THE

SUNRISE PROPERTY

HAZELTON, B.C.

by

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Report

submitted in

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SUNRISE PROPERTY, HAZELTON, B.C.

Introduction

The Sunrise property, owned by N.S.Lougheed of Vancouver, B.C., is situated on Nine Mile mountain, about 15 miles from Hazelton. The group consists of 5 crown granted claims and fractions, lying on the north side of the mountain. The group is reached from Hazelton first by 14 miles of good truck road, and then 1½ miles of good trail.

There is abundant timber, and a water power site near at hand.

Acknowledgements

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Purpose

This report is submitted in the course of Geology 9, Faculty of Applied Science, University of British Columbia. The object is to study a suite of ore by the aid of a microscope. The method is by studying etch tests on polished sections, and by microchemical analysis.

Bibliography

Galloway,J.D., Min.Mines Rept.,B.C.,1920

Min.Mines Rept.,B.C.,1923.

Min.Mines Rept.,B.C.,1924

Lay,Douglas, Min.Mines Rept.,B.C.,1927.

O'Neill,J.J., "Ecconomic Geology of Hazelton District,B.C."
Geol.Sur.,Can.,Mem.110, Geol.Series,89.

Chapter 2

Description.

Quoting from Galloway,1920: " There are two well defined mineralized zones on this property occuring in granodiorite. The lower-elevation 4950', strikes N.E. and dips 45° S.E. It has been developed by open cuts for a distance of 300' and shows irregular mineralization over a width of 10'.

The upper zone-elevation 5050' strikes E.W. and dips 25° to the south. The width varies from 4' to 8'. It is a sheared zone apparently following one line of jointing in the granodiorite. An incline shaft was sunk on the vein to a depth of 40', disclosing good ore at the bottom.

Assays

The following assays are by the B.C.Bureau of Mines.

1. Bright clean galena from a four inch stringer in mineralized shear zone.

Gold	0.02	oz.
Silver	140.0	oz.
Lead	72.5	%

2 Across 5' of shear zone.

Silver	49.8	oz.
Zinc	5.2	%
Lead	24.2	%

3. Picked ore from same zone.

Gold	Trace	
Silver	86.	oz.
Lead	61.6	%
Zinc	7.5	%

Chapter 3

Mineralogy

Megascopically.

The ore consists of massive sulphides. The galena is generally very fine grained and closely packed. It is intimately mixed with boulangerite, the two always occuring together. Gray copper is usually associated with the sphalerite, and is hard to tell from the boulangerite. The gangue minerals are quartz and siderite and probably a little calcite.

There is some crustification of the quartz, and specimens generally show banding.

Arsenopyrite occurs in small amounts but pyrite is hard to find in a hand specimen.

The order of abundance of the minerals, in the specimens examined, is as follows; galena 40%, boulangerite 30%, and smaller amounts of sphalerite, quartz, siderite, freibergite, arsenopyrite, and pyrite.

Microscopically.

The minerals found in the order of their abundance, are as follows; galena, boulangerite, sphalerite, freibergite, arsenopyrite, pyrite, chalcopyrite; the gangue minerals are quartz and carbonates, (siderite and probably a little calcite).

Galena

Galena is the most abundant sulphide. It is most often very fine grained, steel galena, but occasionaly it is coarsely crystalline, with well developed cleavage surfaces. It has been fractured, and carbonates occur along the fractures, but do not replace the galena so far as was seen.

Boulangerite ($5PbS.2Sb_2S_3$)

The data for the determination of this mineral are here listed for record.

Specific Gravity

Group A — Toluol Sp.Gr--.875

No.	Weight in air.	Weight in pure Toluol.	Sp.Gr.
1.	30.03 m.g.	25.77 m.g.	6.24
2.	25.46 "	21.88 "	6.23
3.	14.46 "	12.41 "	6.17
4.	5.78 "	4.97 "	6.32
5.	65.14 "	55.89 "	6.16
6.	33.06 "	28.38 "	6.18
7.	22.32 "	19.14 "	6.13
Total	196.25 "	App.average	6.2

Group B

1.	14.40 "	12.34 "	6.12
2.	8.86 "	7.59 "	6.10
3	14.78 "	12.65 "	6.07
4.	22.21 "	19.00 "	6.05
5.	22.33 "	19.10 "	6.03
6.	¢ 11.78 "	10.07 "	6.03
7.	9.05 "	7.23 "	6.00
8.	# 15.31 "	13.07 "	5.98
9.	# 55.87 "	47.65 "	5.95
10.	# 20.79 "	17.73 "	5.94
11.	# 33.05 "	28.12 "	5.93
12.	# 59.25 "	50.42 "	5.88

¢. weathered surface on one side.
#. small inclusions of gangue visible

A quantitative analysis was run on these two groups. Group B had some more clean chips added to a total of about 500 m.g.

Quantitative analysis

	Lead.	Antimony.	Sulphur.	Iron.	Copper.	Total.
Group A	48.8	24.6			Nil.	
Group B	53.5	23.7	16.4	2.9	.2	96.7
Comp.(Dana)	55.4	25.7	18.9			100.

