

006946

To Ron Murarka

File B-7-410

From Yvon Boudreau

Date August 10, 1984

Subject Aeration Testwork II - Project No: 84:06:FPurpose:

To optimize the results of Aeration Testwork I by changing the aeration time and by putting NaCN or Na_2SO_3 in the grind.

Conclusions:

The Pb recovery at 35% Pb grade stayed about the same as the previous testwork but the Zn and Ag circuits improved with a shorter aeration time.

NaCN in the grind helped the overall metallurgy. Grade and recovery are higher, and the Zn reporting to the Pb circuit has decreased.

Na_2SO_3 in the grind, instead of NaCN, yielded a corresponding metallurgy.

Recommendations:

Further testwork should be tried with the following parameters:

- different amounts of NaCN in the grind with increased aeration time.
- Na_2SO_3 as a replacement for NaCN in the grind.

Results and Discussion:

The aeration test series II was a follow up from the previous test series (Aeration I). In this testwork the aeration time was shortened to 10 minutes and one test was performed using Na_2SO_3 in the grind as a replacement for NaCN, (see Appendix III). These factors indicated to be beneficial in improving the grade and recovery of both the Pb and the Zn circuit, (see Table I).

In order to examine the behavior of Na_2SO_3 on the Pb and Zn circuit, further testwork should be done with different amounts of Na_2SO_3 and by changing the aeration time.

Aeration Testwork II - (Cont'd):

TABLE I
Testwork Conditions
2EF Ore

Test No.	Aeration Time (minutes)	Pb Circuit (g/tonne)				Zn Circuit (g/tonne)	
		NaCN	Z-11	Na ₂ CO ₃	Na ₂ SO ₃	CuSO ₄	Z-11
1	0	200	100	3000	0	700	100
2	10	0	100	"	0	"	100
3	10	100	100	"	0	"	100
4	10	0	50	"	0	"	50
5	0	0	100	"	0	"	100
6	10	0	100	"	1000	"	100
7	0	200	100	"	0	"	100

TABLE II
Recovery @35% Grade
2EF Ore

Test No.	Recovery @ 35% Pb Grade					Recovery @ 35% Zn GRADE		ZINC	
	Pb	Ag	Zn	LEAD K R		Zn	K R		
1	94.5	76.0	18.0	0.55	0.02	98.5	0.33	0.05	
2	91.5	74.0	20.0	0.61	0.38	96.5	0.49	0.07	
3	96.0	77.5	18.0	0.66	0.19	98.5	0.43	0.06	
4	92.0	75.0	21.0	0.37	0.32	98.5	0.45	0.45	
5	92.0	78.0	20.0	0.62	0.13	95.5	0.54	0.07	
6	94.0	76.0	20.0*	0.60	0.23	99.0	0.44	0.06	
7	94.5	77.5	18.0	0.55	0.01	98.5	0.38	0.07	

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APPENDIX I
GRADE RECOVERY CURVES

CYPRUS ANVIL MINING CORPORATION

TEST No: 1 to 7

OBJECTIVE: Observe effect of Aeration

DATE: July 23rd, 1984

CONDITIONS: test #1 & 2 sfd. rough or Tests

test #2 (laminar Aeration, no NaCN)

test #3 (" " , no NaCN)

test #4 (" " , no NaCN, 50% Z=1)

TITLE: Aeration Testwork II

LEGEND: xxx Test #1 *** test #6

ooo test #2 vvv test #7

test #3

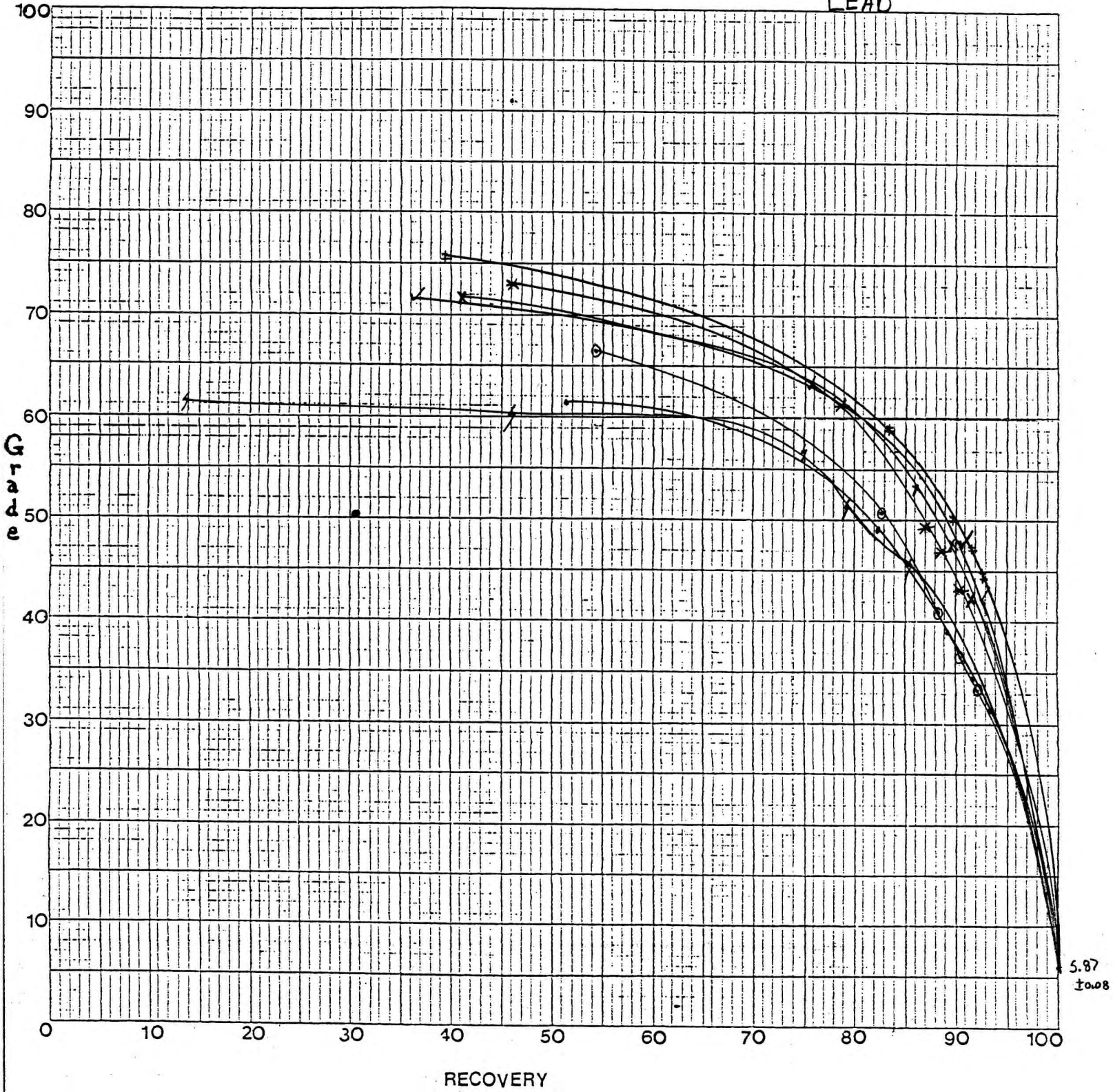
sss test #4

... test #5

test #5 (No Aeration, NaAcid)

