GEOLOGY 409

GRAY ROCK

BRIDGE RIVER

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MEGASCOPIC CHARACTERISTICS

The country rock consists of metamorphosed sediments; the gangue material in the veins is predominantly massive white quartz. Some hand specimens consist of massive stibnite, others show only realgar.

In a large polished slab, pyrite occurs in euhedral cubes and pyritohedrons to 2 cm. and occasionally in massive clumps. Sphalerite is coloured both brown and light green. The brown variety appears in irregular patches to a few centimeters in diameter, whereas the green variety appears in irregular veinlets. Tetrahedrite also occurs in irregular patches and is slightly less abundant than sphalerite.

Galena fills interstices to 2 cm. across. Small amounts of exsolution chalcopyrite in sphalerite are visible under binocular microscope.

MICROSCOPIC CHARACTERISTICS

PYRITE: Euhedral crystals of pyrite show corrosion and partial replacement when in contact with other sulphides. The polish is generally poor, and surfaces are pitted. Occasionally, relict rims of pyrite show almost complete replacement. Estimated 2%.

SPHALERITE: Irregular patches are poorly polished and strongly pitted. Brown sphalerite invariably shows exsolution chalcopyrite blebs and replacement by galena. In some areas the sphalerite shows good internal reflection, but in other areas none is apparent. These are presumably areas of light green and dark brown sphalerite respectively. Estimated 25% in some specimens.

TETRAHEDRITE:

Anisotropism - none

Internal reflection - dull red when scratched

Hardness - D

Etch tests - all negative

Microchemical tests:

As (-)ve

Ag (-)ve

Like sphalerite, the tetrahedrite occurs in irregular patches. The polish is good and the grains show prominent replacement by galena. Small covellite stringers cut the tetrahedrite on occasion. Estimated 15% in two specimens.

GALENA: Galena crystals are well polished and show characteristic triangular pits. It occurs primarily interstitially and strongly replaces tetrahedrite, and to a lesser extent, sphalerite. Blebs of galena are sometimes rimmed and replaced by stibnite. Estimated 5%.

STIBNITE:

Polish - good

Colour - grey

Hardness - B

Texture - massive, occasionally as rims on galena

Pleochroism - distinct on some grains, light to dark grey

Anisotropism - very strong, brown - violet

Twinning - most show lamellar twinning

Etch tests:

$HgCl_2$ — iridescent rapidly

KOH	brown tarnish, yellow coating
KCN	brings out scratches, cleavage
HCl	(-)ve
$FeCl_3$	(-)ve
HNO_3	iridescent

Some sections are almost entirely stibnite, with a few rounded inclusions of vein quartz; other sections show stibnite in small openings in the quartz, rimming galena grains. The grade is difficult to estimate since some specimens are high-grade stibnite, and others, while containing all other sulphides, contain virtually no stibnite.

CHALCOPYRITE: The majority of the chalcopyrite occurs as exsolution blebs in the sphalerite. An occasional veinlet cuts the sphalerite and tetrahedrite but these are rare. Chalcopyrite is estimated at less than 1%.

COVELLITE: Trace amounts of covellite occur, associated only with tetrahedrite. It exhibits typical blue colour and intense red anisotropism. It is most likely secondary after tetrahedrite.

REALGAR: Realgar occurs in veins in the country rock with quartz crystals, massive white quartz, and a little orpiment.

Colour -	grey, red under oblique light
Internal reflection -	red
Anisotropism -	distinct violet - grey

Although no textural relations of realgar were seen under the microscope, realgar is assumed to have been deposited last.

BOURNONITE (?): (trace)

