

EDGEMONT, SOUTH DAKOTA, URANIUM MILL
SEMIANNUAL EFFLUENT RELEASE REPORT NO. 9
July 1, 1979 to December 31, 1979

February 1980

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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 SU'-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 1-4, available results of radionuclide monitoring in restricted and unrestricted areas, conducted between July and December 1979, are presented. These results include quantification of atmospheric particulate concentrations and concentrations in surface and ground waters. 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

<u>Sample Collection Date</u>	<u>Sample No.</u>	<u>Sampling Location Relative to Site Boundary</u>	<u>Approximate Wind mi/h</u>	<u>Wind out of</u>	<u>Uranium (10^{-14} $\mu\text{Ci/ml}$)^a</u>
9/14	1	1/2 mi NW	8	WNW	1.0
9/17	2	SE boundary	2	WNW	1.0
9/17	3	3/4 mi SE	10	S	1.0
9/17	4	1-1/2 mi SE	3	ENE	1.0
12/6	5	1/2 mi NW	2	WNW	ND
12/6	6	SE boundary	18	WSW	ND
12/7	7	3/4 mi SE	7	W	0.2
12/7	8	1-1/2 mi SE	12	WNW	0.1

a. Natural uranium is assumed to have a specific activity of 0.677 $\mu\text{Ci/g}$.

ND = none detected.

Note: 1 μCi = 3.4×10^4 Bq.

TABLE 2

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

<u>Sample Collection Date</u>	<u>Sample No.</u>	<u>Sample Location</u>	<u>Uranium</u> <u>(10^{-7} μCi/ml)^a</u>	<u>Dissolved Radium-226</u> <u>(10^{-9} μCi/ml)</u>
9/17	R ^b -1-1	Cottonwood Creek, 1/2 mi S	<5.7	0.7±0.5 ^c
9/17	R-2-1	Cottonwood Creek, 1/4 mi N	<5.7	0.2±0.5
9/17	R-3-1	Cheyenne River, 1/2 mi W	<5.7	0.2±0.5
9/17	R-4-1	Cheyenne River, 1 mi E	<5.7	1.1±0.7
9/17	W ^d -1-1	Silver King Mines, Inc., feed water	<5.7	2.3±0.9
9/17	W-3-1	City of Edgemont water works	<5.7	1.9±0.9
12/4	R-1-2	Cottonwood Creek, 1/2 mi S	<5.7	0.7±0.5
12/4	R-2-2	Cottonwood Creek, 1/4 mi N	<5.7	0.1±0.2
12/4	R-3-2	Cheyenne River, 1/2 mi W	<5.7	0.1±0.2
12/4	R-4-2	Cheyenne River, 1 mi E	<5.7	0.1±0.2
12/4	W-1-2	Silver King Mines, Inc., feed water	<5.7	3.7±1.2
12/4	W-2-2	City of Edgemont water works	<5.7	3.0±1.0

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

b. "R" implies surface water sources.

c. Counting error at the 95-percent confidence level, 1.96 σ .

d. "W" implies ground water source.

Note: 1 μ Ci = 3.4x10⁴ 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 ⁻⁹ μ Ci/ml) ^c	Total Thorium-230 (10 ⁻⁹ μ Ci/ml)	Total Radium-226 (10 ⁻⁹ μ Ci/ml)
6/1/79 - 7/2	M-9-1	Approx. 200 ft W of Cotton-	2.4	0.10 \pm 0.05 ^d	2.31 \pm 0.01
7/2 - 8/1	M-9-2	wood Creek; 800 ft S of	1.6	-0.03 \pm 0.04 ^e	1.65 \pm 0.01
8/1 - 9/4	M-9-3	Cheyenne River; Well M-9	4.4	0.04 \pm 0.08	2.07 \pm 0.01
9/4 - 10/1	M-9-4		0.2	0.06 \pm 0.07	1.83 \pm 0.01
10/1 - 11/2	M-9-5 ^f		2.3	0.16 \pm 0.09	2.09 \pm 0.01
11/2 - 12/3	M-9-6 ^f				
6/1 - 7/2	M-11-1	Adjacent to NW corner of	11	0.02 \pm 0.03	2.38 \pm 0.01
7/2 - 8/1	M-11-2	Pond No. 7; Well M-11 (flow	11	0.07 \pm 0.07	0.57 \pm 0.01
8/1 - 9/4	M-11-3	in this well is now too low	10	-0.03 \pm 0.07 ^e	0.68 \pm 0.01
9/4 - 10/1	M-11-4	to support a continuous	0.7	0.01 \pm 0.06	0.39 \pm 0.01
10/1 - 11/2	M-11-5 ^f	sampler)	10	0.06 \pm 0.07	0.78 \pm 0.01
11/2 - 12/3	M-11-6 ^f				

- 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 μ Ci/g.
- d. Counting error at the 68-percent confidence level, 1 σ .
- e. A true net activity of less than zero is not implied. The negative sign is a residue arising from the analytical procedure.
- f. Sample results not yet available.

Note: 1 μ Ci = 3.4x10⁴ Bq.

