

006947

To Ron MurarkaFile B-7-410From Yvon BoudreauDate June 26, 1984Subject Aeration Tests on 2EF Ore with Outokompu CellPurpose:

To determine if aeration is beneficial in improving the metallurgical results.

Conclusions:

The standard tests were the best in both Pb and Zn circuits.

With increased aeration time the Zn in the Pb increased, by as much as 2% and the Ag by 3%.

A definite drop in the Zn recovery was apparent with increasing aeration time.

Recommendations:

Further testwork should be tried with the following conditions:

- i) shorter aeration time
- ii) 50% NaCN addition after aeration is complete, then condition and then add the right amount of collector
- iii) change the amount of NaCN and Z-11 to the circuits
- iv) add  $\text{Na}_2\text{SO}_3$  to improve the Zn circuit

Analysis and Discussion:

All of the testwork was done on the O.K. cell. There was no NaCN or Z-11 added to the grind because aeration would have supported frothing of the slurry.

In the Pb circuit, the longer aeration period gave values very close to the ones obtained from the Standards; but in the Zn circuit the trend is opposite. See Appendix I.

The Ag grade and recovery improved with longer aeration time, but as aeration time increases so does the Zn that reports to the Pb circuit.

Analysis and Discussion - (Cont'd):

An oxygen demand curve was prepared to determine the rate at which the sulphide ore would consume the dissolved oxygen in order to improve pyrite rejection by surface oxidation.

By looking at the graph, the rate of oxygen consumption is fast initially and then starts to level off after 30 minutes. The overall observation was that in this series of tests, aeration was beneficial for Pb and Ag but, detrimental to the Zn circuit. Further testwork should be conducted to optimize aeration. See Appendix I.

TABLE I

Recoveries @ 25% and 35% Grades

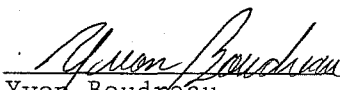
Test No.		2	3	4	5	6
Recovery @ 25% Pb Grade	Pb	93	94	94.5	93	97
	Zn	22	25	29.5	28	23
	Ag	80	80	79	81	79
35% Pb Grade	Pb	91	88	90	91	93
	Zn	15	16.5	18	18	16
	Ag	74	73	74	77	75
Rate Constant (K)		0.64	0.69	0.62	0.60	0.62
R Value		0.37	1.07	0.59	0.39	0.48
Recovery @ 25% ZN Grade						
	Zn	97.5	94.5	96	89.5	96.5
35% Zn Grade	Zn	96.5	94.5	92	<	96.5
Rate Constant (K)		0.53	0.65	0.79	0.63	0.59
R Value		0.06	0.58	3.22	1.79	0.01

Analysis and Discussion - (Cont'd):

TABLE II  
Oxygen Demand

Aeration time (min)	Initial Reading	Shutdown time	Final Reading	$\Delta X$ (ppm/min) (Initial-Final)
0	0	0	0	0
*6:23	6.5	10 sec.	6.0	3.0
5:0	11.2	10 sec.	10.6	3.6
5:0	10.9	10 sec.	10.4	3.0
5.0	9.4	10 sec.	9.3	1.8
5.0	10.3	50 sec.	8.9	1.6
5.0	9.8	1 min	8.4	1.4
"	9.4	"	7.9	1.5
"	9.3	"	7.6	1.5
"	8.9	"	7.4	1.5
"	8.8	"	7.3	1.5
"	8.8	"	7.2	1.6
"	8.7	"	6.8	1.9
"	8.8	"	7.3	1.5

\* $t_1$  = time taken to wash contents of the mill then transferring it to the cell, inserting the  $O_2$  probe in the slurry, start  $N_2$  over surface, start impeller, then take the ppm reading.

