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OTTAWA

September 24th, 1941.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1098.

Sink-and-Float Tests on a Sample of Copper-Zinc Ore from the Normetal Mine 'at Dupuy, Quebec.

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DEPARTMENT OF MINES AND RESOURCES MINES AND GEOLOGY BRANCH

BUREAU OF MINES DIVISION OF METALLIC MINERALS

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Shipment:

One drum of ore, net weight 380 pounds, was received on December 11th, 1940. The sample was submitted by D. E. Bourke, Mill Superintendent, Normetal Mining Corporation Limited, Normetal, Quebec.

Location of Property:

The property from which this ore is taken is located a few miles north of the town of Dupuy, in Abitibi county, northwestern 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 -

Gangue forms the minor portion of the sections and is scattered throughout sulphido masses as grains and small patches. It consists essentially of smoky-grey quartz with abundant, finely disseminated carbonate which gives a moderately strong microchemical reaction for iron.

Motallic Minerals -

Metallic mineralization is heavy and consists of an intimate admixture of sulphides, chiefly as coarse-textured, granular masses. The latter are usually composed of one or another sulphide which predominates and encloses inclusions of the others. A smaller but considerable percentage of the sulphides occurs also as coarse to fine disseminated grains. These, too, are intimately mixed.

Pyrite preponderates, largely as granular aggragates but is also disseminated as irregular grains and cubes. It has been the first sulphide mineral formed and has been attacked and corroded by sphalerite, chalcopyrite, and pyrrotite around margins and along fine fractures.

Sphalerite and chalcopyrite, the next most abundant metallics, occur largely as small masses and grains filling in around the grain boundaries of pyrite aggregates. Both minerals are also present as small inclusions in dense pyrite (Character of the Ore, contid) -

and as irregular grains disseminated in gangue. In places, tiny dots and rods of chalcopyrite are numerous within sphalerite.

In one or two sections, pyrrhotite is common in gangue as medium to fine irregular grains most of which are associated with pyrite, sphalerite, or chalcopyrite. It also occurs as occasional small inclusions within these three sulphides.

Galena is present in almost negligible quantity as small inclusions in pyrite, while two small grains of magnetite in sphalerite, and one of arsenopyrite in a granular mass of pyrite, are visible in the sections.

Sampling and Assaying:

No head sample was taken for assay from the shipment, owing to the nature of the test; but head sample assays calculated from the products of a test are as follows:

Copper	1.7	1,905	per	cent.
Zine	4:3	4,25	ę	Ŷ
Gold	10	0.028	02./	ton

Experimental Tests:

A sample of the ore was treated by the sink-andfloat process with the idea of rejecting a fraction of the ore that would be too low-grade to repay milling casts.

The ore was crushed to pass through a 7/8" screen and all material finer than 8 mesh was screened out since it is too fine to be treated by the sink-and-float process.

A size-density analysie was then made to determine the most satisfactory conditions under which a sink-and-float (Experimental Tests, cont'd) -

separation should be made. This was done as follows:

The ore at -7/8"+8 mesh was sized by screening at 1/8" intervals to give the following products: $-7/8"+\frac{5}{4}"$; $-\frac{5}{8}"+\frac{5}{8}"$; $-\frac{1}{5}/8"$; $-\frac{1}{5}"+3/8"$; -3/8"+8 mesh.

Density separations were then made separately on each size fraction over a range of densities starting at 2.80. The portion which sank at 2.80 was retroated at 2.825, giving an intermediate fraction and one heavier than 2.825. The latter was again retreated at 2.85, giving a final sink product, a float, and two intermediate products.

The intermediate products can be combined with either the sink or the float, depending on their grade, and in this way the proper density at which the separation should be made is determined. The size range best suited for the product to be treated is also determined by both assay value and percentage elimination at both ends of the range treated in the size-density analysis. This may mean crushing to a finer maximum size, screening to a coarser minimum size, or both at the same time.

The density separations are made under static conditions in a bath of substantially stable galena medium. The medium is a suspension of fine galena and water and its density can be controlled to an accuracy of 0.01 by altering the proportion of the two components. The medium used is the same as would be used in a large-scale plant test.

