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RIO ALGOM MINING CORP. 40-8084

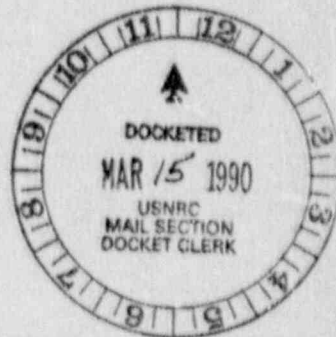
La Sal Route
MOAB, UTAH 84532

Phone: (801) 686-2215
FAX (801) 686-2337

RETURN ORIGINAL TO PDR, HQ.

March 12, 1990

Mr. Ramon E. Hall, Director
U. S. Nuclear Regulatory Commission
Region IV
Uranium Recovery Field Office
P. O. Box 25325
Denver, Colorado 80225



Re: Docket No. 40-8084
Source Material License SUA-1119

Dear Mr. Hall:

Enclosed please find five (5) copies of the Semiannual Effluent Report for Rio Algom Mining Corp.'s Lisbon Mill. This data is the result of monitoring for the period 1 July 1989 through 31 December 1989.

This submittal satisfies License Condition 22 and 10 CFR 40.65.

If you or your staff have any questions concerning this submittal, please call (801) 686-2217.

Respectfully,

L. A. Fossey

F. G. Fossey
Assistant Radiation
Safety Officer
R.A.M.C- Lisbon
Operations

DESIGNATED ORIGINAL

Certified by *Mary C. Hord*

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SEMIANNUAL ENVIRONMENTAL MONITORING REPORT

for

07/01/89 through 12/31/89

Prepared

By

RIO ALGOM MINING CORP. - Lishon Operation

Source Materials License Number - SUA-1119

Docket Number - 40-8084



R. S. Pattison
Manager

12 March 1990.

Date

R.A.M.C.-Lisbon Operation has no stack emission to report during the reporting period 07/01/89 through 12/31/89. The mill was on standby for the entire reporting period.

OFFSITE AIR MONITORING STATIONS

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Date COLLECTED	LOCATION	RADIONUCLIDE	GROSS CONCENTRATION (uCi/ml)	ERROR ESTIMATE (uCi/ml)	LLD (uCi/ml)	(e) % MPCa
06/30/89	EM-1	U-Nat	6.4 E-16	1.2 E-15	5.0 E-16	0.01
to		Th-230	0.0 E+00	4.5 E-16	2.0 E-16	0.00
09/29/89		Ra-226	2.2 E-16	7.0 E-17	1.0 E-16	0.01
		Pb-210	1.2 E-14	2.4 E-15	9.0 E-16	0.31
		Rn-222 (gas)	2.1 E-10	1.0 E-10	6.0 E-11	7.10
09/29/89	EM-1	U-Nat	2.7 E-16	1.3 E-15	5.0 E-16	<0.01
to		Th-230	5.5 E-16	1.0 E-16	3.0 E-16	0.68
12/29/89		Ra-226	3.9 E-15	3.2 E-16	1.0 E-16	0.20
		Pb-210	2.6 E-14	1.2 E-15	9.0 E-16	0.64
		Rn-222 (gas)	4.4 E-10	2.0 E-10	6.0 E-11	14.67
06/30/89	EM-2	U-Nat	0.0 E+00	1.2 E-15	5.0 E-16	0.00
to		Th-230	0.0 E+00	9.2 E-16	2.0 E-16	0.00
09/29/89		Ra-226	3.5 E-16	9.0 E-17	1.0 E-16	0.02
		Pb-210	1.5 E-14	1.4 E-15	7.0 E-16	0.37
		Ra-222 (gas)	3.8 E-10	1.9 E-10	6.0 E-11	12.97
09/29/89	EM-2	U-Nat	1.3 E-15	1.3 E-15	5.0 E-16	0.03
to		Th-230	2.8 E-16	9.1 E-17	3.0 E-16	0.35
12/29/89		Ra-226	3.6 E-16	1.3 E-16	1.0 E-16	0.02
		Pb-210	2.5 E-14	1.4 E-15	7.0 E-16	0.62
		Rn-222 (gas)	9.3 E-10	4.2 E-10	6.0 E-11	30.93
06/30/89	EM-4	U-Nat	0.0 E+00	1.2 E-15	5.0 E-16	0.00
to		Th-230	1.0 E-15	3.3 E-16	1.0 E-16	1.26
09/29/89		Ra-226	4.4 E-16	1.0 E-16	1.0 E-16	0.02
		Pb-210	1.9 E-14	4.4 E-15	8.0 E-16	0.48
		Rn-222 (gas)	1.5 E-10	6.8 E-11	6.0 E-11	5.00
09/29/89	EM-4	U-Nat	1.3 E-15	1.3 E-15	5.0 E-16	0.03
to		Th-230	2.7 E-16	3.9 E-17	3.0 E-16	0.34
12/29/89		Ra-226	6.2 E-16	1.6 E-16	1.0 E-16	0.03
		Pb-210	1.9 E-14	1.1 E-15	8.0 E-16	0.51
		Rn-222 (gas)	3.7 E-10	1.7 E-10	6.0 E-11	12.20
06/30/89	EM-6	U-Nat	3.2 E-15	1.2 E-15	5.0 E-16	0.06
to		Th-230	2.1 E-15	9.9 E-16	2.0 E-16	2.66
09/29/89		Ra-226	3.1 E-16	8.0 E-17	9.0 E-17	0.02
		Pb-210	1.1 E-14	2.3 E-15	1.0 E-15	0.29
		Rn-222 (gas)	2.7 E-10	1.2 E-10	6.0 E-11	9.00
09/29/89	EM-6	U-Nat	1.6 E-15	1.2 E-15	5.0 E-16	0.03
to		Th-230	2.7 E-16	3.7 E-17	4.0 E-16	0.33
12/29/89		Ra-226	3.4 E-16	1.4 E-16	1.0 E-16	0.02
		Pb-210	2.5 E-14	1.3 E-15	1.0 E-16	0.63
		Rn-222 (gas)	5.8 E-10	2.7 E-10	6.0 E-11	19.27