test #6 (laminar " , no NaCN)

LEAD



5.87
1008

CYPRUS ANVIL MINING CORPORATION

TEST No: 1 to 7

OBJECTIVE: Observe effect of Aeration

DATE: July 22nd, 1984

CONDITIONS: test#1 (Std. rougher Tests)

test#2 (low air Aeration, No NaCN)

test#3 (" " " , 100g/l NaCN)

test#4 (" " " , No NaCN) - 50% 2-11)

TITLE: Aeration Testwork II

LEGEND: xxx test#1

xxx test#6

ooo test#2

vuv test#7

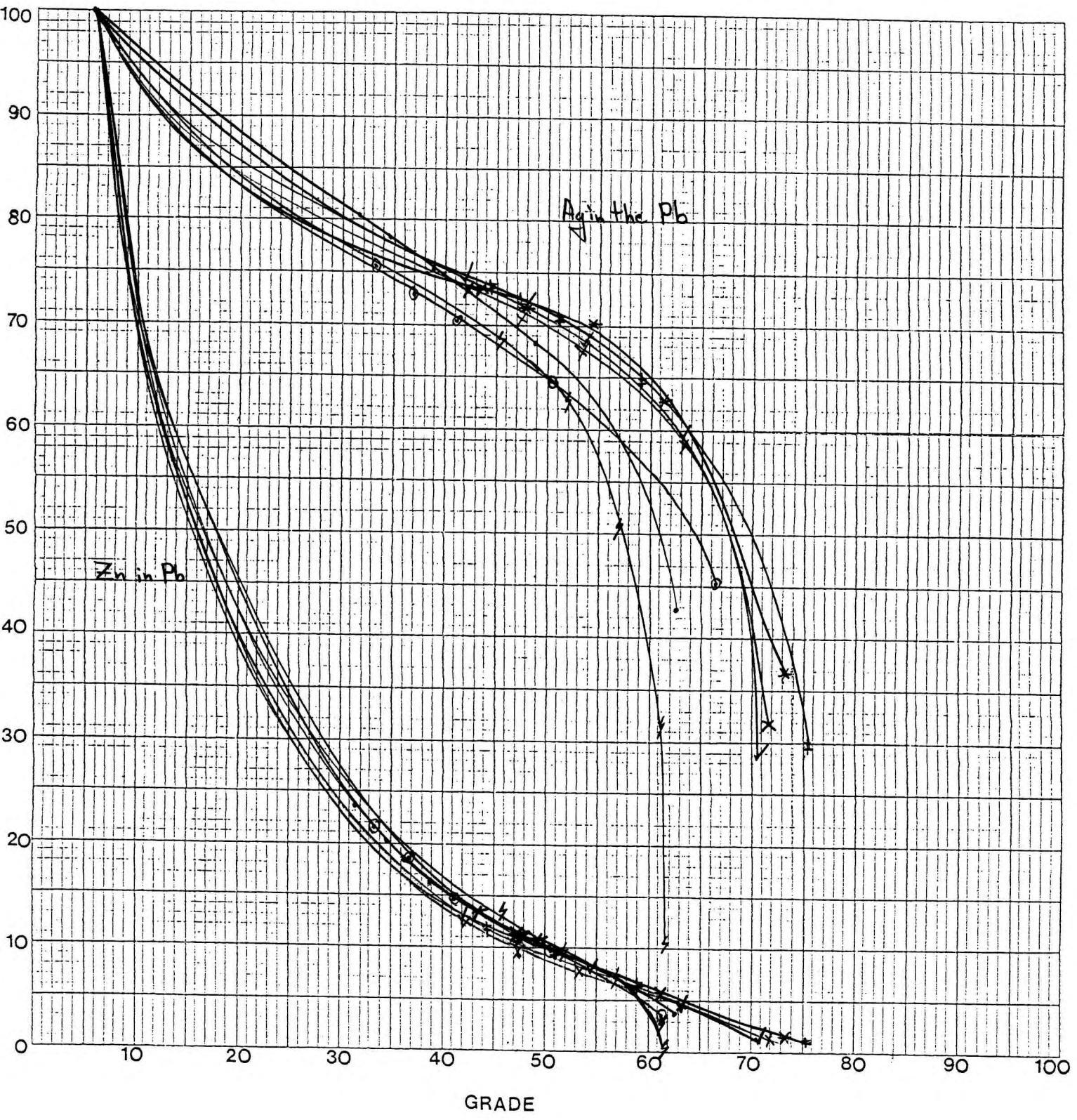
+++ test#3

/// test#4

... test#5

test#5 (No Aeration, No NaCN)

test#6 (low air " , 100g/l Na₂SO₃)



CYPRUS ANVIL MINING CORPORATION

TEST No: 1 to 7

OBJECTIVE: Observe effect of Aeration

DATE: July 23rd, 1984

CONDITIONS: test#1 (Std. rougher Tests)

test#2 (lamin Aeration, no NaCN)

test#3 (" " " , 10ppm NaCN)

test#4 (" " " , No NaCN, -50% Z-H)

test#5 (No Aeration, No NaCN)

test#6 (lamin " , 10ppm NaCN)

