KERR ADDISON MINES LIMITED

(FOR INTER-OFFICE USE ONLY)

017075

Rec'd Sept. 19/69

To P. M. Kavanagh From W. M. Sirola

Subject Vangorda Mines Limited, Diamond Drill Core For Brunswick Mining and Smelting, Metallurgical Testing. Date Sept. 18/69

One box of Winkie drill core from D.D.H. 15-D (157' to 250') on the Vangorda property was shipped yesterday to Brunswick Mining & Smelting Company, Bathurst, N.B., attention Mr. Neumann.

The weight of this core will be closer to 60 pounds rather than the 100 to 200 pounds requested by Brunswick M & S but that is all we can provide from the Vangorda property at the present time.

Lynda Krupp
for
W. M. Sirola.

WMS/lk
cc. R. Anss. Noranda

THE DOWA MINING COMPANY, LTD.

1, 1-CHOME, MARUNOUCHI, CHIYODA-KU
TOKYO

CABLE ADDRESS:
"DOWAMICO"

TELEPHONES:
(201) 1061, 1211

W.S.R.
J.R.S.
E.F.
R.D.S.
D.C.B.
P.M.K.
G.W.M.
R.G.M.
C.K.W.
J.B.S.
G.P.R.
K.F.L.
R.E.H.
E.C.J.

March 25, 1969

Mr. J. H. Stovel
President
Kerr Addison Mines Ltd.
44 King Street West
Toronto 1, Ontario
Canada

Dear Mr. Stovel,

We appologize you for our being late in submitting you our test report on the Pb-Zn ore of your Vangorda property in Yukon. Enclosed is a brief report on our test result. We hope that it will receive your attention and whatever question you have, please do not hesitate to ask us.

Although the test was not always carried out satisfactorily as the given sample was not sufficient to cover all tests we wanted, the result is generally encouraging and we think, the qualities of each concentrates separated by our tests are commercialy marketable.

As you may notice from our report, recoveries are not satisfactory. But we feel that the sample might have not been free from weathering, and we have several tests left which, we believe, may improve the recoveries. Therefore, we are much interested to make further tests if more sample is available to us. Regardless to these tests, however, we are rather confident to obtain better recoveries at the industrial scale operation.

Under these circumstances, we would like to know your opinion whether you will go ahead with this project or not and also how you will do. We appreciate these information even though it might be rough indication at this stage. In this connection we are pleased to inform you that whenever you desire, we may be nearly to join with you as concentrate buyer or as partner.

Incidently, I am planning to be in Toronto end April on my way back from South America and will be very happy to have an opportunity to exchange our opinion. I will advise you my schedule as soon as it is fixed.

Looking forward to hearing from you soon,

Yours very truly,

THE DOWA MINING CO., LTD.

Y. Suzuki

THE DOWA MINING COMPANY, LTD.

TOKYO

Considerations on the Vangorda and Swim Lake ore

Mar. 17, 1969

Research Laboratory, the Dowa Mining Co.

1. Prior to the investigations on Vangorda and Swim Lake ores, test reports forwarded by 'the Department of Mines and Surveys, Mine Research, Canada' dated Feb. 1955 were sent to the Dowa Mining Co., Tokyo by the Toyo Minka Trading Co. The Dowa Company thought it necessary to study the conclusions of the Canadian people closely and to care about if there might be anything that contribute to them.

2. According to the Canadian Reports, excellent research about fundamental work had been performed at that time and that led-to the conceptions as;

   (a) tests on the hardness of the ores (such as determining work index for grindability)

   (b) tests on the characteristics of grain size and the constituents of metals

   (c) microscopic studies for the mineralization

   these scopes could be left of considerations under the circumstances, while stress should be laid on the flotation tests with microscopic observations of minerals concentrated into the products.

3. Summary of the investigations are as follows:

   (1) The crude ore should be ground to as fine as under 200 meshes to get rejectable wastes.

   (2) The values are copper (chalcopyrite, chalcocite), lead (galena), zinc(sphalerite) and pyrite, though pyrite are thought to be recoverable by any means. So that tests were carried out to obtain (a) lead concentrate and zinc concentrate, (b) copper, lead and zinc concentrate. Since the grade of final concentrate are expected to be of salable ones such as over 50% Pb or Zn, straight differential flotation method were prefered.

   are

(3) In case of (a), on the Swim Lake ores; Pb recovery 71%, that of Zn 75%, on the Vangorda ores; 77% Pb and 60% Zn recovery.
In case of extraction of copper (b), 49% coppor recovery at 11.7% Cu concentrate, 60% Pb recovery and 63% Zn recovery on Swim Lake ores; 44% copper recovery at 6.8% Cu concentrate, 78% Pb and 64% Zn recovery on Vangorda ores.
Such were the results obtained from thirty runs of tests.

