

Report of the Ore Dressing & Metallurgical Laboratories

Report No - 293

The Selective Flotation of Abana Copper-Zinc Ore.  
by H. Anderson & J. S. Godard.

Twenty four bags of ore weighing 2186 lbs were received on March 22, 1928 from the Abana Mines Ltd, <sup>Dupung, Que.</sup>  
This material consisted of mixed sulphides of copper, zinc and iron intimately associated.

The object of the following tests was to determine if the ore was amenable to treatment by selective flotation of the copper and zinc sulphides.

The shipment was crushed to pass an 8 mesh screen by passing through jaw crushers and rolls. A representative sample of the crushed material was secured. This lead sample showed on analysis:

Cu 5.61% , Zn 5.71% , Fe 26.50%

As 0.05% , Ag 4.21%

The - 8 mesh product was fed at the rate of 100 lbs per hour from a belt feeder to an <sup>8</sup> rod mill in closed circuit with an Aitens Classifier. The grinding circuit was adjusted to yield a classifier overflow containing 1 part of ore to 3 parts of water, approximately 85% of the material passing through 150 mesh. Soda ash, thiocarbonyl and zinc sulphate were added to the ball mill while grinding.

Cyanide was added to the classifier overflow which passed to a conditioning tank where the pulp was kept in suspension and in contact with the cyanide for approximately 20 minutes.

The frothing oil, cresylic acid, was added to the overflow of this tank passing to an 8 cell U.S. Type flotation machine where a rougher copper concentrate was taken off. This concentrate was cleaned on a 3 cell Denver Sub A type machine, the middling being

returned to the head of the rougher cell.

The tailing from the copper flotation cell was passed to a second conditioning tank where an additional amount of cyanide was added.

Copper Sulfate and Potassium Permanganate were added to the pulp overflowing from this tank, and passed to a 6 cell Denver Sub A type machine. This produced a rougher concentrate which was cleaned on a Callow pneumatic cell, the middling returned to the head of the rougher cell.

Two tests were run on this ore, each for a period of six hours, and samples taken at regular intervals.

The tests in detail follow:

Test No 1

Reagents

To Ball Mill Soda Ash 5.1 lbs/tow

Zinc Sulfate 1.0 " "

thio carbonic acid 0.09 " "

To Copper Conditioning Tank.

Cyanide 0.42 lbs/tow

To Copper Flotation Machine

Cresylic Acid 0.42 lbs/tow

To Zinc Conditioning Tank.

Cyanide 0.29 lbs/tow

To Zinc Flotation Machine

Copper Sulfate 0.89 lbs/tow

Potassium Permanganate 0.04 " "

Tabl. of results

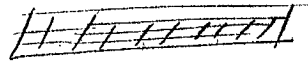
TABLE

Test No 2. This test was carried out under conditions much the same as those of test No 1. The main difference being the omission of zinc sulphate.

Reagents

<u>To Ball Mill</u>	Soda Ash	3.8 lbs/ton
	This carbonalid	0.07
<u>To Copper Conditioning Tank.</u>	Cyanide	0.31 lbs/ton
<u>To Copper Flotation Machine</u>	Cresylic Acid	0.28 lbs/ton
<u>To Zinc Conditioning Tank.</u>	Cyanide	0.30
<u>To Zinc Flotation Machine</u>	Copper Sulphate	0.72 lbs/ton
	Potassium Xanthate	0.04

Table of results:



As shown in the tabulated results, both tests show a satisfactory recovery of both the copper and zinc in concentrates of good grade. The precious metal values in the ore are largely recovered with the copper concentrate.

The separation of the zinc from the copper in this ore presents no great difficulties as it responds quite readily to treatment by flotation under conditions indicated in these tests. Any variations in the results secured in the two tests are due more to manipulation of the machines than to changes in reagent additions.

Care must be exercised however to closely control the amounts of this carbonalid, cresylic acid and Xanthate used, or low grade concentrates will result.

Ottawa, November 2, 1929.

Abana Mines Limited,  
Dupuy, Quebec.

Gentlemen:-

I beg to acknowledge your letter of the 25th ultimo with regard to having further test work done at our Ore Testing Laboratories on a shipment of your ore which would be more representative of the milling ore than the previous shipment.

Our Mr. Timm, chief of the Ore Dressing and Metallurgical Division, under whose direction this test work is carried out, is out of town at the present moment, but on his return, which we expect will be in the next week, he will write you with regard to the arrangement that can be made for having this test work done.

We enclose herewith a copy of our report No. 293 on the shipment of ore which was received from your mine last March.

Yours very truly,

for Director.

FH/MO'B

Ottawa, November 5th, 1929.

Abana Mines Limited,  
Dupuy,  
Quebec.

