

600306

HEDLEY MASCOT GOLD MINES.

Study of:

1. Ore.
2. Mill Tailings.

by

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ORE.

INDEX.

	Page.
Location .....	1.
History .....	1.
Topography .....	2.
Geology	
General Geology .....	2.
Ore Geology .....	3.
Paragenesis	
General .....	4.
Table of Paragenesis .....	6.
Minerals	
Gold .....	6.
Arsenopyrite .....	7.
Chalcopyrite .....	7.
Pyrrhotite .....	8.
Cobaltite .....	8.
Sphalerite .....	8.
Lollingite .....	8.
Marcasite .....	8.
Calcite .....	8.
Quartz .....	9.
Conclusions .....	9.
Plates #1, #2, #3, #4, #5, .....	11.

HEDLEY MASCOT.

ORE.

LOCATION.

Nickel Plate mountain, in which the mine is operated, is in the Osoyoos mining district, about 27 miles north of the international boundary and  $1\frac{1}{2}$  miles west of the 120th. meridian. It is a part of the north west range that borders the Similkameen river valley in which the town of Hedley is situated. The town is on the Great Northern Railroad between the towns of Keremeos and Princeton. From the mine a road joins the Keremeos-Penticton highway, being 13 miles from the road junction and 32 from Penticton. The mine lies one mile north of Hedley.

HISTORY.

In 1931 the Hedley Nickelplate mine shut down for lack of pay ore, the Mascot fraction, 17.2 acres staked in the 1890's and owned by Dunc Woods, was known to contain ore as the company had mined ore from chutes on both sides of the property. It could not however be acquired at the time as terms suitable to both parties could not be agreed upon. Development was, however, again started in 1935 with considerable diamond drilling and surficial geological exploration.

### TOPOGRAPHY.

The area is on the southern border of the interior plateau of British Columbia. The Similkameen River lies in a "U" shaped glaciated valley 4500 feet below the top of Nickel Plate Mountain, the tributary streams such as Hedley and Cahill Creeks running down from overhanging valleys. The sides of the mountain are steep, with very little level ground. In spite of the ruggedness of the country and the extensive rock outcrops, there is considerable pine growing on the slopes.

### GEOLOGY.

The geology of the region has been studied and may be found in Geological Survey of Canada, Memoir #2, 1910 by Chas. Campell. It was later reported on by H. S. Bostoch Geological Survey of Canada, Summary Report, 1929, part A. The Annual Report of the British Columbia Minister of Mines 1901 to 1938, also furnish considerable information. Only a short description of the area will be given here.

General Geology. The regional geology consists of a great thickness of banded argillaceous, calcareous and quartzitic sediments of the Sunnyside and Nickel Plate Triassic beds, intruded by irregular masses of Mesozoic and Tertiary igneous rocks. On Nickel Plate Mountain the calcareous type predominates. There seems to be very little contortion or folding of the sediments. The intruding masses of

hornblende and augite diorite <sup>ore</sup> in the form of stocks, dykes and sills which blend locally into the sediments. These are surrounded on all sides but the west by large bodies of younger granodiorite. Later than this were intruded andesitic and lamprophyric dykes. A large fault, Bradshaw Fault, passes along the west side of the mountain. On the whole the sediments dip westerly to north westerly, increasing to the west, but the general dip is  $23^{\circ}$  west, striking north  $50^{\circ}$  west, being locally contorted.

Ore Geology. The ore occurs in lime bearing rocks that are recrystallized to silicate rocks of medium but not intense degree of metamorphism and occurs only locally in diorite. The ore is shown by Bostock to be found in irregular sheet-like bodies. They occur in sedimentary strata in the Nickel Plate beds, there being mainly only #3, #4 and #5 on the Mascot fraction, which are separated by zones of low grade values in the sediment and by diorite gabbro porphyry. The sediments make up about 60% and the porphyry about 40% of the rock, the ore occurring mainly in the sedimentary strata. Localization of the ore is controlled by the fissuring of the rocks, intensity of metamorphism and by the composition of the metamorphosed host-rocks, giving both fissure and massive sulphide deposits. The fractures tend to follow the bedding or the sediment-diorite contacts. There occur also a few quartz veins which contain

the mineralization in the darker argillaceous sediments. Limits of the ore body are determined by commercial ore usually, there being sometimes high values adjacent to the top of contact of sills, the grade decreasing upward in the sediments. Usually the ore bodies are about 65 feet thick or less and extend up to 400 feet or more, horizontally.

#### PARAGENESIS.

General. The particular theory which will be put forward to explain the deposition of minerals does not entirely agree with any of those postulated by Camshell, Bostock, or Warren and Cummings, but is a possible explanation of the occurrence of the ore as observed in polished sections.

During intrusion of the igneous masses which supplied the hydrothermal solutions, heat, and pressure for metamorphism; it appears that the original sediments were partly taken into solution and considerably fractured. Into these fractures came arsenopyrite and crystallized out in coarse apparently compact holocrystalline form. This arsenopyrite must have carried gold as very small particles scattered throughout it as shown by the analysis of the mineral in tails analysis. It carried with it a small amount of pyrite, which also crystallized out mostly as fairly large, square isometric crystals. Though none of these are found included in the arsenopyrite it is believed that due to the strong crystallizing power of both minerals neither would include particles of the other.

