S.G. 2.9 & 4.2

$\frac{2.9}{4.2} = 0.69$ $\frac{4.2}{2.9} = 1.45$

620 x 1.45 = 899 TPH

620 x 0.69 = 428 TPH

Godfrey McDonald

006480

Grum Plant Trial Tuesday 1/12/92

Intoduction

1. Trial will be over 24 - 30 hours treating up to 20000 tonnes.

2. The plant will be down Tuesday 1st for normal monthly maintenance.

3. Early start up of the plant at 6 p.m. is presently being planned.

4. Grum ore will be fed at that point to the mill, and on to flotation.

5. During the test samples will be taken to confirm the metallurgy - specifically grades, recoveries, liberation and other effects.

Specifics

1. Shift Foreman N/S to ensure soda ash is used on start up. (Soda ash to the dam is to be discontinued at that time).

2. Samples will be collected only when the circuit is stabilised. Refer to the metallurgists (re stability).

3. Bins are to be run empty approaching the monthly shutdown. As empty as feasible. Only No. 4 bin is to remain filled with the current blend. Action Shift Foreman.

4. During the mill maintenance the bins are to be filled with Grum ore - except No.4 bin. Action Shift Foreman.

5. At start up run only Grum ore, unless directed otherwise by the senior metallurgist on duty. Action Shift Foreman.

6. Sampling campaign will be organised by metallurgists. Labourers and buckers will be trained in specific areas. Separate sheets attached (hand written) give the details. Action, metallurgists.

7. As we are treating Grum ore, we will be using the Grum reagent scheme. Action Shift Foreman. (Refer to metallurgist).

Nov. 25/92

PRE PLANT TEST — ACTIVITIES.

1) Lab Test ore sample — roughing and cleaning.

2) Critique sample streams, locations, timing, manpower

3) Make sure we had an adequate no. of hand sample cutters

4) Mark sample locations

5) Review the reagent scheme

= 6) Zn Rghr cone #3 cell of "K" and "L" Banks must be piped to Pump 3103 (currently "J" Bank Slow, cone and "K" / "L" Bank #3 cell flow in the same pipeline) — Good for operation, no good for sample survey.

7) Sample pails and some rovers

8) Sample Frequency. — ±20 min
— 18 cuts total.

9) ASSAYS — Pb, Zn, Fe, Ag, Au
- Acton 1, 10, 17, 21;
Pb, Zn, Fe, Cu, SiO_2 (10, 15, 16, 19, 20, 27) Ag, Au

MULTI ELEMENT - (10, 21)

10) SIZE ANALYSIS.
-(15 to 39)

11) NIGHT SHIFT -
- Godfrey McDaniel
- Greg Rasmussen
- 2 labours.

DAYSHIFT SHIFT
- Gordon Wilson
- Rick Nakkola
- 1 labourer
- 1 bucker.

Circuit Survey Samples. — Grab Paint Test.

* OSA
B – Basement
U – Up Stair
R – Regrind

S – Short handle
L – Long ✓
"A" – Automatic
M – Marcy Can

Pb Circuit

M U	✓1)	Pb Rougher Feed
S R*	✓2)	Pb Rougher Cone — } Remove Grating.
S R	✓3)	Pb Scavenger Cone — }
M U*	✓4)	Pb Scavenger Tailing — G Bank
M U*		— H Bank
	5)	Pb 1st Cleaner (new) Feed
S U	6)	Pb 1st Cleaner Cone
M U*	7)	Pb 1st Cleaner Tailing
S U	8)	Pb 2nd Cleaner Cone
S U	9)	Pb 3rd Cleaner Cone
S U*	10)	Pb 4th Cleaner Cone
?	11)	Pb 4th Cleaner Tailing
?	12)	Pb 1st Cleaner Scavenger – Rougher Cone – I Bank
S R	13)	Pb 1st Cleaner Scavenger – Scavenger Cone – I Bank
M U	14)	Pb 1st Cleaner Scavenger – Tailing — I Bank

Zn Circuit

S R ?	15)	Zn Rougher Cone – Cells 1 & 2 — Remove Grating
		– Cell 3
S R	16)	Zn Scavenger Cone
M U*	17)	Zn Scavenger Tailing { – K Bank
M U		– L Bank
L B	18)	Zn 1st Cleaner – Rougher Cone
S R		– Scavenger Cone
M U*	19)	Zn 1st Cleaner Tailing.
M U ?	20)	Zn Rougher Columa Cone
M U ?	21)	Zn Scavenger Columa Cone
L U	28)	Zn Scavenger Columa Tailing.
	21)	Zn Thickener Feed

} Same pipeline to Zn Regrind mill

Extra Samples

S R	29)	Pb 1st Stage (Pb Rgh Cone) Regrind Cyclone O'Flow. } density readings also
S R ?	30)	Pb 1st Stage (" " ") Regrind Cyclone U'Flow. } Boxed
S R	31)	Pb 1st Stage (" " ") Regrind Discharge.
S R	32)	Pb 2nd Stage (Pb Scav. Cone) Regrind Cyclone O'Flow } density readings also
S R	33)	Pb 2nd Stage (" " ") Regrind Cyclone U'Flow }
S R	34)	Pb 2nd Stage (" " ") Regrind Discharge
S R	35)	Zn Regrind Cyclone O'Flow } density readings also.
S R	36)	Zn Regrind Cyclone U'Flow }
S R	37)	Zn Regrind Discharge
?	38)	"A" Circuit final grind.
?	39)	"B" Circuit final grind.
U	40)	Mill Feed Sampler. — Shovel

GORDON

GRUM PLANT TRIAL SURVEYS

Pre Plant Test - Activities

		Date Completed
1.	Lab Test ore sample	26-Nov-92
2.	Critique sample streams, location, timing and manpower	26-Nov-92
3.	Make sure adequate number of samplers	29-Nov-92
4.	Mark sample locations	29-Nov-92
5.	Review Reagent Scheme (#1)	25-Nov-92
6.	Sample pails and covers	26/ Nov-92

7. Sample Frequency - 30 minutes
   6 hour total
   12 cuts total

8. Assays
   Pb,Zn,Fe,Ag to be done on all samples
   Au on 1,10 or 11,16A,16B,18A,18B,20,21,22,24
   Cu, SiO2 on 10 or 11,16A,16B,20,21,22
   Multi Element on 10 or 11,24

9. Size Analysis to be done on 16A to 35

10. Remove gratings on:
    - I bank roughers and scavengers on north side.
    - K 3rd rougher south side.
    - 1 3rd rougher north side.
    - J bank roughers and scavengers on south side.
    - Lead rougher regrind discharge.
    - Zinc regrind cyclone feed pumpbox.

11. Buckets to be numbered as per attached list.

12. Personnel to be shown where the sample locations are and how the samples are to be taken.

13. Sample bags to be written up.

Circuit Survey Samples

GRUM PLANT TRIAL SURVEYS

Lead Circuit

		Location
1.	Lead Rougher Feed	Tertiary Cyclone O/F
2.	Lead Rougher Conc	O.S.A.
3.	Lead Scavenger Conc	Feed to Regrind
4A.	Lead Scavenger Tailings G Bank	G Bank Tails Box
4B.	Lead Scavenger Tailings H Bank	H Bank Tails Box
5.	Lead 1st Cleaner New Feed.	Pb 1st Dist. Box
6.	Pb 1st Cleaner Conc	1st Cln Launder
7.	Pb 1st Cleaner Tailings	1st Cln Tails Box
8.	Pb 2nd Cleaner Conc	2nd Cln Launder
9.	Pb 3rd Cleaner Conc	3rd Cln Launder
10.	Pb 4th Cleaner Conc	4th Cln Launder
11.	Pb 5th Cleaner Conc	5th Cln Launder
12.	Pb 5th Cleaner Tailings	Last 5th Cell Dip
13.	Pb 1st Cln Scav-Rgh Conc	Grating
14.	Pb 1st Cln Scav-Scav Conc	Grating
15.	Pb 1st Cln Scav Tailings	I Bank Tails Box