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.

LIQUID SAMPLES- Dissolved Radionuclides in Groundwaters

DATE: 2nd. Half 1989

<u>LOCATION</u>	<u>RADIONUCLIDE</u>	<u>GROSS CONCENTRATION (pCi/l)</u>	<u>ERROR ESTIMATE (pCi/l)</u>	<u>LLD (pCi/l)</u>
MW-5	U-NAT	0.00 E+00	2.44 E+00	3.70 E-01
	Ra-226	1.06 E+00	3.26 E-01	4.00 E-01
	Ra-228	0.00 E+00	7.89 E+00	1.00 E+01
	Th-230	4.55 E-01	1.53 E-01	2.00 E-01
	Gross Alpha	0.00 E+00	4.59 E+00	8.00 E+00
MW-6a	U-NAT	5.17 E+03	2.44 E+00	3.70 E-01
	Ra-226	2.62 E-01	2.85 E-01	4.00 E-01
	Ra-228	3.15 E+01	6.03 E+00	6.00 E+00
	Th-230	0.00 E+00	5.46 E+00	1.00 E+01
	Gross Alpha	2.58 E+03	2.58 E+02	5.00 E+01
MW-13	U-NAT	9.96 E+00	2.44 E+00	3.70 E-01
	Ra-226	4.50 E-02	3.18 E-01	5.00 E-01
	Ra-228	2.89 E-01	8.06 E-01	1.00 E+00
	Th-230	6.21 E-02	1.15 E-01	2.00 E-01
	Gross Alpha	2.62 E+00	5.19 E+00	8.00 E+00
H-56	U-Nat	2.52 E+04	6.54 E+01	3.70 E-01
	Ra-226	8.98 E-01	3.54 E-01	5.00 E-01
	Ra-228	0.00 E+00	9.71 E+00	2.00 E+01
	Th-230	0.00 E+00	1.42 E+00	3.00 E+00
	Gross Alpha	7.78 E+03	7.46 E+02	1.00 E+02
CWUT-9	U-Nat	3.35 E+04	5.87 E+01	3.70 E-01
	Ra-226	3.13 E-01	1.39 E-01	2.00 E-01
	Ra-228	0.00 E+00	2.52 E+00	5.00 E+00
	Th-230	1.69 E+01	1.60 E+00	5.00 E-01
	Gross Alpha	7.71 E+03	1.01 E+03	3.00 E+02