ATTENTION! Mr. H.E. Clement, Gen., Mgr.  
Dear Mr. Clement:

Further to your letter of October 25th we will be glad to carry out further tests on your Abana ore.

I would therefore suggest that you ship us a good representative and average sample of about 3000 pounds. We require this amount for continuous tests on our 100 lb. an hour unit. Runs on this unit will be made after preliminary batch tests on the small laboratory machines.

The test work is done free of charge. The only charges to you is for the transportation of the ore to our laboratories.

Kindly have shipment come bagged addressed to the Ore Testing Laboratories, 352 Booth Street,  
O T T A W A.

Yours very truly,

WBT/LCH

W.B. Timm,  
Chief of Division.

# ABANA MINES LIMITED

(NO PERSONAL LIABILITY)

ADDRESS ALL CORRESPONDENCE TO THE COMPANY

DUPUY, QUEBEC  
Oct. 25, 1929.

*W. J. Linn*

Department of Mines  
MINES BRANCH  
OCT 29 1929  
OFFICE OF THE  
DIRECTOR

Department of Mines,  
Mines Branch,  
Ottawa, Ontario.

Dear Sirs:-

Some time in 1928 you made some selective flotation tests on ore from Abana Mine. These were on an ore assaying approximately equal amounts of copper and zinc. After a large amount of development work, we find that this ore was not characteristic of the ore bodies.

We contemplate having further testing done in the near future, and would be pleased to have information as to just what arrangements you make for this work, and to have a rough idea of the cost to us.

We recently sent a sample for testing to the General Engineering Company, Salt Lake City, Utah, representative of the ore on and above the 300 level of the mine; this assayed .04 oz. Au., 4.42 oz. Ag., 4.73 % Cu. and 13.8 % Zn. We are opening up the ore on the 425 and 550 levels and will soon be able to obtain average samples on these lower levels; from work already done we anticipate about the same averages as that on the 300 level.

If you have a copy of the previous test, we would be glad to get it, as none is on file here.

*sent*

Very truly yours,

Abana Mines Ltd.

*H. E. Clement*  
H. E. Clement

Gen. Mgr.

Incl. 293

June 19, 1928

**From: Chief, Division of Ore  
Dressing and Metallurgy**

**To: The Director, Mines Branch**

Abana Mines, Ltd.

I submit herewith the report of the  
Ore Dressing and Metallurgical Laboratories  
on a shipment of copper-zinc ore from the  
Abana mine, Dupuy, Que. #293

Arrangements for this shipment were made  
by the writer on a visit to the mine last  
winter.

A copy of this report should be submitted  
to the following:

Abana Mines Limited, Dupuy, Que.  
Chas. Spearman, Esq., Power Bldg. Montreal  
Superintendent of Mines, Quebec

W. B. Timm,  
Chief of Division

- ORE TESTING LABORATORIES -

Test on Abona. Cu-Zn.....

Date 5/23/28.....

From Sheet # 4.....

Test No. 2.....

Time	Na <sub>2</sub> CO <sub>3</sub>	NaCN	Thio	Acrylic	CuSO <sub>4</sub>	Xanthate	NaCN	Feed.	Class overflow
10.00	4.98	0.41	0.86	0.41	0.88	0.04	0.40	102.4	1:3.5
10.30	"	0.41	0.86	0.41	0.88	"	0.40		1:3.0
11.00	"	0.41	"	"	"	"	"		1:1.7
11.30	"	0.53	"	"	"	"	"		1:2.4
12.00	"	0.53	"	"	"	"	"		1:1.5
12.30	"	0.53	"	"	"	"	"		1:2.0
1.00	"	0.53	"	0.14	"	"	"		"
1.30	3.80	0.42	0.66	0.14	0.72	"	0.30	134	1:1.7
2.00	"	0.41	0.66	0.14	"	"	0.30		1:3.0
2.30	"	0.31	"	0.28	"	"	0.30		1:3.0
3.00	"	0.31	"	0.28	"	"	0.30		1:3.0
3.30	"	<sup>15 min.</sup> 0.31	"	0.41	"	"	0.30		1:3.0
4.00	"	0.31	"	0.28	"	"	0.30		1:3.0
4.30	"	0.31	"	0.28	"	"	0.30		1:3.2

Acrylic acid at 0.41 lbs/ton and cyanide at 0.53 lbs/ton gives a clean zinc product with a dark colored copper mudding. Increasing the frothing oil to 0.14 lbs with cyanide the same passes copper into the zinc.

Cyanide reduced to 0.31 lbs/ton and frothing oil to 0.20 gives best results.