(4) Evidently extraction of copper makes lead and zinc minerals disperse through every products on the Swim Lake ores, that is, recovery of Pb and Zn were lessened. Presumably that accounts for the effect of sulphur dioxide used at the top of flotation feed as the depressant for zinc minerals and pyrite. While on the Vangorda ores with less copper, the depressant would have not sufficient time to excert any influence on the flotability of zinc minerals: probably small amount of copper were floated quickly and sulphur dioxide could not do harm at residual minerals.

4. Attention might be paid on the facts that rather poor figures, recovery and grade of final products, would due to the testing method, the batch flotation test, from which operational informations should be confined to some extent within certain limitations since the values of middlings are excluded. Although the amount of samples sent to the research laboratory were not always small, 8 Kilograms of Vangorda ores and 17 Kilograms of Swim Lake ores, in conventional sense, continuous tests would require ten to thirty times of that amount if more details should be called for.

5. Shortly, as described above, economical estimations on copper extraction should be derived from more elaborate testing data than the ones presented here.
Staffs of the research laboratory have, however, an opinion that entirely new process (patent pending) performed successfuly at Matsumine concentrater of the Dowa Mining Co., might do something to those Canadian ores and if more amount of samples should be avairable they are willing to push on further investigations and hoping to transfer their regards to the Canadian people.

Y. Takamura

Y. Takamura

Chief of the Research and Engineering Department, the Dowa Mining Co.

Flotation Tests of Swim Lake and Vangorda Ore

Introduction

Since the samples of Swim Lake and Vangorda ore arrived at Kosaka, several flotation tests have been tried at research laboratory.

Metal content of each sample is as follows:

	Au	Ag(g/t)	Cu	Pb	Zn	Fe(%)
Swim Lake	0.5	64	0.28	3.25	4.21	24.87
Vangorda	0.5	64	0.14	4.05	5.13	20.71

Each sample was ground under 35 mesh by disk grinder for batch flotation tests. Then, each 1,000gm. sample was ground under 200 mesh by laboratory pebble mill.

Flotation tests were performed on the basis of following flowsheets: i.e. 1) Pb-Zn differential flotation 2) Cu-Pb-Zn differential flotation. Typical metallurgical results are described below.

1) Pb-Zn differential flotation

Preliminary tests were tried by various methods to separate Pb and Zn. Consequently, NaCN method was found to be promissing than others. So, several tests were performed according to the flowsheet, shown in fig. 1.

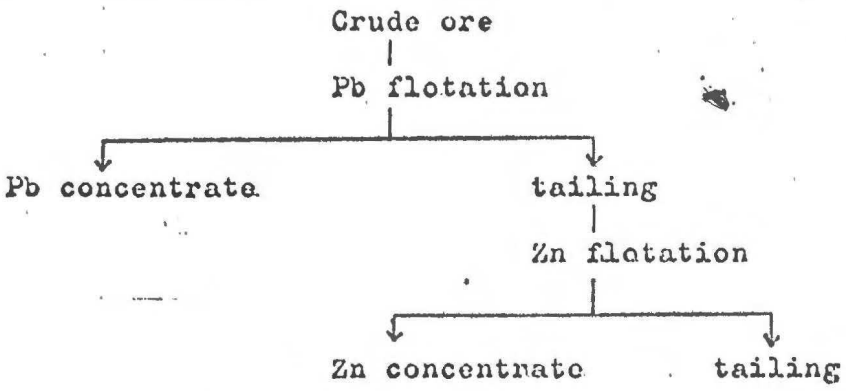

Fig.1 Flowsheet of Pb-Zn differential flotation

Typical metallurgical results are shown in Table 1 (Swim Lake), and Table 2 (Vangorda).