  
Yvon Boudreau  
Metallurgical Technician



APPENDIX I  
GRADE RECOVERY CURVES

CYPRUS ANVIL MINING CORPORATION

TEST No: 2 to 6

OBJECTIVE: 2EF see

DATE: May 10th, 1984

CONDITIONS: Pb circuit

TITLE: Aeration Testwork

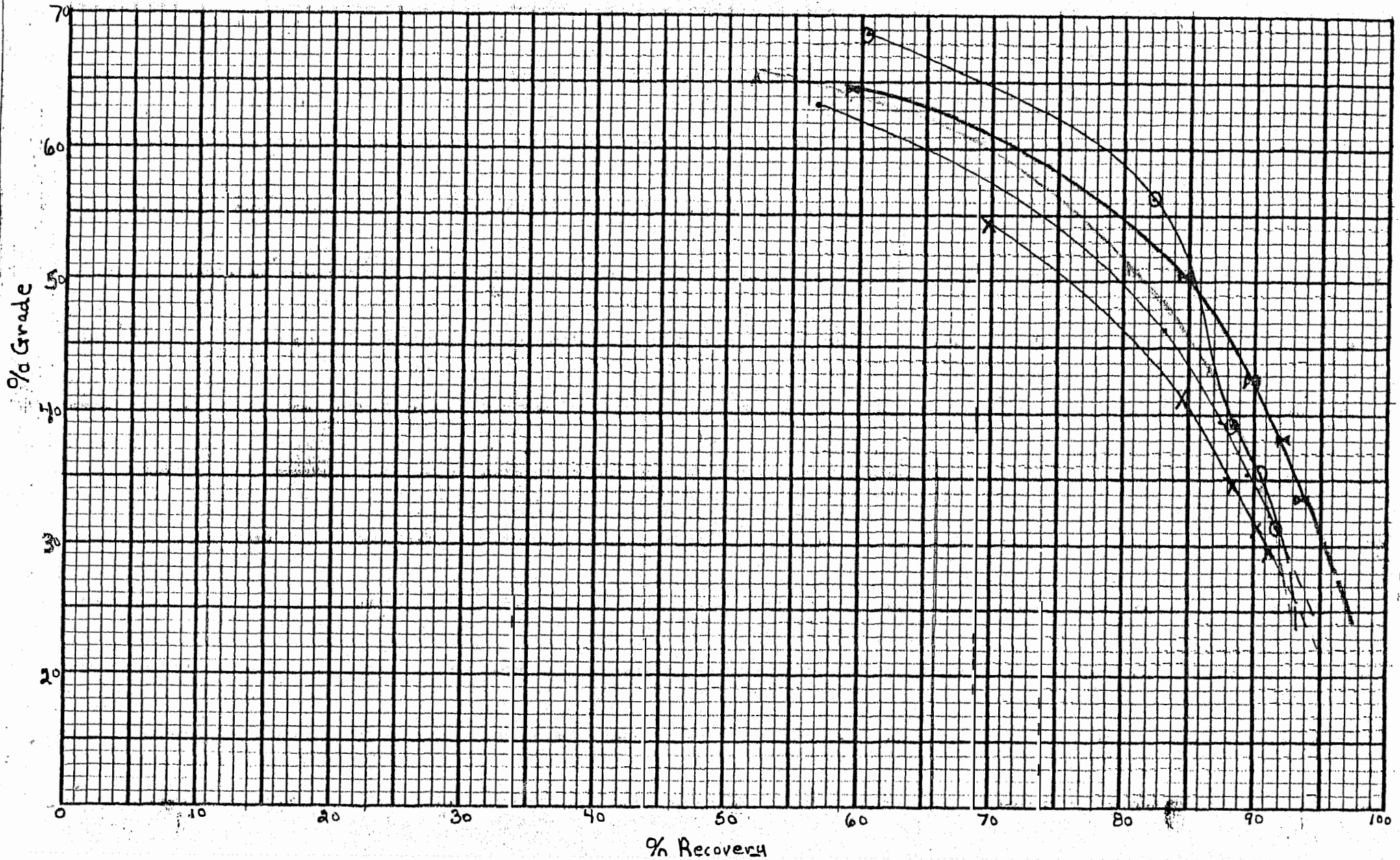
LEGEND: ○ Test #2 Standard Rougher Test (o.k. cell)

X Test #3 20 min Aeration

• Test #4 40 min Aeration

△ Test #5 60 min Aeration

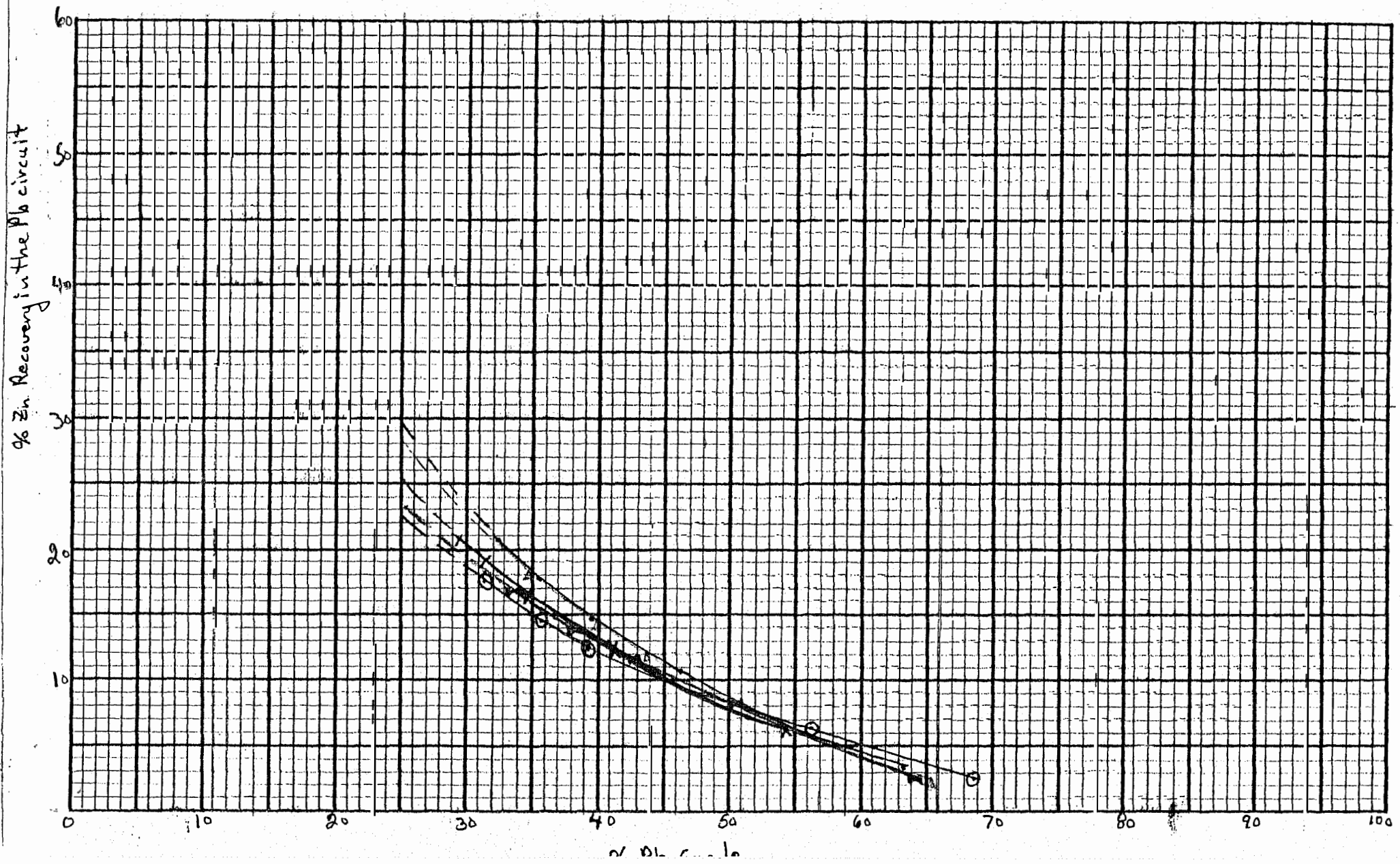
✱ Test #6 Standard Rougher Test (o.k. cell)



