MINERALOGY OF THE RENO GOLD MINE

by

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Geology 9 Report

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Location

The Reno Mine is situated at the head of Reno Creek in the Salmo-Map-Area of British Columbia. The workings lie between 6150 and 7200 feet above sea-level on the west slope of Reno Mountain. They are approximately 15 miles by road from Salmo, B.C.

Geology

The ground in the vicinity of the mine is composed of late pre-Cambrian sediments. The Reno vein is a fissure vein which cuts the Reno Formation-- a thick series of quartzites capped by argillaceous quartzites, limestones, and schists. These strata all strike about 10 degrees and dip easterly at high angles. The fissure apparently dies out as it approaches the contact of the Reno Formation with the less competent Pend-d'Oreille series to the west and the lower part of the Reno Formation to the east.

The ore is considered a derivative of the nearby Nelson batholith. It has been heavily oxidized in the zone within 200 feet of the surface in which no sulphides are found. All of the specimens examined were from unaltered portions of the vein.

Mineralogy

The following minerals were identified in the polished sections of ore specimens from the 5th, 6th, and 7th levels of the mine. No variation in percentage of sulphides present or manner of occurrence was noted between the forementioned levels. Listed in order of quantitative occurrence the minerals are:

(1) Quartz
(2) Pyrrhotite
(3) Sphalerite
(4) Galena
(5) Chalcopyrite
(6) Electrum

(1) Quartz

Quartz is the predominant mineral in the ore. It occurs in massive bands of coarsely crystalline structure. Under the microscope all of the other minerals may be found veining it. The presence of quartz crystals isolated in later sulphides indicates that this mineral had a fairly long period of crystallization. The intercrystal interstices of the quartz have been ideal for receiving the later solutions and contain much of the electrum--especially near the quartz-galena contacts.

(2) Pyrrhotite

Pyrrhotite is the most common sulphide of the ore. It occurs in massive lenses in the vein and forms veinlets in the earlier quartz. In section #117B it is found with sphalerite in inclusions in galena. Here the galena obviously cuts a mixture of pyrrhotite and sphalerite. As the galena is usually found to be considerably later than either of these sulphides, I believe that their presence in

this relationship may be explained either by their spalling off after solidification or by their having a very long period of crystallization.

In section #4 pyrrhotite and chalcopyrite are found in a long straight veinlet in sphalerite. Neighboring smaller similar veinlets suggest a definite orientation along the cleavage faces of the sphalerite. As pyrrhotite and chalcopyrite are usually found to be earlier than sphalerite I believe that their presence in this form may be explained on the basis that they were impurities in the sphalerite melt and were expelled upon cleavage faces during the latters' crystallization.

(3) Sphalerite

Sphalerite occurs in massive bands in the vein. Under the microscope it is found in veinlets in quartz and in pyrrhotite. In section #1 it is found veining pyrrhotite. In section #2 it is found in association with galena and electrum. In section #117B it appears to have crystallized simultaneously with pyrrhotite. Its relationship with pyrrhotite and chalcopyrite in section #4 has been discussed in the preceeding paragraph. General observations lead to the conclusion that sphalerite is later than the pyrrhotite and the chalcopyrite.

(4) Galena

The galena of this ore is obviously one of the latest minerals present. It occurs as small stringers in the vein and may be found cutting all of the other sulphides. In examining the sections it was interesting to note that in almost every case where galena was observed filling small fractures in the quartz a bleb of electrum was to be seen. Its association with electrum is its most interesting feature.

(5) Chalcopyrite

Chalcopyrite is found in a few massive coarsely crystallized lenses in the vein. It is invariably found in association with pyrrhotite. In section #1 it is found filling fractures in quartz along with electrum. In section #115B it is found cutting pyrrhotite and also forms many minute inclusions in the pyrrhotite. Its relationship to sphalerite in section #4 has already been discussed. From its modes of occurrence it is reasonable to assume that the chalcopyrite was introduced shortly after the pyrrhotite.

(6) Electrum

Electrum is to be found in every section of the ore. It is apparently the latest mineral to be introduced and occurs mainly with galena in small fractures in the quartz. The particles of it are between 0.1 and 0.5 mm. in diameter.