TITLE: Aeration Testwork II

LEGEND: XXX Test#1 XXX test#6

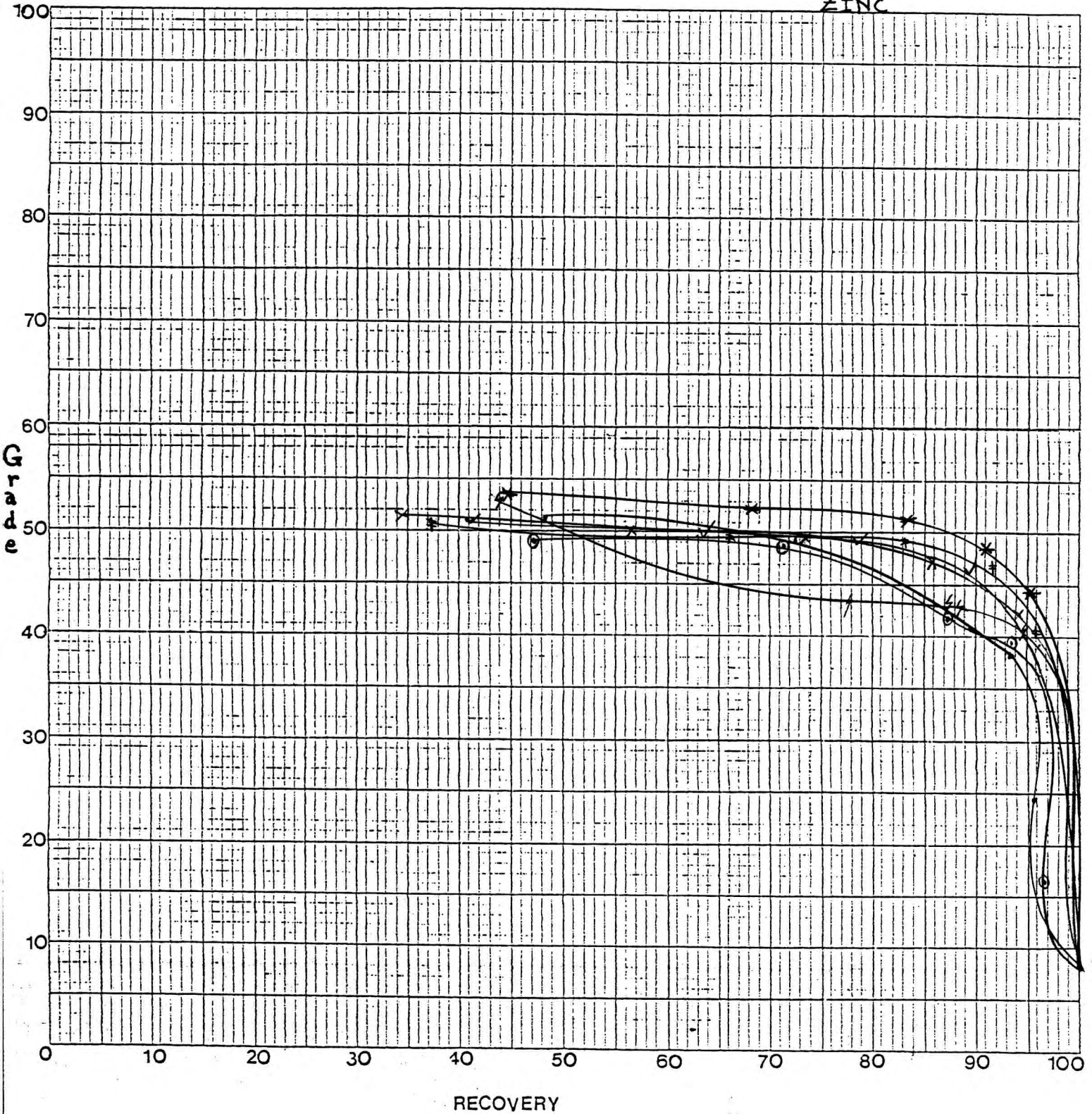
OOO test#2 VVV test#7

+++ test#3

\$\$\$ test#4

... test#5

ZINC



8.12
r.o. 22

APPENDIX II
COMPUTER PRINTOUTS

ROUGHER TEST

TEST #1

ZEF AERATION TESTWORK II
(STANDARD ROUGHER TEST)
D.K. CELL

PROJECT NO. 84:06:F

Pb CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Pb Rfr1	33.70	3.36	71.70	3.72	5.1	0.07	622.38	41.12	1.54	0.58	1.81	31.69	VALUES FOR Pb
Pb Rfr2	36.80	3.66	55.40	6.95	10.4	0.13	486.77	34.69	3.13	1.30	3.68	27.07	=====
Pb Scav1	24.60	2.45	24.50	10.37	21.4	0.22	235.76	10.26	3.13	1.79	4.16	8.76	K= 0.55
Pb Scav2	16.00	1.59	13.10	10.69	25.6	0.28	135.30	3.57	2.10	1.39	3.45	3.27	
Pb Scav3	16.90	1.68	7.59	10.45	27.3	0.35	89.58	2.18	2.16	1.56	4.55	2.29	R= 0.02
Accumulated													
Pb Rfr1	33.70	3.36	71.70	3.72	5.1	0.07	622.38	41.12	1.54	0.58	1.81	31.69	VALUES FOR Zn
Pb Rfr1+2	70.50	7.02	63.19	5.41	7.9	0.10	551.59	75.81	4.67	1.88	5.49	58.76	=====
Pb Rfr1+2+Scav1	95.10	9.47	53.18	6.69	14.8	0.13	469.90	86.06	7.80	3.67	9.66	67.52	K= 0.33
Pb Rfr1+2+Scav1+2	111.10	11.06	47.41	7.27	23.1	0.15	421.71	89.63	9.89	5.06	13.10	70.79	
Pb Rfr1+2+Scav1+2+3	128.00	12.75	42.15	7.69	26.5	0.18	377.86	91.81	12.06	6.62	17.65	73.08	R= 0.05
Pb Scav Tails	876.10	87.25	0.55	8.19	31.4	0.12	20.34	8.19	87.94	93.38	82.35	26.92	
Zn CIRCUIT													
=====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	Zn in the Zn (based on Zn cct. feed)
Zn Rfr1	48.20	4.80	0.38	51.40	10.4	0.20	32.35	0.31	30.37	1.70	7.41	2.36	34.53
Zn Rfr2	32.60	3.25	0.47	48.20	11.2	0.22	36.70	0.26	19.26	1.24	5.52	1.81	21.90
Zn Scav1	25.70	2.56	0.73	47.30	12.7	0.27	36.70	0.32	14.90	1.11	5.34	1.43	16.94
Zn Scav2	24.10	2.40	1.43	37.20	16.7	0.31	48.52	0.59	10.99	1.36	5.75	1.77	12.50
Zn Scav3	29.20	2.91	1.73	20.50	24.9	0.39	46.66	0.86	7.34	2.47	8.76	2.06	8.34
Accumulated													
Zn Rfr1	48.20	4.80	0.38	51.40	10.4	0.20	32.35	0.31	30.37	1.70	7.41	2.36	34.53
Zn Rfr1+2	80.80	8.05	0.42	50.11	10.7	0.21	34.10	0.57	49.62	2.94	12.93	4.16	56.43
Zn Rfr1+2+Scav1	106.50	10.61	0.49	49.43	11.9	0.22	34.73	0.89	64.52	4.04	18.27	5.59	73.37
Zn Rfr1+2+Scav1+2	130.60	13.01	0.67	47.17	14.6	0.24	37.28	1.48	75.51	5.41	24.01	7.36	85.87
Zn Rfr1+2+Scav1+2+3	159.80	15.91	0.86	42.30	14.5	0.27	38.99	2.34	82.85	7.88	32.77	9.41	94.21
Final Tails	716.30	71.34	0.48	0.58	35.2	0.09	16.17	5.85	5.09	85.50	49.58	17.51	
Calc Feed	1004.10	100.00	5.85	8.13	29.4	0.13	65.91	100.00	100.00	100.00	100.00	100.00	
Head Assay			5.38	8.02	29.3	0.12	65.94						

