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40-8084

RETURN ORIGINAL TO PDR, HQ.

SEMIANNUAL ENVIRONMENTAL MONITORING REPORT

FOR

7-1-85 to 12-31-85

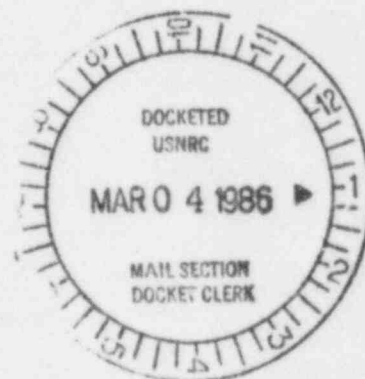


Prepared
By

RIO ALGOM MINING CORP.

Source Materials License Number - SUA-119

Docket Number - 40-8084



for M. D. Lawton
Manager

27 February 1986.
Date

DESIGNATED ORIGINAL

Certified By Mary C. Neal

FEE NOT REQUIRED

8603260310 851231
PDR ADDCK 04008084
C PDR

374

1) STACK - YELLOWCAKE AND ORE

DATE COLLECTED	LOCATION OPERATING HRS./6 MO. x	FLOW RATE (M ³ /Sec.) y	RADIONUCLIDE	AVERAGE IN-STACK CONCENTRATION (uCi/ml) z	ERROR ESTIMATE (uCi/ml)	(a) RELEASE RATE (Ci/6 Mo.)	ERROR ESTIMATE (Ci/6 Mo.)	LLD (uCi/ml)	(b) % MPC
7-01-85 thru 12-31-85	Yellowcake (c) Dust Filter 1385	0.16	U-Nat	0.19E-10	---	1.52E-5	---	1.E-12	19.0
			Th-230	0.29E-12	2.2E-12	2.31E-7	17.5E-7	1.6E-14	14.5
			Ra-226	0.025E-11	0.08E-11	1.99E-7	6.38E-7	4.E-13	0.83
			Pb-210	0.148E-10	0.04E-10	1.18E-5	0.32E-5	8.E-13	14.8
7-01-85 thru 12-31-85	Yellowcake (c) Scrubber 1385	0.63	U-Nat	58.8E-10	---	1.84E-2	---	1.E-12	5880.0
			Th-230	3.29E-12	3.7E-12	1.03E-5	1.16E-5	1.6E-14	164.5
			Ra-226	0.045E-11	0.09E-11	1.41E-6	2.83E-6	4.E-13	1.5
			Pb-210	0.18E-10	0.03E-10	5.65E-5	0.94E-5	8.E-13	13.0
7-01-85 thru 12-31-85	Dryer (c) Center Column 1385	0.20	U-Nat	0.42E-10	---	4.19E-5	---	1.E-12	42.0
			Th-230	7.59E-12	2.6E-12	7.57E-6	2.59E-6	1.6E-14	379.5
			Ra-226	0.09E-11	0.07E-11	8.97E-7	6.98E-11	4.E-13	3.0
			Pb-210	0.005E-10	0.03E-10	4.99E-7	29.92E-7	8.E-13	0.50
7-01-85 thru 12-31-85	Crusher (d) House 1697	2.99	U-Nat	$\bar{x}$ 0.48E-10	---	8.8E-4	---	1.E-12	96.0
			Th-230	$\bar{x}$ 27.3E-12	4.5E-12	5.0E-4	0.3E-4	1.6E-14	27.3
			Ra-226	$\bar{x}$ 4.2E-11	0.45E-11	7.7E-4	0.8E-4	4.E-13	140.0
			Pb-210	$\bar{x}$ 0.02E-10	0.04E-10	0.4E-4	0.7E-4	8.E-13	2.0
7-01-85 thru 12-31-85	Transfer (d) House 1697	0.57	U-Nat	0E-10	---	0	---	1.E-12	0
			Th-230	0.80E-12	2.0E-12	2.8E-6	7.0E-6	1.6E-14	40.0
			Ra-226	0E-11	0.09E-11	0	3.1E-6	4.E-13	0
			Pb-210	0.04E-10	0.03E-10	13.9E-6	10.4E-6	8.E-13	4.0
7-01-85 thru 12-31-85	Headframe (d) House 1697	3.34	U-Nat	0.03E-10	---	6.1E-5	---	1.E-12	6.0
			Th-230	0E-12	4.8E-12	0	9.8E-5	1.6E-14	0
			Ra-226	0E-11	0.05E-11	0	1.0E-5	4.E-13	0
			Pb-210	0.01E-10	0.02E-10	2.0E-5	4.1E-5	8.E-13	1.0

a) Release rate calculation = $x(\text{hrs./6 mo.}) \cdot 3600 \text{ sec./hr.} \cdot y(\text{M}^3/\text{sec.}) \cdot z(\text{uCi/ml}) \cdot 10^6 \text{ ml/M}^3 = 3,600 \cdot xyz \text{ (Ci/6 mo.)}$

b) No atmospheric dispersion considerations or background adjustments were used in stack % MPCa calculations.

c) Yellowcake MPCa = 1×10^{-10} uCi/ml (Restricted Areas).

d) Ore Dust MPCa = 0.5×10^{-10} uCi/ml (Restricted Areas).