GROUNDWATER DISSOLVED CHEMISTRIES-(Gross Concentrations)

<u>Date Collected</u>	<u>Location</u>	<u>Sulfate mg/l</u>	<u>Chloride mg/l</u>	<u>pH SU</u>	<u>Conductivity (umho/cm)</u>	<u>Water Level(ft.)</u>
10/11/89	MW-1	510.3	413.3	7.88	2950	60.12
10/13/89	MW-4	434.2	502.6	7.54	2690	134.30
10/11/89	MW-5	146.5	42.3	7.49	613	150.55
10/25/89	MW-7	8299.1	1000.5	7.37	18300	146.22
10/12/89	MW-13	141.6	14.6	7.58	669	90.33
10/24/89	H-56	3487.9	631.4	8.37	10410	91.02
10/18/89	OWUT-9	4959.3	1597.0	9.51	20633	N.A.
10/25/89	RW-1	7710.6	1019.9	9.78	25267	163.50

LIQUID SAMPLES- Dissolved Cations in Groundwaters

DATE: 2nd. Half 1989

<u>LOCATION</u>	<u>CATION</u>	<u>GROSS CONCENTRATION (mg/l)</u>	<u>LLD (mg/l)</u>
MW-5	As	<0.001	0.001
	Ba	<0.01	0.01
	Be	<0.005	0.005
	Cd	<0.005	0.005
	Cr	<0.01	0.01
	Pb	<0.001	0.001
	Mo	<0.05	0.05
	Ni	0.002	0.001
	Se	0.004	0.001
	Ag	<0.01	0.01
MW-6a	As	0.018	0.001
	Ba	<0.01	0.01
	Be	<0.005	0.005
	Cd	<0.005	0.005
	Cr	<0.01	0.01
	Pb	<0.001	0.001
	Mo	1.100	0.05
	Ni	<0.001	0.001
	Se	0.060	0.001
	Ag	<0.01	0.01
MW-13	As	0.018	0.001
	Ba	0.03	0.01
	Be	<0.005	0.005
	Cd	0.005	0.005
	Cr	<0.01	0.01
	Pb	<0.001	0.001
	Mo	<0.05	0.05
	Ni	<0.001	0.001
	Se	0.006	0.001
	Ag	<0.01	0.01

LIQUID SAMPLES- Dissolved Cations in Groundwaters (Cont.)

DATE: 1st. Half 1989

<u>LOCATION</u>	<u>CATION</u>	GROSS CONCENTRATION <u>(mg/l)</u>	LLD <u>(mg/l)</u>
H-56	As	0.150	0.001
	Ba	0.10	0.01
	Be	0.050	0.005
	Cd	0.05	0.005
	Cr	0.10	0.01
	Pb	<0.001	0.001
	Mo	9.000	0.001
	Ni	0.002	0.001
	Se	<0.001	0.001
	Ag	0.05	0.01
OWUT-9	As	0.130	0.001
	Ba	<0.01	0.01
	Be	0.05	0.005
	Cd	0.05	0.005
	Cr	0.10	0.01
	Pb	0.005	0.001
	Mo	16.90	0.05
	Ni	0.009	0.001
	Se	0.002	0.001
	Ag	0.25	0.01

WATER LEVEL DATA-Ground Surface to Water

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<u>Date</u>	<u>Well Location</u>	<u>Depth (ft.)</u>
09/89	MW-9	204.30
09/89	MW-10	177.29
09/89	MW-8	182.54
09/89	H-38	105.82
09/89	H-48	146.84
09/89	H-55	120.41
09/89	H-71	56.60
09/89	H-73	137.74
09/89	H-77	190.44
09/89	H-78	180.13
09/89	LT-5	73.27
09/89	LT-6	64.90
09/89	LT-7	57.30
09/89	LT-10	68.20
09/89	LT-12	41.14
09/89	GW-17	149.37
09/89	GW-19	156.75
09/89	GW-20	189.60
09/89	UT-7	126.35
09/89	UT-9	DRY
09/89	D-3	55.53
09/89	D-10	85.10
09/89	DM80-2	78.94
09/89	DM80-3	67.02
09/89	DM80-4	66.80

