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Report on

THE MICROSCOPICAL EXAMINATION OF THE NICOLA ORE

by

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5th Year Geological Engineering

NICOLA

Location

The Nicola Mine is situated in the Yale Mining Division on Stump Lake, a small body of water 45 miles due east of Spences Bridge and 22 miles due south of Kamloops. Mineralization of economic interest is confined principally to an area about five miles long, with a variable breadth, lying nearly north and south on the east side of the lake.

Access to the properties is by road from Spences Bridge through Merritt or direct from Kamloops.

Historical

Some locations were originally taken up in the neighbourhood of Stump Lake about 1881, but 'prospecting' work appears first to have been undertaken in 1885. In the year 1887, 200 claims were recorded in this vicinity and by the fall of 1888, about 2000' of working shafts and tunnels had been run in the course of development of the Nicola mines.

Practically no work was done in this camp between 1890 and 1915, but in March 1916, eight Crown granted claims were acquired by the Donohoe Mines Corporation; these

included, among others, the Joshua, Tubal Cain and King William. These properties were worked intermittently, and a few shipments of ore were sent to Trail between 1916 and 1933 when the properties closed down for several months.

In 1934 the Nicola Mines and Metals was formed by the same company under new directors and management to reopen the former Donohoe Mines. This company sank a shaft on the promising Enterprise vein and production commenced at the rate of 65 tons/day late in the same year.

General Geology

The metalliferous veins which have been found within the limited district of the Interior Plateau Region above defined are very numerous. They vary from about ten inches to five or six feet in width, and some of them have been traced for a length of several hundred feet. Though it is probable, from the great number of veins which exist, that no single one will be found to be continuous for a very great distance, a considerable supply of ore is assured. Most of the veins run with very considerable uniformity in bearings a few degrees west of true north, but there are, however, a few which diverge widely from this direction.

The country rock consists of altered volcanic materials of Palaeozoic or Triassic age, and may be generally classified as a diabase-porphyrite, the most characteristic material in this place being a rock of green and green-grey

colour with coarse porphyritic crystals of plagioclase and pyroxene.

Mineralogy

A number of polished sections were made from ore samples taken from the Joshua and Enterprise veins and the following minerals were identified:

Pyrite	Tetrahedrite
Sphalerite	Chalcopyrite
Galena	An unknown metallic mineral
Quartz	

Pyrite

Pyrite is the most conspicuous metallic constituent of the ore. Characteristically it occurs in large irregular masses, but in places a cubical boundary was seen. In every case it is heavily fractured and the fractures have been healed by quartz, chalcopyrite, sphalerite and galena. Small stringers and inclusions of chalcopyrite, sphalerite and galena in the pyrite were also observed in many places. (Fig. 1 & 2) It is evident from the illustrations that pyrite belongs to a first period of mineralization.

Quartz

Quartz is the main and only conspicuous gangue mineral, and evidence was seen that there were at least two generations of this mineral. It was noted veining all the other minerals in the ore and was in turn veined by galena. (Fig. 1, 4, 5, & 6)

However, no distinction could be made between the different generations, and it is quite possible that quartz was crystallized throughout all the periods of mineralization.

Isolated irregular patches of chalcopyrite, galena and sphalerite in all sizes were found scattered through the quartz.

Sphalerite

Sphalerite is relatively abundant as irregular masses in quartz, and it also penetrates and cements pyrite. (Fig.2) Practically all the sphalerite is intimately associated with chalcopyrite and it is evident that some chalcopyrite at least was deposited during the same period of mineralization as the sphalerite. (Fig. 2 & 4)

Galena

Galena has the same general distribution as that described for sphalerite, but is is present in slightly larger quantities. The galena veins the sphalerite (Fig.3) and consequently belongs to a slightly latter period of mineralization than the sphalerite, but it is also found intimately associated with chalcopyrite which occurs in larger but less numerous irregular blebs. In one place the galena was found veined by chalcopyrite, and it would appear that chalcopyrite was deposited during and after the deposition of the sphalerite and the galena.