2) AIR SAMPLES - Air Particulates and Radon Gas

DATE COLLECTED	LOCATION	RADIONUCLIDE	GROSS CONCENTRATION (uCi/ml)	ERROR ESTIMATE (uCi/ml)	LLD (uCi/ml)	(e) % MPCa
07-01-85 thru 12-31-85	EM-1 (S-1)	U-Nat	0.67E-15	-	5.E-16	.01
		Th-230	0.0E-15	0.81E-15	5.E-16	0
		Ra-226	0.07E-15	0.37E-15	5.E-16	.004
		Pb-210	14.3E-15	2.0E-15	2.E-14	.36
		Rn-222 (gas)	0.23E-9	0.18E-9	2.E-10	7.7
07-01-85 thru 12-31-85	EM-2 (S-2)	U-Nat	2.34E-15	-	5.E-16	.05
		Th-230	0.0E-15	0.39E-15	5.E-16	0
		Ra-226	0.51E-15	0.52E-15	5.E-16	.03
		Pb-210	15.9E-15	2.0E-15	2.E-14	.40
		Rn-222 (gas)	0.51E-9	0.34E-9	2.E-10	17.0
07-01-85 thru 12-31-85	EM-3 (S-3)	U-Nat	1.16E-15	-	5.E-16	.02
		Th-230	0.46E-15	1.8E-15	5.E-16	.57
		Ra-226	0.03E-15	0.44E-15	5.E-16	.002
		Pb-210	14.4E-15	2.1E-15	2.E-14	.36
		Rn-222 (gas)	0.17E-9	0.15E-9	2.E-10	5.7
07-01-85 thru 12-31-85	EM-4 (S-4)	U-Nat	1.53E-15	-	5.E-16	.03
		Th-230	0.48E-15	0.96E-15	5.E-16	.60
		Ra-226	0.43E-15	0.61E-15	5.E-16	.02
		Pb-210	14.2E-15	2.2E-15	2.E-14	.35
		Rn-222 (gas)	0.17E-9	0.23E-9	2.E-10	5.7
07-01-85 thru 12-31-85	EM-5 (S-5)	U-Nat	2.99E-15	-	5.E-16	.06
		Th-230	0.22E-15	0.88E-15	5.E-16	.27
		Ra-226	0E-15	0.35E-15	5.E-16	0
		Pb-210	13.1E-15	1.8E-15	2.E-14	.33
		Rn-222 (gas)	0.22E-9	0.17E-9	2.E-10	7.3
07-01-85 thru 12-31-85	EM-6 (S-6) Bckgrd.	U-Nat	1.40E-15	-	5.E-16	.03
		Th-230	0.22E-15	0.93E-15	5.E-16	.27
		Ra-226	0E-15	0.30E-15	5.E-16	0
		Pb-210	14.1E-15	1.5E-15	2.E-14	.35
		Rn-222 (gas)	0.34E-9	0.27E-9	2.E-10	11.3

e) % MPCa is based upon gross nuclide concentrations divided by the appropriate unrestricted area MPCa from Table 1 on Page 14. No subtraction of EM-6 concentrations (area background) have been performed.

3a) LIQUID SAMPLES - Dissolved Radionuclides in Groundwaters

DATE COLLECTED	LOCATION	TYPE AREA	RADIONUCLIDE	GROSS AVERAGE CONCENTRATION (uCi/ml)	ERROR ESTIMATE (uCi/ml)	LLD (uCi/ml)		
7-01-85 thru 12-31-85	MW-1	Groundwater	U-Nat	5.64E-7	---	9.E-9		
			Th-230	0.19E-9	3.2E-9	1.E-9		
		Restricted	Ra-226	0.66E-9	0.35E-9	1.E-9		
			Pb-210	0.31E-9	1.0E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	MW-2	Groundwater	U-Nat	3.40E-7	---	9.E-9		
			Th-230	0E-9	2.8E-9	1.E-9		
		Restricted	Ra-226	0.40E-9	0.27E-9	1.E-9		
			Pb-210	0.81E-9	1.08E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	MW-4	Groundwater	U-Nat	27.13E-7	---	9.E-9		
			Th-230	0.78E-9	1.9E-9	1.E-9		
		Unrestricted	Ra-226	0.99E-9	0.3E-9	1.E-9		
			Pb-210	0.23E-9	0.97E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	MW-5 Background	Groundwater	U-Nat	0.04E-7	---	9.E-9		
			Th-230	1.16E-9	0.92E-9	1.E-9		
		Unrestricted	Ra-226	0.55E-9	0.29E-9	1.E-9		
			Pb-210	0.12E-9	1.00E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	MW-7	Groundwater	U-Nat	508.1E-7	---	9.E-9		
			Th-230	1.09E-9	0.94E-9	1.E-9		
		Restricted	Ra-226	1.83E-9	0.60E-9	1.E-9		
			Pb-210	3.49E-9	1.70E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	MW-8	Groundwater	U-Nat	307.6E-7	---	9.E-9		
			Th-230	9.8E-9	4.5E-9	1.E-9		
		Restricted	Ra-226	1.28E-9	0.50E-9	1.E-9		
			Pb-210	2.51E-9	1.3E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		