Table 1 Metallurgical result of Swim Lake ore (1)

Product	wt.(%)	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
		(assay %)				(distribution %)			
Head(calc'd)	100	0.22	3.64	4.41	25.33	100	100	100	100
Pb concentrate	5.0	0.26	52.18	6.64	12.42	6.1	71.7	7.5	2.5
Pb-cl-tail	4.5	0.83	11.71	6.66	29.12	17.2	14.5	6.8	5.1

Table 2 Metallurgical result of Vangorda ore (1)

Product	wt.(%)	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
		(assay %)				(distribution %)			
Head(calc'd)	100	0.14	4.01	4.91	20.02	100	100	100	100
Pb concentrate	6.2	0.45	49.85	10.16	10.16	19.9	77.0	12.8	3.2
Pb-cl-tail	3.1	0.89	15.88	12.25	20.75	19.8	12.3	7.8	3.5
Zn concentrate	6.0	0.38	2.18	49.43	9.52	16.3	3.3	60.4	2.9
Zn-cl-tail	13.8	0.19	1.40	3.40	35.64	18.5	4.8	9.5	24.6
Final tail	70.9	0.05	0.15	0.66	18.60	25.5	2.6	9.5	65.8

Reagents used (Lb./ton).

	Swim Lake ore	Vangorda ore
Pb flotation		
Na2CO3	2.8 (pH=10)	2.0 (pH=10)
NaCN	0.5	0.4
Dow#250	0.03	0.05
A.C.C.#25	0.14	0.22
A.C.C.#31	0.17	0.18
Zn flotation		
Ca(OH)2	2.0 (pH=10)	1.2 (pH=10)
CuSO4	0.8	0.8
Nikko#125	0.20	0.20
Ethyl xanthate	0.20	0.11

2). Cu-Pb-Zn differential flotation

Before Pb flotation, Cu flotation was tried by the aid of sulphurous acid which is widely used in treating complex sulphide ores.

Flowsheet is shown in Fig.2 and typical metallurgical results are shown in Table 3 (Swim Lake), and Table 4 (Vangorda).

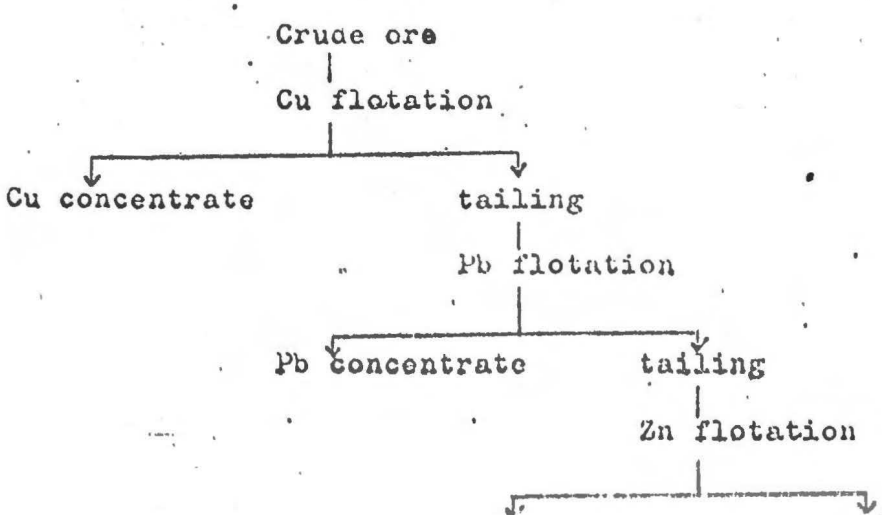

Table 3 Metallurgical result of Swim lake ore (2)

Product	wt.(%)	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
		(assay %)				(distribution %)			
Head(calc'd)	100	0.22	3.25	4.37	24.19	100	100	100	100
Cu concentrate	0.9	11.73	4.63	5.38	26.33	49.1	1.3	1.1	1.0
Pb concentrate	3.6	0.07	53.89	6.39	9.69	1.4	59.7	5.3	1.4
Pb-cl-tail	6.7	0.12	10.36	7.15	19.86	3.7	21.3	10.9	5.5
Zn concentrate	5.7	0.39	1.81	48.88	11.13	10.2	3.2	63.7	2.6
Zn-cl-tail	11.3	0.31	3.53	4.85	29.27	16.2	12.3	12.6	13.7
Final tail	71.8	0.06	0.10	0.39	25.53	19.4	2.2	6.4	75.8

Table 4. Metallurgical result of Vangorda ore (2)

