LAKEFIELD RESEARCH

006225

Test No.: # 1 Project No.: 3733 Date: Operator:

Purpose: Preliminary tests of G-2 composite to study the effect of primary grind on Pb and Zn rougher flotation

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore G-2 composite

Grind: 15 minutes at 65% solids in a lab ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
P. Grind	1500	150	8					15			10.1
Pb rougher 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit											
Condition 1						1000			5		11.7
2					DF 1012		1300		5		11.3
Zn rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage —	Dry froth in Zn circuit, possibly		
Flotation Cell			
Speed: r.p.m.	too much $CuSO_4$		
% Solids			
% — mesh			

FORM LR 6

Test No. 1

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	224.4	11.34	25.5	14.8	77.9	25.9
2. Pb Rougher. Conc.2	67.2	3.40	8.45	14.6	7.7	7.7
3. Pb Rougher. Conc.3	29.2	1.48	4.82	12.9	1.9	2.9
4. Pb Rougher. Conc.4	11.1	0.56	3.89	12.4	0.6	1.1
5. Zn Rougher. Conc.1	183.1	9.25	0.82	31.2	2.0	44.6
6. Zn Rougher. Conc.2	179.2	9.05	1.15	6.28	2.8	8.8
7. Zn Rougher. Conc.3	136	6.87	1.27	2.85	2.4	3.0
8. Zn Rougher.Tail	1149.1	58.06	0.30	0.66	4.7	5.9
Head Calc.	1979.3	100.00	3.71	6.47	100.0	100.0

Combined Products

Products 1+2		14.73	21.6	14.75	85.6	33.6
Products 1-3		16.21	20.0	14.59	87.5	36.6
Products 1-4		16.77	19.5	14.51	88.1	37.6
Products 5+6		18.30	1.0	18.87	4.8	53.4
Products 5-7		25.18	1.1	14.50	7.2	56.4
Products 5-8		83.23	.53	4.85	11.9	62.4

3733 Combined Product #1 June 9/89

234

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+65m	3.36	3.4	3.4	96.6
+100m	8.31	8.3	11.7	88.3
+150m	11.98	12.0	23.7	76.3
+200m	13.77	13.8	37.5	62.5
+270m	12.97	13.0	50.5	49.5
+400m	10.47	10.5	61.0	39.0
33.5 µm	3.74	3.7	64.7	35.3
25.9 µm	5.60	5.6	70.3	29.7
18.1 µm	6.97	7.0	77.3	22.7
12.4 µm	5.21	5.2	82.5	17.5
9.6 µm	1.97	2.0	84.5	15.5
-9.6 µm	1555	15.5	100.0	—
T...	9.9.90	100.0		

$K_{80} = 116.2$ µm

S.G = 3.22

LAKEFIELD RESEARCH

Test No.: 2 Project No.: 3733 Date: Operator:

Purpose: Repeat test 1, but increase the primary grinding time to 20 minutes

Procedure: As for test 1

Feed: 2000 g of minus 10 mesh ore Composite 6-2

Grind: 20 minutes at 65% solids in a lab rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A343	HIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					20			10.1
Pb roughers 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit											
					DF1012						
Condition 1						1000			5		
2							1300		5		11.3
Zn roughers 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR-6

Test No. 2

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	186.8	9.42	30.0	14.0	79.4	20.8
2. Pb Rougher. Conc.2	60.8	3.07	8.37	14.3	7.2	6.9
3. Pb Rougher. Conc.3	35	1.77	4.46	11.5	2.2	3.2
4. Pb Rougher. Conc.4	15.0	0.76	3.64	11.4	0.8	1.4
5. Zn Rougher. Conc.1	178.3	8.99	0.74	37.3	1.9	52.9
6. Zn Rougher. Conc.2	153.9	7.76	0.9	5.21	2.0	6.4
7. Zn Rougher. Conc.3	128.9	6.50	1.25	2.71	2.3	2.8
8. Zn Rougher.Tail	1224	61.73	0.25	0.59	4.3	5.7
Head Calc.	1982.7	100.00	3.56	6.35	100.0	100.0

Combined Products

Products 1+2		12.49	24.7	14.07	86.6	27.7
Products 1-3		14.25	22.2	13.75	88.8	30.9
Products 1-4		15.01	21.2	13.64	89.6	32.3
Products 5+6		16.75	0.8	22.43	3.8	59.2
Products 5-7		23.26	0.9	16.92	6.1	62.0
Products 5-8		84.99	.44	5.06	10.4	67.7

3733 Combined Product #2 June 9/1989

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+65m	1.69	1.7	1.7	98.3
+100m	5.65	5.7	7.4	92.6
+150m	10.95	11.0	18.4	81.6
+200m	16.03	16.1	34.5	65.5
+270m	12.16	12.2	46.7	53.3
+400m	11.59	11.6	58.3	41.7
33.5 µm	3.97	4.0	62.3	37.7
25.9 µm	5.93	5.9	68.2	31.8
18.1 µm	7.70	7.7	75.9	24.1
12.4 µm	6.31	6.3	82.2	17.8
9.6 µm	2.44	2.4	84.6	15.4
— 9.6 µm	15.28	15.4	100.0	—
TOTAL	99.70	100.0		

$K_{80} = 103.3$ µm

S.G = 3.22

LAKEFIELD RESEARCH

Test No.: 3 Project No.: 2733 Date: Operator:

Purpose: Repeat test 1, but increase the primary grinding time to 30 minutes

Procedure: As for test 1

Feed: 2000 g of minus 10 mesh ore Composite G-2

Grind: 30 minutes at 65% solids in a lab rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A 343	HIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					30			10.1
Pb roughers 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit											
					DF 1012						
Condition 1						1000			5		
2							1500		5		11.3
Zn roughers 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Metallurgical Balance

Test No. 3

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	182.5	9.17	33.8	13.6	83.5	19.4
2. Pb Rougher. Conc.2	60.1	3.02	8.04	15.0	6.5	7.1
3. Pb Rougher. Conc.3	33.5	1.68	3.47	11.7	1.6	3.1
4. Pb Rougher. Conc.4	13.4	0.67	2.56	10.6	0.5	1.1
5. Zn Rougher. Coric.1	165.7	8.33	0.56	42.0	1.3	54.5
6. Zn Rougher. Conc.2	108.8	5.47	0.68	7.79	1.0	6.6
7. Zn Rougher. Conc.3	145.3	7.30	0.76	2.06	1.5	2.3
8. Zn Rougher.Tail	1280.4	64.35	0.24	0.59	4.2	5.9
Head Calc.	1989.7	100.00	3.71	6.42	100.0	100.0

Combined Products

Products 1+2		12.19	27.4	13.9	90.0	26.5
Products 1-3		13.88	24.5	13.7	91.6	29.5
Products 1-4		14.55	23.5	13.5	92.1	30.7
Products 5+6		13.80	0.6	28.4	2.3	61.1
Products 5-7		21.10	0.7	19.3	3.8	63.4
Products 5-8		85.45	.34	5.21	7.9	69.3

3733 Combined Product #3 June 9/89

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+150m	2.13	4.3	4.3	95.7
+200m	5.68	11.4	15.7	84.3
+270m	6.83	13.7	29.4	70.6
33.3 µm	7.90	15.8	45.2	54.8
25.8 µm	5.97	11.9	57.1	42.9
18.0 µm	5.60	11.2	68.3	31.7
12.4 µm	4.45	8.9	77.2	22.8
9.6 µm	1.77	3.5	80.7	19.3
9.6 µm	9.67	19.3	100.0	—
TOTAL	50.00	100.0		
	S.G=3.23			

(235)

$K_{80} = 67.8\ \mu m$

LAKEFIELD RESEARCH

Test No.: 4 Project No.: 5755 Date: _____ Operator: _____

Purpose: Repeat test 1, but increase the primary grinding time to 40 minutes

Procedure: As for test 1

Feed: 2000 g of minus 10 mesh ore Composite C-2

Grind: 40 minutes at 65% solids in a lab rod mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A343	MIBC	$G(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					40			10.1
Pb roughers 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit.											
					DF1012						
Condition 1						1000			5		
2							1500		5		11.3
Zn roughers 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR6

Test No. 4

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	189.6	9.56	33.0	13.3	84.7	19.7
2. Pb Rougher. Conc.2	44.6	2.25	9.05	14.6	5.5	5.1
3. Pb Rougher. Conc.3	32.1	1.62	4.07	12.0	1.8	3.0
4. Pb Rougher. Conc.4	16.9	0.85	2.76	11.2	0.6	1.5
5. Zn Rougher. Conc.1	185.8	9.37	0.53	39.4	1.3	57.2
6. Zn Rougher. Conc.2	96.3	4.85	0.57	6.92	0.7	5.2
7. Zn Rougher. Conc.3	66.3	3.34	0.64	2.11	0.6	1.1
8. Zn Rougher.Tail	1352.1	68.16	0.26	0.69	4.8	7.3
Head Calc.	1983.7	100.00	3.72	6.46	100.0	100.0

Combined Products

Products 1+2		11.81	28.4	13.5	90.2	24.8
Products 1-3		13.42	25.5	13.4	92.0	27.8
Products 1-4		14.28	24.1	13.2	92.6	29.3
Products 5+6		14.22	0.5	28.3	2.1	62.4
Products 5-7		17.56	0.6	23.3	2.7	63.5
Products 5-8		85.72	.32	5.33	7.4	70.7

3733 Combined Product #4 June 9/89

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+150m	.84	1.7	1.7	98.3
+200m	3.20	6.4	8.1	91.9
+270m	5.47	10.9	19.0	81.0
33.3 µm	8.76	17.5	36.5	63.5
25.8 µm	6.45	12.9	49.4	50.6
18.0 µm	6.02	12.0	61.4	38.6
12.4 µm	4.02	8.0	69.4	30.6
9.6 µm	1.41	2.8	72.2	27.8
−9.6 µm	13.83	27.8	100.0	—
TOTAL	50.00	100.0		
	S.G= 3.23			

$T_{80} = 50.7 \mu m$

3733 Combined Product #5 June 9/89

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+200m	1.30	2.6	2.6	97.4
+270m	3.76	7.5	10 1	89.9
33.3 µm	891	17.8	279	72 1
25.8 µm	7.40	14.8	42.7	57.3
18.0 µm	7,17	14.3	57.0	43.0
12.4 µm	5.67	11.3	68 3	31.7
9.6 µm	2.08	4.2	72.5	27.5
−9.6 µm	13.71	27.5	100.0	—
TOTAL	50.00	100.0		
	S.G=3.24		K_{80} = 40 µm	

236

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative

LAKEFIELD RESEARCH

1 to 11

Test No.: 5 Project No.: 3733 Date: Operator:

Purpose: Repeat test 1, but increase the primary grinding time to 50 minutes

Procedure: As for test 1

Feed: 2000 g of minus 10 mesh ore. Composite E-2

Grind: 50 minutes at 65% solids in a lab rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A 343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					50			10.1
Pb roughers 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit											
					DF 1012						
Condition 1						1000			5		
2							1500		5		11.3
Zn roughers 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 5

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	178.7	8.99	36.4	13.0	87.5	18.4
2. Pb Rougher. Conc.2	46.5	2.34	7.33	14.5	4.6	5.3
3. Pb Rougher. Conc.3	26.7	1.34	3.58	11.9	1.3	2.5
4. Pb Rougher. Conc.4	13.5	0.68	2.68	10.7	0.5	1.1
5. Zn Rougher. Conc.1	174.9	8.80	0.43	42.1	1.0	58.2
6. Zn Rougher. Conc.2	38.8	1.95	0.7	20.6	0.4	6.3
7. Zn Rougher. Conc.3	93.4	4.70	0.49	2.21	0.6	1.6
8. Zn Rougher.Tail	1415.1	71.20	0.22	0.58	4.2	6.5
Head Calc.	1987.6	100.00	3.74	6.36	100.0	100.0

Combined Products

Products 1+2		11.33	30.4	13.3	92.1	23.7
Products 1-3		12.67	27.6	13.2	93.3	26.2
Products 1-4		13.35	26.3	13.0	93.8	27.3
Products 5+6		10.75	0.5	38.2	1.4	64.5
Products 5-7		15.45	0.5	27.3	2.0	66.2
Products 5-8		86.65	.27	5.34	6.2	72.7

LAKEFIELD RESEARCH

Test No.: 6 Project No.: 4074 Date: Operator:

Purpose: To evaluate the effect of ~~Surgex~~ Agent P# on Pb flotation and upgrade as indicated below

Procedure:

Feed: 2000 grams minus 10 mesh Vangorda ore

Grind: 50 minutes at 65% solids in a laboratory ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na2Cr2O7	Agent P#	NaCN / ZnO	A317	DRB30			GRIND	COND	FROTH	pH
Grind	2000	400						50			
Pb Roughers			400						8	3	
(1)				10.	5				1	3	
(2)			150	5	5						
				2	5						
Regrind	200	150									
Pb 1st cleaners			200						3	1	
				2	2				1	3	
Pb 2nd Clean		25	25						3	3	
				2	2				1	2	
Pb 3rd Cl (1)		25	25						3	3	
(2)									1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 6

Product	Weight		Assays, %			Distribution, %		
	g	%	Cu	Pb	Zn	Cu	Pb	Zn
1. Pb Cl. Conc.	87.5	4.50	2.23	57	12.6	20.8	56.3	11.8
2. Pb 4th Cl. Tail	15.0	0.77	2.76	23.5	22.5	4.4	4.0	3.6
3. Pb 3rd Cl. Tail	32.2	1.66	2.68	10.8	22.1	9.2	3.9	7.6
4. Pb 2nd Cl. Tail	53.8	2.77	1.51	7.48	15.1	8.7	4.6	8.7
5. Pb 1st Cl. Tail	149.2	7.68	1.64	7.14	13.5	26.1	12.0	21.5
6. Pb Ro. Tail	1605.4	82.62	0.18	1.08	2.74	30.8	19.2	46.9
Head Calc.	1943.1	100.00	0.48	4.56	4.83	100.0	100.0	100.0

Combined Products

Products 1+2	5.28	2.31	52.10	14.05	25.2	80.3	15.4
Products 1-3	8.93	2.40	42.18	15.97	34.4	84.2	22.9
Products 1-4	9.70	2.14	32.28	15.72	43.1	88.7	31.6
Products 1-5	17.38	1.92	21.17	14.74	69.2	80.6	53.1

LAKEFIELD RESEARCH

Test No.: 6 Project No.: 5755 Date: Operator:

Purpose: Repeat test 1, but increase the primary grinding time to 60 minutes

Procedure: As for test 1

Feed: 2000 g of minus 10 mesh ore. Composite C-D

Grind: 60 minutes at 65% solids in a Denver mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A 343	HIBC	$G(OH)_4$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					60			10.1
Pb rougher 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit											
					DF 1012						
Condition 1						1000			5		
2							1500		5		~~10~~
Zn rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORMLR 6

Test No. 6

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	176.6	8.88	36.2	12.3	86.7	17.2
2. Pb Rougher. Conc.2	59.6	3.00	7.86	14.4	6.4	6.8
3. Pb Rougher. Conc.3	25.6	1.29	3.47	11.3	1.2	2.3
4. Pb Rougher. Conc.4	14.0	0.70	2.38	10.9	0.5	1.2
5. Zn Rougher. Conc.1	166.8	8.39	0.40	42.6	0.9	56.3
6. Zn Rougher. Conc.2	61.9	3.11	0.56	17.6	0.5	8.6
7. Zn Rougher. Conc.3	90.6	4.55	0.39	1.81	0.5	1.3
8. Zn Rougher.Tail	1394.1	70.08	0.18	0.56	3.4	6.2
Head Calc.	1989.2	100.00	3.71	6.34	100.0	100.0

Combined Products

Products 1+2		11.87	29.0	12.8	93.1	24.0
Products 1-3		13.16	26.5	12.7	94.3	26.3
Products 1-4		13.86	25.3	12.6	94.7	27.5
Products 5+6		11.50	0.4	35.8	1.4	65.0
Products 5-7		16.05	0.4	26.2	1.9	66.3
Products 5-8		86.14	.23	5.33	5.3	72.5

3733 Combined Product 6 June 12/89

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+200 mm	0.79	1.6	1.6	98.4
+270 mm	3.69	5.4	7.0	93.0
33.7 (um)	7.73	15.5	22.5	77.5
26.1	7.38	14.8	37.3	62.7
18.2	8.32	16.6	53.9	46.1
12.5	6.69	13.4	67.3	32.7
9.7	2.82	5.6	72.9	27.1
-9.7 (um)	13.58	27.1	100.0	—
TOTAL	50.00	100.0		
			$K_{80} = 35.5$ um	
	S.G = 3.20			

237

LAKEFIELD RESEARCH

Test No.: 7 Project No.: 5755 Date: _____ Operator: _____

Purpose: Repeat test 1, but increase the primary grinding time to 70 minutes

Procedure: As for test 1

Feed: 2000 g of minus 10 mesh ore Composite C-2

Grind: 70 minutes at 65% solids in a Denver mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A 345	HIBC	G(OH)	$CuSO_4$	GRIND	COND.	FROTH	pH
S. Grind	1500	150	8					70			10.1
Pb. roughers 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	0	
Zn circuit											
					DF 1012						
Condition 1						1500			5		
2							1500		5		11.3
Zn roughers 1				30	10				1	2	
2					10				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 7

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	164	8.21	38.3	11.5	84.7	14.8
2. Pb Rougher. Conc.2	63.3	3.17	9.46	15.4	8.1	7.7
3. Pb Rougher. Conc.3	56.4	2.82	2.03	7.02	1.5	3.1
4. Pb Rougher. Conc.4	40.0	2.00	1.14	5.05	0.6	1.6
5. Zn Rougher. Conc.1	172.8	8.65	0.33	41.9	0.8	56.9
6. Zn Rougher. Conc.2	49.7	2.49	0.52	21	0.3	8.2
7. Zn Rougher. Conc.3	45.1	2.26	0.81	4.78	0.5	1.7
8. Zn Rougher.Tail	1406	70.40	0.18	0.55	3.4	6.1
Head Calc.	1997.3	100.00	3.71	6.37	100.0	100.0

