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TENNESSEE VALLEY AUTHORITY

EDGEMONT, SOUTH DAKOTA, URANIUM MILL

SEMIANNUAL EFFLUENT RELEASE REPORT NO. 8

January 1, 1979 to June 30, 1979

DIVISION OF ENVIRONMENTAL PLANNING

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August 1979

Prepared for the:

Nuclear Regulatory Commission
Region IV
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

by

Tennessee Valley Authority
Chattanooga, Tennessee 37401

Source Material License SUA-816

I. Introduction

On August 16, 1974, TVA purchased the Edgemont, South Dakota, Uranium Mill and associated uranium properties. The Source Material License No. SUA-816 was transferred to TVA coincident with transfer of title of the milling facility. The Code of Federal Regulations, Title 10, Section 40.65 requires source material licensees to submit a report semi-annually to the appropriate Nuclear Regulatory Commission Regional Office specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and gaseous effluents during the previous six months of operation. Although the Edgemont facility did not process ore during the applicable six-month period, this report is submitted to fulfill applicable requirements of Section 40.65.

II. Radiological Surveillance Information

In Tables 1-5, available results of radionuclide monitoring in restricted and unrestricted areas, conducted between January and June 1979, are presented. These results include quantification of atmospheric particulate and radon concentrations, concentrations in surface and ground water, and rates of radon exhalation to the atmosphere. Results of other onsite radionuclide monitoring may be found in the mill's quarterly monitoring reports.

The environmental monitoring results show concentrations of radioactive materials released to unrestricted areas are well below maximum permissible concentrations.

TABLE 1

CONCENTRATIONS IN ATMOSPHERIC PARTICULATES - ROUTINE SAMPLING BY MILL PERSONNEL

Sample Collection Date	Sample No.	Sampling Location Relative to Site Boundary	Approximate Wind mi/h	Approximate Wind out of	Uranium (10^{-14} µCi/ml)[a]
3/6	1	1/2 mi NW	8	WNW	6.8
3/5	2	SE boundary	5	WNW	20.3
3/5	3	3/4 mi SE	5	WNW	6.8
3/5	4	1-1/2 mi SE	5	WNW	20.3
6/5	5	1/2-mi NW	11	NW	9.0
6/4	6	SE boundary	11	NW	5.0
6/4	7	3/4 mi SE	11	NW	3.0
6/4	8	1-1/2 mi SE	11	NW	7.0

a. Natural uranium is assumed to have a specific activity of 0.677 µCi/g.

Note: 1 µCi = 3.4×10^4 Bq.

TABLE 2

CONCENTRATIONS IN SURFACE AND GROUND WATERS - ROUTINE SAMPLING BY MILL PERSONNEL

Sample Collection Date	Sample No.	Sample Location	Uranium (10^{-7} µCi/ml)[a]	Dissolved Radium-226 (10^{-9} µCi/ml)
3/2	R[b]-1-1	Cottonwood Creek, 1/2 mi S	<5.7	0.5±0.4[c]
3/2	R-2-1	Cottonwood Creek, 1/4 mi N	<5.7	0.2±0.3
3/2	R-3-1	Cheyenne River, 1/2 mi W	<5.7	0.2±0.3
3/2	R-4-1	Cheyenne River, 1 mi E	<5.7	0.1±0.2
3/2	W[d]-1-1	Siver King Mines, Inc., feed water	<5.7	3.2±1.0
3/2	W-3-1	City of Edgemont water works	<5.7	3.3±1.0
6/5	R-1-2	Cottonwood Creek, 1/2 mi S	<5.7	0.0±0.2
6/5	R-2-2	Cottonwood Creek, 1/4 mi N	<5.7	1.9±0.8
6/5	R-3-2	Cheyenne River, 1/2 mi W	<5.7	0.3±0.3
6/5	R-4-2	Cheyenne River, 1 mi E	<5.7	0.2±0.3
6/5	W-1-2	Silver King Mines, Inc. feed water	<5.7	3.2±1.1
6/5	W-2-2	City of Edgemont water works	<5.7	2.7±1.2

a. Natural uranium is assumed to have a specific activity of 0.677 µCi/g.
b. "R" implies surface water sources.
c. Counting error at the 95-percent confidence level, 1.96σ.
d. "W" implies ground water source.

Note: 1 µCi = 3.4×10^4 Bq.

