

O T T A W A

January 17th, 1941.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 947.

Cobalt-Nickel Ore from the H. Shakt Mine,
Township of Coleman, Trout Lake Area,
Ontario.

BUREAU OF MINES
DIVISION OF METALLIC MINERALS
—
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CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Township of Coleman, Trout Lake Area,
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Shipment:

A shipment of 56 pounds of cobalt-nickel ore was received on November 29th, 1940, from the H. Shakt mine, which is located in the southwest corner of the township of Coleman, in the Trout Lake area, Ontario.

The shipment was submitted by T. Davis, Box 57, Latchford, Ontario.

Purpose of the Investigation:

A previous investigation had covered a shipment of finely ground samples of assay rejects and it had been suggested when reporting the results that fresh uncrushed ore might be more suitable for the investigation.

This shipment was made in accordance with the above suggestion to determine the amenability of the ore to concentration.

Character of the Ore:

Six polished sections were prepared and examined microscopically for the purpose of determining the character of the ore.

Gangue -

Gangue composes the minor portion of the sections and consists of soft, fine-grained, light to dark greenish grey rock which carries abundant carbonate (calcite).

Metallic Minerals -

As already suggested under "Gangue" above, metallic mineralization in the polished sections is heavy and consists of hard, white, granular masses disseminated throughout gangue. Etch and microchemical reactions indicate these masses to be a mixture of cobaltite (CoAsS) and gersdorffite (NiAsS) rather than smaltite-chloanthite ((Co,Ni)As₂), since sulphur appears to be present in essential quantities. Some of the latter series may be present, however, but none was positively identified in the sections. The masses contain numerous inclusions and veinlets of gangue as well as occasional, small, irregular

(Character of the Ore, cont'd) -

grains of niccolite.

Native gold is comparatively abundant in the polished sections, eighteen small grains being observed and measured. It appears to have been deposited later than the cobalt-nickel minerals although in the table which follows some 20 per cent is shown as occurring in apparently dense metallic. Most of the grains which are associated with the gersdorffite-cobaltite admixture are interstitial to grains of metallic or along veinlets of gangue cutting metallic masses.

Grain Size and Modes of Occurrence of Native Gold.				
Tyler mesh	: GOLD IN GANGUE		: GOLD IN	
	: Associated with : metallic minerals, : per cent	: Alone, : per : cent	: DENSE METAL- : LIC MINERAL, : per cent	: TOTALS, : per : cent
+ 280	13.1			13.1
- 280 + 400	-			-
- 400 + 560	30.4	6.9	15.2	52.5
- 560 + 800	5.5	4.6	5.5	15.6
- 800 +1100	3.2			3.2
-1100 +1600	13.8			13.8
-1600	1.8			1.8
	67.8	11.5	20.7	100.0

Sampling and Analysis:

The shipment was crushed and sampled by standard methods and was found to contain:

Gold	-	0.64 oz./ton
Silver	-	0.25 "
Cobalt	-	7.91 per cent
Nickel	-	7.75 "
Arsenic	-	21.52 "

Investigative Procedure:

The ore was treated by flotation, using various reagents and varying the fineness of grinding.

Results:

This sample was heavily mineralized and very high in cobalt and nickel. The ratio of concentration was 3:1. The recovery in the cleaner concentrate was: gold, 96.1 per cent; silver, 88 per cent; cobalt, 92 per cent; and nickel, 93 per cent.

Details of the Tests:

Test No. 1. - Flotation.

A sample of the ore was ground in a ball mill at a dilution of 4 parts solids to 3 parts water, with 8 pounds of soda ash and 0.5 pound of Barrett No. 4 oil per ton.

The pulp was conditioned in a flotation machine with 1.0 pound of amyl xanthate per ton added in stages. The froth was made by adding 0.10 pound of pine oil per ton in stages as required. A final addition of 1.0 pound CuSO_4 and 0.2 pound of amyl xanthate per ton was made.

The concentrate was cleaned without adding any reagents.

(Continued on next page)

(Test No. 1, cont'd) -

Results of Flotation:

Product	Weight, : per : cent	Assays				Distribution, per cent				Ratio : of con- : cent'n.
		: Oz./ton : Au	: Per cent : Ag	: Per cent : Co	: Per cent : Ni	: Au	: Ag	: Co	: Ni	
Feed [Ⓢ]	:100.00	:0.68	0.20	7.57	7.52	:100.0	100.0	100.0	100.0	:
Cleaner conc.	: 33.55	:1.58	0.36	14.20	14.64	:77.2	61.5	62.9	65.3	: 3:1.
Cleaner tailing	: 26.54	:0.50	0.18	8.50	7.88	:19.3	24.3	29.8	27.8	:3.8:1.
Flot. tailing	: 39.91	:0.06	0.07	1.39	1.30	: 3.5	14.2	7.3	6.9	:

[Ⓢ] The assays of the feed were calculated from the products.

Arsenic in concentrate = 29.1 per cent.

Arsenic in flotation tailing = 13.2 per cent.

A microscopic examination of the flotation tailing shows the presence of metallic minerals.

Test No. 2. - Flotation.

A sample of ore was ground 90 per cent minus 200 mesh in a ball mill at a dilution of 4:3, with 8.0 pounds of soda ash and 0.5 pound of coal tar creosote per ton.

The ground pulp was conditioned in a flotation machine for 2 minutes with 0.6 pound of amyl xanthate and 0.05 pound of pine oil per ton and a concentrate was removed within 3 minutes. The pulp was then conditioned for 5 minutes with 10 pounds of soda ash and 1.0 pound of copper sulphate (CuSO₄) per ton, then 0.6 pound of amyl xanthate and 0.1 pound of pine oil per ton were added in stages until no more concentrate could be raised. This operation lasted approximately 30 minutes.

The bulk concentrate was cleaned without reagents.

(Continued on next page)

(Test No. 2, cont'd) -

Product	Weight. per cent	Assays				Distribution, per cent				Ratio of concentration
		Oz./ton	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	
		Au	Ag	Co	Ni	Au	Ag	Co	Ni	
Feed [⊕]	100.00	0.87	0.25	7.92	7.72	100.0	100.0	100.0	100.0	
Cleaner conc.	52.14	1.60	0.42	14.01	13.81	96.1	88.3	92.2	93.3	1.9:1.
Cleaner tailing	13.87	0.17	0.11	3.28	2.90	2.7	6.2	5.7	5.2	
Flot. tailing	33.99	0.02	0.04	0.47	0.35	1.2	5.5	2.1	1.5	

⊕ Calculated assays.

Arsenic in concentrate = 37.75 per cent.

Arsenic in flotation tailing = 1.0 per cent.

A microscopic examination showed a very small amount of metallic minerals in the flotation tailing.

Summary:

This sample of ore was very high grade in cobalt and nickel. More than half the weight of the feed reported in the cleaner concentrate, giving a low ratio of concentration.

Conclusions:

It was found that the ore in this shipment reacted similarly to that in the previous shipment except that larger amounts of reagents were required to float it. Due to the richer heads the recoveries were greater but a clean tailing was more difficult to obtain.

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