Combined Products

Products 1+2		11.38	30.3	12.6	92.8	22.5
Products 1-3		14.20	24.7	11.5	94.4	25.6
Products 1-4		16.21	21.7	10.7	95.0	27.2
Products 5+6		11.14	0.4	37.2	1.1	65.1
Products 5-7		13.40	0.4	31.8	1.6	66.8
Products 5-8		83.79	.22	5.54	5.0	72.8

3733 Combined Product 7 June 12/89

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+200m	0.39	0.8	08	99.2
+270m	1.30	2.6	3.4	96.6
33.7 (um)	6.36	12.7	16.1	83 9
26.1	6.85	13.7	29.8	70 2
18.2	8.67	17.3	47.1	529
12.5	7.49	15.0	62.1	37.9
9.7	3.37	6.7	68 8	312
-9.7 (um)	15.57	31.2	100.0	—
TOTAL	50.00	100.0		
			$K_{80} = 31$ um	
	S.G = 3.21			

LAKEFIELD RESEARCH

Test No.: 8 Project No.: 3733 Date: Operator:

Purpose: To study the effect of grinding in a lab rod mill

Procedure: As for test 1, but primary grinding was performed in a lab rod mill

Feed: 2000g of minus 10 mesh ore Composite G-2

Grind: 50 minutes at 65% solids in a lab rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A 343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					50			10.1
Pb rougher 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit					DF 1012						
Condition 1						1000			5		
2							1300		5		11.3
Zn rougher 1				30	10				1	2	
2					10				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 8

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	197.2	9.92	32.4	13.8	86.5	21.2
2. Pb Rougher. Conc.2	44.9	2.26	8.05	14.0	4.9	4.9
3. Pb Rougher. Conc.3	30.5	1.53	3.44	11.6	1.4	2.7
4. Pb Rougher. Conc.4	11.6	0.58	2.64	10.9	0.4	1.0
5. Zn Rougher. Conc.1	201.6	10.14	0.46	37.0	1.3	58.0
6. Zn Rougher. Conc.2	146.7	7.38	0.55	4.94	1.1	5.6
7. Zn Rougher. Conc.3	54.4	2.74	0.75	2.28	0.6	1.0
8. Zn Rougher.Tail	1301	65.45	0.22	0.56	3.9	5.7
Head Calc.	1987.9	100.00	3.72	6.47	100.0	100.0

Combined Products

Products 1+2		12.18	27.9	13.8	91.4	26.0
Products 1-3		13.71	25.1	13.6	92.8	28.8
Products 1-4		14.30	24.2	13.5	93.2	29.8
Products 5+6		17.52	0.5	23.5	2.3	63.6
Products 5-7		20.26	0.5	20.6	2.9	64.6
Products 5-8		85.70	.29	5.30	6.8	70.2

3733 Combined Product #8 June 12/89

(238)

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+200m	2.88	5.8	5.8	94.2
+270m	8.90	17.8	23.6	76.4
33.7 µm	9.82	19.6	43.2	56.8
26.1	6.75	13.5	56.7	43.3
18.2	5.93	11.9	68.6	31.4
12.5	4.29	8.6	77.2	22.8
9.7	1.51	3.0	80.2	19.8
-9.7 µm	9.92	19.8	100.0	—
TOTAL	50.00	100.0		
		$K_{80} = 56$ µm		
	S.G = 3.22			

LAKEFIELD RESEARCH

Test No.: 9 Project No.: 3733 Date: _____ Operator: _____

Purpose: Repeat the condition of test 8, but increase the grinding time to 60 minutes

Procedure: As for test 8

Feed: 2000 g of minus 10 mesh ore Composite G-2

Grind: 60 minutes at 65% solids in a lab rod mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					60			10.1
Pb roughers 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn circuit					DF 1012						
Condition 1						1000			5		
2							1300		5		10.9
Zn roughers 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR6

Test No. 9

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	194.9	9.79	32.3	13.3	85.8	20.4
2. Pb Rougher. Conc.2	45.9	2.31	9.93	14.8	6.2	5.3
3. Pb Rougher. Conc.3	21.6	1.09	4.36	12.3	1.3	2.1
4. Pb Rougher. Conc.4	19.4	0.97	2.62	10.9	0.7	1.7
5. Zn Rougher. Conc.1	231.9	11.65	0.43	31.4	1.4	57.2
6. Zn Rougher. Conc.2	103.4	5.20	0.48	7.34	0.7	6.0
7. Zn Rougher. Conc.3	65.8	3.31	0.68	2.62	0.6	1.4
8. Zn Rougher.Tail	1307.2	65.69	0.19	0.59	3.4	6.1
Head Calc.	1990.1	100.00	3.69	6.40	100.0	100.0

Combined Products

Products 1+2		12.10	28.0	13.6	92.0	25.7
Products 1-3		13.19	26.1	13.5	93.3	27.8
Products 1-4		14.16	24.5	13.3	94.0	29.4
Products 5+6		16.85	0.4	24.0	2.0	63.1
Products 5-7		20.15	0.5	20.5	2.6	64.5
Products 5-8		85.84	.26	5.26	6.0	70.6

3733 Combined Product #9 June 12/89

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+200m	1.02	2.0	2.0	98.0
+270m	7.01	14.0	16.0	84.0
38.7 µm	10.73	21.5	37.5	62.5
26.1	7.73	15.5	53.0	47.0
18.2	6.59	13.2	66.2	33.8
12.5	4.45	8.9	75.1	24.9
9.7	1.43	2.9	78.0	22.0
-9.7	11.04	22.0	100.0	—
TOTAL	50.00	100.0		
		K_{80} = 47 µm		
	SG = 3.22			

LAKEFIELD RESEARCH

Test No.: 10 Project No.: 3733 Date: _____ Operator: _____

Purpose: Repeat the condition of test 8, but increase the grinding time to 10 minutes

Procedure: As for test 8

Feed: 2000 g of minus 10 mesh ore Composite G-2

Grind: 70 minutes at 65% solids in a lab rod mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					70			10.1
Pb rougher 1				40	10				1	2	
2					5				1	3	
3				20	5				1	2	
4					5				1	2	
Zn circuit					DF 1012						
Condition 1						1500			5		
2							1500		5		11.3
Zn rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 10

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	196.7	9.86	31.3	12.5	85.6	19.2
2. Pb Rougher. Conc.2	45.1	2.26	9.96	15.6	6.2	5.5
3. Pb Rougher. Conc.3	32.2	1.61	4.07	11.8	1.8	3.0
4. Pb Rougher. Conc.4	22.3	1.12	2.33	9.66	0.7	1.7
5. Zn Rougher. Conc.1	167.7	8.40	0.42	40.5	1.0	53.1
6. Zn Rougher. Conc.2	58.1	2.91	0.62	22	0.5	10.0
7. Zn Rougher. Conc.3	92.3	4.63	0.57	1.88	0.7	1.4
8. Zn Rougher.Tail	1381	69.21	0.18	0.58	3.5	6.3
Head Calc.	1995.4	100.00	3.61	6.42	100.0	100.0

Combined Products

Products 1+2		12.12	27.3	13.1	91.8	24.7
Products 1-3		13.73	24.6	12.9	93.6	27.7
Products 1-4		14.85	22.9	12.7	94.3	29.4
Products 5+6		11.32	0.5	35.7	1.5	63.0
Products 5-7		15.94	0.5	25.9	2.2	64.4
Products 5-8		85.15	.24	5.32	5.7	70.6

3733 Continuous Product #10 Aug 12/89

(289)

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative
+200m	0.46	0.9	0.9	99.1
+270m	3.18	6.4	7.3	92.7
33.7 µm	11.95	23.9	31.2	68.8
26.1	8.14	16.3	47.5	52.5
18.2	7.24	14.5	62.0	38.0
12.5	5.30	10.6	72.6	27.4
9.7	1.66	3.3	75.9	24.1
-9.7 µm	12.07	24.	100.0	—
TOTAL	50.00	100.0		
		K_{80} = 42 µm		
	S.G = 3.21			

Particle Size	Weight grams	% Retained Individual	% Retained Cumulative	% Passing Cumulative

LAKEFIELD RESEARCH

Test No.: 11 Project No.: 3733 Date: Operator:

Purpose: The first in a series of tests to evaluate various depressants in the Pb circuit

Procedure: As for test 5- but add 750 g/t $ZnSO_4$ to the primary grind and reduce $CuSO_4$ in the Zn circuit

Feed: 2000 g of minus 10 mesh ore composite 6-2

Grind: 50 minutes at 65% solids in a lab ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	$ZnSO_4$	R242	A343	MIBC	$Ca(OH)_2$	GRIND	COND.	FROTH	pH
Grind	1500	750	750	8				50			
Pb rougher 1					40	10			1	2	9.7
2						5			1	3	
3					20	5			1	3	
4						5			1	2	
Zn circuit											
			$CuSO_4$	DF 1012							
Condition 1							150		5		
2			900						5		11.4
Zn rougher 1				10	30				1	2	
2				5					1	2	
3					10				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 11

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	188	9.42	32.7	12.1	83.3	17.9
2. Pb Rougher. Conc.2	48	2.41	11.60	15.0	7.5	5.7
3. Pb Rougher. Conc.3	25.3	1.27	5.21	12.3	1.8	2.5
4. Pb Rougher. Conc.4	14.2	0.71	3.23	11	0.6	1.2
5. Zn Rougher. Conc.1	174.4	8.74	0.52	42.3	1.2	58.2
6. Zn Rougher. Conc.2	51.6	2.59	0.98	17.6	0.7	7.2
7. Zn Rougher. Conc.3	70.6	3.54	0.58	1.87	0.6	1.0
8. Zn Rougher.Tail	1422.8	71.32	0.22	0.56	4.2	6.3
Head Calc.	1994.9	100.00	3.70	6.35	100.0	100.0

Combined Products

Products 1+2		11.83	28.4	12.7	90.9	23.6
Products 1-3		13.10	26.2	12.7	92.7	26.1
Products 1-4		13.81	25.0	12.6	93.3	27.3
Products 5+6		11.33	0.6	36.7	1.9	65.4
Products 5-7		14.87	0.6	28.4	2.5	66.4
Products 5-8		86.19	.29	5.36	6.7	72.7

LAKEFIELD RESEARCH

Test No.: 12 Project No.: 3733 Date: Operator:

Purpose: Repeat test 11, but add 100 g/t of NaCN/ZnO 3:1 to the primary grind

Procedure: As for test 11

Feed: 2000g of minus 10 mesh ore Composite G-2

Grind: 50 minutes at 65% solids in a lab ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	NaCN/ZnO	$ZnSO_4$	R 242	A343	HIBC	GRIND	COND.	FROTH	pH
Grind	1500	75	100	725	8			50			
Pb roughers 1						40	10		1	2	9.8
2							5		1	3	
3						20	5		1	3	
4							5		1	2	
Zn circuit		$Ca(OH)_2$	$CuSO_4$	DF 1012							
Condition 1		1500							5		
2			800						5		11.5
Zn. roughers 1				10		30			1	2	
2				5					1	2	
3						10			1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 12

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	177.4	8.89	36.0	12.8	83.1	17.6
2. Pb Rougher. Conc.2	44.4	2.22	13.40	15.8	7.7	5.5
3. Pb Rougher. Conc.3	23.3	1.17	5.62	12.2	1.7	2.2
4. Pb Rougher. Conc.4	15.8	0.79	3.54	12	0.7	1.5
5. Zn Rougher. Conc.1	167.2	8.38	0.52	42.8	1.1	55.6
6. Zn Rougher. Conc.2	62	3.11	0.83	20.3	0.7	9.8
7. Zn Rougher. Conc.3	74.1	3.71	0.63	2.24	0.6	1.3
8. Zn Rougher.Tail	1431.7	71.73	0.23	0.59	4.3	6.6
Head Calc.	1995.9	100.00	3.85	6.45	100.0	100.0

Combined Products

Products 1+2		11.11	31.5	13.4	90.9	23.1
Products 1-3		12.28	29.0	13.3	92.6	25.3
Products 1-4		13.07	27.5	13.2	93.3	26.8
Products 5+6		11.48	0.60	36.7	1.8	65.4
Products 5-7		15.20	0.61	28.3	2.4	66.7
Products 5-8		86.93	0.30	5.43	6.7	73.2

LAKEFIELD RESEARCH

Test No.: 13 Project No.: 3733 Date: _____ Operator: _____

Purpose: Repeat test 11, but add 750g/t of Na_2SO_3 to the primary grind

Procedure: As for test 11

Feed: 2000g of minus 10 mesh ore. Composite G-2

Grind: 50 minutes at 65% solids in a lab ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	Na_2SO_3		R 242	A343	HIBC	GRIND	COND.	FROTH	pH
Grind	1500	150	750		8			50			10.1
Pb roughers 1						40	10		1	2	
2							5		1	2	
3						20	5		1	3	
4							5		1	0	
Zn circuit		$Ca(OH)_2$	$CuSO_4$	DF 1012							
Condition 1		1500							5		
2			800						5		11.7
Zn roughers 1				10		30			1	2	
2				5					1	2	
3						10			1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 13

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	176.1	8.84	37.2	13.3	86.8	18.7
2. Pb Rougher. Conc.2	30.7	1.54	10.70	15.4	4.4	3.8
3. Pb Rougher. Conc.3	19.3	0.97	5.64	13.7	1.4	2.1
4. Pb Rougher. Conc.4	10.2	0.51	3.81	12.9	0.5	1.0
5. Zn Rougher. Conc.1	170.9	8.58	0.51	44.0	1.2	59.9
6. Zn Rougher. Conc.2	41.1	2.06	0.81	19.7	0.4	6.5
7. Zn Rougher. Conc.3	36.9	1.85	1.09	6.00	0.5	1.8
8. Zn Rougher.Tail	1507.7	75.65	0.24	0.52	4.8	6.2
Head Calc.	1992.9	100.00	3.79	6.30	100.0	100.0

Combined Products

Products 1+2		10.38	33.3	13.6	91.1	22.4
Products 1-3		11.35	30.9	13.6	92.6	24.5
Products 1-4		11.86	29.7	13.6	93.1	25.6
Products 5+6		10.64	0.57	39.3	1.6	66.4
Products 5-7		12.49	0.65	34.4	2.1	68.2
Products 5-8		88.14	0.30	5.31	6.9	74.4

LAKEFIELD RESEARCH

Test No.: 14 Project No.: 3733 Date: _____ Operator: _____

Purpose: Repeat test 11, but add 150 g/t of depressant LS-8 to the primary grind

Procedure: As for test 11

Feed: 2000 g of minus 10 mesh ore Composite G-2

Grind: 50 minutes at 65% solids in a lab ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	LS-8		R 242	A343	HIBC	GRIND	COND.	FROTH	pH
Grind	1500	75	150		8			50			10.1
Pb roughers 1						40	10		1	2	
2							5		1	3	
3						20	5		1	3	
4							5		1	2	
Zn circuit		$Ca(OH)_2$	$CuSO_4$	DF 1012							
Conditioner 1		1500							5		
2			800						5		11.7
Zn roughers 1				10		30			1	2	
2				5					1	2	
3						10			1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 14

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	171.8	8.64	36.0	12.2	84.0	16.6
2. Pb Rougher. Conc.2	52.3	2.63	9.08	15.0	6.5	6.2
3. Pb Rougher. Conc.3	25	1.26	4.67	11.5	1.6	2.3
4. Pb Rougher. Conc.4	16.7	0.84	3.14	10.8	0.7	1.4
5. Zn Rougher. Conc.1	177.4	8.92	0.58	42.8	1.4	60.3
6. Zn Rougher. Conc.2	50.8	2.55	1.05	14.4	0.7	5.8
7. Zn Rougher. Conc.3	93.1	4.68	0.7	1.98	0.9	1.5
8. Zn Rougher.Tail	1402	70.48	0.22	0.53	4.2	5.9
Head Calc.	1989.1	100.00	3.70	6.33	100.0	100.0

Combined Products

Products 1+2		11.27	29.7	12.9	90.5	22.9
Products 1-3		12.52	27.2	12.7	92.1	25.1
Products 1-4		13.36	25.7	12.6	92.8	26.6
Products 5+6		11.47	0.68	36.5	2.1	66.1
Products 5-7		16.15	0.69	26.5	3.0	67.5
Products 5-8		86.64	0.31	5.37	7.2	73.4

LAKEFIELD RESEARCH

Test No.: 15 Project No.: 3733 Date: _____ Operator: _____

Purpose: Repeat test 11, but add 150g/t of 70% NH_4Cl 30% lactic acid to the primary grind

Procedure: As for test 11

Feed: 2000g of minus 10 mesh ore. Composite G-2

Grind: 50 minutes at 65% solids in a lab rod mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME. MINUTES			
	Na_2CO_3	NaCN	NH_4Cl lactic		R 242	A343	H18C	GRIND	COND.	FROTH	pH
Grind	1500	150	150		8			50			10.0
Pb roughers 1						40	10		1	2	
2							5		1	2	
3						20	5		1	2	
4							5		1	0	
Zn circuit		$Ca(OH)_2$	$CuSO_4$	DF 1012							
Condition 1		1500							5		
2			800						5		11.7
Zn roughers 1				10		30			1	2	
2				5					1	2	
3						10			1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 15

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	164.9	8.27	38.6	12.7	84.0	16.9
2. Pb Rougher. Conc.2	50	2.51	10.30	14.6	6.8	5.9
3. Pb Rougher. Conc.3	30.3	1.52	3.99	12.0	1.6	2.9
4. Pb Rougher. Conc.4	14.3	0.72	2.68	10.9	0.5	1.3
5. Zn Rougher. Conc.1	188.3	9.45	0.46	39.8	1.1	60.3
6. Zn Rougher. Conc.2	45.6	2.29	0.79	14.5	0.5	5.3
7. Zn Rougher. Conc.3	80.2	4.02	0.59	2.00	0.6	1.3
8. Zn Rougher.Tail	1419.7	71.22	0.26	0.54	4.9	6.2
Head Calc.	1993.3	100.00	3.80	6.23	100.0	100.0

Combined Products

Products 1+2		10.78	32.0	13.1	90.8	22.7
Products 1-3		12.30	28.6	13.0	92.4	25.7
Products 1-4		13.02	27.1	12.9	92.9	26.9
Products 5+6		11.73	0.52	34.9	1.6	65.6
Products 5-7		15.76	0.54	26.5	2.2	66.9
Products 5-8		86.98	0.31	5.24	7.1	73.1

LAKEFIELD RESEARCH

Test No.: 16 Project No.: 3733 Date: Operator:

Purpose: Repeat test 11, but add 500 g/t of SO_2 to the primary grind

Procedure: As for test 11

Feed: 2000 g of minus 10 mesh ore Composite G-2

Grind: 50 minutes at 65% solids in a lab rod mill

Conditions:

	REAGENTS ADDED GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	SO_2		R 242	A 343	HIBC	GRIND	COND.	FROTH	pH
Grind	1500	150	500		8			50			8.5
Pb roughers 1						40	10		1	2	
2							5		1	3	
3						20	5		1	3	
4							5		1	2	
Zn circuit		$Ca(OH)_2$	$CuSO_4$	DF 1012							
Condition 1		1500							5		
2			800						5		11.2
Zn roughers 1				10		30			1	2	
2				5					1	2	
3						10			1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 16

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	215.6	10.74	29.0	10.4	82.3	17.6
2. Pb Rougher. Conc.2	71.6	3.57	8.39	14.9	7.9	8.4
3. Pb Rougher. Conc.3	62.3	3.10	2.38	6.62	2.0	3.2
4. Pb Rougher. Conc.4	51.0	2.54	1.72	5.44	1.2	2.2
5. Zn Rougher. Conc.1	228.4	11.37	0.61	33.5	1.8	60.0
6. Zn Rougher. Conc.2	40.1	2.00	1.34	7.67	0.7	2.4
7. Zn Rougher. Conc.3	49.2	2.45	1.11	2.05	0.7	0.8
8. Zn Rougher.Tail	1290	64.24	0.20	0.54	3.4	5.5
Head Calc.	2008.2	100.00	3.78	6.35	100.0	100.0

Combined Products

Products 1+2		14.30	23.9	11.5	90.2	25.9
Products 1-3		17.40	20.0	10.6	92.2	29.2
Products 1-4		19.94	17.7	10.0	93.3	31.4
Products 5+6		13.37	0.72	29.6	2.5	62.4
Products 5-7		15.82	0.78	25.4	3.3	63.2
Products 5-8		80.06	0.31	5.45	6.7	68.6

LAKEFIELD RESEARCH

Test No.: 17 Project No.: 3733 Date: _____ Operator: _____

Purpose: Repeat test 11, but add 500 g/t of Sodium Metabisulphite to the primary grind

Procedure: As for test 11

Feed: 2000 g of minus 10 mesh ore. Composite G-2

Grind: 50 minutes at 65% solids in a lab rod mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	$Na_2S_2O_5$		R 242	A 343	HIBC	GRIND	COND.	FROTH	pH
Grind	1500	150	500		8			50			9.9
Pb roughers 1						40	10		1	2	
2							5		1	3	
3						20	5		1	3	
4							5		1	2	
Zn circuit		$Ca(OH)_2$	$CuSO_4$	DF 1012							
Condition 1		1500							5		
2			800						5		11.7
Zn. roughers 1				10		30			1	2	
2				5					1	2	
3						10			1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 17

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	185.5	9.29	35.2	12.0	83.7	17.2
2. Pb Rougher. Conc.2	50.3	2.52	10.20	15.4	6.6	6.0
3. Pb Rougher. Conc.3	38.7	1.94	3.36	8.40	1.7	2.5
4. Pb Rougher. Conc.4	22.0	1.10	2.23	7.33	0.6	1.2
5. Zn Rougher. Conc.1	166.7	8.35	0.48	42.7	1.0	55.1
6. Zn Rougher. Conc.2	43.9	2.20	0.63	23.9	0.4	8.1
7. Zn Rougher. Conc.3	42.4	2.12	0.95	7.74	0.5	2.5
8. Zn Rougher.Tail	1448	72.49	0.30	0.64	5.6	7.2
Head Calc.	1997.5	100.00	3.91	6.46	100.0	100.0

Combined Products

Products 1+2		11.80	29.9	12.7	90.2	23.2
Products 1-3		13.74	26.1	12.1	91.9	25.8
Products 1-4		14.84	24.4	11.8	92.5	27.0
Products 5+6		10.54	0.51	38.8	1.4	63.3
Products 5-7		12.67	0.58	33.6	1.9	65.8
Products 5-8		85.16	0.34	5.54	7.5	73.0

LAKEFIELD RESEARCH

Test No.: 12 Project No.: 3733 Date: June 22, 1989 Operator:

Purpose: Same as F-5 with only 50 g/t NaCN in the mill and 800 g/t $CuSO_4$ in the copper circuit

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 50 minutes at 65% solids in lab. ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Ground	1500	50	8					50			
Pb Roughers 1				40	10				1	2	10.1
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zinc circuit					DF1012						
Conditioner 1						1000			5		
2							800		5		
Zn Roughers 1				20	10				1	2	11.4
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Metallurgical Balance

Test No. 18

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	216.9	10.87	30.8	12.6	87.6	21.2
2. Pb Rougher. Conc.2	59.6	2.99	6.14	10.7	4.8	5.0
3. Pb Rougher. Conc.3	110	5.52	1.47	5.68	2.1	4.9
4. Pb Rougher. Conc.4	85.9	4.31	1.02	5.4	1.1	3.6
5. Zn Rougher. Conc.1	142.1	7.12	0.35	45.1	0.7	49.8
6. Zn Rougher. Conc.2	30.7	1.54	0.44	26.6	0.2	6.3
7. Zn Rougher. Conc.3	71.4	3.58	0.53	5.52	0.5	3.1
8. Zn Rougher.Tail	1277.9	64.07	0.18	0.62	3.0	6.2
Head Calc.	1994.5	100.00	3.82	6.45	100.0	100.0

Combined Products

Products 1+2		13.86	25.5	12.2	92.4	26.2
Products 1-3		19.38	18.6	10.3	94.5	31.0
Products 1-4		23.69	15.4	9.4	95.7	34.6
Products 5+6		8.66	0.37	41.8	.8	56.1
Products 5-7		12.24	0.41	31.2	1.3	59.2
Products 5-8		76.31	0.22	5.53	4.3	65.4

LAKEFIELD RESEARCH

Test No.: 19 Project No.: 3733 Date: June 22, 1989 Operator: _____

Purpose: Same as test 18 but used 100 g/t NaCN

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 50 minutes at 65% solids in lab ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R242	R343	MIBC	$CaCl_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Ground	1500	100	2					50			
Pb Roughers 1				40	10				1	2	10.1
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
To circuit					DF 612						
Cond. 1						1500			5		
2							800		5		
											11.9
To Rougher 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 19

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	179.4	8.97	36.0	12.8	84.9	17.9
2. Pb Rougher. Conc.2	66.2	3.31	8.87	13.9	7.7	7.2
3. Pb Rougher. Conc.3	60.3	3.01	2.34	9.05	1.9	4.3
4. Pb Rougher. Conc.4	44.1	2.20	1.20	7.36	0.7	2.5
5. Zn Rougher. Conc.1	154.7	7.73	0.34	43.3	0.7	52.3
6. Zn Rougher. Conc.2	43.1	2.15	0.52	23.7	0.3	8.0
7. Zn Rougher. Conc.3	74.1	3.70	0.63	3.48	0.6	2.0
8. Zn Rougher.Tail	1379.2	68.92	0.18	0.54	3.3	5.8
Head Calc.	2001.1	100.00	3.80	6.40	100.0	100.0

Combined Products

Products 1+2		12.27	28.7	13.1	92.6	25.1
Products 1-3		15.29	23.5	12.3	94.4	29.4
Products 1-4		17.49	20.7	11.7	95.1	31.9
Products 5+6		9.88	0.38	39.0	1.0	60.3
Products 5-7		13.59	0.45	29.3	1.6	62.3
Products 5-8		82.51	0.22	5.28	4.9	68.1

LAKEFIELD RESEARCH

Test No.: 20 Project No.: 3733 Date: June 22, 1989 Operator: _____

Purpose: Same as test 18 but used 2.00 g/t NaCN

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 50 minutes at 65% solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2S	NaCN	R242	AF343	MIBC	$CaCl_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grinding	1500	200	8					50			
Pb Rougher 1				40	10	)			1	2	10.1
2					5	/ RPM !!			1	3	
3				20	5	(			1	3	
4					5	)			1	2	
Zn cruut					DF1012						
Condit. 1						2000					
2							800				12.2
Zn Rougher 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 20

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	195.9	9.80	33.7	13.0	86.1	19.6
2. Pb Rougher. Conc.2	66.9	3.35	7.78	13.3	6.8	6.9
3. Pb Rougher. Conc.3	39.2	1.96	2.65	11.50	1.4	3.5
4. Pb Rougher. Conc.4	22.4	1.12	1.62	10.2	0.5	1.8
5. Zn Rougher. Conc.1	170.2	8.52	0.38	43.3	0.8	56.8
6. Zn Rougher. Conc.2	48.6	2.43	0.68	12.5	0.4	4.7
7. Zn Rougher. Conc.3	59.9	3.00	0.74	3.30	0.6	1.5
8. Zn Rougher.Tail	1394.9	69.81	0.19	0.49	3.5	5.3
Head Calc.	1998	100.00	3.84	6.49	100.0	100.0

Combined Products

Products1+2		13.15	27.1	13.1	92.9	26.5
Products 1-3		15.12	23.9	12.9	94.2	30.0
Products 1-4		16.24	22.4	12.7	94.7	31.7
Products 5+6		10.95	0.45	36.5	1.3	61.5
Products 5-7		13.95	0.51	29.3	1.9	63.0
Products 5-8		83.76	0.24	5.29	5.3	68.3

LAKEFIELD RESEARCH

Test No.: 91 Project No.: 3733 Date: June 22 1989 Operator: _____

Purpose: First of a series of tests to determine the optimum grinding grind for Composite G-1.

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore Composite G-1

Grind: 70 minutes at 67% solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A 343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
grinding	1500	150	6					70			
Pb Ro-1				35	10	RPM!			1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	9.8
Zn cruant					PF_{1012}						
Conditi 1						1500			5		
2							800		5		
Zn Ro 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	11.6

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Metallurgical Balance

Test No. 21

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	141.8	7.12	31.0	8.4	78.9	11.7
2. Pb Rougher. Conc.2	137.4	6.90	4.51	7.8	11.1	10.5
3. Pb Rougher. Conc.3	70.2	3.52	1.86	6.67	2.3	4.6
4. Pb Rougher. Conc.4	62.2	3.12	0.97	5.83	1.1	3.6
5. Zn Rougher. Conc.1	145.3	7.29	0.36	41.5	0.9	59.4
6. Zn Rougher. Conc.2	56.7	2.85	0.57	6.12	0.6	3.4
7. Zn Rougher. Conc.3	76.1	3.82	0.45	0.86	0.6	0.6
8. Zn Rougher.Tail	1302.5	65.38	0.19	0.48	4.4	6.2
Head Calc.	1992.2	100.00	2.80	5.10	100.0	100.0

Combined Products

Products1+2		14.01	18.0	8.1	90.0	22.2
Products 1-3		17.54	14.7	7.8	92.3	26.8
Products 1-4		20.66	12.6	7.5	93.4	30.4
Products 5+6		10.14	0.42	31.6	1.5	62.8
Products 5-7		13.96	0.43	23.2	2.1	63.4
Products 5-8		79.34	0.23	4.47	6.6	69.6

LAKEFIELD RESEARCH

SCREEN ANALYSIS RECORD

Operator Kevin Sloan **Project No.** 3733 **Date** June 23/89

F-21 | Comb Prod

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150	0.1	0.1	0.1	99.9	150				
74	200	0.6	0.6	0.7	99.3	200				
53	270	3.1	3.1	3.8	96.2	270				
37	400	9.6	9.6	13.4	86.6	400				
	−400	86.6	86.6	100.0	—	−400				
	Total	100.0	100.0			Total				

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200					200				
53	270					270				
37	400					400				
	−400					−400				
	Total					Total				

FORM LR 8

LAKEFIELD RESEARCH

Test No.: 22 Project No.: 3733 Date: June 22, 1989 Operator: _____

Purpose: Same as test 21 but 60 min. grind

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-1

Grind: 60 minutes at 65% solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R 242	A 343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind/Lime	1500	150	8					60			
Pb Rougher 1				35	10				1	2	10.1
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zn anc'l					DF1012						
conduct 1						1500			5		
2							800		5		
Zn Ro 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 22

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	182.1	9.16	25.2	8.8	83.4	16.0
2. Pb Rougher. Conc.2	120.2	6.05	3.49	7.1	7.6	8.5
3. Pb Rougher. Conc.3	59	2.97	1.55	6.54	1.7	3.9
4. Pb Rougher. Conc.4	29.7	1.49	1.15	5.95	0.6	1.8
5. Zn Rougher. Conc.1	151.7	7.63	0.37	39.3	1.0	59.6
6. Zn Rougher. Conc.2	58	2.92	0.63	5.75	0.7	3.3
7. Zn Rougher. Conc.3	93.3	4.69	0.46	0.88	0.8	0.8
8. Zn Rougher.Tail	1293.6	65.08	0.18	0.48	4.2	6.2
Head Calc.	1987.6	100.00	2.77	5.04	100.0	100.0

Combined Products

Products1+2		15.21	16.6	8.1	91.0	24.5
Products 1-3		18.18	14.1	7.8	92.7	28.3
Products 1-4		19.67	13.1	7.7	93.3	30.1
Products 5+6		10.55	0.44	30.0	1.7	62.9
Products 5-7		15.24	0.45	21.0	2.5	63.7
Products 5-8		80.33	0.23	4.38	6.7	69.9

LAKEFIELD RESEARCH
SCREEN ANALYSIS RECORD

Operator RORY C **Project No.** 3733 **Date** JUNE 26/89

COMB PROD F-22?

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150	0.2	0.2	0.2	99.8	150				
74	200	1.5	1.5	1.7	98.3	200				
53	270	4.7	4.7	6.4	93.6	270				
37	400	11.8	11.8	18.2	81.8	400				
	−400	81.8	81.8	100.0	—	−400				
	Total	100.0	100.0	—	—	Total				

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200					200				
53	270					270				
37	400					400				
	−400					−400				
	Total					Total				

FORM LR 8

LAKEFIELD RESEARCH

Test No.: F-23 Project No.: 3733 Date: _____ Operator: _____

Purpose: The first in a series of tests to see the effect of soda with a coarse primary grind.

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 30 minutes at 65% solids in L.L. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R3418	A_3	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grinding	1000	50	8					30			
Pb Rougher 1				40	10				1	2	10.1
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zinc rougher 1					DF1012						
2						1500					
							800				
				30	10				1	2	
					5				1	2	
				10	5				1	2	11.2

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 23

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	228.5	11.48	28.0	13.5	86.3	24.7
2. Pb Rougher. Conc.2	58.9	2.96	6.62	12.6	5.3	5.9
3. Pb Rougher. Conc.3	33.7	1.69	2.77	9.61	1.3	2.6
4. Pb Rougher. Conc.4	43.9	2.20	1.59	8.22	0.9	2.9
5. Zn Rougher. Conc.1	162.4	8.16	0.42	39.0	0.9	50.7
6. Zn Rougher. Conc.2	59.7	3.00	0.72	11	0.6	5.3
7. Zn Rougher. Conc.3	159.8	8.03	0.59	1.88	1.3	2.4
8. Zn Rougher.Tail	1244.1	62.49	0.21	0.55	3.5	5.5
Head Calc.	1991	100.00	3.73	6.27	100.0	100.0

Combined Products

Products 1+2		14.43	23.6	13.3	91.5	30.6
Products 1-3		16.13	21.4	12.9	92.8	33.2
Products 1-4		18.33	19.0	12.4	93.7	36.1
Products 5+6		11.16	0.50	31.5	1.5	56.0
Products 5-7		19.18	0.54	19.1	2.8	58.4
Products 5-8		81.67	0.29	4.90	6.3	63.9

LAKEFIELD RESEARCH

Test No.: F-24 Project No.: 3733 Date: June 23.1989 Operator: _____

Purpose: Same as test F-23 but 100 g/t NaCN

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 30 minutes at 65% solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
grinding	1500	100	8					30			
Pb Roughers 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zinc circuit					DF1012						
Conditioner 1						1500			5		
2							800		5		
Zinc Roughers 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 24

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	236.3	11.86	27.1	13.1	87.0	24.4
2. Pb Rougher. Conc.2	55.6	2.79	5.98	12.6	4.5	5.5
3. Pb Rougher. Conc.3	31.1	1.56	2.52	10.30	1.1	2.5
4. Pb Rougher. Conc.4	18.9	0.95	1.74	9.65	0.4	1.4
5. Zn Rougher. Conc.1	151.1	7.58	0.48	43.2	1.0	51.5
6. Zn Rougher. Conc.2	62.5	3.14	0.74	13.5	0.6	6.7
7. Zn Rougher. Conc.3	148.1	7.43	0.59	1.85	1.2	2.2
8. Zn Rougher.Tail	1289.1	64.69	0.24	0.57	4.2	5.8
Head Calc.	1992.7	100.00	3.69	6.36	100.0	100.0

Combined Products

Products 1+2		14.65	23.1	13.0	91.5	29.9
Products 1-3		16.21	21.1	12.7	92.6	32.5
Products 1-4		17.16	20.0	12.6	93.0	33.9
Products 5+6		10.72	0.56	34.5	1.6	58.1
Products 5-7		18.15	0.57	21.1	2.8	60.3
Products 5-8		82.84	0.31	5.08	7.0	66.1

LAKEFIELD RESEARCH

Test No.: F-25 Project No.: 3733 Date: June 23 1989 Operator: _____

Purpose: Same as test F-23 but 200 g/t NaCN

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 30 minutes at 65 % solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R242	A3418	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grinding	1500	200	8					30			
Pb Rougher 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zinc circuit					DF1012						
Condtn. 1						1500			5		
2							800		5		
Zinc Rougher 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Metallurgical Balance

Test No. 25

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	252.7	12.69	25.7	12.9	87.5	26.0
2. Pb Rougher. Conc.2	58.8	2.95	5.84	11.7	4.6	5.5
3. Pb Rougher. Conc.3	34.5	1.73	2.65	9.77	1.2	2.7
4. Pb Rougher. Conc.4	22.4	1.12	1.74	8.9	0.5	1.6
5. Zn Rougher. Conc.1	166.5	8.36	0.43	38.7	1.0	51.4
6. Zn Rougher. Conc.2	79.3	3.98	0.7	9.5	0.7	6.0
7. Zn Rougher. Conc.3	104	5.22	0.56	1.54	0.8	1.3
8. Zn Rougher.Tail	1273.4	63.94	0.21	0.54	3.6	5.5
Head Calc.	1991.6	100.00	3.73	6.29	100.0	100.0

