

MATTAGAMI LAKE MINES LIMITED

Matagami, Que.

019854

OCT - 4 1976

INTER-OFFICE MEMORANDUM

FROM K.V. Konigsmann TO R.L. Coleman
 DATE September 30, 1976 COPY TO R.P. Wallace
 SUBJECT Flotation Process for Ores COPY TO E. Kirkpatrick
from the Grum Deposit.

Flotation Process for Ores from the Grum Deposit.

Reference is made to B-type ores as represented by a sample received on March 19, 1976.

The last summary on flotation results with Grum ores had been submitted on July 30, 1976. Since then some progress has been made in the development of a stable zinc circuit. However, major obstacles remain to be overcome in the lead rougher flotation. Too much zinc is still floating with the lead. In the lead cleaner flotation, zinc depression remains inefficient.

From test results produced to date, projected plant results are as tabulated below. The forecast is without safety margin, on the contrary, all laboratory results are interpreted in the most favourable light.

	<u>Analyses oz/t or %</u>			<u>Recoveries %</u>		
	<u>Ag</u>	<u>Pb</u>	<u>Zn</u>	<u>Ag</u>	<u>Pb</u>	<u>Zn</u>
Mill Feed	3.8	8.7	16			
Lead Concentrate	20	45-55	12-15	65	75	
Zinc Concentrate	3	3	53+			70

Lead Flotation

The main difficulty in circuit development remains in lead flotation. The quantities of zinc and pyrite floating into the lead rougher concentrate are yet too high. Currently rougher concentrates contain

<u>Assay %</u>		<u>Metal Distribution (%MF)</u>	
<u>Pb</u>	<u>Zn</u>	<u>Pb</u>	<u>Zn</u>
24	20	92	42

In lead cleaner flotation the depression of the contaminants is not adequate. Lead circuit flotation (Flowsheet on figure 3, page 11) is still unstable; a slight error in reagent or product manipulation throws a long test out of balance. Conditions of greater stability will have to be developed in the laboratory to be acceptable for plant operation.

Oxidation of the ore along apparent leach planes is seen as the cause of preactivation of zinc. The extremely fine grained mineralization adds to the difficulty of separation.

Zinc Flotation

By comparison with the lead circuit, the zinc circuit presents few problems. 85 to 90 per cent of the zinc in the circuit feed is recovered into a product of good grade. For example test #97:

	<u>Assay</u>	<u>Zn Recovery</u>	
	<u>Zn</u>	<u>% Circuit Feed</u>	<u>% Mill Feed</u>
Zinc circuit feed	14.9	100	75.6
Zinc concentrate	54.0	87.2	65.9
Zinc cleaner tailings*	14.0	4.1	3.1
Zinc rougher tailings	1.8	8.7	6.6
Calculated final tail	2.5	12.8	9.7

* Zinc cleaner tailings are discarded.

The zinc circuits are stable.

Contaminants

The ores contain some arsenic, 0.2 to 0.4% As; mercury has been analysed at about 50 ppm. A zinc concentrate of high grade contained 650 ppm Hg. The distribution of impurities in all products will be investigated in detail only after flowsheet design has advanced further.

K. Kampmann

MATTAGAMI LAKE MINES LIMITED

CONCENTRATOR LABORATORY

VANGORDA-GRUM

SAMPLE B₃

PROGRESS REPORT #3

WORK PERFORMED FROM JULY 28 to SEPTEMBER 30, 1976.

TESTS #VAN 88-VAN 103



K. STOWE
METALLURGIST

SEPTEMBER 30, 1976.

Vangorda-Grum Testwork

Tests VAN #88-103

The ore used in this series of tests consisted of a sample of B material received in March 1976 and assaying 8% Pb and 16% Zn. The sample was highly oxidized and easily fractured.

The majority of the tests were locked cycle tests of 6 or 7 cycles. Circuit stability was obtained in almost all tests. However little or no improvement was shown over the results reported earlier for VAN 86.

VAN 88

Six rougher flotations were performed with fineness of grind varied from 25-95% -325 mesh. Results are listed in TABLE 1.

Increasing grind time improved selectivity in the Pb rougher only marginally. Pb and Zn recoveries in their respective rougher concentrates were relatively constant for

grinds of 10 minutes (70% -325 mesh) to 18 minutes (95% -325 mesh). The most marked improvement was in the rougher concentrate grades.

Samples of rougher tailings were infrasized. From FIGURES 1 and 2 a grind of between 50-70% -325 mesh was sufficient to minimize Pb and Zn losses to the tailings.

LOCKED CYCLE TESTS VAN# 91, 93-98, 100, 103.

The main problem with the ore has been the poor selectivity in the Pb circuit. Changes in grind, collector, pH and depressants have had little effect. This remained true for this series of tests. Consequences are:-

1. Pb concentrates are extremely low grade at acceptable levels of recovery.
2. Although high grade Zn concentrates are possible Zn recovery is necessarily low.