Etch tests

HNO_3--stains brown black, slow starting, then at one side of drop and spreads rapidly across it. HCl--neg. KCN--slowly light brown but usually negative. $FeCl_3$, KOH, $HgCl_2$ ---neg. Hardness B. Color galena white with a slight tinge of green when in contact with galena. Streak black.

Boulangerite was in all cases intimately associated with galena. It appears feathery, and in part may be contemporaneous and in part replacing the galena. It has been fractured with the galena, and carbonate occurs along the fractures but was not seen to be replacing it. (Fig.2&5)

Sphalerite

Crystalline, brown sphalerite is generally associated with quartz, and probably replaces it in part. (Fig.3) In part it also replaces siderite. It also occurs as inclusions in galena and boulangerite.(Fig.6) It shows two distinct generations of fracturing. The first generation has been veined by tetrahedrite (freibergite) (Fig.4). The second generation which also fractured the freibergite, galena and boulangerite, has carbonates occuring in them, and these may in part be replacing the sphalerite.

Freibergite (Argentiferous tetrahedrite)

The tetrahedrite was tested microchemically for silver, by the use of potasium mercuric thiocyanate solution. The fairly abundant fine white precipitate that spread out before the greenish yellow mosslike precipitate of copper, seemed to indicate the presence of enough silver to call the mineral freibergite.

Freibergite is generally associated with sphalerite. It is later than sphalerite and in part replaces it as well as quartz.(Fig8). (Fig.4). It has been fractured.

Arsenopyrite

Arsenopyrite occurs only in small amounts and always associated with quartz. (Fig.7) The mineral was probably deposited later than the quartz in which it occurs, gaining entrance between the microscopic openings of the quartz crystals to form small crystals of arsenopyrite replacing the quartz.

Pyrite

Pyrite occurs similarly to the arsenopyrite, associated with quartz. It was noticed that the greatest concentration of the pyrite was around the periphery of the quartz. (Fig.3) This would support the contention that the pyrite was later than the quartz, being introduced along the micro-partings between the quartz crystals, and then crystallizing not far from the surface of the quartz. No pyrite was found very far within the quartz. Pyrite is also found in calcite? (carbonate) (Fig.1). This may have been deposited in the same way as it was in the quartz, or possibly have been left in the carbonate after the quartz was replaced by the carbonate.

Chalcopyrite

A very small amount of chalcopyrite was found to occur as crystals and laths in sphalerite probably due to exsolution. It also occurs to a very small extent in siderite as small crystals and laths. (Fig.7) It was probably introduced along cleavage planes in the siderite since it outlines the rhombic cleavage.

Quartz

Quartz occurs to a limited extent in all sections. It was evidently the first mineral to deposit, and while generally massive, it sometimes shows crustification.(Fig.7).

Carbonates

Siderite and probably some calcite seem to have been deposited quite early. (Fig.1,6,7) That it is earlier than the galena and boulangerite is strikingly shown in Fig.6. where it occurs as inclusions as also sphalerite,in the galena.

There was a late stage, after the deposition of the vein minerals, where they were all fractured. Carbonate solutions were introduced along these fractures. It appears as if the sphalerite in part was replaced by these later carbonates.But they seemed to have little effect on the other minerals.

Paragenesis

1. Fracturing of the country rock with development of shear zones.
2. Deposition of quartz.
3. Deposition of calcite? and siderite.
4. " pyrite.
5. " arsenopyrite.
6. " Sphalerite
7. " Chalcopyrite
8. Fracturing.
9. Deposition of tetrahedrite (Freibergite)
10. " galena.
11. " boulangerite.
12. Fracturing.
13. Carbonate solutions along fractures.

Quartz ----------

Carbonates --------

Pyrite --------

Arsenopyrite --------

Sphalerite --------

Chalcopyrite ----

Fracturing

Freibergite ----------

Galena ----------

Boulangerite ----------

Fracturing

Carbonate ----

SiO_2 ----------

Ca? -----

CO_2 --------

Fe ----------

S ----------

As ------

Zn --------

Cu ----------

Sb ----------

Pb ----------

CO_2 ----

Conclusions

The first event of the ore deposition was the fissuring of the country rock granodiorite. This developed shear zones which were favorable for ascending mineral laden solutions, to precipitate their charge. Quartz was the earliest mineral to form and probably kept depositing for a considerable time. Carbonate charged waters or solutions deposited siderite early in the history of the veins. Now sulphide laden solutions started to deposit their charge. Pyrite and arsenopyrite probably formed at near the same time, but neither very extensively. Sphalerite deposited next and replaced quartz and siderite to a certain extent. Chalcopyrite occured also at this time from exsolution forming laths and crystals in the sphalerite, and laths along the cleavage planes in the siderite from infiltering solutions. Fracturing occured at this stage and probably some brecciation of the vein minerals. Lower temperature sulphides now started to deposit, with freibergite probably the first, followed by galena and boulangerite. The vein minerals were again fractured, with slight movement, developing small drag folds in the galena and boulangerite. Carbonate waters of probably meteoric origin infiltered along these later fractures and possibly replaced some of the sphalerite but had little effect on the other minerals.

The deposit is of the mesothermal type and the sucession of minerals points to telescoping.