Combined Products

Products 1+2		15.64	22.0	12.7	92.1	31.5
Products 1-3		17.37	20.0	12.4	93.4	34.2
Products 1-4		18.50	18.9	12.2	93.9	35.8
Products 5+6		12.34	0.52	29.3	1.7	57.4
Products 5-7		17.56	0.53	21.0	2.5	58.7
Products 5-8		81.50	0.28	4.96	6.1	64.2

LAKEFIELD RESEARCH

Test No.: F-26 Project No.: 3733 Date: June 22, 1989 Operator: _____

Purpose: Same as test F-23 but 1500 g/t $CuSO_4$

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 30 minutes at 65% solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R208	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind.	1500	25	6					30			
Pb. Rougher 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zinc circuit					DF1012						
Conditioner 1						1500			5		
2							800		5		
Zinc Rougher 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 26

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	244.3	12.30	27.4	13.8	88.7	26.4
2. Pb Rougher. Conc.2	50.6	2.55	5.28	12.1	3.5	4.8
3. Pb Rougher. Conc.3	28.4	1.43	2.69	10.20	1.0	2.3
4. Pb Rougher. Conc.4	19.8	1.00	1.77	9.01	0.5	1.4
5. Zn Rougher. Conc.1	163.8	8.24	0.50	42.3	1.1	54.2
6. Zn Rougher. Conc.2	69.8	3.51	0.85	8.36	0.8	4.6
7. Zn Rougher. Conc.3	97.6	4.91	0.6	1.48	0.8	1.1
8. Zn Rougher.Tail	1312.5	66.06	0.21	0.51	3.7	5.2
Head Calc.	1986.8	100.00	3.80	6.43	100.0	100.0

Combined Products

Products 1+2		14.84	23.6	13.5	92.2	31.2
Products 1-3		16.27	21.8	13.2	93.2	33.4
Products 1-4		17.27	20.6	13.0	93.7	34.8
Products 5+6		11.76	0.60	32.2	1.9	58.8
Products 5-7		16.67	0.60	23.1	2.6	59.9
Products 5-8		82.73	0.29	5.07	6.3	65.2

LAKEFIELD RESEARCH

Test No.: F-27 Project No.: 2733 Date: June 6, 1989 Operator: _____

Purpose: as test F-23 but 300 g/t NaCN

Procedure: as shown below

Feed: Sample of minus 10 mesh ore composite G-2

Grind: 30 minutes at 65% solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	$K_2Cr_2O_7$	AERO 3418	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	Na2	300	3					30			
Pb Rougher 1				40	10					2	10.1
2					5					3	
3				20	5					3	
4					5				1	2	
Zinc circuit					DF1012						
Cu Cleaner 1						1500			5		
2							80		5		
Zinc Rougher 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 27

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	264.4	13.33	24.7	13.3	89.4	27.8
2. Pb Rougher. Conc.2	46.8	2.36	4.88	12.3	3.1	4.5
3. Pb Rougher. Conc.3	30.5	1.54	2.36	9.27	1.0	2.2
4. Pb Rougher. Conc.4	13.5	0.68	1.68	8.97	0.3	1.0
5. Zn Rougher. Conc.1	171.5	8.65	0.49	40.6	1.2	55.0
6. Zn Rougher. Conc.2	90.1	4.54	0.81	4.76	1.0	3.4
7. Zn Rougher. Conc.3	132.2	6.67	0.55	0.95	1.0	1.0
8. Zn Rougher.Tail	1234	62.23	0.18	0.53	3.0	5.2
Head Calc.	1983	100.00	3.68	6.39	100.0	100.0

Combined Products

Products 1+2		15.69	21.7	13.1	92.5	32.3
Products 1-3		17.23	20.0	12.8	93.5	34.5
Products 1-4		17.91	19.3	12.7	93.8	35.5
Products 5+6		13.19	0.60	28.3	2.1	58.4
Products 5-7		19.86	0.58	19.1	3.1	59.3
Products 5-8		82.09	0.28	5.02	6.2	64.5

LAKEFIELD RESEARCH

Test No.: F-28 Project No.: 3733 Date: June 26, 1989 Operator: _____

Purpose: Same as test F-23 but 350 g/t NaCN

Procedure: As shown below

Feed: 2000 g of minus 10 mesh ore composite G-2

Grind: 30 minutes at 65% solids in lab. ball mill

Conditions: _____

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R3418	A343	MIBC	$Cu(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	350	8					30			
Pb Rougher 1				40	10				1	2	
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Zinc circuit					DF1012						
Conditioner 1						1500			5		
2							800		5		
Zinc Rougher 1				30	10				1	2	
2					5				1	2	
3				10	5				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 28

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	250.6	12.67	25.9	13.2	88.5	25.9
2. Pb Rougher. Conc.2	40.4	2.04	6.29	12.5	3.5	3.9
3. Pb Rougher. Conc.3	21.4	1.08	3.63	10.70	1.1	1.8
4. Pb Rougher. Conc.4	15.6	0.79	2.15	10	0.5	1.2
5. Zn Rougher. Conc.1	158.6	8.02	0.52	44.7	1.1	55.4
6. Zn Rougher. Conc.2	64.7	3.27	0.97	9.81	0.9	5.0
7. Zn Rougher. Conc.3	103.5	5.23	0.64	1.59	0.9	1.3
8. Zn Rougher.Tail	1323.8	66.91	0.20	0.53	3.6	5.5
Head Calc.	1978.6	100.00	3.71	6.46	100.0	100.0

Combined Products

Products 1+2		14.71	23.2	13.1	92.0	29.8
Products 1-3		15.79	21.8	12.9	93.0	31.6
Products 1-4		16.58	20.9	12.8	93.5	32.8
Products 5+6		11.29	0.65	34.6	2.0	60.4
Products 5-7		16.52	0.65	24.1	2.9	61.7
Products 5-8		83.42	0.29	5.20	6.5	67.2

LAKEFIELD RESEARCH

Test No.: 29 Project No.: 3733 Date: 29 June 89 Operator: CP

Purpose: To repeat test No. 3, but with a different technician and in a different cell.

Procedure: Grind and float four lead concentrates. Condition the lead rougher tailing and float three zinc concentrates.

Feed: 2000 grams minus 10 mesh G-2 Composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					30			
Pb Rougher 1				40	10				1	2	10.0
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
					(8F2)						
Condition 1						1000			5		
2							1300		5		
Zn Rougher 1				30	10				1	2	10.8
2					5				1	2	
3				10					1	2	

Stage	Cell No. 3				
Flotation Cell	1000 g				
Speed: r.p.m.	2000				
% Solids					
% – mesh					

Test No. 29

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	272.7	13.77	24.4	13.5	87.9	28.4
2. Pb Rougher. Conc.2	90.7	4.58	3.70	10.6	4.4	7.4
3. Pb Rougher. Conc.3	54.6	2.76	1.47	7.97	1.1	3.4
4. Pb Rougher. Conc.4	27.4	1.38	0.99	7.35	0.4	1.6
5. Zn Rougher. Conc.1	251.3	12.69	0.54	27.4	1.8	53.1
6. Zn Rougher. Conc.2	129.7	6.55	0.51	1.64	0.9	1.6
7. Zn Rougher. Conc.3	71.1	3.59	0.42	0.83	0.4	0.5
8. Zn Rougher.Tail	1083	54.68	0.22	0.48	3.1	4.0
Head Calc.	1980.5	100.00	3.82	6.54	100.0	100.0

Combined Products

Products 1+2		18.35	19.2	12.8	92.4	35.8
Products 1-3		21.11	16.9	12.1	93.4	39.2
Products 1-4		22.49	15.9	11.9	93.8	40.7
Products 5+6		19.24	0.53	18.6	2.7	54.8
Products 5-7		22.83	0.51	15.8	3.1	55.2
Products 5-8		77.51	0.31	5.00	6.2	59.3

LAKEFIELD RESEARCH

Test No.: 30 Project No.: 3733 Date: 29 June 89 Operator: CP

Purpose: The first of a series of tests to investigate the effect of replacing NaCN with PK3-C.

Procedure:

As for test No. 29.

Feed: 2000 grams minus 10 mesh G-2 Composite

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	PK3-C	242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	100	8					30			
Pb Rougher 1				40	10				1	2	10.0
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
					DF1012						
Condition 1						1500			5		
2							800		5		11.5
Zn Rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh				-	

Test No. 30

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	306.9	15.44	21.1	13.0	86.9	31.4
2. Pb Rougher. Conc.2	115.4	5.80	3.35	9.5	5.2	8.6
3. Pb Rougher. Conc.3	120.4	6.06	1.16	6.14	1.9	5.8
4. Pb Rougher. Conc.4	71.0	3.57	0.90	6.45	0.9	3.6
5. Zn Rougher. Conc.1	205	10.31	0.51	27.5	1.4	44.4
6. Zn Rougher. Conc.2	104.8	5.27	0.64	2.21	0.9	1.8
7. Zn Rougher. Conc.3	57.6	2.90	0.53	1.09	0.4	0.5
8. Zn Rougher.Tail	1007	50.65	0.18	0.48	2.4	3.8
Head Calc.	1988.1	100.00	3.75	6.39	100.0	100.0

Combined Products

Products 1+2		21.24	16.2	12.0	92.1	40.1
Products 1-3		27.30	12.9	10.7	94.0	45.9
Products 1-4		30.87	11.5	10.2	94.9	49.5
Products 5+6		15.58	0.55	18.9	2.3	46.2
Products 5-7		18.48	0.55	16.1	2.7	46.7
Products 5-8		69.13	0.28	4.67	5.1	50.5

LAKEFIELD RESEARCH

Test No.: 31 Project No.: 3733 Date: 29 June 89 Operator: CP

Purpose: To repeat test No. 30, but increase PK3-C addition to 150 g/t.

Procedure: As for test No. 29.

Feed: 2000 grams minus 10 mesh G-2 Composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	PK3-C	242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					30			
Pb Rougher 1				40	10				1	2	10.1
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
					DF1012						
Condition 1						1500			5		
2							800		5		
Zn Rougher 1				30	10				1	2	11.6
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Metallurgical Balance

Test No. 31

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	289.4	14.13	22.1	13.1	84.5	29.2
2. Pb Rougher. Conc.2	115.2	5.62	3.77	10.6	5.7	9.4
3. Pb Rougher. Conc.3	152	7.42	1.56	7.45	3.1	8.7
4. Pb Rougher. Conc.4	43.8	2.14	1.27	7.19	0.7	2.4
5. Zn Rougher. Conc.1	237.2	11.58	0.60	24.4	1.9	44.6
6. Zn Rougher. Conc.2	105	5.13	0.62	1.81	0.9	1.5
7. Zn Rougher. Conc.3	68.7	3.35	0.52	0.91	0.5	0.5
8. Zn Rougher.Tail	1036.8	50.62	0.20	0.47	2.7	3.8
Head Calc.	2048.1	100.00	3.70	6.34	100.0	100.0

Combined Products

Products 1+2		19.75	16.9	12.4	90.2	38.6
Products 1-3		27.18	12.7	11.0	93.3	47.3
Products 1-4		29.31	11.9	10.8	94.1	49.7
Products 5+6		16.71	0.61	17.5	2.7	46.0
Products 5-7		20.06	0.59	14.7	3.2	46.5
Products 5-8		70.69	0.31	4.51	5.9	50.3

LAKEFIELD RESEARCH

Test No.: 32 Project No.: 3733 Date: 30 June 89 Operator: CP

Purpose: To repeat test No. 30, but increase PK3-C addition to 200 g/t.

Procedure: As for test No. 29

Feed: 2000 grams minus 10 mesh 6-2 Composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	PK3-C	242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	200	8					30			
Pb Rougher 1				40	10				1	2	10.1
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
					DF1012						
Condition 1						1500			5		
2							800		5		11.4
Zn Rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 32

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	263.4	13.24	24.5	13.7	83.4	27.4
2. Pb Rougher. Conc.2	106.1	5.33	4.85	11.2	6.7	9.0
3. Pb Rougher. Conc.3	112.8	5.67	1.97	8.48	2.9	7.3
4. Pb Rougher. Conc.4	42.3	2.13	1.55	7.86	0.8	2.5
5. Zn Rougher. Conc.1	250	12.56	0.65	25.2	2.1	47.8
6. Zn Rougher. Conc.2	118.5	5.96	0.68	1.71	1.0	1.5
7. Zn Rougher. Conc.3	70.4	3.54	0.59	0.93	0.5	0.5
8. Zn Rougher.Tail	1026.3	51.58	0.19	0.50	2.5	3.9
Head Calc.	1989.8	100.00	3.89	6.62	100.0	100.0

Combined Products

Products 1+2		18.57	18.9	13.0	90.1	36.4
Products 1-3		24.24	14.9	11.9	93.0	43.7
Products 1-4		26.36	13.8	11.6	93.8	46.2
Products 5+6		18.52	0.66	17.6	3.1	49.4
Products 5-7		22.06	0.65	15.0	3.7	49.9
Products 5-8		73.64	0.33	4.83	6.2	53.8

LAKEFIELD RESEARCH

Test No.: 33 Project No.: 3733 Date: 30 June 89 Operator: CP

Purpose: The first in a series of tests to investigate the effect of replacing NaCN with a Thiourea/NaCN Complex.

Procedure: As for test No. 29

Feed: 2000 grams minus 10 mesh G-2 Composite

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thio/NaCN	242	A343	M150	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	100	8					30			
Pb Rougher 1				40	10				1	2	10.1
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
					DF1012						
Condition 1						1500			5		
2							800		5		
Zn Rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 33

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	349.3	17.57	18.8	11.3	88.6	30.9
2. Pb Rougher. Conc.2	185	9.31	1.94	8.1	4.8	11.7
3. Pb Rougher. Conc.3	124.6	6.27	0.92	6.40	1.5	6.2
4. Pb Rougher. Conc.4	41.8	2.10	0.81	7.51	0.5	2.5
5. Zn Rougher. Conc.1	249.9	12.57	0.46	22.5	1.6	44.0
6. Zn Rougher. Conc.2	63.2	3.18	0.49	1.63	0.4	0.8
7. Zn Rougher. Conc.3	40.5	2.04	0.42	1.02	0.2	0.3
8. Zn Rougher.Tail	933.7	46.97	0.19	0.48	2.4	3.5
Head Calc.	1988	100.00	3.73	6.42	100.0	100.0

Combined Products

Products 1+2		26.88	13.0	10.2	93.4	42.6
Products 1-3		33.14	10.7	9.5	95.0	48.9
Products 1-4		35.25	10.1	9.4	95.4	51.3
Products 5+6		15.75	0.47	18.3	2.0	44.8
Products 5-7		17.79	0.46	16.3	2.2	45.2
Products 5-8		64.75	0.26	4.83	4.6	48.7

LAKEFIELD RESEARCH

Test No.: 34 Project No.: 3733 Date: 30 June 89 Operator: CP

Purpose: To repeat test No. 33, but increase Thio/NaCN complex addition to 150 g/t.

Procedure:

As for test No. 29.

Feed: 2000 grams minus 10 mesh G-2 Composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thio/NaCN	242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					30			
Pb Rougher 1				40	10				1	2	10.2
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
					DF1012						
Condition 1						1500			5		
2							800		5		11.5
Zn Rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 34

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	292.5	14.75	22.5	12.3	87.9	28.6
2. Pb Rougher. Conc.2	167	8.42	2.38	8.9	5.3	11.8
3. Pb Rougher. Conc.3	171	8.62	0.86	5.36	2.0	7.3
4. Pb Rougher. Conc.4	59.0	2.98	0.67	6.6	0.5	3.1
5. Zn Rougher. Conc.1	218.5	11.02	0.46	25.7	1.3	44.6
6. Zn Rougher. Conc.2	69.7	3.51	0.47	1.82	0.4	1.0
7. Zn Rougher. Conc.3	46.9	2.37	0.37	0.98	0.2	0.4
8. Zn Rougher.Tail	958.4	48.33	0.18	0.44	2.3	3.3
Head Calc.	1983	100.00	3.78	6.35	100.0	100.0

Combined Products

Products 1+2		23.17	15.2	11.1	93.2	40.3
Products 1-3		31.80	11.3	9.5	95.2	47.6
Products 1-4		34.77	10.4	9.3	95.7	50.7
Products 5+6		14.53	0.46	19.9	1.8	45.6
Products 5-7		16.90	0.45	17.3	2.0	45.9
Products 5-8		65.23	0.25	4.80	4.3	49.3

LAKEFIELD RESEARCH

Test No.: 35 Project No.: 3733 Date: 4 July 89 Operator: CP

Purpose: To repeat test No. 33, but increase Thio/NaCN complex addition to 200 g/t

Procedure: As for test No. 29.

Feed: 2000 grams minus 10 mesh G-2 Composite

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thio./NaCN	242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	200	8					30			
Pb Rougher 1				40	10				1	2	10.2
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
					DF1012						
Condition 1						1500			5		
2							800		5		11.6
Zn Rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 35

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	292.1	14.69	22.5	12.9	88.9	30.0
2. Pb Rougher. Conc.2	102	5.13	3.02	10.3	4.2	8.4
3. Pb Rougher. Conc.3	114.8	5.77	0.93	5.37	1.4	4.9
4. Pb Rougher. Conc.4	56.3	2.83	0.80	5.83	0.6	2.6
5. Zn Rougher. Conc.1	251.8	12.67	0.50	24.4	1.7	49.0
6. Zn Rougher. Conc.2	78.3	3.94	0.55	1.65	0.6	1.0
7. Zn Rougher. Conc.3	63.4	3.19	0.42	0.83	0.4	0.4
8. Zn Rougher.Tail	1029.3	51.78	0.16	0.44	2.2	3.6
Head Calc.	1988	100.00	3.72	6.31	100.0	100.0

Combined Products

Products 1+2		19.82	17.5	12.2	93.1	38.4
Products 1-3		25.60	13.7	10.7	94.5	43.3
Products 1-4		28.43	12.4	10.2	95.1	46.0
Products 5+6		16.60	0.51	19.0	2.3	50.0
Products 5-7		19.79	0.50	16.1	2.6	50.4
Products 5-8		71.57	0.25	4.76	4.9	54.0

LAKEFIELD RESEARCH

Test No.: 36 Project No.: 3733 Date: 4 July 89 Operator: CP

Purpose: To investigate the effect of replacing the 242-343 collector combination with a 1:1 mixture of AX317 & A3418A.

