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REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES

Report No.206

Concentration of a lead-zinc ore from Riondel, B.C.

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Shipments: Two shipments of a lead-zinc ore were received from the Shepherd Mining Co., Riondel, B.C.
Shipment no. 1 of 5 pounds was received November 10, 1923
Shipment no. 2 of 172 pounds was received December 12, 1923

Purpose of experimental tests: Tests were desired to determine a suitable method of recovering the lead and zinc values in marketable products.

Characteristics of the ore: The chief mineral constituents of the ore are galena, zinc blende, arsenopyrite, pyrite, calcite, rhodochrosite (manganese carbonate) and quartz.

Sampling and Analysis: Lot No. 1 was crushed to 20 mesh and a sample for analysis was cut out and ground to 100 mesh. Lot No. 2 was crushed to ½", a sample was cut out and crushed to 20 mesh. A sample for analysis was obtained from the 20 mesh sample and ground to 100 mesh. The analysis of the samples was as follows:

	Lot no. 1	Lot no. 2
Lead	5.38 %	3.03 %
Zinc	8.58	4.31
Managanese	13.70	3.57
Arsenic	0.62	0.58
Gold	0.04 oz/ton	0.01 oz/ton
Silver	6.69 "	5.58 "

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EXPERIMENTAL TESTS

A number of tests were conducted on shipment no. 2. These consisted of - First tabling to remove as much lead as possible in a high grade concentrate followed by flotation and, Second, selective flotation of the lead and zinc values. While a high grade lead product was obtained by tabling, using

the first method, the recoveries were low and a satisfactory zinc product was not obtained. The second method gave the better results. A description of a few of the tests with the results obtained are given below:

Test No. 21:

Procedure: A 1000 gram sample was ground wet in a small ball mill for 30 minutes with 2.5 grams of soda ash and 0.1 cc of a mixture of 40% coal tar and 60% coal tar creosote. The ground charge was then transferred to a small Ruth flotation machine and the lead floated by the use of 0.05 grams sodium cyanide and 0.1 cc of cresylic acid. The lead concentrate was rerun with 0.1 cc cresylic acid to clean it. The lead tailings were put back into the Ruth machine after decanting off the excess water, and the zinc floated by using 0.5 grams of copper sulphate, 1 gram soda ash, and 0.15 cc Barretts #634, 0.1 cc TT mixture and 0.05 cc Aldol. The zinc concentrate was rerun to clean it.

Results: The results of the test are given in the following table:

Product	Weight %	Analysis % lead	Analysis % zinc	Percent of values Lead	Percent of values zinc
Lead concentrate	5.60	44.90	9.30	69.2	10.3
" middling	7.10	12.23	11.70	23.9	16.3
Zinc concentrate	7.96	1.00	43.20	2.2	67.7
" middling	5.55	0.89	1.90	1.3	2.1
Tailing	72.85	0.17	0.25	3.4	3.6

A screen test on the tailing gave:

-65+100	2.9 %
-100+150	5.5
-150+200	12.2
-200	79.4

Test No. 22:

Procedure: This test is similar to test no. 21, except that different flotation reagents were used.

Reagents for flotation of lead:

Added to ball mill	Soda ash	1 gram
	Water gas tar	0.1 cc
	Coal tar creos.	0.1 cc
Added to flotation cell	Sodium cyanide	0.05 grams
	Cresylic acid	0.1 cc
To clean lead concentrate	Cresylic acid	0.05 cc

Reagents used for flotation of zinc:

Added to flotation cell	Copper sulphate	0.5 grams
	Water gas tar	0.1 cc
	TT mixture	0.15 cc
To clean zinc concentrate	Cresylic acid	0.05 cc
	Aldol	0.05 cc

Results: The results of the test are given in the following table:

Product	Weight %	Analysis % lead	Analysis % zinc	Percent of values Lead	Percent of values Zinc
Lead concentrate	8.15	33.36	8.55	84.6	13.9
" middling	9.82	2.45	10.60	7.5	20.8
Zinc concentrate	5.12	0.78	52.30	1.3	53.5
" middling	4.04	1.28	9.80	1.6	7.9
Tailing	73.14	0.22	0.27	5.0	3.9

Remarks: The results of the above tests would indicate that the minerals were not entirely freed. The grade of the lead concentrate was low and the recoveries of both lead and zinc only fair. A number of tests were made in which the ore was ground wet to pass 200 mesh.

Test No. 27: Selective flotation at 200 mesh

Procedure: 1000 grams of the ore was ground for 30 minutes in a small ball mill with 0.05 cc of a mixture of 40% coal tar and 60% coal tar creosote. The ball mill charge was then screened wet on 200 mesh and the oversize returned to the mill and ground for the same time with the same amount of oil. The charge was again screened and the oversize reground as before. After the third grinding only a small amount of 200 mesh material remained on the screen The charge was then dewatered and returned to the mill for mixing with the flotation reagents. 0.05 cc mixture of coal tar and coal tar creosote and 2.5 grams soda ash were used. The charge was then floated in a similar manner to test no. 21, except that no aldol was used in making the zinc rougher concentrate, but 0.05 cc aldol was used to clean it.

Results: The results of the test are given in the following table:

Product	Weight %	Analysis				Percent of values			
		Lead %	Zinc %	Gold oz/tn	Silver oz/ton	lead	Zinc	Gold	Silver
Lead concentrate	4.91	59.16	7.60	0.20	77.50	80.5	7.3	74.6	55.4
" middling	6.11	7.52	7.20	0.02	17.82	12.7	8.6	9.3	15.8
Zinc concentrate	6.42	0.96	55.70	0.01	8.35	1.7	60.8	2.4	7.8
" middling	3.00	1.19	12.80	0.06	6.14	1.0	7.5	13.7	2.7
" tailing	77.45	0.19	0.45	0.00	1.62	4.1	6.8	0.0	18.3

CONCLUSIONS: The results of the tests show that the ore is amenable to treatment by selective flotation. The above results are only indicative of what could be expected under operating conditions on a similar grade and class of ore. A 60% lead concentrate should be obtained with a recovery of 85% of the lead. A 55% zinc concentrate should be obtained with a recovery of 75% of the zinc.

In conducting the small scale tests, sufficient concentrate was not obtained of either product to maintain the proper conditions as to pulp density for cleaning the rougher concentrates. This condition is believed to be the cause for the excessive fine grinding to obtain the results of test no. 27. To obtain reliable results, experimental tests should be conducted on a larger scale under continuous operating conditions.

The gold and silver values seem to be associated with the lead. In test no. 27, 75% of the gold values and 55% of the silver values reported in the lead concentrate. The low recovery of silver was no doubt due to excessive sliming.