Zinc Circuit

16A.	Zinc Rougher Conc 1&2 Cells	Feed to Regrind
16B.	Zinc Rougher Conc 3rd Cell	Grating
17.	Zinc Scavenger Conc	Feed to Regrind
18A.	Zinc Scavenger Tailings K Bank	K Bank Tails Box
18B.	Zinc Scavenger Tailings L Bank	L Bank Tails Box
19A.	Zinc 1st Cln Rougher Conc	Grating
19B.	Zinc 1st Cln Scavenger Conc	Grating
20.	Zinc 1st Cleaner Tailings	J Bank Tails Box
21.	Zinc Rougher Column Conc	Rgh Column Launder
22.	Zinc Scavenger Column Conc	Scav Column Launder
23.	Zinc Scavenger Column Tails	J Bank Feed End
24.	Zinc Thickener Feed	Zn Thickener

Extra Samples

25.	Pb Rgh Regrind Cyclone O/F	Rgh Cyclone O/F
26.	Pb Rgh Regrind Cyclone U/F	Rgh Cyclone U/F
27.	Pb Rgh Regrind Mill Discharge	Rgh Reg Mill Disch
28.	Pb Scav Regrind Cyclone O/F	Scav Cyclone O/F
29.	Pb Scav Regrind Cyclone U/F	Scav Cyclone U/F
30.	Pb Scav Regrind Mill Dishcarge	Scav Reg Mill Disch
31.	Zn Regrind Cyclone O/F	Zn Cyclone O/F
32.	Zn Regrind Cyclone U/F	Zn Cyclone U/F
33.	Zn Regrind Mill Discharge	Zn Reg Mill Disch
34.	"A" Circuit Final Grind	#4 Cyclopac O/F
35.	"B" Circuit Final Grind	#6 Cyclopac O/F
36.	Mill Feed Sample	#4 Cross Conv Disch

Personnel:

		Duites
Dayshift:	Rick Pakkala	Work with operators
	Mike Byblow	Pb Circuit
	Shane Wilson	Extra Samples
	Shawn Carrick	Zn Circuit
Nightshift:	Godfrey McDonald	Work with operators
	Greg Rasmussen	Zn Circuit
	Jennifer Pelham	Pb Circuit
	Gary Winkell	Extra Samples

Pb Circuit Sample Order

2-5-7-6-8-9-11-12-10-13-14-15-4B-4A-3

Zn Circuit Sample Order

21-22-23-19A-16B-18A-18B-19B-20-24-16A-17

Extra Samples

36-35-1-34-28-29-25-26-31-32-33-27-30

Circuit Survey Samples

GRUM PLANT TRIAL SURVEYS

Lead Circuit

Mike Byblow - Dayshift
Jennifer Pelham - Nightshift

		Location
2.	Lead Rougher Conc	O.S.A.
5.	Lead 1st Cleaner New Feed.	Pb 1st Dist. Box
7.	Pb 1st Cleaner Tailings	1st Cln Tails Box
6.	Pb 1st Cleaner Conc	1st Cln Launder
8.	Pb 2nd Cleaner Conc	2nd Cln Launder
9.	Pb 3rd Cleaner Conc	3rd Cln Launder
11.	Pb 5th Cleaner Conc	5th Cln Launder
12.	Pb 5th Cleaner Tailings	Last 5th Cell Dip
10.	Pb 4th Cleaner Conc	4th Cln Launder
13.	Pb 1st Cln Scav-Rgh Conc	Grating
14.	Pb 1st Cln Scav-Scav Conc	Grating
15.	Pb 1st Cln Scav Tailings	I Bank Tails Box
4B.	Lead Scavenger Tailings H Bank	H Bank Tails Box
4A.	Lead Scavenger Tailings G Bank	G Bank Tails Box
3.	Lead Scavenger Conc	Feed to Regrind

Circuit Survey Samples

GRUM PLANT TRIAL SURVEYS

Zinc Circuit

Shawn Carrick - Dayshift
Greg Rasmussen - Nightshift

		Location
21.	Zinc Rougher Column Conc	Rgh Column Launder
22.	Zinc Scavenger Column Conc	Scav Column Launder
23.	Zinc Scavenger Column Tails	J Bank Feed End
19A.	Zinc 1st Cln Rougher Conc	Grating
16B.	Zinc Rougher Conc 3rd Cell	Grating
18A.	Zinc Scavenger Tailings K Bank	K Bank Tails Box
18B.	Zinc Scavenger Tailings L Bank	L Bank Tails Box
19B.	Zinc 1st Cln Scavenger Conc	Grating
20.	Zinc 1st Cleaner Tailings	J Bank Tails Box
24.	Zinc Thickener Feed	Zn Thickener
16A.	Zinc Rougher Conc 1&2 Cells	Feed to Regrind
17.	Zinc Scavenger Conc	Feed to Regrind

Circuit Survey Samples

GRUM PLANT TRIAL SURVEYS

Extra Samples

Shane Wilson - Dayshift
Gary Winkell - Nightshift

		Location
36.	Mill Feed Sample	#4 Cross Conv Disch
35.	"B" Circuit Final Grind	#6 Cyclopac O/F
1.	Lead Rougher Feed	Tertiary Cyclone O/F
34.	"A" Circuit Final Grind	#4 Cyclopac O/F
28.	Pb Scav Regrind Cyclone O/F	Scav Cyclone O/F
29.	Pb Scav Regrind Cyclone U/F	Scav Cyclone U/F
25.	Pb Rgh Regrind Cyclone O/F	Rgh Cyclone O/F
26.	Pb Rgh Regrind Cyclone U/F	Rgh Cyclone U/F
31.	Zn Regrind Cyclone O/F	Zn Cyclone O/F
32.	Zn Regrind Cyclone U/F	Zn Cyclone U/F
33.	Zn Regrind Mill Discharge	Zn Reg Mill Disch
27.	Pb Rgh Regrind Mill Discharge	Rgh Reg Mill Disch
30.	Pb Scav Regrind Mill Dishcarge	Scav Reg Mill Disch

LAKEFIELD RESEARCH

R & D
IN-PLANT CONSULTING

FAX: (705) 652 - 6365

ATTENTION:	G. McDonald	COMPANY:	CURRAGH
FROM:	R. Wagner	FAX NO.	416-363-1732
DATE:	Nov. 6, 1992	REFERENCE:	LR-4385

MESSAGE:

Dear Godfrey:

Please find attached a summary of the testwork performed on-site by Richard Wagner, Lakefield Report #4385

CC: ERIC PAKKALA - Sr. Metallurgist
FARO 403-994-3184

Please find ____7___ pages attached to this transmission.

TESTWORK SUMMARY

- Grum ore type 2 samples were generally low grade, 3.5% to 6.5% combined Pb & Zn grade, with minor amounts of copper.

- The flotation rougher selectivity was good for the majority of samples tested. The test conditions and results are given in Tables 1 & 2.

In general, even though the samples contained some copper, the CN soluble copper did not appear to cause selectivity problems in the Pb rougher.

- Hole 1 (1276m to 1270m) and Grum chips G-70-2 ore samples gave Pb selectivity problems. Hole 1 (1276m to 1270m) sample was tested further to determine if the standard mill circuit cleaning scheme would upgrade the bulk rougher concentrate. The resultant 4th Pb cleaner concentrate was poor (Test 2A, 52% Pb grade, 66.4% Pb recovery), however, the zinc 3rd cleaner concentrate was acceptable (51.1% Zn, 2.08% Pb, 70% Zn recovery). For comparison purposes, in Test 2B soda ash replaced lime and the Pb concentrate grade improved to 58.9% Pb grade with 71.5% Pb recovery. In Test 2C, the soda ash BPW system Pb 4th cleaner results were similar to lime. These tests 2A, 2B and 2C are graphed in Figure 1.

2A - LIME
2B - Na_2CO_3
2C - BPW + $NaHCO_3$.

- A composite was made up from ore type 2, ribbon banded carbonaceous quartz and interbanded phyllites samples, with heads of 5% combined Pb+Zn. This ore type composite was examined in tests LR12 to LR15 to determine: 1) the effect of grind in the lime/NaCN SD200 reagent scheme, 2) to determine the effect of changing the reagent scheme at the nominal mill grind of 80% -200 mesh. These results showed the grind had minor effect and the soda ash system was superior over lime in Figures 2 & 3 respectively.

- The massive sulphide sample 89G-35 was tested (LR10) with good flotation response and the head grade averaged 14.6% combined Pb & Zn. This high grade sample was intended to be used in upgrading, lower grade Grum ore type 2 samples to typical budget grades, but time constraints did not allow this testwork to be completed.