3a) LIQUID SAMPLES - Dissolved Radionuclides in Groundwaters

DATE COLLECTED	LOCATION	TYPE AREA	RADIONUCLIDE	GROSS AVERAGE CONCENTRATION (uCi/ml)	ERROR ESTIMATE (uCi/ml)	LLD (uCi/ml)		
7-01-85 thru 12-31-85	MW-11	Groundwater	U-Nat	32.6E-7	---	9.E-9		
			Th-230	1.04E-9	2.24E-9	1.E-9		
		Restricted	Ra-226	0.31E-9	0.24E-9	1.E-9		
			Pb-210	0.0E-9	1.01E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	H-10	Groundwater	U-Nat	0.38E-7	---	9.E-9		
			Th-230	1.12E-9	0.90E-9	1.E-9		
		Restricted	Ra-226	2.82E-9	0.76E-9	1.E-9		
			Pb-210	0.0E-9	1.05E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	H-38	Groundwater	U-Nat	0.50E-7	---	9.E-9		
			Th-230	3.8E-9	6.9E-9	1.E-9		
		Restricted	Ra-226	0.68E-9	0.33E-9	1.E-9		
			Pb-210	0.0E-9	1.05E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	H-49	Groundwater	U-Nat	186.6E-7	---	9.E-9		
			Th-230	1.2E-9	1.0E-9	1.E-9		
		Unrestricted	Ra-226	0.95E-9	0.52E-9	1.E-9		
			Pb-210	0.78E-9	0.33E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	H-56	Groundwater	U-Nat	550.4E-7	---	9.E-9		
			Th-230	0E-9	5.3E-9	1.E-9		
		Restricted	Ra-226	1.01E-9	0.59E-9	1.E-9		
			Pb-210	13.5E-9	1.38E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		

3a) LIQUID SAMPLES - Dissolved Radionuclides in Groundwaters

DATE COLLECTED	LOCATION	TYPE AREA	RADIONUCLIDE	GROSS AVERAGE CONCENTRATION ($\mu\text{Ci/ml}$)	ERROR ESTIMATE ($\mu\text{Ci/ml}$)	LLD ($\mu\text{Ci/ml}$)		
7-01-85 thru 12-31-85	H-71	Groundwater Restricted	U-Nat	0.30E-7	---	9.E-9		
			Th-230	1.6E-9	1.5E-9	1.E-9		
			Ra-226	0.25E-9	0.20E-9	1.E-9		
			Pb-210	0.60E-9	2.30E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	H-73	Groundwater Restricted	U-Nat	0.58E-7	---	9.E-9		
			Th-230	0E-9	1.1E-9	1.E-9		
			Ra-226	0.73E-9	0.34E-9	1.E-9		
			Pb-210	0.47E-9	1.35E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	H-78	Groundwater Restricted	U-Nat	0.26E-7	---	9.E-9		
			Th-230	0.14E-9	1.5E-9	1.E-9		
			Ra-226	1.39E-9	0.66E-9	1.E-9		
			Pb-210	0.29E-9	1.30E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	D-10	Groundwater Restricted	U-Nat	4.35E-7	---	9.E-9		
			Th-230	2.1E-9	0.94E-9	1.E-9		
			Ra-226	1.11E-9	0.42E-9	1.E-9		
			Pb-210	0.61E-9	1.28E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	DM80-1	Groundwater Restricted	U-Nat	7.03E-7	---	9.E-9		
			Th-230	0.83E-9	0.59E-9	1.E-9		
			Ra-226	1.18E-9	0.52E-9	1.E-9		
			Pb-210	0.46E-9	1.18E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		