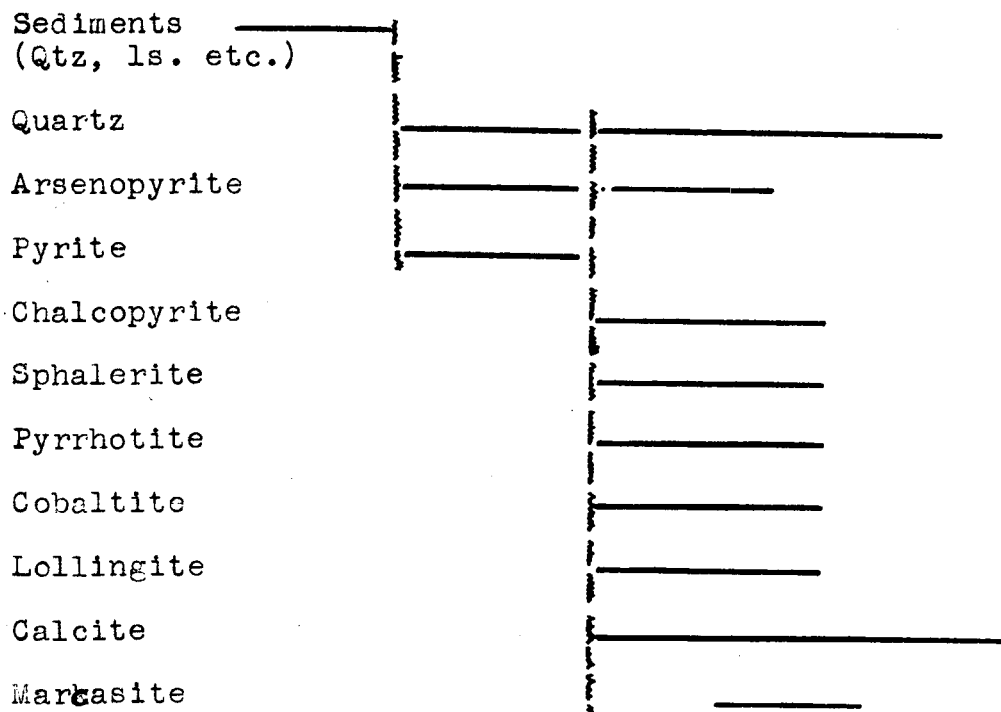
There contacts are shown in some cases as streight lines, but usually they are separated by quartz.

This sulphide was not disseminated through the rocks very much but deposited mainly in the fractures. Coarse hexagonal crystals of quartz formed with the sulphide in the fissures. These minerals were fractured due to movement or possibly another igneous intrusion, since there have been several in the district, and higher temperature <sup>solutions</sup> came in carryin~~g~~ chalcopyrite, pyrrhotite and a great deal of quartz, and smaller amounts of lollingite, sphalerite, cobaltite, arsenopyrite and calcite. Quartz continued to come in and is seen flowing around former light colored crystals of quartz that came in with the arsenopyrite. Also it has rounded grains of chalcopyrite, pyrrhotite and sphalerite deposited in fractures and isolated them in late quartz. All this quartz appears to carry in it small patches of calcite. That in the hexagonal crystals could have come in with the first quartz; been taken into the hexagonal crystals from the lime sediments, or have worked in during the last deposition when the main sulphides came. One of the first two seem most likely. The late quartz also carried small specks of sulphides which have some gold with them when found in large numbers. Gold was also found associated with the pyrrhotite, calcite, and chalcopyrite. The secondary solutions have altered much of the pyrite to marcasite leaving in some cases only a rim of pyrite in contact with the surrounding quartz.

Section #3 shows an intimate mixture of arsenopyrite and pyrrhotite where the latter has replaced about 60% of the former, especially along fractures.

Megoscopically the ore consists of three main types, veined arsenopyrite, a green silicate with coarse arsenopyrite crystals and a dark green silicate impregnated with very fine particles of sulphides.

Paragenesis



MINERALS.

Gold (Au.) This mineral for which the ore is mined appears mainly as very fine blebs in second generation quartz. A few very coarse crystals were observed, two with the quartz and one associated with the sulphides. The general



run of gold, of less than 1.5 microns, occurs in localised area with other numerous specks of very finely divided sulphides such as chalcopyrite, in the quartz; the main part of the quartz tending to be barren. Considerable very fine gold must occur in the arsenopyrite as shown by assays, but this type was not observed by the author working under such coarse magnification.

Arsenopyrite. (Fe As S) is the most abundant sulphide. It occurs mainly pure with no inclusion of other sulphides and has numerous fractures in it which are filled mainly with quartz. A small amount of arsenopyrite appears to have come in with the late sulphide as shown in plate #1 and other places in section #2. Another reason for this statement is that it is found in the veins in the calcite in section #3. Here it has been with the sphalerite, pyrrhotite and chalcopyrite, when they veined the original rock and were later individually isolated and rounded by an influx of late calcite. This section is also thought to indicate replacement of arsenopyrite by pyrrhotite.

