To: R. Murarka
From: Rhonda Martel
Date: June 21, 1982

006191

SUBJECT: Copper Flotation - update
(To be attached to Copper Flotation update, Rhonda Martel to R. Murarka, June 2, 1983.)

GROUP B TESTWORK (cont'd)
- Copper Prefloat, 2BCD ore

B-9 - see previous report as listed above

B-10 - see previous report as listed above

B-11 - This test followed the same procedure as test no. 7 (see previous reports as listed above), but a 20 minute primary grind. This test was done because the optimum grind for 2BCD was obtained after 20 minutes of grinding, so it was hoped that copper flotation would improve.
- Copper recovery was better in test 7 where a 15 minute primary grind was used.
- no significant change in Pb.

B-12 - This test was done to duplicate the results of the large scale test no. 5-4. Test no. 5-4 was done to generate a a bulk Cu/Pb rougher concentrate using high 2-11 dosage. Test B-12 was a 1000 g chg test.

B-13 - This test was done to test high Na_2SO_3 with low 2-11.
- 2 kg/T Na_2SO_3
- 70 g/T 2-11 (total)
- no $K_2Cr_2O_7$
- Compared to test B-9 where the procedure and scheme is the same except only 1 kg/T Na_2SO_3 was used.

GROUP B TESTWORK (cont'd)

B-13 (cont'd) - Both Pb and Cu recovery improved with more Na_2SO_3 used in the grind
- Cu/Pb separation is not so good.

B-14 - Cu pre-float
- Pb depressed by lower pH
- pH of 6.5 was the goal, pH lowered by H_2SO_3
- no Na_2CO_3 was used in the grind and pH out of the grind was 5.4, so no H_2SO_3 was used
- Cu and Pb recovery were poor.

B

Cu Pre-float

June 1, 1983

	ORETYPE and Test Description	SAMPLE	WTS	ASSAYS Pb	Zn	Fe	Cu	Ag	DISTRIBUTION Pb	Zn	Fe	Cu	Ag
9.	2BCD	CuCC1	12.2	11.70	12.58	15.1	9.49	7.20	4.69	2.17	1.45	40.65	1.22
	-same as no.7	CuCT1	36.9	8.09	9.61	10.4	.46	3.14	9.80	5.02	3.01	5.96	3.69
	but no $K_2Cr_2O_7$	*CuRoCon	49.1	9.99	10.35	11.6	2.70	4.16	14.49	7.19	4.46	46.61	4.91
	-low Z-11 used	CuRoTls	950.3	2.74	6.90	12.8	.16	1.50	85.51	92.81	95.54	53.39	95.09
	(70 g/T in whole circuit)	Heads	999.4	3.05	7.07	12.74	.26	1.63	100.00	100.00	100.00	100.00	100.00
10.	2BCD	CuCC1	17.5	11.90	11.48	15.2	7.01	6.76	6.90	2.84	2.17	40.74	7.32
	-same as no.7	CuCT1	112.1	19.60	8.15	13.4	.28	7.43	72.77	12.93	12.28	10.42	51.50
	but with 2kg/T	* CuRoCon	129.6	18.56	8.60	13.6	1.19	7.34	79.67	15.77	14.45	51.16	58.82
	Na_2SO_3	CuRoTls	8649	.71	6.88	12.1	.17	.77	20.34	84.22	85.55	48.83	41.18
		Heads	994.5	3.04	7.10	12.3	.30	1.63	100.00	100.00	100.00	100.00	100.00

