

O T T A W A

March 30th, 1942.

R E P O R T

of the

ORE DRESSING AND METALLURGICAL LABORATORIES.

Investigation No. 1194.

Gold Ore from Claim 1724, Guillet Township,
Bellevue Mining Area, County of
Temiskaming, Quebec.

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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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Gold Ore from Claim 1724, Guillet Township,
Belleterre Mining Area, County of
Temiskaming, Quebec.

Shipment:

A shipment of 300 pounds of gold ore was received on December 28th, 1941, from A. Cook, Box 39, 44 Cochrane Road, Bartonville, Ontario. The ore was taken from a test pit on the vein in Claim No. 1724, Guillet township, in the Belleterre mining area of Temiskaming county, Quebec.

Purpose of the Investigation:

The investigation was made to determine a method of treatment for the ore.

Character of the Ore:

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

Gangue -

In the polished sections gangue material preponderates over metallic mineralization and consists of fine-textured, grey quartz containing a small amount of carbonate as tiny, disseminated grains and narrow, irregular stringers.

Metallic Minerals -

In their approximate order of decreasing abundance, the metallic minerals present in the sections are: pyrite, sphalerite, galena, chalcopyrite, and native gold. These minerals are scattered unevenly through gangue as small masses and coarse to fine irregular grains which, in places, form irregular stringers (probably arranged along lines of weakness which formed channelways for the ore-bearing solutions).

The pyrite occurs largely as coarse to fine irregular grains which appear to have been deposited earlier than the other metallics. It contains occasional small inclusions of gangue and the other sulphides. The masses and grains of sphalerite, galena, and chalcopyrite are often intimately admixed with each other and associated with pyrite.

Twenty-two grains of gold, ranging from 108 microns (-100+150 Tyler mesh) down to 16 microns (-800+1100 Tyler mesh) in size, are contained in five of the six polished sections. Twenty occur in gangue; two in sphalerite. Some of the grains in gangue are alone but most of them are against grains of

(Metallic Minerals, cont'd) -

sulphide; both grains enclosed in sphalerite are associated with inclusions of gangue. While most of the gold visible in the sections is associated with the sulphides in this way, there is no evidence that it was deposited contemporaneously with them. Hence it is not probable that the sulphides carry any appreciable quantity of gold in submicroscopic sizes.

Sampling and Analysis:

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

Gold (Au)	-	2.15 oz./ton
Silver (Ag)	-	6.75 "
Copper (Cu)	-	0.11 per cent
Lead (Pb)	-	0.66 "
Zinc (Zn)	-	0.43 "
Iron (Fe)	-	3.25 "
Arsenic (As)	-	None detected.
Sulphur (S)	-	1.58 per cent
Tungsten trioxide (WO ₃)	-	None detected.

Investigative Procedure:

The ore was concentrated by flotation and by jigging followed by flotation and cyanidation. The jig concentrates were barrel-amalgamated. The ore also was tested by straight cyanidation.

An infrasizer test was made on a sample of cyanide tailing to observe the distribution of gold in the various sized particles.

Results of the Test Work:

76 per cent of the gold and 80 per cent of the silver were recovered in a flotation concentrate assaying 44 ounces of gold, 200 ounces of silver, 3.4 per cent copper, 16 per cent lead, and 12.8 per cent zinc per ton. The ratio of concentration was 36:1. A second, pyrite, concentrate assayed 3.5

(Results of the Test Work, cont'd) -

ounces of gold and 12 ounces of silver per ton with a ratio of concentration of 22:1.

27 per cent of the gold in the ore was recovered by amalgamation, at a grind of 92 per cent.

85 per cent of the gold was extracted by straight cyanidation, at a grind of 90 per cent minus 200 mesh, within 72 hours.

Amalgamation followed by cyanidation resulted in an overall recovery of 95 per cent of the gold within 24 hours and 96 per cent within 48 hours, without appreciable fouling of the solutions.

Details of the Tests:

Test No. 1. - Straight Flotation.

This test was made to determine the grade of concentrate that could be recovered by straight flotation.

A sample of the ore was ground in water with 1.2 pounds of lime and 0.1 pound of sodium cyanide per ton at a dilution of 4 parts solids to three parts of water. The grind was 77 per cent minus 200 mesh.

The pulp was transferred to a flotation machine.

