DEPARTMENT OF MINES AND RESOURCES

BUREAU OF MINES

CANADA

Ottawa, June 10, 1946.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2057.

IR 2057

Sink-and-Float Tests on a Sample of Split Drill Cores from an Orebody containing both Massive and Disseminated Pyrite at Noranda Mines, Quebec.

==========

18P

Note:
This report relates essentially to the samples as received. It shall not, nor any correspondence connected therewith, be used in part or in full as publicity or advertising matter for the sale of shares in any promotion.

(Copy No. 7.)

1983

BUREAU OF MINES
DIVISION OF METALLIC MINERALS

ORE DRESSING AND
METALLURGICAL LABORATORIES

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

OTTAWA   June 10, 1946.

REPORT

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 2057.

Sink-and-Float Tests on a Sample of
Split Drill Cores from an Orebody containing
both Massive and Disseminated Pyrite
at Noranda Mines, Quebec.

============

Shipments:

Two boxes of split drill cores, net weight 77 pounds, were forwarded to these Laboratories from those of the National Research Council, Ottawa, on November 23, 1945. A few days later, on November 27, 1945, two more boxes of split drill cores, net weight 180 pounds, were forwarded to these Laboratories from the same place. The samples were submitted by Dr. Paul Gishler, of the staff of the National Research Council, acting for H. L. Roscoe, Vice President and General Manager, Noranda Mines Limited, Noranda, Quebec.

Location of Property:

The samples submitted were taken from a new orebody being explored at Noranda Mines Limited, Noranda, Quebec.

Sampling and Assaying:

Owing to the nature of the tests, the original ore was not crushed and sampled for assay, but an average head sample assay calculated from the products of a test is as follows:

Gold	-	0.058	oz./ton
Copper	-	0.37	per cent
Zinc	-	0.56	"
Iron	-	23.91	"
Sulphur	-	25.66	"
Insoluble	-	46.02	"

Purpose of the Test:

The test was conducted to find out whether or not a product containing 80 to 85 per cent sulphides could be produced in coarse sizes by the sink-and-float process, leaving the -8 mesh fines and the "sink and float" reject to be crushed and treated by other means, possibly gravity concentration and flotation.

Results of Experimental Tests:

The tests showed that a product of the desired grade could be made by the sink-and-float process from the sample submitted.

Maximum grade of product was obtained by separating with a medium density of 3.25 and with the feed crushed to -3/4". With slightly coarser crushing, about -1" or -7/8", a higher recovery was obtained with a product slightly lower in grade but still a little better than 83 per cent sulphides.

Conclusions:

These tests have been conducted on split drill core samples and until they have been confirmed on samples of ore mined and crushed by normal operations it would be well to consider them as tentative.

The reason for this hesitancy to accept the results as final is that the efficacy of a "sink and float" separation depends to a large extent on the way an ore will break in the crushing operation. It usually breaks along natural lines of weakness and this, of course, is not what happens in diamond drilling.

The test, however, indicates that with ore crushed to the size range - 1"+8 mesh and separated at a density of 3.25, with the -8 mesh fines treated by jigs and tables, a product assaying 83 per cent sulphides and containing 78 to 82 per cent of the copper, zinc, iron and sulphur can be produced.

If the ore be crushed to the size range - 3/4" + 8 mesh and treated in the same way, the product will assay better than 85 per cent sulphides and contain from 74 to 80 per cent of the copper, zinc, iron and sulphur.

The "sink and float" rejects, along with jig and table tailings, will assay around 20 per cent sulphides and could be reground for flotation or sent to direct smelting.

The maximum grade of product obtainable by sink and float combined with jig and table concentration of -8 mesh fines appears to be about 85 per cent sulphides, and this can be obtained by crushing the ore to -3/4" and then screening out the fines.

Character of the Ore:

Six polished sections, three from each sample, were prepared and examined microscopically for the purpose of determining the general character of the ore.

"Disseminated" Ore -

In two of the three sections made from this sample the bulk of the metallic mineralization occurs as narrow granular stringers which transect the polished surfaces; in the third section, sulphides are scattered more or less evenly and abundantly throughout gangue material. The latter mode of occurrence is thought to be more representative of this type of ore.

Pyrite preponderates as coarse to fine irregular grains and subhedral crystals disseminated through gangue. The largest grain visible in the polished sections is 3 to 4 millimetres in diameter. The grains range from that down to only a few microns, with the larger sizes predominant. The pyrite contains inclusions of chalcopyrite, sphalerite and gangue, but appears to be the first sulphide mineral formed.

Chalcopyrite, the next most abundant metallic, occurs as small masses and disseminated grains largely interstitial to grains of pyrite, although, as already noted, some grains are included within apparently dense iron sulphide. The copper mineral encloses grains of pyrite and sphalerite as well as some inclusions of gangue.

Sphalerite is present in small amount as medium coarse to fine grains in gangue and in the other sulphides. In places it contains inclusions of gangue and of the other sulphides, particularly tiny dots of chalcopyrite which are characteristic of the copper mineral.

(Continued on next page)

(Character of the Ore (cont'd) -

In the polished sections gangue is composed of fairly hard, dense, creamy white material with abundant scattered grains and small masses of quartz.

"Massive" Ore -

In the polished sections this type of ore consists or more or less solid granular masses of pyrite throughout which are scattered numerous, coarse to fine grains and small patches of chalcopyrite, sphalerite and gangue. The latter constituent, of course, forms only a small part of the polished surfaces and is composed of similar material to that in the "disseminated" ore.

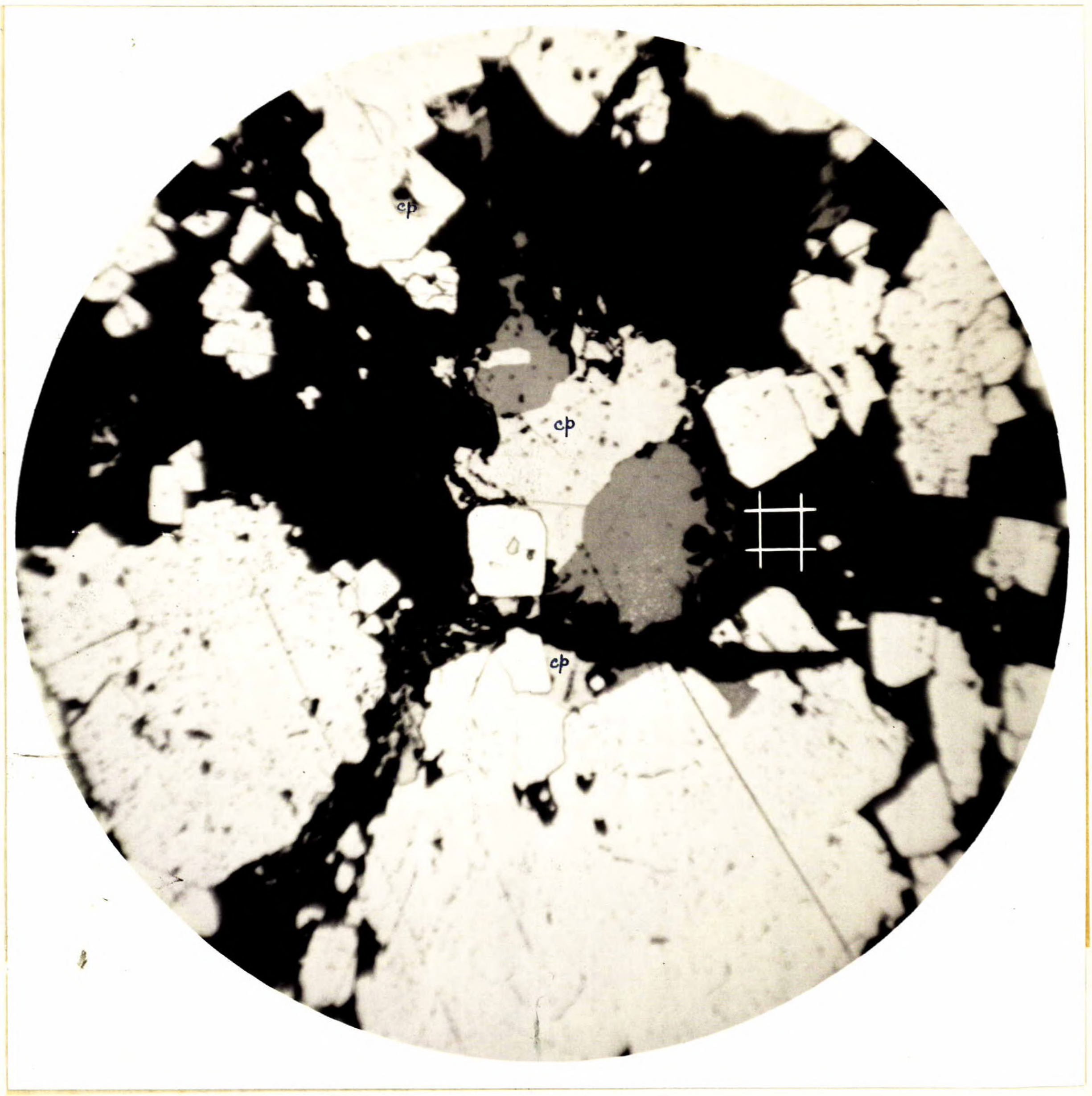
Conclusion from Microscopic Examination -

The only difference between the two types of ore seems to be in the density with which the sulphides are deposited. A sort of intermediate variety is pictured in Figure 1, i.e., "massive" tending towards "disseminated", in an effort to show the average type of mineralization which probably will be mined.

(Figure 1 follows,)
(on Page 6.   )

(Character of the Ore, cont'd) -

Figure 1.



X80.

PHOTOMICROGRAPH SHOWING AN APPROXIMATELY AVERAGE FIELD INTERMEDIATE BETWEEN THE TYPICALLY "MASSIVE" AND "DISSEMINATED" TYPES OF ORE.

Note the tiny dots of chalcopyrite in lower half of largest grain of sphalerite. A 200-mesh screen opening is superimposed.

Pyrite - white, high relief.
Chalcopyrite (cp) - light grey.
Sphalerite - grey.
Gangue and pits - black.

—

Details of Investigation:

The first shipment of two boxes was crushed in a jaw crusher set to give as coarse a product as possible but at the same time to do some appreciable crushing. Tests Nos. 1 and 2 were done on this sample. The two boxes of cores received later were crushed for Test No. 3.

The product from the first crushing operation was screened as follows:

		Lb	Oz.
+3/4"	-	5	6
-3/4" +5/8"	-	6	1
-5/8" +1/2"	-	16	10
-1/2" +3/8"	-	14	11
-3/8" + 8 mesh	-	21	14
-8 mesh	-	12	4
Total	-	76	14

The products coarser than 8 mesh amount to 84.07 per cent of the weight of ore crushed, while 15.93 per cent of the ore is finer than 8 mesh. Each of the fractions coarser than 8 mesh was now divided into two approximately equal parts to be used for sink-and-float separations. The fraction finer than 8 mesh was sampled for assay and the remainder of it screened as follows: (Material finer than 8 mesh cannot be treated by sink-and-float.)

		Lb	Oz.
+20 mesh	-	4	12
-20+35 "	-	1	7
-35+48 "	-	0	9
-48+65 "	-	0	9
-65+100 "	-	0	10
-100 "	-	2	9
Total		10	8

The fraction coarser than 20 mesh, amounting to 45.24 per cent of the fines and 7.21 per cent of the total ore, was concentrated by jigging without further crushing. The fractions finer than 20 mesh, amounting to 54.76 per cent of the -8 mesh fines and 8.72 per cent of the total ore, were treated separately on a table and the table products combined for assay.

At this point attention is called to the fact that the same assays of jig and table products are used to compute

(Details of Investigation, cont'd) -

final results in Tests Nos. 1, 2 and 3, to be described later, but small corrections will be noticed in the "weight, per cent" columns to correct for slight changes in weight distribution due to extra crushing with a greater proportion of fines.

The sink-and-float separations were made in a galena-water suspension of 3.25 specific gravity, the maximum at which our sink-and-float installation can be operated. The results of these tests are quite encouraging but were obtained from drill cores which we do not consider a good sample for this purpose, for the reason already given, namely, that the ore may not always be broken along its natural lines of weakness, and it may or may not be possible to duplicate these results with ore crushed in the normal way.

Test No. 1.

A size-density analysis was made on this sample. The screened fractions of coarse ore were separated and the products weighed and assayed as individual lots. The fraction -3/8"+8 mesh was separated as one lot but the separation products were screened on 3-, 4- and 6-mesh screens and these fractions were assayed individually.

The results of the size-density analyses are given in Table I, in which the untreated -8 mesh fines is included in order to complete the picture of weight distribution with respect to the whole ore.

In Table II will be found a summary of the results of sink-and-float separation combined with jig and table concentration, giving the final products to be treated for sulphur recovery on the one hand and by flotation or smelting on the other hand.

(Tables I and II follow,)
(on Pages 9 and 10.)

TABLE I. - Size-Density Analysis, Test No. 1.

(Separating density, 3.25; Size range of feed, -1"+8 mesh.)

Product	Weight, per cent	ASSAYS: Per cent: Cu	Zn	Fe	S	Insol.	Au, oz./ton	Distribution, per cent total: Cu	Zn	Fe	S	Insol.	Au
-8 mesh fines	15.93	0.43	0.80	23.20	25.52	47.06	0.06	18.71	19.28	15.46	15.90	16.29	16.49
-6 +8 mesh	3.00	0.23	0.25	9.24	9.29	75.97	0.05	1.88	1.13	1.16	1.09	4.95	2.59
-4 +6 mesh	3.29	0.22	0.20	8.40	8.75	78.09	0.04	1.98	1.00	1.16	1.12	5.58	2.27
-3 +4 mesh	3.77	0.13	0.15	7.14	7.09	80.95	0.04	1.34	0.86	1.13	1.05	6.63	2.60
-3/8" +3 mesh	5.84	0.11	0.15	7.14	7.41	81.00	0.04	1.76	1.33	1.74	1.69	10.28	4.03
-1/2" +3/8"	9.60	0.09	0.25	7.24	7.15	81.43	0.04	2.36	3.63	2.91	2.69	16.99	6.63
-5/8" +1/2"	9.41	0.10	0.30	8.51	8.55	78.78	0.025	2.57	4.27	3.35	3.15	16.11	4.06
-3/4" +5/8"	3.86	0.08	0.45	11.55	12.38	71.93	0.02	0.84	2.63	1.86	1.87	6.03	1.33
+3/4"	2.33	0.05	0.50	16.38	18.04	61.75	0.03	0.32	1.76	1.59	1.64	3.13	1.21
Average float @ 3.25 (calc.)	41.10	0.12	0.27	8.67	8.89	78.04	0.035	13.05	16.61	14.90	14.30	69.70	24.72
-6 +8 mesh	1.27	0.52	1.00	39.69	44.00	13.20	0.07	1.81	1.92	2.11	2.19	0.37	1.54
-4 +6 mesh	2.39	0.57	1.40	38.85	42.28	13.06	0.07	3.72	5.06	3.88	3.95	0.68	2.89
-3 +4 mesh	3.25	0.56	0.80	39.69	43.11	14.12	0.085	4.97	3.94	5.40	5.48	1.00	4.77
-3/8" +3 mesh	5.64	0.54	0.80	39.69	42.29	14.86	0.075	8.32	6.83	9.36	9.33	1.82	7.30
-1/2" +3/8"	9.58	0.60	0.90	38.43	41.46	14.14	0.075	15.70	13.05	15.40	15.54	2.94	12.40
-5/8" +1/2"	11.87	0.62	1.00	39.26	41.19	14.44	0.08	20.11	17.96	19.50	19.13	3.72	16.38
-3/4" +5/8"	4.15	0.62	1.40	38.64	42.01	14.86	0.09	7.03	8.79	6.71	6.82	1.34	6.44
+3/4"	4.82	0.50	0.90	36.12	39.06	20.42	0.085	6.58	6.56	7.28	7.36	2.14	7.07
Average sink @ 3.25 (calc.)	42.97	0.58	0.99	38.74	41.52	15.00	0.079	68.24	64.11	69.64	69.80	14.01	58.79
Sink and float feed (calc.)	84.07	0.35	0.63	24.04	25.57	45.82	0.058	81.29	80.72	84.54	84.10	83.71	83.51
Ore (calc.)	100.00	0.37	0.66	23.91	25.56	46.02	0.058	100.00	100.00	100.00	100.00	100.00	100.00

-

TABLE II. - Summary of Results, Test No. 1.

Product	Weight, per cent	ASSAYS: Per cent: Cu	Zn	Fe	S	Insol.	Au, oz./ton	Distribution, per cent total: Cu	Zn	Fe	S	Insol.	Au
Float @ 3.25 (calc.), +3/4" to 8 mesh	41.10	0.12	0.27	8.67	8.89	78.04	0.035	13.05	16.61	14.90	14.30	69.70	24.72
Jig middling, -8+20 mesh	0.49	0.35	0.40	19.37	21.45	56.28	0.07	0.47	0.32	0.40	0.42	0.61	0.52
Jig tailing, -8+20 mesh	3.85	0.10	0.08	6.21	6.06	76.94	0.04	1.05	0.50	1.00	0.92	6.55	2.33
Table middling, -20 mesh	1.38	0.43	0.80	12.21	12.58	69.14	0.06	1.62	1.80	0.71	0.69	2.11	1.25
Table sand tailing, -20 mesh	2.60	0.43	0.38	9.84	11.00	74.86	0.05	3.04	1.62	1.07	1.13	4.31	1.97
Table slime tailing, -20 mesh	1.11	0.52	0.80	12.95	14.58	65.76	0.06	1.57	1.45	0.60	0.64	1.61	1.01
Product to further treatment by flotation or smelting (calc.)	50.53	0.15	0.29	8.84	9.13	77.07	0.038	20.80	22.30	18.68	18.10	84.89	31.80
Sink @ 3.25 (calc.), +3/4" to 8 mesh	42.97	0.58	0.99	38.74	41.52	15.00	0.079	68.24	64.11	69.64	69.80	14.01	58.79
Jig concentrate, -8+20 mesh	2.87	0.62	1.00	41.49	45.35	10.40	0.09	4.84	4.69	5.00	5.16	0.66	3.91
Table concentrate, -20 mesh	3.63	0.62	1.50	43.80	48.28	5.42	0.10	6.12	8.90	6.68	6.94	0.44	5.50
Product for sulphur recovery (calc.)	49.47	0.59	1.03	39.27	42.24	14.03	0.081	79.20	77.70	81.32	81.90	15.11	68.20

(Details of Investigation, cont'd) -

Test No. 2.

In the size-density analysis it will be noted that the +3/4" float @ 3.25 is much higher grade than the finer fractions of the "floats" and at the same time the +3/4" "sink" at 3.25 is lower grade than the finer fractions of the "sinks".

In this confirmatory test it was therefore decided to crush the material coarser than 3/4 inch until it would pass through a 3/4-inch screen, with the hope of improving the grade of the sink product. This operation increased the -8 mesh fraction from 15.93 per cent of the total ore to 16.24 per cent with, of course, a corresponding decrease in the +8 mesh fraction.

In this test the sink-and-float feed was fed to the separator in bulk, as would be done in a commercial operation, and not in sized fractions as was done in Test No. 1. The results of this test are summarized in Table III. Table IV contains a summary of the combined results of "sink-and-float," jig and table concentration for Test No. 2.

A comparison of the results of the two tests show that Test No. 2 gives a higher grade product and slightly lower recovery than Test No. 1.

(Tables III and IV follow,)
(on Page 12.)

TABLE III. - Sink-and-Float Separation, Test No. 2.

(Separating density, 3.24; size range of feed, -3/4"+8 mesh).

Product	Weight, per cent	Assays, Per Cent: Cu	Zn	Fe	S	Insol.	Au, oz./ton	Distribution, per cent total: Cu	Zn	Fe	S	Insol.	Au
-8 mesh fines	16.24	0.43	0.80	23.20	25.52	47.06	0.06	20.21	27.32	15.77	15.79	16.47	14.33
Float @ 3.25 -3/4"-8 mesh	43.12	0.14	0.17	9.37	9.90	76.58	0.055	17.47	15.42	16.90	16.27	71.16	34.87
Sink @ 3.25 -3/4" +8 mesh	40.64	0.53	0.67	39.59	43.88	14.12	0.085	62.32	57.26	67.33	67.94	12.37	50.80
Sink and float feed (calc.)	83.76	0.33	0.41	24.03	26.39	46.27	0.070	79.79	72.68	84.23	84.21	83.53	85.67
Ore (calc.)	100.00	0.35	0.48	23.90	26.25	46.40	0.068	100.00	100.00	100.00	100.00	100.00	100.00

TABLE IV. - Summary of Results, Test No. 2.

Product	Weight, per cent	Assays, Per Cent: Cu	Zn	Fe	S	Insol.	Au oz./ton	Distribution, per cent total: Cu	Zn	Fe	S	Insol.	Au
Float @ 3.25 +3/4"+8 mesh	43.12	0.14	0.17	9.37	9.90	76.58	0.055	17.47	15.42	16.90	16.27	71.16	34.87
Jig middling -8+20 mesh	0.50	0.35	0.40	19.37	21.45	56.28	0.07	0.50	0.46	0.41	0.41	0.62	0.45
Jig tailing -8+20 mesh	3.92	0.10	0.08	6.21	6.06	76.94	0.04	1.13	0.71	1.02	0.92	6.62	2.03
Table middling -20 mesh	1.41	0.43	0.80	12.21	12.58	69.14	0.06	1.75	2.56	0.72	0.68	2.14	1.09
Table sand tailing -20 mesh	2.65	0.43	0.38	9.84	11.00	74.86	0.05	3.29	2.29	1.09	1.12	4.35	1.71
Table slime tailing -20 mesh	1.13	0.52	0.80	12.95	14.58	65.76	0.06	1.69	2.05	0.62	0.64	1.63	0.88
Product to flotation or smelting (calc.)	52.73	0.17	0.21	9.41	9.95	75.90	0.054	25.83	23.49	20.76	20.04	86.52	41.03
Sink @ 3.25 -3/4"+8 mesh	40.64	0.53	0.67	39.59	43.88	14.12	0.085	62.32	57.26	67.33	67.94	12.37	50.80
Jig concentrate -8+20 mesh	2.93	0.62	1.00	41.49	45.35	10.40	0.09	5.24	6.65	5.10	5.12	0.67	3.40
Table concentrate -20 mesh	3.70	0.62	1.50	43.80	48.28	5.42	0.10	6.61	12.60	6.81	6.90	0.44	4.77
Product for sulphur recovery (calc.)	47.27	0.54	0.76	40.04	44.32	13.21	0.086	74.17	76.51	79.24	79.96	13.48	58.97

(Details of Investigation, cont'd) -

Test No. 3

A further sink-and-float test was conducted on the second lot of split drill core samples received. This test was made with ore in the size range -5/8"+8 mesh, and the separations were made in bulk.

A series of separations were made at different densities, as follows:

The crushed ore was treated first at a density of 2.80, giving a finished float product which was kept for assay and a sink product which was retreated at a density of 2.90. This retreatment gave an intermediate float product which was kept for assay and a second sink product which was again retreated at a density of 3.00. This process was repeated until six separations had been made at as many different densities, giving in all seven separation products for assay as well as the -8 mesh fines.

The results of this test are laid out in Table V and they show the effect of each increase or decrease in medium density.

In Table VI will be found the net results of separations that might have been made at each of the foregoing densities. These results have been calculated from those in Table V, by collecting together in one group and averaging all those products that would float collectively at any given density and by collecting together in another group and averaging all those products that would sink collectively at the same given density. For example, if the complete sample had been separated at a density of 3.10 the first four separation products listed in Table V would float off together while the remaining three would sink together.

Table VI therefore shows the approximate grade of both

(Details of Investigation, cont'd) -

sink-and-float products that might be expected from separations made at any of these densities.

They indicate that, in order to get the grade of product asked for, the separating density will have to be very close to 3.20.

A comparison of the results of this test and of the previous tests indicates that a steady decline in recovery in the sink product will follow finer crushing of the feed to the sink-and-float process. While perhaps some slight improvement in the grade of sink product might be expected from finer crushing, it seems that 84 to 85 per cent sulphides is about the maximum possible.

In Table VII, for purposes of comparison with Tests Nos. 1 and 2, the same jig and table products were combined with the sink-and-float products of Test No. 3 as was done with Tests Nos. 1 and 2, although the actual -8 mesh fines produced from the second lot of drill cores differed a little from those produced from the first lot of drill cores crushed. This difference will be noted by comparing Tables I and III with Table V.

Table VIII gives a comparison of final results of all three tests.

(Tables V to VIII follow,)
(on Pages 15 to 18.)

TABLE V.
(Size range of ore treated, -5/8"+8 mesh.)

Product	Weight, per cent	ASSAYS Per Cent					Au	Distribution, per cent					
		Cu	Zn	Fe	S	Insol.	oz./ton	Cu	Zn	Fe	S	Insol.	Au
-8 mesh fines	15.59	0.48	0.75	25.06	28.00	43.80	0.05	22.75	21.73	16.06	16.06	15.28	14.41
Float @ 2.80	15.84	0.05	0.27	3.31	3.03	89.96	0.02	2.41	7.94	2.16	1.76	31.88	5.86
Float @ 2.90, sink @ 2.80	9.79	0.07	0.15	6.74	6.11	81.88	0.02	2.08	2.73	2.71	2.20	17.93	3.62
Float @ 3.00, sink @ 2.90	3.89	0.11	0.17	9.48	9.20	74.06	0.02	1.30	1.23	1.52	1.32	6.45	1.44
Float @ 3.10, sink @ 3.00	3.75	0.21	0.32	13.69	13.93	66.68	0.04	2.39	2.23	2.11	1.92	5.60	2.77
Float @ 3.20, sink @ 3.10	6.63	0.30	0.47	20.01	21.83	55.02	0.055	6.05	5.79	5.45	5.32	8.16	6.74
Float @ 3.25, sink @ 3.20	2.45	0.39	0.80	29.69	32.63	35.80	0.065	2.91	3.64	2.99	2.94	1.96	2.95
Sink @ 3.25	42.06	0.47	0.70	38.75	44.26	13.54	0.08	60.11	54.71	67.00	68.48	12.74	62.21
Feed to sink-and-float (calc.)	84.41	0.30	0.50	24.19	27.04	44.86	0.055	77.25	78.27	83.94	83.94	84.72	85.59
Ore (calc.)	100.00	0.33	0.54	24.33	27.19	44.70	0.054	100.00	100.00	100.00	100.00	100.00	100.00

—

TABLE VI.

(Size range of ore treated, -5/8"+8 mesh.)

Product	Weight, per cent	ASSAYS Per Cent: Cu	Zn	Fe	S	Insol.	Au, oz./ton	Distribution, per cent: Cu	Zn	Fe	S	Insol.	Au
SEPARATING AT 3.25 -													
Average float @ 3.25	42.35	0.13	0.30	9.73	9.93	75.97	0.030	17.14	23.56	16.94	15.46	71.98	23.38
Sink @ 3.25	42.06	0.47	0.70	38.75	44.26	13.54	0.08	60.11	54.71	67.00	68.48	12.74	62.21
S.F. feed	84.41							77.25	78.27	83.94	83.94	84.72	85.59
SEPARATING AT 3.20 -													
Average float @ 3.20	39.90	0.12	0.27	8.50	8.54	78.43	0.028	14.23	19.92	13.95	12.52	70.02	20.43
Average sink @ 3.20	44.51	0.47	0.71	38.25	43.62	14.77	0.079	63.02	58.35	69.99	71.42	14.70	65.16
S.F. feed	84.41							77.25	78.27	83.94	83.94	84.74	85.59
SEPARATING AT 3.10 -													
Average float @ 3.10	33.27	0.08	0.23	6.21	5.89	83.10	0.022	8.18	14.13	8.50	7.20	61.86	13.69
Average sink @ 3.10	51.14	0.44	0.68	35.89	40.79	19.98	0.076	69.07	64.14	75.44	76.74	22.86	71.90
S.F. feed	84.41							77.25	78.27	83.94	83.94	84.72	85.59
SEPARATING AT 3.00 -													
Average float @ 3.00	29.52	0.07	0.22	5.26	4.86	85.19	0.020	5.79	11.90	6.39	5.28	56.26	10.92
Average sink @ 3.00	54.89	0.43	0.65	34.37	38.96	23.17	0.074	71.46	66.37	77.55	78.66	28.46	74.67
S.F. feed	84.41							77.25	78.27	83.94	83.94	84.72	85.59
SEPARATING AT 2.90 -													
Average float @ 2.90	25.63	0.06	0.22	4.62	4.21	86.87	0.020	4.49	10.67	4.87	3.96	49.81	9.48
Average sink @ 2.90	58.78	0.41	0.62	32.72	36.99	26.54	0.070	72.76	67.60	79.07	79.98	34.91	76.11
S.F. feed	84.41							77.25	78.27	83.94	83.94	84.72	85.59
SEPARATING AT 2.80 -													
Average float @ 2.80	15.84	0.05	0.27	3.31	3.03	89.96	0.020	2.41	7.94	2.16	1.76	31.88	5.86
Average sink @ 2.80	68.57	0.36	0.55	29.01	32.58	34.44	0.063	74.84	70.33	81.78	82.18	52.84	79.73
S.F. feed	84.41							77.25	78.27	83.94	83.94	84.72	85.59

TABLE VII. - Summary of Results, Test No. 3.