OFFSITE SURFACE WATER

<u>Date</u> <u>COLLECTED</u>	<u>LOCATION</u>	<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(uCi/ml)</u>	<u>ERROR ESTIMATE</u> <u>(uCi/ml)</u>	<u>LLD</u> <u>(uCi/ml)</u>	<u>% MPCw</u>
07/14/89	SS-1	U-Nat d	0.00 E+00	3.40 E+00	3.00 E+00	0.00
		s	0.00 E+00	3.40 E+00	3.00 E+00	0.00
		Ra-226 d	5.49 E-02	1.64 E-01	3.00 E-01	0.18
		s	2.61 E-01	6.88 E-02	7.00 E-02	<0.01

d= dissolved
s= suspended

%MPCw's are based upon the limits set in 10 CFR 20, Appendix B.

SOIL -- Annual requirement ONLY.

<u>DATE</u> <u>COLLECTED</u>	<u>LOCATION</u>	<u>TYPE/PORTION</u> <u>ANALYZED</u>	(a) GROSS <u>RADIONUCLIDE</u>	ERROR CONCENTRATION (pCi/g)	ESTIMATE (pCi/g)	LLD (pCi/g)
07/14/89	FM-1	Grab/Surface	U-Nat	7.10 E+00	1.59 E+00	4.0E-02
			Ra-226	4.35 E-01	6.77 E-02	4.0E-02
			Pb-210	4.70 E+00	2.40 E+00	4.0E+00
07/14/89	EM-2	Grab/Surface	U-Nat	0.00 E+00	1.31 E+00	7.3E-01
			Ra-226	6.51 E-01	1.43 E-01	3.0E-01
			Pb-210	1.01 E+00	2.74 E+00	5.0E+00
07/14/89	EM-4	Grab/Surface	U-Nat	0.00 E+00	1.31 E+00	7.3E-01
			Ra-226	7.96 E-01	1.44 E-01	3.0E-01
			Pb-210	1.45 E+00	3.41 E+00	6.0E+00
07/14/89 Bckgrd.	EM-6	Grab/Surface	U-Nat	3.57 E-01	1.31 E+00	7.3E-01
			Ra-226	5.83 E-01	1.01 E-01	3.0E-01
			Pb-210	1.61 E+00	4.60 E+00	8.0E+00

SEDIMENT -- Annual requirement ONLY.

<u>DATE</u> <u>COLLECTED</u>	<u>LOCATION</u>	<u>TYPE/PORTION</u> <u>ANALYZED</u>	(a) GROSS <u>RADIONUCLIDE</u>	ERROR CONCENTRATION (pCi/g)	ESTIMATE (pCi/g)	LLD (pCi/g)
07/14/89	SS-1	Grab/Surface	U-Nat	2.30 E+01	1.79 E+00	4.0E-02
			Ra-226	1.51 E+00	1.23 E+00	7.0E-02
			Pb-210	0.00 E+00	2.79 E+00	5.0E+00

VEGETATION Annual requirment.

<u>MONTHS</u> <u>COLLECTED</u>	<u>LOCATION</u>	<u>TYPE/PORTION ANALYZED</u>	<u>RADIONUCLIDE</u>	<u>CONCENTRATION</u> <u>(μCi/Kg)</u>	<u>ERROR</u> <u>ESTIMATE</u> <u>(μCi/Kg)</u>	<u>LLD</u> <u>(μCi/Kg)</u>
May Aug. Sept.	EM-1	Comp./Dry Vegetation	Ra-226 Pb-210	5.30 E-05 1.64 E-05	1.80 E-05 1.00 E-05	4.0 E-06 8.0 E-06
May Aug. Sept.	EM-4	Comp./Dry Vegetation	Ra-226 Pb-210	1.21 E-04 9.10 E-05	4.00 E-05 9.80 E-05	8.0 E-06 3.0 E-05
May Aug. Sept.	EM-6	Comp./Dry Vegetation	Ra-226 Pb-210	5.60 E-05 6.59 E-05	1.80 E-05 1.70 E-05	2.0 E-06 1.0 E-05

Vegetation sampled annually, three times during grazing season.