* calculated

B

Cu Pre Float Testing

ORETYPE and Test Description	SAMPLE	WTS	ASSAYS Pb	Zn	Fe	Cu	Ag	DISTRIBUTION Pb	Zn	Fe	Cu	Ag
11. 2BCD Same as B-7 but with a 20 minute primary grind.	CuCC1	36.8	13.00	8.16	17.0	3.18	5.71	15.93	4.41	5.53	48.29	15.15
	CuCT1	167.6	12.60	5.99	16.9	.18	4.80	70.34	14.75	25.05	12.45	57.99
	Cu/PbRoConc.	204.4	12.67	6.38	16.9	.72	4.96	86.27	19.16	30.58	60.74	73.14
	Cu/PbScTls	74.28	.52	6.44	9.9	.12	.47	13.73	80.84	69.42	39.26	26.86
	Heads	997.2	3.01	6.83	11.94	.24	1.39	100.00	100.00	100.00	100.00	100.00
12. 2BCD Same as B-7 but with high 2-11 Purpose: to duplicate metallurgy in lg scale test	Cu/PbRoConc.	274.3	9.71	5.07	20.4	.57	3.84	88.88	14.91	51.07	64.87	83.07
	Cu/PbScTls	724.5	.46	7.72	7.4	.12	.29	11.12	80.09	48.93	35.73	16.63
	Heads	998.8	3.00	6.99	10.97	.24	1.26	100.00	100.00	100.00	100.00	100.00
13. 2BCD -no NaCN -2kg/t Na_2SO_3 -70 g/t 2-11 (total) -no $K_2Cr_2O_7$	CuCC1	23.9	30.60	10.26	9.9	5.33	12.20	24.61	3.74	2.04	51.02	19.25
	CuCT1	34.2	9.74	9.67	10.2	.28	3.52	11.21	5.04	3.01	3.84	7.91
	Cu/PbRoConc	58.1	18.32	9.91	10.1	2.36	7.12	35.82	8.78	5.05	54.86	27.16
	Cu/PbScTls	939.4	2.03	6.37	11.7	.12	1.18	64.18	91.22	94.94	45.15	72.84
	Heads	997.5	2.98	6.58	11.61	.25	1.53	100.00	100.00	100.00	100.00	100.00
14. 2BCD Cu/Pb Ro Conc. Low pH with H_2SO_3 -20 g/t 2-11	Cu/PbRoConc	24.0	18.30	10.00	12.5	4.99	7.69	14.82	3.63	2.48	45.02	12.93
	Cu/PbScTls	974.9	2.59	6.54	12.1	.15	1.27	85.18	96.37	97.52	54.98	87.03
	Heads	998.9	2.97	6.62	12.11	.27	1.42	100.00	100.00	100.00	100.00	100.00

GROUP D TESTWORK - Cu/Pb separation from Cu/Pb Rougher Con Pb Cleaning.

D 1-5 - see previous report as listed above.

- Increases in NaCN did reduce the copper recovery to the PbCO3 considerably.
- Pb recovery did not change much but Pb grade improved as NaCN increased
- Pb recovery in the cleaners is not good, it is below 20%

D-6
- used the Vihanti process, a Finnish process.
- Bulk Cu/Pb flotation to third cleaner
- Separation in fourth cleaner using $K_2Cr_2O_7$ to depress Pb.
- pH 10.8 with lime
- 240 g/t Z-11 (total)
- Separation was not successful.

D-7
- In this test, a bulk Cu/Pb Rougher conc was generated and then Pb cleaning was done to the first cleaner only
- no sulphite or cyanide in the grind
- 200 g/t NaCN to the regrind
- 240 g/t Z-11 used in total
- Pb grade and recovery were not bad
- Cu recovery to the Pb first cleaner conc. was 20%