Chalcopyrite. (Cu Fe S<sub>2</sub>) This mineral is third in abundance after pyrrhotite with which it came in. In practically all places pyrrhotite is found close to it. It is also found as small isolated crystals in the late quartz and as minute exsolution particles in some of the sphalerite. Magnification was not sufficient to verify the possibility that it might occur in all of the sphalerite.

Pyrrhotite. ( $\text{Fe}_x \text{S}_{x-1}$ ) ( $x = 5$  to  $16$ ) It occurs as irregular grains filling fractures in early quartz, replacing arsenopyrite and associated with later quartz and sulphides. It has much the same deposition characteristics as the chalcopyrite.

Cobaltite. ( $\text{Co As}_2$ ) Occurs as rectangular shaped crystals always in contact with, or very close to pyrrhotite. It is not very abundant but fairly easily recognised by a faint pinkish tinge to separate <sup>it</sup> from arsenopyrite.

Sphalerite ( $\text{Zn S}$ ) is almost as scarce as cobaltite. It occurs contemporaneously with chalcopyrite and pyrrhotite with which it is closely associated. It contains very minute inclusions of exsolved chalcopyrite, scarcely visible under the highest magnification used, without the use of oil immersion.

Lollingite ( $\text{Fe As}_2$ , possibly carrying cobaltite) was identified by its close resemblance to arsenopyrite and differentiated from it by a reaction with  $\text{Fe Cl}_3$ . It is contemporaneous with the chalcopyrite, pyrrhotite, etc.

Marcasite ( $\text{Fe S}_2$ ) is readily differentiated by etching apparent pyrite crystals for a short time with nitric acid. It darkens more than the pyrite. Its presence is due to the effect of the second hydrothermal solutions, altering the pyrite to marcasite.

Calcite. ( $\text{Ca C O}_3$ ) This mineral is not as abundant as the effervescence of a specimen treated with nitric acid

would at first indicate. Mainly it has come in with the second generation quartz and some of it even later, as the final mineral to deposit, apparently replacing quartz that bordered veins. (see section #3). The age of that included in the primary quartz is doubtful and may be contemporaneous or introduced at a later phase.

Quartz. ( $\text{SiO}_2$ ) The primary sediments, including all silicates are listed as quartz in the paragenesis since no exact differentiation could be made between them in the polished sections. The sediments were fissured by intrusion and quartz, arsenopyrite and pyrite came in. Further metamorphism occurred with a second intrusion and all of the rocks were impregnated with solutions. Part of this first quartz was dissolved by the hydrothermal solutions and around the old quartz grains, both original and hexagonal, was deposited a dark variety of second generation quartz containing small inclusions of sulphides, Both these quartzes appear to have a small amount of calcite in them as did the original sediment.

The original silicates and the hexagonal crystals of quartz brought in with the arsenopyrite is all listed as first generation quartz in the plates, though in reality there are probably three ages represented.

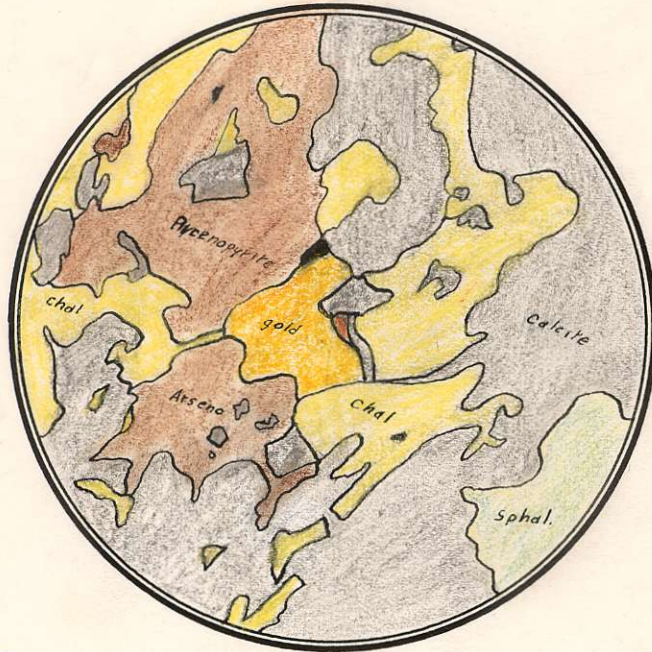
#### CONCLUSIONS.

From arsenopyrite analysis on the tailings, considerable of the gold is seen to occur with this mineral though it was

not observed microscopically, possibly due to the low magnification. A great deal however occurs in the second generation quartz which carried numerous sulphides and which has permeated the sediments almost throughout. The coarse gold, what there is of it, occurs in this association. The solutions appear to have been at quite high temperature, high mesothermal, judging from the complete permeation of the rocks and from the high temperature silicates such as garnet and epidote that are reported to be found. These minerals also indicate a high degree of metamorphism but thin sections of the silicates were not examined to verify this.