TABLE 4

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

<u>Sample Collection Date</u>	<u>Sample No.</u>	<u>Sampling Location</u>	<u>Total Uranium (10^{-8} $\mu\text{Ci/ml}$)^a</u>	<u>Total Thorium-230 (10^{-9} $\mu\text{Ci/ml}$)</u>	<u>Total Radium-226 (10^{-9} $\mu\text{Ci/ml}$)</u>
I. Surface Water					
5/19/79	1-1	Cheyenne River, upstream at railroad bridge	0.44	0.10 ± 0.05^b	0.40 ± 0.01
6/19/79	2-1	Cheyenne River, at Red Canyon	0.39	0.07 ± 0.05	0.36 ± 0.01
6/19/79	3-1	Cheyenne River approx. 6 mi downstream	1.4	0.10 ± 0.05	0.28 ± 0.01
6/19/79	4-1	Cottonwood Creek, upstream at bridge	0.60	0.12 ± 0.06	0.16 ± 0.01
6/19/79	5-1	Cottonwood Creek, at mill road culvert ^c	1.7	0.17 ± 0.08	1.33 ± 0.01
6/19/79	6-1	Cottonwood Creek, at mouth	1.2	0.14 ± 0.07	1.05 ± 0.01
9/10/79	1-2	Cheyenne River, upstream at railroad bridge	0.67	-0.01 ± 0.05^d	0.24 ± 0.01
9/10/79	2-2	Cheyenne River, at Red Canyon	0.77	0.08 ± 0.07	0.49 ± 0.01
9/10/79	3-2	Cheyenne River approx. 6 mi downstream	0.58	0.04 ± 0.06	0.24 ± 0.01
9/10/79	4-2	Cottonwood Creek, upstream at bridge	0.62	0.04 ± 0.06	0.21 ± 0.01
9/10/79	5-2	Cottonwood Creek, at mill road culvert	1.7	0.06 ± 0.07	0.86 ± 0.01
9/10/79	6-2	Cottonwood Creek, at mouth ^e	2.0	0.13 ± 0.09	1.47 ± 0.01

a. Natural uranium is assumed to have a specific activity of $0.677 \mu\text{Ci/g}$.

b. Counting error at the 68-percent confidence level, 1σ .

c. Additional analysis on this sample--polonium-210, $3.7 \pm 0.8 \text{ pCi/l}$; lead-210, $3.3 \pm 0.7 \text{ pCi/l}$.

d. A true net activity of less than zero is not implied. The negative sign is a residue arising from the analytical procedure.

e. Additional analysis on this sample--polonium-210, $2.8 \pm 0.6 \text{ pCi/l}$; lead-210, $3.3 \pm 0.6 \text{ pCi/l}$.

Note: Samples for December collected 12/27/79. Results not yet available.

$1 \mu\text{Ci} = 2.4 \times 10^4 \text{ Bq}$

TABLE 4 (Continued)

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

<u>Sample Collection Date</u>	<u>Sample No.</u>	<u>Sampling Location</u>	<u>Total Uranium (10⁻⁸ μCi/ml)^a</u>	<u>Total Thorium-230 (10⁻⁹ μCi/ml)</u>	<u>Total Radium-226 (10⁻⁹ μCi/ml)</u>
II. Ground Water					
6/19/79	M ^b -1-1	NW corner of Pond No. 1	3.8	0.14±0.07 ^c	3.80±0.01
6/19/79	M-7-1	SE corner of Pond No. 1	6.5	0.10±0.05	3.47±0.01
6/19/79	M-8-1	N of ore storage area	3.1	0.07±0.05	1.87±0.01
6/19/79	M-10-1	Near mill road culvert ^d	20.6	0.12±0.06	0.23±0.01
6/19/79	M-RT-1	Control, R. Toman farm	1.8	0.17±0.08	0.10±0.01
9/10/79	M-1-2	NW corner of Pond No. 1	4.5	0.00±0.07	1.24±0.01
9/10/79	M-2-2	N of center of Pond No. 1	15	0.00±0.07	1.26±0.01
9/10/79	M-3-2	NE corner of Pond No. 1	e	e	e
9/10/79	M-7-2	SE corner of Pond No. 1	8.6	-0.03±0.07 ^f	3.07±0.01
9/10/79	M-8-2	N of ore storage area	2.2	-0.03±0.07 ^f	0.29±0.01
9/10/79	M-10-2	Near mill road culvert ^g	6.8	0.07±0.08 ^f	0.82±0.01
9/10/79	M-12-2	NW corner of Pond No. 8	3.5	-0.05±0.06 ^f	1.89±0.01
9/10/79	M-13-2	NE corner of Pond No. 9	0.35	0.08±0.09	10.20±0.01
9/10/79	M-14-2	NW corner of Pond No. 10	8.7	0.11±0.08	1.01±0.01
9/10/79	M-RT-2	Control, R. Toman farm	7.1	0.08±0.07	0.16±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. Additional analysis on this sample--polonium-210, 15.6±3.8 pCi/l; lead-210, 4.1±1.1 pCi/l.

e. Sample discarded, unable to filter prior to analysis.

f. A true net activity of less than zero is not implied. The negative sign is a residue arising from the analytical procedure.

g. Additional analysis on this sample--polonium-210, 3.0±0.7 pCi/l; lead-210, 8.5±1.1 pCi/l.

Note: Samples for December collected 12/28/79. Results not yet available.

1 μCi = 3.4x10⁴ Bq.