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REPORT ON THE MICRO-CHEMICAL  
DETERMINATION OF MINERALS IN THE  
HEDLEY MASCOT ORE DEPOSIT

by

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Metallurgy '39

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REPORT ON THE MICRO-CHEMICAL DETERMINATION  
OF MINERALS IN THE HEDLEY MASCOT ORE DEPOSIT

Introduction:

The following microscopic determination of the minerals in the Hedley Mascot ore deposit was carried out by the author in Geology 9 laboratories at the University of British Columbia. All specimens used in the determination were generously donated by Dr. V. Dolmage.

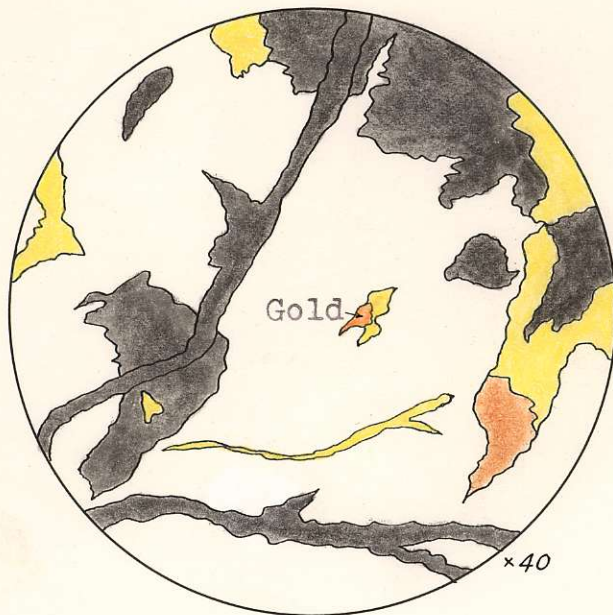
Acknowledgments:

The author wishes to express his sincere appreciation to Dr. H. V. Warren under whose guidance the work was carried out.

Much valuable assistance was rendered to the author by the Geology 9 instructors, Messrs. W. H. White and E. P. Davis.

The author also wishes to extend his gratitude to Mr. J. Donovan, a member of the University Fire Department, who sacrificed his "off duty" time while making and super-polishing all of the bakelite-mounted sections used by the author in the Hedley Mascot ore determination.

SECTION OF DIAMOND-DRILL CORE #53  
69



- Gold
- Arsenopyrite
- Chalcopyrite
- Pyrrhotite
- Calcite





Approximate gold content of  
the section

11.45 oz/ton

SECTION OF DIAMOND-DRILL CORE

#53  
69



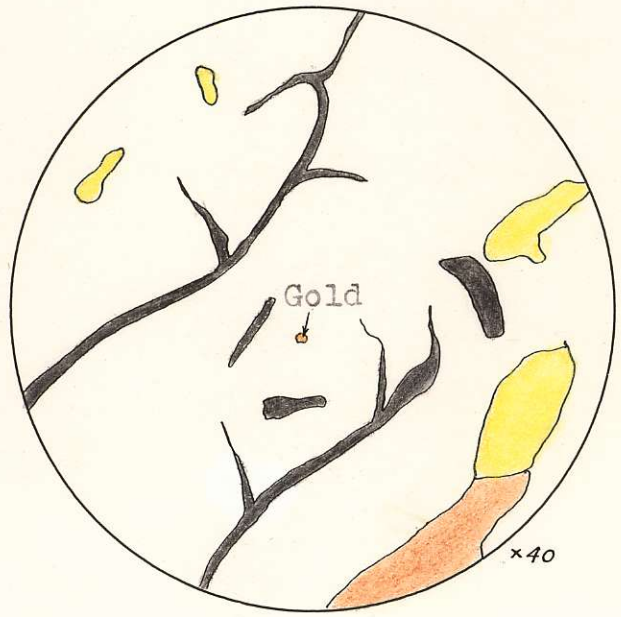
- Gold 
- Arsenopyrite 
- Pyrite 
- Calcite 






