

DIVISION OF
ORE DRESSING AND
METALLURGY



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DEPARTMENT OF MINES
CANADA

MINES BRANCH

Ottawa, June 12th, 1929.

REPORT

Inv. 323

of the

ORE DRESSING AND METALLURGICAL LABORATORIES

Concentration of Lead-Zinc Ore From
Geneva, Ontario.

By C.S. Parsons.

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Report No.

Concentration of Lead-Zinc Ore From Geneva, Ontario.

By C. S. Parsons

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Shipment: A shipment of 60 bags of lead-zinc ore approximately 3000 pounds was received in March, 1929, from the Geneva Lake property of the Towagmac Exploration Company, Geneva, Ontario.

Characteristics of Ore: The ore consists of a siliceous gangue, containing galena, zinc blende and pyrite together with low values in both gold and silver. The minerals are disseminated throughout the gangue, but very fine grinding is not necessary in order to free them.

Analysis of Sample:

Lead	-	3.44 %
Zinc	-	9.41 %
Gold	-	0.01 oz/ton
Silver	-	1.25 oz/ton

Results of Experimental Tests: Three continuous small scale selective flotation tests were made. The ore was treated at the rate of one hundred pounds per hour. The flow sheet used was as follows: The ore was crushed to

1/8 inch and sampled, then fed to a small rod mill in closed circuit with a classifier. The classifier overflow went direct to a small 6-cell flotation machine. The lead was floated in this machine and the rougher concentrate was re-cleaned in one cell. The tailing from the lead flotation cell was pumped to an 8-cell flotation machine where the zinc was floated. The zinc rougher concentrate was re-cleaned in a 3-cell machine, the cleaner tailing being returned to the head of the zinc rougher cell.

The following tables give the reagents used and the results of the tests.

Summary and Conclusions: Owing to the excellent results obtained it is hardly necessary to discuss them in detail.

The grade of the concentrates can be varied between quite wide limits without affecting the recoveries of the lead or zinc. The silver and gold recoveries fall off slightly as the grade of the lead concentrate is raised. The most profitable grade to make will have to be determined from a study of the smelter charges and freight rates.

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Test No. 1

Reagents Used in Pounds Per Ton of Ore.

Time	Lead reagents					Zinc reagents			Density		Remarks
	Soda ash	Cyanide	Xanthate	Cresylic acid	Zinc sulphate	Copper sulphate	Xanthate	Pine oil	Lead cell discharge		
10.00 am.	.99	.11	.01	.4	1.5	1.0	.12	.15	1	Ore feed rate -	
10.30 "	.99	.11	.01	.4	1.5	1.0	.12	.15		110 lbs/ hour	
11.00 "	.99	.12	.01	.4	1.6	1.0	.12	.15	1:2.3		
11.30 "	1.12	.099	.01	.4	1.5	1.0	.11	.15	1:1.6		
12.00 pm.	1.12	.099	.01	.4	1.6	1.0	.097	.15	1:1.6		
12.30 "	1.09	.10	.01	.4	1.5	1.0	.1	.15	1:1.8		
1.00 "	1.09	.106	.01	.4	1.4	1.0	.1	.15	1:1.8	Started taking samples	
1.30 "	1.09	.106	.01	.4	1.5	1.0	.1	.15	1:1.6	every 5 minutes.	
2.00 "	1.2	.13	.01	.4	1.7	1.0	.12	.15			
2.30 "	1.2	.13	.01	.4	1.8	1.0	.097	.15			
3.00 "	1.12	.12	.01	.4	1.7	1.0	.097	.15	1:1.6		
3.30 "	1.19	.12	.01	.4	1.6	1.0	.11	.15			
3.40 "	1.19	.12	.01	.4	1.6	1.0	.045	.15		Reduced amount of Xanthate	
4.00 "	1.2	.12	.01	.4	1.7	1.0	.045	.15		for zinc flot. results O.K.	
4.30 "	1.2	.12	.01	.4	1.7	1.0	.045	.15	1:1.85		

Soda ash was fed to ball mill.
 Cyanide was fed to ball mill.
 Zinc sulphate to classifier overflow.
 Xanthate to head of lead cells.
 Cresylic acid to head of lead cells.
 Copper sulphate to pump between lead and zinc cells.
 Xanthate to head of zinc cells.
 Pine oil to pump between lead and zinc cells.

