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An Investigation of

THE RECOVERY OF LEAD AND ZINC

from Rea Gold Silver Zone

submitted by

CORPORATION FALCONBRIDGE COPPER

Progress Report No. I

Project No. L.R. 3277

NOTE:

This report refers to the samples as received.

LAKEFIELD RESEARCH
A Division of Falconbridge Limited
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INTRODUCTION

In a letter dated January 23, 1987, Mr. A.J. Davidson of Corporation Falconbridge Copper requested some preliminary metallurgical testing on two Rea Gold Zone samples. The objective was to recover lead and silver into lead concentrate and zinc into a zinc concentrate or all three into a bulk sulphide concentrate.

LAKEFIELD RESEARCH

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SUMMARY

1. Head Sample

The head assays of the two samples as received are shown in Table No. 1.

Table No. 1 - Head Sample Assays

	RGA	RGB
Pb (%)	54.9	3.39
Zn (%)	6.54	6.05
Cu (%)	3.21	1.63
Fe(%)	1.61	4.30
S(%)	14.4	8.65
Au (g/t)	4.22	0.98
Ag (g/t)	4649	649
Specific Gravity	5.25	3.07

The average calculated head assays obtained from the testwork are shown below:

	RGA	RGB	Composite
Pb(%)	55.1	3.13	18.1
Zn(%)	6.85	6.00	5.92
Cu(%)	3.26	1.59	2.15
Au (g/t)	4.47	1.07	2.10
Ag (g/t)	4875	660	1901

Summary - Continued

2. Flotation of RGA Sample

A one kilogram sample was ground with soda ash and the zinc depressant Na_2SO_3, followed by lead flotation using the collector cyanamid AX 343 and AF 3477. The lead rougher tailing was then conditioned with lime and copper sulphate, followed by zinc flotation.

The results of Test No. 1 in Table No. 2 show that most of the metals, including Pb, Zn, Cu, Au and Ag, were collected into the lead rougher concentrate. Little metal was left for the zinc circuit. The lead rougher concentrate assayed 62.5% Pb and 5445 g/t Ag for a recovery of 94.5% of the lead, 95.3% of the silver and 90% ~ 94% of the other metals. The lead-zinc bulk concentrate prepared by blending the lead rougher and zinc rougher concentrate assayed 60.2% Pb and 5331 g/t Ag for a recovery of 98.5% of the lead and 99.2% of the silver and 97% ~ 99% of the other metals.

In Test No. 5, one rougher or cleaner bulk concentrate was obtained. The grade of the concentrate was similar to that of Test No. 1 but with a lower metals recovery. The excess amount of NaCN used may have caused the slightly lower recoveries.

Table No. 2 - Flotation Results for the RGA Sample

Test No.	Product	Wt %	Assays, %, g/t Cu	Pb	Zn	Au	Ag	% Distribution Cu	Pb	Zn	Au	Ag
1	Pb Cl.Conc.	77.22	3.86	63.8	7.93	4.72	5668	90.3	88.9	88.1	81.3	89.8
2	Pb Ro.Conc.	83.74	3.72	62.5	7.71	4.82	5445	94.3	94.5	92.9	90.2	95.3
3	Zn Cl.Conc.	4.04	2.45	35.8	8.55	5.34	2920	3.0	2.6	5.0	4.8	2.4
4	Zn Ro.Conc.	6.91	2.24	32.1	6.17	4.80	2740	4.7	4.0	6.2	7.4	3.9
* 5	Pb-Zn Bulk Conc.	90.65	3.60	60.2	7.60	4.82	5331	99.0	98.5	99.1	97.6	99.2
6	Zn Ro. Tail	9.35	0.37	9.12	0.67	1.12	460	1.0	1.5	0.9	2.4	0.8
	Head (Calc.)	100.0	3.30	55.4	6.95	4.47	4875	100.0	100.0	100.0	100.0	100.0
5	Cleaner Conc.	81.10	2.73	62.6	7.86	-	-	93.8	92.5	94.4	-	-
	Bulk Conc.	90.18	3.50	59.4	7.36	-	-	98.0	97.7	98.3	-	-
	Bulk Tail	9.82	0.64	13.0	1.16	-	-	2.0	2.3	1.7	-	-
	Head (Calc.)	100.0	3.22	54.9	6.75	-	-	100.0	100.0	100.0	-	-

Summary - Continued

3. Flotation of RGB Sample

The flotation procedure as tested on the RGA sample discussed in the previous section was also used for the TGB sample. The results for Test No. 2 as shown in Table No. 3 indicate that most of the valuable metals, including Cu, Pb, Zn, Au and Ag, reported to the lead rougher concentrate. Zinc depression was not very effective in the lead circuit. After three stages of cleaning the lead grade was only upgraded from 13.9% to 16.8%. This low grade lead concentrate was due primarily to contamination by other valuable metals, such as copper, gold and silver. In Test No. 6, sodium cyanide was tried to depress the other metals. The grade of the lead cleaner concentrate improved to 30.6%.

In Tests No. 4 and No. 7 as shown in Table No. 4, the separation of the copper from the lead in the lead cleaner concentrate was attempted. A copper concentrate of 30.2% Cu was produced and the lead concentrate was upgraded frofm 27.1% Pb to 32.9% Pb. There is a possibility to further upgrade the lead concentrate. There was excess depressant in Test Noi. 7 which not only depressed the lead but also the coper in the Cu-Pb separation circuit.

The zinc flotation has shown some promise. In Test No. 2, the zinc concentrate was upgraded from 19.8% Zn to 48.5% Zn. In Test No. 6, the zinc was upgraded from 10.1% to 47.1%. There was little zinc lost in the zinc cleaner stages.

In Test No. 7, the fineness of the grind was increased both in the primary and the regrinding stages. The zinc dropped in the lead first cleaner concentrate and was reported to the zuinc circuit. The zinc flotation was significantly improved. The zinc cleaner concentrate assayed 60.2% Zn and recovered 67.1% of the total zinc. Only 3.4% of the zinc was lost in the zinc cleaner stages.