ROUGHER TEST

TEST #2

2EF AERATION TESTWORK II
(10 MIN. AERATION & NO NACH)
O.K. CELL

PROJECT NO. 84:06:F

Pb CIRCUIT

=====

Pb Rfr1

Pb Rfr2

Pb Scav1

Pb Scav2

Pb Scav3

Accumulated

Pb Rfr1

Pb Rfr1+2

Pb Rfr1+2+Scav1

Pb Rfr1+2+Scav1+2

Pb Rfr1+2+Scav1+2+3

Pb Scav Tails

Zn CIRCUIT

=====

Zn Rfr1

Zn Rfr2

Zn Scav1

Zn Scav2

Zn Scav3

Accumulated

Zn Rfr1

Zn Rfr1+2

Zn Rfr1+2+Scav1

Zn Rfr1+2+Scav1+2

Zn Rfr1+2+Scav1+2+3

Final Tails

Calc Feed

Head Assay

MASS
(GM)

WT. (%)

ASSAYS (%)

Pb

Zn

Fe

Cu

Ag (g/t)

DISTRIBUTION (%)

Pb

Zn

Fe

Cu

Ag

VALUES FOR Pb

=====

K= 0.61

R= 0.38

VALUES FOR Zn

=====

K= 0.49

R= 0.07

Zn in the Zn
(based on Zn cct. feed)

