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April 23rd, 1942.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1207.

Gold Ore from the S. and O. Claims,
Sulphide Lake, via Lac la Ronge P.O.,
Saskatchewan.

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(Copy No. 19.)



BUREAU OF MINES
DIVISION OF METALLIC MINERALS
—
ORE DRESSING AND
METALLURGICAL LABORATORIES

CANADA
DEPARTMENT
OF
MINES AND RESOURCES
MINES AND GEOLOGY BRANCH

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Shipment:

A shipment of 220 pounds of gold ore was received on January 28th, 1942, and was submitted by A. Studer, Lac la Ronge P.O., Saskatchewan.

The shipment consisted of two samples, designated A-1 and B-1, said to have been taken from the S. and O. claims Nos. 1 and 3 from a total group of fifteen claims situated at Sulphide Lake, in the Lac la Ronge district, Saskatchewan.

Purpose of the Investigation:

The shipment was submitted to determine whether ore of this type could be treated in the mill of the Preview Mines Limited at Preview Lake, Saskatchewan.

Characteristics of the Ore:

Selected specimens of the ore were taken and subjected to microscopic examination of polished sections.

Sample A-1.

Gangue -

The gangue material is composed chiefly of fine-textured, milky white quartz which is transected by narrow, hairlike fractures along some of which are stains of iron oxides. One section consists entirely of highly siliceous, dark-grey rock which contains no metallic mineralization.

Metallic Minerals -

Pyrite, the only really abundant metallic mineral, occurs largely as coarse irregular grains and small masses in gangue. It contains inclusions of gangue, sphalerite and pyrrhotite, and, in places, is extensively brecciated and sealed with gangue.

Sphalerite is common as small masses and anhedral grains, coarse to fine in size, disseminated in gangue. Although pyrite encloses an occasional grain of sphalerite, as noted above, most of the latter mineral is in gangue interstitial to grains of pyrite and appears to have been deposited later than the iron sulphide.

Pyrrhotite and chalcopyrite are present as occasional, small, irregular particles in gangue. The former is also visible as rare, tiny rounded inclusions in pyrite, the latter as dots and dashes in sphalerite.

Very small amounts of marcasite and "limonite" are present in the polished sections. The former occurs with

(Characteristics of the Ore)
(Sample A-1, cont'd) -

(Metallic Minerals, cont'd) -

the other sulphides as small, fine-textured patches in gangue; the latter occurs in one section as replacement veinlets in pyrite and as reddish brown stains in gangue. A negligible quantity of covellite is visible as rare tiny scales in chalcopyrite.

Eighteen grains of native gold, ranging from 156 microns (-65+100 Tyler mesh) down to 4 microns (-2500 Tyler mesh) in size, were observed and measured. All occur in gangue, eight alone and ten associated with sphalerite.

Sample B-1.

Gangue -

The gangue varies in character and is a mixture of fine-textured, milky white quartz, and soft, grey rock. The former constituent bears local brown stains of iron oxides; the latter constituent carries abundant, finely disseminated carbonate (calcite).

Metallic Minerals -

Arsenopyrite is the only abundant metallic mineral in the polished surfaces. It is disseminated through gangue as small masses and coarse to fine irregular grains which contain numerous inclusions of gangue and which are severely fractured in places and the fractures filled with gangue.

A hard, grey, anisotropic mineral, regarded as ilmenite probably altering to leucoxene, is locally common as small, irregular grains and fine-textured aggregates in gangue and in arsenopyrite but its total amount is small.

Pyrite is present in gangue as occasional small,

(Characteristics of the Ore)
(Sample B-1, cont'd) -

(Metallic Minerals, cont'd) -

irregular grains usually associated with arsenopyrite, and pyrrhotite is present in arsenopyrite and pyrite as rare, tiny grains. "Limonite" is visible in gangue as reddish brown stains and rare small grains.

Seven small grains of native gold are visible in the sections. They range in size from 54 microns (-200+280 Tyler mesh) down to 12 microns (-1100+1600 Tyler mesh). As in Sample A-1, all occur in gangue, three alone, two against arsenopyrite, one against pyrite, and one along a gangue-filled fracture in arsenopyrite.

Sampling and Analysis:

The shipment was crushed and each sample was treated separately.

	<u>Sample A-1.</u>	<u>Sample B-1.</u>
Gold (Au) -	0.385 oz./ton.	0.71 oz./ton.
Silver (Ag) -	0.08 "	0.16 "
Arsenic (As) -	None detected.	8.63 per cent.
Iron (Fe) -	3.60 per cent.	11.03 "
Zinc (Zn) -	0.50 "	0.11 "
Copper (Cu) -	None detected.	None detected.
Sulphur (S) -	1.52 per cent.	4.51 per cent.

Experimental Tests:

The flow-sheet at Preview as given by Mr. Robert Caldwell, Preview Mines Limited, was essentially crushing, plate amalgamation, blanket concentration, classifying and regrinding the coarse sands.

Both samples were treated separately by plate amalgamation, blanket concentration followed by barrel-amalgamation of the blanket concentrates.

Details of Tests:

Tests Nos. 1, 2, 3 and 4.

Samples of the ore were ground in ball mills at a dilution of 4 parts of solids to 3 parts of water for various periods of time.

The pulp was plate amalgamated and the plate tailing passed over corduroy blankets. The blanket concentrates were reground and barrel-amalgamated.

After removing the mercury and amalgam from the concentrate, each concentrate was returned to its respective blanket tailing and sampled.

A screen test was made on each tailing to note the degree of grinding.

Results of Amalgamation:

Sample A-1.				
Test No.	Grind, % -200 mesh	Assays, Au, oz./ton. Feed	Assays, Au, oz./ton. Tailing	Extraction of gold, per cent
1	74	0.385	0.045	88.3
2	89	0.385	0.05	87.0

Sample B-1.				
Test No.	Grind, % -200 mesh	Assays, Au, oz./ton. Feed	Assays, Au, oz./ton. Tailing	Extraction of gold, per cent
3	87	0.71	0.26	63.4
4	94	0.71	0.27	62.0

Screen Test.				
Mesh No	Weight, per cent			
	Test No. 1.	Test No. 2.	Test No. 3.	Test No. 4.
- 65+100	2.1	0.1	0.2	-
-100+150	9.7	3.1	4.2	1.5
-150+200	13.9	7.6	8.2	4.1
-200	74.3	89.2	87.4	94.4
	100.0	100.0	100.0	100.0

Summary and Conclusion:

The results of the investigation indicate that the free gold can be recovered by amalgamation. For Sample A-1 the grind is indicated as approximately 75 per cent minus 200 mesh and for Sample B-1, approximately 85 per cent minus 200 mesh. The gold in this sample was smaller in size than that of Sample A-1, as observed in the polished sections.

The higher tailing in Sample B-1 indicates that part of the gold in this sample is associated with the arsenopyrite and is not amenable to amalgamation. This material would probably require roasting and cyanidation in order to obtain a maximum extraction.

Sample B-1 submitted for the investigation is apparently not representative of the large ore body from which it was obtained.

The large deposit was stated to average about \$7.00 per ton. The B-1 sample assays \$24.85 a ton at \$35.00 gold. The recovery of 63.4 per cent as determined by the test work on this high-grade sample will not apply to the seven-dollar ore. The recovery will probably be much lower. The arsenopyrite itself probably carries most of the gold in the seven-dollar ore, while the enriched high-grade sample contains free gold which was recovered by amalgamation.

The results obtained in this investigation therefore apply only to ore similar in grade and character to that submitted for the investigation.

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