TESTWORK DISCUSSION

Grinding:

Type 2 Mill 1.

Major viscosity effects were observed in the primary grind of Tests LR12 to LR15. Primary grinding with lime caused the pulp to stick to the rods, while grinding with soda ash dispersed the sample and left the rods clean. The viscosity effects of lime in the rod mill were only apparent in finer grinding to nominally 80% -200 mesh (for example with lime, 39 min to give 83% -200 mesh versus soda ash 32 min to give 82% -200 mesh). In coarser grind tests, LR2A, 2B, using lime or soda ash the viscosity effects on grind were minimal (69.2% -200 mesh, versus 68.2% -200 mesh respectively).

Rougher Flotation:

In the lime system the Pb minerals were coated with black fines. In the soda ash system the black coatings were minimized.

Cleaner Flotation:

In the lime system the higher grade Pb minerals floated quickly, gangue flotation was slower to concentrate. In the soda ash system, no problems were observed.

The BPW/NaCN depressant (Test LR14A) showed the lowest Zn grade (6.85% Zn) reporting to the Pb concentrate.

RIBBON BANDED CARBONACEOUS QUARTZ

SAMPLE OF TEST HOLE 1, 1276m to 1270m, Rock Type 2.

Grade Recovery Relationship

+ Lime as pH modifier in roughers and cleaners Test LR2A
○ Soda Ash " " " " " " Test LR2B
△ " " " with SPW as depressant " Test LR2C

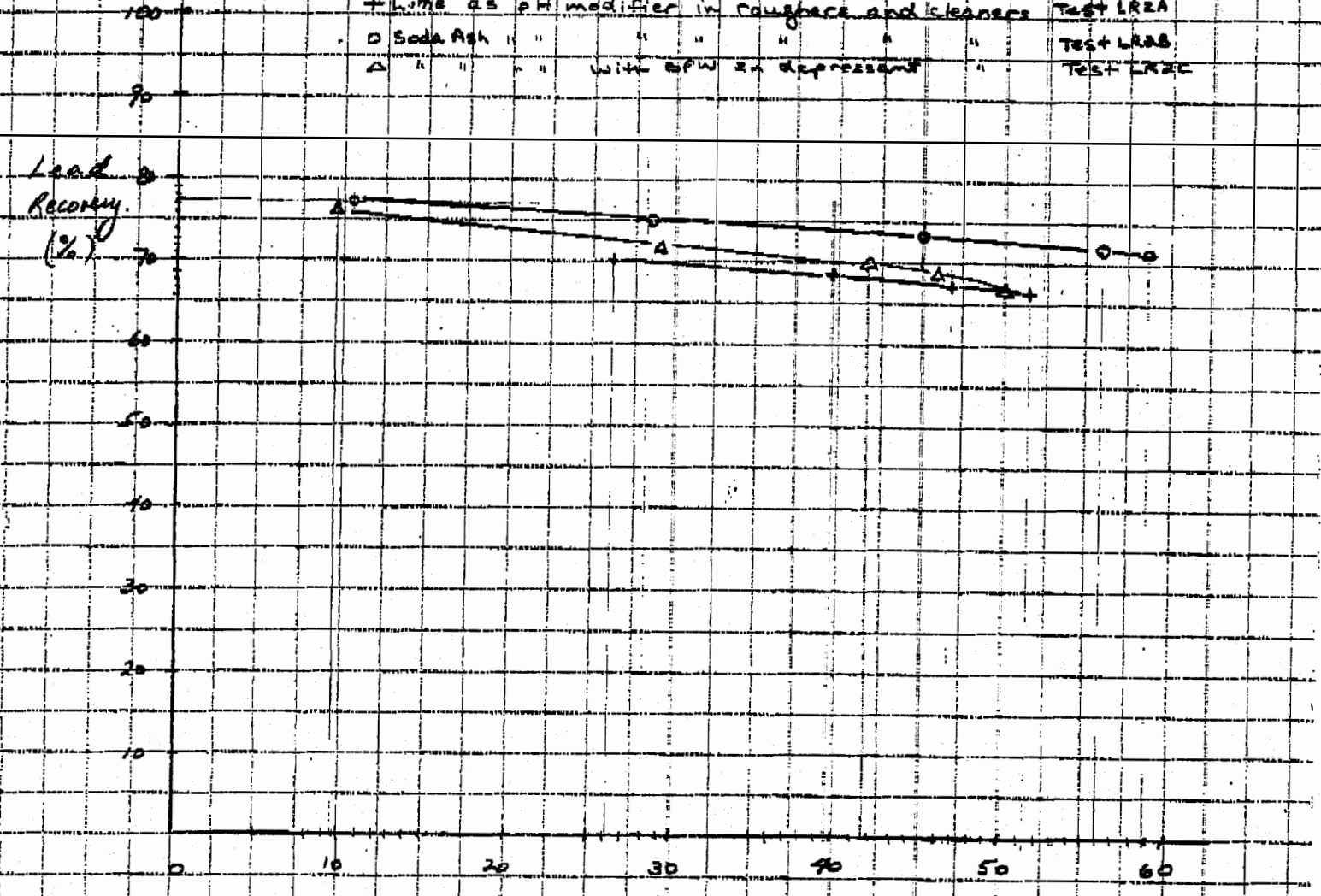

Figure 1: Effect of a change in reagent scheme on the grade and recovery of ore type 2, Hole 1, 1270m to 1276m beach.

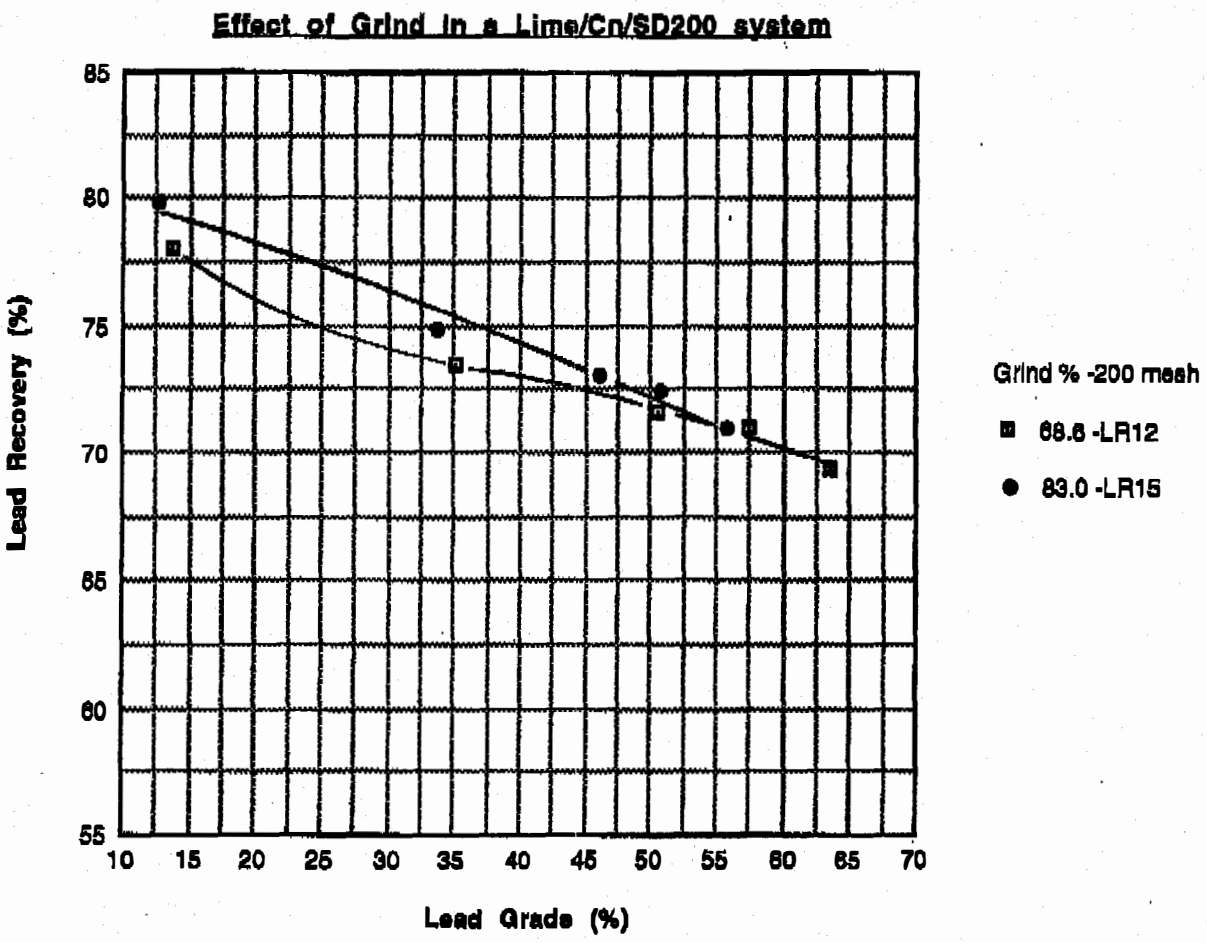

Figure 2: Effect of grind on the grade and recovery of a composite of ore type 2. (Hole 1, 1276m to 1258m and Hole 5, 1258m to 1252.5m)