The standard flowsheet for the cycle tests, as developed from previous work, is shown in FIGURE 3. Deviations from this standard and descriptions of the individual tests are listed in TABLE 2. Important features are:-

1. a grind of 70% -325 mesh was usually used
2. NaCN was not used in most of the tests
3. only 1 or 2 Zn cleaners were employed
4. up to 4 regrinds were used:- Pb rougher conc, Pb scavenger conc, Zn rougher Conc, and Zn scavenger conc.
5. 1st Pb Clnr Tails were recirculated to either the Pb or Zn circuits.

Results of the 2 best tests are listed in TABLES 3-6.

Low grade Pb concentrates and excellent Zn concentrates were obtained. Pb recovery versus Pb grade for all the tests is plotted in FIGURE 4. From this curve a Pb recovery of 70% would be expected at 50% grade using the standard flowsheet. During the testwork 2 variables stood out as determining the Pb grade and recovery for the various tests:-

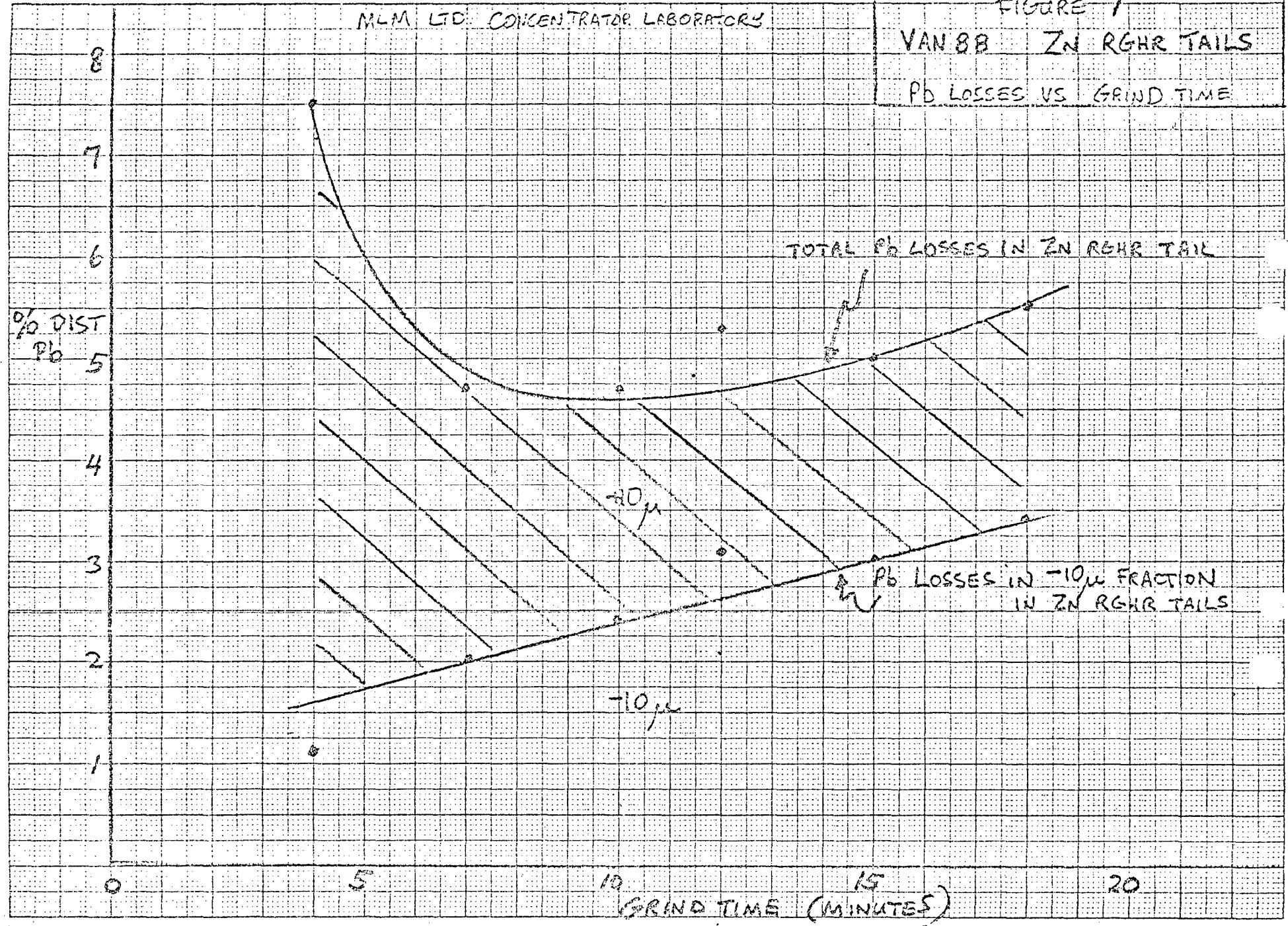
1. the speed of Pb rougher flotation
2. the amount of regrind of the Pb rougher concentrate.