Product	wt.(%)	Cu	Pb	Zn	Fe	Cu	Pb	Zn	Fe
		(assay %)				(distribution %)			
Head(calc'd)	100	0.12	4.18	5.25	20.11	100	100	100	100
Cu concentrate	0.8	6.81	11.52	4.72	30.85	44.7	2.2	0.7	1.2
Pb concentrate	6.7	0.06	49.10	10.31	10.09	3.3	78.7	13.2	3.3
Pb-cl-tail	1.6	0.11	10.93	9.53	22.00	1.6	4.1	2.9	1.8
Zn concentrate	7.4	0.44	4.05	49.03	11.05	26.0	6.7	64.4	3.9
Zn-cl-tail	6.9	0.21	2.80	5.53	23.93	12.2	4.6	7.3	8.2
Final tail	76.6	0.02	0.20	0.79	21.41	12.2	3.7	11.5	81.6

Reagents used (Lb./ton).

	Swim Lake ore	Vangorda ore
Cu flotation		
H_2SO_3	(pH=5.3)	(pH=5.2)
Dow#250	0.05	0.05
A.C.C.#208	0.32	0.34
Pb flotation		
Na_2CO_3	3.8 (pH=10)	5.0 (pH=10)
NaCN	0.45	0.32
A.C.C.#25	0.45	-
A.C.C.#31	0.43	0.46
Zn flotation		
$Ca(OH)_2$	(pH=10)	(pH=10)
$CuSO_4$	1.0	1.0
Nikko#125	0.3	0.2
Ethyl xanthate	0.27	0.13

The above-mentioned is outline of our batch flotation tests. We expect better result in case of continuous operation.

Notes:

1. As a result of microscopic examination, galena, sphalerite, iron pyrite and small amount of chalcopyrite was found as valuable minerals.
2. In the case of Cu-Pb-Zn differential flotation, Cu flotation tailing was reground prior to Pb flotation.
3. Number of stage of cleaning in each flotation test is as follows.

	Cu	Pb	Zn
Swim Lake ore (1)	-	3	2
(2)	2	4	3
Vangorda ore (1)	-	3	3
(2)	2	3	2

THE GALIGHER COMPANY

ESTABLISHED 1901

CABLE ADDRESS
GALSAL

440 WEST EIGHTH SOUTH STREET
P. O. BOX 209
SALT LAKE CITY, UTAH 84110
U.S.A.

TELEPHONE
359-8731
AREA CODE 801

L. Ames

July 17, 1969

Dr. P. M. Kavanagh
Vice President - Exploration
Kerr Addison Mines, Ltd.
Suite 1600 - 44 King Street West
Toronto 1, Ontario, Canada

At Lydell Ames' request I advised the Galigher Co. on Sept. 10th that Mr. Ames intends to visit there in the near future, and that they should hold off any further testing till then.
Sept. 11/69

Dear Dr. Kavanagh:

Pursuant to your telephone call of some time ago, we completed the closed circuit test which you requested be conducted on your sample of Vangorda ore, our Lot No. 1833. In this test (Test No. 5) the three lead cleaner tails in a given series were combined and added at the head of the lead rougher flotation for the next series. Likewise, the three zinc cleaner tails were combined and added to the first zinc rougher conditioner of the next series. All pertinent test details are contained on the attached test data sheets.

The results which were obtained in this test are summarized as follows:

Lot No. 1833, Test No. 5

Product	Wt (gms)	Wt %	Assays			Distributions	
			Pb	Zn	Fe	Pb	Zn
Series 1							
Pb Cl Conc #3	51	5.0	57.8	7.09	9.84		
Zn Cl Conc #3	47	4.6	2.47	52.8	7.64		
Zn Ro Tail	708	69.6	0.58	0.37			
Head (Less C.L.*)	806	79.2	4.31	3.84			
Series 2							
Pb Cl Conc #3	68	6.8	56.6	7.20	10.72	83.8	10.4
Zn Cl Conc #3	70	6.9	2.93	54.4	6.90	4.4	79.7
Zn Ro Tail	868	86.3	0.63	0.54		11.8	9.9
Head (Calc.)	1006	100.0	4.59	4.71		100.0	100.0
Combined Conc.		13.7	29.6	31.0	8.8	88.2	90.1

AIR MAIL

cc: Stark

Lot No. 1833, Test No. 5 (Continued)