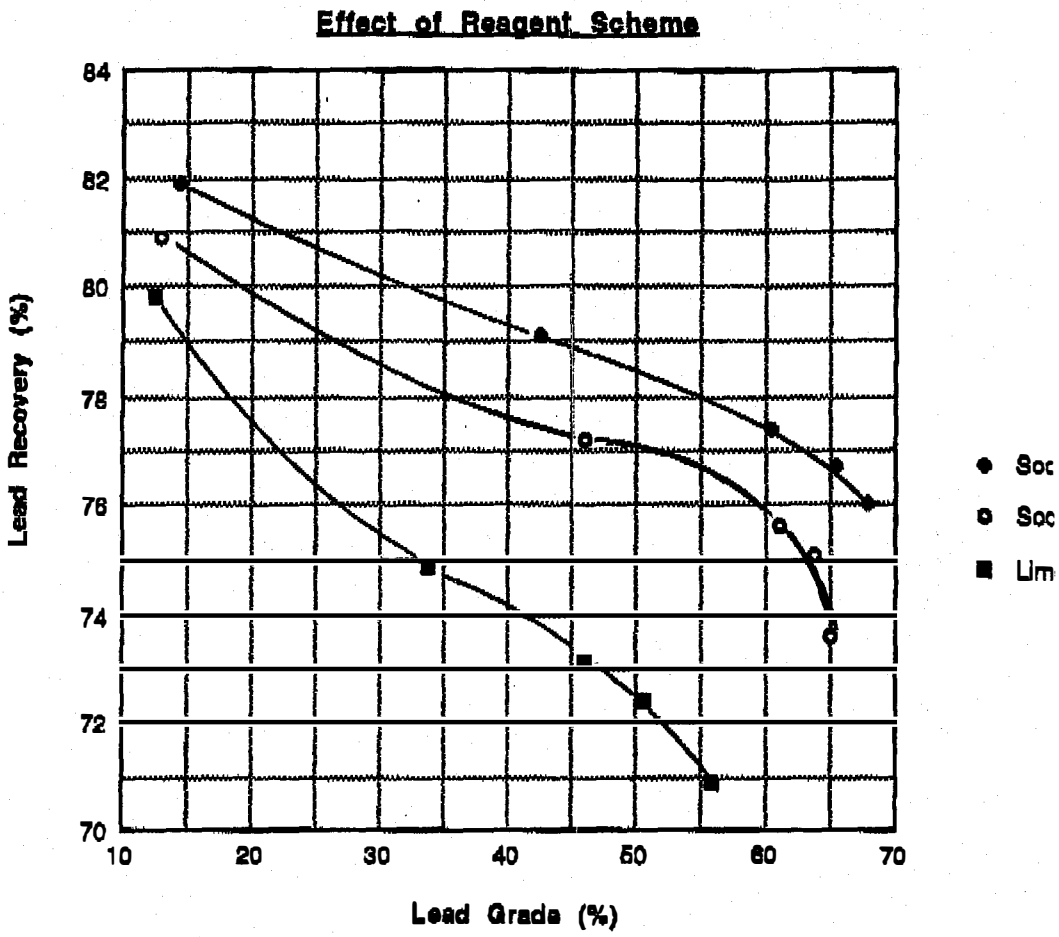

Figure 3: Effect of a change in reagent scheme on the grade and recovery of a composite of ore type 2 (Hole 1, 1276m to1258m and Hole 5, 1258m to 1252.5m)

TABLE NO. 1 : Faro Laboratory Flotation Test Conditions

Test No.	Test Variables	Grinding Time min	Grinding Lime g/t	Grinding NaCN SD200	Grinding NAX g/t	Pb Roughing Lime g/t	Pb Roughing pH	Pb Roughing NAX g/t	Pb Roughing MIBC g/t	Pb Roughing Cond min	Pb Roughing Float min	Pb Scavenging NAX g/t	Pb Scavenging MIBC g/t	Pb Scavenging Cond min	Pb Scavenging Float min	Comments	Grind %-200 mesh
LR1	standard	20	500	250	10	0	9.5	40	18	1	4	15	6	1	3	Pb was slow floating	63.0
LR2	standard															very quick floating	
	Lime-Ro,Sc	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	black-Pb tough froth	68.6
LR2A	Lime	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	difficult cleaning	69.2
LR2B	$NaCO_3$	20	$NaCO_3$ 1500	250	10	0	9.7	40	18	1	4	15	6	1	3	Froth did not appear as black or as tough, better drainage	68.2
LR2C	BPW	20	$NaCO_3$ 1500	BPW 250	5	0	9.9	20*	18	1	4	10*	6	1	3	through froth bed. *less collector with BPW	66.4
LR3	standard	20	Lime 500	NaCN/ SD200 250	10	0	10.2	40	18	1	4	15	6	1	3	The Pb rougher locked blackish-blue Zn coming up in scav.	65.7
LR4	standard	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	Selective Pb float, less black carbonaceous in feed & concs.	63.6
LR5	standard	20	500	250	10	185	9.7	40	18	1	4	15	6	1	3	Slow floating Pb, blackish-blue fragile froth. Low head grade	61.5
LR6	standard	20	500	250	10	180	9.7	40	18	1	4	15	6	1	3	The Pb froth locked blue not black, some brown Zn, stable froth.	74.3
LR7	standard	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	From typical Pb color with some black fines.	70.4
LR8	standard	20	500	250	10	0	10.2	40	18	1	4	15	6	1	3	Tough blue-black froth	72.2
LR9	standard	20	500	250	10	0	-	40	18	1	4	15	6	1	3	Blue froth with some black fines.	62.2
LR10	standard	20	500	250	10	250	9.7	40	18	1	4	15	6	1	3	Massive sulphide increased lime consumption Very blue Pb froth	95.2
LR11	standard Na_2CO_3	20	Na_2CO_3 1500	250	10	0	9.7	40	18	1	4	15	6	1	3	Good froth drainage	73.9
LR12	25 min grind Lime	25	Lime 500	250	10	0	10.2	40	18	1	4	15	6	1	3	Carbon floating later in rougher & cleaners. Pb floating fast.	68.6
LR13	35 min grind Na_2CO_3	35	Na_2CO_3 1500	250	10	0	9.8	40	18	1	4	15	6	1	3	Good selectivity	84.9
LR14	32 min grind Lime	32	Lime 500	250	10	0	9.3	40	18	1	4	15	6	1	3	Carbon floating later in rougher & cleaners	76.0
LR 14A	32 min grind BPW/NaCN Na_2CO_3 system	32	Na_2CO_3 1500	NaCN/ BPW 250	10	0	10.0	40	18	1	4	15	18**	1	3	Fast floating lead, little Pb float in last min of Ro & Cl **more MIBC with BPW	82.0
LR15	39 min grind Lime	39	Lime 500	SD200 NaCN 250	10	0	9.8	40	18	1	4	15	6	1	3	Slow floating carbon spoils Pb 4th Cl Conc grade in last min of cleaning.	83.0

Massive Sulphides — carbonaceous

cleaner grind

SENT BY:Xerox Telecopier 7020 ;11- 6-92 ; 9:42AM ; LAKEFIELD RESEARCH→ 4163631732;# 7