Reagents to float chalcocopyrite:

	<u>Lb./ton</u>
Sodium ethyl xanthate (Z-4)	- 0.04
Reagent No. 301	- 0.02
Pine oil	- 0.10

The concentrate recovered was designated No. 1.

The pulp was then conditioned with 1.0 pound of copper sulphate per ton. Then 0.1 pound of amyl xanthate per ton was added and a second concentrate was recovered.

(Continued on next page)

(Test No. 1, cont'd) -

The products were assayed for gold and copper.

Results:

Product	Weight, per cent	Flotation, Assays		Distribution, per cent		Ratio of concentrations
		Au, oz./ton	Cu, per cent	Au	Cu	
Feed [Ⓢ]	100.00	2.03	0.11	100.00	100.00	
Conc. No. 1	3.02	52.68	2.49	78.42	68.4	53:1.
Conc. No. 2	4.14	3.34	0.46	6.82	17.3	24:1.
Combined conc [Ⓢ]	7.16	24.15		85.24	-	14:1.
Flot. tailing	92.84	0.32	0.02	14.76	14.3	

[Ⓢ] Calculated values.

Lead in Conc. No. 1. - 13.15 per cent.

Microscopic examination of the flotation tailing disclosed some particles of coarse free gold that had not been recovered by flotation. The coarse particles of gangue contained sulphide particles which were very small. The tailing assay indicated that the ore was not ground fine enough to liberate the values.

The presence of free gold in the tailing indicated the necessity of recovering the coarse gold prior to flotation by jigs, blankets or traps.

Test No. 2. - Jig Concentration; Amalgamation of the Jig Concentrate; and Flotation of the Jig Tailing and Amalgamated Concentrate.

This test was made to determine the recovery of gold by jigging and amalgamation followed by flotation.

A sample of ore was ground in water, dilution 4:3, to give a product 77 per cent minus 200 mesh.

The pulp was passed over a Denver laboratory mineral jig.

The jig concentrate was barrel-amalgamated and after separating the amalgam, the amalgamated concentrate

(Test No. 2, cont'd) -

was returned to the jig tailing. The amalgam was assayed.

The jig tailing was then filtered and repulped in a flotation machine to 30 per cent solids.

The pulp was conditioned with 2.0 pounds of soda ash per ton for 15 minutes. Then 0.4 pound of potassium butyl xanthate (Z-8) per ton was added in stages with 0.1 pound of pine oil and the concentrate was removed.

The concentrate was recleaned with 10 pounds of lime per ton.

Results:

Amalgamation.

Assay of original feed	-	2.15 oz./ton.
Assay of flotation feed = amalgamation tailing	-	<u>1.71</u> "
Recovery by amalgamation	-	0.44 "
Recovery by amalgamation	-	20.5 per cent.
Gold remaining in flotation feed	-	79.5 "

		100.0

Flotation.

Product	Weight, per cent	Assays		Distribution, per cent			Ratio of concentration
		Au, oz./ ton	Cu, per cent	Gold In test	In orig. feed	Cu	
Feed [⊙]	100.00	1.71	0.11	100.00	79.5	100.0	
Rough conc. [⊙]	9.26	19.17	1.19	81.55	64.8	86.1	15.8:1.
Cleaner "	3.78	32.36	2.08	71.71	57.0	78.1	26.5:1.
Middling	3.48	4.82	0.23	9.82	7.8	8.0	28.7:1.
Flotation tailing	92.74	0.34	0.015	18.47	14.7	13.9	

[⊙] Calculated values.

Lead in cleaner concentrate - 9.74 per cent.

(Continued on next page)

(Test No. 2, cont'd) -

Summary of Test:

	<u>Per cent</u>
Recovery of gold by amalgamation -	20.5
Recovery of gold in the flotation conc. -	57.0
	<hr/> 77.5
Gold in the flotation middling -	7.8
Gold in the flotation tailing -	14.7
	<hr/>
Total -	100.0

Microscopic examination of the tailing shows particles of sulphides, varying in size from coarse to very tiny, adhering to or included within particles of gangue. This grind was not fine enough to liberate the values.

Test No. 3. - Jig Concentration; Amalgamation of Jig Concentrate; and Flotation of the Jig Tailing and Amalgamated Concentrate.