Fine grinding, floatation and cyanidation of the quartz tail would suggest itself for the recovery of the gold values. No great amount of mica was noticed which would cause difficulty in floatation.

PLATE #1.



Section #2.

Magnification : x285

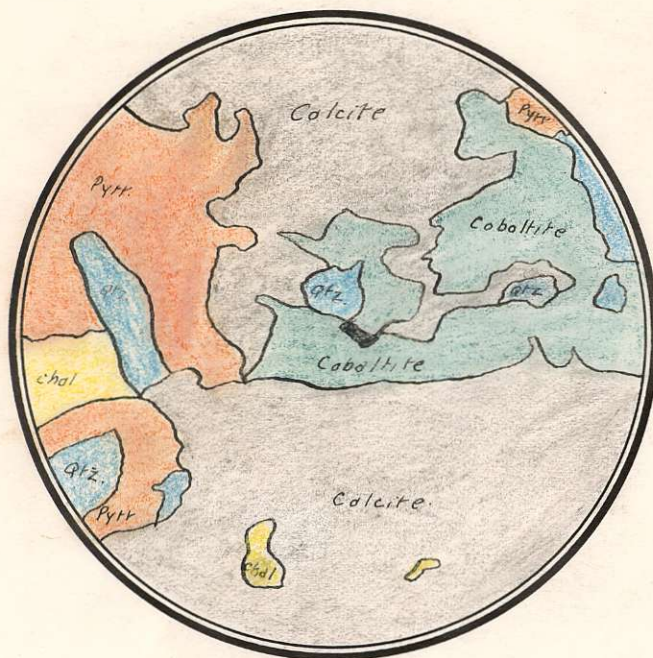
Legend:

Gold:  Arsenopyrite:  Chalcopyrite:   
Sphalerite:  Calcite:

Description:

This section represents the largest occurrence of gold found measuring 70 microns. It appears to be contemporaneous with the sphalerite and chalcopyrite. The arsenopyrite is also apparently of the same age and has come in with the other minerals, with the calcite.

PLATE #2.



Section #1.

Magnification  $\times 285$

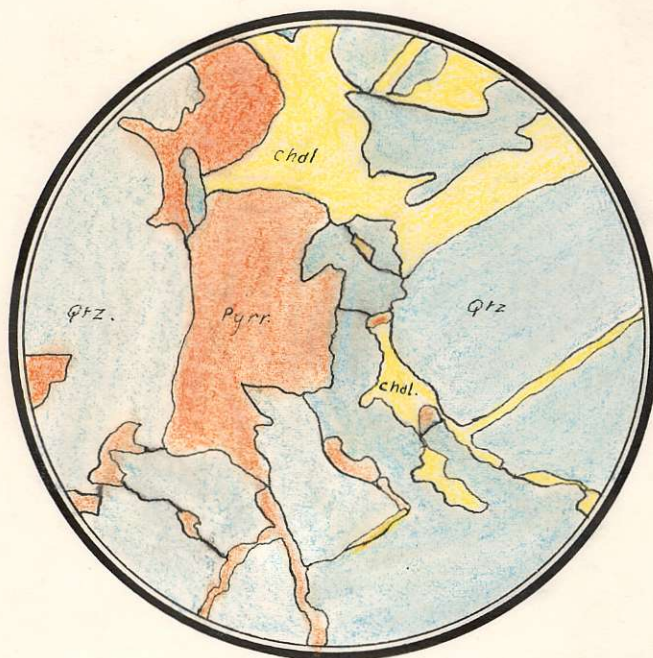
Legend:

Cobaltite:  Pyrrhotite:  Chalcocite:   
Calcite:  Quartz:

Description:

This section shows the association of the cobaltite ( $\text{Co As}_2$ ). It appears in contact with pyrrhotite which is contemporaneous with the sphalerite. There are also shown here some of the old quartz remnants, the main part of the section being occupied by late or contemporaneous calcite.

PLATE #3.



Section #1

Magnification . x 285

Legend:

Pyrrhotite:

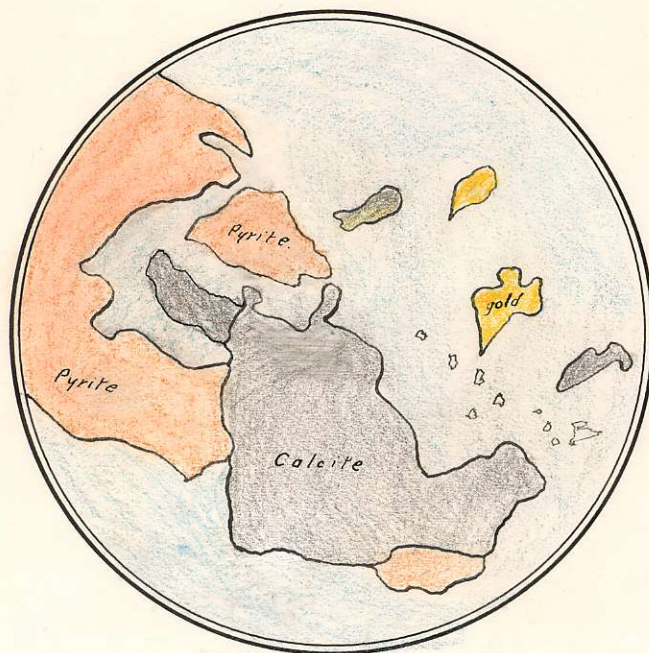
Chalcopyrite:

Quartz:

Discussion:

This section was drawn to show the route by which the contemporaneous chalcopyrite and pyrrhotite have come in along the fractured quartz and possibly other silicates. There are no isolated crystals of any sulphides in the quartz without fracture access and hence the quartz must be primary or belong to the original sediments intruded and invaded by hydrothermal solutions. Cobaltite is found very close to this position and also second generation quartz.