The results of the size-density analysis are set out in the following table:

(See Pages 5 and 6)

SIZE-DENSITY	ANALYSIS.
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(S.F. Fest No. 22 - Normetal)

Size Fractions	-6-	+8 Mesh			-4∻ô Mesh			Mesh	1949-973-97-97-97-97-97-97-97-97-97-97-97-97-97-	-3/8"+3 Mesh		
DENSITY FRACTIONS			- 11 e	1 3	n t	e pr	O P	<u>)</u>		n s		
	frac- S.F. tion feed		.F. ed	frac- tion		S.F. feed	irac- tion		» S.F. feed	Size frac- tion	S 54	% °F. Sed
Float @ 2.80	34.92	S	" 39	29_60	C	2.18	20.37		1.84	15.90	6	2,11
Float @ 2,825; sink @ 2,80	12,46	0	,85	10.0	ō	0.74	8,78	reatt strato	0.80	6,50	0	0,86
Float : 2,35; sink @ 2,825	5.60	0	0,38		0,38		4,22		0,38	3,9	8	0,52
Sink @ 2.85	47.02	3	,22	55.2	4	4.06	66.63		6,02	73.6	2	9,75
NEEDENN STRENT AN ANN AN		7.02 3.22 55.24 4.06 66.63 6.02 73.62 9.75 0.00 6.84 100.00 7.36 100.00 9.04 100.00 13.24 $-$ A s s a y s $(Au_{g}oz./ton; Gu and Zn, per cent) -$										
analaan ahaan ahaan ahaa maamadi xaan uu oo ahayaa haraan amadada ahaa ahaada ahaa ahaa ahaa ahaa	Cu	Zn	Au	Cu	Za	Au Au	į Cu	Zn	i Au	Cu	Zn	AU
Float © 2.80	0,51	1.21	0.02	0.21	0,81	10.01	0,15	0.71	0.01	J,24	0.35	0,01
Float 3 2,825; sink 6 2,80	1.03	1,57	0,06	0,49	0,76	0.01	0.26	0.61	0_005	0,16	0,35	0.0025
Float é 2,85; sink é 2,825	1.73	2,66	0.01	0,83	1,52	0.02	0.78	0.66	0,02	0,34	0,33	S0°0
Sink @ 2.85	3,24	7,35	0.02	2,94	6.34	S0.0	2,47	5.73	0.025	2,35	5.53	0.02

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SIZE-DENSITY ANALYSIS.

(S.F. Test No. 22 - Normetal, cont'd)

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Size Fractions		<u>}</u> "+3/8'	2		-5/8"+=""			"÷5/8	9	{ =7/8"+ ³ [™]			Total	
***************************************				- W	8	1 8 1	0 0	P	ΓO	p c	r t	i o	<u>11 S -</u>	
DENSITY FRACTIONS	: % : Size : frec : tion :	in l	% S.F. Ceed	x Siz ír ír		% S.F. feed	Size fra tic		% S.F. feed	% Size frac- tion		% F. Teed	% Size frac- tion	% S.F. feed
F, @ 2,80	: 17,49		\$°83	15.(53	2.21 2	8.	37	1,38	8,80		. 47	16,47	16.47
F. @ 2,825; S. & 2,80	, 4. 8().79	3.9	98	0,59	7.3	36	1,15	5 .83	5 1 (0°88	6,76	6 . 75
F. @ 2.85; S. @ 2.825	. 6,7t	10	1,11	4.	71	0,69	4,	18	0.65	4,93	5 (2,83	4.94	4_94
S. © 2,85	. 70,96	3 13	1,71	76,2	88	11.21	79.	59	12,39	80,44		5,47	71.83	71,84
TOTAL -	,100.00)] 1(5.50	100.0	00 j	14,70	100。	00	15,57	100.00) 1(3.75	100,00 .	100,00
AND COLL THIS COLLEGE IN LOGICAL THE PARTY OF THE AND	* *				- <u>A</u>	SSQ	y s	(A	u,oz./t	ion; Cu	i and	Zn, pe	r cent) -	-
	<u>. 611</u>	Zn	Au	012	<u> </u>	<u>A12</u>	Gu	<u>7.n</u>	Au	<u>Cv</u>	<u> </u>	Âu		
F, & 2,80	° • 0,14	0.41	0.01	0.08	0.61	0.01	0.08	0,71	Trace	0.31	0,56	0.01	no-manufacture de la constante	
F. @ 2.825; S. @ 2.80	: 0.23	0.30	0,0025	0.28	0.15	0,005	Mil	0.35	0.0025	0.10	0.46	0,0025		
F. @ 2.85; S. : 2.825	: 0.22	0,35	0,005	O_OL	0.07	Trace	0.15	0.35	0.005	0.08	0,15	0,005	2014 And	
S. @ 2.85	; ; 2,30 ;	5.53	0.02	2.23	5.07	0,12	2.02	5.32	0.02	2,74	4.41	S0°0	א לעודליוז ב בעוקשה א	