TABLE NO. 2 : Faro Laboratory Flotation Rougher & Scavenger Test Results

Test	Sample Description	Heads Calculated %Pb	%Zn	%Fe	%Pb+Zn	Combined Rougher & Scavenger Grades (Calc) %Pb	%Zn	%Fe	Recoveries %Pb	%Zn	%Fe	Comments
LR1	Hole 5, 1258m-1252.5m high phyllitic, greyish white ore	1.25	2.79	4.30	4.04	23.4	12.9	7.90	83.1	20.5	8.1	Selective
LR2	Hole 1, 1276m-1270m	1.45	3.22	2.93	4.67	11.8	9.28	4.99	75.5	26.7	15.8	Unselective, high carbon
LR2A	Very blackish grey ore	1.45	3.08	3.04	4.53	Repeat of 2 but with Pb & Zn cleaning						
LR2B	Very blackish grey ore	1.38	3.11	2.96	4.49	10.6	7.96	5.63	77.4	25.7	19.2	Improved recy selectivity.
LR2C	Very blackish grey ore	1.46	3.27	3.45	4.73	9.69	9.46	9.28	76.4	33.4	31.0	Poor Pb & Zn selectivity.
LR3	Hole 1, 1270m-1264m moderate blackish-grey color	1.55	4.19	2.57	5.74	19.4	15.0	5.26	73.2	20.9	11.9	Selective Pb Sc Tails, %ZnO=0.07 & %PbO=0.04
LR4	Hole 1, 1264m-1258m not very blackish, more grey	1.42	2.70	4.45	4.12	19.3	15.0	9.75	77.4	31.5	12.4	Selective
LR5	Hole 1, 1258m-1252.5m very blackish grey color	0.44	0.53	8.19	0.97	6.0	1.5	6.1	58.1	11.7	3.1	Waste
LR6	Hole 4, 1276m-1270m oxidized reddish-brown color	1.20	2.31	3.82	3.51	14.8	11.9	5.65	75.7	31.4	12.9	Selective Pb Sc Tails. %PbO=0.11 & %ZnO=0.82
LR7	Hole 5, 1276m-1270m grey-black (like LR4) plus reddish brown	1.11	3.77	3.58	4.88	14.1	7.94	4.50	95.0	15.8	9.4	Selective but some black fines in Pb froth.
LR8	Hole 5, 1270m-1264m grey-black plus red-brown	1.25	3.79	3.14	5.05	16.3	9.69	4.75	95.6	18.9	11.2	Selective blue-black froth
LR9	Hole 5, 1264m-1258m grey-black plus sulphide yellow tone	1.28	2.71	4.89	3.99	14.7	8.16	8.90	78.2	20.6	12.4	Selective black froth with some black fines
LR10	Hole 89G-35, 37144 to 37155 Massive sulphide	5.19	9.44	23.45	14.63	32.8	16.2	14.7	90.6	24.5	9.0	Selective
LR11	Grum chip samples, carbonaceous ore, G-70-2	1.96	4.42	3.13	6.38	12.6	9.62	6.21	80.8	27.8	24.9	Unselective, high carbon content
LR12	Composite of feed to LR1 - 4 Hole 5 1258m-1252.5m Hole 1 1276m-1258m	1.42	3.31	3.78	4.73	13.7	10.4	6.27	78.0	25.5	13.4	Poor selectivity, high carbon in Rb-Scav
LR13	Composite of feed to LR1-4	1.47	3.27	3.51	4.74	14.3	7.81	8.07	81.9	20.0	14.5	Better selectivity
LR14	Composite of feed to LR1-4	1.21	3.28	3.49	4.49	11.2	7.29	5.55	74.2	17.8	12.8	Low calculated head
LR 14A	Composite of feed to LR1-4	1.34	3.27	3.79	4.61	13.0	8.28	6.94	80.9	21.2	15.3	Good selectivity, BPW/NACN
LR15	Composite of feed to LR1-4	1.39	3.34	3.49	4.73	12.6	8.05	5.38	79.8	21.3	13.6	Slow floating carbon in cleaners

SENT BY:Xerox Telecopier 7020 ;11- 6-92 ; 9:43AM ; LAKEFIELD RESEARCH→ 4163831732;# 8

LAKEFIELD RESEARCH

Test No.: 13 Project No.: 4385 Date: Oct 20 Operator: B

Purpose: A standard test to investigate the effect of a finer grind on the Pb rougher and cleaner using the ~~Na_2CO_3~~ NaCN/SD200 system

Procedure: As described below.

Feed: 2000 g of Composite of LR1 to LR4,

Grind: 35 minutes in the laboratory rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE						TIME, MINUTES			
	Na_2CO_3	NaCN/SD200	NAX	MIBC			GRIND	COND.	FROTH	pH
Grind	1500	250	10	–			35	–	–	
Pb Rougher			40	18				1	4	9.8
Pb Scav			15	6				1	3	
Pb Ro Conc Reg	250	75	10				10			
Pb 1st Cl			–	10				1	3	7.9
			5	–				1	2	
Pb 1st Cl. Scav			5	2				1	1	9.6
Pb 2nd Cleaner		20	–	–				1	2.5	9.1
		–	5	4				1	2	
Pb 3rd Cleaner		20	–	2				1	2	9.1
			2.5	4				1	2	
Pb 4th Cleaner		20	2.5	2				1	3	9.1

Stage	Ro + Sc	1st, 2nd	3rd, 4th		
Flotation Cell					
Speed: r.p.m.	1800	1500	1200		
% Solids					
84.9% -200 mesh					

LAKEFIELD RESEARCH

Test No.: LR13 Project No.: 4385 Date: Oct 28

Metallurgical Results

	PRODUCT	WEIGHT		ASSAYS, %					% DISTRIBUTION					METAL UNITS				
		g	%	Pb	Zn	Fe	Pb/Zn		Pb	Zn	Fe			Pb	Zn	Fe		
1	Pb Rougher II (26830)	1832.4	91.62	0.29	2.86	3.28			18.1	80.0	85.5			26.570	262.033	300.514		
2	Pb 1st Cl. Sc. II (26831)	112.9	5.65	0.73	6.86	6.28			2.8	11.8	10.1			4.125	38.759	35.482		
3	Pb 2nd Cl. Te (26832)	17.1	0.85	2.93	10.5	8.25			1.7	2.7	2.0			2.491	8.925	7.013		
4	Pb 3rd Cl. II (26833	3.2	0.16	6.48	15.7	10.5			0.7	0.8	0.5			1.037	2.512	1.680		
5	Pb 4th cl. Te (26834)	1.5	0.08	12.2	20.0	13.9			0.7	0.5	0.3			0.976	1.600	1.112		
6	Pb 4th Cl. Conc (26835)	32.9	1.64	68.0	8.33	3.41			76.0	4.2	1.6			111.520	13.661	5.593		
7																		
8																		
9																		
10																		
11																		
12																		
	Head (calc.)	2000	100	1.47	3.27	3.51	4.74		100	100	100			146.719	327.149	351.394		

Calculated Grades and Recoveries

Pb 3rd Cl. Conc	1.72	65.4	8.87	3.90			76.7	4.7	1.9			112.496	15.261	6.765		
Pb 2nd Cl. Conc	1.88	60.4	9.45	4.46			77.4	5.5	2.4			113.533	17.773	8.385		
Pb 1st Cl. Conc	2.73	42.5	9.78	5.64			79.1	8.2	4.4			116.024	26.698	15.398		
Pb Rou. Sc. Conc.	8.38	14.3	7.81	6.07			81.9	20.0	14.5			120.149	65.457	50.88		

LR-7

SENT BY:Xerox Telecopier 7020 ;11- 4-82 ; 5:17PM ; LAKEFIELD RESEARCH→ 4163631732;# 6

LAKEFIELD RESEARCH

Test No.: 14 Project No.: 4385 Date: Oct 29 Operator: DV

Purpose: A standard test to investigate the coarse grinding effect on the Pb rougher and cleaner performance using the mill Lime - NaCN/SD200 reagent scheme.

Procedure: As described below.

Feed: 2000 grams of composite LR1 to LR4 feed.