VAN #101-102

Dezincing of the Pb concentrate by a procedure used at the Sullivan Concentrator was investigated. The flowsheet and results of VAN 101 are shown in FIGURE 5. % Zn in the Pb concentrate was reduced to 5% however a considerable amount of Pb also floated. More testwork is needed to properly evaluate this procedure.

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FIGURE 1
VAN 88 ZN RGR TAILS
Pb LOSSES VS GRIND TIME

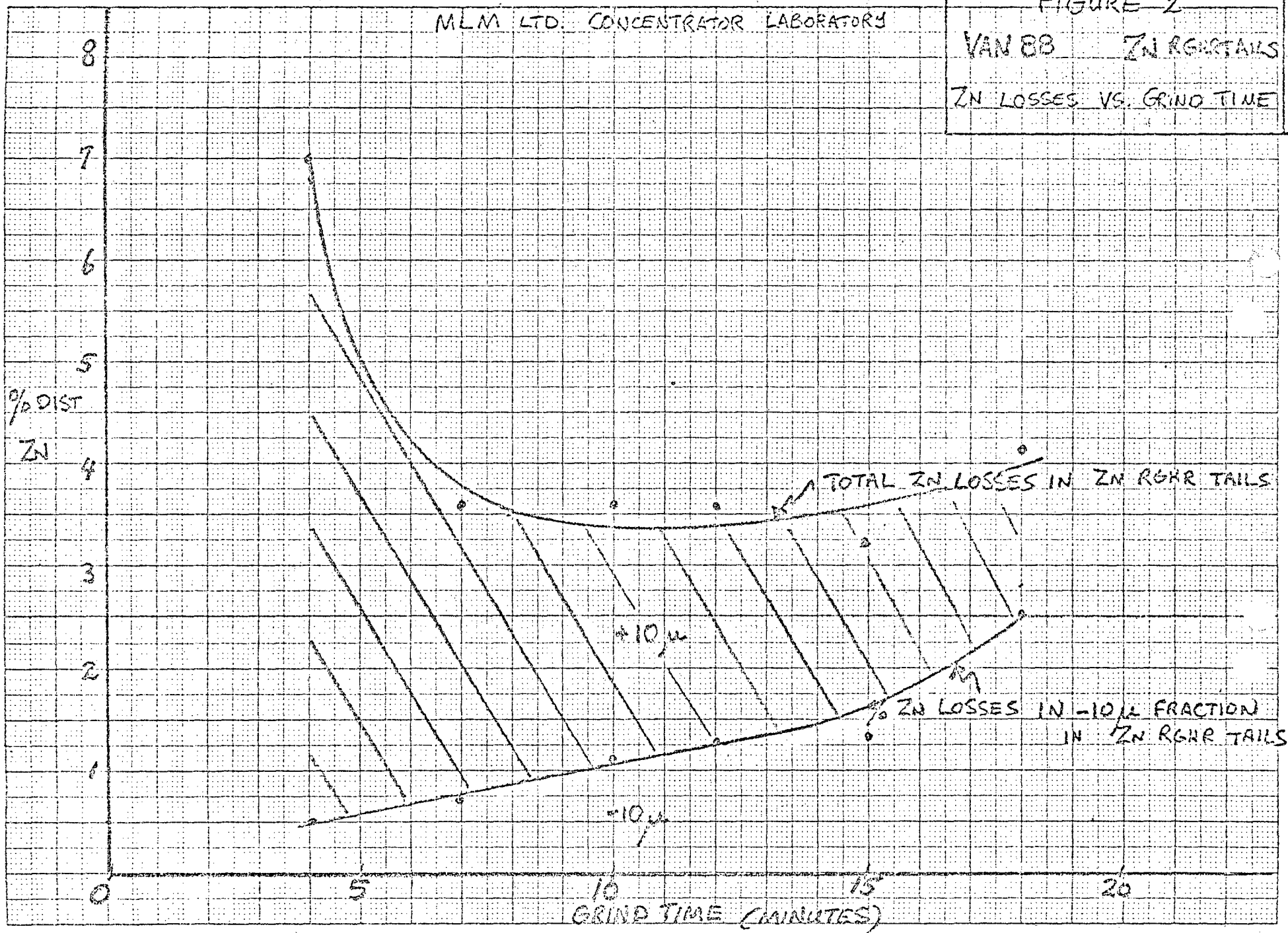


MLM LTD. CONCENTRATOR LABORATORY

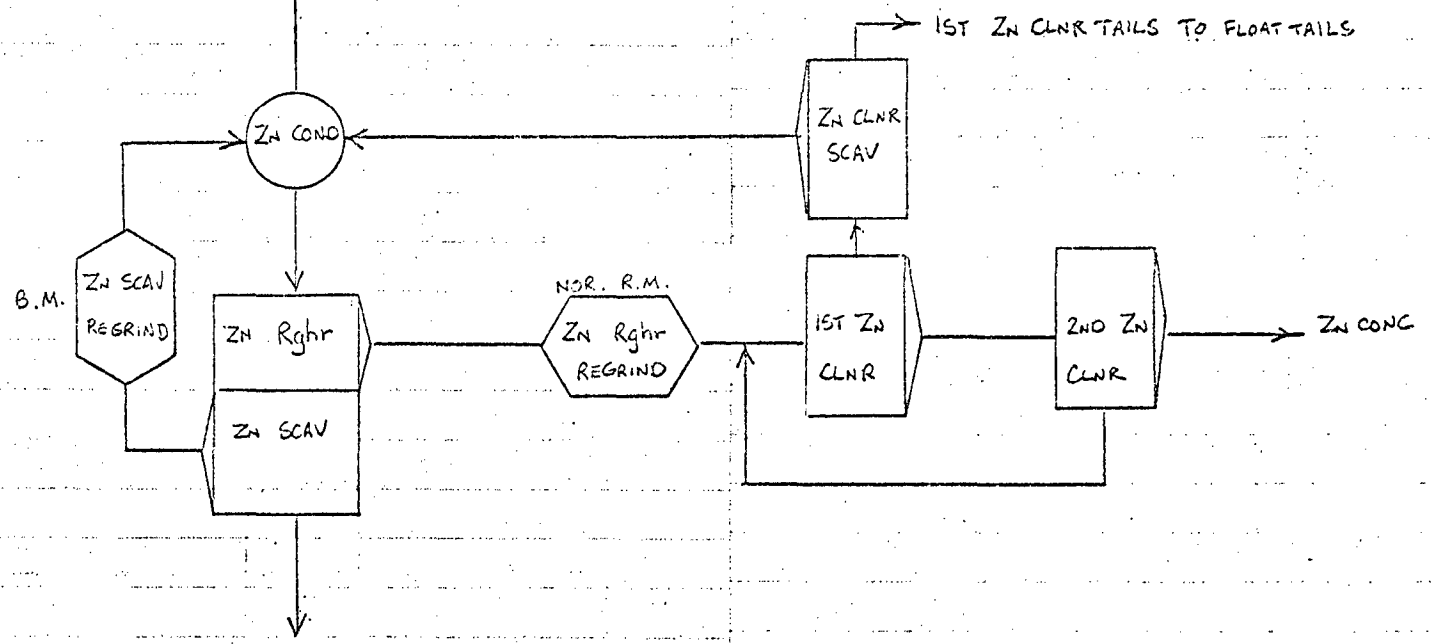
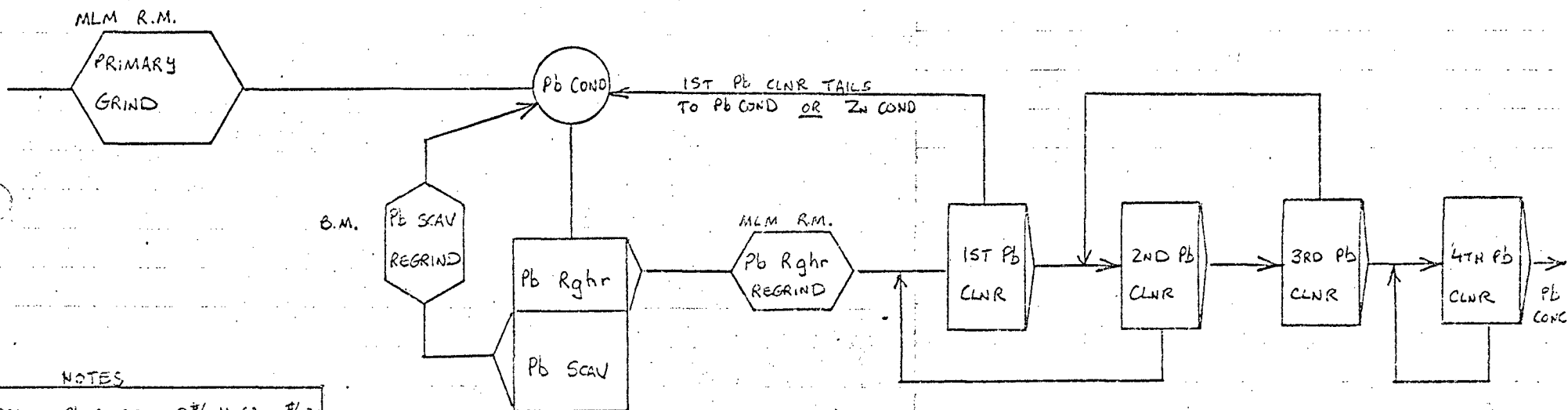
FIGURE 2

VAN B8 ZN RGRR TAILS

ZN LOSSES VS. GRIND TIME



VANGORDA - GRUM TESTWORK
 "STANDARD" FLOWSHEET
 LOCKED CYCLE TESTS



NOTES

2ND, 3RD, 4TH Pb CLNRS - $3\frac{3}{4}\% \text{Na}_2\text{CO}_3, 2\frac{1}{4}\% \text{ZnO}$