Product	Wt (gms)	Wt %	Assays			Distributions	
			Pb	Zn	Fe	Pb	Zn
Series 3							
Pb Cl Conc #3	63	6.1	51.4	7.05	13.2	78.9	8.9
Zn Cl Conc #3	72	7.0	2.80	54.0	7.25	4.9	78.2
Zn Ro Tail	891	86.9	0.74	0.72		16.2	12.9
Head (Calc.)	1026	100.0	3.98	4.84		100.0	100.0
Combined Conc.		13.1	25.5	32.1	10.0	83.8	87.1
Total Test Head (Incl. C.L.*)	3049		4.32	4.87			

* C.L. - Circulating Load

As a result of this test, certain observations were formed, these being as follows:

1. The calculated lead head assay for this test (4.32% Pb) looks as though it may be a little high, 4.1% Pb being the assay obtained on the head sample. Repeat assaying which was conducted on various test products did not effectively alter any of the original assays. The calculated zinc head assay of 4.87% Zn checks very well in the actual assay of 4.84% Zn.

2. There is some doubt that this closed circuit test achieved a balance. In looking at the product weights, it is seen that the average sample weight per series was 1016 grams (3049 ÷ 3). On the basis of weights only, one would be led to believe that the circuits were in balance (1006 grams in Series 2 and 1026 grams in Series 3). The assays, however, do not confirm this. Particularly confusing is the low Pb assay in the lead concentrate of Series 3, together with a low product weight, compared to Series 2. You would expect a high weight with a low assay. Because of this apparent discrepancy, no accurate estimate of what could be expected in the lead circuit can be made on the basis of this test alone. We feel, however, that the results shown for Series 2 would be closer to the expected than those shown for Series 3.

3. The zinc circuit gives a much better indication of balancing than does the lead circuit. The zinc contained in the lead circulating load products evidently reported to the head of zinc flotation as is shown by the strong increase in zinc recovery compared with open circuit testing (42.7% Zn recovery in Test No. 3). The results of this test indicate that a zinc concentrate grade of 54% Zn at a recovery of 78-80% could be expected.

4. Relative to your telephone request of considering the possibility of producing a bulk lead-zinc concentrate assaying less than 10% Fe, it is seen that, by combining the lead and zinc concentrates in Series 2 and in Series 3, this was possible. Here again, we feel that the combined concentrate assays and recoveries shown in Series 2 would more closely represent those which could be expected in milling ores as represented by the sample tested.

In summarizing our observations relative to the outcome of this test, the lead results are still dubious for the reasons given above. The results obtained in the zinc circuit look quite good as does the possibility of producing a bulk Pb-Zn concentrate containing less than 10% Fe. We do have just enough sample left (4900 grams) for a four series closed circuit test. Perhaps the difficulties which were encountered in the lead circuit could be partially resolved by running this additional test. If not, an additional amount of sample would be required with which we would plan to run closed circuit tests only with reference to the lead circuit to see if the potential problems can be solved. No further testing will be conducted until we receive your comments relative to the results obtained to date.

Sincerely yours,

THE GALIGHER COMPANY

R. O. Huch
Metallurgist

ROH/lp

Attachments (Test Data Sheets)

METALLURGICAL RESEARCH DEPT.

CABLE "CALSAL"

THE CALIGHER COMPANY

P. O. BOX 200 — 545-555 WEST 5TH SOUTH STREET
SALT LAKE CITY, UTAH 84110 — U.S.A.

TELEPHONE 359-8721

OUR LOT NO. 1833
DATE 4/15/69
BY JK

TEST NO. 5-1 NAME Kerr Addison

Closed Circuit Test based on Tests Three and Four.

PRODUCT	Weight	Percent Weight	ASSAY									DISTRIBUTION				
				Pb	Zn	Fe						Pb	Zn			
Series #1																
Pb Cl Conc #3	51	5.0		57.8	7.09	9.86										
Zn Cl Conc #3	47	4.6		2.47	52.8	7.64										
Zn Ro Tail	708	69.6		0.58	0.37											
Head (Calc C.L.)	806	79.2		4.31	3.84											
Series #2																
Pb Cl Conc #3	69	6.8		56.6	7.20	10.72						83.8	10.4			
Zn Cl Conc #3	70	6.9		2.92	54.4	6.90						4.4	79.7			
Zn Ro Tail	868	86.3		0.63	0.54							11.8	9.9			
Head (Calc)	1006	100.0		4.59	4.71							100.0	100.0			
Comb Conc		13.7		29.6	31.0	8.8						88.2	90.1			

