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

IN REPLY REFER TO:

January 18, 1995

Mr. Samuel Collins
Director, Region IV
U.S. Nuclear Regulatory Commission
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,

Timothy M. DeBey
Reactor Supervisor

Enclosure

Copy to:

Document Control Desk (2)

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

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U.S. GEOLOGICAL SURVEY TRIGA REACTOR

ANNUAL REPORT

JANUARY 1, 1994 - DECEMBER 31, 1994

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

I. Personnel Changes

The Reactor Health Physicist resigned in March and was temporarily replaced by another staff person. A permanent, full time replacement for the Reactor Health Physicist was hired in September. The facility staff continues to be 4 full time employees (reactor operators and health physicist).

II. Operating Experience

The Geological Survey TRIGA Reactor (GSTR) was in normal operation for the year 1994. No major facility changes were made during the year.

A total of 240 irradiation requests were processed during the year, with the average request representing 55 samples and 9 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	10,809
Geologic Division - Isotope Geology	1,344
Geologic Division - Cent. Mineral Res.	21
Geologic Division - Sedimentary Proc.	8
Non-USGS users	970
Total	13,152

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

B. One new Class I experiment was approved during this period. The Class I experiment involved the activation of a rock and mineral samples. No new Class II experiments were approved during the year.

C. 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.

D. Tours were provided to individuals and groups during the year for a total visitor count of approximately 205.

E. Six fuel movements were performed during 1994 for the purposes of increasing reactivity, performing experiments and the removal of a leaking element.

III. Tabulation of Energy Generated

Month	Megawatt Hours	Time Reactor Was Critical	Number of Pulses
January	107.679	109 hours 47 minutes	0
February	117.890	121 hours 41 minutes	0
March	163.100	166 hours 19 minutes	0
April	80.479	88 hours 20 minutes	0
May	75.500	76 hours 19 minutes	0
June	120.850	122 hours 3 minutes	0
July	54.009	55 hours 16 minutes	0
August	74.641	76 hours 36 minutes	0
September	105.413	107 hours 29 minutes	0
October	80.567	81 hours 34 minutes	0
November	82.295	83 hours 56 minutes	0
December	132.250	133 hours 1 minute	0
Totals	1194.673	1228 hours 21 minutes	0

IV. Unscheduled Shutdowns

Serial No.	Date	Cause
580	1/20	CSC watchdog scram due to computer lockup.
581	1/20	CSC watchdog scram due to computer lockup.
582	2/1	NM1000 data error scram.
583	2/1	NM1000 data error scram.
584	2/1	NM1000 data error scram.
585	2/1	NM1000 data error scram.
586	2/8	CSC watchdog scram due to computer lockup.
587	2/11	CSC watchdog scram due to computer lockup.
588	2/23	CSC watchdog scram due to computer lockup.
589	2/24	CSC watchdog scram due to computer lockup.
590	3/8	CSC watchdog scram due to computer lockup.
591	3/17	CSC watchdog scram due to computer lockup.
592	3/23	CSC watchdog scram due to computer lockup.
593	3/31	CSC watchdog scram due to computer lockup.
594	4/29	CSC watchdog scram due to computer lockup.
595	5/4	CSC watchdog scram due to computer lockup.
596	5/17	NPP 1000 scram.
597	5/18	CSC watchdog scram due to computer lockup.
598	5/26	CSC watchdog scram due to computer lockup.
599	6/14	CSC watchdog scram due to computer lockup.
600	6/15	CSC watchdog scram due to computer lockup.
601	6/21	CSC watchdog scram due to computer lockup.
602	6/23	CSC watchdog scram due to computer lockup.
603	6/29	CSC watchdog scram due to computer lockup.
604	6/29	CSC watchdog scram due to computer lockup.
605	7/27	CSC watchdog scram due to computer lockup.
606	8/8	CSC watchdog scram due to computer lockup.
607	8/8	CSC watchdog scram due to computer lockup.