Summary - Continued

Table No. 3 - Flotation Result for the RGB Sample

Test No.	Product	Wt %	Assays, %, g/t					% Distribution				
			Cu	Pb	Zn	Au	Ag	Cu	Pb	Zn	Au	Ag
2	Pb Cl.Conc.	9.16	16.2	16.8	16.6	7.95	6443	89.9	46.8	24.8	68.2	89.4
	Pb Ro.Conc.	21.33	7.43	13.9	17.3	4.22	2984	96.0	90.0	60.2	84.4	96.4
	Zn Cl.Conc.	4.82	0.18	2.26	48.5	0.71	97.1	0.5	3.3	38.2	3.2	0.7
	Zn Ro.Conc.	12.14	0.27	1.68	19.8	0.60	123	2.0	6.1	39.3	6.9	2.3
→	Pb-Zn Bulk Conc.	33.47	4.83	9.45	18.2	2.91	1946	98.0	96.1	95.5	91.3	98.7
	Zn Ro.Tail	66.53	0.049	0.19	0.045	0.14	12.7	2.0	3.9	0.5	8.7	1.3
	Head (Calc.)	100.0	1.65	3.29	6.12	1.07	660	100.0	100.0	100.0	100.0	100.0
6	Pb Cl.Conc.	7.01	12.7	30.6	14.7	5.96	5375	56.5	68.9	18.0	61.44	60.25
	Pb Ro.Conc.	19.96	7.36	14.0	20.7	2.64	3038	93.3	89.9	72.0	72.41	96.91
	Zn Cl.Conc.	3.18	1.61	3.65	47.1	0.94	174	3.2	3.7	26.1	4.40	1.88
	Zn Ro.Conc.	15.57	0.49	1.29	10.1	0.45	78	4.8	6.4	27.5	10.07	1.95
	Pb-Zn Bulk Conc.	35.53	4.35	8.45	16.1	1.68	1740	98.1	96.3	99.5	83.88	99.07
	Zn Ro.Tail	64.47	0.046	0.18	0.043	0.13	11	1.9	3.7	0.5	12.50	1.13
	Head (Calc.)	100.0	1.57	3.12	5.74	-	-	100.0	100.0	100.0	-	-

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Summary - Continued

Table No. 4 - Flotation Result with Cu-Pb Separation on the RGB Sample

Test No.	Product	Weight %	Assays %, g/t Cu	Pb	Zn	% Distribution Cu	Pb	Zn
4	Cu Cl.Conc.	1.35	30.2	9.38	7.22	25.6	4.1	1.6
	Pb Cl.Conc.	5.56	6.58	32.9	14.8	23.0	59.3	13.5
	Cu-Pb Ro.Conc.	18.61	8.22	15.5	13.9	96.1	93.2	42.5
	Zn Cl.Conc.	5.00	0.36	0.84	59.5	1.1	1.4	48.7
	Zn Ro.Conc.	8.79	0.35	0.89	38.9	1.9	2.6	56.0
	Bulk Ro.Conc.	27.40	5.69	10.8	21.9	98.0	95.8	98.5
	Zn Ro.Tail	72.60	0.044	0.18	0.13	2.0	4.2	1.5
	Head (Calc.)	100.0	1.59	3.08	6.10	100.0	100.0	100.0
7	Cu Cl.Conc.	1.36	14.2	28.2	9.49	12.4	12.8	2.1
	Pb Cl.Conc.	5.56	10.4	23.6	12.9	37.1	43.6	11.9
	Cu-Pb Ro.Conc.	13.81	10.2	20.1	12.5	90.4	92.5	28.6
	Zn Cl.Conc.	6.74	0.49	0.72	60.2	2.1	1.6	67.1
	Zn Ro.Conc.	23.87	0.49	0.61	17.9	7.5	4.8	70.5
	Bulk Ro.Conc.	37.68	4.05	7.76	15.9	97.9	97.3	99.1
	Zn Ro.Tail	62.32	0.053	0.13	0.095	2.1	2.7	0.9
	Head (Calc.)	100.0	1.56	3.01	6.05	100.0	100.0	100.0

4. Flotation of the Composite Sample

The composite sample, composed from the RGA and RGB samples in the ratio of 3 to 7, was tested for the standard lead-zinc flotation as described in the previous section. The results of Test No. 3 as shown in Table No. 5 indicate that the flotation characteristics of the composite sample were similar to the RGA sample. Most of the metals, including Cu, Pb, Zn, Au and Ag, were collected into the lead concentrate. The lead rougher concentrate assayed 51.2% combined lead and zinc with a recovery of 95.3% of the lead and 96.8% of the zinc, was an acceptable bulk concentrate. The lead rougher concentrate also assayed 4.29 g/t Au, 4096 g/t Ag for recoveries of 91.7% of the gold and 96.8% of the silver. Insufficient metal was left for reasonable zinc flotation.

Summary - Continued

Table No. 5 - Flotation Results for the Composite Sample (Test No. 3)

Product	Wt %	Assays, %, g/t					% Distribution				
		Pb	Zn	Cu	Au	Ag	Pb	Zn	Cu	Au	Ag
Pb Cl.Conc.	20.67	42.2	12.3	9.08	7.23	7892	48.2	42.9	87.5	71.0	85.6
Pb Ro.Conc.	44.99	38.4	12.8	4.59	4.29	4096	95.3	96.8	96.3	91.7	96.8
Zn Cl.Conc.	6.29	2.54	1.87	0.32	0.60	283	0.9	2.0	0.9	1.8	1.0
Zn Ro.Conc.	20.61	1.81	0.68	0.21	0.40	169	2.1	2.4	2.0	3.9	1.9
Pb-Zn Bulk Conc.	65.60	26.9	8.96	3.21	3.07	2862	97.4	99.2	98.3	95.6	98.7
Zn Ro.Tail	34.40	1.40	0.13	0.11	0.27	68.2	2.6	0.8	1.7	4.4	1.3
Head (Calc.)	100.0	18.1	5.92	2.15	2.10	1901	100.0	100.0	100.0	100.0	100.0

