O T T A W A April 21st, 1942.

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of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1206.

Sink-and-Float Tests on a Sample of Zinc Ore from the Golden Manitou Mine, near Val d'Or, Quebec.

(Copy No. 25.)

BUREAU OF MINES
DIVISION OF METALLIC MINERALS

ORE DRESSING AND
METALLURGICAL LABORATORIES

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Shipment:

Three sacks of ore, net weight 450 pounds, were received on March 18th, 1942. The shipment was submitted by Andrew Robertson, Manager, Golden Manitou Mines Limited, Val d'Or, Quebec.

Location of Property:

The property from which this ore was taken is about 10 or 12 miles east of the town of Val d'Or in Bourlamaque township, Abitibi county, Quebec.

Character of the Ore:

Six polished sections were prepared and examined under the reflecting microscope for the purpose of determining the character of the ore.

Gangue -

In the polished sections the gangue is a complex mixture of soft grey rock, milky quartz, and carbonate. The rock material appears to be slightly schistose and the carbonate dolomitic in character.

Metallic Minerals:

Metallic mineralization is heavy and forms the major portion of the six polished surfaces. In their approximate order of abundance the metallic minerals present are: pyrite, sphalerite, galena, chalcopyrite, arsenopyrite, and tetrahedrite.

Pyrite predominates as small granular aggregates and coarse to fine disseminated grains which contain inclusions of gangue, sphalerite, galena, and chalcopyrite.

Rather light-coloured sphalerite occurs as small masses and coarse to fine irregular grains in gangue. As already noted this mineral is visible also as inclusions in pyrite, but most of it is interstitial to grains of iron sulphide and appears to have been deposited later than the latter.

Galena has the same modes of occurrence as sphalerite with which it is often closely associated.

(Continued on next page)

(Character of the Ore, cont'd) -

Chalcopyrite and arsenopyrite are locally common as medium to fine irregular grains and subhedral crystals admixed with the other sulphides. The former is quite prevalent in sphalerite as tiny blebs which, in some places, are in alignment, perhaps along crystallographic directions of the zinc sulphide.

Tetrahedrite, or probably tetrahedrite-tennantite, is present in two of the six sections. In one it occurs with intimately admixed grains of galena, sphalerite, chalcopyrite, and arsenopyrite, as an irregular stringer, one to two millimetres wide, transecting gangue. In the other it is present in sphalerite as occasional, small grains which are often closely associated with chalcopyrite.

Sampling and Assaying:

A head sample cut from the shipment was assayed and reported as follows:

Gold	-	0.058 oz./ton.
Silver	-	4.49 "
Copper	-	0.35 per cent
Lead	-	0.68 "
Zinc	-	11.99 "
Iron	-	13.93 "
Sulphur	-	20.31 "

Experimental Tests:

A size-density analysis was conducted on a sample of this ore to determine its suitability, or otherwise, for beneficiation by the sink-and-float process.

The ore was crushed finer than one inch and the minus 8 mesh material screened out, this being the lower size limit of feed to the sink-and-float process under the most favourable circumstances.

A 50-pound sample of material in the size range

(Experimental Tests, cont'd) -

-1"+8 mesh was then cut out and fractionated on a series of screens at 1/8-inch intervals from 7/8 inch to 3/8 inch, the finest fraction being minus 3/8 inch plus 8 mesh.

A series of density separations was made on each size fraction in a bath of substantially stable galena-water suspension, the density of which can be controlled to an accuracy of 0.01. The first separation was made at a density of 2.85, the float being assayed while the sink was retreated at a higher density giving an intermediate float and a second sink. This process was repeated until four separating densities had been used. The separation products from the -3/8"+8 mesh fraction were screened on 3-, 4-, and 6-mesh screens, giving in all a series of separation products in each of nine different sizes.

The results of this test indicate that the ore is entirely unsuitable for beneficiation by this process because part of the sphalerite is so fine and so widely disseminated that no part of the sample submitted is free of zinc or carries it in small enough quantities to permit it to be rejected as waste.

The results of the size-density analysis are tabulated below and show the gold, silver and zinc assays of the various products. Nothing has been done with the minus 8 mesh fines nor have they been considered in the per cent weight figures quoted in this table. The fines would be sent on to further treatment, along with the sink, in normal circumstances.

SIZE-DENSITY ANALYSIS.