CYPRUS ANVIL MINING CORPORATION

TEST No: 2 to 6  
 OBJECTIVE: Zn Fore  
 DATE: May 10th, 1984  
 CONDITIONS: Zn in the Pb

TITLE: Aeration Testwork  
 LEGEND: ○ Test #2 Std. Rougher Test (O.K. cell)  
X Test #3 20min aeration  
• Test #4 40min aeration  
▲ Test #5 60min aeration  
✱ Test #6 Standard Rougher Test (O.K. cell)



CYPRUS ANVIL MINING CORPORATION

TEST No: 2 to 6

OBJECTIVE: Effore Aeration test (Ag in the Pb)

DATE: May 18th, 1984

CONDITIONS: test #2 Standard Rougher Test (o.k. cell)

test #3 20min Aeration

test #4 40min Aeration

test #5 60min Aeration

test #6 Standard Rougher Test (o.k. cell)

TITLE: Aeration Testwork

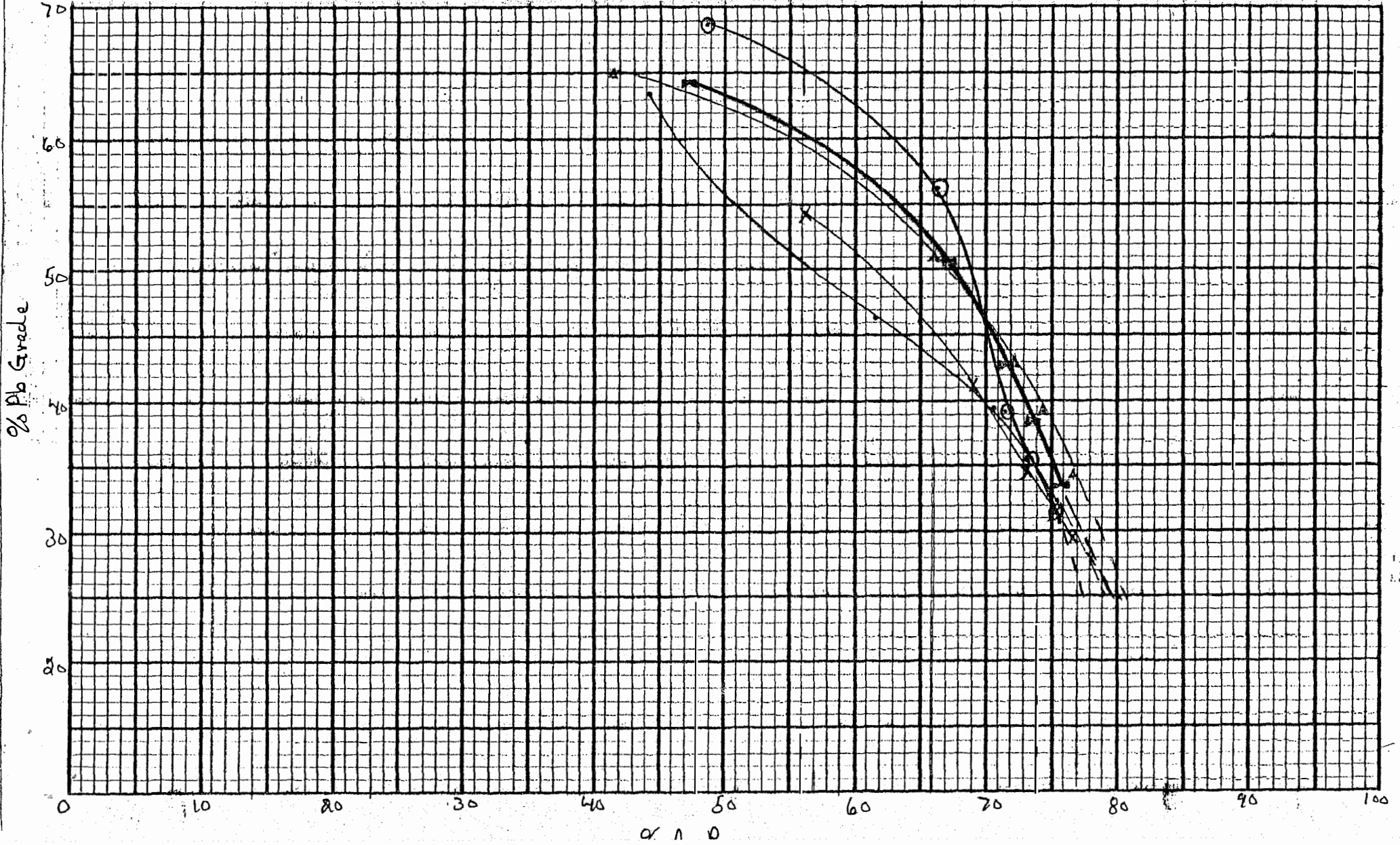
LEGEND: ○ Test #2

X Test #3

• Test #4

▲ Test #5

▼ Test #6



CYPRUS ANVIL MINING CORPORATION

TEST No: 2 to 7

OBJECTIVE: REE ore

DATE: May 10th, 1984

CONDITIONS: Zn in the Zn

TITLE: Aeration Testwork

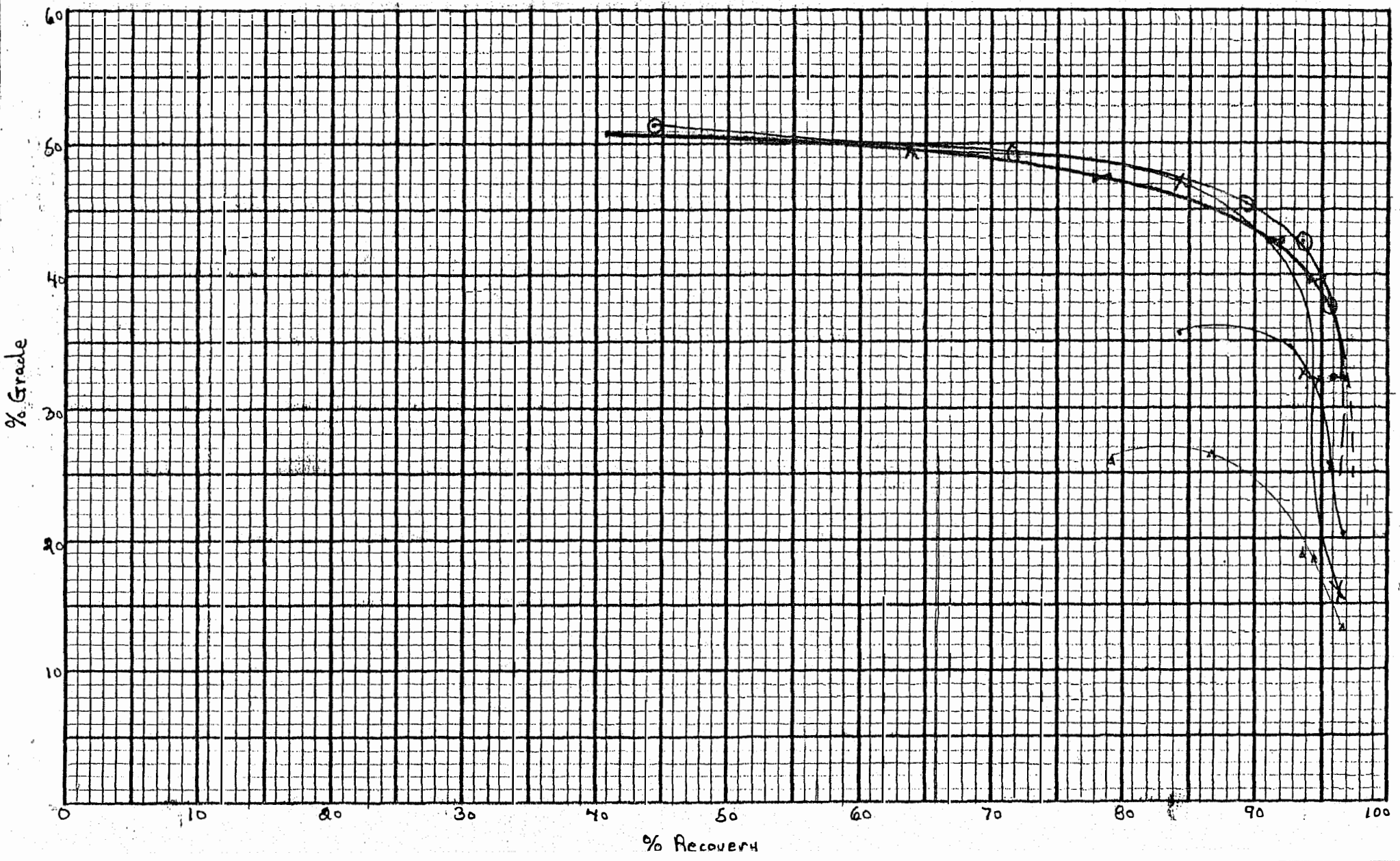
LEGEND: ○ Test #2 Std. Rougher Test (O.K. cell)