The sample of ore was ground 92 per cent minus 200 mesh and jigged. The jig concentrates were barrel-amalgamated. The amalgamated concentrates and jig tailing were filtered and repulped in a flotation machine.

The pulp was conditioned with the following reagents and a copper concentrate was recovered (Concentrate No. 1.):

	<u>Lb./ton</u>
Soda ash -	2.0
Sodium cyanide -	0.1
Sodium ethyl xanthate -	0.04
Pine oil -	0.05

The pH of pulp was 8.2.

(Continued on next page)

(Test No. 3, cont'd) -

To float the pyrite the following reagents were added:

Copper sulphate - 1.0 lb./ton.
 Potassium amyl xanthate - 0.1 "

No pine oil was required. (Concentrate No. 2.).

Results:

Product	Weight, per cent	Assays					Distribution, per cent				Ratio of concentration
		Au	Ag	Cu	Pb	Zn	Au	Ag	Cu	Pb	
Feed	100.00	1.57	6.79	0.12	0.56	0.43	100.0	100.0	100.0	100.0	
Conc. No. 1	2.72	44.16	200.42	3.40	16.54	12.87	76.7	80.3	77.7	78.3	36.7:1.
Conc. No. 2	4.47	3.58	12.0	0.18	1.10	0.78	10.3	7.9	6.7	8.7	22.4:1.
Combined conc [Ⓞ]	7.19	18.93	83.28	1.40	6.87	-	87.0	88.2	84.4	87.0	13.9:1.
Tailing	92.81	0.22	0.86	0.02	0.08	-	13.0	11.8	15.6	13.0	

[Ⓞ] Calculated value.

Summary of the Test:

Amalgamation.	
Feed	- 2.15 oz./ton.
Amalgamation tailing = flotation feed	- 1.57 "
Recovery	- 27.0 per cent.
	<u>Per cent</u>
Gold remaining in flotation feed	- 73.0
Recovery by Flot. Conc. No. 1.	- 56.0
Recovery by Flot. Conc. No. 2.	- 7.5
Combined concentrate	- 63.5
Flotation tailing	- <u>9.5</u> <u>9.5</u>
	73.0 73.0
Recovery by amalgamation	- <u>27.0</u>
Total	- 100.0

(Details of Tests, cont'd) -

Test No. 4. - Jig Concentration; Amalgamation of Jig Concentrate; and Flotation of the Jig Tailing and Amalgamated Concentrate.

This test was made to determine the recoveries of gold and silver in a bulk concentrate.

The sample of ore was ground 92 per cent minus 200 mesh and jigged. The jig concentrate was barrel-smalгамated.

The jig tailing and amalgamated concentrate were floated with the following reagents:

Soda ash - 2.0 lb./ton.) (pH, 8.2)
 Aerofloat No. 31 - 0.1 ") Condition 5 minutes.
 Potassium amyl xanthate - 0.1 lb./ton.
 Pine oil - 0.05 "

Flotation time, 5 minutes.

Conditioned the pulp with:

Copper sulphate, 1.0 lb./ton.
 Potassium amyl xanthate, 0.1 "
 Pine oil, 0.05 "

Flotation time, 5 minutes.

The combined concentrates were cleaned without reagents.

Results:

Product	Flotation.					
	Weight, per cent	Assays, oz./ton		Distribution, per cent		Ratio of concentration
		Au	Ag	Au	Ag	
Feed	100.00	1.57	6.85	100.0	100.0	
Rough conc.®	9.85	14.36	63.73	90.2	91.7	10.2:1.
Cleaner conc.	5.01	26.66	118.02	85.2	86.4	20.0:1.
Middling	4.84	1.62	7.54	5.0	5.3	20.7:1.
Flot. tailing	90.15	0.17	0.63	9.8	8.3	

® Calculated values.

(Continued on next page)

(Test No. 4, cont'd) -

Summary of the Test:

Amalgamation.

Feed	-	2.15 oz./ton.
Amalgamation tailing = flotation feed	-	1.57 "
Recovery of gold	-	27.0 per cent.
		<u>Per cent</u>
Gold remaining in flotation feed	-	73.0
Recovery of gold in rough concentrate	-	65.9
Recovery of gold in cleaner conc.	-	62.2
Gold in middling	-	3.7
Gold in flotation tailing	-	<u>7.1</u> <u>7.1</u>
		73.0 73.0
Recovery by amalgamation	-	<u>27.0</u>
Total	-	100.0

In this test stronger reagents are used for collecting gold, without depressants such as sodium cyanide. This resulted in a higher recovery of gold. No attempt was made to separate copper (chalcopyrite) or lead from the pyrite.