608	8/10	CSC watchdog scram due to computer lockup.
609	8/10	CSC watchdog scram due to computer lockup.
610	8/16	CSC watchdog scram due to computer lockup.
611	8/24	CSC watchdog scram due to computer lockup.
612	9/19	CSC watchdog scram due to computer lockup.
613	9/26	CSC watchdog scram due to computer lockup.
614	9/28	CSC watchdog scram due to computer lockup.
615	9/29	CSC watchdog scram due to computer lockup.
616	9/30	CSC watchdog scram due to computer lockup.
617	10/12	CSC watchdog scram due to computer lockup.
618	10/12	Database timeout scram
619	10/12	Database timeout scram
620	10/12	Database timeout scram
621	10/13	Database timeout scram
622	10/13	Database timeout scram
623	10/13	Database timeout scram
624	10/13	Database timeout scram
625	10/14	Database timeout scram
626	10/19	NM1000 data error scram
627	10/19	CSC watchdog scram due to computer lockup.
628	10/28	CSC watchdog scram due to computer lockup.
629	11/1	CSC watchdog scram due to computer lockup.
630	11/8	CSC watchdog scram due to computer lockup.
631	11/9	CSC watchdog scram due to computer lockup.
632	11/22	CSC watchdog scram due to computer lockup.
633	11/29	CSC watchdog scram due to computer lockup.
634	11/30	CSC watchdog scram due to computer lockup.
635	12/2	CSC watchdog scram due to computer lockup.
636	12/6	CSC watchdog scram due to computer lockup.
637	12/7	CSC watchdog scram due to computer lockup.
638	12/7	CSC watchdog scram due to computer lockup.
639	12/8	CSC watchdog scram due to computer lockup.
640	12/8	CSC watchdog scram due to computer lockup.
641	12/14	CSC watchdog scram due to computer lockup.
642	12/15	CSC watchdog scram due to computer lockup.
643	12/15	CSC watchdog scram due to computer lockup.

V. Major Maintenance Operations

An instrumented fuel element developed a cladding leak on 1/4/94 and was located and removed from the core on 1/5/94. A total release of fission product gases was estimated to be 259 microCuries for this event. A separate report detailing the event was sent to the NRC in January, 1994. 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 May.

VI. Summary of 10 CFR 50.59 changes

There were no 50.59 charges at the facility during this report period.

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	0.625	5.8	0.133	250
February	0.673	5.8	0.162	250
March	0.828	5.8	0.208	250
April	0.345	5.8	0.159	250
May	0.193	5.8	0.155	250
June	0.359	5.8	0.162	250
July	0.326	5.8	0.179	250
August	0.505	5.8	0.175	250
September	0.592	5.8	0.191	250
October	0.729	5.8	0.204	250
November	0.449	5.8	0.184	250
December	0.848	5.8	0.209	250
Total	6.472	70.0	2.121	3000
% of allowable limits:		9.25%		.071%

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.

B. No low level solid waste or solidified resin was shipped for burial in Washington state during the year and no contaminated water was discharged to the sewer system.

Note: The principal radioactive waste generated at the reactor facility is the demineralizer resin - used resin with small quantities of rinse water was solidified 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. Eighteen 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. A Continuous Air Monitor (CAM) samples the air in the reactor bay. An equilibrium particulate concentration of about 1×10^{-8} uCi/ml present for two minutes will result in an increase of 500 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, filter analyses showed that no reactor-produced isotopes were present on the filters.

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.

Thirty contaminated areas were noted within the facility during routine wipe surveys. Beta activities ranging from 30 to 1219 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 2.5 mR/hr) during 1 MW operations.

4. Personnel, X and gamma, beta and neutron dosimeters are assigned to all permanent occupants of the Nuclear Science Building. $CaSO_4$:Dy and LiF 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:

	Rem		
	Deep Dose Equivalent	Shallow Dose Equivalent	Neutron Dose Equivalent
Reactor Staff			
Whole Body Cumulative Dose for Calendar Year (through 11-30-94)			
Highest	0.073	0.073	0.000
Hands Cumulative Shallow Dose for Calendar Year			
Highest		0.106	
Reactor Experimenters			
Whole Body Cumulative Dose for Calendar Year			
Highest	0	0	0
Hands Cumulative Dose for Calendar Year			
Highest		0.129	

Reactor Visitors and Occasional Experimenters

No individual reading was greater than 4 mrem.

Note: Personnel dosimetry results are for January 1st through November 30th. The results for December have not yet been received.

Environmental Stations - TLD Monitoring Results

Location	RAD
Exhaust Stack	0.1317
West Gate (Rm 149)	0.0399
Loading Dock Gate (Rm 151)	0.0989
Fence (by Cooling Tower)	0.0205
Southwest Light Pole	0.0109
Southeast Light Pole	0.0018
- Control (background)	0.1247

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. The attached map gives the locations of the soil samples taken on the Denver Federal Center. Subsequent lists are attached that give the locations of offsite soil samples, and water samples that were collected at various nearby locations. The analyses results for the samples are in the final attachment. All sample activity concentrations are of the same relative magnitude as those of previous samples.