CONCLUSIONS AND DISCUSSION

Both the RGA and composite samples were high grade in lead. It was easier to produce a bulk concentrate product at high recovery than separate concentrates. The bulk concentrate from RGA sample assayed 60.2% Pb, 7.6% Zn, 3.6% Cu, 4.82 g/t Au and 5331 g/t Ag and represented a recovery of more than 97% of all metals. The bulk concentrate from the composite sample assayed 38.4% Pb, 12.8% Zn, 4.59% Cu, 4.29 g/t Au and 4096 g/t Ag for a recovery of more than 95% for lead, zinc, copper and silver and 91.7% for gold.

The RGB sample assayed lower grade and an acceptable bulk concentrate could not be produced. Copper, lead and zinc concentrate products were produced however. The copper-lead flotastion was not easy and more testwork is required. The silver minerals reported to the copper lead concentrate at a high recovery. When the zinc is depressed effectively in the lead circuit and reported to the zinc circuit, an acceptable zinc concentrate should be easily obtained at a reasonable recovery.

SAMPLE PREPARATION

A five kilogram sample of RGA and a four kilogram sample of RGB were received at Lakefield on January 26, 1987. Each sample was crushed separately to minus 10 mesh. Head samples and test charges were prepared for the testwork.

Test No. 1

Purpose: To perform a preliminary test on Sample RGA to investigate the recovery of lead and zinc.

Procedure:

Feed: 1000 grams minus 10 mesh sample RGA

Grind: 10 minutes at 60% solids in the lab rod mill

Conditions:

Stage	Reagents Added, grams per tonne							Time, minutes			pH
	Na_2CO_3	Na_2SO_3	AX 343	MIBC	$Ca(OH)_2$	$CuSO_4$	A3477	Grind	Cond.	Froth	
Grind	500	1000	-	-	-	-	-	10	-	-	8.0
Pb Rougher	500	-	30	10	-	-	10	-	1	3	9.5
	-	-	20	5	-	-	10	-	1	3	-
	-	-	10	-	-	-	5	-	1	3	-
Condition	-	-	-	-	1250	-	-	-	5	-	-
	-	-	-	-	-	800	-	-	5	-	11.5
Zn Rougher	-	-	40	5	-	-	20	-	1	2	-
	-	-	-	-	-	400	-	-	3	-	-
	-	-	70	-	-	-	20	-	1	1	9.0
	-	-	-	-	50	-	-	-	-	-	10.5
Aeration	-	-	-	-	-	500	-	-	10	-	-
							M 2030				
Zn Rougher (Cont'd)	-	-	-	-	-	-	20	-	1	3	-
	-	-	20	-	-	-	10	-	1	-	-
Tailing Regrind	-	-	-	-	500	200	5	5	-	-	-
Zn Rougher (Cont'd)	-	-	10	-	-	-	5	-	1	1	10.2
	-	-	50	-	-	-	-	-	1	1	-

Test No. 1 - Continued

Stage	Reagents Added, grams per tonne							Time, minutes			pH
	Na_2CO_3	Na_2SO_3	AX 343	3477	MIBC	$Ca(OH)_2$	M 2030	Grind	Cond.	Froth	
Pb 1st Cleaner	125	250	10	-	5	-	-	-	2	1	8.5
	-	-	20	10	10	-	-	-	1	2	-
	-	-	5	5	5	-	-	-	1	2	-
Pb 2nd Cleaner	125	250	10	5	5	-	-	-	2	3	8.3
	-	-	5	5	5	-	-	-	1	2	-
Zn Cleaner	-	-	-	-	-	400	-	-	2	2	11.7
	-	-	-	-	-	-	5	-	1	1	-

Metallurgical Results

Product	Wt %	Assays, %, g/t					% Distribution				
		Pb	Zn	Cu	Au	Ag	Pb	Zn	Cu	Au	Ag
1. PbCleaner Conc.	77.22	63.8	7.93	3.86	4.71	5668	88.9	88.1	90.3	81.3	89.8
2. Pb 2nd Cl.Tail	2.16	53.8	5.95	2.12	6.69	4497	2.1	1.8	1.4	3.2	2.0
3. Pb 1st Cl.Tail	4.36	44.7	4.74	1.94	5.82	3881	3.5	3.0	2.6	5.7	3.5
4. Zn Cleaner Conc.	4.04	35.8	8.55	2.45	5.34	2920	2.6	5.0	3.0	4.8	2.4
5. Zn Cleaner Tail.	2.87	26.8	2.83	1.94	4.04	2486	1.4	1.2	1.7	2.6	1.5
6. Zn Rougher Tail	9.35	9.12	0.67	0.37	1.12	460	1.5	0.9	1.0	2.4	0.8
Head (Calc.)	100.0	55.4	6.95	3.30	4.47	4875.5	100.0	100.0	100.0	100.0	100.0

Calculated Grades and Recoveries

Products 1 and 2	79.38	63.5	7.88	3.81	4.76	5636	91.0	89.9	91.7	84.5	91.8
Products 1 to 3	83.74	62.5	7.71	3.72	4.82	5545	94.5	92.9	94.3	90.2	95.3
Products 4 and 5	6.91	32.1	6.17	2.24	4.80	2740	4.0	6.2	4.7	7.4	3.9
Products 1 to 5	90.65	60.2	7.60	3.60	4.82	5331	98.5	99.1	99.0	97.6	99.2

Test No. 1 - Continued

Screen Analysis

Mesh Size (Tyler)	% Retained		% Passing
	Individual	Cumulative	Cumulative
+ 150	.2	.2	99.8
200	1.9	2.1	97.9
270	9.4	11.5	88.5
400	12.5	24.0	76.0
- 400	76.0	100.0	-
Total	100.0	-	-

Test No. 2

Purpose: To perform a preliminary test on Sample RGB to investigate the recovery of lead and zinc.