Procedure:

As for test No. 29

Feed: 2000 grams minus 10 mesh C-2 Composite

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	$Ca(OH)_2$	$CuSO_4$	DF1012	GRIND	COND.	FROTH	pH
Grind	1500	150	8					30			
Pb Rougher 1			40	10					1	2	10.1
2				5					1	3	
3			20	5					1	3	
4				5					1	2	
Condition 1					1500				5		
2						800			5		11.5
Zn Rougher 1			30				10		1	2	
2							5		1	2	
3			10						1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 36

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	258	12.96	25.6	13.4	88.3	26.7
2. Pb Rougher. Conc.2	109.8	5.52	3.66	11.4	5.4	9.7
3. Pb Rougher. Conc.3	83.7	4.21	1.29	8.90	1.4	5.7
4. Pb Rougher. Conc.4	39.2	1.97	0.95	7.69	0.5	2.3
5. Zn Rougher. Conc.1	160.9	8.09	0.33	34.4	0.7	42.7
6. Zn Rougher. Conc.2	77.9	3.91	0.57	7.51	0.6	4.5
7. Zn Rougher. Conc.3	68.9	3.46	0.57	7.51	0.5	4.0
8. Zn Rougher.Tail	1191.7	59.88	0.16	0.48	2.5	4.4
Head Calc.	1990.1	100.00	3.76	6.51	100.0	100.0

Combined Products

Products 1+2		18.48	19.1	12.8	93.7	36.3
Products 1-3		22.69	15.8	12.1	95.1	42.1
Products 1-4		24.66	14.6	11.7	95.6	44.4
Products 5+6		12.00	0.41	25.6	1.3	47.2
Products 5-7		15.46	0.44	21.6	1.8	51.2
Products 5-8		75.34	0.22	4.81	4.4	55.6

LAKEFIELD RESEARCH

Test No.: 37 Project No.: 3733 Date: 4 July 89 Operator: CP

Purpose: To investigate the effect of using a 1:1 mixture of AX350 : A3418A as lead and zinc collector.

Procedure: As for Test No. 29.

Feed: 2000 grams minus 10 mesh G-2 Composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A350 / 3418A	MIBC	$Ca(OH)_2$	$CuSO_4$	DF1012	GRIND	COND.	FROTH	pH
Grind	1500	150	8					30			
Pb Rougher 1			40	10					1	2	
2				5					1	3	
3			20	5					1	3	
4				5					1	2	
Condition 1					1500				5		
2						800			5		
Zn Rougher 1			30				10		1	2	
2							5		1	2	
3			10						1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 37

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	249.6	12.53	26.3	12.5	87.1	24.8
2. Pb Rougher. Conc.2	151.9	7.63	3.29	11.1	6.6	13.4
3. Pb Rougher. Conc.3	139.9	7.03	0.97	8.07	1.8	9.0
4. Pb Rougher. Conc.4	52.6	2.64	0.88	8.04	0.6	3.4
5. Zn Rougher. Conc.1	131.7	6.61	0.28	36.7	0.5	38.4
6. Zn Rougher. Conc.2	49.4	2.48	0.39	10.6	0.3	4.2
7. Zn Rougher. Conc.3	84.8	4.26	0.64	3.59	0.7	2.4
8. Zn Rougher.Tail	1131.5	56.82	0.16	0.50	2.4	4.5
Head Calc.	1991.4	100.00	3.79	6.32	100.0	100.0

Combined Products

Products 1+2		20.16	17.6	12.0	93.7	38.2
Products 1-3		27.19	13.3	11.0	95.5	47.2
Products 1-4		29.83	12.2	10.7	96.1	50.5
Products 5+6		9.09	0.31	29.6	.7	42.6
Products 5-7		13.35	0.42	21.3	1.5	45.0
Products 5-8		70.17	0.21	4.46	3.9	49.5

LAKEFIELD RESEARCH

Test No.: 38 Project No.: 3733 Date: 5 July 89 Operator: CP

Purpose: To repeat test No. 29, but reduce collector additions in both lead and zinc circuits.

Procedure:
As for test No. 29.

Feed: 2000 grams minus 10 mesh Composite G-2

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	R242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	150	8					30			
Pb Rougher 1				30	10				1	2	10.0
2					5				1	3	
3				15	5				1	3	
4					5				1	2	
Condition 1						1500			5		
2							800		5		11.5
					DF1012						
Zn Rougher 1				20	10				1	2	
2					5				1	2	
3				10					1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

FORM LR 6

Test No. 38

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	248.2	12.59	26.4	13.5	88.5	27.0
2. Pb Rougher. Conc.2	71.9	3.65	4.16	11.5	4.0	6.7
3. Pb Rougher. Conc.3	60	3.04	1.62	9.11	1.3	4.4
4. Pb Rougher. Conc.4	22.9	1.16	1.19	8.26	0.4	1.5
5. Zn Rougher. Conc.1	211.2	10.72	0.54	31.6	1.5	53.7
6. Zn Rougher. Conc.2	77.4	3.93	0.63	2.88	0.7	1.8
7. Zn Rougher. Conc.3	80.9	4.11	0.45	0.78	0.5	0.5
8. Zn Rougher.Tail	1198.2	60.80	0.19	0.46	3.1	4.4
Head Calc.	1970.7	100.00	3.76	6.30	100.0	100.0

Combined Products

Products 1+2		16.24	21.4	13.1	92.6	33.6
Products 1-3		19.29	18.3	12.4	93.9	38.0
Products 1-4		20.45	17.3	12.2	94.2	39.5
Products 5+6		14.64	0.56	23.9	2.2	55.5
Products 5-7		18.75	0.54	18.8	2.7	56.0
Products 5-8		79.55	0.27	4.79	5.8	60.5

LAKEFIELD RESEARCH

Test No.: 39 Project No.: 3733 Date: 7 July 89 Operator: CP

Purpose: To repeat tests 33 to 35, but increase Thio/NaCN complex addition to 300 g/t.

Procedure:

As for test No. 29.

Feed: 2000 grams minus 10 mesh G-2 Composite

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thio. NaCN	242	A343	MIBC	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	300	8					30			
Pb Rougher 1				40	10				1	2	10.2
2					5				1	3	
3				20	5				1	3	
4					5				1	2	
Condition 1						1500			5		
2							800		5		11.6
					DF1012						
Zn Rougher 1				30	10				1	2	
2					5				1	2	
3				10					1	2	

Stage						
Flotation Cell						
Speed: r.p.m.						
% Solids						
% — mesh						

FORM LR-6

Metallurgical Balance

Test No. 39

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	258.3	12.93	25.9	13.8	88.2	27.9
2. Pb Rougher. Conc.2	85.7	4.29	3.92	11.8	4.4	7.9
3. Pb Rougher. Conc.3	53.3	2.67	1.73	9.20	1.2	3.8
4. Pb Rougher. Conc.4	26.9	1.35	1.29	8.3	0.5	1.7
5. Zn Rougher. Conc.1	404.7	20.26	0.49	16.9	2.6	53.5
6. Zn Rougher. Conc.2	74.7	3.74	0.52	1.62	0.5	0.9
7. Zn Rougher. Conc.3	45.3	2.27	0.43	1.01	0.3	0.4
8. Zn Rougher.Tail	1048.2	52.49	0.17	0.46	2.3	3.8
Head Calc.	1997.1	100.00	3.80	6.40	100.0	100.0

Combined Products

Products 1+2		17.22	20.4	13.3	92.6	35.8
Products 1-3		19.89	17.9	12.8	93.8	39.6
Products 1-4		21.24	16.9	12.5	94.3	41.4
Products 5+6		24.00	0.49	14.5	3.1	54.5
Products 5-7		26.27	0.49	13.4	3.4	54.8
Products 5-8		78.76	0.28	4.76	5.7	58.6

LAKEFIELD RESEARCH

Test No.: 40 Project No.: 3733 Date: 7 July 89 Operator: CP

Purpose: To repeat tests 33 to 35, but with both NaCN and Thio/NaCN complex added to the grind.

Procedure: As for test No. 29.

Feed: 2000 grams minus 10 mesh G-2 Composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	Thio/NaCN	242	A343	MIBC	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	50	200	8				30			
Pb Rougher 1					40	10			1	2	10.2
2						5			1	3	
3					20	5			1	3	
4						5			1	2	
	$Ca(OH)_2$					DF1012					
Condition 1	1500								5		
2							800		5		11.5
Zn Rougher 1					30	10			1	2	
2						5			1	2	
3					10				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No.40

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	262.8	13.17	25.2	13.2	87.9	27.0
2. Pb Rougher. Conc.2	72.4	3.63	4.45	12.1	4.3	6.8
3. Pb Rougher. Conc.3	60.4	3.03	1.75	9.23	1.4	4.3
4. Pb Rougher. Conc.4	29.9	1.50	1.18	8.28	0.5	1.9
5. Zn Rougher. Conc.1	284.8	14.27	0.49	24.2	1.9	53.6
6. Zn Rougher. Conc.2	122.9	6.16	0.56	1.87	0.9	1.8
7. Zn Rougher. Conc.3	69	3.46	0.47	0.87	0.4	0.5
8. Zn Rougher.Tail	1093.8	54.80	0.19	0.48	2.8	4.1
Head Calc.	1996	100.00	3.77	6.44	100.0	100.0

Combined Products

Products 1+2		16.79	20.7	13.0	92.2	33.8
Products 1-3		19.82	17.8	12.4	93.6	38.1
Products 1-4		21.32	16.7	12.1	94.0	40.1
Products 5+6		20.43	0.51	17.5	2.8	55.4
Products 5-7		23.88	0.51	15.1	3.2	55.9
Products 5-8		78.68	0.29	4.91	6.0	59.9

LAKEFIELD RESEARCH

Test No.: 41 Project No.: 3733 Date: 7 July 89 Operator: CP

Purpose: To repeat test No. 32, but add both NaCN and PK3-C to the grind.

Procedure: As for test No. 29.

Feed: 2000 grams minus 10 mesh C-2 Composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	PK3-C	242	A343	MIBC	$CuSO_4$	GRIND	COND.	FROTH	pH
Grind	1500	50	200	8				30			
Pb Rougher 1					40	10			1	2	
2						5			1	3	
3					20	5			1	3	
4						5			1	2	
	$Ca(OH)_2$					DF1012					
Condition 1	1500								5		
2							800		5		
Zn Rougher 1					30	10			1	2	
2						5			1	2	
3					10				1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Metallurgical Balance

Test No.41

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb Rougher. Conc.1	246.2	12.33	25.8	13.5	82.6	25.7
2. Pb Rougher. Conc.2	96.2	4.82	5.64	11.7	7.1	8.7
3. Pb Rougher. Conc.3	75.2	3.77	2.56	8.86	2.5	5.1
4. Pb Rougher. Conc.4	29.4	1.47	2.04	8.52	0.8	1.9
5. Zn Rougher. Conc.1	183.1	9.17	0.54	35.0	1.3	49.5
6. Zn Rougher. Conc.2	182.4	9.14	0.69	2.8	1.6	3.9
7. Zn Rougher. Conc.3	92.4	4.63	0.63	1.08	0.8	0.8
8. Zn Rougher.Tail	1091.5	54.67	0.24	0.52	3.4	4.4
Head Calc.	1996.4	100.00	3.85	6.49	100.0	100.0

Combined Products

Products 1+2		17.15	20.1	13.0	89.6	34.4
Products 1-3		20.92	17.0	12.2	92.1	39.5
Products 1-4		22.39	16.0	12.0	92.9	41.4
Products 5+6		18.31	0.61	18.9	2.9	53.4
Products 5-7		22.94	0.62	15.3	3.7	54.2
Products 5-8		77.61	0.35	4.90	7.1	58.6

LAKEFIELD RESEARCH

Test No.: 42 Project No.: 3733 Date: 11 July 89 Operator: CP

Purpose: The first in a series of tests to investigate the effect of regrind fineness on the cleaning of the lead concentrate.

Procedure: Grind and float a lead rougher concentrate. Clean the concentrate four times.

Feed: 2000 grams minus 10 mesh G-2 composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Rougher			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb 1st Cleaner		50	5		100				1	3	9.9
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner		25			50				1	3	
			5	2.5					1	2	
Pb 3rd Cleaner		25			50				1	2	9.8
			2.5	2.5					1	2	
Pb 4th Cleaner		25		2.5	50				1	3	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 42

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	224.9	11.34	28.70	17.50	87.1	31.4
Pb 4th Cleaner Tail	17.4	0.88	11.50	10.20	2.7	1.4
Pb 3d Cleaner Tail	18.4	0.93	4.64	4.59	1.2	.7
Pb 2d Cleaner Tail	28.7	1.45	2.88	4.84	1.1	1.1
Pb 1st Cl Scav Conc.	7.2	0.36	3.83	9.82	.4	.6
Pb 1st cl Scav Tail	113.9	5.74	0.92	5.60	1.4	5.1
Pb Rougher Tail	1573.4	79.31	0.29	4.75	6.2	59.7
Head Calc.	1983.9	100.00	3.74	6.31	100.0	100.0

Combined Products

Products 1+2		12.21	27.46	17.0	89.8	32.9
Products 1to3		13.14	25.85	16.1	90.9	33.5
Products 1to4		14.59	23.58	15.0	92.1	34.6
Products1to5		14.95	23.10	14.9	92.4	35.2
Products 1to6		20.69	16.94	12.3	93.8	40.3

Project No: 3733 Test No: 42

Product: Comb. Cleaner Prod. SG. 4.13

Mesh	Weight Grams	% Weight		
		Ind.	Cum.	Passing
150	1.26	2.5	2.5	97.5
200	4.55	9.1	11.6	88.4
270	6.09	12.2	23.8	76.2
26.5µ	11.56	23.1	46.9	53.1
20.5	5.16	10.3	57.2	42.8
14.3	5.33	10.7	67.9	32.1
9.8	4.36	8.7	76.6	23.4
7.6	1.99	4.0	80.6	19.4
-7.6	9.70	19.4	100.0	-

LAKEFIELD RESEARCH

Test No.: 43 Project No.: 3733 Date: 11 July 89 Operator: CP

Purpose: To repeat test No. 42, but regrind the rougher concentrate before cleaning.

Procedure: Grind and float a lead rougher concentrate. Regrind the rougher concentrate and clean four times.

Feed: 2000 grams minus 10 mesh 6-2 composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Rougher			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		50	10		100			10			
Pb 1st Cleaner				7.5					1	3	9.5
			5	5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner		25			50				1	3	
			5	2.5					1	2	
Pb 3rd Cleaner		25			50				1	2	9.5
			2.5	2.5					1	2	
Pb 4th Cleaner		25		2.5	50				1	3	

Stage	Rougher	Conc. Regrind	1st to 2nd Cls.	3rd & 4th Cls.	
Flotation Cell	1000g D-1	Rod Mill	500g D-1	250g D-1	
Speed: r.p.m.	1400		1400	1100	
% Solids					
% – mesh					

FORM LR6

Test No. 43

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	143.2	7.22	44.40	14.40	86.7	16.6
Pb 4th Cleaner Tail	15.3	0.77	13.90	15.50	2.9	1.9
Pb 3d Cleaner Tail	9.6	0.48	4.72	9.46	.6	.7
Pb 2d Cleaner Tail	46.8	2.36	2.83	12.60	1.8	4.7
Pb 1st Cl Scav Conc.	14.2	0.72	2.59	14.50	.5	1.7
Pb 1st cl Scav Tail	208.4	10.50	0.57	11.20	1.6	18.7
Pb Rougher Tail	1547.0	77.95	0.28	4.48	5.9	55.7
Head Calc.	1984.5	100.00	3.70	6.27	100.0	100.0

Combined Products

Products 1+2		7.99	41.46	14.5	89.6	18.5
Products 1to3		8.47	39.36	14.2	90.2	19.2
Products 1to4		10.83	31.40	13.9	92.0	23.9
Products1to5		11.54	29.62	13.9	92.5	25.6
Products 1to6		22.05	15.78	12.6	94.1	44.3

Project No: 3733 Test No: 43

Product: Comb. [redacted] Cleaner Prod. SG. 4.11

Mesh	Weight Grams	% Weight		
		Ind.	Cum.	Passing
150	0.00	0.0	0.0	100.0
200	0.00	0.0	0.0	100.0
270	0.00	0.0	0.0	100.0
26.5µ	8.14	16.3	16.3	83.7
20.5	8.29	16.6	32.9	67.1
14.3	10.00	20.0	52.9	47.1
9.8	7.56	15.1	68.0	32.0
7.6	3.30	6.6	74.6	25.4
-7.6	12.71	25.4	100.0	-
Total	50.00	100.0	-	-

LAKEFIELD RESEARCH

Test No.: 44 Project No.: 3733 Date: 12 July 89 Operator: CP

Purpose: To repeat test No. 43, but increase regrind time to 20 minutes.

Procedure: As for test No. 43.

Feed: 2000 grams minus 10 mesh G-2 composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Cone. Regrind		50	15		100			20			
Pb 1st Cleaner				7.5					1	3	9.8
			5	5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner		25			50				1	3	
			5	2.5					1	2	
Pb 3rd Cleaner		25			50				1	2	9.6
			2.5	2.5					1	2	
Pb 4th Cleaner		25		2.5	50				1	3	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% — mesh					

Test No. 44

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	111.0	5.62	56.00	11.50	86.2	10.2
Pb 4th Cleaner Tail	12.6	0.64	18.00	19.20	3.1	1.9
Pb 3d Cleaner Tail	8.1	0.41	7.79	11.30	.9	.7
Pb 2d Cleaner Tail	49.2	2.49	3.11	15.90	2.1	6.3
Pb 1st Cl Scav Conc.	13.2	0.67	1.85	17.00	.3	1.8
Pb 1st cl Scav Tail	228.6	11.57	0.47	14.00	1.5	25.6
Pb Rougher Tail	1553.5	78.61	0.27	4.29	5.8	53.4
Head Calc.	1976.2	100.00	3.65	6.32	100.0	100.0

Combined Products

Products 1+2		6.25	52.13	12.3	89.4	12.2
Products 1to3		6.66	49.40	12.2	90.2	12.9
Products 1to4		9.15	36.81	13.2	92.4	19.2
Products1to5		9.82	34.43	13.5	92.7	21.0
Products 1to6		21.39	16.07	13.8	94.2	46.6

Project No: 3733 Test No: 44

Product: Combined Cleaner Product SG -4.18

Mesh	Weight	% Weight		
	Grams	Ind.	Cum.	Passing
26.7µ	1.67	3.3	3.3	96.7
20.7	4.72	9.4	12.8	87.2
14.4	10.45	20.9	33.7	66.3
9.9	10.45	20.9	54.6	45.4
7.7	4.87	9.7	64.3	35.7
-7.7	17.84	35.7	100.0	-

LAKEFIELD RESEARCH

Test No.: 45 Project No.: 3733 Date: 14 July 89 Operator: CP

Purpose: To repeat test No. 43, but increase regrind time to 30 minutes.