1ST, 2ND Zn CLNRS - pH 11.5

MILLS USED

MLM R.M. - 8" DIA x 15" LONG
 LIFTER BARS, 22.5 Kg $\frac{1}{2}$ " RODS

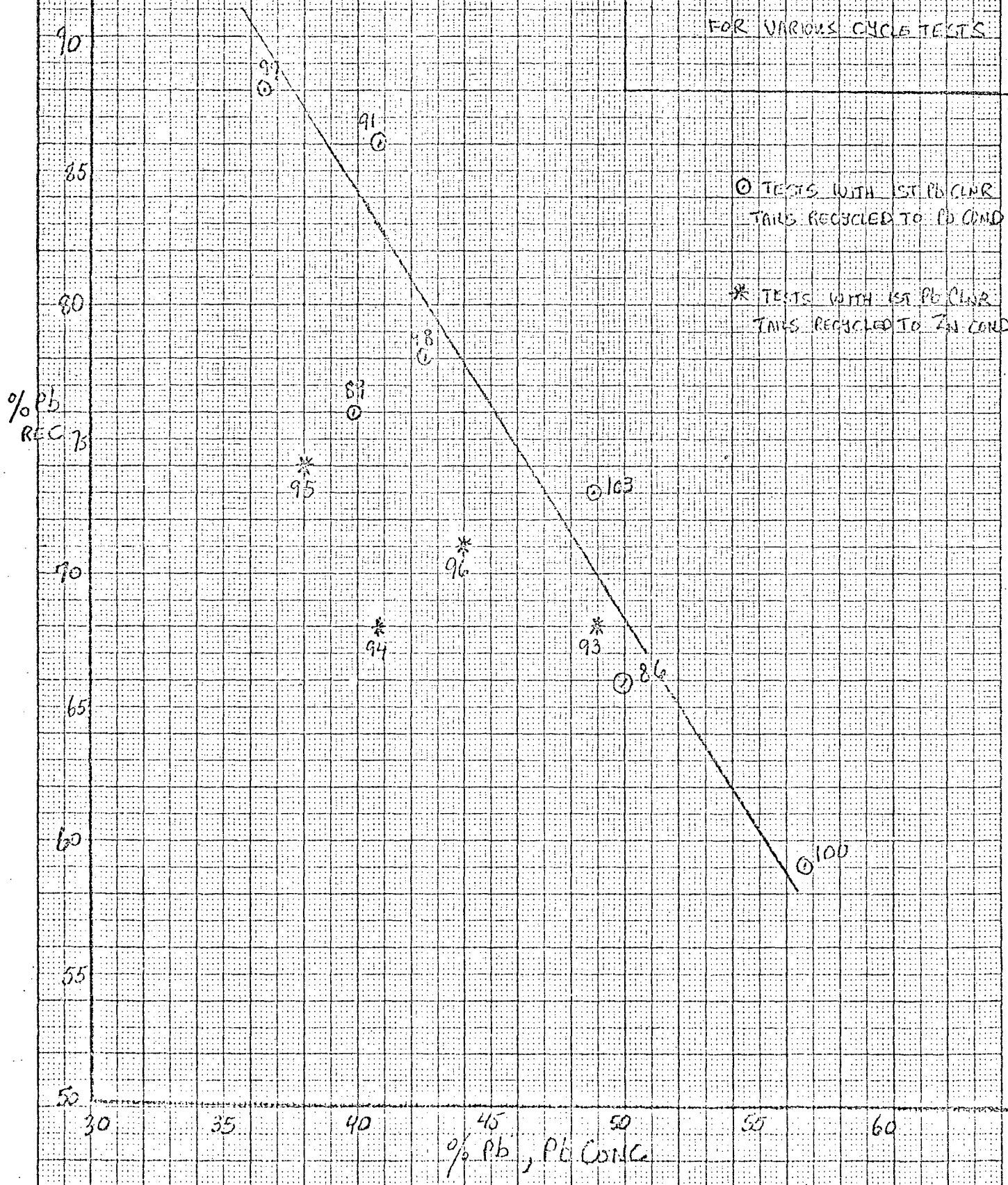
MLM R.M. WITH BALLS - AS ABOVE ONLY
 A CHARGE OF 20 kg
 - 1" STAINLESS STEEL BALLS