Procedure:

Feed: 1000 grams minus 10 mesh sample RGB

Grind: 10 minutes at 60% solids in the lab rod mill

Conditions:

Stage	Reagents Added, grams per tonne							Time, minutes			pH
	Na_2CO_3	Na_2SO_3	AX 343	A 3477	MIBC	$Ca(OH)_2$	$CuSO_4$	Grind	Cond.	Froth	
Grind	500	1000	-	-	-	-	-	10	-	-	-
Pb Rougher	-	-	10	10	5	-	-	-	1	3	9.4
	-	-	5	5	-	-	-	-	1	2	-
Condition	-	-	-	-	-	1000	-	-	5	-	-
	-	-	-	-	-	-	800	-	5	-	11.4
Zn Rougher	-	-	10	-	5	-	-	-	1	2	-
	-	-	5	5	-	-	-	-	1	1	-
Pb 1st Cleaner	250	500	-	2.5	2.5	-	-	-	2	3	9.6
Pb 2nd Cleaner	250	250	-	-	2.5	-	-	-	2	2 1/2	9.6
Pb 3rd Cleaner	250	250	-	-	2.5	-	-	-	2	2	-
					DF 1012						
Zn 1st Cleaner	-	-	-	-	-	300	-	-	2	2	11.6
	-	-	-	5	5	-	-	-	1	1	-
Zn 2nd Cleaner	-	-	-	-	5	250	-	-	2	2	11.7
Zn 3rd Cleaner	-	-	-	-	5	250	-	-	2	2	11.8

TEST NO. 2 PROJECT NO. 3277

PRODUCT	WT. %	ASSAY, CU	ASSAY, PB	ASSAY, ZN	% DIST CU	% DIST PB	% DIST ZN
1 PB CL CONC	9.16	16.20	16.80	16.60	89.90	46.79	24.83
2 PB 3RD CL TAIL	1.90	1.94	19.90	19.80	2.23	11.49	6.14
3 PB 2ND CL TAIL	3.92	1.07	12.00	20.30	2.54	14.30	13.00
4 PB 1ST CL TAIL	6.35	0.36	8.99	15.60	1.38	17.35	16.17
5 ZN CL CONC	4.62	0.18	2.26	48.50	0.53	3.31	38.21
6 ZN 3RD CL TAIL	0.28	0.39	3.63	4.36	0.07	0.31	0.20
7 ZN 2ND CL TAIL	0.85	0.56	2.46	3.06	0.29	0.64	0.43
8 ZN 1ST CL TAIL	6.19	0.29	1.04	0.53	1.09	1.96	0.54
9 ZN RO TAIL	66.53	0.05	0.19	0.05	1.98	3.84	0.49
10							
11							
12							
HEAD,CALC	100.00	1.65	3.29	6.12	100.00	100.00	100.00

CALC. GRADES & RECOVERIES

1 + 2	11.06	13.75	17.33	17.15	92.13	58.28	30.97
1 - 3	14.97	10.43	15.94	17.97	94.67	72.58	43.97
1 - 4	21.32	7.43	13.87	17.27	96.05	89.93	60.14
5 + 6	5.11	0.19	2.34	46.04	0.53	3.63	38.41
5 - 7	5.96	0.24	2.35	38.89	0.88	4.27	38.84
5 - 8	12.15	0.27	1.68	19.83	1.97	6.23	39.37
1 - 8	33.47	4.83	9.45	18.20	98.02	96.16	99.51

Test No. 2 - Continued

Metallurgical Results

Product	Wt %	Assays, %, g/t Pb	Zn	Cu	Au	Ag	% Distribution Pb	Zn	Cu	Au	Ag
1. Pb Cleaner Conc.	9.16	16.8	16.6	16.2	7.95	6443	46.8	24.8	89.9	68.2	89.4
2. Pb 3rd Cl.Tail	1.90	19.9	19.8	1.94	2.37	783	11.5	6.2	2.2	4.2	2.3
3. Pb 2nd Cl.Tail	3.92	12.0	20.3	1.07	1.48	459	14.3	13.0	2.5	5.4	2.7
4. Pb 1st Cl.Tail	6.35	8.99	15.6	0.36	1.10	212	17.4	16.2	1.4	6.6	2.0
5. Zn Cleaner Conc.	4.82	2.26	48.5	0.18	0.71	97.1	3.3	38.2	0.5	3.2	0.7
6. Zn 3rd Cl.Tail	0.28	3.63	4.36	0.39	1.39	196	0.3	0.2	0.1	0.4	0.1
7. Zn 2nd Cl.Tail	0.85	2.46	3.06	0.56	0.88	251	0.6	0.4	0.3	0.7	0.3
8. Zn 1st Cl.Tail	6.19	1.04	0.53	0.29	0.44	123	1.9	0.5	1.1	2.6	1.2
9. Zn Rougher Tail	66.53	0.19	0.045	0.049	0.14	12.7	3.9	0.5	2.0	8.7	1.3
Head (Calc.)	100.0	3.29	6.12	1.65	1.07	660	100.0	100.0	100.0	100.0	100.0

Calculated Grades and Recoveries

Products 1 and 2	11.06	17.3	17.1	13.7	6.99	5471	58.3	31.0	92.1	72.4	91.7
Products 1 to 3	14.98	15.9	18.0	10.4	5.55	4159	72.6	44.0	94.6	77.8	94.4
Products 1 to 4	21.33	13.9	17.3	7.43	4.22	2984	90.0	60.2	96.0	84.4	96.4
Products 5 and 6	5.10	2.34	46.1	0.19	0.75	102.5	3.6	38.4	0.6	3.6	0.8
Products 5 to 7	5.95	2.35	33.9	0.24	0.77	123.7	4.2	38.8	0.9	4.3	1.1
Products 5 to 8	12.14	1.68	19.8	0.27	0.60	123.4	6.1	39.3	2.0	6.9	2.3
Products 1 to 8	33.47	9.45	18.2	4.83	2.91	1946	96.1	95.5	98.0	91.3	98.7

Screen Analysis

Mesh Size (Tyler)	% Retained Individual	Cumulative	% Passing Cumulative
+ 100	.2	.2	99.8
150	2.4	2.6	97.4
200	13.8	16.4	83.6
270	14.8	31.2	68.8
400	10.0	41.2	58.8
- 400	58.8	100.0	-
Total	100.0	-	-

Test No. 3

Purpose: To investigate the flotation of lead and zinc from a 7:3 mixture of samples RGB and RGA.

