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August 17, 1945.

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

Investigation No. 1918.

Investigation of the Effect of Intrusive Rock on the
Flotation of Copper and Zinc Minerals from a Sample
of Ore from the Normetal Mine, Normetal, Quebec.

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. 14.)

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Shipment:

A shipment was received on February 22, 1945, contain-
ing seven different samples of rock, designated as follows:

				<u>Weight</u>
Mill Feed	-	-	-	92 pounds
High-grade Copper Ore (for adjusting)	-	24	"	
High-grade Zinc Ore (for adjusting)	-	28	"	
Intrusive from Stope 2103, H.W. Side	-	16	"	
" " " 2103, F.W. Side	-	6	"	
" " " 2001	-	15	"	
" " " 2301, West Waste	-	14	"	

The samples were submitted by D. E. Bourke, Mill
Superintendent, Normetal Mining Corporation Limited, Normetal,
Quebec.

Location of Property:

The property from which these samples were taken is located in Abitibi county, about 12 miles north of Dupuy station, on the C.N.R. transcontinental line, northwestern Quebec.

Purpose of Tests:

The operators report that when the above-mentioned intrusive rocks are included in the mill feed they cause a sharp decrease in recovery of both copper and zinc. The object of these tests is to try to find a remedy for this condition and, if possible, to determine its cause.

Sampling and Assaying:

The samples were crushed, assayed, and reported as follows:

		Gold, oz./ ton	Silver, oz./ ton	Copper, per cent	Lead, per cent	Zinc, per cent	Iron, per cent	Sulphur, per cent
Mill Feed	-	0.0375	1.99	3.58	--	3.67	--	--
High-grade copper ore	-	--	--	18.90	--	1.42	--	--
High-grade zinc ore	-	--	--	0.01		29.63	--	--
Intrusive rock from Stope 2103, H.W. side	-	Trace.	0.03	Nil.	Nil.	Nil	7.77	Trace.
Intrusive rock from Stope 2103, F.W. side	-	Trace.	0.03	Nil.	Nil.	Nil.	6.69	0.08
Intrusive rock from Stope 2001	-	Trace.	0.02	Nil.	Nil.	Nil.	5.15	0.27
Intrusive rock from Stope 2301, West Waste	-	Trace.	0.04	Nil.	0.04	Nil.	2.84	Nil.
Mill feed sample* adjusted for zinc content	-	0.035	1.74	3.15	0.05	7.36	22.48	20.60

*The mill feed sample submitted was lower in zinc and somewhat higher in copper than the ore currently fed to

(Sampling and Assaying, cont'd) -

the mill, so this sample was adjusted by adding high-grade zinc ore in the ratio of 13 pounds to 85 pounds of the mill feed sample submitted. The sample thus prepared was the sample used as mill feed in all of the following tests.

Conclusions:

The results of tests conducted on samples of this ore have not shown that any bad effect or unusual condition follows the introduction of intrusive rock into the feed. A number of tests have been conducted with and without intrusive rock in the feed and while recoveries were slightly lower when intrusive rock was added tailing assays were also lower, indicating that the lower recoveries were due to the lower grade of feed caused by the introduction of 40 per cent of barren intrusive rock.

The rock samples had been crushed and left for a few days before any tests were conducted, so that these results may be confirming the finding of the Normetal Corporation that the objectionable features of the intrusive rock disappear after a few days' exposure to the atmosphere.

A petrographic examination of the samples of intrusive rock failed to associate their peculiar behaviour in a flotation circuit with the presence of any specific mineral. The fact that exposing the rock to the atmosphere or blowing air through it provides a solution to the problem would indicate that oxidation of some constituent of the rock, or the formation of carbonates, had taken place to bring it about.

Reducing powers have been determined on solutions from samples of pulp and found equal when straight ore was used and when the feed contained 40 per cent of intrusive rock. The reducing power was very low, 6 c.c. N/10 KMnO_4 per litre, and the solutions were found to contain small amounts of

(Conclusions, cont'd) -

CaSO_4 and ZnSO_4 .

Since the samples submitted failed to show any unusual behaviour, presumably because they were exposed to the atmosphere before any tests were conducted, it is impossible to make any definite statements as to the cause of the existing problem or its remedy.

From the description supplied of the froth condition in the cells it would appear to be a slime problem, but, on the other hand, no instance can be recalled of a slime problem being solved by simply exposing the rock to the atmosphere for a few days.

There is also the possibility of some radical change in the mill water supply from summer to winter which upsets the reagent balance.

Character of the Samples:

No microscopic examination was made of the present sample of mill feed, since a complete description of a former shipment of ore from this property is contained in Report of Investigation No. 1098, issued in September, 1941.

A petrographic examination was made of the samples of intrusive rock and reported as follows:

Sample No. 1	=	Stope 2103, H.W. side.
" No. 2	=	Stope 2001.
" No. 3	=	Stope 2301, West Waste.
" No. 4	=	Stope 2103, F.W. side.

These dark greenish foliated rocks are all related to one another. They contain the same minerals and their only difference is in the proportion of the minerals present.

One of the most interesting minerals visible in the thin sections is chlorite, two varieties of which have definitely been identified, chlinochlore and penninite, while it is believed that remnants of chloritoid are also present.