PLATE #4.



Section #6.

Magnification : x285

Legend:

Gold:  Pyrite:  Calcite:  Quartz:

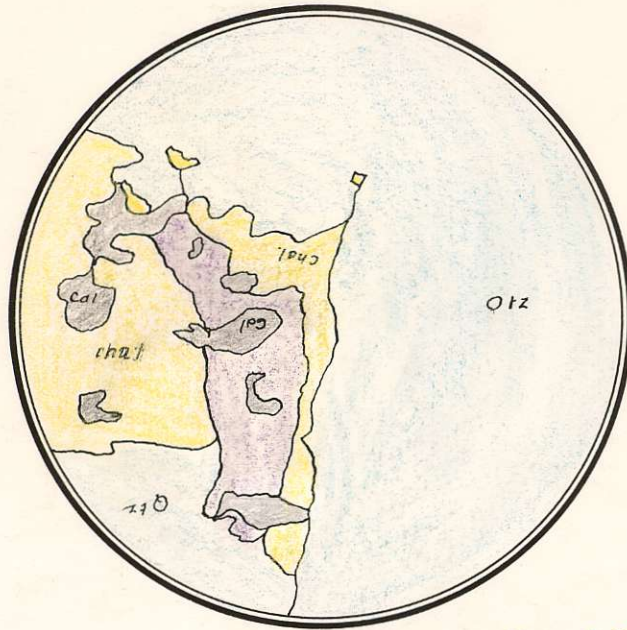
Description:

This plate shows primarily the contemporaneous association of gold with quartz. The pyrite is believed to have come in with the first arsenopyrite generation and the calcite either with the quartz or overlapping it to slightly later.

*Gold measures 35 and 20 microns.*



PLATE #5.



Section #2.

Magnification = x285

Legend:

Lollingite:       Chalcopyrite:       Calcite:   
Quartz:

Description:

Lollingite appears here to be the same age as the chalcopyrite. It has come in with the calcite later than the quartz deposition. In very few of the sections is there any evidence of replacement.

HEDLEY MASCOT GOLD MINE.

INDEX.

	Page.
Introduction .....	1
Procedure .....	1
Theory .....	2
Discussion of Operations	
Screening and Infra-sizing .	3
Panning .....	4
Tables	
#1. ....	6
#2. ....	6
#3. ....	7
#4 ....	8
#5. ....	8
Conclusions .....	9

HEDLEY MASCOT.

INTRODUCTION.

The object of the study of Hedley tailings was undertaken to determine whether a higher recovery of gold might be obtained by a change in the present mill flow-sheet. To do this it was necessary to discover where the main part of the gold in the tails is to be found. It might occur in one of three places: with the arsenopyrite, with the pyrrhotite or with the quartz gangue.

Procedure.

2280 grams of mill tailings were dried and screened into five sizes +65, +100, +150, +200 and -200 mesh, in mechanical screens allowing 45 minutes per 120 grams. The -200 mesh product was further sized into seven products by the use of an infra-sizer in 200 gram lots, allowing each lot 2 hours to separate.

These products were sized by examination under a microscope with an ultro-pak attachment.

All products were then sub-divided into two, three or four products on a super-panner.

The weights of all the products of each operation were weighed and the weight and percentage losses for each operation calculated and tabulated in table #1.

Asseys were made of the head sample and of all the products of each separation as a control and check on quantity and value, and to determine where the gold was to

be found. The results of these assays are laid down in the tables #2 and 3.

A microscopic study was made of the products and, by counting particles, an estimate of the sulphide percentage was made. For the pyrrhotite concentrate this was very difficult as the small magnetic particles tended to bunch together and a uniform distribution for counting could not be obtained.

### THEORY

There are two methods of approach to the problem. The first is to separate a concentrate of pure arsenopyrite; with as little as possible gangue and pyrrhotite; a large middlings with the remainder of the arsenopyrite and pyrrhotite; and a small tailings of pure gangue with no sulphides. By this method, it can be determined if the concentrate of arsenopyrite carries the main part of the gold. If a gold free tails is recovered, it indicates that there is no gold in the quartz gangue, thus the remainder must be in the pyrrhotite and the arsenopyrite of the middlings.