D

Cu/Pb Separation from Cu/Pb Rougher Concentrate - Pb Cleaning

ORETYPE and Test Description	SAMPLE	WTS	ASSAYS Pb	Zn	Fe	Cu	Ag	DISTRIBUTION Pb	Zn	Fe	Cu	Ag
2BCD	$PbCC_3$	7.7	57.70	4.17	6.6	4.83	22.09	16.50	7.17	3.11	21.62	16.87
1. Std Pb Cleaning circuit -no NaCN to regrind	$PbCT_3$	8.3	44.10	6.94	9.8	4.87	16.91	13.59	12.81	4.97	23.49	13.92
	$PbCC_2$	16.0	50.65	5.59	8.3	4.85	19.40	30.09	19.98	8.08	45.11	30.79
	$PbCT_2$	13.3	31.10	5.90	14.1	2.40	11.78	15.36	17.52	11.47	18.55	15.54
	$PbCC_1$	29.3	41.77	5.73	10.9	3.74	15.94	45.45	37.50	19.55	63.66	46.33
	$PbCT_1$	72.7	20.20	3.85	18.1	.86	7.44	54.54	62.50	80.45	36.34	53.66
	* Heads	102.0	26.40	4.34	16.0	1.69	9.88	100.00	100.00	100.00	100.00	100.00
2. Same as above - 50 g/T NaCN in regrind.	$PbCC_3$	6.6	71.70	1.03	2.9	1.47	26.11	17.74	1.55	1.19	5.59	17.55
	$PbCT_3$	7.2	55.60	2.09	7.2	2.80	20.58	15.01	3.44	3.23	11.62	15.09
	$PbCC_2$	13.8	63.30	1.58	5.1	2.16	23.22	32.75	4.99	4.42	17.21	32.64
	$PbCT_2$	9.2	31.80	4.11	14.5	2.56	11.77	10.97	8.64	8.31	13.57	11.03
	$PbCC_1$	23.0	50.70	2.59	8.9	2.32	18.64	43.72	13.63	12.73	30.78	43.67
	$PbCT_1$	77.0	19.50	4.91	18.2	1.56	7.18	56.29	86.37	87.27	69.22	56.32
	* Heads	100.0	26.68	4.38	16.1	1.74	9.82	100.00	100.00	100.00	100.00	100.00
3. Same as above -100 g/T NaCN in Regrind	$PbCC_3$	7.6	74.00	1.00	2.4	1.05	26.06	21.07	1.68	1.14	4.72	20.24
	$PbCT_3$	6.6	55.20	2.06	6.9	2.37	20.10	13.65	3.00	2.84	9.26	13.60
	$PbCC_2$	14.2	65.26	1.44	4.5	1.10	23.32	34.72	4.68	3.98	13.98	33.84
	$PbCT_2$	9.5	31.40	4.03	14.2	2.44	11.71	11.18	8.44	8.41	13.72	11.32
	$PbCC_1$	23.7	51.69	2.51	8.4	1.69	18.66	45.90	13.12	12.39	27.70	45.16
	$PbCT_1$	76.8	18.80	5.13	18.3	1.59	6.98	54.10	86.88	87.61	72.30	54.84
	* Heads	100.50	26.56	4.51	16.0	1.68	9.74	100.00	100.00	100.00	100.00	100.00

* Heads were Cu/Pb Rougher conc that was generated in test E-3.

D

Cu/Pb Separation from Cu/Pb Rougher Conc. Pb Cleaning.

ORETYPE and Test Description	SAMPLE	WTS	ASSAYS Pb	Zn	Fe	Cu	Ag	DISTRIBUTION Pb	Zn	Fe	Cu	Ag
2BCD												
4. std Pb cleaning circuit - 200 g/t NaCN to Regrind	$PbCC_3$	6.4	75.50	1.04	2.0	.42	26.19	17.77	1.56	.80	1.55	16.72
	$PbCT_3$	7.3	61.90	1.87	4.9	1.13	22.18	16.62	3.06	2.25	4.75	16.15
	$PbCC_2$	13.7	68.25	1.50	3.5	.80	24.05	34.34	4.62	3.05	6.30	32.87
	$PbCT_2$	9.3	31.40	4.18	14.0	2.28	11.98	10.74	8.71	8.17	12.22	11.11
	$PbCC_1$	23.0	53.35	2.58	7.7	1.40	19.17	45.13	13.33	11.22	18.52	43.98
	$PbCT_1$	77	19.20	4.51	18.2	1.82	7.23	54.87	86.67	88.78	81.48	56.02
	* Heads	100.7	27.00	4.43	15.8	1.72	9.96	100.00	100.00	100.00	100.00	100.00
5. Std Pb cleaning circuit - 500 g/t NaCN to regrind.	$PbCC_3$	6.8	61.40	1.21	1.9	0.33	26.08	16.46	1.87	.81	1.33	17.27
	$PbCT_3$	5.1	58.60	3.02	5.5	.94	20.45	11.78	3.50	1.77	3.09	10.57
	$PbCC_2$	11.9	60.20	1.99	3.4	.61	23.67	28.24	5.37	2.58	4.33	28.54
	$PbCT_2$	10.2	33.40	6.04	12.7	1.88	12.50	13.43	14.01	8.16	11.40	12.92
	$PbCC_1$	22.1	47.83	3.86	7.7	1.20	18.51	41.66	19.39	10.74	15.73	41.46
	$PbCT_1$	77.9	19.00	4.55	18.2	1.82	7.42	58.34	80.61	82.26	84.37	58.55
	* Heads	100.0	25.37	4.40	15.9	1.68	9.87	100.00	100.00	100.00	100.00	100.00
6. 2BCD Vihanti process 1 kg test. Bulk Flotation to Third cleaner conc and separate. - pH to 10.8 with lime - 240 g/t Z-11 (total) - Fourth cleaner 2000 g/t $K_2Cr_2O_7$	Cu Conc.	2.3	31.40	22.00	7.7	3.13	12.00	1.27	3.54	.46	2.36	1.39
	Pb Conc	31.4	52.00	9.40	6.3	1.78	17.08	28.68	20.63	5.18	18.34	27.09
	Cu/Pb CT_3	28.3	34.70	10.05	10.5	2.42	12.64	17.25	19.88	7.79	22.47	18.07
	Cu/Pb CC_2	62.0	43.34	10.16	8.3	2.12	14.86	97.20	44.05	13.43	43.17	46.65
	Cu/Pb CT_2	21.9	21.60	5.81	16.3	1.34	8.03	12.15	8.89	9.36	9.99	8.88
	Cu/Pb CC_1	83.9	37.67	9.02	10.9	1.93	13.08	59.35	52.94	22.79	53.16	55.43
	Cu/Pb CT_1	150.3	15.40	4.48	19.6	.95	5.87	40.65	47.06	77.21	46.85	44.56
	Heads	234.2	29.31	6.11	16.29	1.30	8.45	100.00	100.00	100.00	100.00	100.00