Chalcopyrite

Chalcopyrite is locally conspicuous, but is actually only a minor constituent of the ore. It occurs as small, irregular masses in the quartz and sulphides as described above, but it is most typically found associated with sphalerite in which mineral it occurs as tiny blebs distributed somewhat erratically along cleavage lines. (For size refer to the summary).

Tetrahedrite

Intimately associated with the galena were seen small blebs of a soft metallic mineral slightly darker in color than the surrounding sulphide. This mineral did not react with any of the reagents commonly used in microscopical determinations and unfortunately nons of the pieces seen were large enough to be picked out for chemical tests. However, from the negative results obtained with etching and from the characteristic mode of occurrence of this mineral in the galena, it is very probable that the dark blebs are tetrahedrite, especially as tetrahedrite is known to be present from megascopic examinations of the ore.

Paragenesis

The following paragenesis is suggested:

1. (Oldest) Pyrite and possibly quartz
2. Sphalerite, chalcopyrite and possible quartz
3. Galena, chalcopyrite and possibly quartz
4. Quartz and possible chalcopyrite.

Assays

Assays were run on samples of ore submitted by the Nicola Mine to the University of B.C. The following results were obtained:

Gold (oz/T)	Silver (oz/T)	Lead	Zinc	Copper
0.40	19.35	10.40	6.63	1.04
0.425	23.43	10.70	7.00	1.02
0.365	19.20	10.50	6.70	1.04

A trace of stibnite was found in several of the assays and in some it ran 0.9%.

Summary and Conclusions

1. The gold averaged 0.397 oz./ton for 3 assays, and no specks of gold were seen in any of the polished sections. Hence, it is impossible to say how it occurs or with which mineral or minerals it is associated. No telluride minerals were identified.

2. The silver averaged 20.66 oz./ton for 3 assays. As previously stated no tetrahedrite was identified positively microscopically, but its presence was definitely shown megascopically. On the basis of the work done at the present time, it is only possible to state that the majority of the silver is probably derived from the tetrahedrite and that it

is possible that the galena also carries small silver values.

3. The zinc averaged 6.78% for 3 assays and was derived entirely from the sphalerite.

4. The lead averaged 10.53% for 3 assays and was derived entirely from the galena.

5. The copper averaged 1.03% for 3 assays and was derived almost entirely from the chalcopyrite, tetrahedrite contributing a small amount.

The majority of the chalcopyrite is found in the sphalerite in masses ranging from 140 x 46 microns down to 4 x 3 microns and smaller. In general, the average area of the larger blebs is approximately 47 x 31 microns and that of the smaller ones 22 x 15. The small blebs are very numerous, however, and in volume are probably almost equivalent to the larger grains. The larger grains would be liberated at 300 mesh, but the average sized small grain would not be liberated at any practical crushing ratio. However, while the large grains are irregularly arranged, the small ones tend to follow the cleavage lines of the sphalerite and, despite their smaller size, a good recovery should be obtained at 300 mesh.

The chalcopyrite in the galena and the small amounts in the pyrite and quartz, occur in larger particles on the whole than are found in the sphalerite, and consequently would be almost entirely liberated at 300 mesh.

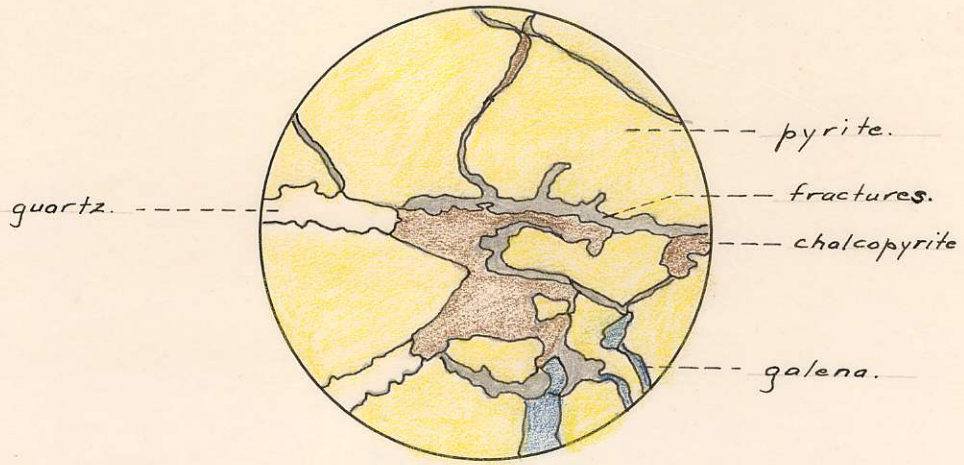

Fig. 1. (X 30)

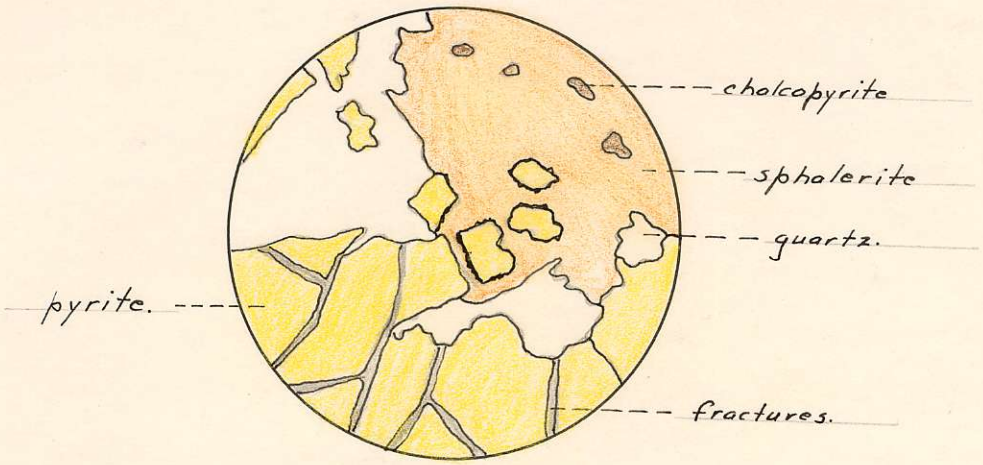

Fig. 2. (X30)

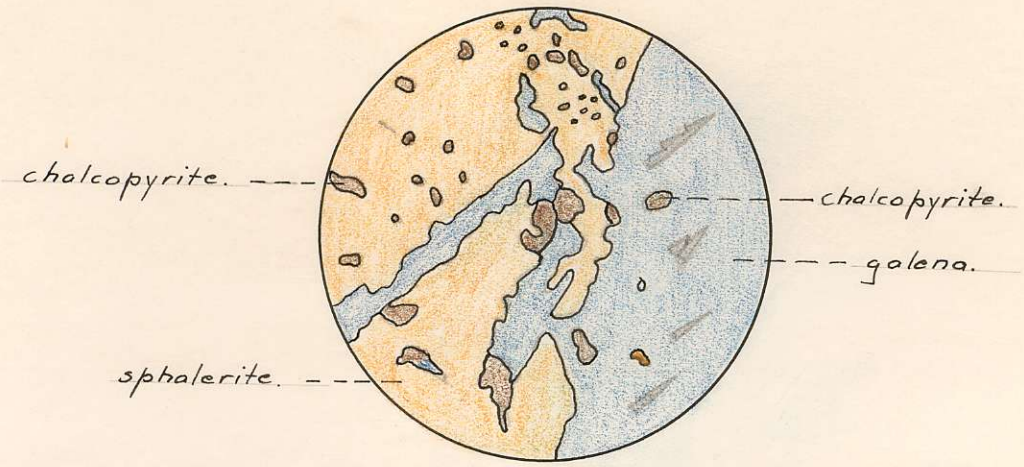

Fig. 3. (X30)

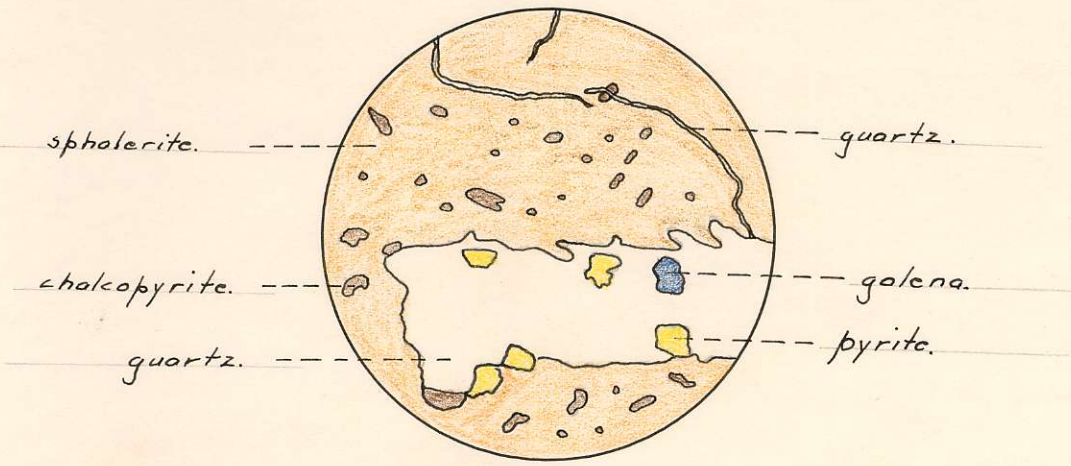

Fig. 4. (X30)

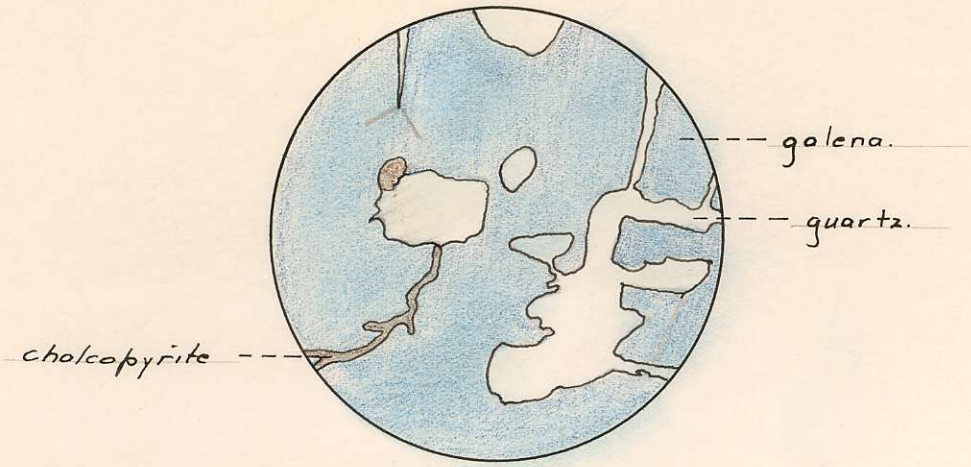

Fig. 5. (x30)

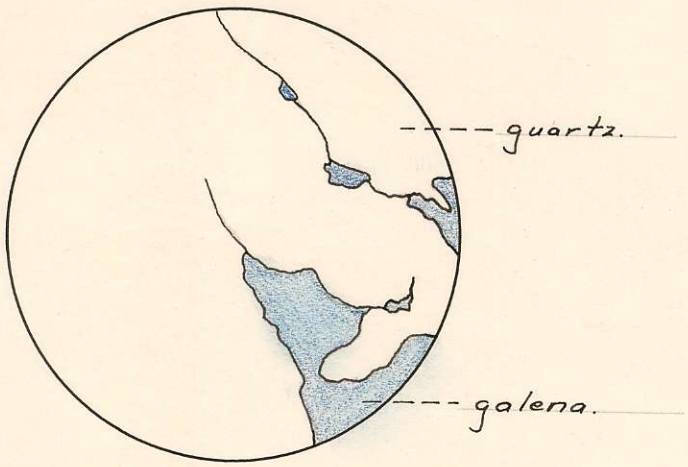

Fig. 6. (x30)