TABLE 3

CONCENTRATIONS IN WELL WATER[a] - CONTINUOUS (WELL M-9) AND COMPOSITE GRAB[b] (WELL M-11) SAMPLING

Sample Collection Date	Sample No.	Sampling Location	Total Uranium (10^{-6} µCi/ml)[c]	Total Thorium-230 (10^{-9} µCi/ml)	Total Radium-226 (10^{-9} µCi/ml)
12/1/78-1/3	M-9-1	Approx. 200 ft W of Cotton-	1.7	0.25±0.11[d]	0.31±0.01
1/3-2/1	M-9-2	wood Creek; 800 ft S of	4.7	0.17±0.10	0.59±0.01
e	M-9-3	Cheyenne River; Well M-9	-	-	-
4/4	M-9-4		6.8	0.05±0.06	1.80±0.01
4/4-5/1	M-9-5		2.7	0.09±0.06	1.38±0.01
5/1-6/1	M-9-6		6.4	0.07±0.05	1.76±0.01
12/1/78-1/3	M-11-1	Adjacent to NW corner of	11	0.22±0.10	0.90±0.01
1/3-2/1	M-11-2	Pond No. 7; Well M-11 (flow	10	0.29±0.13	0.64±0.01
e	M-11-3	in this well is now too low	-	-	-
4/4	M-11-4	to support a continuous	4.0	-0.05±0.03[f]	1.62±0.01
4/4-5/1	M-11-5	sampler)	12	0.21±0.10	1.66±0.01
5/1-6/1	M-11-6		3.7	0.05±0.04	1.28±0.01

a. The wells numbered "M-9" and "M-11" are onsite and the water pumped from these wells is not used for human consumption.
b. Composite of grab samples collected at a rate of one per week.
c. Natural uranium is assumed to have a specific activity of 0.677 µCi/g.
d. Counting error at the 68-percent confidence level, 1σ.
e. No sample received.
f. A true net activity of less than zero is not implied. The negative sign is a residue arising from the analytical procedure.

Note: 1 µCi = 3.4×10^4 Bq.

TABLE 4

CONCENTRATIONS IN SURFACE AND GROUND WATERS - ROUTINE SAMPLING AT STATIONS ESTABLISHED BY TVA

Sample Collection Date	Sample No.	Sampling Location	Total Uranium (10^{-8} µCi/ml)[a]	Total Thorium-230 (10^{-9} µCi/ml)	Total Radium-226 (10^{-9} µCi/ml)
I. Surface Water					
12/5/78	1-1	Cheyenne River, upstream at railroad bridge	0.46	0.00±0.01[b]	0.22±0.01
12/5/78	2-1	Cheyenne River, at Red Canyon	c	c	0.15±0.01
12/5/78	3-1	Cheyenne River approx. 6 mi downstream	0.64	0.17±0.10	0.15±0.01
12/5/78	4-1	Cottonwood Creek, upstream at bridge	0.73	0.02±0.06	1.00±0.01
12/5/78	5-1	Cottonwood Creek, at mill road culvert	2.3	0.22±0.11	0.39±0.01
12/5/78	6-1	Cottonwood Creek, at mouth[d]	1.7	0.22±0.11	0.49±0.01
3/23/79	1-2	Cheyenne River, upstream at railroad bridge	0.39	-0.05±0.06[e]	0.91±0.01
3/23/79	2-2	Cheyenne River, at Red Canyon	0.40	0.10±0.09	0.40±0.01
3/23/79	3-2	Cheyenne River approx. 6 mi downstream	0.64	0.02±0.07	0.39±0.01
3/23/79	4-2	Cottonwood Creek, upstream at bridge	0.95	0.05±0.08	0.16±0.01
3/23/79	5-2	Cottonwood Creek, at mill road culvert[f]	0.41	0.00±0.00	0.40±0.01
3/23/79	6-2	Cottonwood Creek, at mouth	0.67	0.05±0.08	0.41±0.01

a. Natural uranium is assumed to have a specific activity of 0.677 µCi/g.
b. Counting error at the 68-percent confidence level, 1σ.
c. Insufficient sample.
d. Additional analysis on this sample--polonium-210 3.7±0.8 pCi/l; lead-210 3.4±0.8 pCi/l.
e. A true net activity of less than zero is not implied. The negative sign is a residue arising from the analytical procedure.
f. Additional analysis on this sample--polonium-210 2.9±0.6 pCi/l; lead-210 1.3±0.3 pCi/l.

Note: Samples for June collected 6/19/79 results not yet available.
1 µCi = 3.4×10^{5} Bq.