(Page 6)

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(Experimental Tests, cont'd) -

Examining the figures in the size-density analysis, it will be noted that in the sizes finer than 3 mesh the assays of the "floats" and intermediate products are too high to allow them to be discarded. In the coarser sizes the same products are low enough in grade to be discarded. It was therefore decided that sink-and-float feed should be screened on 3 mesh and the separation made at a density of 2.85 or perhaps higher. The product finer than 3 mesh is ultimately added to the "sinks" for further treatment.

On this basis the following tables have been prepared:

Table I	c =>	Distribution	of	Products	îrom	Crushing.
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	0		9 9 9				UNDUICED A CHARTENESS CONTRACTOR
S, F, feed	; 62,56	:1.807:	4.02	;0.0315	: 59.35;	59,12:	: 70.08
Flnos -3 mesh	67, <u>3</u> 2	: E. 068	4.64	:0.0225	40,65	40,88	59,92
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an fa fan strangen fan fan fan fan fan de fan	a A D	0 9	224 x 40 x 14 x 14 x 16 x 16 x 16 x 16 x 16 x 16	o G Ø	innin hilen in sanai an an G) } }
S. F. conc.	; 76,26	26,32	:5,14	:0.039	: 97.95:	97.56	94.72
S. F. tailing	: 23.74	:0.156	:0,412	;0,007	: 2.05:	2.44	5,28
	°	0 0	0 0	p 0			
S. F. feed	: 100.00	:1.807	:4.02	;0.0315:	:100.00:	100.003	100.00
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Table III Summe	ary of P:	roducts	e crom	Pro-Cor	icontrei	sion.	WINT RECOVERAGE WITH THE
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S. F. conc.	\$ 47,71	:2,32	:5.14	:0.039	: 58,14;	: 57,68:	66,38
Fines -3 mesh	: 37.44	:2,068	\$.64	:0,0225	: 40.65	40,88	<u> 29°95</u>
	0	0 5	9		h 9	8	
Product for	0 0	0	0 0	b		;	1
further treatment	: 85,15	:5.21	:4.92	:0.0318	: 98,79;	: 98,56;	96,30
S. F. tailing	: 14.85	:0,156	:0.412	:0.007	: 1.21;	1,448	3,70
9 15	0 6	0	0	9 9		1	} • • • • • •
Feed sample	: 100,00	:1.905	:4,25	:0.028	:100,00:	100,00;	100,00
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Summary:

On the basis of the sample submitted the results may be summarized as follows:

Proportion of ore to be crushed								=	100,00	per cen	t,
				S.	F. 1	ିର୍ଚ୍ଚ	ed.	¢,	62,56	(1	
	19	17 f9	to	fur	ther		reatment	42*	85,15	26	
							Copper		Zinc	Gold	
							per cent	pe	r cont	oz./ton	
Assay (of ore re	sceiv	ed			•••	1.905		4.25	0.028	
18	¹¹ S. F.	feed				57	1,807		4.02	0,031.5	
rə	" taili	igs p	roduc)ed		17.0	0,156		0,412	0,007	
81	" concer	atrat	es pi	odu	ced	471	2.32		5.14	0,039	
11	" ore to) fur	ther	tre	at-		v			•	
				me	nt	c %	2,21		4.98	0.0318	
Elimina "	ation (b:	y wei.	ght)	of of	S. I whol) .e	feed -	,ху ны н <i>Ф</i> 73(17	23.74 p 14.85	er cont.	
							Copper		Zinc	Gold	
Motal : n	recovery "	from n	S. I who]	°, 1 .6 0	eed re	e 0	- 97,95 - 98,79		97.56 98.56	94 °78 96 °30	

Conclusions:

While the metal recovery in the product for further treatment is high, elimination of low-grade material is low. It may be possible to increase the elimination by separating at a higher density but a further shipment of ore will be needed in order to carry out further tests.

12.8146949491112.007758204212.00775.00775

From the mineralogical description of the ore it appears that the copper and zine minerals are widely disseminated and this condition mitigates against concentration of the ore by this process.