.....Engineer



Heads, Cu 5.61, Zn 5.71, Au 0.05, Ag 4.21, Fe 26.50

Product.	% Wt.	Assay				Metallics				% Values			
		Cu	Zn	Au	Ag	Cu	Zn	Au	Ag	Cu	Zn	Au	Ag
Cu Conc.	25.03	21.86	4.28	0.13	14.55	5.47	1.07	0.03	3.64	97.50	18.74	78.95	85.05
Zn Conc.	8.40	0.52	51.60	0.02	1.73	.04	4.33	0.001	0.14	0.71	75.83	2.63	3.27
Cu Sals		0.20	6.47	0.02	0.96								
Zn Sals	66.57	0.16	0.46	0.01	0.75	.10	0.31	0.007	0.50	1.79	5.43	18.42	11.68
	100.00					5.61	5.71	0.038	4.28	100.00	100.00	100.00	100.00

- ORE TESTING LABORATORIES -

Test on *Abana... Cu-Zn*

Date *5/22/28*

From *Sheet # 4*

Test No. *1*

Time	Na <sub>2</sub> CO <sub>3</sub> lbs/ton	NaCN lbs/ton	ZnSO <sub>4</sub> lbs/ton	Thio. lbs/ton	Crosslic. lbs/ton	CuSO <sub>4</sub> lbs/ton	NaCN lbs/ton	Kantate lbs/ton	Class. Feed. Overflow lbs/hr.
10:30	5.1	0.42	1.0	0.09					
11:00	5.1	0.39	"	0.09	0.56				100
11:30	5.1	0.42	"	"	0.42	0.89		0.05	1:3.2
12:00	"	0.43	"	"	"	"	0.29	"	1:4.0
12:30	"	0.42	"	"	"	"	0.29	"	1:3.3
1:00	"	0.42	"	"	"	"	"	"	1:4.0
1:30	"	0.42	"	"	"	"	"	"	1:3.5
2:00	"	0.51	"	"	"	"	"	"	1:3.3
2:30	"	0.60	"	"	"	"	"	"	1:2.2
3:00	"	0.60	"	"	"	"	"	"	1:2.2
3:30	"	0.61	"	"	"	"	0.41	0.04	1:3.0
4:00	"	0.63	"	"	"	"	0.41	0.04	1:2.8
4:30	"	0.63	"	"	"	"	0.41	0.04	1:2.1

Sample started.

About 2 pm. the copper froth on the last 3 cells of the copper machine became dark colored. The cyanide was increased to all of zinc and iron apparently floating should be kept down.

A sample of concentrate was taken from the 1st cell of the zinc machine, and cleaned on the small float machine

Zn Conc 179.4 gms - 57.37% Zn  
 " " 65.1 " - 15.61% "

See back of sheet for calculated results.

.....Engineer

Needs Cu 5.61, Zn 5.71, Au 0.05, Ag 4.21, Fe 26.50

Sample	% Wt.	Assay				Distribution				% Values			
		Cu	Zn	Au	Ag	Cu	Zn	Au	Ag	Cu	Zn	Au	Ag
Cu Conc.	24.62	22.18	4.41	0.16	13.08	5.46	1.09	0.04	3.22	97.33	19.09	76.92	77.97
Zn Conc.	7.85	0.87	50.30	0.025	2.80	0.07	3.95	0.002	0.22	1.25	69.18	3.85	5.33
Cu Sulf		0.18	6.06	0.02	1.18								
Zn Sulf	67.53	0.12	1.00	0.02	1.02	0.08	0.67	0.01	0.69	1.42	11.73	19.23	16.70
	100.00					5.61	5.71	0.052	4.13	100.00	100.00	100.00	100.00

*Chas. Spearman*

CHAS. SPEARMAN, B. SC., M.A.  
Consulting Mining Geologist & Engineer  
Power Building  
MONTREAL  
Lan. 7640

Department of Mines  
MINES BRANCH  
DEC 20 1927  
OFFICE OF THE  
DIRECTOR

December 19th, 1927.

Bureau of Mines Testing Laboratories,  
OTTAWA, Ontario.

Gentlemen:-

We expect to ship you within the next few days three samples of ore for treatment, one of which is for the most part massive sphalerite, another for the most part massive chalcopryrite, and the other mixed sphalerite and chalcopryrite. These samples are for testing purposes in connection with the erection of a plant to treat the above classes of ore.

The development work has not proceeded sufficiently far to get a real representative sample, but in about 300 ft. of drifting on the orebodies they have not varied very much from the samples sent you.

I am sending the above samples merely to give you some idea of the ore and the problems which we have to work out, and would ask you to kindly go ahead on these samples and let me have your report for the Abana Mines Ltd.

Sincerely yours,

(Sgd.) Chas. Spearman.

CS:KTH.