47.18

24.15

15.76

6.53

2.77

47.18

71.33

87.09

93.62

96.39

47.50

4.74

66.40

5.25

6.4

0.62

543.69

54.18

3.15

1.03

23.08

40.20

48.10

4.80

34.50

11.00

17.7

0.65

323.79

28.51

6.68

2.88

24.50

24.25

29.40

2.94

10.99

13.60

25.2

0.40

126.59

5.55

5.05

2.51

9.22

5.79

17.30

1.73

7.30

14.70

27.4

0.28

98.60

2.17

3.21

1.60

3.80

2.66

18.20

1.82

5.55

14.80

27.5

0.23

85.22

1.74

3.40

1.69

3.28

2.41

47.50

4.74

66.40

5.25

6.4

0.62

543.69

54.18

3.15

1.03

23.08

40.20

95.60

9.55

50.35

8.14

12.1

0.64

433.05

82.69

9.83

3.91

47.58

64.45

125.00

12.49

41.09

9.43

20.5

0.58

360.97

88.24

14.87

6.42

56.80

70.24

142.30

14.21

36.98

10.07

26.0

0.54

329.07

90.41

18.08

8.02

60.60

72.90

160.50

16.03

33.42

10.60

27.5

0.51

301.42

92.14

21.48

9.72

63.88

75.31

640.60

83.97

0.54

7.40

31.7

0.05

18.86

7.86

78.52

90.28

36.12

24.69

59.90

5.98

0.39

49.00

10.8

0.13

25.82

0.40

37.05

2.19

6.10

2.41

31.30

3.13

0.61

48.00

12.3

0.17

32.97

0.33

18.96

1.30

4.17

1.61

38.30

3.83

0.73

25.60

23.8

0.12

30.79

0.48

12.38

3.09

3.60

1.84

17.00

1.70

1.46

23.90

27.0

0.17

42.30

0.43

5.13

1.55

2.26

1.12

226.80

22.66

0.36

0.76

38.0

0.03

14.93

1.40

2.18

29.17

5.33

5.27

59.90

5.98

0.39

49.00

10.8

0.13

25.82

0.40

37.05

2.19

6.10

2.41

91.20

9.11

0.47

48.66

11.3

0.14

28.27

0.73

56.01

3.49

10.27

4.01

129.50

12.94

0.54

41.84

18.6

0.14

29.02

1.21

68.38

6.58

13.88

5.85

146.50

ROUGHER TEST

TEST #3

2EF AERATION TESTWORK II
 (10 MIN. AERATION & 100g/t NACN IN GRIND)
 O.K. CELL PROJECT NO. 84:06:F

Pb CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					VALUES FOR Pb =====
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Pb Rfr1	31.30	3.11	75.10	3.13	3.0	0.06	672.15	39.46	1.19	0.32	1.44	29.84	K= 0.66 R= 0.19
Pb Rfr2	53.00	5.27	49.50	8.35	11.4	0.16	461.58	44.04	5.37	2.06	6.49	34.70	
Pb Scav1	20.60	2.05	18.30	10.87	23.5	0.34	194.09	6.33	2.72	1.65	5.36	5.67	
Pb Scav2	10.40	1.03	10.33	11.00	26.2	0.49	125.97	1.80	1.39	0.93	3.90	1.86	
Pb Scav3	9.30	0.92	7.26	10.72	27.5	0.66	102.64	1.13	1.21	0.87	4.70	1.35	
Accumulated													
Pb Rfr1	31.30	3.11	75.10	3.13	3.0	0.06	672.15	39.46	1.19	0.32	1.44	29.84	VALUES FOR Zn ===== K= 0.43 R= 0.06
Pb Rfr1+2	84.30	8.38	59.01	6.41	8.3	0.12	539.76	83.50	6.56	2.38	7.92	64.54	
Pb Rfr1+2+Scav1	104.90	10.43	51.01	7.29	14.8	0.17	471.88	89.82	9.28	4.02	13.28	70.21	
Pb Rfr1+2+Scav1+2	115.30	11.46	47.34	7.62	24.4	0.19	440.68	91.63	10.67	4.95	17.18	72.07	
Pb Rfr1+2+Scav1+2+3	124.60	12.39	44.35	7.85	26.8	0.23	415.45	92.76	11.88	5.82	21.88	73.42	
Pb Scav Tails	881.10	87.61	0.49	8.23	31.4	0.12	21.27	7.24	88.12	94.18	78.12	26.58	
Zn CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					Zn in the Zn (based on Zn cct. feed)
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Zn Rfr1	53.70	5.34	0.38	50.40	10.7	0.19	30.79	0.34	32.87	1.96	7.81	2.35	37.30
Zn Rfr2	42.50	4.23	0.48	49.00	10.6	0.23	38.57	0.34	25.29	1.53	7.48	2.32	28.70
Zn Scav1	25.40	2.53	0.77	48.80	12.4	0.28	41.06	0.33	15.05	1.07	5.44	1.48	17.08
Zn Scav2	19.30	1.92	1.10	32.90	18.3	0.37	45.72	0.36	7.71	1.20	5.46	1.25	8.75
Zn Scav3	32.10	3.19	1.41	9.39	30.5	0.35	43.86	0.76	3.66	3.33	8.60	2.00	4.15
Accumulated													
Zn Rfr1	53.70	5.34	0.38	50.40	10.7	0.19	30.79	0.34	32.87	1.96	7.81	2.35	37.30
Zn Rfr1+2	96.20	9.57	0.42	49.78	10.7	0.21	34.23	0.68	58.16	3.49	15.28	4.67	66.01
Zn Rfr1+2+Scav1	121.60	12.09	0.50	49.58	11.3	0.22	35.65	1.01	73.22	4.56	20.73	6.15	83.09
Zn Rfr1+2+Scav1+2	140.90	14.01	0.58	47.29	14.9	0.24	37.03	1.37	80.93	5.76	26.19	7.40	91.84
Zn Rfr1+2+Scav1+2+3	173.00	17.20	0.73	40.26	15.4	0.26	38.30	2.13	84.59	9.10	34.78	9.40	96.00
Final Tails	708.10	70.41	0.43	0.41	35.3	0.08	17.11	5.11	3.53	85.08	43.34	17.18	
Calc Feed	1005.70	100.00	5.92	8.19	29.2	0.13	70.10	100.00	100.00	100.00	100.00	100.00	
Head Assay			5.56	8.29	29.0	0.12	66.25						

ROUGHER TEST

TEST #4

ZEF AERATION TESTWORK II
(10 MIN. AERATION , NO NACN & 50% LESS Z-11)
O.K. CELL PROJECT NO. 84:06:F

Pb CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Pb Rfr1	13.40	1.33	61.50	5.39	7.7	1.27	578.52	13.79	0.86	0.35	12.62	10.85	VALUES FOR Pb
Pb Rfr2	26.40	2.63	60.90	6.75	7.8	1.06	563.91	26.90	2.13	0.71	20.76	20.84	=====
Pb Scav1	38.70	3.85	52.70	9.03	10.5	0.50	496.41	34.13	4.17	1.40	14.35	26.90	K= 0.37
Pb Scav2	13.20	1.31	19.70	17.90	19.7	0.61	218.97	4.35	2.82	0.89	5.97	4.05	
Pb Scav3	19.90	1.98	18.10	15.70	21.2	0.26	193.77	6.03	3.73	1.45	3.84	5.40	R= 0.32
Accumulated													
Pb Rfr1	13.40	1.33	61.50	5.39	7.7	1.27	578.52	13.79	0.86	0.35	12.62	10.85	VALUES FOR Zn
Pb Rfr1+2	39.80	3.96	61.10	6.29	7.8	1.13	568.83	40.70	2.99	1.06	33.38	31.70	=====
Pb Rfr1+2+Scav1	78.50	7.82	56.96	7.64	9.4	0.82	533.13	74.82	7.16	2.46	47.73	58.60	K= 0.45
Pb Rfr1+2+Scav1+2	91.70	9.13	51.60	9.12	12.8	0.79	487.90	79.18	9.98	3.35	53.71	62.65	
Pb Rfr1+2+Scav1+2+3	111.60	11.11	45.62	10.29	20.6	0.70	435.46	85.20	13.71	4.80	57.54	68.04	R= 0.45
Pb Scav Tails	892.70	88.89	0.99	8.09	31.1	0.06	25.57	14.80	86.29	95.20	12.46	31.96	
Zn CIRCUIT													
Zn CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					Zn in the Zn (based on Zn cct. feed)
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Zn Rfr1	59.70	5.94	0.67	53.20	9.5	0.15	35.46	0.67	37.92	1.95	6.64	2.96	43.95
Zn Rfr2	70.10	6.98	1.40	34.70	17.8	0.16	36.39	1.64	29.05	4.28	8.32	3.57	33.66
Zn Scav1	14.60	1.45	2.19	47.90	11.6	0.23	51.63	0.54	8.35	0.58	2.49	1.06	9.68
Zn Scav2	2.30	0.23	4.48	34.10	15.3	0.30	90.20	0.17	0.94	0.12	0.51	0.29	1.09
Zn Scav3	21.20	2.11	3.11	21.50	22.8	0.19	55.99	1.10	5.44	1.66	2.99	1.66	6.31
Accumulated													
Zn Rfr1	59.70	5.94	0.67	53.20	9.5	0.15	35.46	0.67	37.92	1.95	6.64	2.96	43.95
Zn Rfr1+2	129.80	12.92	1.06	43.21	14.0	0.16	35.96	2.31	66.97	6.23	14.96	6.54	77.61
Zn Rfr1+2+Scav1	144.40	14.38	1.18	43.68	16.7	0.16	37.55	2.85	75.32	6.81	17.45	7.59	87.29
Zn Rfr1+2+Scav1+2	146.70	14.61	1.23	43.53	12.1	0.17	38.37	3.02	76.26	6.93	17.96	7.88	88.38
Zn Rfr1+2+Scav1+2+3	167.90	16.72	1.47	40.75	14.9	0.17	40.60	4.12	81.70	8.59	20.95	9.54	94.68
Final Tails	724.80	72.17	0.88	0.53	34.8	0.04	22.08	10.67	4.59	86.61	21.50	22.41	
Calc Feed	1004.30	100.00	5.95	8.34	29.0	0.13	71.11	100.00	100.00	100.00	100.00	100.00	
Head Assay			5.55	8.08	29.0	0.12	66.25						