TABLE 4 (Continued)

CONCENTRATIONS IN SURFACE AND GROUND WATERS - ROUTINE SAMPLING AT STATIONS ESTABLISHED BY TVA

Sample Collection Date	Sample No.	Sampling Location	Total Uranium[a] (10^{-6} µCi/ml)	Total Thorium-230 (10^{-9} µCi/ml)	Total Radium-226 (10^{-9} µCi/ml)
II. Ground Water					
12/5/78	M[b]-1-1	NW corner of Pond No. 1	3.2	0.07±0.07[c]	1.77±0.01
12/5/78	M-2-1	N of center of Pond No. 1	[d]	[d]	[d]
12/5/78	M-3-1	NE corner of Pond No. 1	3.0	0.00±0.01	1.42±0.01
12/5/78	M-7-1	SE corner of Pond No. 1	14	0.07±0.07	0.68±0.01
12/5/78	M-8-1	N of ore storage area	22	0.22±0.11	2.88±0.01
12/5/78	M-10-1	Near mill road culvert[e]	36	0.07±0.07	1.25±0.01
12/5/78	M-12-1	NW corner of Pond No. 8	2.8	0.10±0.08	0.60±0.01
12/5/78	M-13-1	NE corner of Pond No. 9	0.79	0.12±0.09	2.10±0.01
12/5/78	M-14-1	NW corner of Pond No. 10	4.7	0.05±0.07	1.10±0.01
12/5/78	M-RT-1	Control, R. Toman farm	0.63	0.12±0.09	0.32±0.01
3/23/79	M[d]-1-2	NW corner of Pond No. 1	2.5	0.10±0.09	1.04±0.01
3/23/79	M-7-2	SE corner of Pond No. 1	2.0	0.05±0.08	3.48±0.01
3/23/79	M-8-2	N of ore storage area	17	0.12±0.09	3.66±0.01
3/23/79	M-10-2	Near mill road culvert	16	0.00±0.00	0.62±0.01
3/23/79	M-RT-2	Control, R. Toman farm	0.93	0.17±0.10	0.29±0.01

a. Natural uranium is assumed to have a specific activity of 0.677 µCi/g.
b. "M" implies ground water source. No water from numbered wells is used for human consumption.
c. Counting error at the 68-percent confidence level, 1σ.
d. Insufficient sample.
e. Additional analysis on this sample--polonium-210 6.5±1.1 pCi/l; lead-210 7.4±1.3 pCi/l.

Note: Samples for June collected 6/19/79 results not yet available.
1 µCi = 3.4×10^4 Bq.

TABLE 5

RADON EXHALATION[a] - "AEC" SAND TAILINGS AREA

Sample Collection Period	Radon Flux Density ($fCi\ cm^{-2}s^{-1}$)			Radon Concentration ($pCi\ \ell^{-1}$)		
	Location 1[b]	Location 2[c]	Location 3[d]	Location 1	Location 2	Location 3
1/2-4	2.4[e]	1.5[e]	0.09[e]	1.3	0.90	0.50
1/9-11	3.1	1.9	0.09	-	-	-
1/19-22	3.3	2.0	0.09	3.3	3.0	0.70
1/29-2/1	2.0[e]	1.0[e]	0.08[e]	2.7	1.4	0.90
2/5-8	2.3	1.7	0.06	4.5	4.2	1.4
2/13-16	0.90	1.0	0.05	4.7	4.3	0.90
2/20-23	0.20[e]	1.8[e]	0.06[e]	3.0	2.2	0.90
3/5-12	0.80	1.1	0.06	1.1	2.5	0.60
3/12-15	1.3	1.7	0.05	2.8	4.0	0.80
3/19-22	2.3	1.8	0.05	3.5	4.3	-
4/2-4	5.5	6.3	0.04	-	-	0.60
4/9-12	1.3	0.60	0.07	2.7	2.0	0.53
4/16-19	1.1	0.80	0.08	3.2	2.5	0.32
4/30-5/3	0.19	0.58	0.01	-	4.5	-
5/7-14	-	-	-	3.6	3.6	0.67
5/18-21	1.9	3.0	0.12	5.1	6.0	0.50
6/11-14	2.8	0.90	0.11	-	-	-
6/18-21	0.81	0.85	0.09	2.7	3.1	0.41
6/25-29	2.0	2.1	0.08	5.2	3.0	0.76

a. Methodology and analysis by Environmental Measurements Laboratory (formerly, Health and Safety Laboratory), New York City. Use of these experimental data should be restricted unless approval for their use is granted by the Environmental Measurements Laboratory and the Tennessee Valley Authority.
b. Location 1 is in the northwest quadrant of the tailings pile.
c. Location 2 is near the center of the tailings pile surface.
d. Location 3 is a control location 3/4 mi NW of the mill.
e. Snow covered.