Product	Weight, per cent	Assays, Per Cent: Cu	Zn	Fe	S	Insol.	Au, oz./ton	Distribution, per cent: Cu	Zn	Fe	S	Insol.	Au
Float @ 3.25, -5/8"+8 mesh	42.35	0.13	0.30	9.73	9.93	75.97	0.030	17.14	23.56	16.94	15.46	71.98	23.38
Jig middling, -8+20 mesh	0.48	0.35	0.40	19.37	21.45	56.28	0.07	0.57	0.36	0.42	0.42	0.57	0.45
Jig tailing, -8+20 mesh	3.76	0.10	0.08	6.21	6.06	76.94	0.04	1.27	0.57	1.04	0.93	6.14	2.04
Table middling, -20 mesh	1.35	0.43	0.80	12.21	12.58	69.14	0.06	1.96	2.03	0.73	0.69	1.98	1.10
Table sand tailing, -20 mesh	2.55	0.43	0.38	9.84	11.00	74.86	0.05	3.71	1.83	1.12	1.15	4.04	1.72
Table slime tailing, -20 mesh	1.09	0.52	0.80	12.95	14.58	65.76	0.06	1.91	1.64	0.63	0.65	1.52	0.88
Product to further treatment by flotation or smelting	51.58	0.16	0.31	9.70	9.98	75.41	0.033	26.56	29.99	20.88	19.30	86.23	29.57
Sink @ 3.25, -5/8"+8 mesh	42.06	0.47	0.70	38.75	44.26	13.54	0.08	60.11	54.71	67.00	68.48	12.74	62.21
Jig concentrate, -8+20 mesh	2.81	0.62	1.00	41.49	45.35	10.40	0.09	5.89	5.28	5.19	5.21	0.62	3.42
Table concentrate, -20 mesh	3.55	0.62	1.50	43.80	48.28	5.42	0.10	7.44	10.02	6.93	7.01	0.41	4.80
Product for sulphur recovery (calc.)	48.42	0.49	0.78	39.28	44.62	12.76	0.082	73.44	70.01	79.12	80.70	13.77	70.43

TABLE VIII. - A Comparison of Final Products from Tests Nos. 1, 2 and 3.

Product, Test No., and Size Range treated by Sink-and-Float @ 3.25 Density.	Weight, per cent	ASSAYS Per Cent: Cu	Zn	Fe	S	Insol.	Au, oz./ton	Distribution, per cent: Cu	Zn	Fe	S	Insol.	Au
Conc., Test No. 1, -1"+8 mesh	49.47	0.59	1.03	39.27	42.24	14.03	0.081	79.20	77.70	81.32	81.90	15.11	68.20
Tailing, Test No. 1, -1"+8 mesh	50.53	0.15	0.29	8.84	9.13	77.07	0.038	20.80	22.30	18.68	18.10	84.89	31.80
Conc., Test No. 2, -3/4"+8 mesh	47.27	0.54	0.76	40.04	44.32	13.21	0.086	74.17	76.51	79.24	79.96	13.48	58.97
Tailing, Test No. 2, -3/4"+8 mesh	52.73	0.17	0.21	9.41	9.95	75.90	0.054	25.83	23.49	20.76	20.04	86.52	41.03
Conc., Test No. 3, -5/8"+8 mesh	48.42	0.49	0.78	39.28	44.62	12.76	0.082	73.44	70.01	79.12	80.70	13.77	70.43
Tailing, Test No. 3, -5/8"+8 mesh	51.58	0.16	0.31	9.70	9.98	75.41	0.033	26.56	29.99	20.88	19.30	86.23	29.57

= = = = = = = =
= = = =

Ottawa, Ontario.
June 10, 1946.
JDJ:LB.