Test No. 5. - Jig Concentration; Amalgamation of Jig Concentrate; and Flotation of the Jig Tailing and Amalgamated Concentrate.

This test was made similarly to Test No. 4 except that the ore was ground 97 per cent minus 200 mesh.

The pulp was jigged. The jig concentrate was barrel-amalgamated.

The flotation feed was treated in the same manner with the same reagents and amounts as in Test No. 4. The

(Test No. 5, cont'd) -

products were assayed for copper, lead, and zinc to note the recoveries of these metals.

Results:

Pro-duct	Flotation.											
	Weight, per cent	A s s a y s					Distribution, per cent					
		Oz./ton	Per cent	Au	Ag	Cu	Pb	Zn	Au	Ag	Cu	Pb
Feed	100.00	1.61	6.89	0.16	0.66	0.37	100.0	100.0	100.0	100.0	100.0	100.0
Rough conc [®]	11.92	12.51	53.32	1.30	4.80	3.10	91.5	92.2	94.6	86.7	98.8	
Cleaner conc.	5.03	27.78	120.14	3.00	10.42	7.34	86.9	87.7	92.1	79.4	98.6	
Middling	6.89	1.02	4.54	0.06	0.70	0.01	4.4	4.5	2.5	7.3	0.2	
Flot. tailing	88.08	0.16	0.61	0.01	0.10	0.005	8.7	7.8	5.4	13.3	1.2	

Ratios of Concentration:

Rough concentrate [®]	-	8.4:1.
Cleaner concentrate	-	19.9:1.
Middling	-	14.5:1.

[®] Calculated values.

Summary of the Test:

Amalgamation.

Feed	-	2.15 oz./ton.
Amalgamation tailing = flotation feed	-	1.61 "
Recovery of gold	-	25.1 per cent.
		<u>Per cent</u>
Gold remaining in flotation feed	-	74.9
Recovery of gold in rough concentrate	-	68.3
Recovery of gold in cleaner conc.	-	65.0
Gold in the middling	-	3.3
Gold in the tailing	-	6.6
		<u>74.9</u> <u>74.9</u>
Recovery by amalgamation	-	<u>25.1</u>
Total	-	100.0

(Test No. 5, cont'd) -

The cleaner concentrate assayed:

Gold (Au)	-	27.78	oz./ton.
Silver (Ag)	-	120.14	"
Copper (Cu)	-	3.00	per cent.
Lead (Pb)	-	10.42	"
Zinc (Zn)	-	7.34	"
Iron (Fe)	-	27.13	"
Insoluble	-	22.83	"

The silver is apparently associated with the galena, as none was recovered by amalgamation.

Test No. 6. - Straight Cyanidation, Infrasizer
Test on the Minus 200 Mesh
Cyanide Tailing.

Samples of ore were ground in cyanide solution at a dilution of 4:3 to give a product of 90 per cent minus 200 mesh. The strength of the solution was 2.0 pounds of sodium cyanide per ton. Lime was added to give protective alkalinity to the pulp.

The pulp was agitated for 72 hours at a dilution of 1 part solids to 1½ parts of solution which was made up to 2.0 pounds of NaCN per ton. The solutions were kept up to strength during the period of agitation.

After sampling the cyanide tailings, a portion was screened on a 200-mesh screen. The minus 200 mesh fraction was classified into various fractions by means of the Haultain infrasizer.

Each fraction was assayed for gold.

Results:

Straight Cyanidation.							
Assays,	Extrac-	Final	Titration,	Reagents	consumed,	R. P.	
Au oz./ton	tion,	lb./ton	solution:	lb./ton	ore	ml. N/10	
Feed :	Tailing:	per cent:	NaCN :	CaO :	NaCN :	CaO :	Per litre
2.15	0.32	85.1	2.0	0.55	1.40	10.2	100.0

* Reducing power of the solution in terms of one-tenth normal solution of potassium permanganate solution and is the amount of fouling in the solution.

(Test No. 6, cont'd) -

Infrasizer Test on Minus 200 Mesh Cyanide Tailing.