Procedure: As for test No. 43.

Feed: 2000 grams minus 10 mesh G-2 composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		50	20		100			30			
Pb 1st Cleaner				10					1	3	9.6
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner		25			50				1	3	
			5	2.5					1	2	
Pb 3rd Cleaner		25			50				1	2	9.5
			2.5	2.5					1	2	
Pb 4th Cleaner		25		2.5	50				1	3	

Stage		1st	2nd	3rd	4th	
Flotation Cell	NaCN	25	15	15	15	
Speed: r.p.m.		15	10	10	10	
% Solids		100	10	10	10	
	Lime	PH 11			10.5	
% –	mesh					

FORM LR6

Test No. 45

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	97.1	4.87	63.90	8.49	85.5	6.6
Pb 4th Cleaner Tail	12.9	0.65	19.70	17.60	3.5	1.8
Pb 3d Cleaner Tail	10.8	0.54	7.12	14.20	1.1	1.2
Pb 2d Cleaner Tail	47.4	2.38	2.52	15.70	1.6	5.9
Pb 1st Cl Scav Conc.	20.7	1.04	1.40	14.90	.4	2.5
Pb 1st cl Scav Tail	226.1	11.35	0.66	11.80	2.1	21.3
Pb Rougher Tail	1577.4	79.17	0.27	4.81	5.9	60.6
Head Calc.	1992.4	100.00	3.64	6.28	100.0	100.0

Combined Products

Products 1+2		5.52	58.72	9.6	89.0	8.4
Products 1to3		6.06	54.10	10.0	90.0	9.6
Products 1to4		8.44	39.57	11.6	91.7	15.6
Products1to5		9.48	35.38	12.0	92.1	18.0
Products 1to6		20.83	16.47	11.9	94.1	39.4

Product: Combined Cleaner Product Test No: 45 SG -4.22

Mesh	Weight	% Weight		
	Grams	Ind.	Cum.	Passing
26.0µ	0.59	1.2	1.2	98.8
20.2	2.85	5.7	6.9	93.1
14.1	8.82	17.6	24.5	75.5
9.6	11.11	22.2	46.7	53.3
7.5	5.45	10.9	57.6	42.4
-7.5	21.18	42.4	100.0	-

LAKEFIELD RESEARCH

Test No.: 46 Project No.: 3733 Date: 14 July 89 Operator: CP

Purpose: To repeat test No. 43, but increase regrind time to 40 minutes.

Procedure:
As for test No. 43

Feed: 2000 grams minus 10 mesh G-2 composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		50	20		100			40			
Pb-1st Cleaner				10					1	3	9.5
			5	5					1	3	
Pb-1st Cl. Scav.			5	2.5					1	2	
Pb-2nd Cleaner		25			50				1	3	
			5	2.5					1	2	
Pb-3rd Cleaner		25			50				1	2	9.4
			2.5	2.5					1	2	
Pb 4th Cleaner		25		2.5	50				1	3	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% — mesh					

Test No. 46

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	89.3	4.47	68.00	7.03	83.7	5.1
Pb 4th Cleaner Tail	13.5	0.68	27.40	17.00	5.1	1.9
Pb 3d Cleaner Tail	12.0	0.60	8.15	15.60	1.3	1.5
Pb 2d Cleaner Tail	48.7	2.44	2.51	15.60	1.7	6.2
Pb 1st Cl Scav Conc.	15.8	0.79	1.59	15.70	.3	2.0
Pb 1st cl Scav Tail	271.2	13.58	0.50	11.80	1.9	26.1
Pb Rougher Tail	1547.0	77.45	0.28	4.54	6.0	57.2
Head Calc.	1997.5	100.00	3.63	6.15	100.0	100.0

Combined Products

Products 1+2		5.15	62.67	8.3	88.8	7.0
Products 1to3		5.75	56.97	9.1	90.1	8.5
Products 1to4		8.19	40.75	11.0	91.8	14.7
Products1to5		8.98	37.30	11.4	92.2	16.7
Products 1to6		22.55	15.15	11.7	94.0	42.8

Product: Combined Cleaner Product Test No: 46 SG -4.18

Mesh	Weight	% Weight		
	Grams	Ind.	Cum.	Passing
26.0μ	0.57	1.1	1.1	98.9
20.2	2.65	5.3	6.4	93.6
14.1	7.81	15.6	22.1	77.9
9.6	10.81	21.6	43.7	56.3
7.5	5.60	11.2	54.9	45.1
-7.5	22.56	45.1	100.0	-
Total	50.00	100.0	-	-

LAKEFIELD RESEARCH

Test No.: 47 Project No.: 3733 Date: 18 July 89 Operator: CP

Purpose: To repeat test No. 45, but decrease NaCN additions to the regrind and cleaners.

Procedure:

As for test No. 43.

Feed: 2000 grams minus 10 mesh G-2 composite.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		25	20		100			30			
Pb 1st Cleaner				10						3	9.4
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner		15			50				1	3	9.4
			5	2.5					1	2	
Pb 3rd Cleaner		15			50				1	2	
			2.5	2.5					1	2	
Pb 4th Cleaner		15		2.5	50				1	3	9.3

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 47

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	101.5	5.08	62.20	8.77	86.9	7.1
Pb 4th Cleaner Tail	12.9	0.65	16.30	19.80	2.9	2.0
Pb 3d Cleaner Tail	15.5	0.78	6.36	15.20	1.4	1.9
Pb 2d Cleaner Tail	51.3	2.57	2.10	15.00	1.5	6.1
Pb 1st Cl Scav Conc.	11.5	0.58	1.67	14.40	.3	1.3
Pb 1st cl Scav Tail	283.8	14.22	0.53	11.00	2.1	24.7
Pb Rougher Tail	1519.7	76.13	0.24	4.73	5.0	56.9
Head Calc.	1996.2	100.00	3.64	6.33	100.0	100.0

Combined Products

Products 1+2		5.73	57.02	10.0	89.8	9.1
Products 1to3		6.51	50.98	10.6	91.2	10.9
Products 1to4		9.08	37.14	11.9	92.6	17.0
Products1to5		9.65	35.02	12.0	92.9	18.3
Products 1to6		23.87	14.48	11.4	95.0	43.1

LAKEFIELD RESEARCH

Test No.: 48 Project No.: 3733 Date: 18 July 89 Operator: CP

Purpose: To repeat tests No. 45 and 47, but further decrease the NaCN additions to the regrind and cleaners.

Procedure: As for test No. 43

Feed: 2000 grams minus 10 mesh G-2 composite,

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.1
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		15	20		100			30			
Pb 1st Cleaner				10					1	3	
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner		10			50				1	3	
			5	2.5					1	2	
Pb 3rd Cleaner		10			50				1	2	
			2.5	2.5					1	2	
Pb 4th Cleaner		10		2.5	50				1	3	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 48

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	102.4	5.11	61.70	8.39	88.6	7.0
Pb 4th Cleaner Tail	11.3	0.56	14.40	17.80	2.3	1.6
Pb 3d Cleaner Tail	12.5	0.62	5.20	15.50	.9	1.6
Pb 2d Cleaner Tail	59.5	2.97	2.04	14.30	1.7	6.9
Pb 1st Cl Scav Conc.	19.8	0.99	1.33	13.40	.4	2.2
Pb 1st cl Scav Tail	265.0	13.24	0.44	10.80	1.6	23.2
Pb Rougher Tail	1531.5	76.50	0.21	4.64	4.5	57.6
Head Calc.	2002.0	100.00	3.56	6.16	100.0	100.0

Combined Products

Products 1+2		5.68	57.00	9.3	90.9	8.6
Products 1to3		6.30	51.87	9.9	91.8	10.2
Products 1to4		9.28	35.90	11.3	93.5	17.1
Products1to5		10.26	32.57	11.5	93.9	19.2
Products 1to6		23.50	14.47	11.1	95.5	42.4

LAKEFIELD RESEARCH

Test No.: 49 Project No.: 3733 Date: 19 July 89 Operator: CP

Purpose: To repeat tests 46 to 48 but increase NaCN addition to the regrind only.

Procedure:

As for test No. 43.

Feed: 2000 grams minus 10 mesh G-2 composite.

Grind: 30 minutes at 65% solids in the lab. rod mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 3418A	MIBC	Na_2SiO_3			GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		100	20		100			30			
Pb 1st Cleaner				10					1	3	9.6
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner		10			50				1	3	
			5	2.5					1	2	
Pb 3rd Cleaner		10			50				1	2	
			2.5	2.5					1	2	
Pb 4th Cleaner		10		2.5	50				1	3	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% — mesh					

Test No. 49

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	93.7	4.69	65.00	7.86	86.1	6.0
Pb 4th Cleaner Tail	12.3	0.62	20.40	18.10	3.5	1.8
Pb 3d Cleaner Tail	10.9	0.55	7.72	17.00	1.2	1.5
Pb 2d Cleaner Tail	48.3	2.42	2.73	15.60	1.9	6.2
Pb 1st Cl Scav Conc.	18.4	0.92	1.52	15.50	.4	2.3
Pb 1st cl Scav Tail	281.9	14.10	0.47	11.30	1.9	26.1
Pb Rougher Tail	1533.2	76.71	0.23	4.46	5.0	56.0
Head Calc.	1998.7	100.00	3.54	6.11	100.0	100.0

Combined Products

Products 1+2		5.30	59.82	9.0	89.7	7.9
Products 1to3		5.85	54.97	9.8	90.9	9.4
Products 1to4		8.27	39.69	11.5	92.7	15.5
Products1to5		9.19	35.87	11.9	93.1	17.9
Products 1to6		23.29	14.43	11.5	95.0	44.0

Test No. 3

Product	Weight		Assay, %, g/t				% Distribution			
	g	%	Pb	Zn	Au	Ag	Pb	Zn	Au	Ag
1. Pb Rougher. Conc.1	182.5	9.17	33.8	13.6	2.21	811.4	83.5	19.4	32.1	63.4
2. Pb Rougher. Conc.2	60.1	3.02	8.04	15.0	0.99	794.2	6.5	7.1	4.7	20.4
3. Pb Rougher. Conc.3	33.5	1.68	3.47	11.7	3.29	78.4	1.6	3.1	8.8	1.1
4. Pb Rougher. Conc.4	13.4	0.67	2.56	10.6	1.73	65.1	0.5	1.1	1.8	.4
5. Zn Rougher. Conc.1	165.7	8.33	0.56	42.0	0.67	42.4	1.3	54.5	8.8	3.0
6. Zn Rougher. Conc.2	108.8	5.47	0.68	7.79	2.05	31.3	1.0	6.6	17.7	1.5
7. Zn Rougher. Conc.3	145.3	7.30	0.76	2.06	1.11	35.7	1.5	2.3	12.8	2.2
8. Zn Rougher.Tail	1280.4	64.35	0.24	0.59	0.13	14.5	4.2	5.9	13.2	8.0
Head Calc.	1989.7	100.00	3.71	6.42	0.63	117.35	100.0	100.0	100.0	100.0

Combined Products

Products 1+2		12.19	27.4	13.9	1.91	807.1	90.0	26.5	36.8	83.9
Products 1-3		13.88	24.5	13.7	2.08	718.7	91.6	29.5	45.6	85.0
Products 1-4		14.55	23.5	13.5	2.06	688.5	92.1	30.7	47.4	85.4
Products 5+6		13.80	0.6	28.4	1.22	38.0	2.3	61.1	26.6	4.5
Products 5-7		21.10	0.7	19.3	1.18	37.2	3.8	63.4	39.4	6.7
Products 5-8		85.45	.34	5.21	0.39	20.1	7.9	69.3	52.6	14.6

Test No. 7

Product	Weight		Assay, %, g/t				% Distribution			
	g	%	Pb	Zn	Au	Ag	Pb	Zn	Au	Ag
1. Pb Rougher. Conc.1	164	8.21	38.3	11.5	3.14	548.9	84.7	14.8	39.1	71.1
2. Pb Rougher. Conc.2	63.3	3.17	9.46	15.4	2.57	216.0	8.1	7.7	12.3	10.8
3. Pb Rougher. Conc.3	56.4	2.82	2.03	7.0	1.52	60.1	1.5	3.1	6.5	2.7
4. Pb Rougher. Conc.4	40.0	2.00	1.14	5.1	1.06	40.7	0.6	1.6	3.2	1.3
5. Zn Rougher. Conc.1	172.8	8.65	0.33	41.9	0.34	32.8	0.8	56.9	4.5	4.5
6. Zn Rougher. Conc.2	49.7	2.49	0.52	21	1.38	36.3	0.3	8.2	5.2	1.4
7. Zn Rougher. Conc.3	45.1	2.26	0.81	4.78	5.42	33.6	.5	1.7	18.5	1.2
8. Zn Rougher.Tail	1406	70.40	0.18	0.55	0.10	6.3	3.4	6.1	10.7	7.0
Head Calc.	1997.3	100.00	3.71	6.37	0.66	63.36	100.0	100.0	100.0	100.0

Combined Products

Products 1+2		11.38	30.3	12.6	2.98	456.2	92.8	22.5	51.4	81.9
Products 1-3		14.20	24.7	11.5	2.69	377.4	94.4	25.6	57.9	84.6
Products 1-4		16.21	21.7	10.7	2.49	335.8	95.0	27.2	61.1	85.9
Products 5+6		11.14	0.4	37.2	0.57	33.6	1.1	65.1	9.7	5.9
Products 5-7		13.40	0.4	31.8	1.39	33.6	1.6	66.8	28.2	7.1
Products 5-8		83.79	.22	5.54	0.31	10.7	5.0	72.8	38.9	14.1

Test No. 33

Product	Weight		Assay,%, g/t				% Distribution			
	g	%	Pb	Zn	Au	Ag	Pb	Zn	Au	Ag
1. Pb Rougher. Conc.1	349.3	17.57	18.8	11.3	2.51	282.5	88.6	30.9	60.7	79.9
2. Pb Rougher. Conc.2	185	9.31	1.94	8.1	1.13	47.3	4.8	11.7	14.5	7.1
3. Pb Rougher. Conc.3	124.6	6.27	0.92	6.4	1.14	30.8	1.5	6.2	9.8	3.1
4. Pb Rougher. Conc.4	41.8	2.10	0.81	7.5	0.57	27.5	0.5	2.5	1.6	.9
5. Zn Rougher. Conc.1	249.9	12.57	0.46	22.5	0.57	26.6	1.6	44.0	9.9	5.4
6. Zn Rougher. Conc.2	63.2	3.18	0.49	1.63	0.23	16.2	0.4	.8	1.0	.8
7. Zn Rougher. Conc.3	40.5	2.04	0.42	1.02	0.21	15.1	.2	.3	.6	.5
8. Zn Rougher.Tail	933.7	46.97	0.19	0.48	0.03	3.0	2.4	3.5	1.9	2.3
Head Calc.	1988	100.00	3.73	6.42	0.73	62.12	100.0	100.0	100.0	100.0

Combined Products

Products 1+2		26.88	13.0	10.2	2.03	201.1	93.4	42.6	75.1	87.0
Products 1-3		33.14	10.7	9.5	1.86	168.9	95.0	48.9	85.0	90.1
Products 1-4		35.25	10.1	9.4	1.79	160.4	95.4	51.3	86.6	91.0
Products 5+6		15.75	0.5	18.3	0.50	24.5	2.0	44.8	10.9	6.2
Products 5-7		17.79	0.5	16.3	0.47	23.4	2.2	45.2	11.5	6.7
Products 5-8		64.75	.26	4.83	0.15	8.6	4.6	48.7	13.4	9.0

Test No. 43

Product	Weight		Assay %, g/t				% Distribution			
	g	%	Pb	Ag	Au	Zn	Pb	Ag	Au	Zn
1. Pb Cleaner Conc.	143.2	7.22	44.40	619.8	5.08	14.40	86.7	65.5	48.6	16.6
Pb 4th Cleaner Tail	15.3	0.77	13.90	219.1	1.80	15.50	2.9	2.5	1.8	1.9
Pb 3rd Cleaner Tail	9.6	0.48	4.72	85.9	1.75	9.46	.6	.6	1.1	.7
Pb 2nd Cleaner Tail	46.8	2.36	2.83	60.1	1.10	12.60	1.8	2.1	3.4	4.7
Pb 1st Cl Scav Conc.	14.2	0.72	2.59	70.5	1.29	14.50	.5	.7	1.2	1.7
Pb 1st cl Scav Tail	208.4	10.50	0.57	26.1	0.77	11.20	1.6	4.0	10.7	18.7
Pb Rougher Tail	1547.0	77.95	0.28	21.5	0.32	4.48	5.9	24.6	33.1	55.7
Head Calc.	1984.5	100.00	3.70	68.3	0.75	6.27	100.0	100.0	100.0	100.0

Combined Products

Products 1+2		7.99	41.46	581.1	4.76	14.5	89.6	68.0	50.4	18.5
Products 1to3		8.47	39.36	552.8	4.59	14.2	90.2	68.6	51.6	19.2
Products 1to4		10.83	31.40	445.5	3.83	13.9	92.0	70.7	55.0	23.9
Products1to5		11.54	29.62	422.3	3.67	13.9	92.5	71.4	56.2	25.6
Products 1to6		22.05	15.78	233.6	2.29	12.6	94.1	75.4	66.9	44.3

LAKEFIELD RESEARCH

Test No.: 50 Project No.: 3733 Date: 19 July 89 Operator: CP

Purpose: To investigate the effect of replacing NaCN with lime in the regrind and cleaners.