NOR. R.M. - 8" DIA x 15" LONG
 NO LIFTER BARS
 22 Kg. $\frac{3}{4}$ " RODS

B.M. - 7" DIA x 8" CERAMIC REGRIND
 MILL WITH 6 lbs $\frac{1}{2}$ " CERAMIC BALLS

FIGURE 4

% Pb REC. VS % Pb IN Pb CONC
FOR VARIOUS CYCLE TESTS



461510

10 X 10 TO THE CENTIMETER 16 X 25 CM.
KEUFFEL & ESSER CO. MADE IN U.S.A.

K
E
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VAN 101
B2

21/9/76

EXPERIMENTAL Pb DEZINC FLOTATION

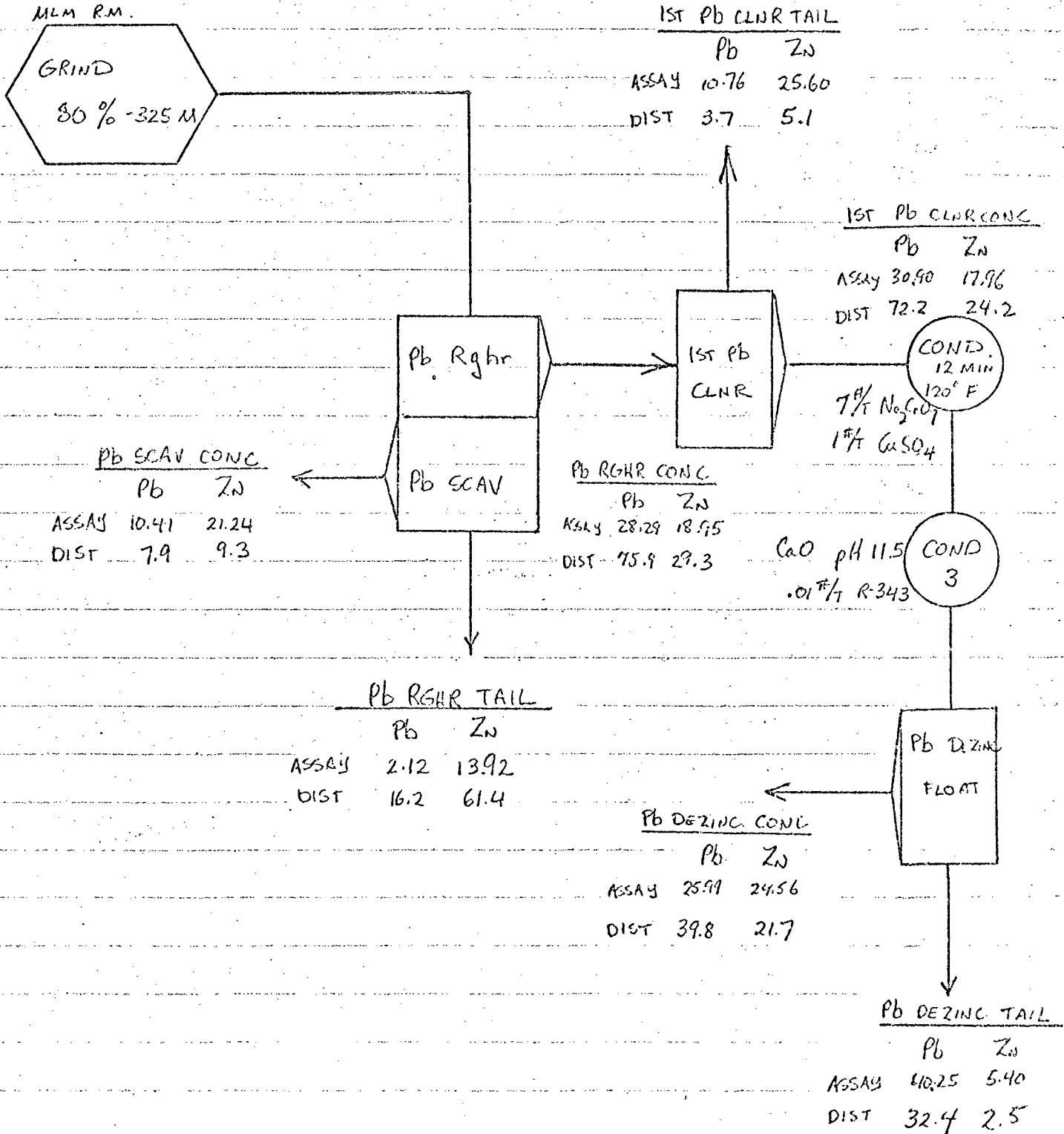


TABLE 1

VAN #88

B3

	GRIND		PB RGHR CONCENTRATE				ZN RGHR CONCENTRATE			
	MIN	% 325 MESH	% Pb	% Zn	% DIST Pb	% DIST Zn	% Pb	% Zn	% DIST Pb	% DIST Zn
VAN 88	4	25	18.79	20.36	76.1	43.5	3.47	19.97	16.4	49.5
	7	50	20.17	21.17	86.1	46.8	2.30	23.97	9.2	49.6
	10	70	23.12	20.93	89.0	42.6	2.04	32.77	6.3	54.8
	12	80	23.67	20.74	89.7	42.2	1.87	37.76	5.0	54.2
	15	90	25.81	21.15	90.2	40.1	1.88	40.20	5.8	56.8
	18	95	28.24	21.11	89.7	36.1	2.10	42.74	4.8	58.6