Product	Weight, per cent	Assays, Au oz./ton	Distribution of gold, per cent
-200 mesh +56 microns	6.0	1.87	33.8
- 56 microns +40 "	27.7	0.35	29.2
- 40 " +28 "	23.9	0.13	9.3
- 28 " +20 "	13.9	0.08	3.3
- 20 " +14 "	7.7	0.05	1.2
- 14 " +10 "	3.0	0.08	0.7
- 10 "	8.1	0.08	2.0
+200 mesh	9.7	0.70	20.5
Feed	100.0	0.33	100.0

Infrasizer Data:

1 inch = 25.4 millimetres.

1 millimetre = 1,000 microns.

Length of test, 8 hours.

Drops per minute, 63.

Height of drop, 5/16 inch.

Differential pressure, 19 inches of water.

Standard gold balls used.

2.0 per cent of the gold in the tailing was found to be in the minus 10 micron size particles.

Straight cyanidation of this ore is not a suitable method of extraction of gold as indicated by the tailing. The larger particles did not apparently dissolve within 72 hours.

The ore requires grinding to about 28 microns to obtain a minimum tailing.

(Details of Tests, cont'd) -

Test No. 7. - Jig Concentration; Amalgamation of Jig Concentrate; and Cyanidation of Jig Tailing and the Amalgamated Concentrate.

Samples of ore were ground in water, dilution 4:3, to give a product 90 per cent minus 200 mesh.

The ore was jigged and the jig concentrate was amalgamated.

The jig tailing and amalgamated concentrate were filtered and sampled.

Portions of the filter cake were repulped in cyanide solution, at a dilution of one part solids to two parts of solution. In one group of samples the solution was made up to 0.5 pound of NaCN per ton; in the other group of samples the solution was made up to 1.0 pound of NaCN per ton. One-half of each group of samples was agitated for 24 hours and the remainder for 48 hours.

Results of Cyanidation:

24-Hour Tests.

Test No.	NaCN solution, lb./ton	Assays, oz./ton				Extraction, per cent		Final filtration, lb./ton		Reagents consumed, lb./ton ore		
		Feed	Tailing	In Test	Original	Feed, Au	NaCN	CaO	NaCN	CaO		
7												
A	0.5	1.67	6.75	0.14	3.61	91.6	46.5	71.2	0.35	0.10	0.4	5.2
B	0.5	1.67	6.75	0.14	3.38	91.6	49.9	71.2	0.40	0.13	0.4	5.1
C	1.0	1.67	6.75	0.11	1.65	93.4	75.6	72.6	0.95	0.13	0.5	5.1
D	1.0	1.67	6.75	0.11	1.75	93.4	74.1	72.6	1.00	0.15	0.5	5.1

48-Hour Tests.

E	0.5	1.67	6.75	0.08	2.13	95.2	68.4	74.0	0.50	0.15	0.7	6.1
F	0.5	1.67	6.75	0.08	2.12	95.2	68.6	74.0	0.55	0.15	0.7	6.1
G	1.0	1.67	6.75	0.08	0.92	95.2	86.4	74.0	1.0	0.15	0.8	6.1
H	1.0	1.67	6.75	0.08	0.92	95.2	86.4	74.0	1.0	0.15	0.8	6.1

Recovery of gold by amalgamation - 22.3 per cent.

(Test No. 7, cont'd) -

Summary of the Test:

Amalgamation.

Feed - Au, 2.15 oz./ton.
 Amalgamation tailing
 = feed to cyanidation - 1.67 "
 Recovery of gold - 22.3 per cent.

Overall Recoveries of Gold.

Test No.	Recovery by amalgamation, per cent	Extraction by cyanidation, per cent	Overall recovery, per cent
7A	22.3	71.2	93.5
7B	22.3	71.2	93.5
7C	22.3	72.6	94.9
7D	22.3	72.6	94.9
7E	22.3	74.0	96.3
7F	22.3	74.0	96.3
7G	22.3	74.0	96.3
7H	22.3	74.0	96.3

Reducing power of the solution after 48 hours:

0.5 pound NaCN per ton solution was 82 cc. N/10 KMnO₄ per litre.
 1.0 " " " " " " " 106 " " " " "
 Test No. 6 - 2.0 pounds NaCN
 per ton solution was 100 cc. " " " "
 in 72 hours.