Procedure:
As for test No. 45.

Feed: 2000 grams minus 10 mesh Composite G-2

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	$Ca(OH)_2$	Na_2SiO_3		GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind			20		500	100		30			
Pb 1st Cleaner				15					1	3	11.1
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner					50	50			1	3	10.5
			5	2.5					1	2	
Pb 3rd Cleaner					25	50			1	2	10.5
			2.5	2.5					1	2	
Pb 4th Cleaner			2.5	2.5	20	50			1	3	10.5

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 50

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	56.4	2.83	62.80	7.71	50.8	3.6
Pb 4th Cleaner Tail	15.8	0.79	41.10	11.60	9.3	1.5
Pb 3d Cleaner Tail	20.3	1.02	29.20	12.40	8.5	2.1
Pb 2d Cleaner Tail	73.9	3.70	14.40	12.10	15.3	7.3
Pb 1st Cl Scav Conc.	34.5	1.73	6.35	14.40	3.1	4.1
Pb 1st cl Scav Tail	274.2	13.74	1.97	11.30	7.7	25.3
Pb Rougher Tail	1520.0	76.19	0.24	4.52	5.2	56.2
Head Calc.	1995.1	100.00	3.49	6.13	100.0	100.0

Combined Products

Products 1+2		3.62	58.05	8.6	60.1	5.1
Products 1to3		4.64	51.72	9.4	68.6	7.1
Products 1to4		8.34	35.15	10.6	83.9	14.4
Products1to5		10.07	30.20	11.3	87.0	18.5
Products 1to6		23.81	13.91	11.3	94.8	43.8

LAKEFIELD RESEARCH

Test No.: 51 Project No.: 3733 Date: 20 July 89 Operator: CP

Purpose: To repeat test No. 50, but reduce lime addition to the regrind.

Procedure:

As for test No. 43.

Feed: 2000 grams minus 10 mesh Composite G-2

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	$Ca(OH)_2$	Na_2SiO_3		GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind			20		250	100		30			
Pb 1st Cleaner				5					1	3	10.1
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner					70	50			1	3	10.5
			5	2.5					1	2	
Pb 3rd Cleaner					25	50			1	2	10.5
			2.5	2.5					1	2	
Pb 4th Cleaner			2.5	2.5	20	50			1	3	10.5

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 51

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	95.9	4.81	59.90	8.48	80.5	6.7
Pb 4th Cleaner Tail	12.7	0.64	17.10	17.30	3.0	1.8
Pb 3d Cleaner Tail	15.4	0.77	11.40	16.00	2.5	2.0
Pb 2d Cleaner Tail	56.8	2.85	5.58	14.30	4.4	6.6
Pb 1st Cl Scav Conc.	36.1	1.81	2.24	14.70	1.1	4.3
Pb 1st cl Scav Tail	230.8	11.57	0.85	10.40	2.8	19.6
Pb Rougher Tail	1547.1	77.56	0.26	4.65	5.6	58.9
Head Calc.	1994.8	100.00	3.58	6.12	100.0	100.0

Combined Products

Products 1+2		5.44	54.89	9.5	83.6	8.5
Products 1to3		6.22	49.49	10.3	86.0	10.5
Products 1to4		9.06	35.70	11.6	90.5	17.1
Products1to5		10.87	30.13	12.1	91.6	21.5
Products 1to6		22.44	15.03	11.2	94.4	41.1

LAKEFIELD RESEARCH

Test No.: 52 Project No.: 3733 Date: 20 July 89 Operator: CP

Purpose: To investigate the effect of replacing NaCN with Thiourea Complex in the Pb regrind and cleaners.

Procedure:

As for test No. 43

Feed: 2000 grams minus 10 mesh Composite G-2.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	NaCN	A317 / 3418A	MIBC	Thiour. Complex	Na_2SiO_3		GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind			20		25	100		30			
Pb 1st Cleaner				10					1	3	9.3
			5	2.5					1	3	
Pb 1st Cl. Scav.			5	2.5					1	2	
Pb 2nd Cleaner					15	50			1	3	9.2
			5	2.5					1	2	
Pb 3rd Cleaner					15	50			1	2	
			2.5	2.5					1	2	
Pb 4th Cleaner				2.5	15	50			1	3	9.1

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 52

Product		Weight	Assay,%,		% Distribution	
	g	%	Pb	Zn	Pb	Zn
Pb 4th Cleaner Conc.	100.5	5.03	63.20	7.98	87.5	6.7
Pb 4th Cleaner Tail	11.4	0.57	15.60	17.40	2.4	1.6
Pb 3d Cleaner Tail	18.2	0.91	5.50	17.30	1.4	2.6
Pb 2d Cleaner Tail	52.7	2.64	1.83	14.70	1.3	6.4
Pb 1st Cl Scav Conc.	17.7	0.89	1.22	13.50	.3	2.0
Pb 1st cl Scav Tail	262.3	13.12	0.44	10.70	1.6	23.3
Pb Rougher Tail	1536.5	76.85	0.26	4.50	5.5	57.4
Head Calc.	1999.3	100.00	3.63	6.03	100.0	100.0

Combined Products

Products 1+2		5.60	58.35	8.9	89.9	8.3
Products 1to3		6.51	50.96	10.1	91.3	10.9
Products 1to4		9.14	36.79	11.4	92.6	17.3
Products1to5		10.03	33.65	11.6	92.9	19.3
Products 1to6		23.15	14.83	11.1	94.5	42.6

LAKEFIELD RESEARCH

Test No.: 55 Project No.: 3733 Date: 25 July 89 Operator: CP

Purpose: The first of a series of tests on the mine circuit to investigate the effect of varying the CuSO4 addition

Procedure:

Grind and float a lead rougher concentrate. Regrind the lead concentrate and clean once. Combine the lead rougher and 1st cleaner tailings, condition and float three Zn rougher cones.

Feed: 2000 grams minus 10 mesh Composite G-2.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thiocarb. Complex	#317 3418A	MIBC	Na_2SiO_3	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Rougher			40	10					1	2	9.9
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Cone. Regrind		50	20		100			30			
Pb 1st Cleaner				10					1	3	9.4
			5	2.5					1	3	
			5	2.5					1	2	
Combine Pb rougher and 1st cleaner tailings											
			A350	DF1012							
Condition						2000			5		
							600		5		
Zn Ro. Cone. 1			30	10					1	2	11.7
Zn Ro. Cone. 2				5					1	2	
Zn Ro. Cone. 3			10						1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 55

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb 1st Cl. Conc.	181.3	9.02	38.0	11.7	93.1	17.2
2. Zn Rougher. Conc.1	212.9	10.60	0.37	40.3	1.1	69.5
3. Zn Rougher. Conc.2	99.6	4.96	0.62	7.95	0.8	6.4
4. Zn Rougher. Conc.3	95.3	4.74	0.64	2.13	0.8	1.6
5. Zn Rougher.Tail	1420	70.68	0.22	0.46	4.2	5.3
Head Calc.	2009.1	100.00	3.68	6.15	100.0	100.0

Combined Products

Products 1		9.02	38.0	11.7	93.1	17.2
Products 2 + 3		15.55	0.45	30.0	1.9	75.9
Products 2 to 4		20.30	0.49	23.5	2.7	77.5
Products 2 to 5		90.98	0.28	5.60	6.9	82.8

LAKEFIELD RESEARCH

Test No.: 56 Project No.: 3733 Date: 25 July 89 Operator: CP

Purpose: To repeat test No. 55, but increase $CuSO_4$ addition to 800 g/t.

Procedure: As for test No. 55.

Feed: 2000 grams minus 10 mesh Composite G-2.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thiosn. Complex	A317 3418A	MIBC	Na_2SiO_3	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Primary Grind	1500	150						30			
Pb Roughers			40	10					1	2	10.0
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		50	20		100			30			
Pb 1st Cleaner				10					1	3	9.5
			5	2.5					1	3	
			5	2.5					1	2	
Combine Pb roughers and 1st Cleaner tailings											
	V		A350	DF1012			/				
Condition						2000			5		
							800		5		11.6
Zn Ro. Conc. 1			30	10					1	2	
Zn Ro. Conc. 2				5					1	2	
Zn Ro. Conc. 3			10						1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No. 56

Product	Weight		Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb 1st Cl. Conc.	184	9.15	36.4	11.3	92.8	16.9
2. Zn Rougher. Conc.1	240.1	11.93	0.38	36.5	1.3	71.2
3. Zn Rougher. Conc.2	91.1	4.53	0.66	6.71	0.8	5.0
4. Zn Rougher. Conc.3	98.6	4.90	0.6	1.83	0.8	1.5
5. Zn Rougher.Tail	1398	69.49	0.22	0.48	4.3	5.5
Head Calc.	2011.8	100.00	3.59	6.12	100.0	100.0

Combined Products

Products 1		9.15	36.4	11.3	92.8	16.9
Products 2 + 3		16.46	0.46	28.3	2.1	76.2
Products 2 to 4		21.36	0.49	22.2	2.9	77.7
Products 2 to 5		90.85	0.28	5.59	7.2	83.1

LAKEFIELD RESEARCH

Test No.: 57 Project No.: 3733 Date: 26 July 89 Operator: CP

Purpose: To repeat test No. 55, but increase $CuSO_4$ addition to 1000 g/t.

Procedure: As for test No. 55

Feed: 2000 grams minus 10 mesh Composite G-2.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thiom. Complex	A317 / 3418A	MIBC	Na_2SiO_3	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	9.9
–				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		50	20		100			30			
Pb 1st Cleaner				10					1	3	9.5
–			5	2.5					1	3	
			5	2.5					1	2	
Combine Pb roughers and 1st cleaner tailings											
			A350	DF1012							
Condition						2000			5		
			–				1000		5		11.5
Zn Ro. Conc. 1			30	10					1	2	
Zn Ro. Conc. 2				5					1	2	
Zn Ro. Conc. 3			10						1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
% – mesh					

Test No.57

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb 1st Cl. Conc.	186.3	9.27	37.1	11.4	93.4	17.3
2. Zn Rougher. Conc.1	232.6	11.57	0.38	36.3	1.2	68.9
3. Zn Rougher. Conc.2	104	5.17	0.6	7.96	0.8	6.8
4. Zn Rougher. Conc.3	104.5	5.20	0.58	1.92	0.8	1.6
5. Zn Rougher.Tail	1383.3	68.80	0.20	0.47	3.7	5.3
Head Calc.	2010.7	100.00	3.68	6.09	100.0	100.0

Combined Products

Products 1		9.27	37.1	11.4	93.4	17.3
Products 2 + 3		16.74	0.45	27.5	2.0	75.7
Products 2 to 4		21.94	0.48	21.5	2.9	77.3
Products 2 to 5		90.73	0.27	5.55	6.6	82.7

77
17
94

LAKEFIELD RESEARCH

Test No.: 58 Project No.: 3733 Date: 26 July 89 Operator: CP

Purpose: To repeat test No. 55, but increase $CuSO_4$ addition to 1200 g/t.

Procedure:

As for test No. 55.

Feed: 2000 grams minus 10 mesh Composite G-2.

Grind: 30 minutes at 65% solids in the lab. ball mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	Thiocarb. Complex	A317 / 3418A	MIBC	Na_2SiO_3	$Ca(OH)_2$	$CuSO_4$	GRIND	COND.	FROTH	pH
Primary Grind	1500	150	8					30			
Pb Roughers			40	10					1	2	9.9
				5					1	3	
			20	5					1	3	
				5					1	2	
Pb Conc. Regrind		50	20		100			30			
Pb 1st Cleaner				10					1	3	9.4
			5	2.5					1	3	
			5	2.5					1	2	
Combine Pb roughers and 1st cleaner tailings											
			A350	DF1012							
Condition						2000			5		
							1200		5		11.4
Zn Ro. Conc. 1			30	10					1	2	
Zn Ro. Conc. 2				5					1	2	
Zn Ro. Conc. 3			10						1	2	

Stage					
Flotation Cell					
Speed: r.p.m.					
% Solids					
⅛ — mesh					

Test No. 58

Product		Weight	Assay, % g/t		% Distribution	
	g	%	Pb	Zn	Pb	Zn
1. Pb 1st Cl. Conc.	193.8	9.65	35.0	11.5	93.1	18.0
2. Zn Rougher. Conc.1	242.1	12.05	0.37	35.8	1.2	69.9
3. Zn Rougher. Conc.2	127.4	6.34	0.53	5.68	0.9	5.8
4. Zn Rougher. Conc.3	116.1	5.78	0.54	1.54	0.9	1.4
5. Zn Rougher.Tail	1329.7	66.18	0.21	0.45	3.8	4.8
Head Calc.	2009.1	100.00	3.62	6.17	100.0	100.0

Combined Products

Products 1		9.65	35.0	11.5	93.1	18.0
Products 2 + 3		18.39	0.43	25.4	2.2	75.8
Products 2 to 4		24.17	0.45	19.7	3.0	77.2
Products 2 to 5		90.35	0.27	5.60	6.9	82.0

Test No. 45

Product	Weight		Assay %, g/t				% Distribution			
	g	%	Pb	Ag	Au	Zn	Pb	Ag	Au	Zn
1. Pb Cleaner Conc.	97.1	4.87	63.90	570.9	5.73	8.49	85.5	65.2	41.1	6.6
Pb 4th Cleaner Tail	12.9	0.65	19.70	198.8	1.78	17.60	3.5	3.0	1.7	1.8
Pb 3rd Cleaner Tail	10.8	0.54	7.12	136.9	1.87	14.20	1.1	1.7	1.5	1.2
Pb 2nd Cleaner Tail	47.4	2.38	2.52	60.4	1.24	15.70	1.6	3.4	4.3	5.9
Pb 1st Cl Scav Conc.	20.7	1.04	1.40	50.1	1.44	14.90	.4	1.2	2.2	2.5
Pb 1st cl Scav Tail	226.1	11.35	0.66	26.6	0.85	11.80	2.1	7.1	14.2	21.3
Pb Rougher Tail	1577.4	79.17	0.27	9.9	0.30	4.81	5.9	18.4	35.0	60.6
Head Calc.	1992.4	100.00	3.64	42.7	0.68	6.28	100.0	100.0	100.0	100.0

Combined Products

Products 1+2		5.52	58.72	527.3	5.27	9.6	89.0	68.2	42.8	8.4
Products 1to3		6.06	54.10	492.4	4.96	10.0	90.0	70.0	44.3	9.6
Products 1to4		8.44	39.57	370.6	3.91	11.6	91.7	73.3	48.6	15.6
Products1to5		9.48	35.38	335.5	3.64	12.0	92.1	74.6	50.8	18.0
Products 1to6		20.83	16.47	167.2	2.12	11.9	94.1	81.6	65.0	39.4

3733

1073

BOND BALL MILL CLOSED CIRCUIT GRINDABILITY TEST

Sample: Comp G-2 -10m Date: JUNE 9/89

Submitted by: _____

Mesh of Grind: 150 Mesh Feed: 18.8 % Passing 150 Mesh

Cycle	New Feed g	Number of Revolutions	grams of minus _____ mesh			
			In Mill Product	In Mill Feed	Net Product	Net Per Revolution
(1)	1482	150	465	279	186	1.24
(2)	465	250	484	87	397	1.59
(3)	484	209	409	91	318	1.52
(4)	409	228	428	77	351	1.54
(5)	428	223	427	80	347	1.56
(6)	427	220	429	80	349	1.59
(7)	429	215	409	81	328	1.53

Unit Volume (700 ml) = 1482 g in mill : Equivalent to 2117 kg/m³ at minus 10 mesh

Ideal potential product = 423 g

Average of last 3 periods : 422 g : 251 % circulating load

: 1.56 Net g minus 150 mesh per revolution

Bonds Formula

$$W_i = 44.5 / (P_1)^{0.23} \times (Gbp)^{0.82} \left(\frac{10}{\sqrt{P}} - \frac{10}{\sqrt{F}} \right)$$

Where:

W_i = Work Index = 12.8

P_1 = Screen size test in microns = 104

Gbp = Net grams of undersize produced per revolution of test mill = 1.56

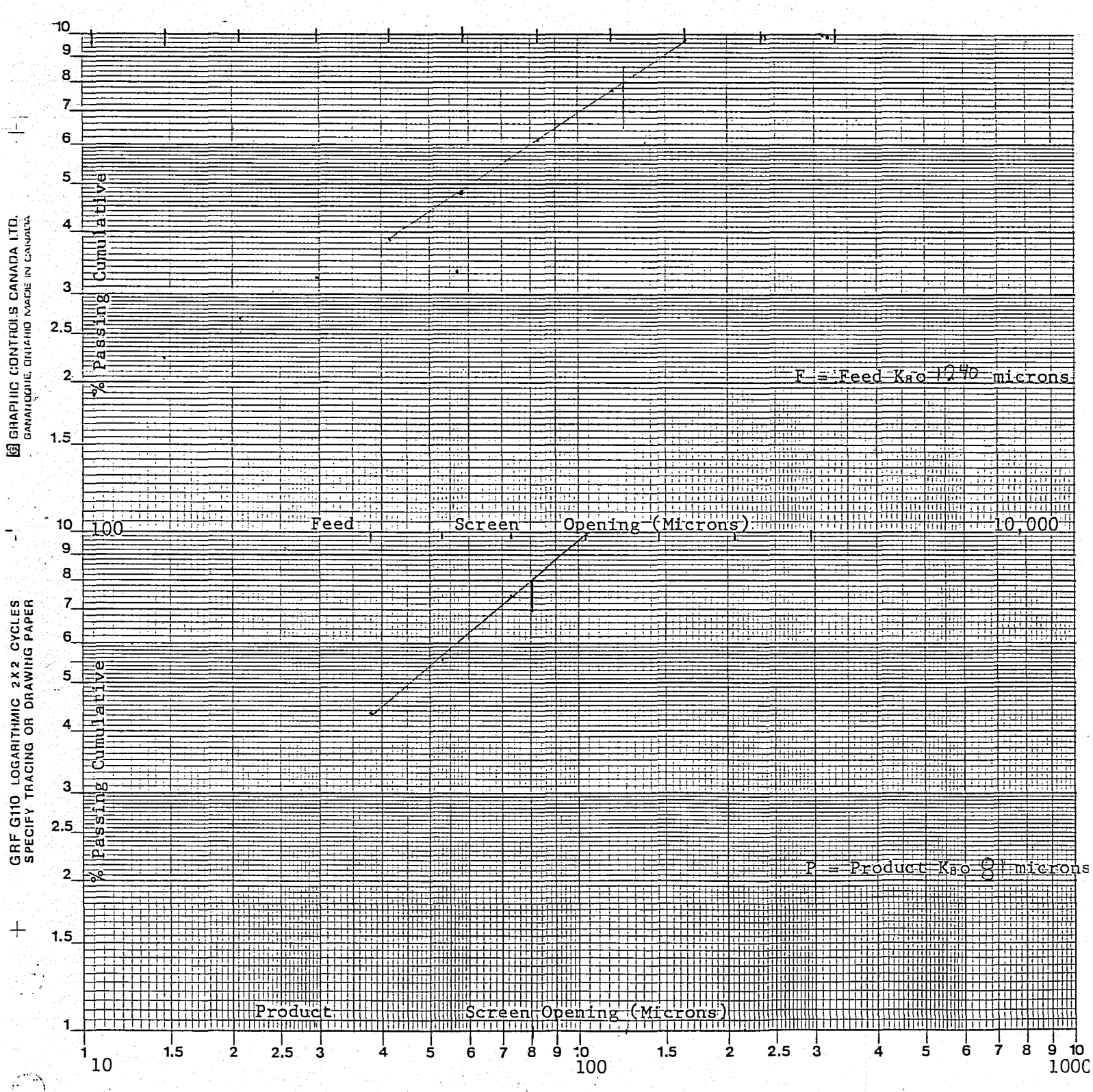
P = Size in microns which 80 percent of test product passes = 81