Densities were taken of the tailing discharges from lead cells.

Results - Test No. 1.

Heads: Pb - 3.44%; Zn - 9.41%; Au - 0.01 oz/ton; Ag - 1.75 oz/ton

Test No.	Product	Wt. %	Assay				Recovery - %			
			Pb %	Zn %	Au oz/t	Ag oz/t	Pb	Zn	Au	Ag
1.	Pb - conc.	6.81	48.80	12.06	0.12	15.75	96.6	8.7	82.1	92.1
Samples taken	Pb - tailing		0.10	3.00	tr	0.27				
1 pm to 4.30 pm	Zn - conc.	15.45	0.25	53.61	0.01	0.90	1.1	88.1	15.0	1.2
	Zn - tailing	77.74	0.10	0.39	tr	0.10	2.3	3.2	2.9	6.7
1.	Pb - conc.		48.00	12.60						
Samples taken	Zn - conc.		0.15	54.00						
of entire run	Tailing		0.12	0.39						

Screen Test on Tailing

Mesh	Wt. %	Cumulative %
+ 65	2.5	2.5
- 65 + 100	6.4	10.9
-100 + 150	9.2	20.1
-150 + 200	13.9	34.0
-200	66.0	

Test No. 3.

Reagents Used in Pounds per ton

Time	Lead reagents					Zinc reagents			Density		Remarks
	Soda ash	Cyanide	Zinc sulphate	Sodium areofloat	Cresylic acid	Copper sulphate	Xanthate	Pine oil	Lead cell discharge		
10.00 am.	.96	.49	2.7	.008	.53						Oye feed rate
10.30 "	.96	.49	2.6	.008	.53						110 lbs/ hour
11.00 "	.94	.44	2.6	.008	.53	.88	.044	.08	1:3.3		
11.30 "	.94	.44	2.8	.008	.53	.88	.04	.08	1:2.3		
12.00 pm.	.88	.44	2.6	.114	.53	.92	.047	.08	1:2.4		
12.30 "	.88	.44	2.8	.114	.53	.91	.047	.08	1:2.4		
1.00 "	.96	.46	2.8	.114	.53	.92	.047	.08	1:2.3		
1.30 "	1.0	.41	3.0	.114	.53	.85	.047	.08	1:2.5		
2.00 "	1.0	.42	2.8	.114	.53	.88	.047	.08	1:2.5		
2.30 "	.96	.42	2.7	.114	.53	.93	.047	.08	1:2.5		Note: Xanthate
3.00 "	.96	.44	2.8	.114	.66	.94	.09	.08	1:1.78		feed line plugged.
3.30 "	.94	.44	2.7	.114	.66	1.9	.09	.08	1:1.6		
4.00 "	.82	.41	2.6	.114	.66	1.9	.09	.08	1:1.33		
4.30 "	.82	.41	2.6	.114	.66	1.9	.09	.08	1:1.4		

Soda ash was fed to ball mill.
 Cyanide was fed to ball mill.
 Zinc sulphate was fed to ball mill.
 Sodium areofloat was fed to lead cells.
 Cresylic acid was fed to lead cells.

Copper sulphate was fed to pump to zinc cells.
 Xanthate was fed to zinc cells.
 Pine oil was fed to pump to zinc cells.

Densities were on lead cell tailings.
 Same grinding in Test # 2.

Test No. 2.

