NEW ORE ZONE AT THE MINERAL KING MINE B.C.

A report submitted in partial fulfilment of the course in mineralogy, Geology 409, at the University of British Columbia

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INTRODUCTION

Location

The Mineral King Mine, 50°116°SE, is about twenty-six miles west of Althalmer, British Columbia. Access is by road. The property lies on the Toby Creek slope,between the Toby and Jumbo creeks, at an elevation of 5500 feet.

History

The property was first mentioned in the British Columbia Report of the Minister of Mines in 1898. Between 1898 and 1950 several companies looked at the prospect and minor amounts of work were done. Most of the work involved small scale trenching and a few small adits were driven.

In 1950, the Sheep Creek Gold Quartz company became interested in the property . From drilling results the company decided to bring it into production. Design of the mill facilities and their installation was completed for a production start early in 1954. Milling is at 12,000 to 16,000 tons per month. Concentrates containing values in silver, copper, lead, zinc, cadmium, and barite are produced.

Mineralization

Country rocks of the Mineral King area are dolomitic and siliceous limestones of the late Pre-Cambrian Mount Nelson formation.

part of the upper Purcell and lower Windemere systems. A detailed account of the regional and local geology is given in the British Columbia Report of the Minister of Mines for 1959.

Ore bodies in the upper developed part of the mine are replacements of dolomite by barite, sphalerite, galena, pyrite and minor bournonite. There two kinds of sphalerite. One is a brown massive sphalerite, the other is a light yellow and disseminated variety. Galena has a wide range of grain sizes from coarse to very fine. The gangue minerals are dolomite, quartz and barite, although minor quantities of barite are sold.

Structures

The structural geology of the area is complex. Complicated folding and faulting has occurred. In general the faults seem to be later than the folds(folds transected by faults). Both the faults and the fold crests are important ore controls at the Mineral King.

General

Recently a new ore zone has been found. Specimens from this new zone indicate that bournonite is a major mineral rather than a minor one, as found in the upper levels. The object of this report is to identify the minerals and the mineralographic relationships of this new ore.

The writer has not been on the Mineral King property. The Following mineralogy was done in March of 1963.

IDENTIFICATION OF MINERALS

Galena was identified by its good polish, white colour and low hardness. It was isotropic and showed a profusion of cleavage pits. Etch tests were KCN neg., $FeCl_3$, HCl and HNO_3 pos..

Tetrahedrite was identified by its good polish, pale brown colour and low hardness. It was isotropic . Etch tests were HNO_3 pos. and KCN, HCl and $FeCl_3$ neg..

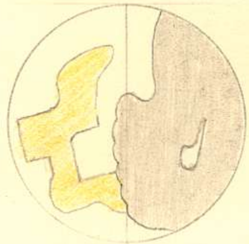
Bournonite was identified by its good polish, grey-white colour and low hardness. It was strongly anisotropic, showing colours of grey, brown and green. Twinning was also seen under the crossed nicols. Etch tests were the same as for tetrahedrite. Microchemical tests gave positive results for copper, lead and antimony .

Sphalerite was identified by its good polish, grey colour and low hardness. It was isotropic but showed good internal reflection.

Pyrite was identified by its poor polish, brass yellow colour and high hardness.

Covellite was identified by its good polish, blue colour and low hardness. It was anisotropic , showing a fiery red colour under the crossed nicols.

FIGURES 1-5 SELECTED SECTIONS



X10

Fig. 1

Bournonite
Galena
Sphalerite
Tetrahedrite

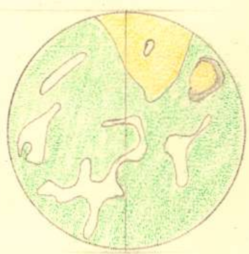


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Fig. 2

Bournonite
Galena
Sphalerite
Tetrahedrite

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Fig. 3

Bournonite
Galena
Sphalerite
Tetrahedrite

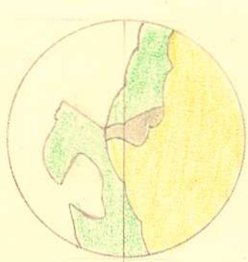

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Fig. 4

Bournonite
Galena
Sphalerite
Tetrahedrite

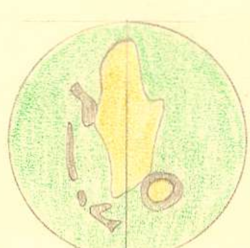

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Fig. 5

Bournonite
Galena
Sphalerite
Tetrahedrite

INTERPRETATION OF TEXTURES

From Fig.1, tetrahedrite appears to be replacing galena and is forming straight edges along the crystallographic planes of galena. A caries texture also supports the replacement of galena.

In the same figure, a well developed caries texture is seen between galena and sphalerite and tetrahedrite and sphalerite. Normally the caries texture as seen in this section would support sphalerite replacing galena. According to Edwards, however, the formation of caries texture is usually reversed at sphalerite-galena interfaces. Therefore galena is replacing sphalerite. It is assumed that the caries texture between sphalerite and tetrahedrite is the result of tetrahedrite having replaced the galena right to the sphalerite interface. The sphalerite in figure 1 is the primary high temperature dark sphalerite.

Figure 2 shows what the writer considers to be a graphic replacement texture of tetrahedrite replacing galena, where bournonite has completely replaced the tetrahedrite within the intergrowth. Further evidence of bournonite replacing tetrahedrite is shown in the caries texture of Fig. 3.

A second deposit of iron free low temperature sphalerite appears to be replacing tetrahedrite as evidenced by the many rim textures as in Fig. 2 and the caries texture of Fig. 4.

Bournonite which is also replacing the tetrahedrite (above) seems to be doing so selectively, leaving replacement rings untouched. This is best illustrated by Fig. 5, which shows a partial rim of sphalerite separated from tetrahedrite by bournonite. A complete rim of sphalerite may be seen in the same section around a smaller grain of tetrahedrite.

Covellite is a supergene replacement. In very minor quantities it is replacing sphalerite.

The order of deposition is probably pyrite, sphalerite (HT), galena, tetrahedrite, sphalerite (LT), bournonite with supergene covellite.

GENESIS

Previous work has suggested that this is a hydrothermal replacement deposit. That would agree with the work done for this report. The presence of barite suggests possible epithermal origin.

Pyrite and the dark sphalerite were deposited at high temperature. The sphalerite is very dark indicating about 10% solid solution of Fe in the sphalerite. It is likely that the temperature was about 350° C.

The second phase of galena, tetrahedrite, sphalerite and bournonite was at a lower temperature of say 150° C . This deposition of sphalerite is out of place in the normal sequence. This is explained by Bastin as caused by changing saturation conditions of the fluid.

The intense shearing shown in galena and the twinning of bourninite indicate a period of faulting and/or folding. This is substantiated by the geology of the area. The strain raising phenomena evidently took place before and after the deposition of the minerals.

The minerals in order of abundance are-

bournonite	60%
tetrahedrite	20%
sphalerite	10%
galena	10%
pyrite	$<1\%$
covellite	$<1\%$

CONCLUSIONS

The same minerals are found in this part of the deposit as in that part already worked. However they are in different relative amounts. In these specimens , bournonite is the major mineral. Sphalerite and galena are in lesser amounts. Two sphalerites, high and low temperature, are present.

There is direct evidence in the specimens of shearing.

There would seem to be no problem in mining of this ore but the sooty condition of the hand specimens indicate that a slime problem may be encountered in the milling of this ore.

REFERENCES

A.B. Edwards, Textures of the Ore Minerals

British Columbia Report of the Minister of Mines
(1953 and 1959)