X Test #3 20 min aeration

• Test #4 40 min aeration

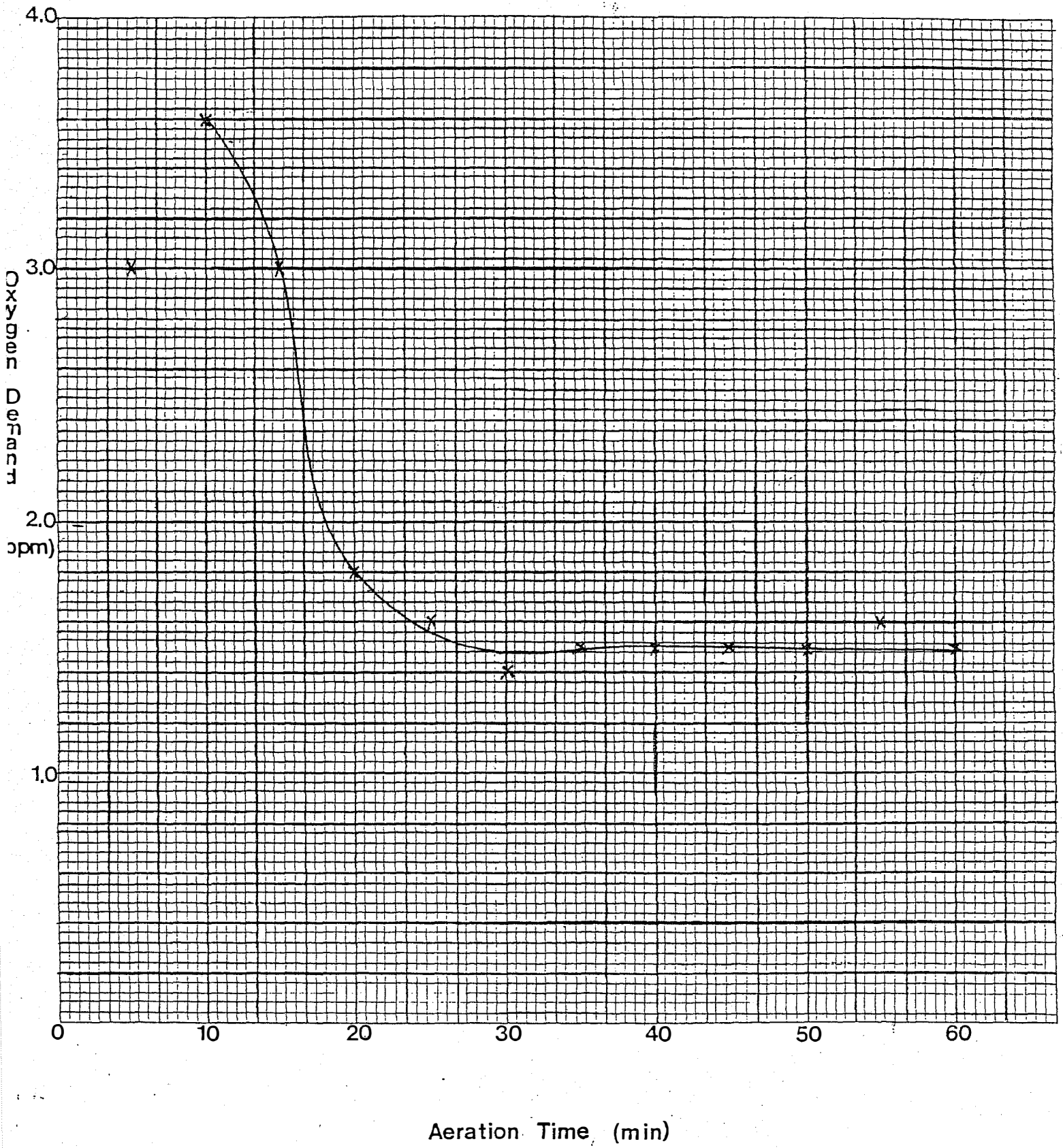
▲ Test #5 60 min aeration

▶ Test #6 Std. Rougher Test (O.K. cell)



CYPRUS ANVIL MINING CORPORATION  
TEST No: 1  
OBJECTIVE: Oxygen demand for 1hr  
DATE: June 17, 1984  
CONDITIONS: Nitrogen gas is blown  
over surface of slurry  
- O.K. cell

TITLE: Oxygen Demand On 2EFOre  
LEGEND: X Test #1



APPENDIX II  
COMPUTER PRINTOUTS



ROUGHER TEST

AERATION TESTWORK (TEST #3)  
(20 MIN. AERATION)  
O.K. CELL

	MASS (GM)	ASSAYS (%)					DISTRIBUTION (%)				
		Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag
Pb R01	71.40	54.40	6.71	9.10	0.61	520.05	69.98	6.14	2.14	33.81	56.18
Pb R02	42.40	19.10	11.42	22.90	0.55	200.00	14.59	6.20	3.20	18.10	12.83
Pb SC1	26.70	7.70	11.70	27.90	0.28	100.46	3.70	4.00	2.46	5.80	4.06
Pb SC2	18.10	5.60	11.57	28.70	0.25	82.42	1.83	2.68	1.71	3.51	2.26
Pb SC3	12.80	4.88	11.72	29.40	0.24	80.87	1.13	1.92	1.24	2.38	1.57
Zn R01	79.30	0.48	49.60	10.30	0.14	28.30	0.69	50.37	2.69	8.62	3.40
Zn R02	30.70	1.07	41.10	13.40	0.18	39.81	0.59	16.16	1.36	4.29	1.85
Zn SC1	67.00	0.77	9.05	33.60	0.08	24.26	0.93	7.77	7.42	4.16	2.46
Zn SC2	5.20	2.81	10.16	29.80	0.16	54.12	0.26	0.68	0.51	0.65	0.43
Zn SC3	190.90	0.37	0.52	39.20	0.03	9.33	1.27	1.27	24.68	4.45	2.69
Zn SC TLS	458.10	0.61	6.48	34.80	0.04	17.73	5.03	2.82	52.58	14.22	12.29
Calc Pb Feed	1002.60	5.54	7.79	30.2	0.13	65.93	100.00	100.00	100.00	100.00	100.00
Calc Zn Feed	831.20	0.59	7.43	32.6	0.06	18.38	8.78	79.06	89.24	36.39	23.11
Head Assay		5.52	7.98	30.9	0.11	65.63					

CUM. GRADE (%) CUM. RECOVERY (%)  
(Based on feed to the Pb circuit)

CUM. GRADE (%) CUM. RECOVERY (%)  
(Based on feed to the Zn circuit)

Pb in the Pb Circuit, K= 0.69

Pb in the Zn Circuit

54.40	69.98
41.25	84.57
34.87	88.27
31.53	90.10
29.54	91.22

0.48	7.81
0.64	14.56
0.69	25.14
0.75	28.14
0.56	42.64

Cu in the Pb Circuit

Cu in the Zn Circuit

0.61	33.81
0.59	51.91
0.53	57.72
0.50	61.23
0.48	63.61

0.14	23.69
0.15	35.48
0.12	46.91
0.13	48.69
0.08	60.91

Ag in the Pb Circuit

Ag in the Zn Circuit

520.05	56.18
400.80	69.01
343.73	73.06
313.91	75.32
296.50	76.89

28.30	14.69
31.52	22.69
28.77	33.33
29.49	35.18
19.18	46.84

Zn in the Pb Circuit

Zn in the Zn Circuit, K= 0.65

(Based on Pb cct feed)

(Based on Pb cct feed)

(Based on Zn cct feed)

6.71	6.14
8.46	12.34
9.08	16.34
9.36	19.02
9.54	20.94

49.60	50.37
47.23	66.53
32.78	74.30
32.13	74.97
15.96	76.24

49.60	63.71
47.23	84.15
32.78	93.97
32.13	94.83
15.96	96.44

(cum%gr) (cum%rec)

(cum%gr) (cum%rec)

(cum%gr) (cum%rec)