Procedure:

Feed: 300 g RGA + 700 g RGB minus 10 mesh sample

Grind: 10 minutes at 60% solids in the lab rod mill

Conditions:

Stage	Reagents Added, grams per tonne							Time, minutes			pH
	Na_2CO_3	Na_2SO_3	AX 343	A 3477	MIBC	$Ca(OH)_2$	$CuSO_4$	Grind	Cond.	Froth	
Grind	500	1000	-	-	-	-	-	10	-	-	-
Pb Rougher	-	-	10	10	5	-	-	-	1	2	9.3
	-	-	5	5	5	-	-	-	1	2	-
	-	-	5	5	-	-	-	-	1	2	-
Condition	-	-	-	-	-	1250	-	-	5	-	-
								M 2030			
	-	-	-	-	-	-	800	-	5	-	11.0
Zn Rougher	-	-	20	-	5	-	-	10	1	2	-
	-	-	10	-	-	-	-	10	1	2	-
Aeration	-	-	-	-	-	250	500	-	10	-	10.5
Zn Rougher(Cont'd)	-	-	-	-	-	-	-	20	1	1	-
Pb 1st Cleaner	250	250	-	-	-	-	-	-	2	2	9.5
	-	-	2.5	5	-	-	-	-	1	3	-
Pb 2nd Cleaner	250	250	-	-	-	-	-	-	1	2	9.7
	-	-	-	5	5	-	-	-	1	2	-
Pb 3rd Cleaner	250	125	-	-	5	-	-	-	1	3	9.9
Zn Cleaner	-	-	-	-	-	350	-	-	2	-	11.8

Test No. 3 - Continued

Metallurgical Results

Product	Wt %	Assays, %, g/t Pb	Zn	Cu	Au	Ag	% Distribution Pb	Zn	Cu	Au	Ag
1. Pb Cleaner Conc.	20.67	42.2	12.3	9.08	7.23	7892	48.2	42.9	87.5	71.0	85.6
2. Pb 3rd Cl.Tail	4.78	52.0	13.4	1.16	2.46	1388	13.7	10.8	2.6	5.6	3.5
3. Pb 2nd Cl.Tail	9.42	46.5	15.1	0.61	1.51	779	24.2	24.0	2.7	6.8	3.9
4. Pb 1st Cl.Tail	10.12	16.5	11.2	0.74	1.73	711	9.2	19.1	3.5	8.3	3.8
5. Zn Cleaner Conc.	6.29	2.54	1.87	0.32	0.60	283	0.9	2.0	0.9	1.8	1.0
6. Zn Cleaner Tail	14.32	1.49	0.16	0.16	0.31	119	1.2	0.4	1.1	2.1	0.9
7. Zn Rougher Tail	34.40	1.40	0.13	0.11	0.27	68.2	2.6	0.8	1.7	4.4	1.3
Head (Calc.)	100.0	18.1	5.92	2.15	2.10	1901	100.0	100.0	100.0	100.0	100.0

Calculated Grades and Recoveries

Products 1 and 2	25.45	44.1	12.5	7.59	6.33	6670	61.9	53.7	90.1	76.6	89.1
Products 1 to 3	34.87	33.2	13.2	5.71	5.03	5079	86.1	77.7	92.8	83.4	93.0
Products 1 to 4	44.99	38.4	12.8	4.59	4.29	4096	95.3	96.8	96.3	91.7	96.8
Products 5 and 6	20.61	1.81	0.68	0.21	0.40	169	2.1	2.4	2.0	3.9	1.9
Products 1 to 6	65.60	26.9	8.96	3.21	3.07	2862	97.4	99.2	98.3	95.6	98.7

Screen Analysis

Mesh Size (Tyler)	% Retained Individual	Cumulative	% Passing Cumulative
+ 150	1.5	1.5	98.5
200	9.3	10.8	89.2
270	16.0	26.8	73.2
400	10.7	37.5	62.5
- 400	62.5	100.0	-
Total	100.0	-	-

Test No. 4

Purpose: To repeat Test No. 2 (Sample RGB) but replace Na_2SO_3 with $ZnSO_4$/NaCN mixture and regrind the lead rougher concentrate.

Procedure:

Feed: 1000 grams minus 10 mesh sample RGB

Grind: 10 minutes at 60% solids in the lab rod mill

Conditions:

Stage	Reagents Added, grams per tonne							Time, minutes			pH
	Na_2CO_3	$ZnSO_4$ NaCN	AX 343	A 3477	MIBC	$Ca(OH)_2$	$CuSO_4$	Grind	Cond.	Froth	
Primary Grind	500	1000	-	-	-	-	-	10	-	-	-
Pb Rougher	-	-	10	10	5	-	-	-	1	3	9.7
	-	-	5	5	-	-	-	-	1	2	-
Condition	-	-	-	-	-	1000	-	-	5	-	-
	-	-	-	-	-	-	800	-	5	-	11.5
Zn Rougher	-	-	10	-	5	-	-	-	1	2	-
	-	-	5	5	-	-	-	-	1	1	-
Pb Conc.Regrind(PM)	250	500	-	-	-	-	-	10	-	-	-
Pb 1st Cleaner	-	-	5	5	5	-	-	-	1	2	9.5
	-	-	5	-	5	-	-	-	1	2	-
Pb 2nd Cleaner	-	200	-	-	-	-	-	-	2	3	9.5
Cu-Pb Separation	SO_2	XD31									
Condition	600	-	-	-	-	-	-	-	5	-	4.0
	-	250	-	-	-	-	-	-	5	-	-
Cu Rougher	-	-	-	5	5	-	-	-	1	2	-
Cu Cleaner	150	-	-	-	-	-	-	-	3	-	4.0
	-	125	-	-	-	-	-	-	3	-	-
	-	-	-	5	5	-	-	-	1	1	-
Zn 1st Cleaner	-	-	-	-	-	300	-	-	2	2	11.7
	-	-	-	5	5	-	-	-	1	1	-
Zn 2nd Cleaner	-	-	-	-	5	250	-	-	2	2	-
Zn 3rd Cleaner	-	-	-	-	-	200	-	-	2	2	11.9

Test No. 4 - Continued

TEST NO. 4 PROJECT NO. 3277

PRODUCT	WT. %	ASSAY, CU	PB	ZN	% DIST CU	PB	ZN
1 CU CL CONC	1.35	30.20	9.38	7.22	25.58	4.10	1.60
2 CU CL TAIL	2.04	19.50	23.00	8.70	24.96	15.18	2.91
3 CU-PB SEPT TAIL	5.56	6.58	32.90	14.80	23.01	59.33	13.50
4 PB 2ND CL TAIL	1.61	7.55	10.70	16.40	8.61	6.29	4.88
5 PB 1ST CL TAIL	7.85	2.82	3.28	15.20	13.90	8.34	13.55
6 ZN CL CONC	5.00	0.36	0.84	59.50	1.13	1.36	48.74
7 ZN 3RD CL TAIL	0.68	0.51	1.12	30.40	0.22	0.25	3.38
8 ZN 2ND CL TAIL	0.55	0.37	1.02	8.34	0.13	0.18	0.75
9 ZN 1ST CL TAIL	2.56	0.28	0.89	7.52	0.45	0.74	3.16
10 ZN RO TAIL	72.60	0.04	0.18	0.13	2.01	4.23	1.55
11							
12							
HEAD,CALC	100.00	1.59	3.09	6.10	100.00	100.00	100.00

CALC. GRADES & RECOVERIES

1 + 2	3.39	23.76	17.58	8.11	50.55	19.28	4.50
1 - 3	8.95	13.08	27.10	12.27	73.56	78.61	18.00
1 - 4	10.76	12.15	24.34	12.97	82.16	84.90	22.88
1 - 5	18.61	8.21	15.46	13.91	96.07	93.24	42.42
6 + 7	5.68	0.38	0.87	56.02	1.35	1.61	52.12
6 - 8	6.22	0.38	0.89	51.83	1.48	1.79	52.87
6 - 9	8.79	0.35	0.89	38.90	1.93	2.53	56.03
1 - 9	27.40	5.69	10.79	21.92	97.99	95.77	98.45

Test No. 5

Purpose: To perform a test on sample RGA, to investigate the effect of floating a bulk concentrate.

Procedure: As indicated below.

Feed: 1000 grams minus 10 mesh sample RGA.

Grind: 10 minutes at 60% solids in the lab rod mill

Conditions:

Stage	Reagents Added, grams per tonne					Time, minutes			pH
	Na_2CO_3	A343	A3477	MIBC	NaCN	Grind	Cond.	Froth	
Primary Grind	1000	-	-	-	-	10	-	-	7.5
Bulk Flotation	500	50	20	10	-	-	1	3	8.9
	-	20	5	-	-	-	1	3	-
	-	10	5	-	-	-	1	3	-
Bulk Conc.Regrind	250	-	-	-	250	20	-	-	-
Pb 1st Cleaner	250	10	-	10	-	-	1	2	9.0
	-	20	-	5	-	-	1	2	-
	-	10	-	5	-	-	1	2	-
Pb 2nd Cleaner	-	-	-	-	250	-	2	3	8.8
	-	5		5	-	-	1	2	-

Test No. 5 - Continued

Metallurgical Results

Product	Weight %	Assays % Cu	Pb	Zn	% Distribution Cu	Pb	Zn
1. Pb Cleaner Conc.	81.10	3.73	62.6	7.86	93.8	92.5	94.4
2. Pb 2nd Cl.Tail	2.89	1.80	39.9	4.23	1.6	2.1	1.8
3. Pb 1st Cl.Tail	6.19	1.35	27.0	2.31	2.6	3.1	2.1
4. Bulk Flot.Tail	9.82	0.64	13.0	1.16	2.0	2.3	1.7
Head (Calc.)	100.0	3.22	54.9	6.75	100.0	100.0	100.0

Calculated Grades and Recoveries

Products 1 and 2	83.99	3.66	61.8	7.73	95.4	94.6	96.2
Products 1 to 3	90.18	3.50	59.4	7.36	98.0	97.7	98.3

Test No. 6

Purpose: To perform a test on sample RGB, using NaCN in the primary grind and Pb cleaners and regrinding the Zn rougher Conc. prior to cleaning

Procedure:

Feed: 1000 grams minus 10 mesh sample RGB.

