METALLOGRAPHY OF HAZELTON ORES.

BY

L. G. MATHEWS

FACULTY OF APPLIED SCIENCE

THE UNIVERSITY OF BRITISH COLUMBIA

APRIL, 1931.

TABLE OF CONTENTS.

METALLOGRAPHY OF HAZELTON ORES.

I. INTRODUCTION.

The district is known as the Hazelton sub-district of the Omineca mining division; it has an area of approximately 225 square miles, and is situated 130 miles northeast of Prince Rupert. Hazelton is in the northwest quadrant of the area.

The C.N.R. railway practically bisects the district in making a right angle bend around the Rocher Deboule Mountains, giving good shipping facilities from the various properties. The main trunk wagon roads of the Skeena and Bulkley valleys run through the district and, with branches to the different mining groups, furnish easy access to the railway.

II. GENERAL GEOLOGY.

The district lies immediately to the East of the Coast Range of mountains and is a continuation of the Interior Plateau of Southern British Columbia. There are isolated groups of hills and mountains of various altitudes, some of which are subdued in type, others are extremely rugged. These groups are separated by broad valleys in which erosion is actively carried on by tumultuous streams.

The main valleys have all been eroded in rocks

much softer than those which form the hills. The cores of the hills are igneous rocks in small stocks and these have metamorphosed and hardened the surrounding rocks forming resistant areas in a generally soft country. A striking contrast is offered between the broad valleys of the Skeena and Bulkley Rivers and the rugged topography of the Rocker Deboule Mountains. The topographic contrast is accentuated by valley glaciation, minor irregularities being filled with debris from tuncated spurs and ridges. The glaciers attained an elevation of over 5500 ft. and created, or accentuated, a subdued topography up to that altitude. Recent glaciation has produced a rugged and serrated topography above the main glaciation limits and many small and comparatively inactive glaciers are still in existance. This type of topography is well developed in the granodiorite of the Rocher Deboule group.

Finely stratified muds and sands have been redeposited as a result of the reworking of boulder clays by the rivers.

Glacial striae are found on the west side of Glen Mt. in three sets - one N 13°E, one N 21°E and an older set N 6°E overridden by the other two. On Ninemile Mt., towards the west side at 5000 ft. the striae are N 31°E, and the movement was apparently north to south. In most cases the hills are covered with vegetation, or were weathered so that no striae are visible.

The Bulkley and the Skeena are the main rivers

traversing the district, and both have numerous smaller tributaries reaching all parts of the area. All the streams, especially those from the Rocher Deboule group, have steep gradients and are potential sources of considerable water power. The Bulkley, flowing through several miles of canyon above Hazelton, is capable of furnishing power for the whole district.

The bedded rocks of the Hazelton district are all of the Hazelton series, described by Leach[1] from the Telkwa district and extending north into the Groundhog[2] area.

Interbedded flows and course tuffs or tuff-agglomerates extend across the southern part of the Rocher Deboule mountains. The series becomes more evenly bedded north of the central part of the group. Distinct banding of tuffaceous material occurs.

The exposed beds in the Bulkley River canyon contain fossils that seem to indicate the very top of the Jurassic or the lowest Kootenay rocks. An horizon on Ninemile Mt., near the northern edge of the sheet contains an abundance of marine fauna, mostly pelecypods. Dr. T. W. Stanton (U. S. Geol. Surv.) places the age of this series as "most probably upper Jurassic."

Folding in these rocks, as shown in the Bulkley canyon, took place with axes approximately north-east--south-west. Small stocks forming the cores of Ninemile, Fourmile,

1. Can. Geol. Survey, Sum.Rept., 1919, page 91.
2. " " " " " 1912, page 76.

and Rocher Deboule mountains were intruded after the folding. Dykes were also intruded traversing both the mountains and the valleys. No appreciable deflection of the bedding was caused by the intrusives.

III. ECONOMIC GEOLOGY: General Statement.

The Bulkley River divides the district into two parts. The Southern of Rocher Deboule area is characterized by deposits of chalcopyrite carrying some gold and silver. The Northern area includes Ninemile, Fourmile and Glen Mountains, and is characterized by silver-lead deposits.

The Rocher Deboule mine is the only large producer south of the Bulkley River, but development is being carried on at Delta, Hazelton View, Cap, and Golden Wonder properties. Milling facilities are required for economical mining of the low grade ore.