Approximate gold content  
of the section

11.45 oz/ton

SECTION OF DIAMOND-DRILL CORE

#53  
69



- Gold 
- Arsenopyrite 
- Chalcopyrite 
- Pyrrhotite 
- Calcite 

Approximate gold content  
of the section

11.45 oz/ton

SECTION OF DIAMOND-DRILL CORE

#53  
69



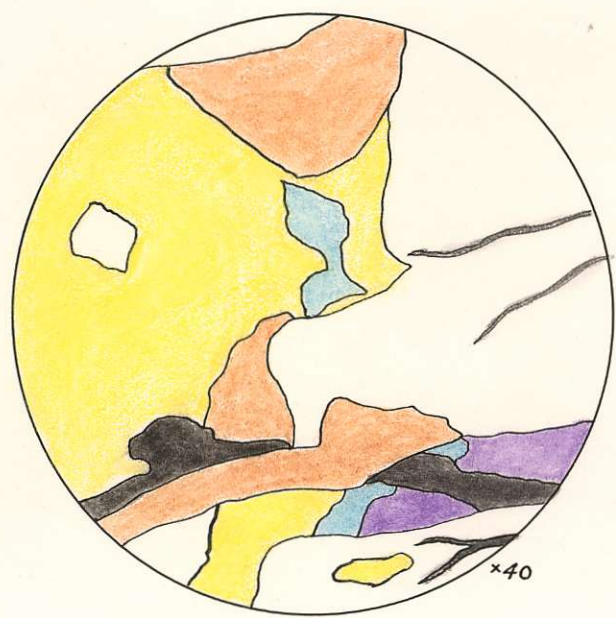
- Arsenopyrite
- Pyrite
- Chalcopyrite
- Calcite

Approximate gold content  
of the section

11.45 oz/ton

SECTION OF DIAMOND-DRILL CORE

#53  
69



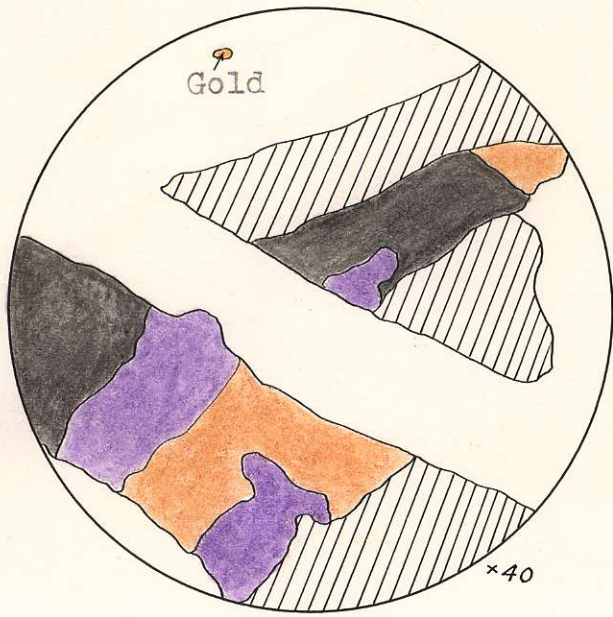
- Arsenopyrite
- Chalcopyrite
- Pyrrhotite
- Sphalerite
- Quartz
- Calcite

Approximate gold content  
of the section 11.45 oz/ton



SECTION OF DIAMOND-DRILL CORE

# 8  
72



- Gold
- Arsenopyrite
- Pyrrhotite
- Lollingite(?)
- Quartz
- Calcite

Approximate gold content  
of the section 4 oz/ton

SECTION OF DIAMOND-DRILL CORE

#145  
71



Gold



Arsenopyrite



Quartz



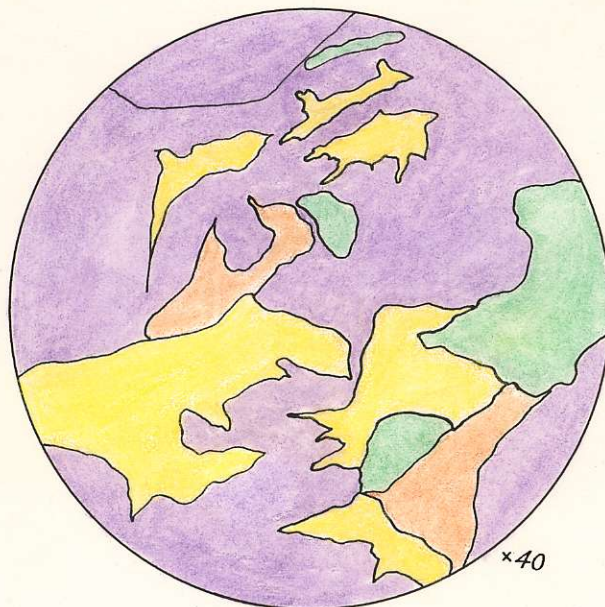
Calcite



Approximate gold content  
of the section

2.96 oz/ton

SECTION OF SAMPLE "TYPICAL 3a"