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.

OFFSITE SOIL SAMPLES

Sample Number	Location
OS-1	Glennon Heights School, West Virginia and Pierson streets. About 10 feet east of north entrance gate.
OS-2	Divinney Elementary School, South Welch Circle and South Wright streets. About 30 feet north of incenerator inside of fenced area.
OS-3	West Florida and South Kindall streets, at northwest corner near base of street light.
OS-4	Ninth and Quitman streets at base of street light.
OS-5	Sloans Lake, 50 feet north of Recreation Center building.
OS-6	Jefferson County Park at 33rd and Fenton, on softball diamond, 3rd base line at edge of grass.
OS-7	Jefferson Avenue Methodist Church, 44th and Kipling streets, under sign in front of building.
OS-8	Carl G. Morse Park, 20th and Allison streets, on softball diamond, at home plate.
OS-9	Moffat Water Treatment Plant on 20th Avenue, west side of entrance gate.
OS-10	Lakewood Country Club at 10th and Pierce streets, approximately 20 feet inside of ncrth gate.
OS-11	Washington Heights School at West 1st Avenue and Lamar streets, at baseball field, first base.
OS-12	Alameda Park at Harlan and Jefferson Place, north baseball field, in back of baseball field backstop.
OS-13	East side of Kipling across from gate 1 of the Federal Center, between east side of street and the athletic field.

ALL WATER SAMPLES (1 liter volume)

W-1	At pedestrian bridge crossing the stream at 3rd and Center Avenue on Federal Center.
W-2	At the "duck pond", east side of Federal Center, on the west side of the pond.
W-3	Ward Reservoir No.1, at the north end, at the boat ramp.
W-4	Sloans Lake, south side.
W-5	Clear Creek at the Youngfield Street bridge.
W-6	Kendrick Reservoir, at the east side.