The second approach, which is thought to be better, is to separate a concentrate of pure arsenopyrite first, then remove from the sides or by a secondary panning at the end of the panning of each product, a pure concentrate of some of the pyrrhotite which should contain no arsenopyrite. A small middlings was also removed which, it was hoped, would contain the remainder of the arsenopyrite not in the con-

centrate. The large tails will contain the gangue and the pyrrhotite not recovered previously. If the gold is in the arsenopyrite, most of the values will be in the concentrate and a smaller amount in the middlings. If it is in the pyrrhotite, an assay of the pure pyrrhotite will show this and the main volume of gold will be found here and in the tailings, with a small amount in the middlings. If it is in neither the arsenopyrite nor the pyrrhotite, then it must be in the gangue.

One of the main reasons for using this method was that it was found almost impossible to get even a small tails without the inclusion of some of the pyrrhotite, which tends to float as a flocculent precipitate on the top of the tails and along its flanks in the pan.

#### DISCUSSION OF OPERATIONS.

Screening and infra-sizing. The screening loss was very low at 0.28%. The #65 product was so small that it was neglected throughout the remainder of the operation. A very fine powder adhered to the screened products but was not discovered until panning was attempted, or it might have been loosened by rubbing the screened products on the screens or between the hands. Though the tailings were dried for 24 hours before screening was started, and the product not actually being screened was kept warm, there was still a tendency for it to remain in balls on the coarse screen. These were broken up and screened through with the following

run.

The infra-sizing loss was 0.45% of the total 1830 grams put through. So that this loss would not cause an error, the percentages of the infra-sized product were calculated proportionally to add up to the percentage of the -200 product sized which was 80.50% , rather than adding the total sized products - both screened and infra-sized - and making them a proportional percent of that.

A variation from the former sizing of products may result in the second infra-size product due to a dint in the column causing a reduction in cross sectional area and thus increasing the velocity of air through the column, resulting in a coarser average product in this column and thus coarser average product in the next. Whether this would affect the uniformity of the products is not known, but since a series of dints would, it is likely that a single one would also affect the uniformity of the product sized somewhat.

Panning. In panning the screened products (100, 150 and 200 mesh ) considerable very fine powder remained sticking to the particles of this coarser mesh, as previously explained. As a result, these products had to be washed three or four times to remove this fine product in suspension before panning could be effected. Even then considerable of the fine product remained as a bed in the bottom, on which the very small amount of arsenopyrite collected, and some of this clay-like material was included with the small middlings removed. No concentrate of arsenopyrite could be taken from these

products as there were only a few small coarse grains. Three or four small turnings of brass were found in the #150 mesh and came off with the middlings.

In the panning of the infra-sized products, the first gangue taken off consists of a small amount of apparently dark iron amphibole. Pyrrhotite is seen collecting along the sides of the product in the pan as two black lines and it appeared impossible to get even a small clean tailings without some pyrrhotite. Some fairly pure pyrrhotite could be collected by drawing this from the edges and this was done in the finer products. A concentrate of fairly pure arsenopyrite was drawn off and a small middlings which would include, it was hoped, the remainder of the arsenopyrite with, no doubt, some pyrrhotite, as indicated by the rusty color of the product when dried. Thus if all of the arsenopyrite was taken off it can be told if the main part of the gold was in it, and by an assay of the pyrrhotite whether it carried any outstanding amount of gold.

Practically no arsenopyrite was visible in the -12 product tip and it was difficult to recover a high percentage of pyrrhotite; however an attempt was made. A coarse green product came off at the head of the sample in the pan which contained considerable pyrrhotite, then a fairly concentrated pyrrhotite and then a tails flanked with pyrrhotite which had to be drawn from the sides to be recovered. Any very fine pyrrhotite was floated off with the suspended gangue.

A middlings of this fine product should possibly have been made but since the product was not uniform in size only the coarser grains would be collected so no great amount of information could be obtained from this separation.

#### TABLES

#1. This is mainly self-explanatory. It shows the percentage of each sized product in the original tailings. Also it shows the percentage division of each product into concentrate of arsenopyrite, middlings, tails and pyrrhotite. This pyrrhotite percentage is only a small percentage of the total pyrrhotite, which is contained also in the middlings and tails, the separation only being made for assay purposes. The percentage losses of each operation are shown along with the total percentage panning loss.

#2. Here is shown the distribution of gold in the sized products. In three head samples the average was 0.030 mg. per assay ton. The error in result calculated from the sum of the sized products is -8.7%, which it is believed, is in the opposite direction to which the usual error is found. The values decrease quite uniformly from that of the coarsest product to that of the second finest. The -10 micron size shows a jump up in value probably due to the fact that it is not of uniform size and will therefore more closely resemble the head sample in value. The parallelism of this trend of values is borne out in the



general trend of the tailings assays which represent the bulk of the gold in the samples panned. The high value of the +70 micron sample is most likely due to salting by a stray piece of gold in the sample taken.

#3. Here is shown the assay of each panned product, the percentage of the total product of each small division and, by addition of these percentages in each group, the percentage of the total product in concentrates, pyrrhotite, middlings and tailings. From these results it is found that over 95% of the products were taken off as tailings, almost 4% as middlings and just over 1% as sulphides.

