MINERALOGICAL REPORT

on

Ruby Silver and Native Silver

of the

Waterloo Mine, B. C.

by

H. V. Warren, D. Phil.

September 29, 1933.

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Ruby Silver at the Waterloo Mine

Introduction

Considerable quantities of ruby silver and native silver are found about two-hundred feet below the surface at the Waterloo Mine. The problem of whether these minerals are the result of secondary surface (supergene) enrichment or of deep-seated (hypogene) origin is of considerable importance to the mine. Should the deposits be hypogene there is a much greater expectation of the ore bodies continuing to depth.

Several specimens of ore from this mine were submitted to me by W. G. Wilkins, the Secretary-Treasurer of this Company.

Conclusions

The ruby silver (pyrargyrite) is hypogene in origin as is a part of the native silver. However, some of the native silver is secondary.

This does not mean that pyrargyrite will continue to great depth because it seldom attains a depth of over twelve hundred feet and usually "plays out" between four and eight hundred.

If the specimens which I was given are representative, the native silver will not continue to be of such relative importance with respect to pyrargyrite as depth is attained in the mine.

Ruby Silver at the Waterloo Mine

Mineralogy

The following minerals were identified in the specimens which were submitted:-

Gangue Minerals: Calcite. Quartz.

Ore Minerals: Pyrite, Galena, Sphalerite, Chalcopyrite, Pyrargyrite, Native Silver, Tetrahedrite.

Other minerals were seen but, being in minor quantities, their identification was not attempted as their determination might have taken many days. Tetrahedrite was not identified in the polished sections but only in the hand specimen and consequently its paragenesis is not discussed.

Paragenesis

From the evidence available in the specimens which were submitted, it is clear that there were two distinct periods of mineralization in this silver rich vein.

In the first, pyrite and quartz were introduced and these were then fractured and solutions containing the remaining minerals were introduced. In this case, the important gangue mineral was calcite which, in places, replaced the quartz which had been fractured after its solidification, probably by later movement along the fault plane.

The order of crystallization of this second group of minerals was as follows:- Sphalerite, galena and chalcopyrite; calcite; ruby silver and native silver.

Sketches illustrating these relationships have been prepared from drawings of actual sections and these will be found at the end of this report.

The minerals of the first period of mineralization and the first three of the second period are undoubtedly primary in origin.

This leaves three minerals whose origin is undetermined, calcite, ruby silver, and native silver.

All three may be either supergene or hypogene so that in their case their origin must be determined by their relationship between themselves and other minerals.

Taking all the evidence into consideration, I believe that the ruby silver is primary, for the following reasons:-

1) Lack of any primary minerals from which this rich silver mineral could be derived. Galena and the few specks of tetrahedrite are the only possible minerals which could supply an abundance of silver and they do not appear to be present or have been present in sufficient quantities to give rise to the rich silver minerals in the quantities in which they occur.

2) Lack of any supergene copper minerals which would normally be found in association with pyrargyrite were this latter mineral secondary.

3) Lack of any oxidation products to suggest that any alteration had taken place.

4) Lack of any replacement structures usually associated with sscondary enrichment.

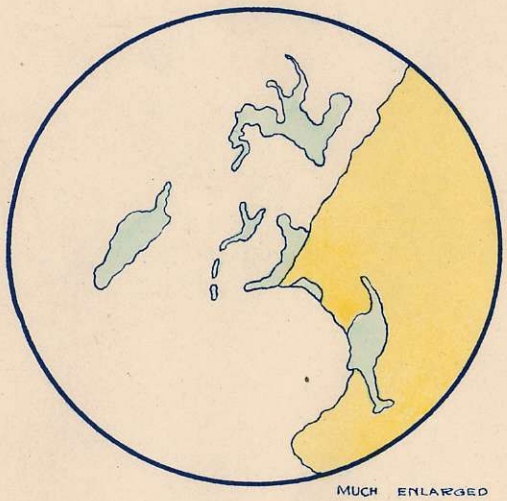
The case of the native silver is more confusing and I believe that in all probability some is secondary--arising from the alteration of the ruby silver--and that some is primary.

The evidence in favour of the primary silver is similar to that already brought forward for the pyrargyrite.

That some of the native silver is secondary I surmise from its characteristic occurrence in wire-like forms in calcite and its occurrence, paper thin, along numerous fractures.