3a) LIQUID SAMPLES - Dissolved Radionuclides in Groundwaters

DATE COLLECTED	LOCATION	TYPE AREA	RADIONUCLIDE	GROSS AVERAGE CONCENTRATION ($\mu\text{Ci/ml}$)	ERROR ESTIMATE ($\mu\text{Ci/ml}$)	LLD ($\mu\text{Ci/ml}$)		
7-01-85 thru 12-31-85	RW-1	Groundwater Restricted	U-Nat	582.9E-7	---	9.E-9		
			Th-230	7.4E-9	1.0E-9	1.E-9		
			Ra-226	0.49E-9	0.33E-9	1.E-9		
			Pb-210	11.6E-9	1.2E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
7-01-85 thru 12-31-85	RW-2	Groundwater Restricted	U-Nat	152.9E-7	---	9.E-9		
			Th-230	3.9E-9	2.8E-9	1.E-9		
			Ra-226	0.42E-9	0.27E-9	1.E-9		
			Pb-210	3.5E-9	1.0E-9	2.E-9		
			Po-210	N/A	N/A	2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		
			U-Nat			9.E-9		
			Th-230			1.E-9		
			Ra-226			1.E-9		
			Pb-210			2.E-9		
			Po-210			2.E-9		

3a) GROUNDWATER DISSOLVED CHEMISTRIES

Date Collected	Location	Gross Average Concentrations					
		Alkalinity	Chloride	Nitrate	Sulfate	Total Dissolved Solids	M
07-01-85 thru 12-31-85	MW-1 (R)	226	505	38	255	1,494	
07-01-85 thru 12-31-85	MW-2 (R)	227	440	32	256	1,415	
07-01-85 thru 12-31-85	MW-4 (UNR)	373	308	84	833	2,161	
07-01-85 thru 12-31-85	MW-5 (UNR)	166	44	4	147	365	
07-01-85 thru 12-31-85	MW-7 (R)	1,330	985	228	5,886	11,536	25
07-01-85 thru 12-31-85	MW-8 (R)	1,096	895	264	4,826	9,789	4
07-01-85 thru 12-31-85	MW-11 (R)	440	871	61	719	2,869	1
07-01-85 thru 12-31-85	H-10 (R)	305	3,535	33	416	7,156	
07-01-85 thru 12-31-85	H-33 (R)	218	1,400	29	350	3,114	

*See Attachment Reference to License

(R) - Restricted Area

(UNR) - Unrestricted Area

*Groundlevel to Water

as mg/l				pH (SU)	Conductivity (uomho/cm) @25°C	Water Level *(Feet)
Lead	Fluoride	Arsenic	Selenium			
+.1	.50	.024+.001	.002+.001	7.8	2,500	60.82
+.1	.45	.015+.002	(.001+.001)	7.7	2,150	61.37
+.1	.40	.004	.008	7.7	3,050	133.77
+.1	.30	⊙	⊙	7.4	710	162.06
+.1	.015	(.005+.004)	.001+.002	7.2	16,466	148.73
+.1	.12	(.005+.004)	(.001+.001)	7.1	13,476	173.75
+.1	.45	.04+.001	(.001+.001)	7.3	4,350	61.86
+.1	.40	(.005+.004)	(.001+.001)	7.4	11,976	55.05
+.1	.40	.002	.002	7.3	4,900	104.45

Condition 53

8603260310-01

Also Available On
Aperture Card

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CARD

3a) GROUNDWATER DISSOLVED CHEMISTRIES

Date Collected	Location	Gross Average Concentration				
		Alkalinity	Chloride	Nitrate	Sulfate	Total Dissolved Solids
07-01-85 thru 12-31-85	H-49a (UNR)	319	863	99	2,961	6,946
07-01-85 thru 12-31-85	H-56 (R)	6,601	1,050	319	7,187	19,226
07-01-85 thru 12-31-85	H-71 (R)	511	94	6	677	1,599
07-01-85 thru 12-31-85	H-73 (R)	134	99	17	224	668
07-01-85 thru 12-31-85	H-78 (R)	173	747	61	246	1,398
07-01-85 thru 12-31-85	DH-10 (R)	218	542	40	334	1,512
07-01-85 thru 12-31-85	DM80-1 (R)	171	220	32	622	1,416
07-01-85 thru 12-31-85	RW-1 (R)	8,673	1,131	385	8,107	21,560
07-01-85 thru 12-31-85	RW-2 (R)	1,141	864	284	2,772	6,903