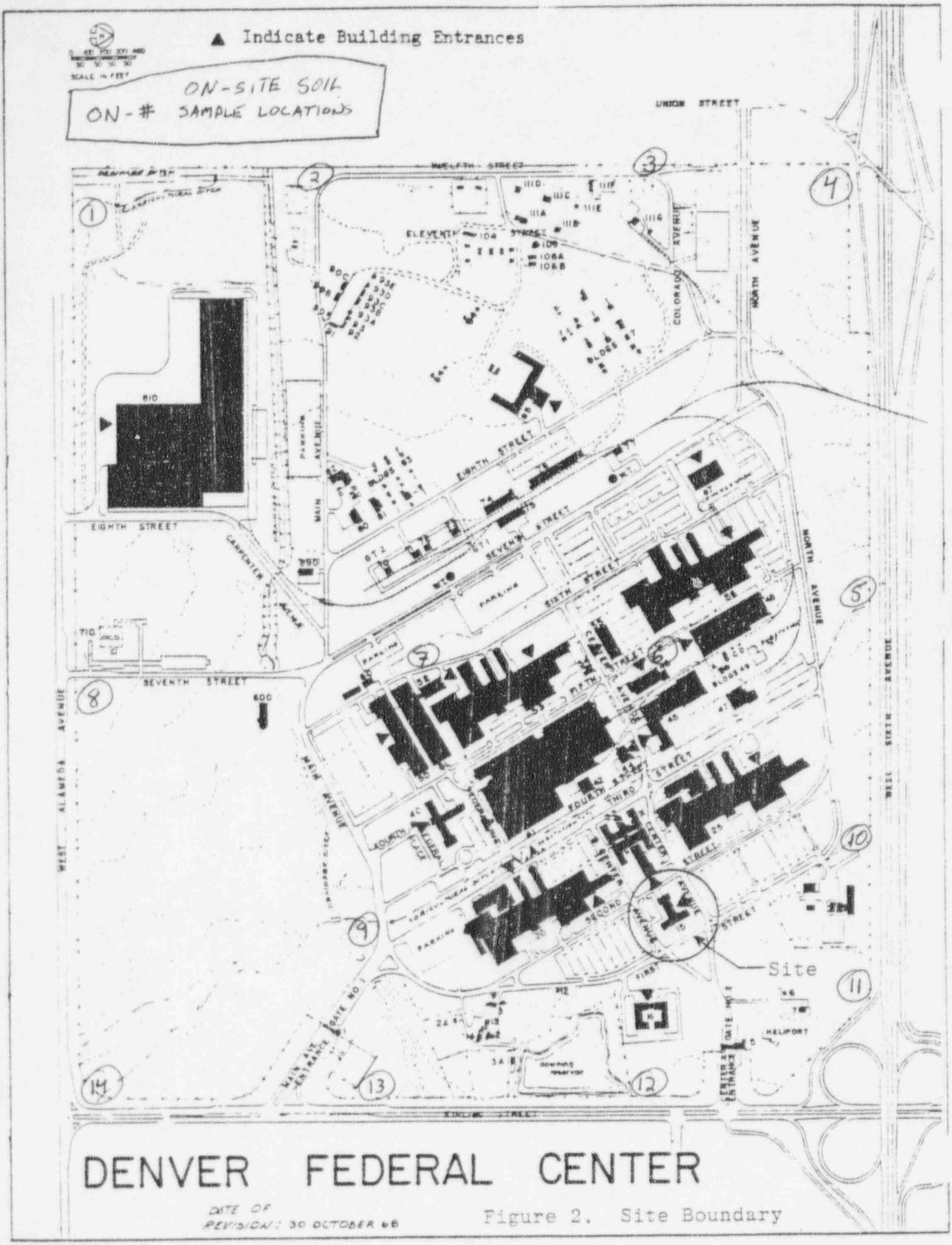

Figure 2. Site Boundary

Sample OS-1		
Nuclide	Conc. (pCi/g)*	±1.96 سس
Cs-134	-0.01	0.05
Cs-137	0.07	0.05
Th-232	0.81	0.19
Co-60	-0.01	0.04
Ra-226	0.72	0.10
Fe-59	0.08	0.18
Mn-54	0.02	0.05
Zr-95	-0.06	0.10
mg K-40/g	16	1.2
U-238	2.5	2.5

Sample OS-2		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.019	0.039
Cs-137	0.085	0.046
Th-232	0.84	0.16
Co-60	0.027	0.037
Ra-226	0.37	0.074
Fe-59	0.15	0.17
Mn-54	0.010	0.039
Zr-95	-0.056	0.085
mg K-40/g	14	0.93
U-238	1.8	2.2

Sample OS-3		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.023	0.036
Cs-137	0.12	0.041
Th-232	0.77	0.14
Co-60	-0.0049	0.034
Ra-226	0.61	0.072
Fe-59	-0.084	0.069
Mn-54	-0.0063	0.030
Zr-95	0.071	0.14
mg K-40/g	15	0.84
U-238	0.94	1.9

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample OS-4		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.015	0.042
Cs-137	0.062	0.046
Th-232	0.75	0.16
Co-60	-0.017	0.037
Ra-226	0.77	0.088
Fe-59	-0.087	0.083
Mn-54	0.016	0.042
Zr-95	0.039	0.16
mg K-40/g	16	0.97
U-238	3.7	2.2

Sample OS-5		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.0074	0.036
Cs-137	0.16	0.041
Th-232	1.1	0.15
Co-60	-0.020	0.031
Ra-226	0.64	0.075
Fe-59	0.062	0.14
Mn-54	-0.017	0.031
Zr-95	0.13	0.15
mg K-40/g	14	0.79
U-238	2.0	1.9

Sample OS-6		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.016	0.038
Cs-137	0.071	0.044
Th-232	1.1	0.16
Co-60	0.0086	0.038
Ra-226	0.53	0.076
Fe-59	-0.051	0.077
Mn-54	-0.019	0.034
Zr-95	-0.0047	0.091
mg K-40/g	20	2.0
U-238	0.44	2.0

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample OS-7		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.0037	0.036
Cs-137	0.38	0.046
Th-232	1.6	0.15
Co-60	0.0085	0.031
Ra-226	1.1	0.079
Fe-59	-0.0096	0.066
Mn-54	0.021	0.036
Zr-95	-0.018	0.084
mg K-40/g	14	0.72
U-238	0.17	1.8

Sample OS-8		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.030	0.041
Cs-137	0.090	0.045
Th-232	0.92	0.15
Co-60	-0.0011	0.035
Ra-226	0.60	0.082
Fe-59	-0.016	0.082
Mn-54	-0.012	0.035
Zr-95	-0.036	0.086
mg K-40/g	17	0.96
U-238	2.5	2.0

