United States Department of the Interior
GEOLOGICAL SURVEY
BOX 25046 M.S. 974
DENVER FEDERAL CENTER
DENVER, COLORADO 80225

IN REPLY REFER TO

U.S. Nuclear Regulatory Commission

January 18, 1996

Division of Radiation Safety and Safeguards
ATTN: Samuel J. Collins, Director
611 Ryan Plaza Dr., Suite 400
Arlington, TX 76011

Dear Mr. Collins:

The attached annual report of the U.S. Geological Survey TRIGA reactor facility is submitted in accordance with license conditions. The facility docket number is 50-274.

Sincerely,

Paul G. Helfer
Acting Reactor Supervisor

Enclosure

Copy to:

Document Control Desk (2)

Mr. Blair Nicholas
USNRC
611 Ryan Plaza Dr. Suite 400
Arlington TX 76011

230085

9601250027 951231
PDR ADOCK 05000274
R PDR

A020
1/1

U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 1995 - DECEMBER 31, 1995
NRC LICENSE NO. R-113 - DOCKET NO. 50-274

I. Personnel Changes

The Reactor Health Physicist resigned in May and this position is being temporarily filled by another staff person. The Reactor Supervisor resigned in September and this position is being temporarily filled by another staff person. The facility staff consists of 2 Senior Reactor Operators, one also serves as the Acting Reactor Supervisor and one also serves as the Acting Reactor Health Physicist.

II. Operating Experience

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 1995. No major facility changes were made during the year.

A total of 188 irradiation requests were processed during the year, with the average request representing 46 samples and 7.5 full-power hours of reactor operation. 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 - Geochemistry	6,660
Geologic Division - Isotope Geology	977
Geologic Division - Cent. Mineral Res.	34
Geologic Division - Sedimentary Proc.	30
Non-USGS users	763
Total	8,464

A. Thermal power calibrations were performed in February and August, with minor adjustments required.

B. Two new Class I experiment were approved during this period. Both Class I experiments involved the activation of urine samples, with the intent of determining Th concentrations. No new Class II experiments were approved during the year.

C. During the report period, 156 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 175.

E. 38 fuel movements were performed during 1995 for the purposes of increasing reactivity and performing experiments.

III. Tabulation of Energy Generated

Month	Megawatt Hours	Time Reactor Was Critical	Number of Pulses
January	85.065	88 hours 00 minutes	0
February	76.362	80 hours 26 minutes	0
March	95.988	97 hours 22 minutes	0
April	128.901	136 hours 08 minutes	0
May	85.433	99 hours 05 minutes	0
June	63.666	67 hours 30 minutes	0
July	96.500	97 hours 48 minutes	0
August	58.386	61 hours 10 minutes	0
September	28.188	29 hours 00 minutes	0
October	46.463	47 hours 42 minutes	0
November	56.317	57 hours 26 minutes	0
December	56.000	64 hours 49 minute	0
Totals	877.269	926 hours 26 minutes	0

IV. Unscheduled Shutdowns

Serial No.	Date	Cause
644	1/10	Manual scram, Rabbit stuck in transfer tube.
645	1/12	CSC watchdog scram due to computer lockup.
646	1/18	CSC watchdog scram due to computer lockup.
647	1/20	CSC watchdog scram due to computer lockup.
648	2/1	CSC watchdog scram due to computer lockup.
649	2/13	CSC watchdog scram due to computer lockup
650	2/14	CSC watchdog scram due to computer lockup.
651	3/1	CSC watchdog scram due to computer lockup.
652	3/7	CSC watchdog scram due to computer lockup.
653	3/7	CSC watchdog scram due to computer lockup.
654	3/8	CSC watchdog scram due to computer lockup.
655	3/9	CSC watchdog scram due to computer lockup.
656	3/10	CSC watchdog scram due to computer lockup.
657	3/16	DAC watchdog scram due to computer lockup.
658	3/22	CSC watchdog scram due to computer lockup.
659	4/6	CSC watchdog scram due to computer lockup.
660	4/10	CSC watchdog scram due to computer lockup.
661	4/11	CSC watchdog scram due to computer lockup.
662	4/17	CSC watchdog scram due to computer lockup.
663	4/26	CSC watchdog scram due to computer lockup.
664	4/26	CSC watchdog scram due to computer lockup.
665	4/27	CSC watchdog scram due to computer lockup.
666	4/27	CSC watchdog scram due to computer lockup.
667	5/1	CSC watchdog scram due to computer lockup.
668	5/5	CSC watchdog scram due to computer lockup.
669	5/18	CSC watchdog scram due to computer lockup.
670	5/24	CSC watchdog scram due to computer lockup.
671	5/24	CSC watchdog scram due to computer lockup.

672	6/6	CSC watchdog scram due to computer lockup.
673	6/7	CSC watchdog scram due to computer lockup.
674	6/9	CSC watchdog scram due to computer lockup.
675	6/9	CSC watchdog scram due to computer lockup.
676	6/9	CSC watchdog scram due to computer lockup.
677	6/14	CSC watchdog scram due to computer lockup.
678	7/5	AC Power dip.
679	7/14	CSC watchdog scram due to computer lockup.
680	7/18	CSC watchdog scram due to computer lockup.
681	7/19	CSC watchdog scram due to computer lockup.
682	7/21	CSC watchdog scram due to computer lockup.
683	7/27	NPP 1000 scram
684	8/7	CSC watchdog scram due to computer lockup.
685	8/9	CSC watchdog scram due to computer lockup.
686	8/16	CSC watchdog scram due to computer lockup.
687	8/29	Auto reboot.
688	8/29	CSC watchdog scram due to computer lockup.
689	9/6	CSC watchdog scram due to computer lockup.
690	9/8	AC Power dip, NM1000 data error scram
691	9/20	NM1000 data error scram
692	10/13	CSC watchdog scram due to computer lockup.
693	10/18	CSC watchdog scram due to computer lockup.
694	11/1	CSC watchdog scram due to computer lockup.
695	11/2	CSC watchdog scram due to computer lockup.
696	11/6	CSC watchdog scram due to computer lockup.
697	11/16	CSC watchdog scram due to computer lockup.
698	11/29	NPP 1000 scram.
699	11/29	CSC watchdog scram due to computer lockup.
700	12/13	CSC watchdog scram due to computer lockup.
701	12/15	CSC watchdog scram due to computer lockup.
702	12/19	CSC watchdog scram due to computer lockup.