Grind: 32 minutes in the laboratory rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Lime	NaCN/SD200	NAY	MIBC				GRIND	COND.	FROTH	pH
Grind	500	250	10					32	—	—	
Pb Rougher			40	18					1	4	9.3
			15	6					1	3	9.0
Pb Conc Regrind	80	75	10	—				10	—	—	
Pb 1st cleaner			—	10					1	3	NA *
			5	—					1	2	
Pb 1st Cl. Scav.			5	2					1	1	9.4
Pb 2nd Cleaner		20	—	4					1	2.5	
		—	5	2					1	2	9.3
Pb 3rd Cleaner		20	—	2					1	2	9
			2.5	4					1	2	9
Pb 4th Cleaner		20	2.5	12					1	3	9.4
Blackish blue Pb rougher scavenger.											
Good carbon rejection in cleaning.											
									Lastly		

NA - not available Tech. Error in laboratory pH. meter

Stage	Ro+Sc.	1ST+2nd Cl.	3RD+4TH Cl.		
Flotation Cell	5L	2.5L	1L		
Speed: r.p.m.	1800	1500	1200		
% Solids					
% -200 mesh					

FORM LR 6

LAKEFIELD RESEARCH

Test No.: 14 Project No.: 4385 Date: Oct 29

Metallurgical Results

	PRODUCT	WEIGHT		ASSAYS, %					% DISTRIBUTION					METAL UNITS				
		g	%	Pb	Zn	Fe	Pb+Zn		Pb	Zn	Fe			Pb	Zn	Fe		
1	Pb Ro.Sc. Tl (26836)	1839.5	91.97	0.34	2.93	3.31			25.8	82.2	87.2			31.270	269.472	304.484		
2	Pb 1st Cl.Sc Tl (26837)	94.9	4.75	0.96	3.79	5.21			3.8	5.5	7.1			4.560	18.003	24.748		
3	Pb 2nd Cl. Tl (26838)	30.9	1.54	4.23	12.0	7.29			5.4	5.6	3.2			6.514	18.480	11.227		
4	Pb 3rd Cl. Tl (26839)	3.1	0.16	7.34	15.5	7.85			1.0	0.8	0.4			1.174	2.480	1.256		
5	Pb 4th Cl. Tl (26840)	2.3	0.12	15.5	9.6	9.18			1.5	0.7	0.3			1.860	2.352	1.102		
6	Pb 4th Cl Lnc (26841)	29.3	1.46	51.8	11.8	4.26			62.5	5.2	1.8			75.628	17.228	6.220		
7																		
8																		
9																		
10																		
11																		
12																		
	Head (calc.)	2000	100	1.21	3.28	3.49			100	100	100			121.006	328.045	348.974		

Calculated Grades and Recoveries

Pb 3rd Cl. Lnc	1.58	49.0	12.4	4.63			64.0	5.9	2.1			77.488	19.580	7.322		
Pb 2nd Cl. Lnc	1.74	45.2	12.7	4.93			65.0	6.7	2.5			78.662	22.060	8.578		
Pb 1st Cl. Lnc	3.28	26.0	12.4	6.04			70.4	12.3	5.7			85.176	40.540	19.805		
Pb Rough. Lnc.	8.03	11.2	7.29	5.55			74.2	17.8	12.8			89.736	58.543	44.553		

LR-7

SENT BY:Xerox Telecopier 7020 ;11- 4-92 ; 5:18PM ; LAKEFIELD RESEARCH→ 4163831732;# 8

LAKEFIELD RESEARCH

Test No.: 14A Project No.: 4385 Date: Oct 29 Operator: Gr.

ose: A standard test a repeat of 14, to evaluate the effect of BPM/NaCN zinc depressant in a Na_2CO_3 system.

Procedure: As described below

Feed: 2000 g of composite of feed to LR1 to LR4

Grind: 32 minutes in the laboratory rod mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Na_2CO_3	BPM/NaCN	NAX	MIBC				GRIND	COND.	FROTH	pH
Grind	1500	250	10	–				32	—	—	
Pb Rougher		[redacted]	40	18					1	4	10.0
		—	15	18					1	3	9.9
Pb Conc Regrind	250	75	10					10			
Pb 1st Cleaner		–	–	10					1	3	9.9
		—	5	–					1	2	
Pb 1st Cl. Scav.		–	5	2					1	1	9.8
Pb 2nd Cleaner		20	–	4					1	2.5	9.8
		–	5	2					1	2	8.7
Pb 3rd Cleaner		20	–	2					1	2	9.0
			2.5	4					1	1	8.8
Pb 4th Cleaner		20	2.5	12					1	3	9.0
Fast floaty Very little	lead in floated in		3rd 1 min	cleaner,		floated in 3rd cleaner scav.		first 2 minutes.			

BPM/NaCN mixed 2/1 into a 1% solution.

Stage					
Flotation Cell					
ed: r.p.m.					
% Solids					
82% – 200 mesh					

FORM LR 8

SENT BY:Xerox Telecopier 7020 ;11- 4-92 ; 5:20PM ; LAKEFIELD RESEARCH+

		g	%	Pb	Zn	Fe	Pb/Zn		Pb	Zn	Fe			Pb	Zn	Fe	
1	Pb Ro. Sc. Tl (26842)	1833.4	91.67	0.28	2.82	3.50			19.1	78.9	84.7			25.668	258.509	320.845	
2	Pb 1st Cl. Sc. Tl (26843)	121.7	6.08	0.82	7.97	7.29			3.7	19.8	11.7			4.986	18.458	44.323	
3	Pb 2nd Cl. Tl (26844)	11.8	0.59	3.74	12.9	10.4			1.6	2.3	1.6			2.207	7.611	6.136	
4	Pb 3rd Cl. Tl (26845)	1.6	0.08	7.64	19.1	14.8			0.5	0.5	0.3			0.611	1.528	1.184	
5	Pb 4th Cl. Tl (26846)	1.1	0.06	32.8	15.8	11.6			1.5	0.3	0.2			1.968	0.948	0.696	
6	Pb 4th Cleaner Cond (26847)	30.4	1.52	65.0	6.85	3.60			73.6	3.2	1.5			98.800	10.412	5.472	
7																	
8																	
9																	
10																	
11																	
12																	
	Head (calc.)	2000	100	1.34	3.27	3.79	4.61		100	100	100			134.240	327.466	378.656	

Calculated Grades and Recoveries

Pb 3rd Cl Conc	1.58	63.8	7.19	3.90			75.1	3.5	1.7			100.768	11.360	6.168	
Pb 2nd Cl. Conc	1.66	61.1	7.76	4.43			75.6	4.0	2.0			101.379	12.888	7.352	
Pb 1st Cl. Conc	2.25	46.0	9.11	6.00			77.2	6.3	3.6			103.586	20.499	13.488	
Pb Ro+Sc. Conc	8.33	13.0	8.28	6.94			80.9	21.1	15.3			108.572	68.957	57.811	

LAKEFIELD RESEARCH

Test No.: LR15 Project No.: 4385 Date: Oct 30/92 Operator: RB

Purpose: A standard to investigate the standard mill grind effect on the the Pb rougher and cleaner performance using the lime, NaCN/SO200 reagent scheme

Procedure: As described below.

Feed: 2000 grams of composite LR1 to LR4 feed.

Grind: 39 minute in the laboratory rod mill.

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE							TIME, MINUTES			
	Lime	NaCN/SO200	NAX	HIBC				GRIND	COND.	FROTH	pH
Grind	500	250	10					39	—	—	
Pb Rougher			40	18					1	4	9.8
			15	6					1	3	9.6
Pb Conc Regrind	80	75	10	—				10	—	—	
Pb 1ST Cleaner			—	10					1	3	10.1
			5	—					1	2	
Pb 1ST Cl. Scav			5	2					1	1	9.8
Pb 2nd Cleaner		20	—	4					1	2.5	9.1
		—	5	2					1	2	8.9
Pb 3rd Cleaner		20	—	2					1	2	9.2
			2.5	4					1	2	
Pb 4th Cleaner		20	2.5	12					1	3	9.2
In Cleaners Pb foles in the first two minutes of each stage, afterward froth turns black, with slower floating calcite, etc.											