F = Size in microns which 80 percent of test feed passes = 1240

Project No. 3733 Date June 9/89

Screen Size Analysis for Bond Work Index

Feed of Sample: Comp G-2 -10m
(BWI 150m)



GRAPHIC CONTROLS CANADA LTD. GANANOQUE, ONTARIO MADE IN CANADA

GRF G110 LOGARITHMIC 2X2 CYCLES SPECIFY TRACING OR DRAWING PAPER

LAKEFIELD RESEARCH

SCREEN ANALYSIS RECORD

Operator RORY CUMMINGS **Project No.** 3733 **Date** JUNE 9/89

BWI — Comp G-2 -10m

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10	13.3	2.8	2.8	97.2	10				
1168	14	94.7	19.8	22.6	77.4	14				
833	20	77.0	16.1	38.7	61.3	20				
589	28	63.5	13.3	52.0	48.0	28				
417	35	44.7	9.3	61.3	38.7	35				
295	48	31.6	6.6	67.9	32.1	48				
208	65	25.0	5.2	73.1	26.9	65				
147	100	21.4	4.5	77.6	22.4	100				
104	150	17.2	3.6	81.2	18.8	150				
74	200	16.6	3.5	84.7	15.3	200				
53	270	14.7	3.1	87.8	12.2	270				
37	400	11.7	2.4	90.2	9.8	400				
	−400	46.8	9.8	100.0	—	−400				
	Total	478.2	100.0	—	—	Total				

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200					200				
53	270					270				
37	400					400				
	−400					−400				
	Total					Total				

LAKEFIELD RESEARCH

SCREEN ANALYSIS RECORD

Operator KENT PERRY Project No. 3733 Date JUNE 12/89

B.W.I. COMP G-2 u/s #5-#7

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150	2.3	1.5	1.5	98.5	150				
74	200	37.2	24.3	25.8	74.2	200				
53	270	28.0	18.3	44.1	55.9	270				
37	400	19.2	12.5	56.6	43.4	400				
	−400	66.4	43.4	100.0	—	−400				
	Total	153.1	100.0			Total				

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200					200				
53	270					270				
37	400					400				
	−400					−400				
	Total					Total				

5733

BOND BALL MILL CLOSED CIRCUIT GRINDABILITY TEST

1046
1064
1059

Sample: Comp G-2 -10m Date: JUNE 9/89

Submitted by: _____

Mesh of Grind: 200 Mesh Feed: 15.3 % Passing 200 Mesh

Cycle	New Feed g	Number of Revolutions	grams of minus ____ mesh			
			In Mill Product	In Mill Feed	Net Product	Net Per Revolution
①	1482	200	457	227	230	1.15
②	457	307	440	70	370	1.21
③	440	294	436	67	369	1.26
4	436	283	418	67	351	1.24
5	418	290	423	64	359	1.24

Unit Volume (700 ml) = 1482 g in mill : Equivalent to 2117 kg/m³ at minus 70 mes

Ideal potential product = 423 g

Average of last 2 periods : 421 g : 252 % circulating load

: 1.24 Net g minus 200 mesh per revolution

Bonds Formula

$$W_i = 44.5 / (P_1)^{0.23} \times (Gbp)^{0.82} \left(\frac{10}{\sqrt{P}} - \frac{10}{\sqrt{F}} \right)$$

Where:

W_i = Work Index = 13.9

P_1 = Screen size test in microns = 74

Gbp = Net grams of undersize produced per revolution of test mill = 1.24

P = Size in microns which 80 percent of test product passes = 61

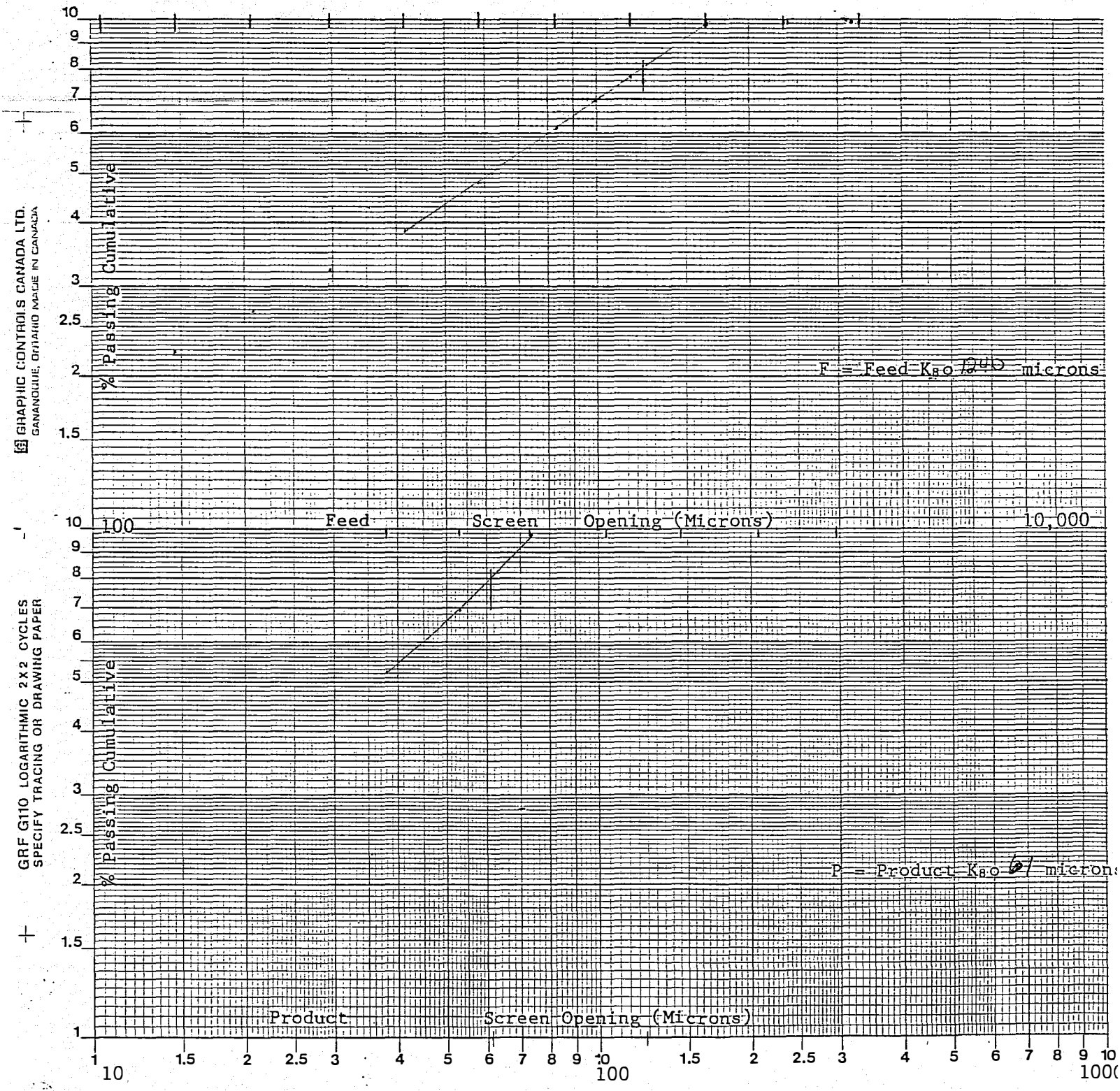
F = Size in microns which 80 percent of test feed passes = 1240

Project No. 3733 Date June 9/89

Screen Size Analysis for Bond Work Index

Feed of Sample: Comp G-2 -10m

(BWI 200m)



GRUM 3733

Composite G-2 -10 Mesh

Bond work index - 150 mesh

200 mesh

45 Gallon Drum Inside

Freezer

LAKEFIELD RESEARCH

SCREEN ANALYSIS RECORD

Operator RORY Cummings Project No. 3733 Date JUNE 9/89

BWI

Comp G-2
-10m

icrons	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
651	10	13.3	2.8	2.8	97.2	10				
168	14	94.7	19.9	22.6	77.4	14				
833	20	77.0	16.1	38.7	61.3	20				
589	28	63.5	13.3	52.0	48.0	28				
417	35	44.7	9.3	61.3	38.7	35				
295	48	31.6	6.6	67.7	32.1	48				
208	65	25.0	5.2	73.1	26.9	65				
147	100	21.4	4.5	77.6	22.4	100				
104	150	17.2	3.6	81.2	18.8	150				
74	200	16.6	3.5	84.7	15.3	200				
53	270	14.7	3.1	87.8	12.2	270				
37	400	11.7	2.4	90.2	9.8	400				
	—400	46.8	9.8	100.0	—	—400				
	Total	478.2	100.0	—	—	Total				

crons	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
651	10					10				
168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200					200				
53	270					270				
37	400					400				
	—400					—400				
	Total					Total				

LAKEFIELD RESEARCH

SCREEN ANALYSIS RECORD

Operator Milonie Burnett **Project No.** 3733 **Date** June 30/89

U/S #45 BWI Comp G-2

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200	6.1	3.3	3.3	96.7	200				
53	270	49.1	27.1	30.4	69.6	270				
37	400	31.5	17.4	47.8	52.2	400				
	−400	94.6	52.2	100.0	—	−400				
	Total	181.3	100.0			Total				

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200					200				
53	270					270				
37	400					400				
	−400					−400				
	Total					Total				

3733

BOND BALL MILL CLOSED CIRCUIT GRINDABILITY TEST

Sample: G-1 Date: JUNE 16/89

Submitted by: _____

Mesh of Grind: -10 Mesh Feed: 20.8% Passing 150 Mesh

Cycle	New Feed g	Number of Revolutions	grams of minus _____ mesh			
			In Mill Product	In Mill Feed	Net Product	Net Per Revolution
1	1490	100	491	310	181	1.81
2	491	179	379	102	277	1.55
3	379	224	431	79	352	1.57
4	431	214	450	90	360	1.68
5	450	198	420	94	326	1.65
6	420	205	435	87	348	1.70

Unit Volume (700 ml) = 1490 g in mill : Equivalent to 2129 kg/m³ at minus 10 mesh

Ideal potential product = 426 g

Average of last 2 periods : 427 g : 249 % circulating load

: 1.68 Net g minus 150 mesh per revolution

Bonds Formula

$$W_i = 44.5 / (P_1)^{0.23} \times (Gbp)^{0.82} \left(\frac{10}{\sqrt{P}} - \frac{10}{\sqrt{F}} \right)$$

Where:

W_i = Work Index = 12.1

P_1 = Screen size test in microns = 104

Gbp = Net grams of undersize produced per revolution of test mill = 1.68

P = Size in microns which 80 percent of test product passes = 80

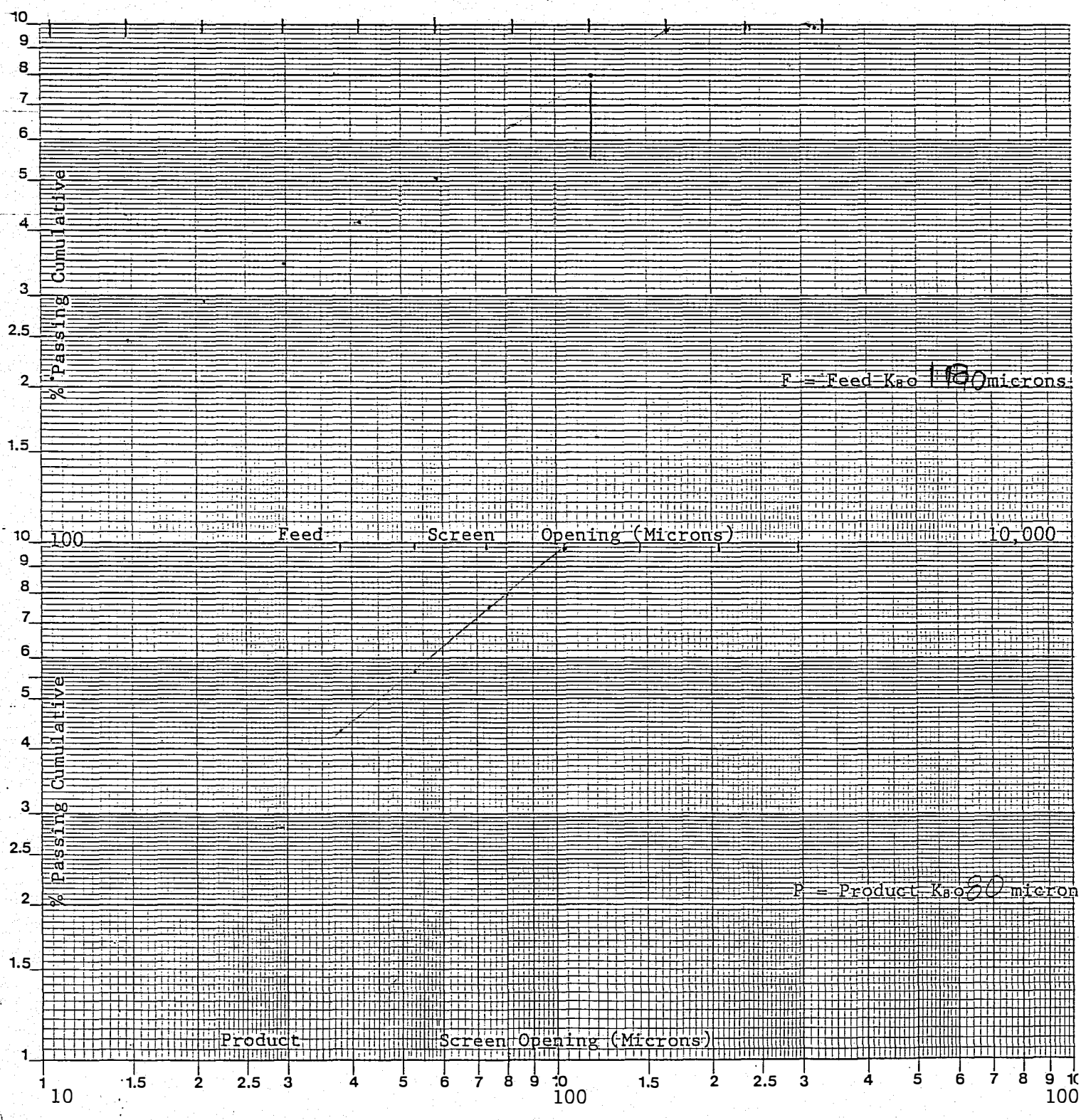
F = Size in microns which 80 percent of test feed passes = 1180

Project No. 3733

Date JUNE 16/89

Screen Size Analysis for Bond Work Index

Feed of Sample: 61



LAKEFIELD RESEARCH

SCREEN ANALYSIS RECORD

Operator KENT PERRY Project No. 3733 Date JUNE 20/89

B.W.I. G-1 150m

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150	3.7	2.7	2.7	97.3	150				
74	200	31.7	22.8	25.5	74.5	200				
53	270	25.3	18.2	43.7	56.3	270				
37	400	18.2	13.1	56.8	43.2	400				
	−400	60.1	43.2	100.0	—	−400				
	Total	139.0	100.0			Total				

Microns	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.	Mesh size (Tyler)	Weight grams	% Retained Ind.	% Retained Cum.	% Pass. Cum.
1651	10					10				
1168	14					14				
833	20					20				
589	28					28				
417	35					35				
295	48					48				
208	65					65				
147	100					100				
104	150					150				
74	200					200				
53	270					270				
37	400					400				
	−400					−400				
	Total					Total				

LAKEFIELD RESEARCH

SCREEN ANALYSIS RECORD SHEET
TYLER STANDARD SCREENS

Operator M. Barnett Date June 16 19 89

Project No.		3733 G1 BWI							
Sample									
Openings			Weight	% Weight			Weight	% Weight		
n.	Mm.	Mesh	Grams	Ind.	Cum.	Passing	Grams	Ind.	Cum.	Passing
050	26.67									
742	18.85									
525	13.33									
371	9.423									
263	6.680	3								
85	4.699	4								
31	3.327	6								
33	2.362	8								
65	1.651	10	10.6	2.0	2.0	98.0				
6	1.168	14	95.3	18.0	20.0	80.0				
28	.833	20	84.8	16.0	36.0	64.0				
32	.589	28	69.4	13.1	49.1	50.9				
54	.417	35	50.1	9.4	58.5	41.5				
6	.295	48	36.3	6.8	65.3	34.7				
2	.208	65	28.5	5.4	70.7	29.3				
3	.147	100	25.0	4.7	75.4	24.6				
1	.104	150	20.0	3.8	79.2	20.8				
1	.074	200	19.2	3.6	82.8	17.2				
	.053	270	17.8	3.4	86.2	13.8				
	.044	400	14.7	2.8	89.0	11.0				
		−400	59.1	11.0	100.0	—				
		Total	530.8	100.0						