V. Major Maintenance Operations

A Fuel Follower control rod (SHIM-2) was replaced with a new rod. The primary coolant pump was replaced. The secondary cooling tank was cleaned and coated. Other less significant activities included the troubleshooting and replacement of several items in the digital control system and replacement of the ion exchange resin in January, June and November.

VI. Summary of 10 CFR 50.59 changes

There was one 50.59 change at the facility during this report period. It was a change to Section 5.2.4 of the Reactor Operations Manual. This section was changed from "5.2.4 At least two reactor staff members must be present at the reactor site whenever the reactor is operating. The operator at the console shall be an NRC-licensed operator and shall be informed of the location of the second person. The Senior Reactor Operator-in-Charge of the particular experiment shall be one of the two staff members on site". Changed to "5.2.4 At least two reactor staff members must be on duty whenever the reactor is operating. The operator at the console shall be an NRC-licensed operator and the second person must be able to reach the facility within 15 minutes after being contacted by the console operator. A method of communication must be available so that the operator at the console is able to contact the second person within a 5 minute time period. The Senior Reactor Operator-in-Charge of the operation must be one of the two staff members on duty, and must be at the facility during reactor start-up , approach to power, recovery from unplaned shutdown, recovery from an unscheduled significant power reduction, relocation of any in-core experiment or core component (other than normal control rod movements) with a reactivity worth greater than one dollar, or fuel movement.
The safety committee evaluation of the change made under the provisions of 10CFR50.59 concluded that the changes to the Reactor Staffing requirements

1. does not increase the probability of occurrence or the consequences of an accident or malfunction of equipment important to safety previously evaluated in the safety analysis report,
2. does not create the possibility for an accident or malfunction of a different type than any evaluated previously in the safety analysis report, and
3. does not reduce the margin of safety as defined in the basis for any technical specification.

VII. . Radioactivity Releases

A. Listed below are the total amounts of radioactive gaseous effluents released to the environs beyond the effective control of the reactor facility.

Month	Argon-41 (Curies)	License (R-113) Allowable (Curies)	Tritium (HTO) (mCuries)	10 CFR 20 Allowable (mCuries)
January	0.450	5.8	0.221	250
February	0.510	5.8	0.114	250
March	0.410	5.8	0.295	250
April	0.590	5.8	0.114	250
May	0.290	5.8	0.239	250
June	0.160	5.8	0.076	250
July	1.060	5.8	0.032	250
August	0.200	5.8	0.760	250
September	1.030	5.8	0.131	250
October	0.160	5.8	0.125	250
November	0.190	5.8	0.091	250
December	0.190	5.8	0.127	250
Total	5.240	70.0	2.325	3000
% of allowable limits:		7.49%		.078%

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 Colorado State University and Barringer Labs (December).

B. No low level solid waste or solidified resin 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 in 55-gallon drums.

VIII. Radiation Monitoring

A. 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 infrequent and due to sample movements.

2. One Continuous Air Monitor (CAM) sampling the air in the reactor bay. An equilibrium concentration of about 1 x 10^{-8} uCi/ml present for two minutes will result in an increase of 520 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 multichannel analyzer counting system. The charcoal filter, fitted behind the air filter, is also changed and counted weekly. In all instances, final sample calculations showed less than 10 CFR Part 20 Appendix B concentrations for all isotopes in question in the reactor bay.

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 G4020 low level counting system.

Fourteen contaminated areas were noted during routine wipe surveys. Beta activities ranging from 30 to 790 pCi/100 cm^2 were noted. Soap and water were used to remove this contamination. The roof area over the reactor tank is roped off and posted as a radiation area (averaging 1.5 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. Li-7 TLD dosimeters have been used at six outdoor environmental stations. Reactor facility visitors are issued self-reading dosimeters. Reactor staff personnel are issued albedo neutron badges.

Personnel monitoring results are categorized below:

	Deep Dose Equivalent	Shallow Dose Equivalent	
	Whole Body	Whole Body	Extremity
Reactor Staff			
Helfer P.	80	80	140
Perryman R.	30	90	130
DeBey T.**	80	80	140
Lassel S.**	20	20	120

Dose is in millirem and includes information from dosimetry reports for period 12-01-94 to 11-30-95. Report for Dec., 1995 has not been received

** DeBey monitoring period 12-01-94 to 09-15-95
** Lassel monitoring period 12-01-94 to 05-23-95

Reactor Visitors and Occasional Experimenters

No individual reading was greater than 1 mrem.

Environmental Stations - TLD Monitoring Results

Location	RAD
Exhaust Stack	0.1542
West Gate (Rm 149)	0.0514
Loading Dock Gate (Rm 151)	0.0992
Fence (by Cooling Tower)	0.0372
Southwest Light Pole	0.0136
Southeast Light Pole	0.0100
- Control (background)	0.1732

Note: Above totals have the background subtracted (see Control).

IX. Environmental Monitoring

Pursuant to GSTR procedures, on and off-site soil and water samples are collected and analyzed on a biennial basis. Environmental soil and water samples were collected in 1994.

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.