GENERAL SUMMARIES OF TESTS:

Test No. 1. Straight flotation resulted in a concentrate assaying 52.6 ounces of gold, 2.5 per cent copper and 13 per cent lead per ton. The ratio of concentration was 33:1. A second, pyrite, concentrate assayed 3.3 ounces of gold and 0.46 per cent of copper per ton. Free coarse flakes of gold were found in the flotation tailing. The grind was 77 per cent minus 200 mesh.

(Continued on next page)

(General Summaries of Tests, cont'd) -

Test No. 2. Jigging and amalgamation prior to flotation resulted in 20.5 per cent of the gold being amalgamated. 57 per cent of the remaining gold was floated in a concentrate assaying 32.3 ounces of gold and 2.1 per cent of copper per ton, with a ratio of concentration of 26.5:1. The grind was 77 per cent minus 200 mesh. Microscopic examination of the tailing discloses that the sulphides were not separated from the gangue at this grind.

Test No. 3. Jigging at 92 per cent minus 200 mesh resulted in a recovery of 27 per cent of the gold by amalgamation. Flotation of the tailing resulted in a concentrate assaying 44 ounces gold, 200 ounces silver, 3.4 per cent copper, 16 per cent lead and 12 per cent zinc per ton. 56 per cent of the remaining gold is represented in this concentrate. A second, pyrite, concentrate assayed 3.5 ounces gold, 12 ounces silver per ton. 7.5 per cent of the gold was in this concentrate. The tailing assayed 0.22 ounces gold per ton.

Test No. 4. This test used the same grind and gave the same recovery by amalgamation. The change in flotation reagents resulted in a higher recovery but a lower grade of concentrate.

Test No. 5. The ore was ground 97 per cent minus 200 mesh and the recovery by amalgamation was 25 per cent. The use of Aerofloat No. 31 resulted in a slightly higher recovery of gold. The assays show very small amounts of copper, lead and zinc in the flotation tailing. The assay of the cleaned concentrate shows 22.8 per cent of insoluble present. The higher recovery of metals is at the expense of a lower grade of concentrate and a lower ratio of concentration.

(Continued on next page)

(General Summaries of Tests, cont'd) -

Test No. 6. Straight cyanidation exhibits the same results as straight flotation in that the coarse gold can be found in the tailing after 72 hours of agitation. A recovery of 85 per cent of the gold was realized at a grind of 90 per cent minus 200 mesh.

Test No. 7. Taking out free gold by jigging and amalgamation at a grind of 90 per cent minus 200 mesh prior to cyanidation resulted in an overall extraction of 95 per cent of the gold and 75.6 per cent of the silver within 24 hours and of 96.3 per cent of the gold and 86.4 per cent of the silver within 48 hours.

No silver was recovered by amalgamation.

The infrasizer test shows that 3.0 per cent of the gold remains in the minus 10 micron sized particles, which assayed 0.08 ounce of gold per ton.

CONCLUSIONS:

The visible gold in the polished sections varied in size from 108 microns to 16 microns. The tests indicate gold in particles of ore below 10 microns in size which assay 0.08 ounce of gold per ton.

This was the lowest assay obtained on a pulp ground to 90 per cent minus 200 mesh and cyanided for 48 hours. It will probably be about the minimum tailing obtained on an ore of this grade and character.

Some means of removing free coarse gold from the circuit, such as traps, blankets, or a mineral jig, should

(Conclusions, cont'd) -

be used.

The flotation tailing at a grind of 97 per cent minus 200 mesh contained 0.16 ounce of gold per ton after removing and amalgamating the free gold from the feed.

The amount of cyanicides present, such as copper sulphide (chalcopyrite), appears to have only a very slight effect on the consumption of reagents. No arsenopyrite was reported in the assay.

The reducing power of the solution after 48 hours was 106 ml. N/10 KMnO_4 per litre.

The ore could be treated by the normal practice of cyanidation after the removal of the coarse gold. The copper-bearing concentrates could not be cyanided without a very high consumption of cyanide and would have to be shipped to a smelter.

In order to determine the best method of treatment, the sample on which the investigation is made should be representative of the proposed mill feed. This shipment is high-grade ore and the results obtained from this investigation will apply only to ore of similar grade and character.

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