Reagents Used in Pounds per ton of Ore

Time	Lead reagents					Zinc reagents			Density	Remarks
	Soda ash	Cyanide	Zinc sulphate	Sodium areofloat	Cresylic acid	Copper sulphate	Xanthate	Pine oil	Lead cell discharge	
9.30 am	.9	.09	0	.014	.4	.91	.04	.08		Ore feed rate
10.00 "	.9	.19	0	.014	.4	.96	.04	.08		110 lbs/hour
10.30 "	.88	.19	0	.014	.4	.96	.04	.08	1:2.3	
11.00 "	.85	.19	0	.011	.4	1.04	.04	.08	1:2.4	
11.30 "	.85	.19	0	.011	.5	.88	.039	.08	1:1.95	
12.00 pm	.85	.2	0	.014	.5	.9	.039	.08	1:1.78	Changed lead
12.30 "	.85	.19	0	.008	.5	.89	.039	.08	1:1.9	samples 12.30 pm.
1.00 "	.85	.18	0	.008	.5	.88	.039	.08	1:1.6	
1.30 "	.83	.2	0	.008	.5	.85	.044	.08	1:1.7	
2.00 "	.85	.19	0	.008	.5	.88	.044	.08	1:2.3	
2.30 "	.85	.19	.91	.008	.5	.08	.04	.08	1:2.4	
3.00 "	.9	.2	.91	.008	.5	.88	.04	.08	1:2.3	Changed lead samples
3.30 "	.9	.12	.9	.008	.5	.89	.04	.08	1:2.1	at 3.00 pm.
4.00 "	.9	.2	.93	.008	.5	.89	.04	.08	1:2.0	Changed zinc samples
4.30 "	.9	.2	.93	.008	.5				1:2.0	at 3.30 pm.

Soda ash was fed to ball mill.
 Cyanide was fed to ball mill.
 Zinc sulphide was fed to classifier overflow.
 Sodium areofloat was fed to lead cells.
 Cresylic acid was fed to lead cells.
 Copper sulphate was fed to pump to zinc cells.
 Xanthate was fed to zinc cells.

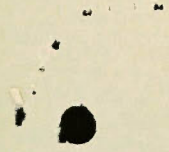
Densities taken on lead cells discharge.

Same grinding as in Test # 1

Results: Test Nos. 2 & 3.

Heads: Pb - 3.44%; zn 9.41%; Au - 0.01 ozs/ton; ag - 1.75 ozs/ton.

Test No.	Product	Wt. %	Assay				Recovery %			
			Pb %	Zn %	Au oz/t	Ag oz/tn	Pb.	Zn.	Au	Ag
2.	Pb. conc.	7.00	47.51	12.06	0.10	14.95	96.6	9.0	70.0	80.5
Samples # 1	Pb. tailing		0.10	8.37	tr	0.22				
10.00 pm. to	Zn. conc.	15.30	0.15	54.90	0.01	1.10	0.7	89.1	15.0	
12.30 pm.	Zn. tailing	77.70	0.12	0.23	tr	0.11	2.7	1.3	15.0	
2.	Pb. conc.	6.25	53.18	11.07	0.12	16.05	36.6	8.9	75.0	81.6
Samples # 2	Pb. tailing		0.10	9.04	tr	0.27				
12.30 pm. to	Zn. conc.	12.50	0.15	54.90	0.01	1.10	0.6	88.7		
3.30 pm.	Zn. tailing	81.25	0.12	0.23	tr	0.11	2.8	2.4		
2.	Pb. conc.	6.19	54.06	10.55	0.10	16.20	97.3	6.9	62.0	80.6
Samples # 3	Pb. tailing		0.09	9.50	tr	0.31				
3.30 pm. to	Zn. conc.	15.48	0.15	55.25	0.01	1.00	0.7	91.8		
4.30 pm.	Zn. tailing	78.33	0.09	0.16	tr	0.11	2.0	1.3		
3.	Pb. conc.	5.76	57.77	10.40	0.12	16.90	93.9	6.4	63.0	77.9
10.00 am.	Pb. tailing		0.17	9.49	tr	0.21				
to	Zn. conc.	15.34	0.20	55.32	0.01	1.08	0.8	90.1		13.3
4.30 pm.	Zn. tailing	78.30	0.10	0.42	tr	0.14	2.3	3.5		8.8



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