* Heads were Cu/Pb rougher conc. that was generated in test E-3.

D

Cu/Pb Separation from Cu/Pb Rougher Concentrate - Pb Cleaning

ORE TYPE and Test Description	SAMPLE	WT	ASSAYS					DISTRIBUTION				
			Pb	Zn	Fe	Cu	Au	Pb	Zn	Fe	Cu	Au
2BCD	Pb CC1	39.5	55.70	2.97	9.1	1.25	19.33	72.71	1.72	2.96	19.79	56.44
7. 1 kg test	Pb CT1	166.1	2.77	5.87	27.0	.63	1.68	15.20	14.28	36.88	41.95	20.63
Cu/Pb Rougher Conc	Cu/Pb Ro	205.6	12.94	5.31	23.6	.75	5.07	87.91	16.00	39.84	61.74	77.07
to Pb first cleaner	Cu/Pb SCTls	795.4	.46	7.21	9.2	.12	.39	12.09	84.00	60.17	38.26	22.93
-no sulphite + no cyanide in primary grind	Heads	1001.0	3.02	6.82	12.15	.25	1.95	100.00	100.00	100.00	100.00	100.00
-200 g/T NaCN in regrind												
-240 g/T Z-11 (total)												

Group E Testwork - Large-Scale Flotation

This is a new group. It has been assigned to the tests where a large rougher conc or first cleaner conc has been generated for future test: ie. generation of $PbCl_3$ for group C testwork or// generation of Cu/Pb rougher conc. for group D testwork

E-1, E-2 } $PbCl_3$ generation for group C testwork

E-3 Cu/Pb Rougher conc for group D testwork.
E-4 Cu/Pb " " unused but probably for group D testwork.

E

Large-Scale Flotation

ORETYPE and Test Description	SAMPLE	WTS	ASSAYS					DISTRIBUTION				
			Pb	Zn	Fe	Cu	Ag	Pb	Zn	Fe	Cu	Ag
2BCD												
1. PbCl$_2$ generation - no assays - Std CAMC 2BCD			NO ASSAYS									
2. Same as #1			NO ASSAYS.									
3. Cu/Pb Ro. Conc. generation for group D1-5 Using B-7 scheme	Cu/Pb Ro Conc	570.60	26.40	4.63	16.0	1.69	10.37	62.77	4.87	9.06	44.64	46.52
	Cu/Pb Ro Tls	7429.4	1.20	6.94	12.3	.16	.83	37.23	95.13	90.94	55.36	53.48
	Heads	8000.0	3.00	6.78	12.6	.27	1.59	100.00	100.00	100.00	100.00	100.00
4. Cu/Pb Ro Conc generation high Z-11	Cu/Pb Ro Conc	753.6	23.40	6.21	15.4	1.39	9.19	76.54	8.50	11.95	46.76	60.12
	Cu/Pb Ro Tls	7246.4	.75	6.88	11.8	.17	.63	23.46	91.50	88.05	53.24	39.88
	Heads	8000.0	2.88	6.82	12.14	.28	1.44	100.00	100.00	100.00	100.00	100.00