The evidence presented by the few samples which I was given seems conclusive but I must state that decisions on matters of this importance are best determined by field work in conjunction with laboratory work and that a detailed and systematic examination in the field might lead to a modification of the conclusions at which I have arrived.

Respectfully Submitted.



MUCH ENLARGED

FIGURE 1. SHOWING RELATIONSHIP OF NATIVE SILVER, SPHALERITE, AND CALCITE.

~ LEGEND ~

NATIVE SILVER

SPHALERITE

CALCITE

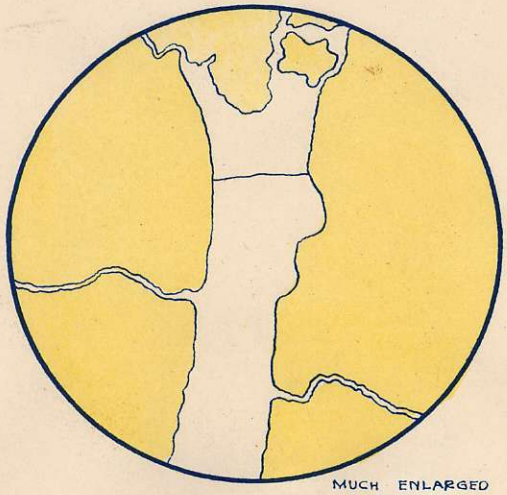


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FIGURE 2. ILLUSTRATING THAT CALCITE IS LATER THAN SPHALERITE

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SPHALERITE

CALCITE

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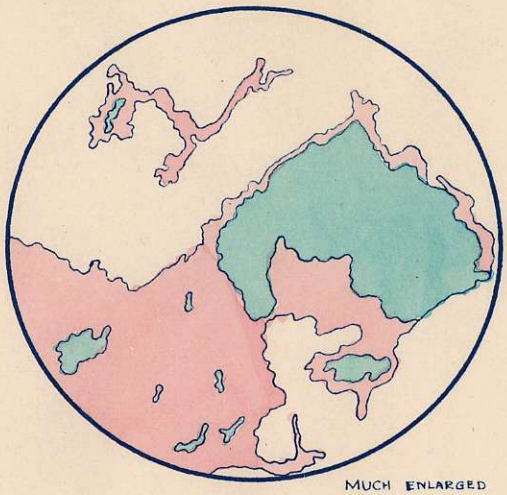

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FIGURE 3. SHOWING RELATIONSHIP PYRARGYRITE, NATIVE SILVER, & CALCITE.

~ LEGEND ~

- PYRARGYRITE
- NATIVE SILVER
- CALCITE

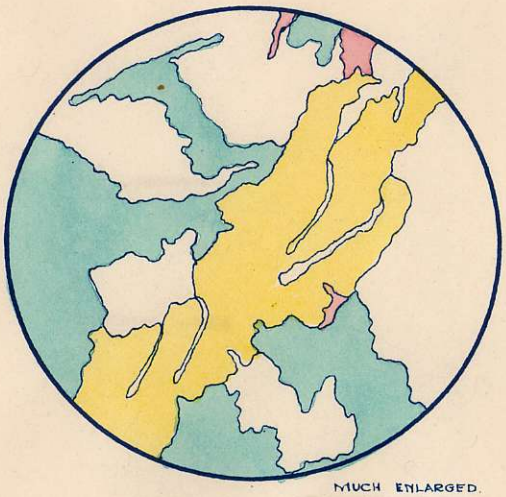

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FIGURE 4. SHOWING RELATIONSHIP OF PYRARGYRITE, NATIVE SILVER, CALCITE & SPHALERITE.

~ LEGEND ~

- PYRARGYRITE
- NATIVE SILVER
- CALCITE
- SPHALERITE

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FIG. 5

DIAGRAMATIC SKETCH OF ORE SHOWING TWO PERIODS OF MINERALIZATION.
THE QUARTZ AND PYRITE ON THE LEFT BELONG THE FIRST, AND THE CALCITE, PYRARGYRITE, SPHALERITE, AND NATIVE SILVER BELONG TO THE SECOND.

~LEGEND~

QUARTZ WITH PYRITE.

CALCITE.

PYRARGYRITE & SPHALERITE.

SPHALERITE.

PYRARGYRITE & NATIVE SILVER.

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