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

Reporting Period: 1 July 1989 through 31 December 1989

Internal Radiation Exposure:

The most probable pathway is inhalation of airborne particulates.

50 year dose commitment (mrem)

3rd Qtr. 1989

<u>RADIONUCLIDE</u>	<u>WHOLE BODY</u> ^(f)	<u>BONE</u> ^(f)	<u>LUNG</u> ^(f)
U-Nat	-1.47 E-02*	-2.52 E-01*	-5.06 E+00*
Th-230	-1.86 E-01*	-6.66 E+00*	-3.58 E+00*
Ra-226	4.02 E-03	4.02 E-02	8.59 E-01

4th. Qtr. 1989

<u>RADIONUCLIDE</u>	<u>WHOLE BODY</u> ^(f)	<u>BONE</u> ^(f)	<u>LUNG</u> ^(f)
U-Nat	-1.25 E-03*	-2.14 E-02*	-4.56 E-02*
Th-230	8.30 E-04	2.98 E-02	1.61 E-02
Ra-226	8.56 E-03	8.56 E-02	1.83 E+00

*Calculations resulted in negative radionuclide concentration

External Radiation Exposure:

3rd Qtr. 1989

EM Site #4 - EM Site #6 = Net Exposure
13.0 mrem/qtr. - 13.0 mrem/qtr. = -0.5 < 0 mrem/qtr.

4th. Qtr. 1989

EM Site #4 - EM Site #6 = Net Exposure
15.0 mrem/qtr. - 16.5 mrem/qtr. = -1.5 < 0 mrem/qtr.

(f) based upon 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: $\text{El2 uCi/ml} = \text{pCi/M}^3$

Net Concentration (uCi/ml) x El2 = Net Concentration (pCi/M³), then:

Net Concentration (pCi/M³) x Dose Conversion Factor (mrem/pCi/M³) = Dose (mrem)

3rd. Qtr. 1989

EM-4 NUCLIDE	GROSS	-	EM-6 BACKGROUND	=	EM-4 NET	x El2	x	ORGAN DOSE CONVERSION FACTOR
U-Nat	0.00 E+00		3.18 E-15	=	-3.18 E-15			(pCi/M ³) x fi ₁
Th-230	1.01 E-15		2.13 E-15	=	-1.12 E-15			(pCi/M ³) x fi ₂
Ra-226	4.40 E-16		3.10 E-16	=	1.30 E-16			(pCi/M ³) x 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".

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

Qtr. 1989

U-Nat

Whole Body	(-3.18 E-15) (1 El2) (4.62)	=	-1.47 E-02 <0 mrem/yr
Bone	(-3.18 E-15) (1 El2) (79.4)	=	-2.52 E-01 <0 mrem/yr
Lung	(-3.18 E-15) (1 El2) (1590)	=	-5.06 E+00 <0 mrem/yr

Th230

Whole Body	(-1.12 E-15) (1 El2) (166)	=	-1.86 E-01 <0 mrem/yr
Bone	(-1.12 E-15) (1 El2) (5950)	=	-6.66 E+00 <0 mrem/yr
Lung	(-1.12 E-15) (1 El2) (3200)	=	-3.58 E+00 <0 mrem/yr

Ra226

Whole Body	(1.3 E-16) (1 El2) (30.9)	=	4.02 E-03 mrem/yr
Bone	(1.3 E-16) (1 El2) (309)	=	4.02 E-02 mrem/yr
Lung	(1.3 E-16) (1 El2) (6610)	=	8.59 E-01 mrem/yr

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: $\text{El2} \times \text{uCi/ml} = \text{pCi/M}^3$

Net Concentration (uCi/ml) $\times \text{El2} = \text{Net Concentration (pCi/M}^3\text{)}$, then:

Net Concentration (pCi/M³) $\times \text{Dose Conversion Factor (mrem/pCi/M}^3\text{)} = \text{Dose (mrem)}$

4th. Qtr. 1989

EM-4 NUCLIDE	GROSS	-	EM-6 BACKGROUND	=	EM-4 NET	$\times \text{E}^{12}$	$\times$	ORGAN DOSE CONVERSION FACTOR
U-Nat	1.34 E-15	-	1.61 E-15	=	-2.70 E-16			(pCi/M ³) $\times \text{fi}_1$
Th-230	2.71 E-16	-	2.66 E-16	=	5.00 E-18			(pCi/M ³) $\times \text{fi}_2$
Ra-226	6.15 E-16	-	3.38 E-16	=	2.77 E-16			(pCi/M ³) $\times \text{fi}_3$
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.
2nd Qtr, 1989					
U-Nat					
Whole Body	(-2.70 E-16)	(El2)	(4.62)	=	-1.25 E-03 <0 mrem/yr
Bone	(-2.70 E-16)	(El2)	(79.4)	=	-2.14 E-02 <0 mrem/yr
Lung	(-2.70 E-16)	(El2)	(169)	=	-4.56 E-02 <0 mrem/yr
Ra226					
Whole Body	(2.77 E-16)	(El2)	(30.9)	=	8.56 E-03 mrem/yr
Bone	(2.77 E-16)	(El2)	(309)	=	8.56 E-02 mrem/yr
Lung	(2.77 E-16)	(El2)	(6610)	=	1.83 E+00 mrem/yr
Th230					
Whole Body	(5.00 E-18)	(El2)	(166)	=	8.30 E-04 mrem/yr
Bone	(5.00 E-18)	(El2)	(5950)	=	2.98 E-02 mrem/yr
Lung	(5.00 E-18)	(El2)	(3220)	=	1.61 E-02 mrem/yr

DIRECT RADIATION

<u>DATES MONITORED</u>	<u>LOCATION</u>	<u>AVERAGE EXPOSURE RATE (mr/qtr.)</u>	<u>ERROR ESTIMATE (mr/qtr.)</u>
07/01/89 to 09/30/89	EM-1	16.0	5.1
10/01/89 to 12/31/89	EM-1	17.0	4.9
07/01/89 to 09/30/89	EM-2	22.0	5.3
10/01/89 to 12/31/89	EM-2	23.0	5.1
07/01/89 to 09/30/89	EM-4	13.0	4.9
10/01/89 to 12/31/89	EM-4	15.0	4.8
07/01/89 to 09/30/89	EM-6 (Background)	13.5	5.0
10/01/89 to 12/31/89	EM-6 (Background)	16.5	4.8

Bio Assay results for the reporting period 1 July 1989 to 31 December 1989:

No urine sample exceeded the 15 ug/l action level, during the period of time covered by this report.

SUPPLEMENTARY INFORMATIONSurface Water and Sediment Sampling Site (See Attached Map)

<u>SITE</u>	<u>DIRECTION FROM MILL</u>	<u>LOCATION</u>
SS-1	NW	West Coyote Wash

Environmental Monitoring Sites (See Attached Map)

<u>SITE</u>	<u>DIRECTION FROM MILL</u>	<u>LOCATION</u>
(EM-1)	SE	South property boundary
(EM-2)	SW	West property boundary
(EM-4)	N	Nearest resident, approximately 1 mile north of property boundary
(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

	<u>Restricted Area (uCi/ml)</u>			<u>Unrestricted Area (uCi/ml)</u>	
	<u>Air</u>		<u>Water</u>	<u>Air</u>	<u>Water</u>
	<u>Ore</u>	<u>Yellowcake</u>			
U-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
Th-230		2×10^{-12} S	5×10^{-5}	8×10^{-14} S	2×10^{-6} S, 3×10^{-5} I
Ra-226		3×10^{-11} S	4×10^{-7} S	2×10^{-12} I	3×10^{-8} S, 3×10^{-5} I
Pb-210		1×10^{-10} S	4×10^{-6} S	4×10^{-12} S	1×10^{-7} S, 2×10^{-4} I
Po-210		3×10^{-11} I	2×10^{-5} S	1×10^{-12} I	7×10^{-7} S, 3×10^{-5} I
Rn-222				3×10^{-9}	

S = soluble = dissolved

I = insoluble = suspended

Calculation:

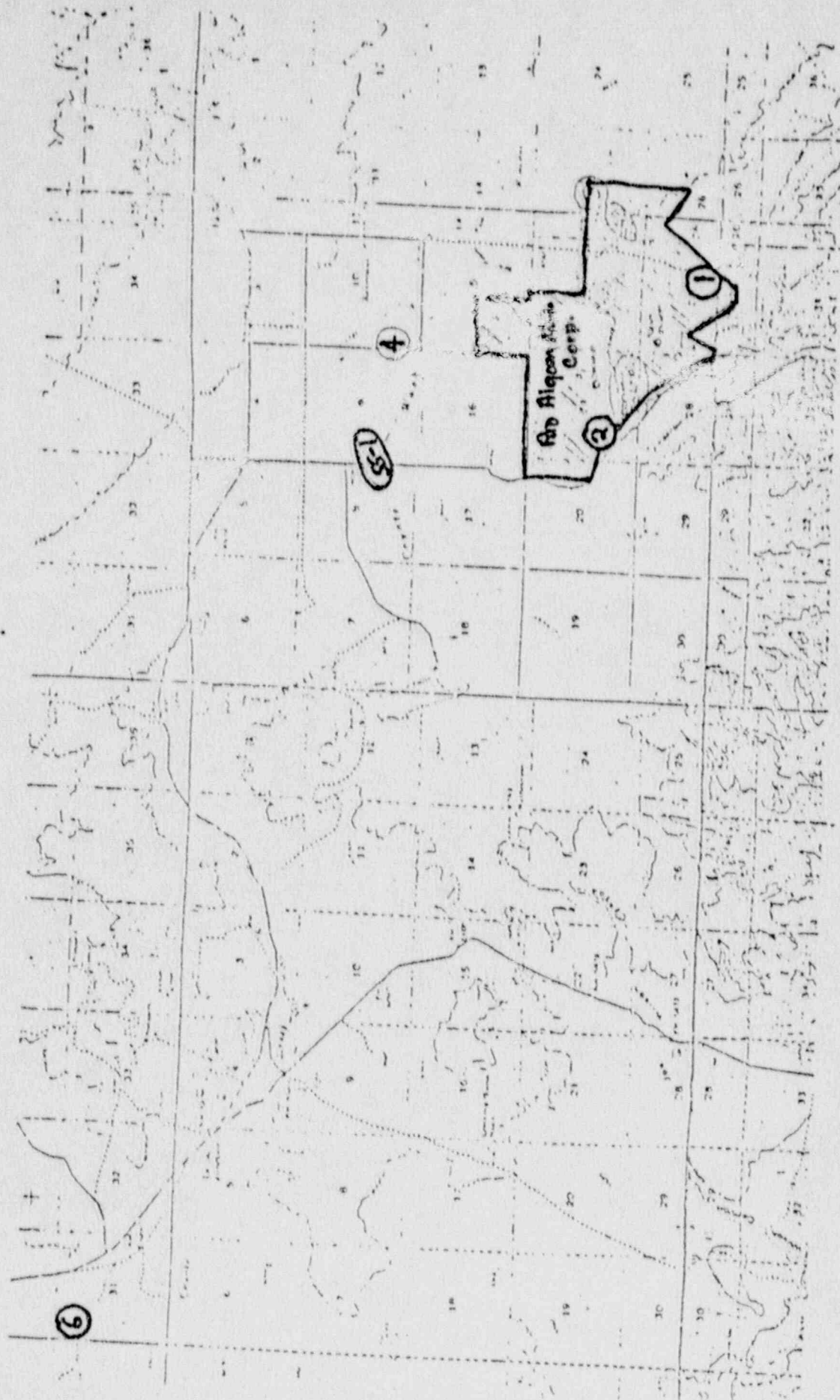
Nuclide concentration at the location = Ni

Maximum Permissible Concentration for the nuclide (above) = MPCi

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

EM Stations = ○

N



Sampling locations for air particulates, radon, soils, and direct radiation.
Vegetation sampling near sites 1 and 2.