TABLE 2

MATTAG LAKE MINES LTD. CONCENTRATOR LABORATORY
SUMMARY OF RESULTS AND PROCEDURES OF CYCLE TESTS # 91, 93-98, 100, 103

TEST #	REMARKS	PRIMARY GRIND	PB RGR CONC REGRIND	PB SCAV CONC REGRIND	Zn RGR CONC REGRIND	Zn SCAV CONC REGRIND	Pb. CONCENTRATE				Zn CONCENTRATE				Zn RGR TAILS			
							Pb	Zn	% DIST		Pb	Zn	% DIST		Pb	Zn	% DIST	
									Pb	Zn			Pb	Zn			Pb	Zn
VAN 91 (84)	No NaCN, 2 Zn CLNRS	12 MIN, 10 #/T Na ₂ CO ₃ 1 #/T ZnSO ₄ .08 #/T 242	12 MIN (MLM R.M.) 1.5 #/T Na ₂ CO ₃ , 1 #/T ZnSO ₄ .03 #/T 242	10 MIN (BALL MILL) 1 #/T Na ₂ CO ₃ , 1 #/T ZnSO ₄ .01 #/T 242	10 MIN (NORANDA R.M.) .5 #/T CuSO ₄ 1 #/T CaO, .02 #/T Z200	NO	408	19.2	86	21	18	54.6	4	66	1.1	2.2	8	8
VAN 93 (84)	No NaCN; 2 Zn CLNRS; REDUCED H ₂ O ₃ COLLECTOR TO PRIM. GRIND 1ST Pb CLNR TAIL TO Zn COND.	6 #/T Na ₂ CO ₃ .03 #/T 242 .03 #/T 404	.02 #/T 242 .02 #/T 404	AS FOR VAN-91	AS FOR VAN-91	NO	49	16	68	11	4.1	53.5	11	68	2.0	3.0	15	11
VAN 94 (84)	No NaCN; 2 Zn CLNRS; 1ST Pb CLNR TAILS TO Zn COND; REDUCED Pb TO Zn RGR CONC REGRIND; INCREASE COLLECTOR RGR REGRIND	AS FOR VAN-93	13 MIN	15 MIN	1.5 #/T CaO .04 #/T Z200	5 MIN (B.M.) .2 #/T CuSO ₄ .01 #/T Z200	40.9	20.6	68	18	4.6	48.1	13	71	2.3	2.4	16	9
VAN 95 (84)	No NaCN; 2 Zn CLNRS; 1ST Pb CLNR TAILS TO Zn CIRCUIT; COARSER PRIM. GRIND 7 CYCLES	10 MIN, 4 #/T Na ₂ CO ₃ .03 #/T 242, .03 #/T 404	14 MIN .01 #/T 242 .01 #/T 404	AS FOR VAN 94	AS FOR VAN-94	AS FOR VAN-94	38	21	74	21	4.1	47	10	60	1.8	3.5	14	14
VAN 96 (84)	AS FOR VAN-95 EXCEPT 15 MIN REGRIND OF Pb RGR CONC Zn CIRCUIT NOT STABLE	AS FOR VAN-95	15 MIN	10 MIN (NOR. R.M.) .05 #/T 242 .01 #/T 404	AS FOR VAN-94	10 MIN (B.M.) .02 #/T Z200 .2 #/T CuSO ₄	44	19	71	17	4.5	52	3	51	1.7	4.0	14	17
VAN 97 (84)	No NaCN; 1 Zn CLNR; 1ST Pb CLNR TAIL TO Pb CIRCUIT; FINER PRIM. GRIND; 7 CYCLES	18 MIN, 10 #/T Na ₂ CO ₃ .08 #/T 242	12 MIN (MLM R.M. WITH 2.5) .03 #/T 242	AS FOR VAN-91	AS FOR VAN 94	AS FOR VAN 94	36.5	20.0	88	24	1.4	54.0	3.4	66	1.0	1.8	7	7
VAN 98 (83)	No NaCN; 1 Zn CLNR ONLY REDUCED COLLECTOR TO PRIM. GRIND	13 MIN, 10 #/T Na ₂ CO ₃ .06 #/T 242	18 MIN .015 #/T 242	AS FOR VAN 91	AS FOR VAN 94	NO	42.5	18.5	78	17	3.5	48.8	10	71	1.5	2.0	10	7
VAN 100 (83)	.2 #/T NaCN IN PRIM. GRIND;	AS FOR VAN-91 EXCEPT .2 #/T NaCN	AS FOR VAN-91	AS FOR VAN-91	AS FOR VAN-94	NO	56.7	14.3	59	6	5.0	48.0	17	65	1.8	2.9	16	10
VAN 103 (82)	.3 #/T NaCN IN PRIMARY GRIND 5 Pb CLNRS, 3 Zn CLNRS REGRIND 1ST CLNR CONC (Pb AND Zn) NO Na ₂ CO ₃ , ZnSO ₄ TO Pb CLNRS	AS FOR VAN-91 EXCEPT .3 #/T NaCN	REGRIND 1ST CLNR CONC 5 MIN; 1.5 #/T Na ₂ CO ₃ 1 #/T ZnSO ₄ , .05 #/T 242	AS FOR VAN 91	AS FOR VAN 94 EXCEPT GRIND 1ST CLNR CONC - 15 MIN	NO	48.0	17.3	72	14	5.0	45	12	60	1.8	2.3	9	6