Grind: 10 minutes at 60% solids in the lab rod mill

Conditions:

Stage	Reagents Added, grams per tonne							Time, minutes			pH
	Na_2CO_3	Na_2SO_3	NaCN	AX 343	A 3477	MIBC	M 2030	Grind	Cond.	Froth	
Primary Grind	500	1000	250	-	-	-	-	10	-	-	-
Pb Rsougher	-	-	-	10	10	5	-	-	1	3	9.8
	-	-	-	5	5	-	-	-	1	2	-
Pb Conc.Regrind	250	500	200	-	-	-	-	10	-	-	-
Pb 1st Cleaner	-	-	-	5	5	-	-	-	1	2	9.7
	-	-	-	5	-	-	-	-	1	2	-
Pb 2nd Cleaner	100	-	100	-	-	-	-	-	2	3	9.9
Pb 3rd Cleaner	50	-	50	-	-	-	-	-	2	2	-
	$Ca(OH)_2$	$CuSO_4$									
Pb Ro.Tail. Cond.	1000	-	-	-	-	-	-	-	5	-	-
	-	800	-	-	-	-	-	-	5	-	11.5
Zn Rougher	-	-	-	10	-	5	-	-	1	2	-
	-	-	-	5	5	-	-	-	1	1	-
Zn Conc. Regrind	500	100	-	-	-	-	10	10	-	-	-
Zn 1st Cleaner	-	-	-	-	-	5	-	-	1	3	11.6
Zn 2nd Cleaner	500	-	-	-	-	-	-	-	2	2	11.9
Zn 3rd Cleaner	500	-	-	-	-	5	-	-	2	2	12.0

Test No. 6 - Continued

TEST NO. 6 PROJECT NO.

PRODUCT	WT. %	ASSAY, CU	PB	ZN	% DIST CU	PB	ZN
1 PB CL CONC	7.01	12.70	30.60	14.70	56.56	68.84	17.96
2 PB 3RD CL TAIL	1.24	7.86	17.40	24.70	6.19	6.92	5.33
3 PB 2ND CL TAIL	1.58	5.14	10.60	24.50	5.14	5.36	6.72
4 PB 1ST CL TAIL	10.13	3.94	2.68	23.80	25.35	8.71	42.01
5 ZN CL CONC	3.18	1.61	3.65	47.10	3.25	3.72	26.10
6 ZN 3RD CL TAIL	0.17	1.12	3.67	11.70	0.12	0.20	0.35
7 ZN 2ND CL TAIL	0.98	0.57	1.96	2.63	0.35	0.61	0.46
8 ZN 1ST CL TAIL	11.24	0.16	0.53	0.30	1.14	1.91	0.53
9 ZN RO TAIL	64.47	0.05	0.18	0.04	1.88	3.72	0.48
10							
11							
12							
HEAD,CALC	100.00	1.57	3.12	5.74	100.00	100.00	100.00

CALC. GRADES & RECOVERIES

1 + 2	8.25	11.97	28.62	16.20	62.75	75.76	23.29
1 - 3	9.83	10.88	25.73	17.53	67.89	81.11	30.01
1 - 4	19.96	7.36	14.03	20.71	93.25	89.82	72.02
5 + 6	3.35	1.58	3.65	45.28	3.38	3.93	26.45
5 - 7	4.33	1.36	3.27	35.63	3.73	4.54	26.91
5 - 8	15.57	0.49	1.29	10.14	4.87	6.45	27.50
1 - 8	35.53	4.35	8.45	16.08	98.12	96.28	99.52

Test No. 7

Purpose: To repeat Test No. 4, but with finer primary grind and finer regrind. Combine lead rougher and 1st cleaner tailings for zinc feed.

Procedure:

Feed: 1000 grams minus 10 mesh sample RGB.

Grind: 15 minutes at 65% solids in the lab rod mill

Conditions:

Stage	Reagents Added, grams per tonne							Time, minutes			pH
	Na_2CO_3	$ZnSO_4$ NaCN	AX 343	A 3477	MIBC	SO_2	XD31	Grind	Cond.	Froth	
Primary Grind	500	1000	-	-	-	-	-	15	-	-	-
Pb Rougher	-	-	10	10	10	-	-	-	1	3	9.7
	-	-	5	5	5	-	-	-	1	2	-
Pb Conc. Regrind	250	500	-	-	-	-	-	20	-	-	-
Pb 1st Cleaner	-	-	5	5	5	-	-	-	1	3	9.6
	-	-	5	5	5	-	-	-	1	2	-
Pb 2nd Cleaner	-	250	-	5	-	-	-	-	2	2	9.8
	-	-	5	-	5	-	-	-	1	2	-
Pb 3rd Cleaner	-	200	-	-	-	-	-	-	2	-	9.9
Cu-Pb Separation											
Condition	-	-	-	-	-	550	-	-	5	-	-
	-	-	-	-	-	-	200	-	5	-	4.0
Cu Rougher	-	-	-	5	5	-	-	-	1	1	-
	-	-	-	5	-	-	-	-	1	1	-
Cu Cl.Conditioner	-	-	-	-	-	50	-	-	3	-	4.0
	-	-	-	-	-	-	50	-	3	-	-
Cu Cleaner	-	-	-	5	5	-	-	-	1	1.5	-

Test No. 7 - Continued

Stage	Reagents Added, grams per tonne					Time, minutes			pH
	$Ca(OH)_2$	$CuSO_4$	AX 343	A 3477	MIBC	Grind	Cond.	Froth	
Zn Circuit (Combined Pb rougher and 1st Cleaner Tailings)									
Condition	1000	-	-	-	-	-	3	-	-
	-	800	-	-	-	-	5	-	11.9
Zn Rougher	-	-	10	10	-	-	1	2	-
	-	-	5	5	-	-	1	1	-
Zn 1st Cleaner	400	-	-	-	-	-	2	2	12.0
	-	-	-	5	-	-	1	1	-
Zn 2nd Cleaner	250	-	-	-	-	-	2	2	-
Zn 3rd Cleaner	250	-	-	-	5	-	2	1.5	12.2