OPERATION	Pb Ro	Pb Ro	Zn Cond	Zn Cond	Cond	Zn Ro	Pb Rougher**	Pb #1 Cl	Pb #2 Cl	Pb #3 Cl		GRINDING PRODUCT	
TIME	20	3	3	5	5	5	5	40	6	5	4		
REAGENTS — LBS. PER TON												Head	
											MESH	%	%
Lime	3.0			(1)							+10		
NaOH	0.5							0.10			+14		
$ZnSO_4$	2.0										+20		
R-343		0.05	0.025					0.15			+28		
MIBC		0.03	0.03						0.03	0.03	0.015	+35	
$CuSO_4$					1.0							+48	
Z-200						0.08						+65	
												+100	0.4
												+150	4.6
MACHINE - AGITAIR		1000							500	500	500	+200	8.0
R.P.M.		1000							1000	1000	1000	+325	23.6
pH		9.3		11.4								-325	63.6
% SOLIDS													
TEMPERATURE													

REMARKS: (1) to a pH of 11.4 - 1.2, 1.4 and 1.7 ppt respectively for Series 1, 2 and 3.

* Circulating Load

** with 3000 gms small balls

METALLURGICAL RESEARCH DEPT. CABLE "GALGAL"

THE GALIGHER COMPANY

P. O. BOX 300 — 340-365 WEST 3rd SOUTH STREET
SALT LAKE CITY, UTAH 84110 — U.S.A.

TELEPHONE 328-9731

OUR LOG NO. 1033
DATE 4/15/69
BY JX

TEST NO. 5-2 NAME Kerr Addison

PRODUCT	Weight	Percent Weight	ASSAY								DISTRIBUTION				
Section #2				Pb	Zn	Fe					Pb	Zn			
Pb #2 Cl Conc	63	6.1		51.4	7.05	13.2					72.0	8.9			
Zn #3 Cl Conc	72	7.0		2.00	54.0	7.25					4.9	70.2			
Zn To Mill	891	86.9		0.74	0.72						16.6	12.0			
Head (Calc.)	1026	100.0		3.62	4.94						100.0	100.0			
Comb. Conc		13.1		25.5	32.1	10.0					83.8	87.1			

OPERATION	Zn Regr.	Cond	Pb #1 Cl	#2 Cl	#3 Cl								GRINDING PRODUCT		
TIME	20	5	5	2-4	2-3										
REAGENTS — LBS. PER TON															
													MESH	%	%
Lime	1.0	0.60		0.40	0.45								+10		
Z-200	0.02												+14		
CuSO4		0.50											+20		
Frother 65			0.025	0.025	0.025								+28		
													+35		
													+48		
													+65		
													+100		
													+150		
MACHINE - AGITAIR		1000		500	500								+200		
R.P.M.		1000		1000	1000								+325		
pH		11.2		10.9	10.9								-325		
% SOLIDS															
TEMPERATURE															

REMARKS: * with 3000 gms small balls

METALLURGICAL RESEARCH DEPT.

CABLE "GALSAL"

THE GALIGHER COMPANY

P. O. BOX 209 — 545-585 WEST 8TH SOUTH STREET
SALT LAKE CITY, UTAH 84110 — U.S.A.

TELEPHONE 359-3731

OUR LOT NO. 1033
DATE 4/15/69
BY JK

TEST NO. 5-3 NAME Kerr Addison

PRODUCT	Weight	Percent Weight	ASSAY								DISTRIBUTION				
				Pb	Zn										
Series #3															
Pb Cl Tail #1	115			3.94	11.03										
Pb Cl Tail #2	14			11.3	13.60										
Pb Cl Tail #3	9			19.3	12.67										
Zn Cl Tail #1	50			2.69	3.26										
Zn Cl Tail #2	15			4.40	10.18										
Zn Cl Tail #3	8			6.32	22.80										
Test Feed (Calc)	3049			4.32	4.87										

OPERATION		GRINDING	
TIME		PRODUCT	
REAGENTS — LBS. PER TON			
		MESH	%	%
		+10		
		+14		
		+20		
		+28		
		+35		
		+48		
		+65		
		+100		
		+150		
MACHINE		+200		
R.P.M.		+325		
pH		−325		
% SOLIDS				
TEMPERATURE				

REMARKS: