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TENNESSEE VALLEY AUTHORITY

EDGEMONT, SOUTH DAKOTA, URANIUM MILL
SEMIANNUAL EFFLUENT RELEASE REPORT NO. 12
January 1, 1981 to June 30, 1981

DIVISION OF OCCUPATIONAL HEALTH AND SAFETY

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AUGUST 1981

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 1-6, available results of radionuclide and radiation monitoring in restricted and unrestricted areas, conducted between January and June 1981, are presented. These results include quantification of radiation exposure rates, atmospheric particulate concentrations, and concentrations in surface and ground waters. Maps have been included to facilitate identification of sample locations. Results of other onsite radionuclide monitoring may be found in the mill's quarterly monitoring reports.

The air particulate and surface water data in Tables 1 and 3 are in response to licensing commitments. The supplimentary data are provided to further document existing radiological characteristics of the area and are not license requirements. 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.	SAMPLE LOCATION RELATIVE TO SITE BOUNDARY	APPROXIMATE WIND mi/h	out of	URANIUM (10^{-15} μCi/mℓ)[a]
3/11	A-1-1	(A-1) 1/2 mi NW	4.5	NW	2.0
3/11	A-2-1	(A-2) SE boundary	5.0	NW	4.0
3/11	A-3-1	(A-3) 3/4 mi SE	6.5	W	2.0
3/11	A-4-1	(A-4) 1-1/2 mi SE	7.0	WNW	2.0
6/3	A-1-2	(A-1) 1/2 mi NW	4.0	NW	11.0
6/3	A-2-2	(A-2) SE boundary	10.0	NW	ND
6/3	A-3-2	(A-3) 3/4 mi SE	2.0	NW	6.0
6/3	A-4-2	(A-4) 1-1/2 mi SE	13.0	NW	6.0

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

ND = none detected

Note: 1 μCi = 3.7×10^4 Bq.

TABLE 2

CONCENTRATIONS IN ATMOSPHERIC PARTICULATES - ROUTINE SAMPLING AT STATIONS ESTABLISHED BY TVA

SAMPLE COLLECTION DATE	SAMPLE NO.	SAMPLE LOCATION	TOTAL URANIUM ($\mu g/m^3$)[a]	THORIUM-230 (pCi/m^3)	RADIUM-226 (pCi/m^3)
11/24/80	ED-1-1	ED-1 (NW Cottonwood Community Approx. 300 m S of Mill)	0.0002 ± 0.0001[b]	0.0002 ± 0.0004	0.0001 ± 0.0001
12/22/80	ED-1-2		0.0004 ± 0.0001	0.0001 ± 0.0001	0.0001 ± 0.0001
1/19/81	ED-1-3		0.0002 ± 0.0001	-0.0001 ± 0.0001[c]	0.0000 ± 0.0001
2/16/81	ED-1-4		0.0004 ± 0.0003	0.0006 ± 0.0002	-0.0000 ± 0.0001[c]
3/16/81	ED-1-5		0.0002 ± 0.0001	0.0003 ± 0.0001	0.0000 ± 0.0001
4/16/81	ED-1-6		0.0004 ± 0.0001	d	0.0000 ± 0.0001
5/16/81	d		d	d	d
6/16/81	d		d	d	d
11/24/80	ED-2-1	ED-2 (Approx. 1.1 km WNW of Mill)	-0.0001 ± 0.0001[c]	0.0001 ± 0.0001	0.0001 ± 0.0001
12/22/80	ED-2-2		0.0003 ± 0.0001	0.0005 ± 0.0002	0.0001 ± 0.0001
1/19/81	ED-2-3		0.0001 ± 0.0001	0.0004 ± 0.0002	0.0000 ± 0.0001
2/16/81	ED-2-4		0.0001 ± 0.0001	0.0001 ± 0.0001	-0.0000 ± 0.0001[c]
3/16/81	ED-2-5		0.0006 ± 0.0001	0.0003 ± 0.0001	0.0000 ± 0.0001
4/16/81	ED-2-6		0.0005 ± 0.0001	d	0.0000 ± 0.0001
5/16/81	d		d	d	d
6/16/81	d		d	d	d

TABLE 2 (continued)

CONCENTRATIONS IN ATMOSPHERIC PARTICULATES - ROUTINE SAMPLING AT STATIONS ESTABLISHED BY TVA

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

b. The uncertainty reported is the 1 - sigma counting error.

c. The negative value is an artifact of counting statistics and does not infer a negative activity.

d. Results not yet available.

Note: 1 μCi = 3.7×10^4 Bq.

TABLE 3

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

SAMPLE COLLECTION DATE	SAMPLE NO.	SAMPLE LOCATION	URANIUM (10^{-9} µCi/mℓ)[a]	DISSOLVED RADIUM-226 (10^{-9} µCi/mℓ)
3/3/81	R-1-1[b]	1-5 (Cottonwood Creek, 1/2 mi S)	11.	0.0 ± 0.2 [c]
3/3/81	R-2-1	1-1 (Cottonwood Creek, 1/2 mi N)	28.	0.5 ± 0.4
3/3/81	R-3-1	1-9 (Cheyenne River, 1/2 mi W)	8.8	0.7 ± 0.6
3/3/81	R-4-1	1-7 (Cheyenne River, 1 mi E)	10.	0.4 ± 1.3
3/3/81	W-1-1[d]	W-1 (Mill feed water)	2.7	4.7 ± 1.3
3/3/81	W-3-1	W-3 (Edgemont City water supply)	2.7	5.4 ± 1.3
6/15/81	R-1-2	1-5 (Cottonwood Creek, 1/2 mi S)	14.	0.3 ± 0.3
6/15/81	R-2-2	1-1 (Cottonwood Creek, 1/2 mi N)	43.	0.2 ± 0.3
6/15/81	R-3-2	1-9 (Cheyenne River, 1/2 mi W)	10.	0.0 ± 0.3
6/15/81	R-4-2	1-7 (Cheyenne River, 1 mi E)	11.	0.6 ± 1.1
6/15/81	W-1-2	W-1 (Mill feed water)	2.7	3.3 ± 1.1
6/15/81	W-3-2	W-3 (Edgemont City water supply)	3.4	3.0 ± 0.9

TABLE 3 (continued)

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

a. Natural uranium is assumed to have specific activity of 0.677 μCi/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 μCi = 3.7×10^4 Bq.

TABLE 4

CONCENTRATIONS IN WELL WATER[a] - WELL M-9 AND WELL M-11 SAMPLING

SAMPLE COLLECTION DATE	SAMPLE NO.	SAMPLING LOCATION	TOTAL URANIUM[c] (10^{-8} μCi/mℓ)[b]	TOTAL THORIUM-230[c] (10^{-9} μCi/mℓ)	TOTAL RADIUM-226[c] (10^{-9} μCi/mℓ)
12/1/80	M-9-1	3-5 (Approx. 200 ft. W. of Cottonwood Creek; 800 ft. S of Cheyenne River)	1.9 ± 0.1	0.50 ± 0.02	1.08 ± 0.09
1/5/81	M-9-2		2.4 ± 0.2	0.85 ± 0.28	1.39 ± 0.11
2/8/81	M-9-3		1.1 ± 0.1	0.55 ± 0.33	0.44 ± 0.06
3/2/81	M-9-4		2.4 ± 0.2	0.11 ± 0.08	0.74 ± 0.08
3/30/81	M-9-5		2.9 ± 0.3	1.09 ± 0.33	0.78 ± 0.08
4/30/81	d		d	d	d
5/30/81	d		d	d	d
12/1/81	M-11-1	3-8 (Adjacent to NW corner Pond No. 7; Flow in this well is now too low to support a continuous sampler)	17.9 ± 7.5	0.20 ± 0.16	0.76 ± 0.08
1/5/81	M-11-2		9.4 ± 0.5	0.03 ± 0.08	0.51 ± 0.07
2/2/81	M-11-3		7.8 ± 0.5	0.49 ± 0.33	0.70 ± 0.07
3/2/81	M-11-4		16.3 ± 1.0	0.46 ± 0.17	0.62 ± 0.07
3/30/81	M-11-5		14.0 ± 0.8	d	0.73 ± 0.07
4/30/81	d		d	d	d
5/30/81	d		d	d	d

TABLE 4 (continued)

CONCENTRATIONS IN WELL WATER[a] - WELL M-9 AND WELL M-11 SAMPLING

a. The wells numbered "M-9" and "M-11" are onsite and the water pumped from these wells is collected weekly and composited monthly for analysis. The water from these wells is not used for human consumption.

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

c. The uncertainty reported is the 1-sigma counting error.

d. Results not yet available.

Note: 1 μCi = 3.7×10^4 Bq.

TABLE 5

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

I. SURFACE WATER

SAMPLING COLLECTION DATE	SAMPLE NO.	SAMPLING LOCATION	TOTAL URANIUM (10^{-8} μCi/mℓ)[a]	THORIUM-230 (10^{-9} μCi/mℓ)	RADIUM-226 (10^{-9} μCi/mℓ)	POLONIUM-210 (10^{-9} μCi/mℓ)
12/30/80	1-1	1-6(Cheyenne River, upstream at Railroad Bridge)	0.6 ± 0.04	0.13 ± 0.15	0.16 + 0.02	
	2-1	1-7(Cheyenne River, at Red Canyon)	0.8 ± 0.06	0.13 ± 0.15	0.48 ± 0.05	
	3-1	1-8(Cheyenne River, approx. 6 miles downstream)	0.8 ± 0.06	0.34 ± 0.19	0.14 ± 0.04	
	4-1	1-5(Cottonwood Creek, upstream at bridge)	0.8 ± 0.05	0.37 ± 0.19	0.29 ± 0.03	
	5-1	1-2(Cottonwood Creek at Mill Road culvert)	2.4 ± 0.18	0.84 ± 0.30	1.29 ± 0.10	
	6-1	1-1(Cottonwood Creek at mouth)	2.8 ± 0.23	0.37 ± 0.19	1.37 ± 0.11	
3/12/81	1-2	1-6(Cheyenne River, upstream at Railroad Bridge)	0.8 ± 0.06	0.41 ± 0.17	0.44 ± 0.04	
	2-2	1-7(Cheyenne River at Red Canyon)	0.9 ± 0.07	0.10 ± 0.10	0.30 ± 0.04	
	3-2	1-8(Cheyenne River, approx. 6 miles downstream)	1.0 ± 0.08	0.87 ± 0.28	0.20 ± 0.04	
	4-2	1-5(Cottonwood Creek, upstream at bridge)	0.9 ± 0.06	0.14 ± 0.12	0.38 ± 0.06	
	5-2	1-2(Cottonwood Creek at Mill Road culvert)	4.9 ± 0.38	0.51 ± 0.20	1.66 ± 0.13	3.8 ± 0.60
	6-2	1-1(Cottonwood Creek at mouth)	3.8 ± 0.37	0.52 ± 0.19	0.63 ± 0.06	

TABLE 5 (continued)

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

II. GROUND WATER

SAMPLE COLLECTION DATE	SAMPLE NO.	SAMPLING LOCATION	TOTAL URANIUM (10^{-8} µCi/mℓ)[a]	THORIUM-230 (10^{-9} µCi/mℓ)	RADIUM-226 (10^{-9} µCi/mℓ)	POLONIUM-210 (10^{-9} µCi/mℓ)
12/30/80	1-1	3-1(NW Corner Pond No. 1)	17.6 ± 0.43[b]	-0.03 ± 0.06[c]	2.17 ± 0.16	
	2-1	3-7(SE Corner Pond No. 1)	15.6 ± 0.94	6.14 ± 1.60	3.65 ± 0.26	
	3-1	3-4(N of ore storage area)	1.8 ± 0.14	2.01 ± 0.57	0.85 ± 0.07	
	4-1	3-6(Near Mill Road culvert)	21.2 ± 1.65	2.11 ± 0.60	0.42 ± 0.07	
	5-1	3-12(Control, R. Toman Farm)	1.9 ± 0.14	0.51 ± 0.20	0.15 ± 0.04	
3/11/81	1-2	3-1(NW Corner Pond No. 1)	6.3 ± 0.52	0.23 ± 0.13	1.09 ± 0.10	
	2-2	3-7(SE Corner Pond No. 1)	16.4 ± 1.05	3.02 ± 0.81	4.29 ± 0.31	
	3-2	3-4(N of ore storage area)	2.3 ± 0.23	1.79 ± 0.51	0.30 ± 0.05	
	4-2	3-6(Near Mill Road culvert)	14.5 ± 1.06	0.20 ± 0.11	0.27 ± 0.06	12.0 ± 1.22
	5-2	3-12(Control, R. Toman Farm)	2.0 ± 0.17	0.31 ± 0.15	0.19 ± 0.05	

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

b. The uncertainty reported is the 1-sigma counting error.

c. The negative value is an artifact of counting statistics and does not infer a negative activity.

Note: 1 µCi = 3.7×10^4 Bq.

TABLE 6

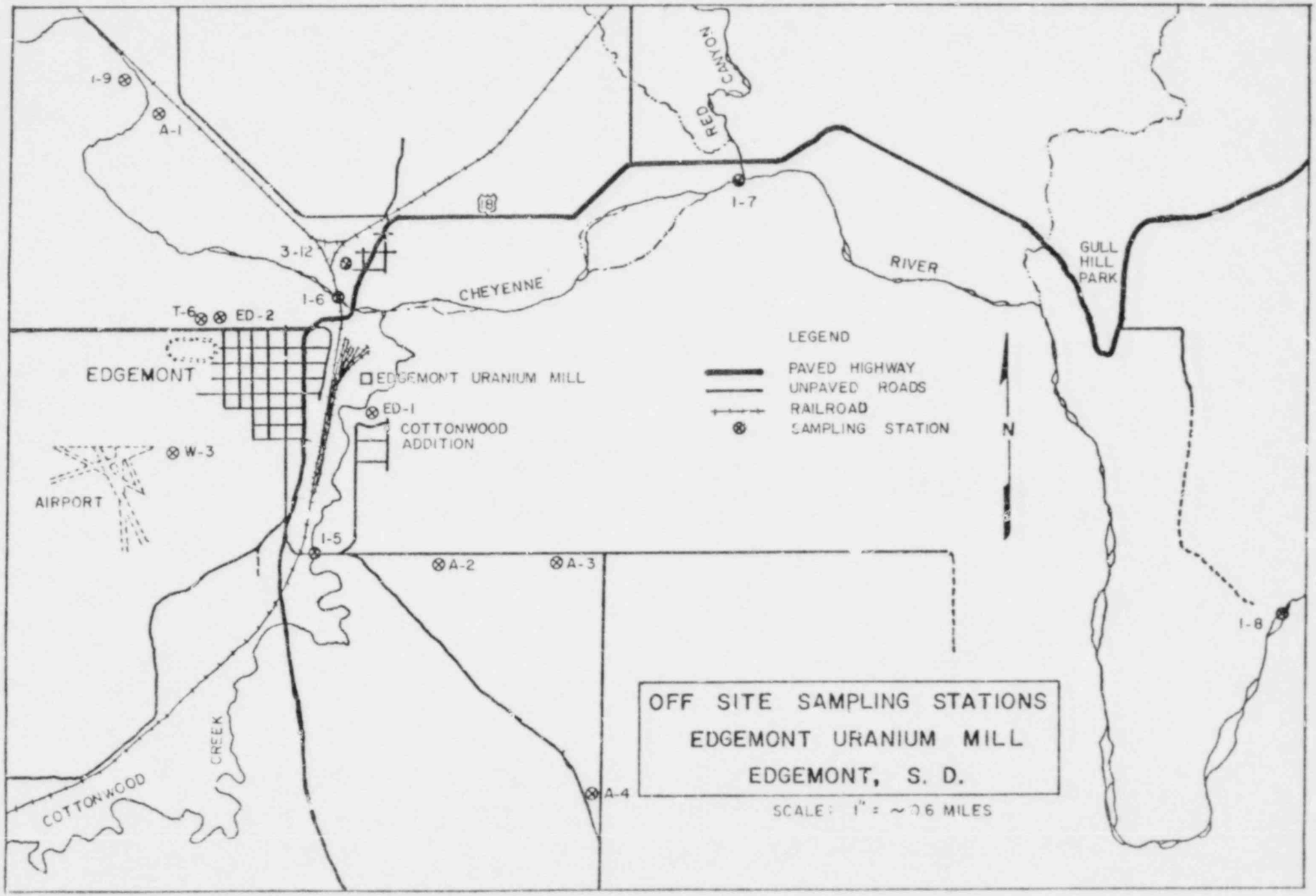
ENVIRONMENTAL GAMMA RADIATION LEVELS: EDGEMONT URANIUM MILL

JANUARY - JUNE 1981

MONITORING STATION	ENVIRONMENTAL GAMMA RADIATION LEVELS mR/quarter[a]	
	Feb.-March 1981	April-June 1981
T-1	100.2 ± 1.8[b]	94.9 + 4.9
T-2	53.5 ± 1.1	46.2 ± 1.1
T-3	37.4 ± 1.2	30.9 ± 1.0
T-4	80.8 ± 3.2	71.6 ± 1.4
T-5	54.2 ± 1.9	49.1 ± 1.3
T-6(control)	23.1 ± 0.5	18.2 ± 0.3

a. Data normalized to one quarter (2190 hours).

b. Mean of 3 TLDs uncertainty is the 1-sigma value for the mean.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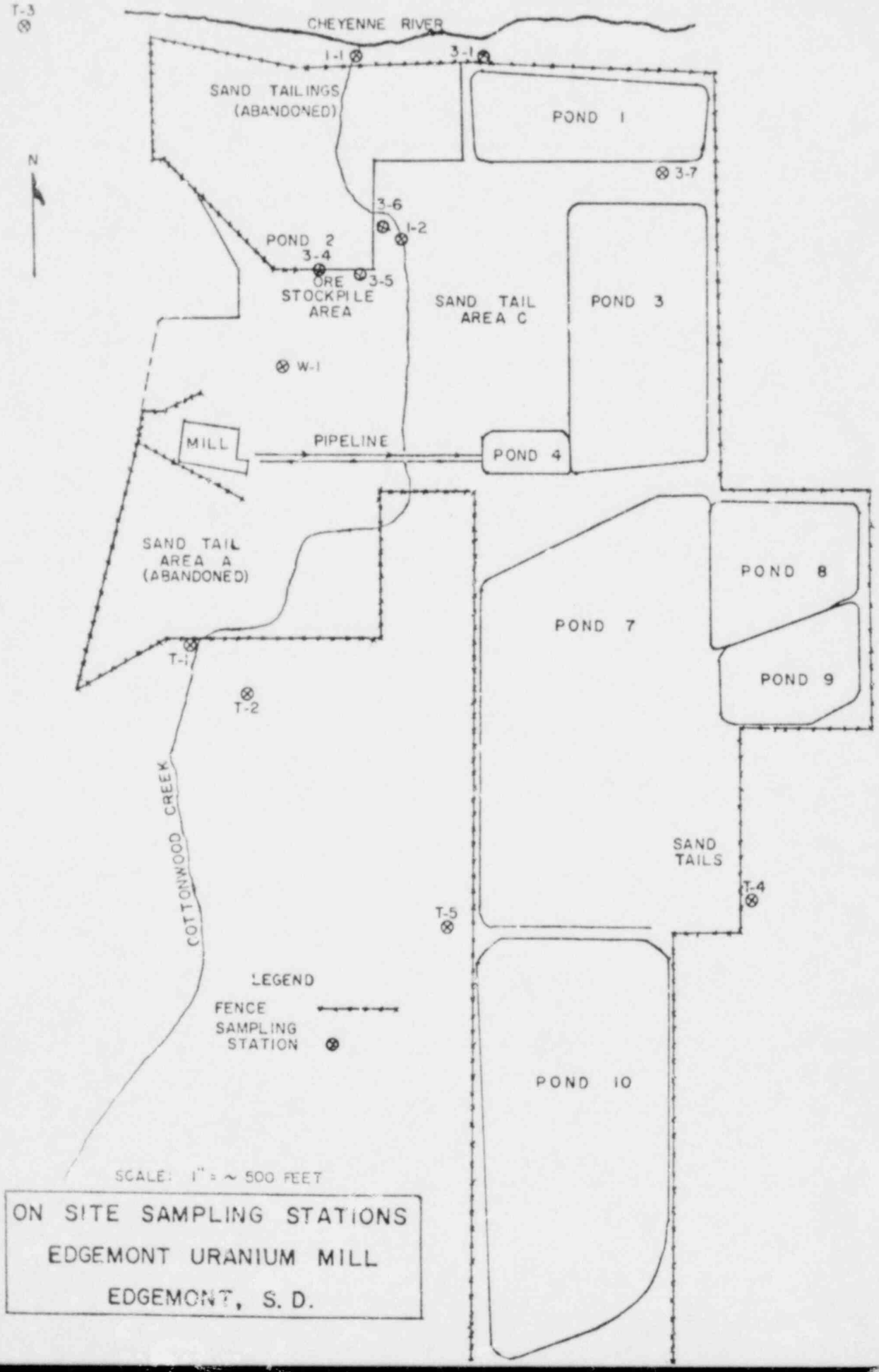
A-1
3-12
I-6
T-6
ED-2
EDGEMONT
EDGEMONT URANIUM MILL
ED-1
COTTONWOOD ADDITION
W-3
AIRPORT
I-5
A-2
A-3
A-4
I-7
I-8
RED CANYON
CHEYENNE
RIVER
GULL HILL PARK
COTTONWOOD
CREEK
LEGEND
PAVED HIGHWAY
UNPAVED ROADS
RAILROAD
SAMPLING STATION
N
OFF SITE SAMPLING STATIONS
EDGEMONT URANIUM MILL
EDGEMONT, S. D.
SCALE: 1" = ~0.6 MILES



ON SITE SAMPLING STATIONS
EDGEMONT URANIUM MILL
EDGEMONT, S. D.