No reason can be given for the lack of gold in the -25 and -17 micron concentrates, unless it was the exceedingly low assay of the sized head sample panned, which contained little more than a trace. The arseopyrite apparently assays on the whole from three to over twenty-five times higher than the head sample, thus indicating a considerably higher concentration of gold than the gangue. The higher figure is likely closer to the true value as it is substantiated by three high values. The pyrrhotite has a fairly uniform value of from two to three times the gold contained by the sized samples.

The middlings has high values in the two coarsest products with the remainder containing less gold than the head sample. This product consisted mainly of gangue and

pyrrhotite with a very small percentage of arsenopyrite. The 100 mesh screen product appears to have been salted as such a high value is unlikely.

The tailings has values higher than the sized head sample in three cases - 200 mesh, +70 and +35 micron sizes. The +200 error is not great but the plus 70 is too high an assay and should be cut down. The error in the plus 35 is not large but, due to the low assay value as a whole, is the source of quite an error.

#4. By means of this table it is possible to locate all of the main errors and thus trace them back; for instance the plus 150 value is too high by 33.9%. By going back we find the high assay value of middlings which should be cut down as previously mentioned. The over percentages of gold in the next two products and the 35, are also due to high assays - this time of tailings. The negative percentage in the -17 size is due to the low assay of the tails. By adjusting these values mentioned, the percentage error of the result would be greatly diminished, and further by averaging the assay values on either side of these products, the adjusted value would approximately correspond.

#5. Here are shown the percentage sulphides. The sulphide in the concentrate was almost pure arsenopyrite. In the middlings only a few particles of arsenopyrite were noticed and these were mainly in the coarsest products,

the remainder of the sulphide being pyrrhotite. The pyrrhotite concentrate contained no arsenopyrite.

By comparing the first four concentrate percentages, with their corresponding assays, it is seen why the first concentrate removed had such a low assay, with only 2.5% arsenopyrite in it. The others had quite a uniform assay paralleling the higher grade of sulphide content in the concentrate. The percentage of pyrrhotite apparently did not affect the value of the assays of this part <sup>(the pyrrhotite concentrate)</sup> of the product, very much.

#### CONCLUSIONS.

From these results it is seen that on the average the arsenopyrite recovered by panning contains twenty-five times, and the pyrrhotite about three times, as much gold as the general gangue. Due to the small percentage of arsenopyrite however (0.152%) only a small portion of the gold could be recovered by floating this off. Pure arsenopyrite would run 3.43 ounces per ton (see note on table #5) and would be worth recovering if the floatation expense were not too great and a fairly pure product could be obtained. The main part of the gold still remains in the gangue however and is thought to occur with it. The maximum percentage of pyrrhotite would be about 1.5%, but it carries only very little gold. Due to the small amounts assayed this value cannot be relied upon and here further research is necessary.

Table # 1

Distribution of Products when Sized and Panned

Size of Products Mesh (Microns)	Wt of Product.	% of Total Pdt.	Amt of product Panned.	Concentrate		Middlings.		% loss in Panning.	Tails.	
				Weight	%	gms. weight	%		gms. Weight	%
+65	0.6					0.49	2.31	13.8	20.71	97.69
+100	24.6	1.08	24.6			3.18	3.67	1.4	83.5	96.33
+150	100.1	4.42	85.5			16.05	5.78	4.5	262.8	94.22
+200	318.4	14.00	291.0							
Microns										
+70	228.2	10.06	199.0	0.315	0.16	8.68	4.53	3.8	182.4	95.31
-70	287.3	12.72	258.1	0.508	0.20	8.395	3.25	0.1	249.5	96.55
-45	261.9	11.60	232.7	0.560	0.24	14.23	6.21	1.2	215.1	93.55
-35	229.2	10.14	200.0	0.570	0.29	8.51	4.40	3.2	178.6	92.23
-25	200.0	8.85	171.8	0.613	0.38	5.53	3.44	6.3	151.0	93.87
-17	183.8	8.13	154.6	0.250	0.18	6.63	4.85	9.5	130.8	94.11
-10	431.3	19.00	147.7					12.2	127.7	98.56
		100.0	1765.8	2.816		71.695			1603.11	

Loss in screening =  $\frac{6.3}{2280} = 0.28\%$

" " Infra - sizing =  $\frac{8.3}{1830} = 0.45\%$

Total " " Panning =  $\frac{78.4}{1765.8} = 4.44\%$

Table # 2

Gold in Sized Product.

Table # 1 {Continued}

Size of Products in Mesh & Microns	Wt of Sample Assayed.	Gold in mg weighed	Gold per Assay Ton.	% of Total Product (Table #1)	% x gold Per AT.	Pyrrhotite gms Wt	%	Total Wt in gms Recovered	Wt in gms Loss in Panning
+65									
+100	0.47		0.05	1.08	0.054			21.20	3.4
+150	0.5 AT	0.02	0.04	4.42	0.177			86.68	1.3
+200	1 AT		0.03	14.00	0.420			178.85	13.0
Microns									
+70	"		0.04	10.06	0.405			191.395	7.6
-70	"		0.04	12.72	0.510			258.403	0.3
-45	"		0.03	11.60	0.348			229.890	2.8
-35	"		0.015	10.14	0.153	5.97	3.08	193.65	6.3
-25	"		0.015	8.85	0.133	3.71	2.31	160.853	10.9
-17	"		0.010	8.13	0.081	1.175	0.86	139.855	14.7
-10	"		0.025	19.00	0.456	1.860	1.44	129.56	18.1
					2.737	12.715		1690.336	78.4

Table #3  
Panned Products.  
Gold Distribution.