VAN 91

B4

SAMPLE	WEIGHT GMS	% Pb	% Zn
Pb CONCENTRATE CYCLE 1	106.2	45.59	16.34
2	198.4	32.48	24.12
3	163.8	41.66	19.32
4	169.6	41.42	19.14
5	164.5	39.21	19.10
6	178.2	38.07	20.08
Zn CONCENTRATE CYCLE 1	85.4	1.10	58.17
2	119.8	1.67	53.49
3	161.0	1.71	54.39
4	141.1	1.84	55.43
5	172.5	1.68	54.14
6	190.7	1.84	54.35
1ST Zn CLEANER TAILS CYCLE 1	38.3	2.13	11.10
2	38.2	1.67	6.57
3	39.2	2.45	10.24
4	51.2	2.75	33.35
5	43.5	2.00	25.32
6	32.5	2.74	20.12
Zn ROUGHER TAILS CYCLE 1	406.2	.93	1.25
2	463.6	.94	1.40
3	557.7	1.10	1.85
4	599.4	1.16	2.30
5	523.4	1.08	2.08
6	596.7	1.11	2.22
1ST Pb CLEANER TAILS CYCLE 6	184.5	3.88	23.06
2ND " " " " "	95.4	6.47	29.54
3RD " " " " "	61.4	9.52	31.19
4th " " " " "	24.5	8.76	31.75
Pb SCAVENGER CONC " "	98.5	7.23	22.31
Zn CLEANER SCAV CONC " "	25.1	3.81	47.55
Zn RGR SCAV CONC " "	32.0	3.16	30.57
2ND Zn CLEANER TAIL " "	30.8	2.74	20.12
HEAD	5853.3	8.02	15.84

TABLE 4

VAN 91

B4

CALCULATED CIRCUIT RESULTS

	WEIGHT		ASSAY		% DISTRIBUTION	
	GMS	%	% Pb	% Zn	Pb	Zn
Pb CONC	170	17.3	40.8	19.2	86.5	20.8
Zn CONC	190	19.3	1.8	54.6	4.2	66.0
Zn CLNR TAILS	35	3.6	2.5	22.3	1.1	5.0
Zn RGR TAILS	590	59.9	1.1	2.2	8.2	8.2
FLOAT TAILS	625	63.5	1.2	3.3	9.3	13.2
HEADS	985	100.0	8.02	15.72	100.0	100.0

VAN 97

B4

SAMPLE	WEIGHT GMS	% Pb	% Zn
Pb CONCENTRATE CYCLE 1	173.0	36.68	20.64
2	235.4	31.38	21.12
3	206.0	33.33	20.96
4	189.5	37.97	21.76
5	193.2	36.15	19.73
6	188.3	36.27	19.27
7	197.1	36.79	20.08
Zn CONCENTRATE CYCLE 1	118.0	1.08	54.71
2	146.3	1.26	55.61
3	150.3	1.22	54.31
4	184.4	1.20	54.61
5	200.7	1.29	53.20
6	185.7	1.37	55.01
7	194.1	1.44	54.00
1ST Zn CLEANER TAILS CYCLE 1	36.2	1.42	11.52
2	36.1	1.55	11.24
3	27.6	1.92	10.16
4	34.8	2.13	11.40
5	37.2	2.16	9.44
6	30.3	2.39	13.18
7	33.2	2.31	14.79
Zn REGR TAILS CYCLE 1	410.6	.62	.94
2	504.0	.70	1.20
3	505.7	.82	1.54
4	565.6	.84	1.58
5	548.3	.96	1.58
6	584.4	.97	1.83
7	583.8	1.00	1.72
1ST Pb CLEANER TAILS CYCLE 7	160.9	4.73	22.19
2ND " " " "	96.3	6.62	25.05
3RD " " " "	41.6	7.79	26.78
4TH " " " "	32.2	8.81	26.63
Pb SCAVENGER CONC " "	72.5	7.79	23.89
Zn CLEANER SCAV CONC " "	13.0	2.58	22.55
Zn SCAVENGER CONC " "	49.9	2.65	24.09
DECANTS ALL CYCLES	37.8	11.75	22.64
HEAD	699.8	8.17	16.14

TABLE 6

VAN 97

BT

CALCULATED CIRCUIT RESULTS

PRODUCT	WEIGHT		ASSAY		% DISTRIBUTION	
	GMS	%	% Pb	% Zn	% Pb	% Zn
Pb CONC	195	19.3	36.5	20.0	88.3	24.4
Zn CONC	195	19.3	1.4	54.0	3.4	65.9
Zn CLR TAILS	35	3.5	2.3	14.0	1.0	3.1
Zn RGR TAILS	585	57.9	1.0	1.8	7.3	6.6
FLOAT TAILS	620	61.4	1.1	2.5	8.3	9.7
HEAD	1010	100.0	8.0	15.9	100.0	100.0