Test No. 7 - Continued

TEST NO. 7 PROJECT NO. 3277

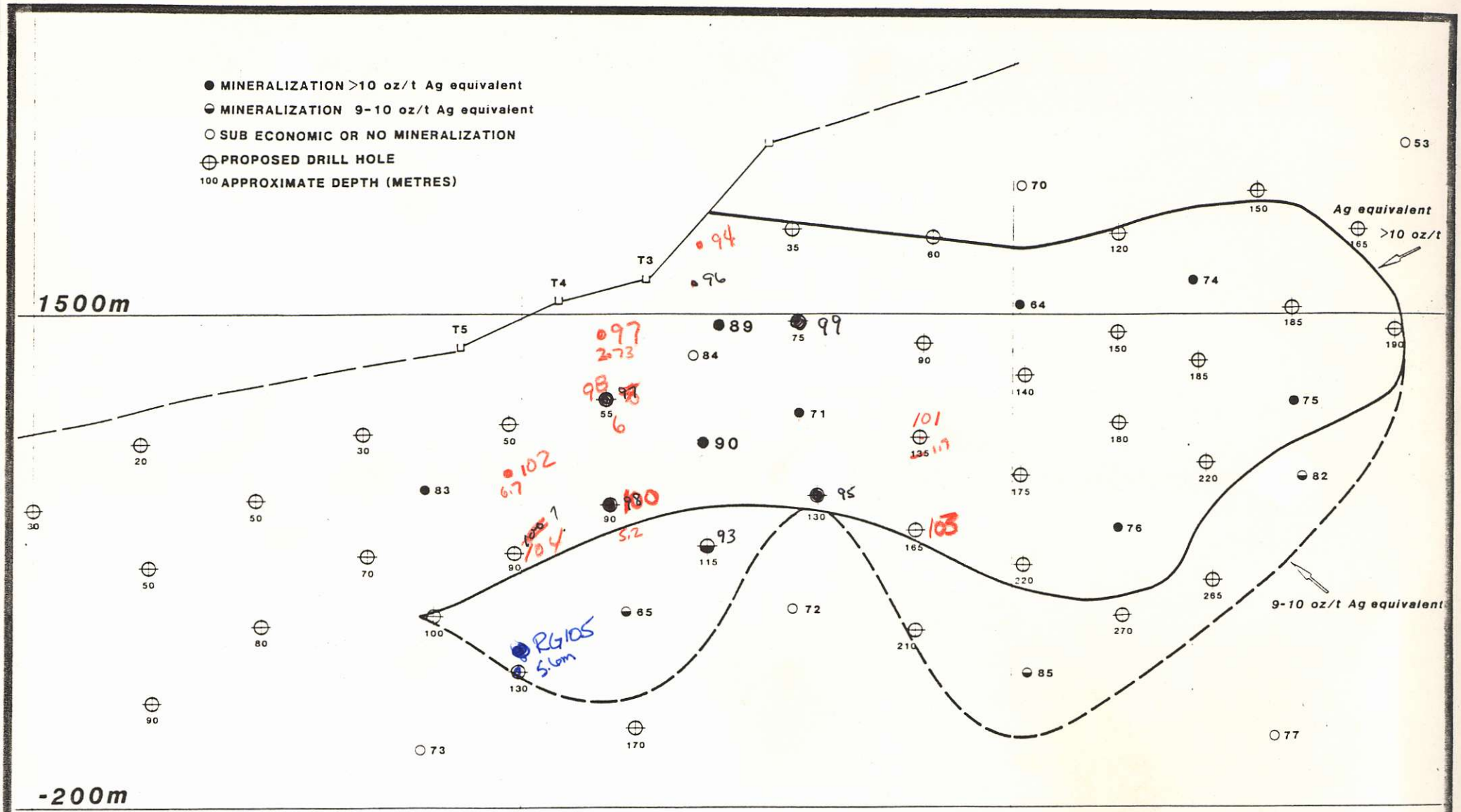
PRODUCT	WT. %	ASSAY, CU	PB	ZN	% DIST CU	PB	ZN
1 CU CL CONC	1.36	14.20	28.20	9.48	12.38	12.75	2.13
2 CU CL TAIL	2.93	13.20	23.80	10.10	24.80	29.03	4.88
3 CU-PB-SEPT TAIL	5.56	10.40	23.60	12.90	37.08	43.63	11.84
4 PB 3RD CL TAIL	1.86	6.42	6.81	15.30	10.04	4.21	4.70
5 PB 2ND CL TAIL	2.10	4.47	4.03	14.40	6.02	2.81	4.99
6 ZN CL CONC	6.74	0.49	0.72	60.20	2.12	1.62	67.06
7 ZN 3RD CL TAIL	0.79	2.53	2.82	13.30	1.31	0.74	1.73
8 ZN 2ND CL TAIL	2.90	1.20	1.17	1.90	2.23	1.13	0.91
9 ZN 1ST CL TAIL	13.44	0.22	0.31	0.35	1.90	1.39	0.78
10 ZN RO TAIL	62.33	0.05	0.13	0.10	2.12	2.70	0.98
11							
12							
HEAD,CALC	100.00	1.56	3.01	6.05	100.00	100.00	100.00

CALC. GRADES & RECOVERIES

1 + 2	4.29	13.52	28.29	9.91	37.18	41.78	7.01
1 - 3	9.84	11.76	25.08	11.60	74.26	85.41	18.85
1 - 4	11.70	11.23	23.02	12.18	84.30	89.62	23.55
1 - 5	13.80	10.20	20.13	12.52	90.32	92.43	28.54
6 + 7	7.53	0.71	0.94	55.29	3.43	2.36	68.80
6 - 8	10.43	0.85	1.00	40.46	5.66	3.48	69.71
6 - 9	23.87	0.43	0.61	17.88	7.56	4.87	70.48
1 - 9	37.67	4.05	7.76	15.92	97.88	97.30	99.02

Lakefield Research
A Division of Falconbridge Limited
Lakefield, Ontario

February 25th, 1987



REA GOLD OPTION
LONGITUDINAL SECTION
IN PLANE OF MINERALIZATION
(ASSUMING SINGLE PLANAR MINERALIZED STRUCTURE)

IDP/dam APRIL 1987

MINNOVA INC.