Size of Products Mesh & Microns	Wt of Product Asseyed.	Concentrate				Middlings				
		Gold per Assey in mg.	Gold per Assey ton	% of Total pdt.	% Times gold/AT.	Wt of Product Asseyed.	Gold in mg.	Gold per A.T.	% of Total Pdt.	% Times gold/AT.
Mosh.										
+ 65										
+ 100						0.49	0.003	0.1785	0.025	0.0045
+ 150						3.18	0.045	0.4120	0.162	0.0668
+ 200						16.05	0.010	0.0182	0.809	0.0147
Microns										
+70	0.315	0.001	0.092	0.016	0.0015	8.68	0.00	0.00	0.460	.
-70	0.508	0.010	0.575	0.025	0.0144	8.395	0.00	0.00	0.414	.
-45	0.560	0.010	0.521	0.028	0.0146	14.23	.005	0.01025	0.720	0.0074
-35	0.570	0.015	0.768	0.029	0.0225	8.51	.001	.0034	0.447	0.0015
-25	0.613	0.00	0.00	0.039		5.53	.004	.0220	0.304	0.0069
-17	0.250	0.00	0.00	0.015		6.63	.005	.02195	0.395	0.0087
-10										
				0.152	0.0530				3.736	0.1105

Size of Products in Mesh & Microns	Wt of Product Asseyed.	Tailings				Pyrrhotite				
		Gold in Assey	Gold per AT.	% of Total pdt.	% Times gold/AT.	Wt of Product Asseyed.	Gold in mg in Assey	Gold Per A.T.	% of Total Pdt	% Times Gold/AT.
Mosh.										
+ 65	26									
+ 100	20.71	0.030	0.0425	1.055	0.0448					
+ 150	1 AT		0.040	4.258	0.1703					
+ 200	"		0.045	13.191	0.5940					
Microns										
+70	"		0.060	9.584	0.5734					
-70	"		0.040	12.281	0.4912					
-45	"		0.030	10.852	0.3256					
-35	"		0.020	9.351	0.1870	5.97	0.020	0.0976	0.313	0.0305
-25	"		0.015	8.303	0.1245	3.710	0.010	0.0786	0.209	0.0610
-17	"		0.003	7.650	0.0229	1.175	0.003	0.0745	0.070	0.0052
-10	"		0.020	18.726	0.3745	1.86	0.005	0.0782	0.274	0.0215
				95.251	2.9082				0.861	0.0732.

Asseys of three head samples of unsized  
product each ran 0.03 mg/Assey Ton

Note - Trace Assays are <sup>also</sup> given as 0.00.

Table # 4.

## Gold Distribution + Errors.

Size of Products Mesh & Microns	% of Gold Present				Total AT % of Panning.	Assay Diff From sized Heads (AT%)	% diff.
	In Arseno	In Middlings	In Tails	In Pyrrhotite			
+100		0.143	1.43		0.0493	-0.0047	-8.8
+150		2.125	5.42		0.2371	+0.0601	+33.9
+200 microns		0.470	18.92		0.6087	+0.1887	+31.2
+70	0.048		18.22		0.5749	+0.1699	+29.5
-70	0.455		15.60		0.5056	-0.0044	-0.9
-45	0.464	0.236	10.38		0.3476	-0.0004	-0.0
-35	0.713	0.048	5.95	1.47	0.2415	+0.0885	+57.7
-25		0.220	3.96	0.77	0.1474	+0.0144	+10.8
-17		0.278	0.73	0.25	0.0368	-0.0442	-54.4
-10			11.85	1.03	0.3960	-0.0690	-13.1
	1.68	3.52	92.46	3.52	3.1449		

Table # 5

Sulphide content  
by Microscopic Count.

Size of Products Mesh & Microns	Sulphide %			
	Arseno.	Pyrrhotite	Middlings	Tails.
+100				>1%
+150				>1%
+200 microns			2.0	>1%
+70	2.5%		2.5	>1%
-70	15.0%		2.5	>1%
-45	18.		3.0	>1%
-35	22.	5	1.0	>1%
-25	11.	10	1.4	>1%
-17	26.	50	2.1	>1%
-10		50		>1%

## Gold Totals

$$\% \text{ Error of sized products} = \frac{-0.263}{3.000} \times 100 = -8.7\%$$

$$\% \text{ " " Panned " " } = \frac{-0.1449}{3.0000} \times 100 = +4.8\%$$

Note Pure arsenopyrite would run by averaging -70, -45, -35 Products. (since  $\frac{.575 + .521 + .768}{3} = .631 \text{ mg/AT}$  is  $\frac{15 + 18 + 22}{3} = 18.4\%$  pure)  
 $= \frac{.631 \times 100}{18.4} = 3.43 \text{ mg/AT}$