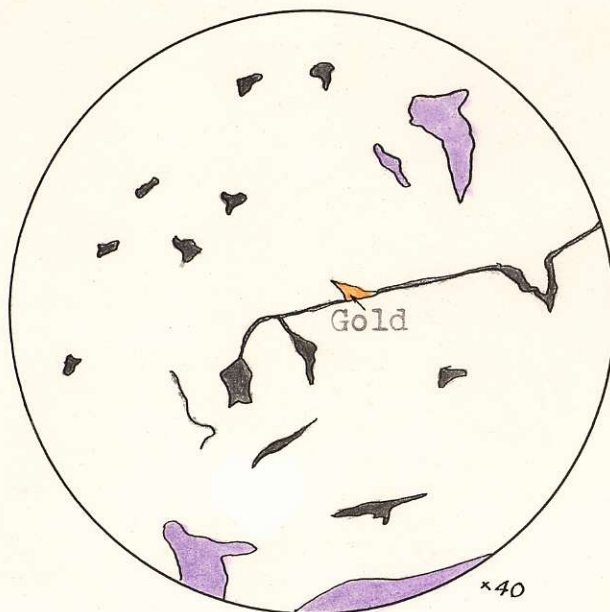


- Chalcopyrite
- Pyrrhotite
- Quartz
- Epidote(?)

Approximate gold content  
of the section 1.40 oz/ton

SECTION OF DIAMOND-DRILL CORE

#152  
71



- Gold
- Arsenopyrite
- Quartz
- Calcite

Approximate gold content  
of the section

1.00 oz/ton

SECTION OF DIAMOND-DRILL CORE#152  
71

Arsenopyrite



Lollingite (?)



Quartz



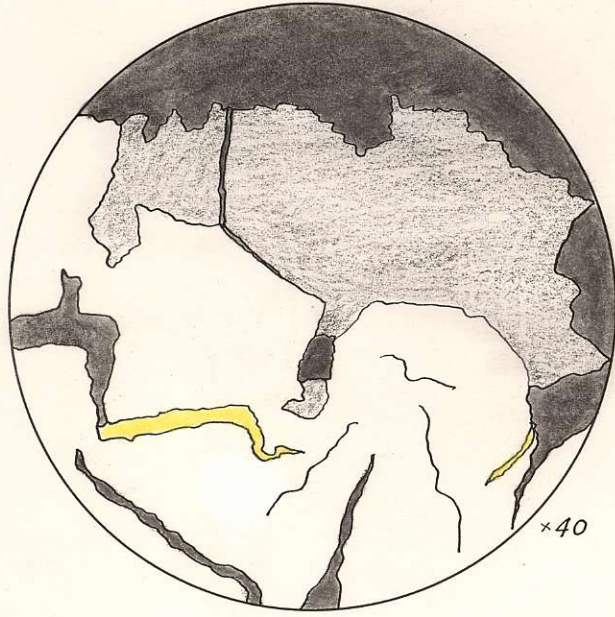
Calcite





Approximate gold content  
of the section

1.00 oz/ton

752 SECTION OF DIAMOND-DRILL CORE

# 152  
71



- Arsenopyrite 
- "Unknown" 
- Chalcopyrite 
- Calcite 

Approximate gold content  
of this section

1.00 oz/ton

Minerals found in the Specimens:

The following minerals were found in the sections;  
in the order of their apparent abundance they are:

<u>Mineral</u>	<u>Color under microscope</u>
Arsenopyrite, FeAsS	Galena-white
Pyrite, FeS <sub>2</sub>	Very light yellow
Pyrrhotite, FeS	Light pinkish-brown
Chalcopyrite, CuFeS <sub>2</sub>	Yellow
Lollingite (?), FeAs <sub>2</sub>	Galena-white
Sphalerite, ZnS	Dull bluish-gray
"Unknown"	Sooty gray
Native gold, Au	Light yellow
<u>Gangue</u>	
Quartz SiO <sub>2</sub>	Gray
Calcite, CaCO <sub>3</sub>	Dark gray to black
Epidote(?) HCa <sub>2</sub> (Al,Fe) <sub>3</sub> Si <sub>3</sub> O <sub>13</sub>	Dark gray.