Chalcopyrite carrying small values in silver and gold is the principal mineral in all the above named properities except Hazelton View. This property contains practically no chalcopyrite and gold. The Black Prince property in the southern area shows important amounts of wolframite in a prospect.

The Silver Standard (Glen Mt.) and the American Boy (Ninemile Mt.) were large producers in the silver-lead group north of the Bulkley River. In both these properties the ore is in fissure veins in tuffaceous sediments, and neither property is near the contact of a large igneous

intrusive. The veins are characterized by galena, sphalerite, and tetrahedrite in siliceous gangue. The general silver values in the ore are high, the tetrahedrite carrying up to 2000 oz. in some places.

In 1929 the Mohawk (Fourmile Mt.) was producing silver-lead-zinc ore, and the Silver Cup (Ninemile Mt.) was producing silver-lead-gold values.

The ore in all of these properties occurs in distinct shoots. The high grade material is associated with so much low grade that milling is required. The Silver Standard ran a custom mill to treat ore from the American Boy in 1919, and The Silver Cup started milling operations in May, 1929.

The Mohawk and the Silver Cup are near the contacts of the ingenous stocks of Fourmile and Ninemile mountains, where the deposits are characterized by jamesonite in addition to the minerals described above. Strong veins, carrying good silver values can be traced considerable distance on Ninemile mountain.

IV. MINERALOGY.

Arsenopyrite:

Occurs in the sheared zones of Hazelton formation shales as shown in Fig.I. Also Fig.IV shows arsenopyrite in an "island" surrounded by tetrahedrite. This proves that tetrahedrite came in later than arsenopyrite.

Pyrite:

Massive pyrite has been shattered and partly replaced by quartz as shown in Fig.II. Also shown replaced by galena in Fig.III.

Chalcopyrite:

Stringers of chalcopyrite are in fissures in arsenopyrite. This is illustrated by Fig.IV which also shows the chalcopyrite cut off by tetrahedrite. The order of mineralization here is arsenopyrite followed by chalcopyrite and followed later by tetrahedrite.

Tetrahedrite:

The relations of this mineral have been discussed in part above. It occurs massive, surrounding "islands" of quartz and arsenopyrite. See Fig.IV.

Sphalerite:

Determined in very small quantities disseminated and evidently replaced by fine galena. This is shown in Fig.III which illustrates replacements of pyrite, sphalerite and bornblende by galena.

Galena:

Discussed above, under sphalerite. See Fig.III. Occurs coarsely crystalline in quartz gangue in one specimen. Fig.V shows galena filling fissures in quartz.

V. GENESIS.

The mineralizing solutions evidently came from the granodiorite stocks which form the cores of mountains in the district. The minerals were deposited in true-fissure-replacement or shear-zone-replacement type veins.

J. J. O'Neill[#] reports two separate periods of mineralization in some of the ores of this district. No evidence of this was found in the specimens examined.

[#]J. J. O'Neill - Memoir 110. G.S.C.,1919, p.14.

VII. SUMMARY AND CONCLUSIONS:

1. Ore occurs near the granodiorite-tuff contacts.
2. The ore is in veins of the true-fissure-replacement and shear-zone-replacement types.
3. There were two periods of mineralization, at least in some of the ore deposits.
4. The approximate order of deposition of the metallic minerals is as follows:

   a. arsenopyrite.
   b. pyrite.
   c. chalcopyrite.
   d. sphalerite)
   e. tetrahedrite) may be reversed.
   f. galena.

On account of the weathered condition of most of the specimens in the Hazelton suite of ores only seven polished sections were made for microscopic examination. It is therefore impossible to make a very complete report from the examination of the ores in question.

