Allowable (Ci)	Tritium (HTO) (mCi) *	10CFR20 Allowable (mCi)
July	0.261	5.833	0.0	124
August	0.107	5.833	0.0	124
September	0.095	5.833	0.071	124
October	0.517	5.833	0.0	124
November	0.535	5.833	0.125	124
December	0.175	5.833	0.0	124
Total	3.60	70.00	0.490	1488
% of Allowable	5.1%	----------	0.033%	----------

* **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 TestAmerica Laboratories.

B. A solid low-level waste shipment of 7.5 cu.ft., part of which was reactor generated, was shipped 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 x 10^{-8} μCi/ml present for two minutes will result in an increase of about 400 cpm above background. The alarm setpoints are a low-level alarm set at 3000 cpm and the high level alarm 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. One area was

equal to 42.5 pCi/100 cm^2 beta, south side of room 149, between small cave and water filter. No areas were greater than 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 (1/1/08 – 11/30/08)

Name	Whole Body (Rem) Deep Dose Equiv.	Whole Body (Rem) Shallow Dose Equiv.	Extremity (Rem) Shallow Dose Equiv.
DeBey, T	0.030	0.030	0.069
Lightner,G	0.030	0.031	0.035
Liles, D	0.046	0.046	0.066
Buehrle,A	0.043	0.043	0.082
Roy.B	0.0190	0.0200	0.089
Farwell, C	0	0	0

Reactor visitors and occasional experimenters wore pocket dosimeters that resulted in no individual reading that was greater than two (2) 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	0.031	0.033	0.029	0.047	0.140
Cooling Tower Fence	0.008	0.001	0.002	0.007	0.018
West Vehicle Gate	0.017	0.008	0.020	0.023	0.068
West Room 151 Gate	0.022	0.015	0.022	0.021	0.080
Southwest Light Pole	0.005	0.005	0.006	0.007	0.023
Control (background)	0.041	0.037	0.033	0.037	0.148
Southeast Light Pole	0.000	0.001	0.000	0.006	0.007

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).