Stage	Ro, Sc	1ST, 2nd Cl.	3rd, 4th Cl.		
Flotation Cell	5L	2.5L	1L		
Speed: r.p.m.	1800	1500	1200		
% Solids					
83% -200 mesh					

FORM.LR6

LAKEFIELD RESEARCH

Test No.: LR 15 Project No.: 4385 Date: Oct 30/92

Metallurgical Results

	PRODUCT	WEIGHT		ASSAYS, %					% DISTRIBUTION					METAL UNITS				
		g	%	Pb	Zn	Fe	Pb/Zn		Pb	Zn	Fe			Pb	Zn	Fe		
1	Pb Co Sc Tl (26873)	1823	91.15	0.31	2.88	3.31			20.2	78.7	86.4			28.257	262.512	301707		
2	Pb 1ST Cl. Sc Tl (26874)	114.9	5.75	1.18	5.80	5.21			4.9	10.0	8.6			6.785	33.350	29958		
3	Pb 2nd Cl. Tl (26875)	17.9	0.89	2.87	10.1	6.06			1.8	2.7	1.5			2.554	8.989	5.393		
4	Pb 3rd Cl. Tl (26876)	4.4	0.22	4.38	12.5	6.72			0.7	0.8	0.4			0.964	2.750	1.478		
5	Pb 4th Cl. Tl (26877)	4.5	0.22	9.44	18.1	8.61			1.5	1.2	0.5			2.077	3.982	1.894		
6	Pb 4th Cl. Conc (26878)	35.3	1.77	55.8	12.5	5.02			70.9	6.6	2.6			98.766	22.125	8.885		
7																		
8																		
9																		
0																		
1																		
2																		
	Head (calc.)	2000	100	1.39	3.34	3.49	4.73							139.463	333.708	349.315		

Calculated Grades and Recoveries

Pb 3rd Cl. Conc	1.99	50.7	13.1	5.42			72.4	7.8	3.1			100.845	26.107	10.779		
Pb 2N Cl. Conc	2.21	46.1	13.1	5.55			73.1	8.6	3.5			101.807	28.857	12.257		
Pb 1ST Cl. Conc	3.10	33.7	12.2	5.69			74.9	11.3	5.0			104.361	37.846	17.650		
Pb Co+Sc. Conc	8.85	12.6	8.05	5.38			79.8	21.3	13.6			111.146	71.196	47.608		

SENT BY: Xerox Telecopier 7020 ; 11- 4-92 ; 5:21PM ; LAKEFIELD RESEARCH→ 4166631732;#12

TESTWORK SUMMARY

- Grum ore type 2 samples were generally low grade, 3.5% to 6.5% combined Pb & Zn grade, with minor amounts of copper.

- The flotation rougher selectivity was good for the majority of samples tested. The test conditions and results are given in Tables 1 & 2.

In general, even though the samples contained some copper, the CN soluble copper did not appear to cause selectivity problems in the Pb rougher.

- Hole 1 (1276m to 1270m) and Grum chips G-70-2 ore samples gave Pb selectivity problems. Hole 1 (1276m to 1270m) sample was tested further to determine if the standard mill circuit cleaning scheme would upgrade the bulk rougher concentrate. The resultant 4th Pb cleaner concentrate was poor (Test 2A, 52% Pb grade, 66.4% Pb recovery), however, the zinc 3rd cleaner concentrate was acceptable (51.1% Zn, 2.06% Pb, 70% Zn recovery). For comparison purposes, in Test 2B soda ash replaced lime and the Pb concentrate grade improved to 58.9% Pb grade with 71.5% Pb recovery. In Test 2C, the soda ash BPW system Pb 4th cleaner results were similar to lime. These tests 2A, 2B and 2C are graphed in Figure 1.

2A- LIME
2B- Na_2CO_3
2C- BPW + NaLiS

- A composite was made up from ore type 2, ribbon banded carbonaceous quartz and interbanded phyllites samples, with heads of 5% combined Pb+Zn. This ore type composite was examined in tests LR12 to LR15 to determine 1) the effect of grind in the lime/NaCN SD200 reagent scheme, 2) to determine the effect of changing the reagent scheme at the nominal mill grind of 80% -200 mesh. These results showed the grind had minor effect and the soda ash system was superior over lime in Figures 2 & 3 respectively.

- The massive sulphide sample 89G-35 was tested (LR10) with good flotation response and the head grade averaged 14.6% combined Pb & Zn. This high grade sample was intended to be used in upgrading, lower grade Grum ore type 2 samples to typical budget grades, but time constraints did not allow this testwork to be completed.

TESTWORK DISCUSSION

Grinding:

Type 2 Hole 1.

Major viscosity effects were observed in the primary grind of Tests LR12 to LR15. Primary grinding with lime caused the pulp to stick to the rods, while grinding with soda ash dispersed the sample and left the rods clean. The viscosity effects of lime in the rod mill were only apparent in finer grinding to nominally 80% -200 mesh (for example with lime, 39 min to give 83% -200 mesh versus soda ash 32 min to give 82% -200 mesh). In coarser grind tests, LR2A, 2B, using lime or soda ash the viscosity effects on grind were minimal (69.2% -200 mesh, versus 68.2% -200 mesh respectively).

Rougher Flotation:

In the lime system the Pb minerals were coated with black fines. In the soda ash system the black coatings were minimized.

Cleaner Flotation:

In the lime system the higher grade Pb minerals floated quickly, gangue flotation was slower to concentrate. In the soda ash system, no problems were observed.

The BPW/NaCN depressant (Test LR14A) showed the lowest Zn grade (6.85% Zn) reporting to the Pb concentrate.

TABLE NO. 1 : Faro Laboratory Flotation Test Conditions

Test No.	Test Variables	Grinding Time min	Grinding Lime g/t	Grinding NaCN SD200	Grinding NAX g/t	Pb Roughing Lime g/t	Pb Roughing pH	Pb Roughing NAX g/t	Pb Roughing MIBC g/t	Pb Roughing Cond min	Pb Roughing Float min	Pb Scavenging NAX g/t	Pb Scavenging MIBC g/t	Pb Scavenging Cond min	Pb Scavenging Float min	Comments	Grind %-200 mesh
LR1	standard	20	500	250	10	0	9.5	40	18	1	4	15	6	1	3	Pb was slow floating	63.0
LR2	standard															very quick floating	
	Lime-Rlo,Sc	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	black-Pb tough froth	68.6
LR2A	Lime	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	difficult cleaning	69.2
LR2B	$NaCO_3$	20	$NaCO_3$ 1500	250	10	0	9.7	40	18	1	4	15	6	1	3	Froth did not appear as black or as tough, better drainage	68.2
LR2C	BPW	20	$NaCO_3$ 1500	BPW 250	5	0	9.9	20*	18	1	4	10*	6	1	3	through froth bed. *less collector with BPW	66.4
LR3	standard	20	Lime 500	NaCN/ SD200 250	10	0	10.2	40	18	1	4	15	6	1	3	The Pb rougher locked blackish-blue Zn coming up in scav.	65.7
LR4	standard	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	Selective Pb float, less black carbonaceous in feed & concs.	63.6
LR5	standard	20	500	250	10	185	9.7	40	18	1	4	15	6	1	3	Slow floating Pb, blackish-blue fragile froth. Low head grade	61.5
LR6	standard	20	500	250	10	180	9.7	40	18	1	4	15	6	1	3	The Pb froth looked blue not black, some brown Zn, stable froth.	74.3
LR7	standard	20	500	250	10	0	10.0	40	18	1	4	15	6	1	3	From typical Pb color with some black fines.	70.4
LR8	standard	20	500	250	10	0	10.2	40	18	1	4	15	6	1	3	Tough blue-black froth	72.2
LR9	standard	20	500	250	10	0	-	40	18	1	4	15	6	1	3	Blue froth with some black fines.	62.2
LR10	standard	20	500	250	10	250	9.7	40	18	1	4	15	6	1	3	Massive sulphide increased lime consumption Very blue Pb froth	95.2
LR11	standard		Na_2CO_3														
	Na_2CO_3	20	1500	250	10	0	9.7	40	18	1	4	15	6	1	3	Good froth drainage	73.9
LR12	25 min grind Lime	25	Lime 500	250	10	0	10.2	40	18	1	4	15	6	1	3	Carbon floating later in rougher & cleaners. Pb floating fast.	68.6
LR13	35 min grind		Na_2CO_3														
	Na_2CO_3	35	1500	250	10	0	9.8	40	18	1	4	15	6	1	3	Good selectivity	84.9
LR14	32 min grind Lime	32	Lime 500	250	10	0	9.3	40	18	1	4	15	6	1	3	Carbon floating later in rougher & cleaners	76.0
LR 14A	32 min grind BPW/NaCN Na_2CO_3 system	32	Na_2CO_3 1500	NaCN/ BPW 250	10	0	10.0	40	18	1	4	15	18**	1	3	Fast floating lead, little Pb float in last min of Ro & Cl **more MIBC with BPW	82.0
LR15	39 min grind Lime	39	Lime 500	SD200 NaCN 250	10	0	9.8	40	18	1	4	15	6	1	3	Slow floating carbon spoils Pb 4th Cl Conc grade in last min of cleaning.	83.0