(Continued on next page)

(Character of the Samples, cont'd) -

In Sections Nos. 1, 2 and 3 these chlorites probably form 40 to 50 per cent of the whole, whereas in No. 4 there is probably not more than 15 per cent of the species present.

Calcite is another prominent mineral, visible as small grains and as masses interlaminated with chlorite and quartz. The percentage of calcite in the various samples examined is approximately as follows:

<u>Sample No.</u>		<u>Per Cent</u>
1	-	20
2	-	5
3	-	15
4	-	30

Quartz is visible as very small grains, irregular in shape and interlaminated with chlorite and calcite. The amount of this mineral present in the samples is as follows:

<u>Sample No.</u>		<u>Per cent</u>
1		20
2		25
3		25
4		30

Muscovite is another prominent constituent of these rocks, visible as laths of various sizes and which seem to be scattered throughout the rock but not in definite bands. It is present in about the following amounts.

<u>Sample No.</u>		<u>Per cent</u>
1		15
2		15
3		5
4		20

Pyrite is visible as small disseminated crystals. It is very fine and fine-grinding would be required in order to liberate it.

There is no apparent reason why this rock should cause trouble in a flotation circuit, except that some

(Character of the Samples, cont'd) -

varieties of mica are very hard to wet and some chlorites may be also.

DETAILS OF INVESTIGATION:

Test No. 1. - Mill Feed, Standard Test.

A sample of the ore was ground about 90 per cent finer than 200 mesh and floated selectively for copper and zinc as follows:

Charge to Ball Mill -

Ore	-	1,000 grams
Water	-	420 "
Lime	-	1.0 lb./ton
Sodium cyanide	-	0.10 "
Grinding time	-	25 minutes.

Copper Conditioner -

Sodium cyanide	-	0.10 lb./ton
Reagent 343	-	0.18 "
Zinc chloride	-	0.18 "
Time	-	5 minutes.
		pH of pulp, 9.50.

Copper flotation -

Reagent 343	-	0.18 lb./ton
Frother #4	-	0.08 "
Time	-	5 minutes.

Zinc Conditioner -

Lime	-	10 lb./ton
Copper sulphate	-	1.0 "
Time	-	15 minutes.
		H of pulp, 11.50.

Zinc Flotation -

Reagent 208	-	0.10 lb./ton
Frother #60	-	0.04 "
Time	-	4 minutes.

Results of Test No. 1:

Product	:Weight,:		Assays		Distribution,	
	per	cent	per	cent	per	cent
	cent		Cu	Zn	Cu	Zn
Cu conc.	14.56	19.96	8.19	92.68	15.96	
Zn conc.	13.63	0.63	44.22	2.74	80.67	
Tailing	71.81	0.20	0.38	4.58	3.37	
Feed (cal.)	100.00	3.14	7.47	100.00	100.00	

(Details of Investigation, cont'd) -

In this test everything seemed to act normally and the colours of the froths were natural.

Test No. 2. - Mill Feed + Intrusive - Standard Test.

This test is also typical of a number conducted, in which the feed to flotation contained 40 per cent of intrusive rock (2103 H.W.). In this series of tests everything also appeared normal. No discolouration of the froth was noticed and while recoveries were slightly lower than in Test No. 1 this is thought to be due to the lower-grade flotation feed caused by introduction of barren intrusive rock.

Charge to Ball Mill:

Ore	-	600 grams
Intrusive (2103 H.W.)	-	400 "
Water	-	420 "
Lime	-	1.20 lb./ton
Sodium cyanide	-	0.10 "
Grinding time	-	25 minutes.

Copper Conditioner:

Sodium cyanide	-	1.10 lb./ton
Reagent 343	-	0.18 "
Zinc chloride	-	0.18 "
Time,	5 minutes.	pH, 8.80.

Copper Flotation:

Reagent 343	-	0.18 lb./ton
Frother #4	-	0.08 "
Time,	5 minutes.	

Zinc Conditioner:

Lime	-	10.0 lb./ton
Copper sulphate	-	1.0 "
Time,	15 minutes.	pH, 11.50.

Zinc Flotation:

Reagent 208	-	0.10 lb./ton
Frother #60	-	0.04 "
Time,	4 minutes.	

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(Details of Investigation, cont'd) -

Results of Test No. 2:

Product	Weight,		Assays,		Distribution,	
	per		per cent		per cent	
	cent	:	Zn	Zn	Cu	Zn
Cu conc.	8.47	:	19.94	5.38	91.94	10.22
Zn conc.	9.11	:	0.63	41.51	3.12	84.79
Tailing	82.42	:	0.11	0.27	4.94	4.99
Feed (cal.)	100.00	:	1.84	4.46	100.00	100.00

The results of this test are typical of a number conducted and in none of them was any abnormal behaviour noticed, such as the froth discolouration that would be expected if slimes were present. The results therefore seem to corroborate those of the Corporation, in which it was noticed that the objectionable qualities of the intrusive rock disappeared after the crushed rock had been exposed to the atmosphere for a few days. It seems necessary, therefore, to conduct the investigation on the property where a fresh supply of ore will always be available.

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