ROUGHER TEST

TEST #5

ZEF AERATION TESTWORK II

(NO AERATION, NO NACN)

O.K. CELL PROJECT NO. B4:06:F

Pb CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Pb Rfr1	47.80	4.76	62.50	6.10	7.8	0.70	574.48	51.38	3.58	1.28	24.37	42.62	VALUES FOR Pb
Pb Rfr2	49.90	4.97	35.80	11.38	16.4	0.71	331.25	30.73	6.97	2.81	25.80	25.66	=====
Pb Scavi	35.40	3.53	11.51	13.60	25.2	0.34	125.35	7.01	5.91	3.07	8.77	6.89	K= 0.62
Pb Scav2	21.40	2.13	7.22	14.80	26.5	0.24	92.69	2.66	3.89	1.95	3.74	3.08	
Pb Scav3	17.00	1.69	4.77	14.30	27.7	0.19	72.47	1.39	2.98	1.62	2.35	1.91	R= 0.13
Accumulated													
Pb Rfr1	47.80	4.76	62.50	6.10	7.8	0.70	574.48	51.38	3.58	1.28	24.37	42.62	VALUES FOR Zn
Pb Rfr1+2	97.70	9.73	48.86	8.80	12.2	0.71	450.25	82.11	10.54	4.10	50.17	68.28	=====
Pb Rfr1+2+Scavi	133.10	13.26	38.93	10.07	20.1	0.61	363.84	89.12	16.45	7.16	58.94	75.17	K= 0.54
Pb Rfr1+2+Scavi+2	154.50	15.39	34.54	10.73	25.7	0.56	326.28	91.78	20.33	9.11	62.68	78.25	
Pb Rfr1+2+Scavi+2+3	171.50	17.08	31.59	11.08	27.0	0.52	301.12	93.17	23.32	10.73	65.03	80.16	R= 0.07
Pb Scav Tails	832.40	82.92	0.48	7.51	31.2	0.06	15.36	6.83	76.68	89.27	34.97	19.84	
Zn CIRCUIT													
=====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					Zn in the Zn (based on Zn cct. feed)
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Zn Rfr1	59.00	5.88	0.39	51.20	10.8	0.15	25.19	0.40	37.06	2.19	6.45	2.31	48.32
Zn Rfr2	32.40	3.23	0.56	46.60	11.8	0.17	33.59	0.31	18.52	1.31	4.01	1.69	24.15
Zn Scavi	45.60	4.54	0.76	23.40	25.6	0.12	27.68	0.60	13.09	4.01	3.99	1.96	17.07
Zn Scav2	16.20	1.61	1.02	15.60	28.3	0.12	32.35	0.28	3.10	1.58	1.42	0.81	4.04
Zn Scav3	92.90	9.25	0.44	1.41	37.1	0.03	12.13	0.70	1.61	11.85	2.03	1.75	2.10
Accumulated													
Zn Rfr1	59.00	5.88	0.39	51.20	10.8	0.15	25.19	0.40	37.06	2.19	6.45	2.31	48.32
Zn Rfr1+2	91.40	9.10	0.45	49.57	11.2	0.16	28.17	0.71	55.58	3.50	10.46	4.00	72.48
Zn Rfr1+2+Scavi	137.00	13.65	0.55	40.86	19.9	0.14	28.01	1.30	68.67	7.52	14.44	5.96	89.55
Zn Rfr1+2+Scavi+2	153.20	15.26	0.60	38.19	26.3	0.14	28.47	1.59	71.77	9.09	15.86	6.77	93.59
Zn Rfr1+2+Scavi+2+3	246.10	24.51	0.54	24.30	24.8	0.10	22.30	2.29	73.38	20.94	17.89	8.52	95.69
Final Tails	586.30	58.40	0.45	0.46	33.9	0.04	12.44	4.54	3.31	68.33	17.08	11.32	
Calc Feed	1003.90	100.00	5.79	8.12	29.0	0.14	64.17	100.00	100.00	100.00	100.00	100.00	
Head Assay			5.45	8.23	29.7	0.12	60.65						