ROUGHER TEST

ZEF ORE AERATION TEST #4  
40 MIN. AERATION

	MASS (GM)	ASSAYS (%)					DISTRIBUTION (%)					CUM. GRADE (%) (Based on feed to the Pb circuit)		CUM. RECOVERY (%)		CUM. GRADE (%) (Based on feed to the Zn circuit)		CUM. RECOVERY (%)			
		Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag	Pb in the Pb Circuit, K= R=	Pb in the Zn Circuit	Pb in the Pb Circuit, K= R=	Pb in the Zn Circuit	Pb in the Pb Circuit, K= R=	Pb in the Zn Circuit				
Pb R01	51.30	63.40	5.42	7.30	0.62	551.15	56.79	3.53	1.23	24.82	44.04	63.40	56.79	0.62	0.55	16.60	63.40	56.79	0.62	0.55	16.60
Pb R02	51.90	29.20	11.01	20.50	0.47	278.69	26.46	7.25	3.50	19.03	22.53	46.20	83.25	0.59	0.70	23.74	46.20	83.25	0.59	0.70	23.74
Pb SC1	23.60	10.39	13.40	27.60	0.40	114.77	4.28	4.01	2.14	7.37	4.22	39.54	87.53		0.68	31.83	39.54	87.53		0.68	31.83
Pb SC2	18.10	6.65	13.50	28.90	0.31	87.71	2.10	3.10	1.72	4.38	2.47	35.43	89.63		0.72	33.68	35.43	89.63		0.72	33.68
Pb SC3	16.90	5.98	13.00	28.20	0.29	83.05	1.76	2.79	1.57	3.82	2.19	32.35	91.39		0.65	39.54	32.35	91.39		0.65	39.54
Zn R01	148.80	0.55	35.40	17.60	0.14	25.50	1.43	66.81	8.61	16.26	5.91	Cu in the Pb Circuit		Cu in the Zn Circuit		Cu in the Pb Circuit		Cu in the Zn Circuit		Cu in the Pb Circuit	
Zn R02	17.60	2.00	31.00	19.30	0.22	52.56	0.61	6.92	1.12	3.02	1.44	0.62	24.82	0.14	40.06	0.62	24.82	0.14	40.06	0.62	24.82
Zn SC1	63.30	0.63	2.47	38.50	0.05	17.73	0.70	1.98	8.01	2.47	1.75	0.54	43.85	0.15	47.51	0.54	43.85	0.15	47.51	0.54	43.85
Zn SC2	2.30	3.97	12.02	27.70	0.21	66.56	0.16	0.35	0.21	0.38	0.24	0.52	51.22	0.12	53.60	0.52	51.22	0.12	53.60	0.52	51.22
Zn SC3	65.70	0.44	0.95	39.10	0.03	12.75	0.50	0.79	8.45	1.54	1.30	0.49	55.60	0.12	54.52	0.49	55.60	0.12	54.52	0.49	55.60
Zn SC TLS	541.90	0.55	0.36	35.60	0.04	16.48	5.20	2.47	63.44	16.91	13.91	0.47	59.42	0.10	58.31	0.47	59.42	0.10	58.31	0.47	59.42
CalcPbFeed	1001.40	5.72	7.87	30.4	0.13	64.11	100.00	100.00	100.00	100.00	100.00	Ag in the Pb Circuit		Ag in the Zn Circuit		Ag in the Pb Circuit		Ag in the Zn Circuit		Ag in the Pb Circuit	
CalcZnFeed	839.60	0.59	7.45	32.5	0.06	18.78	8.61	79.33	89.84	40.58	24.56	551.15	44.04	25.50	24.07	551.15	44.04	25.50	24.07	551.15	44.04
Head Assay		5.80	8.45	31.2	0.11	65.01						414.13	66.57	28.37	29.94	414.13	66.57	28.37	29.94	414.13	66.57
												358.41	70.78	25.44	37.06	358.41	70.78	25.44	37.06	358.41	70.78
												324.60	73.26	25.84	38.03	324.60	73.26	25.84	38.03	324.60	73.26
												299.37	75.44	22.95	43.34	299.37	75.44	22.95	43.34	299.37	75.44
												(g/t)		(g/t)		(g/t)		(g/t)		(g/t)	
												Zn in the Pb Circuit	Zn in the Zn Circuit, K=	0.79	R=	3.22	Zn in the Pb Circuit	Zn in the Zn Circuit, K=	0.79	R=	3.22
												(Based on Pb cct feed)	(Based on Pb cct feed)	(Based on Zn cct feed)		(Based on Pb cct feed)	(Based on Pb cct feed)	(Based on Zn cct feed)		(Based on Pb cct feed)	(Based on Zn cct feed)
												5.42	3.53	35.40	66.81	5.42	3.53	35.40	66.81	5.42	3.53
												8.23	10.77	34.93	73.73	8.23	10.77	34.93	73.73	8.23	10.77
												9.19	14.79	25.99	75.71	9.19	14.79	25.99	75.71	9.19	14.79
												9.73	17.88	25.85	76.06	9.73	17.88	25.85	76.06	9.73	17.88
												10.07	20.67	20.35	76.85	10.07	20.67	20.35	76.85	10.07	20.67
												(cum%gr)	(cum%rec)	(cum%gr)	(cum%rec)	(cum%gr)	(cum%rec)	(cum%gr)	(cum%rec)	(cum%gr)	(cum%rec)

ROUGHER TEST

AERATION TESTWORK (TEST #5)  
(60 MIN. AERATION)  
O.K. CELL

	MASS (GM)	ASSAYS(%)					DISTRIBUTION(%)					CUM. GRADE(%)		CUM. RECOVERY(%)		CUM. GRADE(%)		CUM. RECOVERY(%)	
		Pb	Zn	Fe	Cu	Ag(g/t)	Pb	Zn	Fe	Cu	Ag	(Based on feed to the Pb circuit)	(Based on feed to the Pb circuit)	(Based on feed to the Zn circuit)	(Based on feed to the Zn circuit)	(Based on feed to the Zn circuit)	(Based on feed to the Zn circuit)		
Pb R01	44.80	65.30	4.28	6.00	0.66	586.30	52.04	2.46	0.92	22.85	41.45	Pb in the Pb Circuit, K= 65.30	52.04	0.60	Pb in the Zn Circuit	0.54	19.50		
Pb R02	42.90	37.00	9.66	16.90	0.64	362.98	28.24	5.32	2.49	21.22	24.57	51.46	80.27	R= 0.39	0.62	24.13			
Pb SC1	23.50	15.40	14.20	24.50	0.47	167.96	6.44	4.28	1.98	8.54	6.23	43.84	86.71		0.57	33.51			
Pb SC2	13.80	7.29	13.90	27.50	0.38	97.98	1.79	2.46	1.31	4.05	2.13	39.80	88.50		0.61	36.18			
Pb SC3	20.60	5.42	14.10	29.20	0.28	74.96	1.99	3.73	2.07	4.46	2.44	34.94	90.49		0.56	48.61			
												Cu in the Pb Circuit		Cu in the Zn Circuit					
												0.66	22.85	0.10	38.39				
												0.65	44.07	0.11	44.07				
												0.61	52.61	0.09	54.68				
												0.59	56.66	0.09	56.37				
												0.54	61.12	0.07	64.98				
Zn R01	193.10	0.54	26.10	24.50	0.10	21.77	1.85	64.69	16.28	14.92	6.63	Ag in the Pb Circuit		Ag in the Zn Circuit					
Zn R02	14.30	1.73	33.80	18.70	0.20	43.54	0.44	6.20	0.92	2.21	0.98	586.30	41.45	21.77	28.63				
Zn SC1	106.70	0.47	4.29	37.30	0.05	12.75	0.89	5.88	13.69	4.12	2.15	477.06	66.03	23.27	32.87				
Zn SC2	3.70	3.86	13.10	27.10	0.23	60.34	0.25	0.62	0.34	0.66	0.35	411.74	72.25	19.70	42.14				
Zn SC3	144.50	0.46	1.01	38.50	0.03	15.55	1.18	1.87	19.14	3.35	3.55	377.10	74.39	20.17	43.66				
Zn SC TLS	352.30	0.78	0.55	33.70	0.05	17.11	4.89	2.49	40.85	13.61	9.51	334.35	76.83	18.73	58.96				
CalcPbFeed	960.20	5.85	8.11	30.3	0.13	65.99	100.00	100.00	100.00	100.00	100.00	(g/t)		(g/t)					
CalcZnFeed	814.60	0.66	7.82	32.5	0.06	18.03	9.51	81.75	91.22	38.88	23.17	Zn in the Pb Circuit		Zn in the Zn Circuit, K=		0.63	R=	1.79	
Head Assay		5.71	7.90	31.6	0.12	65.01						(Based on Pb cct feed)		(Based on Pb cct feed)		(Based on Zn cct feed)			
												4.28	2.46	26.10	64.69	26.10	79.13		
												6.91	7.78	26.63	70.89	26.63	86.72		
												8.45	12.06	19.04	76.76	19.04	93.91		
												9.05	14.52	18.97	77.39	18.97	94.67		
												9.77	18.25	13.36	79.26	13.36	96.96		
												(cum%gr)	(cum%rec)	(cum%gr)	(cum%rec)	(cum%gr)	(cum%rec)		

ROUGHER TEST

ZEF ORE AERATION TEST #6  
O.K. CELL, STD. ROUGHER TEST

	MASS (GM)	ASSAYS(%)					DISTRIBUTION(%)				
		Pb	Zn	Fe	Cu	Ag (g/t)	Pb	Zn	Fe	Cu	Ag
Pb R01	51.20	64.30	4.59	6.30	0.08	597.50	59.35	2.96	1.07	3.08	47.11
Pb R02	41.90	33.60	9.88	18.00	0.22	312.90	25.38	5.22	2.50	6.93	20.19
Pb SC1	23.60	12.30	11.44	27.60	0.30	123.79	5.23	3.40	2.16	5.33	4.50
Pb SC2	17.30	6.99	10.93	29.90	0.31	79.00	2.18	2.38	1.71	4.03	2.10
Pb SC3	21.10	4.47	10.61	31.00	0.35	58.79	1.70	2.82	2.17	5.55	1.91
Zn R01	53.60	0.36	50.70	11.20	0.21	27.68	0.35	34.24	1.99	8.47	2.28
Zn R02	56.10	0.44	44.00	13.60	0.25	32.35	0.44	31.10	2.53	10.55	2.79
Zn SC1	31.80	0.85	27.20	21.70	0.33	38.26	0.49	10.90	2.28	7.89	1.87
Zn SC2	15.50	1.19	13.50	30.20	0.37	40.75	0.33	2.64	1.55	4.31	0.97
Zn SC3	40.70	0.68	2.46	37.80	0.17	18.97	0.50	1.26	5.09	5.20	1.19
Zn SC TLS	642.20	0.35	0.38	36.20	0.08	15.24	4.05	3.07	76.96	38.64	15.07
CalcPbFeed	995.00	5.58	7.98	30.4	0.13	65.26	100.00	100.00	100.00	100.00	100.00
CalcZnFeed	839.90	0.41	7.86	32.5	0.12	18.70	6.16	83.22	90.40	75.07	24.19
Head Assay		5.51	7.95	31.4	0.12	58.79					

CUM. GRADE(%) CUM. RECOVERY(%)  
(Based on feed to the Pb circuit)

CUM. GRADE(%) CUM. RECOVERY(%)  
(Based on feed to the Zn circuit)

Pb in the Pb Circuit, K=	0.62	Pb in the Zn Circuit	
64.30	59.35	0.36	5.64
50.48	84.72	0.40	12.86
42.76	89.96	0.50	20.77
38.14	92.14	0.57	26.16
33.56	93.84	0.59	34.26

Cu in the Pb Circuit		Cu in the Zn Circuit	
0.08	3.08	0.21	11.28
0.14	10.01	0.23	25.33
0.17	15.34	0.25	35.84
0.19	19.37	0.26	41.59
0.21	24.93	0.24	48.52

Ag in the Pb Circuit		Ag in the Zn Circuit	
597.50	47.11	27.68	9.45
469.41	67.30	30.07	21.00
399.52	71.80	31.91	28.75
358.14	73.90	32.78	32.77
317.41	75.81	29.94	37.68

Zn in the Pb Circuit (Based on Pb cct feed)	Zn in the Zn Circuit, K=	0.59	R=	0.01	
4.59	2.96	50.70	34.24	50.70	41.15
6.97	8.18	47.27	65.35	47.27	78.52
7.87	11.58	42.76	76.24	42.76	91.62
8.27	13.96	39.87	78.88	39.87	94.79
8.59	16.78	32.17	80.14	32.17	96.30
(cum%gr) (cum%rec)		(cum%gr) (cum%rec)		(cum%gr) (cum%rec)	

APPENDIX III  
REAGENT SCHEMES

TEST NO.: 2 & 6

PURPOSE: Aeration Testwork

PROCEDURE: Standard Rougher Test

FEED: 2EF ORE

GRIND: 10.5min

STAGE	REAGENTS ADDED (g/t)								TIME (MIN)			SCAV TL P <sub>80</sub> <sup>μ</sup>	PH	
	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>3</sub>	NaCN	Z-11	CuSO <sub>4</sub>	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FIN
PRIMARY GRIND	3000		200	60					8.5 2.0					
PbRo <sub>1</sub>							1				1	9.7	10.6	
PbRo <sub>2</sub>											2			
PbSc <sub>1</sub>				20			1				1			
PbSc <sub>2</sub>							1				1			
PbSc <sub>3</sub>				20			1				3			
Zn COND.				60	700					8 2		Start 10.0	after 2.50 19.8 11.0 end	
ZnRo <sub>1</sub>								3			1			
ZnRo <sub>2</sub>											2			
ZnSc <sub>1</sub>				20			1				1			
ZnSc <sub>2</sub>							1				2			
ZnSc <sub>3</sub>				20							3			

TEST NO.: 3

PURPOSE: Aeration Testwork

PROCEDURE: Standard Rougher procedure with 20min aeration and no reagents in the grind

FEED: 2 E F O R E

GRIND: 10.5 min

STAGE	REAGENTS ADDED (g/t)								TIME (MIN)			SCAV TL P <sub>80</sub> <sup>μ</sup>	PH	
	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>3</sub>	NaCN	Z-11	CuSO <sub>4</sub>	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FIN.
PRIMARY GRIND	7000								10.5					
PbRO <sub>1</sub>				60			1				1	9.7	10.0	
PbRO <sub>2</sub>											1			
PbSc <sub>1</sub>				20							2			
PbSc <sub>2</sub>							1				2			
PbSc <sub>3</sub>				20							3			
Zn COND.				60	700						8	Start 19.8	action End 19.5 116.0	
ZnRO <sub>1</sub>								2			1			
ZnRO <sub>2</sub>											2			
ZnSc <sub>1</sub>				20							2			
ZnSc <sub>2</sub>											2			
ZnSc <sub>3</sub>				20				1			3			

TEST NO.: 4

PURPOSE: Aeration Testwork

PROCEDURE: Standard procedure with 40min aeration and No reagent in grind

FEED: 2EF

GRIND: 10.5min

STAGE	REAGENTS ADDED (g/t):								TIME (MIN)			SCAV TL P <sub>80</sub> μ	PH	
	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>3</sub>	NaCN	Z-11	CuSO <sub>4</sub>	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FIN.
PRIMARY GRIND	3000								10.5					
PbRO <sub>1</sub>				60			1				1	9.6	10.6	
PbRO <sub>2</sub>							1				2			
PbSC <sub>1</sub>				20							2			
PbSC <sub>2</sub>							1				2			
PbSC <sub>3</sub>				20							3			
Zn COND.				60	700							Start 9.9	at 8.50 19.6 end 11.0	
ZnRO <sub>1</sub>								3			1			
ZnRO <sub>2</sub>											2			
ZnSC <sub>1</sub>				20							2			
ZnSC <sub>2</sub>											2			
ZnSC <sub>3</sub>				20							3			

TEST NO.: 5

PURPOSE: Aeration testwork

PROCEDURE: Standard procedure with 60min aeration and No reagents ingrind:

FEED: 2EF

GRIND: 10.5

STAGE	REAGENTS ADDED (g/t)								TIME (MIN)			SCAV TL P <sub>80</sub> <sup>μ</sup>	PH	
	Na <sub>2</sub> CO <sub>3</sub>	Na <sub>2</sub> SO <sub>3</sub>	NaCN	Z-11	CuSO <sub>4</sub>	CaO	MIBC drops	DOW drops	GRIND	COND	FROTH		START	FIN
PRIMARY GRIND	3000								10.5					
PbRo <sub>1</sub>				60			1				1	9.4	10.0	
PbRo <sub>2</sub>							1				2			
PbSc <sub>1</sub>				20							2			
PbSc <sub>2</sub>											2			
PbSc <sub>3</sub>				20							3			
Zn COND.				60	700						8.0 2.0	Start 19.8	After 5.0 19.6 end 11.0	
ZnRo <sub>1</sub>							2				1			
ZnRo <sub>2</sub>											2			
ZnSc <sub>1</sub>				20			1				2			
ZnSc <sub>2</sub>											2			
ZnSc <sub>3</sub>				20			1				3			