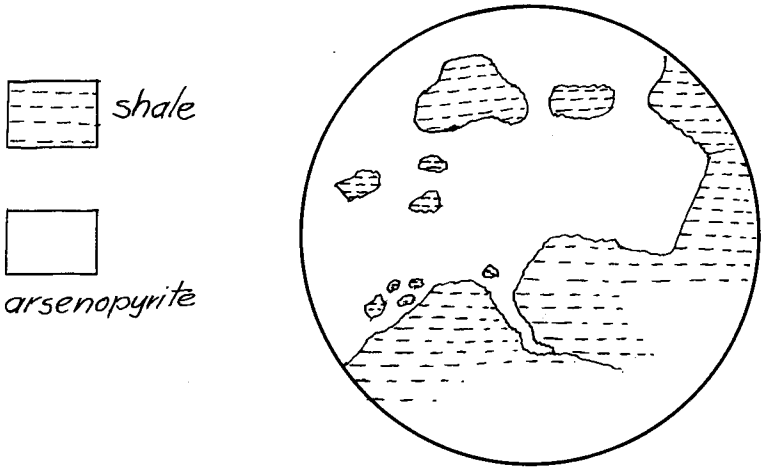

FIG. I

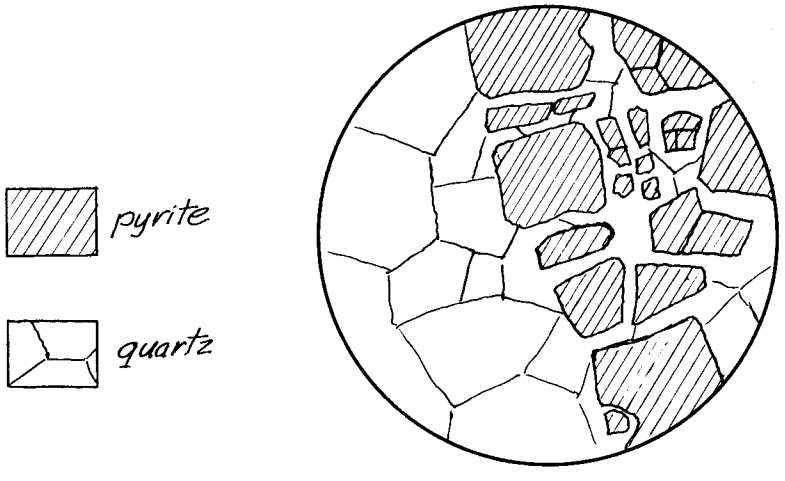

FIG. II

FIG. III

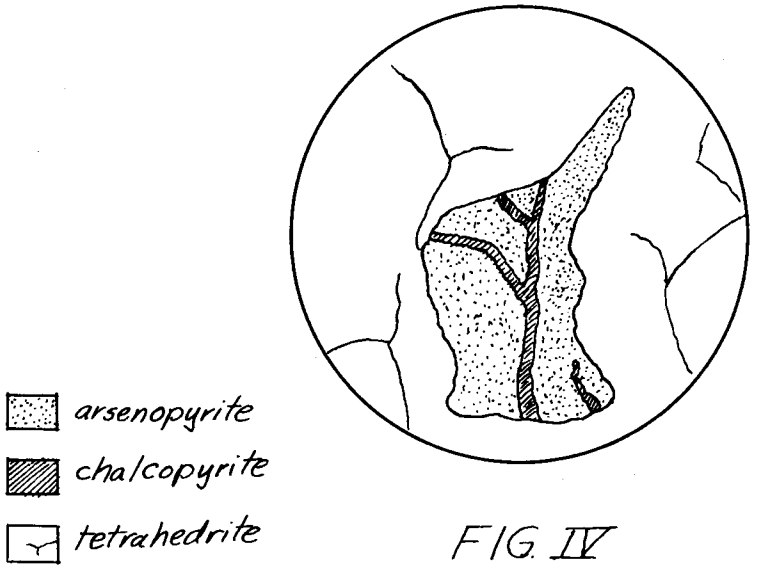

FIG. IV

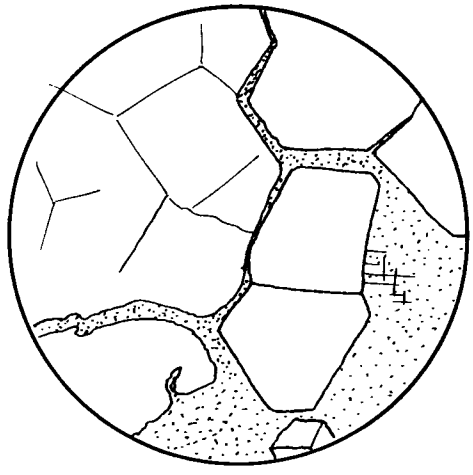

FIG. V

quartz galena.