Mode of Occurrence:Arsenopyrite:

Occurs predominantly as coarsely crystalline and granular mass crossed by irregular fractures containing pyrrhotite, chalcopyrite and calcite. No evidence of arsenopyrite veining or replacing any other mineral was found in the available sections.

Pyrite:

Found mostly as irregular rounded masses associated with arsenopyrite, in several cases pyrite was veining the latter mineral. In one of the sections a fracture in pyrite was filled by chalcopyrite.

Pyrrhotite:

Occurs mainly in arsenopyrite and rarely in quartz as irregular grains; also as narrow veinlets in

the arsenopyrite. Frequent association of pyrrhotite with chalcopyrite was noted in all sections, the boundaries between the two minerals show no indications of either mineral veining or replacing the other.

Chalcopyrite:

Occurs much in the same manner as pyrrhotite although not as abundantly. Several cases of gold association with chalcopyrite were found.

Lollingite (?):

Occurs as rounded areas within arsenopyrite. Appears to possess a smoother surface than the surrounding arsenopyrite. Color of lollingite (?) seems to be a shade lighter than that of arsenopyrite.

Sphalerite:

Found as small "islands" both in chalcopyrite and pyrrhotite.

"Unknown" Mineral:

Found as irregular areas along the contact zone of arsenopyrite and calcite. No indications of the "unknown" mineral veining arsenopyrite were found.

Gold:

Occurs mostly within arsenopyrite as fine grains throughout the mineral. Detected in this form only after etching with 1:1 HNO<sub>3</sub>, in every case application of HNO<sub>3</sub> produced a dark ring around the gold. After the last prolonged super-polishing the 11.45 oz Au/ton section revealed several large grains of gold associated with



chalcopyrite in arsenopyrite, no etching with  $\text{HNO}_3$  was necessary.

Several grains of gold were found in quartz. One large grain of gold was found in calcite filling a fracture in arsenopyrite.

Gangue Minerals:

Quartz:

Found in coarsely crystalline areas. Numerous crystals of hexagonal system were found in the main mass suggesting a subsequent recrystallization of quartz of quartz within itself. This probably took place during a later-mineral deposition. Several perfect square crystals, however, were also found suggesting the possibility of a second generation quartz replacing some mineral belonging to the cubic crystal system. In one or two instances, quartz filled what appeared to be a fracture in arsenopyrite.

Calcite:

Occurs as irregular masses throughout the ore, also as numerous veinlets cutting all other minerals.

Paragenesis:

Bases on the above observations the following possible paragenesis of the Hedley Mascot Mineral deposit is offered.

Arsenopyrite filling a large fracture within a body <sup>of</sup> silicates. Quartz and other silicates (epidote, etc.) later filling fractures in the arsenopyrite. Lollingite(?), pyrite and the "unknown" mineral probably carried in

during the later stages of the arsenopyrite deposition.

Subsequent introduction of pyrrhotite and chalcopyrite, sphalerite probably deposited along with the two minerals. Calcite filling in the later fractures in the mixed mineral body of the above sulphides, as well as quartz.

Tests Used in Determining the Minerals:

Gold:

Very sectile, a cleaner yellow color as compared to chalcopyrite's greenish yellow. Stained quickly by KCN.

Arsenopyrite:

Hardness about 6, galena-white color, negative to all reagents except a slight tarnish with 1:1 HNO<sub>3</sub>.

Pyrite:

Hardness about 6, light yellow slightly grayish color, negative to all tests.

Pyrrhotite:

Hardness about 3, light pinkish-brown color, tarnished darker brown by KOH with eridescence.

Chalcopyrite:

Yellow-greenish color, hardness about 3, negative to all reagents (very slight tarnish with KCN - not always)

Lollingite (?):

Hardness about the same as arsenopyrite. Tarnished with 1:1 HNO<sub>3</sub>, FeCl<sub>3</sub> produced slight brown stain,

AR + CoAsS produces brown stain. FeAsS + AR produces violent reaction. Same reactions were produced on a specimen-lollingite section.

Sphalerite:

Hardness about 3, internal reflection, dull bluish-gray color, negative to all reagents.

"Unknown" mineral:

Hardness about 6, sooty gray color, surface does not acquire polish, slight darkening with Ar + FeAsS

Quartz:

Hardness well above 6, gray color, negative to all tests.

Calcite:

Hardness about 2, effervescence with HNO<sub>3</sub> producing bluish stain.