During early examination of the polished sections, I thought that there were two types of gold present. These I called "light gold" and "dark gold". Separation of the two types under the Ultra-Pak and assaying gave the following results:

Product	%Au	% Ag	Au/Ag Ratio
Light Gold	66.7	33.3	2.0
Dark Gold	76.1	23.9	3.2

These results indicate that the color difference is due to a varying proportion of gold to silver. In subsequent microscopic examination both types reacted with $HgCl_2$ to confirm their being electrum.

Paragenesis

The paragenesis of the ore is given in the following table.

Quartz _____

Pyrrhotite _____

Chalcopyrite _____

Sphalerite _____

Galena _____

Electrum ___

Description of the Polished Sections.

Section #1.

This section is from a sample from the 7th level which assayed 3.46 ozs. gold per ton.

Megascopically the specimen consists of massive pyrrhotite, quartz, and chalcopyrite.

Under the microscope the above minerals plus a small amount of galena and considerable electrum were observed. All of these sulphides may beseen filling fractures in the quartz. The chalcopyrite-pyrrhotite association may be clearly seen. This is the best section of the group for the comparison of chalcopyrite and electrum as there are several areas where these minerals may be seen together.

Section #2

This section is from a sample adjoining section #1 and assays 30.54 ozs. gold per ton. There is no hand specimen of this

section.

Microscopically the section consists of about 85% quartz, 14% sphalerite, and 1% galena. All of the electrum is found in fractures in the quartz and is usually in association with galena. The sphalerite is remarkably free of chalcopyrite. A few blebs of electrum may be seen in the sphalerite.

Section #3

From a sample taken adjacent to sections #1 and #2 and which assayed 9.70 ozs. gold per ton.

The hand specimen shows the crystalline nature of the quartz and the banded nature of the vein. Bands of sphalerite and galena being prominent.

Under the microscope the inter-crystal interstices of the quartz are shown to be filled with galena and sphalerite. The galena-electrum association is again quite apparent.

Section #4.

From a 5th level sample which assayed 1.68 ozs. gold per ton.

Megascopically the specimen consists of coarsely crystaline quartz, pyrrhotite, and sphalerite. Under the microscope chalcopyrite, galena, and electrum may also be seen. It is in the sphalerite of this section that oriented veinlets of pyrrhotite and chalcopyrite may bee seen.

Section #10

From the 6th level of the mine. Assay value of 29.48 ozs. of gold per ton.

The hand specimen of this section shows a very coarse crystalline banding of quartz, pyrrhotite, and sphalerite. A few pieces of electrum may also be seen with the naked eye.

Under the microscope the quartz shows very euhedral development. Small quantities of sphalerite and galena may be seen filling inter-crystal openings in the massive quartz. The galena occurs chiefly in the quartz but may be frequently seen veining the sphalerite and also is found along the quartz-sphalerite contacts. Electrum is well distributed throughout the section and is always in a relationship which shows that it was the latest mineral to be introduced to the ore.

Section #115B

This specimen is the lowest grade one examined. It consists of massive pyrrhotite from the 5th level and assays 0.72 ozs. gold per ton.

Under the microscope the section is seen to be made up of pyrrhotite, quartz, and a minute quantity of sphalerite. The pyrrhotite contains very fine blebs of chalcopyrite. Only one small piece of electrum was observed. It occurred in the quartz.

Section #117B

This specimen is from the 6th level and assayed 2.50 ozs. gold per ton. Megascopically it consists of quartz, galena, pyrrhotite, and sphalerite.

As usual, the electrum of this section is closely associated with the galena and is found chiefly in fractures in the quartz. A small amount of chalcopyrite is found in the pyrrhotite. Perhaps the most interesting feature of the section is the occurrence of

an intimate mixture of pyrrhotite and sphalerite which is veined by galena. The galena contains small pieces of pyrrhotite and sphalerite. This relationship may only be explained by the long crystallization period of the latter sulphides or by their breaking off after solidification.

Concentrate Section

This is a section prepared from a galena-gold concentrate taken from the jig. It serves to illustrate the different colors of electrum which are found in the ore.