Sample OS-9		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.025	0.041
Cs-137	0.18	0.048
Th-232	0.77	0.16
Co-60	-0.020	0.037
Ra-226	0.72	0.089
Fe-59	-0.017	0.080
Mn-54	0.010	0.039
Zr-95	0.088	0.17
mg K-40/g	14	0.91
U-238	1.2	2.2

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample OS-10		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.0082	0.045
Cs-137	0.20	0.053
Th-232	0.90	0.18
Co-60	-0.034	0.040
Ra-226	0.73	0.094
Fe-59	0.0046	0.23
Mn-54	-0.034	0.038
Zr-95	-0.00072	0.099
mg K-40/g	16	1.0
U-238	-1.4	2.3

Sample OS-11		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.024	0.042
Cs-137	0.29	0.052
Th-232	1.2	0.17
Co-60	0.0022	0.040
Ra-226	0.83	0.085
Fe-59	-0.033	0.079
Mn-54	0.0062	0.040
Zr-95	-0.027	0.090
mg K-40/g	17	0.92
U-238	0.19	2.1

Sample OS-12		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.048	0.046
Cs-137	0.35	0.063
Th-232	1.0	0.19
Co-60	0.078	0.044
Ra-226	0.80	0.098
Fe-59	-0.070	0.086
Mn-54	0.012	0.051
Zr-95	0.14	0.21
mg K-40/g	15	1.0
U-238	2.7	2.5

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample OS-13		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.017	0.029
Cs-137	0.17	0.033
Th-232	1.1	0.11
Co-60	-0.0081	0.026
Ra-226	0.79	0.060
Fe-59	-0.0078	0.052
Mn-54	0.020	0.029
Zr-95	0.0068	0.12
mg K-40/g	16	0.64
U-238	1.7	1.4

Sample ON-1		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.0012	0.017
Cs-137	0.11	0.020
Th-232	0.87	0.069
Co-60	-0.0012	0.016
Ra-226	0.67	0.037
Fe-59	0.00090	0.051
Mn-54	0.016	0.017
Zr-95	0.026	0.052
mg K-40/g	15	0.41
U-238	1.6	0.92

Sample ON-2		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.00071	0.030
Cs-137	0.12	0.036
Th-232	0.86	0.12
Co-60	-0.0021	0.027
Ra-226	0.70	0.064
Fe-59	-0.061	0.058
Mn-54	0.0074	0.029
Zr-95	-0.00041	0.066
mg K-40/g	15	0.70
U-238	0.73	1.6

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample ON-3		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.014	0.011
Cs-137	0.053	0.012
Th-232	1.1	0.045
Co-60	-0.00017	0.0095
Ra-226	0.71	0.023
Fe-59	-0.0093	0.020
Mn-54	-0.010	0.0097
Zr-95	-0.026	0.025
mg K-40/g	13	0.23
U-238	1.1	0.55

Sample ON-4		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.0054	0.044
Cs-137	0.084	0.047
Th-232	1.0	0.18
Co-60	-0.020	0.039
Ra-226	0.62	0.090
Fe-59	0.034	0.13
Mn-54	-0.0019	0.037
Zr-95	0.046	0.13
mg K-40/g	12	0.90
U-238	1.3	2.3

Sample ON-5		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.036	0.017
Cs-137	0.14	0.043
Th-232	0.77	0.14
Co-60	0.033	0.035
Ra-226	0.56	0.072
Fe-59	0.0098	0.12
Mn-54	-0.0066	0.032
Zr-95	0.062	0.11
mg K-40/g	14	0.84
U-238	1.8	1.8

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample ON-6		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.020	0.028
Cs-137	0.11	0.034
Th-232	0.86	0.11
Co-60	-0.017	0.026
Ra-226	0.53	0.059
Fe-59	0.018	0.093
Mn-54	0.024	0.028
Zr-95	-0.0096	0.064
mg K-40/g	15	0.67
U-238	1.3	1.5

Sample ON-7		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.023	0.037
Cs-137	0.087	0.042
Th-232	0.90	0.15
Co-60	-0.013	0.036
Ra-226	0.54	0.076
Fe-59	0.074	0.13
Mn-54	-0.0046	0.035
Zr-95	0.013	0.12
mg K-40/g	19	0.97
U-238	1.2	2.0