(R) - Restricted Area
 (UNR) - Unrestricted Area
 *Groundlevel to Water

**TI
 APERTURE
 CARD**

**Also Available On
 Aperture Card**

⊕ See Attachment Reference to L

s mg/l				pH (SU)	Conductivity (uomhg/cm) @25 C	Water Level *(Feet)
lybdenum	Fluoride	Arsenic	Selenium			
5.7 ⁺ .1	1.0	⊙	⊙	8.0	8,700	105.18
9.6 ⁺ .1	3.4	⊙	⊙	9.3	27,216	92.46
.2 ⁺ .1	.50	.03 ⁺ .001	(.001 ⁺ .001	7.3	2,400	96.41
.3 ⁺ .1	.40	(.005 ⁺ .004	(.001 ⁺ .001	7.5	1,050	138.35
.4 ⁺ .1	.12	.02 ⁺ .001	(.001 ⁺ .001	7.3	2,900	187.23
.3 ⁺ .1	.50	.009 ⁺ .002	(.001 ⁺ .001	7.9	2,450	65.63
.3 ⁺ .1	.30	(.005 ⁺ .004	(.001 ⁺ .001	7.3	1,900	67.59
0.8 ⁺ .1	3.4	.067 ⁺ .001	.009 ⁺ .002	9.5	30,966	165.89
6.2 ⁺ .1	1.0	.036 ⁺ .001	(.001 ⁺ .001	8.3	10,966	199.85

cense Condition 53

8603260310-02

3b). LIQUID SAMPLES - Surface Waters

DATE COLLECTED	LOCATION	TYPE AREA	RADIONUCLIDE	CONCENTRATION (uCi/ml)	ERROR ESTIMATE (uCi/ml)	LLD (uCi/ml)
7-01-85 thru 12-31-85	SS-1	Surface Water	U-Nat d	.14E-7	---	9.0E-9
			s	.005E-7	---	9.0E-9
		Unrestricted	Th-230 d	1.3E-9	1.6E-9	1.0E-9
			s	0.58E-9	0.41E-9	1.0E-9
			Ra-226 d	.38E-9	.24E-9	1.0E-9
			s	.22E-9	.95E-9	1.0E-9
			Pb-210 d	.24E-9	1.36E-9	1.0E-8
			s	0E-9	2.6E-9	1.0E-8
			Po-210 d			2.0E-9
7-01-85 thru 12-31-85	SS-2	Surface Water	U-Nat d	.11E-7	---	9.0E-9
			s	.017E-7	---	9.0E-9
		Unrestricted	Th-230 d	0.88E-9	0.74E-9	1.0E-9
			s	1.4E-9	2.8E-9	1.0E-9
			Ra-226 d	.76E-9	.34E-9	1.0E-9
			s	.045E-9	.49E-9	1.0E-9
			Pb-210 d	.14E-9	1.16E-9	1.0E-8
			s	1.0E-9	2.7E-9	1.0E-8
			Po-210 d			2.0E-9
7-01-85 thru 12-31-85	SS-7	Surface Water	U-Nat d	.33E-7	---	9.0E-9
			s	.005E-7	---	9.0E-9
		Unrestricted	Th-230 d	0E-9	0.69E-9	1.0E-9
			s	0.11E-9	1.1E-9	1.0E-9
			Ra-226 d	.57E-9	.30E-9	1.0E-9
			s	0E-9	.42E-9	1.0E-9
			Pb-210 d	.16E-9	1.32E-9	1.0E-8
			s	0E-9	2.5E-9	1.0E-8
			Po-210 d			2.0E-9
			U-Nat d			9.0E-9
			s			9.0E-9
			Th-230 d			1.0E-9
			s			1.0E-9
			Ra-226 d			1.0E-9
			s			1.0E-9
			Pb-210 d			1.0E-8
			s			1.0E-8
			Po-210 d			2.0E-9
			U-Nat d			9.0E-9
			s			9.0E-9
			Th-230 d			1.0E-9
			s			1.0E-9
			Ra-226 d			1.0E-9
			s			1.0E-9
			Pb-210 d			1.0E-8
			s			1.0E-8
			Po-210 d			2.0E-9
			U-Nat d			9.0E-9
			s			9.0E-9
			Th-230 d			1.0E-9
			s			1.0E-9
			Ra-226 d			1.0E-9
			s			1.0E-9
			Pb-210 d			1.0E-8
			s			1.0E-8
			Po-210 d			2.0E-9

d = dissolved

s = suspended

3b) LIQUID SAMPLES - SURFACE WATERS

DATE COLLECTED	LOCATION	TYPE	CHEMISTRY TYPE	AVERAGE CONCENTRATION (ml/L)
07-01-85 thru 12-31-85	Upper Tails Pond	Surface Water Restricted	Fluoride	120
07-01 85 thru 12-31-85	Lower Tails Pond	Surface Water Restricted	Fluoride	150

GROUNDWATER MONITORING DATA
DEPTH TO WATER

WELL	MW-9	MW-10	H-48	H-55	H-72	H-77
<u>Quarter</u>						
3rd 1985	211.80'	187.47'	148.52'	121.99'	76.60'	193.31'
4th 1985	211.33'	186.75'	148.67'	121.87'	76.56'	193.37'

GROUNDWATER DETECTION MONITORING PROGRAM
LICENSE CONDITION 53F

MW-5 (Background)