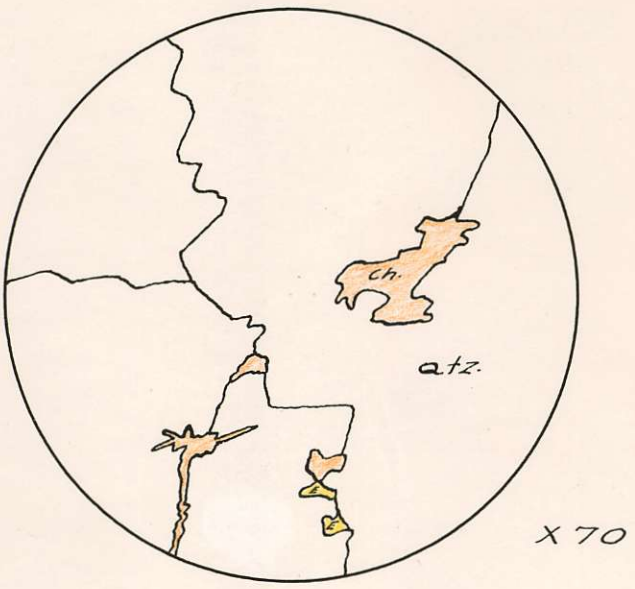

Plate 1.

A sketch from section #1 showing the association of chalcopyrite and electrum as fillings in the fractured quartz.

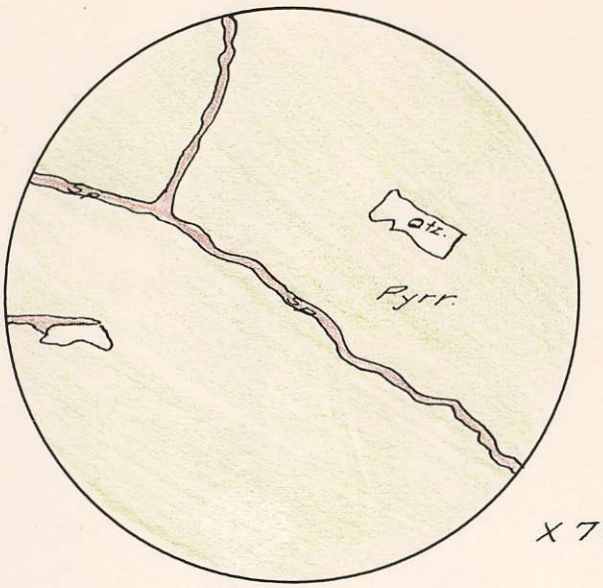

Plate 2.

Showing the veining of pyrrhotite by sphalerite in section #1. Also islands of quartz in the pyrrhotite.

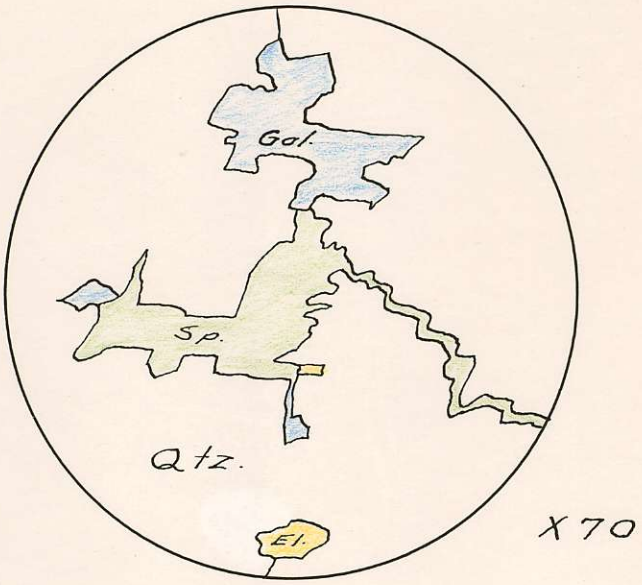

Plate 3.

Sphalerite, galena, and electrum filling fractures in the quartz. From a field in section #2.