(S.F. Test No. 33 - Golden Manitou)

Size Fractions	-6+8 Mesh		-4+6 Mesh		-3+4 Mesh		-3/8"+3 Mesh		-½"+3/8"	
	- Weight Proportions -									
DENSITY FRACTIONS	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed
Float @ 2.85	41.02	1.89	36.59	2.05	26.49	1.79	21.64	1.85	21.85	2.64
Float @ 2.875; sink @ 2.85	10.73	0.49	7.49	0.42	4.48	0.30	3.05	0.26	1.69	0.20
Float @ 2.90; sink @ 2.875	9.21	0.42	5.14	0.29	4.52	0.31	3.49	0.30	3.19	0.39
Float @ 3.00; sink @ 2.90	8.53	0.40	5.80	0.32	5.86	0.39	3.16	0.27	2.71	0.33
Sink @ 3.00	30.51	1.41	44.98	2.51	58.65	3.96	68.67	5.86	70.56	8.53
TOTAL -	100.00	4.61	100.00	5.59	100.00	6.75	100.00	8.54	100.00	12.09
	Assays, per cent		Assays, per cent		Assays, per cent		Assays, per cent		Assays, per cent	
	Zn / Au / Ag		Zn / Au / Ag		Zn / Au / Ag		Zn / Au / Ag		Zn / Au / Ag	
Float @ 2.85	5.73	0.02 / 2.85	3.92	0.02 / 2.02	3.07	0.015 / 1.72	3.22	0.015 / 0.26	2.67	0.025 / 6.30
Float @ 2.875; sink @ 2.85	9.83	0.04 / 3.87	7.66	0.02 / 5.62	5.24	0.04 / 4.11	5.34	0.02 / 2.08	6.30	0.02 / 2.35
Float @ 2.90; sink @ 2.875	13.03	0.22 / 4.21	10.66	0.025 / 7.69	8.05	0.02 / 4.06	6.89	0.02 / 1.86	4.73	0.04 / 9.00
Float @ 3.00; sink @ 2.90	15.12	0.04 / 4.99	13.70	0.07 / 4.97	9.90	0.07 / 4.55	8.16	0.03 / 5.44	6.65	0.03 / 7.61
Sink @ 3.00	17.00	0.085 / 6.78	16.09	0.24 / 5.54	15.79	0.18 / 5.96	15.39	0.075 / 6.64	14.99	0.08 / 6.45

SIZE-DENSITY ANALYSIS.

(S.F. Test No. 33 - Golden Manitou, cont'd)

Size Fractions	-5/8"+½"		-¾"+5/8"		-7/8"+¾"		-1"+7/8"		Total	
	- Weight Proportions -									
DENSITY FRACTIONS	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed	% Size fraction	% S.F. feed
Float @ 2.85.	18.33	2.38	17.83	2.65	15.10	3.59	16.89	1.83	20.66	20.67
Float @ 2.875; sink @ 2.85	3.66	0.47	3.27	0.49	3.83	0.91	1.48	0.16	3.71	3.70
Float @ 2.90; sink @ 2.875	2.94	0.38	2.49	0.37	1.30	0.31	6.01	0.65	3.41	3.42
Float @ 3.00; sink @ 2.90	4.42	0.57	4.64	0.69	3.09	0.73	7.13	0.77	4.48	4.47
Sink @ 3.00	70.65	9.16	71.77	10.68	76.68	18.20	68.49	7.43	67.74	67.74
TOTAL -	100.00	12.96	100.00	14.88	100.00	23.74	100.00	10.84	100.00	100.00

	Assays, per cent			Assays, per cent			Assays, per cent			Assays, per cent		
	Zn	Au	Ag	Zn	Au	Ag	Zn	Au	Ag	Zn	Au	Ag
Float @ 2.85	3.02	0.08	2.23	2.62	0.02	1.68	3.28	0.015	0.53	2.62	0.01	1.41
Float @ 2.875; sink @ 2.85	3.87	0.02	13.12	4.33	0.02	0.77	5.38	0.02	10.18	5.53	0.02	1.36
Float @ 2.90; sink @ 2.875	6.34	0.06	10.95	5.48	0.04	15.38	6.89	0.05	1.63	6.55	0.03	1.55
Float @ 3.00; sink @ 2.90	6.30	0.03	2.61	5.34	0.02	5.07	4.23	0.06	3.90	7.56	0.06	4.00
Sink @ 3.00	15.34	0.09	5.17	15.34	0.08	5.73	12.98	0.05	4.38	14.13	0.16	4.22

(Experimental Tests, cont'd) -

It can be seen at a glance at this table that even the lightest density fractions assay too high in zinc throughout the entire size range and that the higher density fractions assay progressively higher.

CONCLUSIONS:

The sample submitted is entirely unsuitable for treatment by the sink-and-float process, the object of which is to beneficiate the ore by rejecting barren or nearly barren rock. While some of the sphalerite in this sample is massive, more of it is very fine and so widely disseminated that no part of the ore is sufficiently low in zinc to be rejected as waste.

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