CYPRUS ANVIL MINING CORPORATION INTEROFFICE CORRESPONDENCE

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To

From S. Frei

Date October 18, 1982

Subject 2A REVERSE FLOTATION

PURPOSE:

To improve lead grades following cleaning of 2A ore rod mill feed (RMF) with as little loss in recovery as possible. The effectiveness of Potassium Dichromate ($K_2Cr_2O_7$) as a lead depressant during the reverse floation process will be studied.

CONCLUSIONS:

1. At low concentrations of $K_2Cr_2O_7$ (75 g/tonne) added to the lead third cleaner concentrate (3C.C.), a pH of 7.0 or greater is necessary in order to recover at least 34% of the lead with a 5 - 6% improvement in the lead grade (see graph numbers 1, 2 and 3).

2. At high pH (10.6), high concentrations of $K_2Cr_2O_7$ (500 g/tonne) added before each stage of the cycle reverse flotation test showed little improvement in grade (1 - 3%) with considerable recovery loss (see graph numbers 5 and 6).

3. At high concentrations of $K_2Cr_2O_7$ (500+ g/tonne) added to the lead 3C.C., a pH of 5.5 was considerably better than a pH of 7.0, resulting in grade improvements of 13 - 15% with a recovery at 38% of the lead. It should be noted that, had only two stages of the cycle test been completed rather than three, concentrates could be produced showing grade improvements of 11 - 13% with 43% recovery of the lead (see graph numbers 7, 8 and 9).

4. The use of Diesel Fuel Oil as a collector in place of sodium isopropyl xanthate (Z-11) when depressing lead with $K_2Cr_2O_7$ provided for a 48% recovery of lead with a 4% improvement in the lead grade (see graph number 4).

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RECOMMENDATIONS:

Although significant improvements in lead grade were achieved using $K_2Cr_2O_7$, there are very large losses on recovery. The reagent scheme should be further studied to determine means of recovery improvement while maintaining grade improvement.

Diesel Fuel Oil may be a more selective collector than Z-11 when used in conjunction with $K_2Cr_2O_7$.

DISCUSSION:

Potassium Dichromate ($K_2Cr_2O_7$) is used to depress both lead and graphite following the lead cleaning stages. Use of Z-11 on reverse flotation will selectively collect the graphite, resulting in higher grades of lead in the tails.

These flotation tests were performed as in a batch test. However, the concentrate collected is high in graphite and is in fact the tail product of these tests. And the tail sample remaining for treatment in the next stage of the test is in fact the improved lead concentrate. Thus these are reverse flotation tests which are considered to be cycle tests with lead reported as a concentrate (see the flow diagrams in the procedure).

MIBC frother addition was required in all of this testing to maintain an adequate froth. Large amounts of frother were required when using diesel fuel oil or when using high concentrations of $K_2Cr_2O_7$.

The three-stage cycle test may not be the most efficient for $K_2Cr_2O_7$ reverse flotation. As seen in graph numbers 7 and 9, recovery fell more rapidly in the third stage with little gain in lead grade. This indicates that a two-stage cycle test may be more effective in K Cr O reverse flotation.

All test work was performed using 100 g of $PbCC_3$ as heads.

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Procedure (Cont'd)

Specific Test Conditions For Reverse Flotation Using Potassium Dichromate

GRAPH NO.	TYPE NUMBER	TYPE OF TEST	pH	REAGENT ADDITIONS (g/TONNE)						
				BEFORE C_4		BEFORE C_5		BEFORE C_6		Frother Used?
				$K_2Cr_2O_7$	Z-11	$K_2Cr_2O_7$	Z-11	$K_2Cr_2O_7$	Z-11	
1*	27551 27554	Cycle	9.0	75	25	0	25	0	25	yes
2*	27552 27555	Cycle	7.0	75	25	0	25	0	25	yes
3*	27553 27556	Cycle	5.0	75	25	0	25	0	25	yes
4*	27569 27570	Cycle	9.0	75	Fuel Oil 425	0	Fuel Oil 425	0	Fuel Oil 425	yes+
5	27557 27558	Cycle	10.6	500	10	-	-	-	-	yes
6	27571	Cycle	10.6	500	10	500	10	-	-	yes
7	27559	Cycle	5.5	500	10	0	0	0	0	yes++
8	27560	Cycle	7.0	500	10	0	0	0	0	yes++
9	27561	Cycle	5.5	1000	10	0	0	0	0	yes++

* These tests were done using 3C.C. from the mill (high graphite, low sulphide 3C.C. of June 2, 1982).

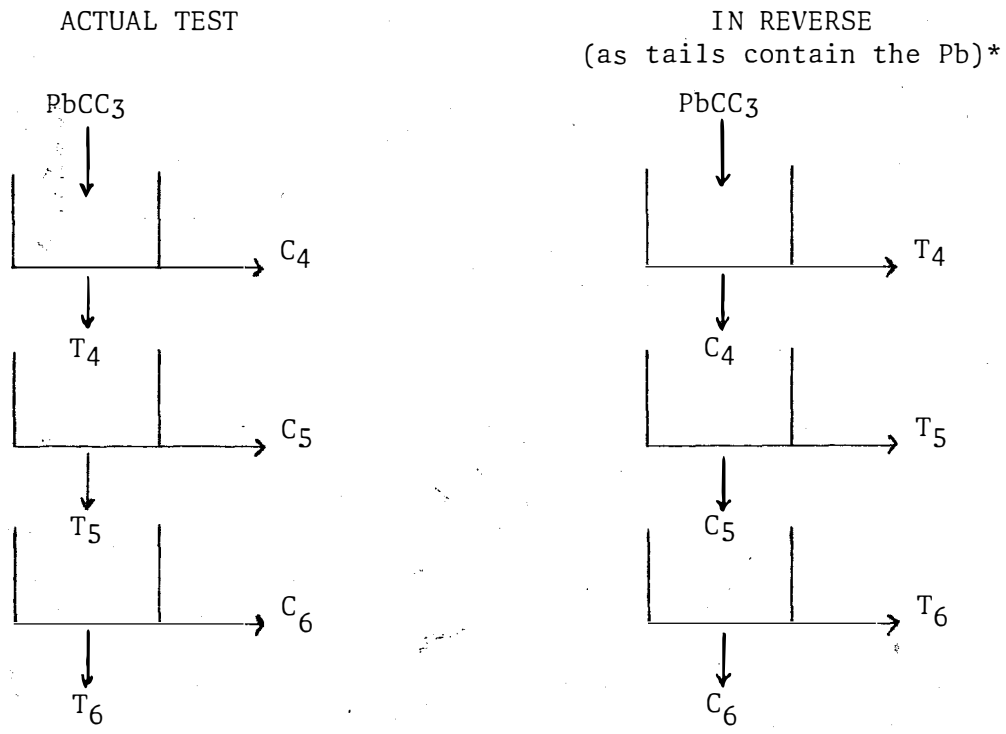
OBSERVATIONS:

Summary of Achieved Cumulative Lead Grades and Recoveries Throughout Each Test

GRAPH NUMBER	HEADS ASSAY	C_4		C_5		C_6	
		% GRADE	% RECOVERY	% GRADE	% RECOVERY	% GRADE	% RECOVERY
1	14.43	16.11	69.87	17.19	55.08	18.97	43.18
2	14.32	15.58	66.73	17.15	49.73	20.41	34.05
3	14.67	14.71	68.54	14.94	46.78	15.56	29.77
4	14.82	15.79	67.27	16.63	56.30	17.96	47.77
5	20.70	21.70	58.13	-	-	-	-
6	21.11	22.04	68.82	24.40	49.36	-	-
7	20.88	29.10	53.85	33.45	44.34	35.60	38.60
8	20.47	27.91	38.89	31.51	29.80	31.90	28.91
9	20.56	29.37	50.77	32.51	42.10	33.40	37.89

PROCEDURE:

Flow Diagram for Potassium Dichromate Reverse Flotation



* This flow diagram used when reporting grades and recoveries and for graphing

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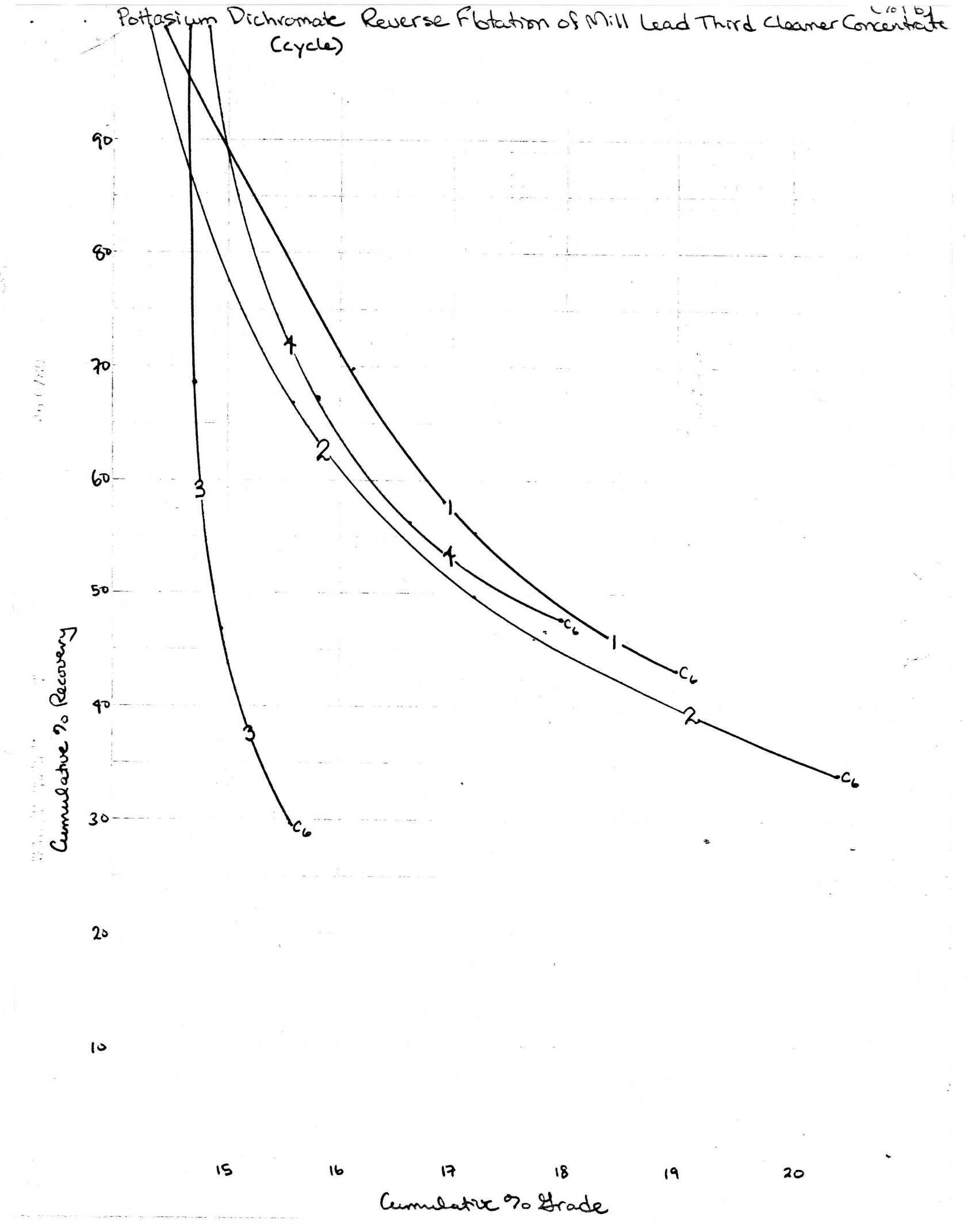
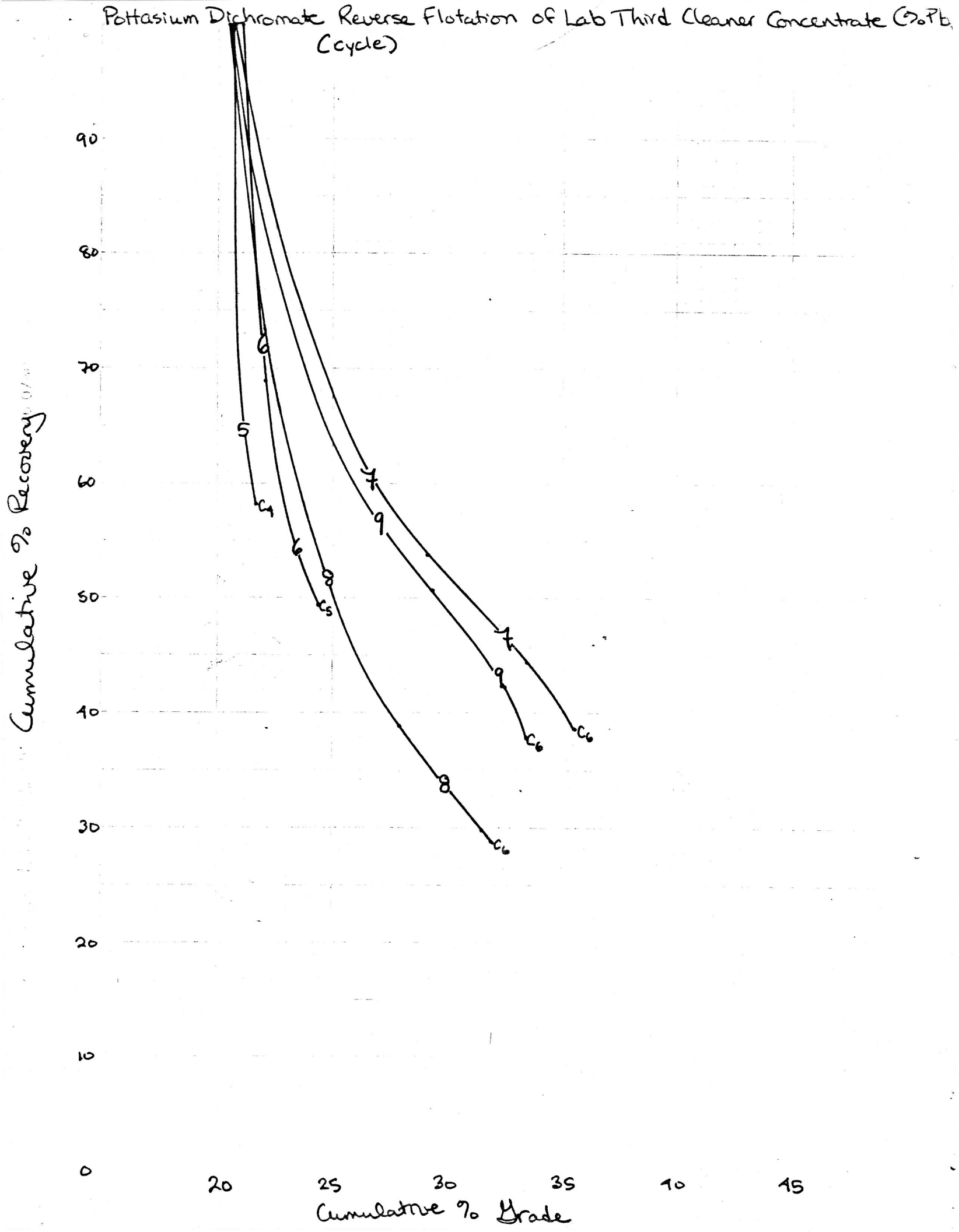

Potassium Dichromate Reverse Flotation of Mill Lead Third Cleaner Concentrate
(cycle)
90
80
70
60
50
40
30
20
10
Cumulative % Recovery
15
16
17
18
19
20
Cumulative % Grade
1
2
3
4
C_6


Pottasium Dichromate Reverse Flotation of Lab Third Cleaner Concentrate (%Pb
(cycle)
Cumulative % Recovery
Cumulative % Grade
90
80
70
60
50
40
30
20
10
0
20
25
30
35
10
15
5
C4
6
6
C5
8
7
9
C6
7
9
C6
8
C6