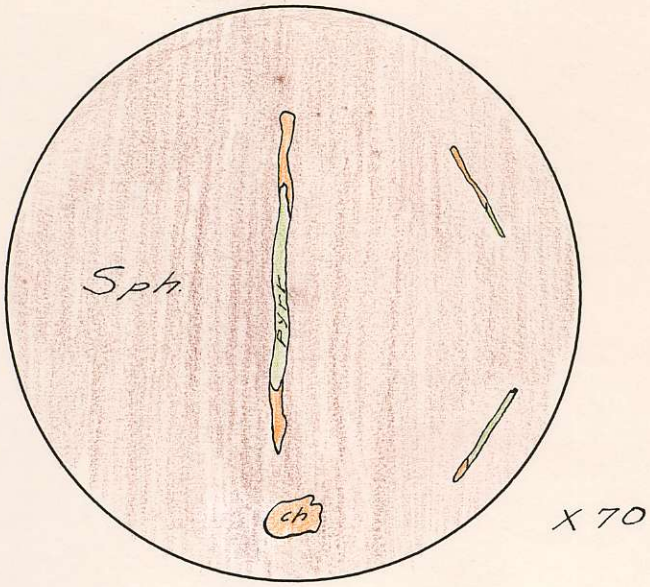

Plate 4.

Veinlets of pyrrhotite and chalcopyrite in sphalerite. Suggests an orientation parallel to the cleavage faces of the sphalerite.

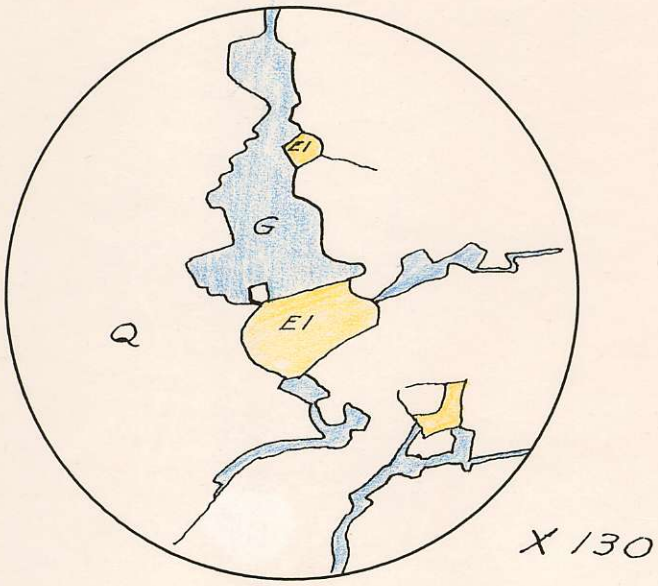

Plate 5.

Showing the intimate association of galena and electrum in section #10. Crystal faces of the quartz may also be seen.

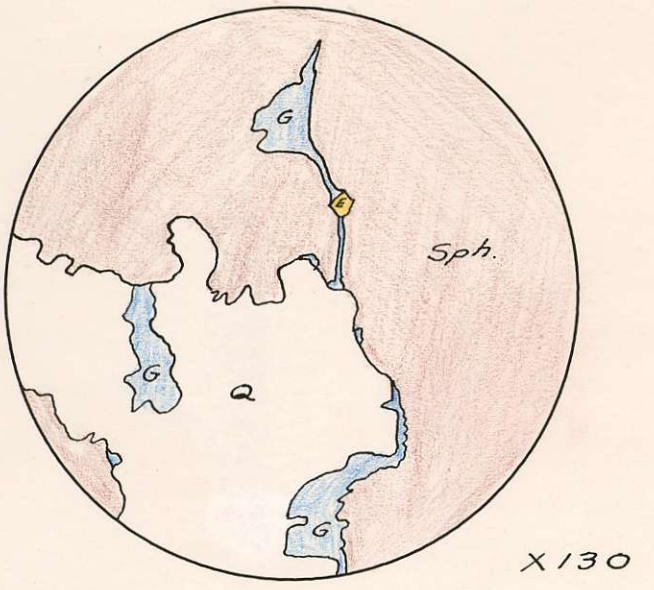

Plate 6.

Galena and electrum veining sphalerite and galena occuring at the quartz-sphalerite contact. Seen in section #10.

Plate 7.

An intimate mixture of pyrrhotite and sphalerite veined by galena which carries inclusions of these sulphides. From section #117B.