ROUGHER TEST

TEST #6

2EF AERATION TESTWORK II
 (10 MIN. AERATION, 1000g/t Na₂S₂O₃ IN GRIND)
 O.K. CELL PROJECT NO. B4:06:F

Pb CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Pb Rfr1	36.90	3.67	73.30	3.73	4.2	0.49	660.02	46.03	1.65	0.52	13.07	36.65	VALUES FOR Pb
Pb Rfr2	38.70	3.85	49.70	8.87	12.5	0.90	451.00	32.73	4.11	1.62	25.18	26.27	=====
Pb Scav1	28.30	2.82	17.10	12.70	23.1	0.61	169.20	8.24	4.31	2.19	12.48	7.21	K= 0.60
Pb Scav2	6.10	0.61	15.90	15.80	22.2	0.72	172.94	1.65	1.15	0.45	3.18	1.59	
Pb Scav3	13.00	1.29	8.19	13.30	27.1	0.39	98.91	1.81	2.07	1.18	3.67	1.94	R= 0.23
Accumulated													
Pb Rfr1	36.90	3.67	73.30	3.73	4.2	0.49	660.02	46.03	1.65	0.52	13.07	36.65	VALUES FOR Zn
Pb Rfr1+2	75.60	7.52	61.22	6.36	8.4	0.70	553.02	78.76	5.76	2.14	38.25	62.92	=====
Pb Rfr1+2+Scav1	103.90	10.34	49.20	8.09	17.0	0.68	448.48	87.00	10.07	4.34	50.73	70.12	K= 0.44
Pb Rfr1+2+Scav1+2	110.00	10.95	47.36	8.52	22.9	0.68	433.20	88.65	11.22	4.79	53.90	71.71	
Pb Rfr1+2+Scav1+2+3	123.00	12.24	43.22	9.02	25.5	0.65	397.87	90.46	13.30	5.97	57.57	73.65	R= 0.06
Pb Scav Tails	881.90	87.76	0.64	8.20	31.8	0.07	19.86	9.54	86.70	94.03	42.43	26.35	
Zn CIRCUIT													
Zn CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					Zn in the Zn (based on Zn cct. feed)
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Zn Rfr1	60.40	6.01	0.52	53.60	9.8	0.17	27.68	0.53	38.79	1.99	7.42	2.52	44.74
Zn Rfr2	33.80	3.36	0.86	50.00	10.2	0.19	39.50	0.49	20.25	1.16	4.64	2.01	23.36
Zn Scav1	22.80	2.27	1.13	48.40	12.3	0.22	39.50	0.44	13.22	0.94	3.63	1.36	15.25
Zn Scav2	19.90	1.98	1.94	28.40	21.4	0.21	46.66	0.66	6.77	1.43	3.02	1.40	7.81
Zn Scav3	18.80	1.87	2.32	15.10	28.1	0.20	49.45	0.74	3.40	1.77	2.72	1.40	3.92
Accumulated													
Zn Rfr1	60.40	6.01	0.52	53.60	9.8	0.17	27.68	0.53	38.79	1.99	7.42	2.52	44.74
Zn Rfr1+2	94.20	9.37	0.64	52.31	9.9	0.18	31.92	1.03	59.04	3.14	12.07	4.53	68.10
Zn Rfr1+2+Scav1	117.00	11.64	0.74	51.55	11.0	0.19	33.40	1.47	72.27	4.08	15.69	5.88	83.35
Zn Rfr1+2+Scav1+2	136.90	13.62	0.91	48.18	16.5	0.19	35.33	2.12	79.04	5.51	18.71	7.28	91.16
Zn Rfr1+2+Scav1+2+3	155.70	15.49	1.08	44.19	13.9	0.19	37.03	2.87	82.44	7.29	21.43	8.68	95.08
Final Tails	726.20	72.27	0.54	0.49	35.6	0.04	16.17	6.67	4.26	86.74	21.00	17.68	
Calc Feed	1004.90	100.00	5.85	8.30	29.7	0.14	66.12	100.00	100.00	100.00	100.00	100.00	
Head Assay			5.46	8.35	29.7	0.12	60.65						

ROUGHER TEST

TEST #7

2EF AERATION TESTWORK II
(STANDARD ROUGHER TEST)

O.K. CELL PROJECT NO. 84:06:F

Pb CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Pb Rfr1	30.50	3.05	70.40	3.86	4.7	0.08	643.84	36.18	1.45	0.51	1.92	28.71	VALUES FOR Pb =====
Pb Rfr2	40.40	4.04	57.40	6.67	9.0	0.12	515.38	39.08	3.33	1.28	3.82	30.45	
Pb Scav1	23.60	2.36	28.30	9.99	18.8	0.21	258.47	11.25	2.91	1.57	3.90	8.92	K= 0.55
Pb Scav2	18.90	1.89	13.40	10.77	24.0	0.28	134.06	4.27	2.51	1.60	4.17	3.70	
Pb Scav3	17.80	1.78	6.60	10.74	26.5	0.38	77.45	1.98	2.36	1.67	5.32	2.02	R= 0.01

Accumulated

Pb Rfr1	30.50	3.05	70.40	3.86	4.7	0.08	643.84	36.18	1.45	0.51	1.92	28.71	VALUES FOR Zn =====
Pb Rfr1+2	70.90	7.09	62.99	5.46	7.2	0.10	570.64	75.26	4.78	1.79	5.74	59.16	
Pb Rfr1+2+Scav1	94.50	9.45	54.33	6.59	12.6	0.13	492.68	86.52	7.69	3.36	9.64	68.08	K= 0.38
Pb Rfr1+2+Scav1+2	113.40	11.34	47.51	7.29	21.1	0.15	432.91	90.78	10.20	4.96	13.80	71.79	
Pb Rfr1+2+Scav1+2+3	131.20	13.12	41.96	7.76	25.2	0.19	384.69	92.76	12.56	6.62	19.13	73.80	R= 0.07

Pb Scav Tails

Pb Scav Tails	868.50	86.88	0.49	8.16	30.4	0.12	20.63	7.24	87.44	93.38	80.87	26.20
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Zn CIRCUIT

Zn CIRCUIT =====	MASS (GM)	WT. (%)	ASSAYS (%)					DISTRIBUTION (%)					Zn in the Zn (based on Zn cct. feed)
			Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	
Zn Rfr1	57.20	5.72	0.39	50.80	9.9	0.19	32.35	0.38	35.86	2.00	8.55	2.71	41.01
Zn Rfr2	32.90	3.29	0.53	48.20	10.6	0.22	33.28	0.29	19.57	1.23	5.70	1.60	22.38
Zn Scav1	23.10	2.31	0.75	46.20	12.5	0.28	39.50	0.29	13.17	1.02	5.09	1.33	15.06
Zn Scav2	23.10	2.31	0.97	33.40	17.9	0.33	41.37	0.38	9.52	1.46	6.00	1.40	10.89
Zn Scav3	38.60	3.86	1.34	11.48	28.6	0.39	43.23	0.87	5.47	3.90	11.85	2.44	6.25

Accumulated

Zn Rfr1	57.20	5.72	0.39	50.80	9.9	0.19	32.35	0.38	35.86	2.00	8.55	2.71	41.01
Zn Rfr1+2	90.10	9.01	0.44	49.85	10.2	0.20	32.69	0.67	55.43	3.23	14.25	4.31	63.39
Zn Rfr1+2+Scav1	113.20	11.32	0.50	49.11	11.4	0.22	34.08	0.96	68.60	4.25	19.34	5.64	78.45
Zn Rfr1+2+Scav1+2	136.30	13.63	0.58	46.44	15.2	0.24	35.31	1.34	78.12	5.71	25.34	7.04	89.34
Zn Rfr1+2+Scav1+2+3	174.90	17.50	0.75	38.73	15.6	0.27	37.06	2.21	83.59	9.61	37.19	9.48	95.59

Final Tails

Final Tails	693.60	69.38	0.43	0.45	34.2	0.08	16.48	5.03	3.85	83.77	43.68	16.72
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Calc Feed

Calc Feed	999.70	100.00	5.94	8.11	28.3	0.13	68.41	100.00	100.00	100.00	100.00	100.00
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APPENDIX III

REAGENT SCHEMES

TEST NO.: 187

PURPOSE: Aeration Testwork II

PROCEDURE: Standard Rougher Tests

FEED: 2 F O R E

GRIND: 10 1/2 minute primary

STAGE	REAGENTS ADDED (g/t)								TIME (MIN)			SCAV TL P80 ^u	PH	
	Na ₂ CO ₃	Na ₂ SO ₃	NaCN	Zn	CuSO ₄	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FINISH
PRIMARY GRIND	3000		200	60					8 1/2					
PbRo ₁							1				1	9.9	10.0	
PbRo ₂							1				2			
PbSc ₁				20			1				2			
PbSc ₂							1				2			
PbSc ₃				20			1				3			
Zn COND.				60	700					8		9.9	9.7	
										2			end	
ZnRo ₁							1				1			
ZnRo ₂							1				2			
ZnSc ₁				20			1				2			
ZnSc ₂							1				2			
ZnSc ₃				20			1				3			

TEST NO.: 2

PURPOSE: Aeration Testwork II

PROCEDURE: Std. Raagher Test with 10 minutes aeration & Na₂NaCN in the grind.

FEED: 2EF ore

GRIND: 10 1/2 minute primary

STAGE	REAGENTS ADDED (g/t):								TIME (MIN)			SCAV TL P ₈₀ ^μ	PH	
	Na ₂ CO ₃	Na ₂ SO ₃	NaCN	Z-11	CuSO ₄	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FINIS
PRIMARY GRIND	<u>3000</u>								<u>10 1/2</u>					
PbRo ₁				<u>60</u>			<u>1</u>			<u>10 Air</u>	<u>1</u>	<u>9.83</u>	<u>10.2</u>	
PbRo ₂							<u>1</u>				<u>1</u>			
PbSc ₁				<u>20</u>			<u>1</u>				<u>1</u>			
PbSc ₂							<u>1</u>				<u>1</u>			
PbSc ₃				<u>20</u>			<u>1</u>				<u>3</u>			
Zn COND.				<u>60</u>	<u>700</u>					<u>8</u> <u>2</u>		<u>Start</u> <u>11.00</u>	<u>after CuSO₄</u> <u>11.00</u> <u>end</u>	
ZnRo ₁							<u>1</u>				<u>1</u>			
ZnRo ₂							<u>1</u>				<u>2</u>			
ZnSc ₁				<u>20</u>			<u>1</u>				<u>1</u>			
ZnSc ₂							<u>1</u>				<u>1</u>			
ZnSc ₃				<u>20</u>			<u>1</u>				<u>3</u>			

TEST NO.: 3

PURPOSE: Aeration Testwork II

PROCEDURE: Std Rougher Test with 50% less NaCN & 10 minutes of Aeration

FEED: 2 EF ORE

GRIND: 1 1/2 minute primary

STAGE	REAGENTS ADDED (g/t):								TIME (MIN)			SCAV TL P ₈₀ ^H	PH	
	Na ₂ CO ₃	Na ₂ SO ₃	NaCN	Zn	CuSO ₄	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FINISH
PRIMARY GRIND	3000		100						10%					
PbRo ₁				60			1			1 min air	1	9.9	10.0	
PbRo ₂							1							
PbSc ₁				20			1				1			
PbSc ₂							1				2			
PbSc ₃				20			1				3			
Zn COND.				60	700						8 2	Start 9.8	after aeration 9.6 11.0 end	
ZnRo ₁							1				1			
ZnRo ₂							1				2			
ZnSc ₁				20			1				2			
ZnSc ₂							1				2			
ZnSc ₃				20			1				3			

ROUGHER TEST

TEST NO.: 4

PURPOSE: Aeration Testwork II

PROCEDURE: Std Rougher but with No NaCN, 50% less Z-11 and 6 minute Aeration

FEED: JEF ORE

GRIND: 10 1/2 minute primary

STAGE	REAGENTS ADDED (g/t):								TIME (MIN)			SCAV TL P 80 ^u	PH	
	Na ₂ CO ₃	Na ₂ SO ₃	NaCN	Z-11	CuSO ₄	CaO	MLBC drops	DOW drops	GRIND	COND	FROTH		START	FINISH
PRIMARY GRIND	300g								18 1/2					
PbRo ₁				30						1		9.8	10.0	
PbRo ₂										2				
PbSc ₁				10						2				
PbSc ₂										2				
PbSc ₃				10						3				
Zn COND.				30	700					2		Start	After 60 sec	
ZnRo ₁										1			end	
ZnRo ₂										2				
ZnSc ₁				10						2				
ZnSc ₂										2				
ZnSc ₃				10						3				

MUGGER TEST

TEST NO.: 5

PURPOSE: Aeration Testwork II

PROCEDURE: Std Raughter with No NaCN & No Aeration

FEED: SEE OAE

GRIND: 10 1/2 minute primary

STAGE	REAGENTS ADDED (g/t):								TIME (MIN)			SCAV TL P 80 ^u	PH	
	Na ₂ CO ₃	Na ₂ SO ₃	NaCN	Zn	CuSO ₄	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FINAL
PRIMARY GRIND	2000								10 1/2					
PbRo ₁				60			1				1	9.7	10.1	
PbRo ₂							1				2			
PbSc ₁				20			1				2			
PbSc ₂							1				2			
PbSc ₃				20							3			
Zn COND.				60	700						8 2	Start 9.9	after 60 sec 11.0 end	
ZnRo ₁							1				1			
ZnRo ₂							1				2			
ZnSc ₁				20			1				2			
ZnSc ₂											2			
ZnSc ₃				20							3			

TEST NO.: 6

PURPOSE: Aeration Testwork II

PROCEDURE: Stdraugher with 100g / t Na₂SO₃ & 4 minute aeration

FEED: 2EFORE

GRIND: 10 1/2 minute primary

STAGE	REAGENTS ADDED (G/T):								TIME (MIN)			SCAV TL P ₈₀ ^μ	PH	
	Na ₂ CO ₃	Na ₂ SO ₃	NaCN	Z-11	CuSO ₄	CaO	MIBC drops	DOW drops	GRIND	COND	PROTH		START	FINISH
PRIMARY GRIND	3000	1000							10 1/2					
PbRo ₁				60			1			10 min	1	9.8	10.0	
PbRo ₂							1				2			
PbSc ₁				20			1				1			
PbSc ₂											2			
PbSc ₃				20			1				3			
Zn COND.				60	700						8	Start	After 10 min	
											2	9.8	9.6	
ZnRo ₁							1				1			
ZnRo ₂							1				2			
ZnSc ₁				20							2			
ZnSc ₂							1				2			
ZnSc ₃				20			1				3			