

R E P O R T
of the
ORE DRESSING AND METALLURGICAL LABORATORIES

Report No. 231

The concentration of the copper ore ("C" ore
body) of the Horne Mine, Noranda Mines Ltd.
Rouyn, Que.

by J. S. Godard

Shipment: A shipment weighing 115 pounds was received June 15th.
1925. It was designated chalcopyrite, and was taken from "C" orebody,
eastern lens, of the company's property at Rouyn, Que.

Characteristics of the ore :- The ore consists of chalcopyrite, pyrrhotite,
and pyrite with which is associated some gold
and silver. The gangue material is rhyolite.

Purpose of experimental tests: The purpose of these tests is to concentrate
the chalcopyrite to the greatest possible
extent commensurate with good recoveries of copper, gold, and silver.

Sampling & Analysis : The entire sample was crushed to $\frac{1}{2}$ " and cut twice,
then reduced to -4 mesh and cut once, further reduced
to -14 mesh and cut twice. The last cut was ground to -150 mesh and
a head sample cut out. Analysis was as follows:

Gold	0.04 oz/ton	Copper	4.60 %
Silver	0.22 "	Zinc	none
Lead	none	Iron	19.83 %
Arsenic	trace	Insol.	50.64 %

Experimental tests

Test No. 1: A sample of about 2000 grams of this ore was cut from
24 pounds at -14 mesh and screened on Tyler standard screens. The

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products were assayed for gold and copper -

Mesh	Weight %	Assay		Percent of values	
		Au. oz	Cu %	Au	Cu
+20	10.8	0.05	4.03	9.6	9.3
-20+28	14.0	0.04	4.01	10.0	12.0
-28+35	16.5	0.05	4.07	14.8	14.4
-35+48	11.9	0.04	4.08	8.6	10.4
-48+65	9.2	0.05	4.18	8.2	8.2
-65+100	7.5	0.07	4.95	9.4	8.0
-100+150	5.2	0.08	5.20	7.5	5.8
-150+200	4.8	0.08	5.57	6.8	5.7
-200	20.1	0.07	6.06	25.1	26.2

Test No. 2 - Flotation, tabling and screening: 1000 grams of ore at -14 mesh was ground wet for 20 minutes in a ball mill with CaO 5 lbs/ton, then floated in a Ruth machine with Xanthate 0.07 lb/ton and pine oil #5, 2 drops. The flotation tailings were tabled on a laboratory Wilfley table. The table tailings were screened.

Product	Weight %	Assays			Percent of values	
		Au oz.	Cu%	Fe%	Au	Cu
Flot conc.	25.6	0.12	17.08	28.40	67.9	95.6
Table "	1.9	0.08	0.10	44.40	3.3	
" midd.	6.4	0.02	0.20	42.40	2.9	0.3
" tail.	50.4	0.02	0.32		22.4	3.5
Slimes	15.7	0.01	0.18		3.5	0.6
+65+100	7.9	0.015	0.62		6.3	15.1
-100+150	13.5	0.020	0.57		14.3	23.8
-150+200	13.4	0.015	0.41		10.6	17.0
-200	65.2	0.020	0.22		68.8	44.1
Average tailing		0.19	0.32			

Tests Nos. 3 to 14 - Flotation

The details, results of tests, and the flotation reagents used are given in the following table:

Test No	Mesh	Product	Weight %	Assays			% of values		Reagent	Amount lb/ton	Added to	Remarks
				Au oz.	Cu %	Fe %	Au	Cu				
3	-65	Cone	17.9	0.15	23.18	29.4	71.2	92.3	Lime	5.0	b.m.	No other reagents added for clean up - froth good
		Middling	918	0.05	1.33		9.0	2.9	Xanthate	.07	Ruth	
		Tailing	72.3	0.015	0.30		19.8	4.8	Pine oil #5	.05	"	
4	-65	Cone	35.3	0.11	12.14	36.60	81.2	95.0	Soda carb	4.0	b.m.	Froth good - Concentrate irony in appearance
		Middling	8.5	0.04	1.39		7.1	2.6	Xanthate	.07	Ruth	
		Tailing	56.2	0.01	0.19		11.7	2.4	Pine oil #5	.03	"	
5	-100	Cone	21.5	0.14	19.82	33.12	55.4	93.7	Lime	3.0	b.m.	Two lots ore 1000 gms each floated. Rougher cones cleaned together tails combined. Froth dull - good
		Middling	8.2	0.08	1.35	30.39	12.2	2.4	Xanthate	0.10	Ruth	
		Tailing	70.3	0.025	0.25		32.4	3.9	"	0.01	cleanup	
6	-100	Cone	15.0	0.19	27.62	29.38	39.5	91.5	Lime	4.0	b.m.	Froth dull in colour but good 0.025 lb/ton Pine oil #5 added for cleanup
		Middling	6.4	0.13	2.89	23.52	11.5	4.1	QED	0.05	Ruth	
		Tailing	78.6	0.045	0.25		49.0	4.4	Pine oil #5	0.05	"	
7	-100	Cone	22.9	0.16	17.20	35.66	47.1	86.0	Soda carb	4.0	b.m.	Froth bright - good 0.025 lb/ton pine oil #5 added for cleanup
		Middling	15.0	0.15	2.47	27.78	29.0	8.1	QED	0.05	Ruth	
		Tailing	62.1	0.03	0.44		23.9	5.9	Pine oil #5	0.05	"	
8	-100	Cone	14.5	0.17	28.72	29.38	42.9	89.9	Lime	4.0	b.m.	Aero brand Ca(CN) ₂ used
		Middling	8.2	0.07	3.00	21.29	9.9	5.3	Cyanide	0.3	b.m.	
		Tailing	77.3	0.035	0.29		47.2	4.8	Xanthate	0.07	Ruth	
9	-100	Cone	10.6	0.22	27.26	30.59	31.2	63.1	Soda carb	4.0	b.m.	
		Middling	13.4	0.14	7.37	24.54	25.1	21.6	Cyanide	0.3	b.m.	
		Tailing	76.0	0.043	0.92		43.7	15.3	Xanthate	0.07	Ruth	
10	-150	Cone	11.2	0.20	26.08	29.81	34.2	63.6	TT	1.0	b.m.	Bakers C.P. NaCN Bubbles small and numerous
		Middling	18.5	0.07	7.72	22.61	19.7	31.1	Cyanide	2.0	b.m.	
		Tailing	70.3	0.043	0.35		46.1	5.3				
11	-150	Cone	12.5	0.16	31.24	29.96	26.6	88.6	Lime	5.0	b.m.	Froth good - 60% tailings remained on 200 mesh
		Middling	6.4	0.23	3.78	27.62	19.5	5.5	Xanthate	0.07	Ruth	
		Tailing	81.1	0.05	0.32		53.9	5.9	Pine oil #5	0.025		
12	-150	Cone	13.4	0.19	30.20	30.16	41.5	84.4	Lime	5.0	b.m.	Froth good Aero brand Ca(CN) ₂
		Middling	6.6	0.12	7.12	22.57	12.9	9.8	Cyanide	0.3	b.m.	
		Tailing	80.0	0.035	0.35		45.6	5.8	Xanthate	0.07	Ruth	
13	-150	Cone	12.5	0.16	30.98	30.68	37.8	85.0	Lime	4.0	b.m.	Froth good
		Middling	7.4	0.12	4.80	21.34	16.8	7.8	Cyanide	0.3	b.m.	
		Tailing	80.1	0.03	0.41		45.4	7.2	QED	0.05	Ruth	
14	-150	Cone	9.5	0.16	28.58	29.14	24.6	58.6	TT	1.0	b.m.	Bubbles small and test unsatisfactory
		Middling	10.0	0.12	10.37	24.62	19.4	23.3	Cyanide	2.0	b.m.	
		Tailing	80.5	0.043	1.00		56.0	18.1	TT	0.03	cleanup	

Summary & Conclusions:

1. In the first three flotation tests excellent copper recoveries were made. If the grade of the ore is taken into consideration, the gold recoveries obtained must also be considered as good. The loss of gold in the tailing varied between 20 and 30 cents, which gives a recovery of between 70 and 80 cents. In the latter tests the aim was to produce a high grade copper concentrate and to determine the recovery of gold obtained with the different percentages of copper in the concentrate. It was found that the recovery of the gold dropped as the grade of the copper in the concentrate was increased. It is hoped that this information will be of assistance in determining the grade of copper concentrate from which the smelter will obtain the greatest profit.
2. From these results it is evident that the gold is not entirely associated with the chalcopyrite but must be either partly free or associated with the other sulphides. The results from tests on samples from "A" orebody show that the pyrrhotite carries no gold, and as pyrrhotite is easily dropped in any alkaline pulp, very little would float in any of the tests reported here. Therefore it follows that the gold is in all probability partly associated with chalcopyrite, partly with pyrite, and partly free. The reason we say partly free is on account of the results obtained in the screen analysis made on the flotation tailing from test no. 2. It will be observed that 68.8% of the gold remaining in this tailing is in the -200 mesh product
3. Crushing finer than 65 mesh did not improve the recovery of the gold or copper.