<u>DATE</u>	<u>As as mg/l</u>	<u>Se as mg/l</u>	<u>PH</u>
07/85	.001 + .001	.001 + .001	7.5 + .07
08/85	.005 + .004	.001 + .001	7.3 + .07
09/85	.005 + .004	.001 + .001	7.1 + .07
10/85	.005 + .004	.001 + .001	8.0 + .07

H-49a

07/85	.003 + .003	.007 + .0007	7.9 + .07
08/85	.219 + .001	.001 + .001	7.9 + .07
09/85	.215 + .001	.001 + .001	7.9 + .07
10/85	.224 + .001	.001 + .001	8.4 + .07

H-55

07/85	1.32 + .132	.02 + .002	9.5 + .07
08/85	1.07 + .004	.009 + .002	9.5 + .07
09/85	1.23 + .004	.009 + .002	9.4 + .07
10/85	.075 + .001	.001 + .001	9.5 + .07

H-56

07/85	1.74 + .174	.02 + .002	9.3 + .07
08/85	1.22 + .004	.009 + .002	9.3 + .07
09/85	1.14 + .004	.010 + .002	9.2 + .07
10/85	1.62 + .004	.009 + .002	9.3 + .07

November and December 1985 data was not reported because of License Condition 53 being revoked as of 11-4-85.

4a) VEGETATION

MONTHS COLLECTED	LOCATION	TYPE/PORTION ANALYZED	RADIOISOTOPE	CONCENTRATION ($\mu\text{Ci/Kg}$)	ERROR ESTIMATE ($\mu\text{Ci/Kg}$)	LLD ($\mu\text{Ci/Kg}$)
7-1-85	EM-1		Ra-226	5.0E-5	1.0E-5	2.E-7
ru 12-31-85	(S-1)	Comp./Dry Vegetation	Pb-210	1.6E-3	.1E-3	5.E-7
7-1-85	EM-3		Ra-226	8.0E-5	1.0E-5	2.E-7
ru 12-31-85	(S-3)	Comp./Dry Vegetation	Pb-210	1.3E-5	.1E-3	5.E-7
7-1-85	EM-4		Ra-226	1.0E-4	1.0E-5	2.E-7
ru 12-31-85	(S-4)	Comp./Dry Vegetation	Pb-210	1.5E-3	.1E-3	5.E-7
7-1-85	EM-6		Ra-226	7.0E-5	1.0E-5	2.E-7
ru 12-31-85	(S-6)	Comp./Dry Vegetation	Pb-210	1.3E-3	.1E-3	5.E-7

Vegetation samples are collected three times during the grazing season. Each assay represents a composite of three site-specific grab samples.

5a) SOIL

DATE COLLECTED	LOCATION	TYPE/PORTION ANALYZED	RADIONUCLIDE	(a) GROSS CONCENTRATION (uCi/g)	ERROR ESTIMATE (uCi/g)	LLD (uCi/g)
7/85	EM-1 (S-1)	Grab/Surface	U-Nat	2.73	---	1.00E-6
			Ra-226	0	.06	2.00E-7
			Pb-210	1.18	1.80	1.00E-6
7/85	EM-2 (S-2)	Grab/Surface	U-Nat	2.39	---	1.00E-6
			Ra-226	0	.06	2.00E-7
			Pb-210	.17	1.04	1.00E-6
7/85	EM-3 (S-3)	Grab/Surface	U-Nat	1.71	---	1.00E-6
			Ra-226	0	.07	2.00E-7
			Pb-210	.96	1.04	1.00E-6
7/85	EM-4 (S-4)	Grab/Surface	U-Nat	1.03	---	1.00E-6
			Ra-226	0	.06	2.00E-7
			Pb-210	1.77	1.03	1.00E-6
7/85	EM-5 (S-5)	Grab/Surface	U-Nat	1.71	---	1.00E-6
			Ra-226	.60	.24	2.00E-7
			Pb-210	.71	1.0	1.00E-6
7/85	EM-6 (S-6) Bckgrd.	Grab/Surface	U-Nat	0.68	---	1.00E-6
			Ra-226	0	.06	2.00E-7
			Pb-210	.91	.97	1.00E-6

5b) SEDIMENT

DATE COLLECTED	LOCATION	TYPE/PORTION ANALYZED	RADIONUCLIDE	GROSS CONCENTRATION (uCi/g)	ERROR ESTIMATE (uCi/g)	LLD (uCi/g)
7/85	SS-1	Grab	U-Nat	1.60	---	1.00E-6
			Th-230	3.86	.63	2.00E-7
			Ra-226	0	.06	2.00E-7
			Pb-210	0	1.28	1.00E-6
7/85	SS-2	Grab	U-Nat	2.58	---	1.00E-6
			Th-230	1.65	.44	2.00E-7
			Ra-226	0	.08	2.00E-7
			Pb-210	.94	1.03	1.00E-6
7/85	SS-7	Grab	U-Nat	1.71	---	1.00E-6
			Th-230	3.34	.59	2.00E-7
			Ra-226	0	.08	2.00E-7
			Pb-210	.21	1.07	1.00E-6
			U-Nat			1.00E-6
			Th-230			2.00E-7
			Ra-226			2.00E-7
			Pb-210			1.00E-6
			U-Nat			1.00E-6
			Th-230			2.00E-7
			Ra-226			2.00E-7
			Pb-210			1.00E-6

6) DIRECT RADIATION

DATES MONITORED	LOCATION	AVERAGE EXPOSURE RATE (mr/qtr.)	ERROR ESTIMATE (mr/qtr.)
07-01-85 thru 12-31-85	EM-1 (S-1)	8.0	5.4
07-01-85 thru 12-31-85	EM-2 (S-2)	17.0	6.4
07-01-85 thru 12-31-85	EM-3 (S-3)	15.5	6.2
07-01-85 thru 12-31-85	EM-4 (S-4)	11.0	5.7
07-01-85 thru 12-31-85	EM-5 (S-5)	17.5	6.4
07-01-85 thru 12-31-85	EM-6 (S-6) (Background)	11.2	8.1

7) DOSE ASSESSMENT BASED UPON ACTUAL ENVIRONMENTAL
MONITORING DATA AT THE NEAREST RESIDENCE - SITE NO. 4

Reporting Period:

Internal Radiation Exposure

The most probable pathway is inhalation of airborne particulates.

50 year dose commitment (mrem)

RADIONUCLIDE	WHOLE BODY (f)	BONE (f)	LUNG (f)
U-Nat	.60	10.3	22.0
Th-230	43.2	1,547.0	837.2
Ra-226	13.3	132.9	2,842.3

For Dose Calculations, see Page

External Radiation Exposure

Nearest residence (EM4) - Background (EM6) = Net rate above background

11.0 mr/qtr. - 11.2 mr/qtr. = 0 mr/qtr.

(f) Based upon net nuclide concentrations.

DOSE CONVERSION CALCULATION FOR INHALATION OF AIRBORNE PARTICULATES
AT ENVIRONMENTAL MONITORING SITE NO. 4 (NEAREST RESIDENCE MONITOR)

(Gross Concentration) - (Background Concentration) = (Net Concentration) in uCi/ml

since: $1 \times 10^{+12} \text{ uCi/ml} = . \text{pCi/M}^3$

Net Concentration (uCi/ml) $\times 10^{+12}$ = Net Concentration (pCi/M³)

and then:

Net Concentration (pCi/M³) $\times$ Dose Conversion Factor (mrem/pCi/M³) = Dose (mrem)

NUCLIDE	EM-4 GROSS	-	EM-6 BACKGROUND	=	EM-4 NET	$\times 10^{+12}$	$\times$	ORGAN DOSE CONVERSION FACTOR
U-Nat	1.53E-15	-	1.40E-15	=	0.13E-15			(pCi/M ³) $\times$ fi ₁
Th-230	0.48E-15	-	0.22E-15	=	0.26E-15			(pCi/M ³) $\times$ fi ₂
Ra-226	0.43E-15	-	0E-15	=	0.43E-15			(pCi/M ³) $\times$ fi ₃

Organ Dose Conversion Factors (Fi)

From Table A-1 of "Compliance Determination Procedures for Environmental Radiation Protection Standards for Uranium Recovery Facilities, 40 CFR 190, November 1980".

	Whole Body	Bone	Lung
U-Nat	4.62	79.4	169.
Th-230	166.	5950.	3220.
Ra-226	30.9	309.	6610.

U-Nat

Whole Body (0.13E-15) (1E12) (4.62) = .006 REM = .6 mrem
 Bone (0.13E-15) (1E12) (79.4) = .0103 REM = 10.3 mrem
 Lung (0.13E-15) (1E12) (169) = .0220 REM = 22.0 mrem

Thorium 230

Whole Body (0.26E-15) (1E12) (166) = .0432 REM = 43.2 mrem
 Bone (0.26E-15) (1E12) (5,950) = 1.547 REM = 1547.0 mrem
 Lung (0.26E-15) (1E12) (3,220) = .8372 REM = 837.2 mrem

Radium 226

Whole Body (0.43E-15) (1E12) (30.9) = 0.133 REM = 13.3 mrem
 Bone (0.43E-15) (1E12) (309) = .1329 REM = 132.9 mrem
 Lung (0.43E-15) (1E12) (6,610) = 2.8423 REM = 2,842.3 mrem

SUPPLEMENTARY INFORMATION

Surface Water and Sediment Sampling Sites (See Attachment)

<u>SITE</u>	<u>DIRECTION FROM MILL</u>	<u>LOCATION</u>
SS-1	NW	West Coyote Wash
SS-2	NW	West Coyote Creek - Sunnyside Incline
SS-3	E	Ditch to Redd Reservoir
SS-7	E	Redd Reservoir
SS-4 (1000 ft. south of lower tailings pond)	SW	1000 feet south of the lower tailings pond

Environmental Monitoring Sites (See Attached Map)

<u>SITE</u>	<u>DIRECTION FROM MILL</u>	<u>LOCATION</u>
S1 (EM-1)	SE	South property boundary
S2 (EM-2)	SW	West property boundary
S3 (EM-3)	E	East property boundary
S4 (EM-4)	N	Nearest residence, approximately 1 mile north of property boundary
S5 (EM-5)	NE	La Sal School (occupiable structure)
S6 (EM-6)	NW	10.5 miles northwest of the mill

TABLE 1

MPC's Used in Calculation of % MPC

Reference 10 CFR 20, Appendix B

	Restricted Area (uCi/ml)			Unrestricted Area (uCi/ml)	
	Air		Water	Air	Water
	Ore	Yellowcake			
-Natural	$.5 \times 10^{-10}$ uCi/ml	1.0×10^{-10} uCi/ml	1×10^{-3} S,I	5×10^{-12}	3×10^{-5} S,I
h-230		2×10^{-12} S	5×10^{-5} S	8×10^{-14} S	2×10^{-6} S, 3×10^{-5} I
a-226		3×10^{-11} S	4×10^{-7} S	2×10^{-12} I	3×10^{-8} S, 3×10^{-5} I
p-210		1×10^{-10} S	4×10^{-6} S	4×10^{-12} S	1×10^{-7} S, 2×10^{-4} I
p-210		3×10^{-11} I	2×10^{-5} S	1×10^{-12} I	7×10^{-7} S, 3×10^{-5} I
p-222				3×10^{-9}	

S = soluble = dissolved

I = insoluble = suspended

Calculation:

Nuclide concentration at the location = Ni

Nuclide concentration at the background location = Nbi

Maximum Permissible Concentration for the nuclide (above) = MPCi

$$\% \text{ MPCi} = \frac{Ni - Nbi}{\text{MPCi}} \times 100$$

✓ 2

Sampling locations for air particulates, radon, soils, and direct radiation. Vegetation sampling near sites 1, 3, and 6.

8.

Mill License Condition 42D requires that:

Documentation shall be provided to the NRC anytime a urinalysis or InVivo measurement exceeds 15 ug/l or 9 Ci of uranium respectively, and will include a summary of all corrective actions taken.

This documentation will be submitted with the semi-annual effluent report.

Name: J. L. (Mill Maintenance)

Date of Collection: 8-8 thru 8-19-85

Type of Bioassay - Urinalysis X InVivo Count

Analytical Results
Urinalysis ug/l InVivo Ci

Corrective Action Taken:

Reference to overexposure report to NRC date 10-15-85.

8.

Mill License Condition 42D requires that:

Documentation shall be provided to the NRC anytime a urinalysis or InVivo measurement exceeds 15 ug/l or 9 Ci of uranium respectively, and will include a summary of all corrective actions taken.

This documentation will be submitted with the semi-annual effluent report.

Name: B. H. (Dryer Operator)

Date of Collection: 7-11-85 and 7-12-85

Type of Bioassay - Urinalysis X InVivo Count

Analytical Results

Urinalysis ug/l 16.7 & 19.6 InVivo Ci

Corrective Action Taken:

7-10-85 The y/c dryer went positive, releasing a small quantity of yellowcake material to the upper deck areas. The dryer operator was standing in the vicinity of the release. His lapel sample indicated 25% MPE_a for the day. Dryer was shut down to investigate the release.

7-11-85 Findings of the investigation indicated that a large buildup of wet yellowcake at the drop point of #1 hearth to #2 hearth fell causing the excess moisture in the material to vaporize itself. Steam and yellowcake was released thru the small observation doors on the hearth.

Better cleaning of the top hearth will eliminate the potential buildup of material. Operator and shifter were instructed in the corrective action.

Bioassay result of dryer operator yielded 16.7 ug/l U^{Nat}. This sample does not meet Reg. guide 8.22 i.e., less than 48 hours after exposure.

7-12-85 Bioassay result of dryer operator yielded 19.6 ug/l U^{Nat}. Sample was 48 hours after exposure. Followup samples were collected thru 7-13-85 and none of them were ≥ 15 ug/l U^{Nat}.

Data as follows:

7-13-85	9.3 ug/l	<u>U^{Nat}</u>
7-14-85	13.2 ug/l	<u>U^{Nat}</u>
7-15-85	13.2 ug/l	<u>U^{Nat}</u>
7-17-85	12.3 ug/l	<u>U^{Nat}</u>
7-18-85	8.2 ug/l	<u>U^{Nat}</u>