SENT BY:Xerox Telecopier 7020 ;11- 6-92 ; 9:42AM ; LAKEFIELD RESEARCH→ 4163631732;# 7

TABLE NO. 2 : Faro Laboratory Flotation Rougher & Scavenger Test Results

Test	Sample Description	Heads Calculated %Pb	%Zn	%Fe	%Pb+Zn	Combined Rougher & Scavenger Grades (Calc) %Pb	%Zn	%Fe	Recoveries %Pb	%Zn	%Fe	Comments
LR1	Hole 5, 1258m-1252.5m high phyllitic, greyish white ore	1.25	2.79	4.30	4.04	23.4	12.9	7.90	93.1	20.5	8.1	Selective
LR2	Hole 1, 1276m-1270m	1.45	3.22	2.93	4.67	11.8	9.28	4.99	75.5	26.7	15.8	Unselective, high carbon
LR2A	Very blackish grey ore	1.45	3.08	3.04	4.53	Repeat of 2 but with Pb & Zn cleaning						
LR2B	Very blackish grey ore	1.38	3.11	2.96	4.49	10.6	7.96	5.63	77.4	25.7	19.2	Improved rec'y selectivity.
LR2C	Very blackish grey ore	1.46	3.27	3.45	4.73	9.69	9.46	9.28	76.4	33.4	31.0	Poor Pb & Zn selectivity.
LR3	Hole 1, 1270m-1264m moderate blackish-grey color	1.55	4.19	2.57	5.74	19.4	15.0	5.26	73.2	20.9	11.9	Selective Pb Sc Tails, %ZnO=0.07 & %PbO=0.04
LR4	Hole 1, 1264m-1258m not very blackish, more grey	1.42	2.79	4.45	4.12	19.3	15.0	9.75	77.4	31.5	12.4	Selective
LR5	Hole 1, 1258m-1252.5m very blackish grey color	0.44	0.53	8.19	0.97	6.0	1.5	6.1	58.1	11.7	3.1	Waste
LR6	Hole 4, 1276m-1270m oxidized reddish-brown color	1.20	2.31	3.82	3.51	14.8	11.9	5.66	75.7	31.4	12.9	Selective Pb Sc Tails, %PbO=0.11 & %ZnO=0.82
LR7	Hole 5, 1276m-1270m grey-black (like LR4) plus reddish brown	1.11	3.77	3.58	4.88	14.1	7.94	4.50	95.0	15.8	9.4	Selective but some black fines in Pb froth.
LR8	Hole 5, 1270m-1264m grey-black plus red-brown	1.26	3.79	3.14	5.05	16.3	9.69	4.75	95.6	18.9	11.2	Selective blue-black froth
LR9	Hole 5, 1264m-1258m grey-black plus sulphide yellow tone	1.28	2.71	4.89	3.99	14.7	8.16	8.90	78.2	20.6	12.4	Selective black froth with some black fines
LR10	Hole 89G-35, 37144 to 37155 Massive sulphide	5.19	9.44	23.45	14.63	32.8	16.2	14.7	90.6	24.5	9.0	Selective
LR11	Grum chip samples, carbonaceous ore, G-70-2	1.96	4.42	3.13	6.38	12.6	9.82	6.21	80.8	27.8	24.9	Unselective, high carbon content
LR12	Composite of feed to LR1 - 4 Hole 5 1258m-1252.5m Hole 1 1276m-1258m	1.42	3.31	3.78	4.73	13.7	10.4	6.27	78.0	25.5	13.4	Poor selectivity, high carbon in Ro-Scav
LR13	Composite of feed to LR1-4	1.47	3.27	3.51	4.74	14.3	7.81	6.07	81.9	20.0	14.5	Better selectivity
LR14	Composite of feed to LR1-4	1.21	3.28	3.49	4.49	11.2	7.29	5.55	74.2	17.8	12.8	Low calculated head
LR 14A	Composite of feed to LR1-4	1.34	3.27	3.79	4.61	13.0	8.28	6.94	80.9	21.2	15.3	Good selectivity, BPW/NACN
LR15	Composite of feed to LR1-4	1.39	3.34	3.49	4.73	12.6	8.06	5.38	79.8	21.3	13.6	Slow floating carbon in cleaners

CURRAGH INC

Date: 01-Dec-97

Month to Date Production Summary

Date	Feed tonnes	Ore Type	Feed Pb	Feed Zn	Feed Fe	Feed Ag	Pb Concentrate tonnes	Pb Conc Pb	Pb Conc Zn	Pb Conc Ag	Zn Concentrate tonnes	Zn Conc Pb	Zn Conc Zn	Zn Conc Fe	Recoveries Pb	Recoveries Zn	Recoveries Ag(to Pb)	Loadout - DMT Pb	Loadout - DMT Zn	Loadout-WH20 Pb	Loadout-WH20 Zn	Loadout - Grades Pb	Loadout - Grades Zn	Loadout - Grades Ag(Pb)
01-Dec	2,590.65		2.51	4.15	13.20	35.00	84.70	52.90	9.69	670.00	152.25	2.15	44.20	12.20	68.90	62.59	62.59	6,530.18	9,940.01	6.10	2.46	60.60	50.10	680.00
02-Dec																								0.00
03-Dec																								0.00
04-Dec																								0.00
05-Dec																								0.00
06-Dec																								0.00
07-Dec																								0.00
08-Dec																								0.00
09-Dec																								0.00
10-Dec																								0.00
11-Dec																								0.00
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25-Dec																								0.00
26-Dec																								0.00
27-Dec																								0.00
28-Dec																								0.00
29-Dec																								0.00
30-Dec																								0.00
31-Dec																								0.00
MTD	2,590.65		2.51	4.15	13.20	35.00	84.70	52.90	9.69	670.00	152.25	2.15	44.20	12.20	68.90	62.59	62.59	6,530.18	9,940.01	6.10	2.46	60.60	50.10	680.00
YTD	3,347,934		3.11	4.56	24.74	43.54	128,099	62.73	5.24	607.82	236,649	2.65	49.22	10.37	77.25	76.25	53.42	129,620	239,859	6.22	6.91	61.98	49.70	603.42

10,735.51

2590
5799
8,389

65.0%

53%

- Pb and Zn did not build float
- Frozen ore lumps affected circuit – densities.
  – reagent additions
  – stability.
- graphite was amenable to depression by adding most collector to Pb cleans.
  – 4 stages of cleaning
  – must use Na_2CO_3 in roughers & cleaners.
- regrind circuit modifications required
- dewatering required. – steam to Pb conc.
  – better air flow through dryers.

Provisional RMT Only

13,526.13

02-DEC-92 03:54

	% PB	% ZN	% FE	% CU	% SOLIDS	SULFIDES TOTAL
-- PB CIRCUIT-----						
NO. 14 PB RO FD	2.46	4.46	10.36	*****	37.07	******
NO. 6 PB RO CONC	19.10	17.56	25.56	*****	*****	******
NO. 13 PB CONC	57.03	9.49	5.10	0.12	*****	90.32
NO. 2 PB 1ST CL TL	1.14	12.67	29.27	1.20	*****	85.35
NO. 7 PB SCAV TL I	0.66	5.41	20.10	*****	42.71	
NO. 8 PB SCAV TL G	0.94	6.86	19.17	*****	40.99	
-- ZN CIRCUIT------						
NO. 5 ZN RO CONC	*****	*****	*****	*****	*****	******
NO. 12 ZN CONC	2.29	51.36	9.42	0.30	15.00	95.64
NO. 11 ZN 1ST CL TL	1.24	*****	21.72	0.25	*****	
NO. 10 ZN SCAV TL	1.07	0.78	16.13	0.01	*****	
NO. 4 CIRCUIT TL	0.57	1.16	22.15	*****	11.21	
RECOVERIES	71.15	70.07				

3:55:29 COPPER Cu ASSAY, *Pb* ROUGHER CONC.