Sample ON-8		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.016	0.040
Cs-137	0.13	0.046
Th-232	0.89	0.16
Co-60	-0.032	0.036
Ra-226	0.62	0.081
Fe-59	0.040	0.13
Mn-54	0.023	0.039
Zr-95	0.073	0.13
mg K-40/g	15	0.95
U-238	-0.92	2.0

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample ON-9		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.017	0.039
Cs-137	0.22	0.048
Th-232	0.84	0.15
Co-60	0.013	0.039
Ra-226	0.67	0.083
Fe-59	0.082	0.14
Mn-54	-0.0058	0.034
Zr-95	-0.053	0.086
mg K-40/g	15	0.90
U-238	0.072	2.1

Sample ON-10		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.0039	0.034
Cs-137	0.19	0.043
Th-232	1.0	0.15
Co-60	-0.032	0.033
Ra-226	0.61	0.075
Fe-59	0.031	0.14
Mn-54	-0.0065	0.033
Zr-95	-0.0097	0.081
mg K-40/g	15	0.82
U-238	-0.0078	1.9

Sample ON-11		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.0078	0.045
Cs-137	0.40	0.063
Th-232	1.2	0.19
Co-60	0.019	0.042
Ra-226	0.75	0.096
Fe-59	0.098	0.16
Mn-54	0.0012	0.043
Zr-95	-0.062	0.10
mg K-40/g	16	1.0
U-238	0.066	2.3

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g.

Sample ON-12		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.013	0.035
Cs-137	0.14	0.041
Th-232	0.83	0.014
Co-60	0.013	0.035
Ra-226	0.60	0.073
Fe-59	0.033	0.14
Mn-54	-0.023	0.031
Zr-95	-0.020	0.081
mg K-40/g	17	0.88
U-238	2.8	1.9

Sample ON-13		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	-0.011	0.040
Cs-137	0.25	0.052
Th-232	0.86	0.16
Co-60	0.0076	0.043
Ra-226	0.61	0.084
Fe-59	0.15	0.15
Mn-54	0.033	0.039
Zr-95	-0.011	0.090
mg K-40/g	18	1.0
U-238	0.43	2.0

Sample ON-14		
Nuclide	Conc. (pCi/g)*	±1.96
Cs-134	0.019	0.041
Cs-137	0.29	0.054
Th-232	0.75	0.16
Co-60	-0.0092	0.038
Ra-226	0.65	0.085
Fe-59	0.061	0.16
Mn-54	-0.0067	0.037
Zr-95	0.086	0.14
mg K-40/g	16	1.0
U-238	1.6	2.1

* All concentrations are expressed in pCi/g, except that of K-40, which is expressed in mg K-40/g

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21-Sep-94
Page: R-1
Job: 942724E
Status: Final

UNITED STATES GEOLOGICAL SURVEY

Analyte: Gross Alpha **Project:**
Fraction: Total **Date Analyzed: 09/16-09/19**
Method: 900.0 **LLD: 2**
Units: pCi/l

Lab Id	Date Sampled	Matrix	Sample Id	Concentration± 2σ	LLD
942724-1	5-Aug-94	Water	Water Samples W-1	1.5±1.1	2
942724-2	5-Aug-94	Water	Water Samples W-2	10±4	2
942724-3	5-Aug-94	Water	Water Samples W-3	0.9±1.7	2
942724-4	5-Aug-94	Water	Water Samples W-4	8.5±3.4	2
942724-5	5-Aug-94	Water	Water Samples W-5	14±4	2
942724-6	5-Aug-94	Water	Water Samples W-6	0.0±1.9	2

Analyte: Gross Beta **Project:**
Fraction: Total **Date Analyzed: 09/16-09/20**
Method: 900.0 **LLD: 4**
Units: pCi/l

Lab Id	Date Sampled	Matrix	Sample Id	Concentration± 2σ	LLD
942724-1	5-Aug-94	Water	Water Samples W-1	2.2±1.6	4
942724-2	5-Aug-94	Water	Water Samples W-2	6.8±2.4	4
942724-3	5-Aug-94	Water	Water Samples W-3	4.0±1.8	4
942724-4	5-Aug-94	Water	Water Samples W-4	8.1±2.2	4
942724-5	5-Aug-94	Water	Water Samples W-5	19±3	4
942724-6	5-Aug-94	Water	Water Samples W-6	3.5±1.8	4