Colour - medium grey

Hardness - B

Association - galena

Anisotropism - distinct violet - brown

Texture - small grains in galena

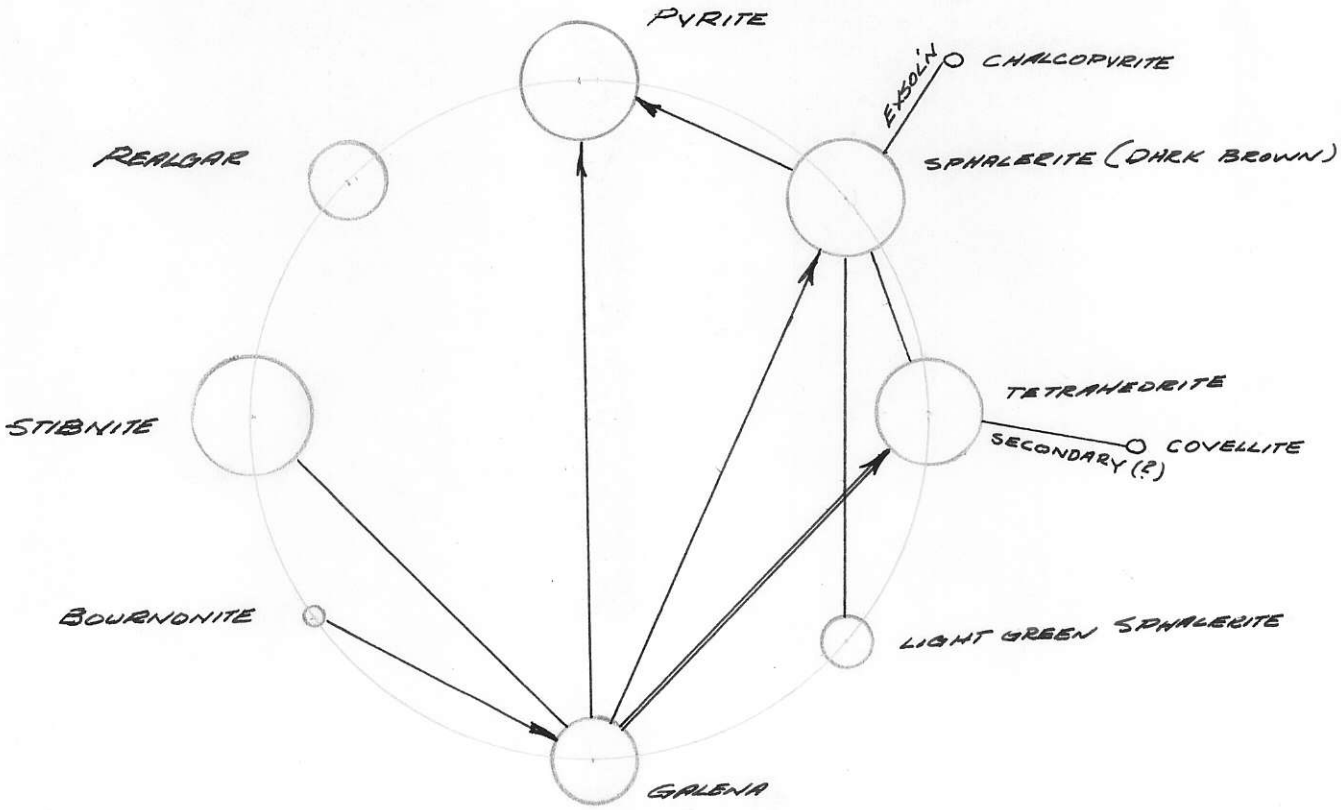
Etch tests:

$HgCl_2$	(-)ve
KOH	(-)ve
KCN	(-)ve
HCl	(-)ve
HNO_3	(-)ve
Aqua Regia	iridescent rapidly

Microchemical tests - confirmation impossible

Two small grains of bournonite (?) occur in galena. From textural relations, bournonite appears to be later than galena, however this was not confirmed by other observations.

PARAGENESIS



Pyrite was deposited first, during early hydrothermal activity, and a little, perhaps, as a result of metamorphism related to a nearby intrusion of quartz diorite. Crystals are euhedral but are commonly corroded and replaced.

Black sphalerite appears to have been deposited next in irregular massive lumps replacing the pyrite. Chalcopyrite has exsolved from the sphalerite in blebs to .2m.m. Tetrahedrite deposition appears to be nearly contemporaneous with sphalerite since conflicting boundary textures are present.

Light green sphalerite was deposited in irregular narrow veinlets, some of which rim and cut the black sphalerite. Thus a later deposition of this sphalerite is indicated. No exsolution minerals were observed.

Galena has strongly replaced tetrahedrite and, to a lesser degree,

the black sphalerite, as well as pyrite. It is primarily interstitial. The two grains of bournonite vein the galena and are assumed to have been deposited next.

Stibnite has formed rims around galena crystals but no replacement textures were noted. Realgar is one of the last minerals to have been deposited.

Since covellite is associated only with tetrahedrite and occurs in small, isolated veinlets in it, it is assumed to be secondary after the tetrahedrite.

TYPE OF DEPOSIT AND ECONOMIC CONSIDERATIONS

According to O'Grady[1], the mineralization occurs in quartz fissure veins in metamorphosed sediments, probably related to the intrusion of quartz diorite in the area. One specimen of tetrahedrite is reported to have assayed 53.9 ounces of silver per ton, but average values are only a few ounces per ton. The stibnite is reported to be free from selenium, and arsenic values are less than 0.5%. Arsenopyrite has been reported but was not seen in the suite of specimens. It is auriferous in the area, and low gold assays have been reported from the property.

Oxidation in the area is apparently quite shallow. The mineral assemblage suggests an epithermal deposit, but textures of deposition do not substantiate this classification. Stibnite and realgar are, on the one hand, typical of low temperature deposits; however exsolution of chalcopyrite from sphalerite occurs at approximately 400 C. No typical open space textures are exhibited by the minerals except

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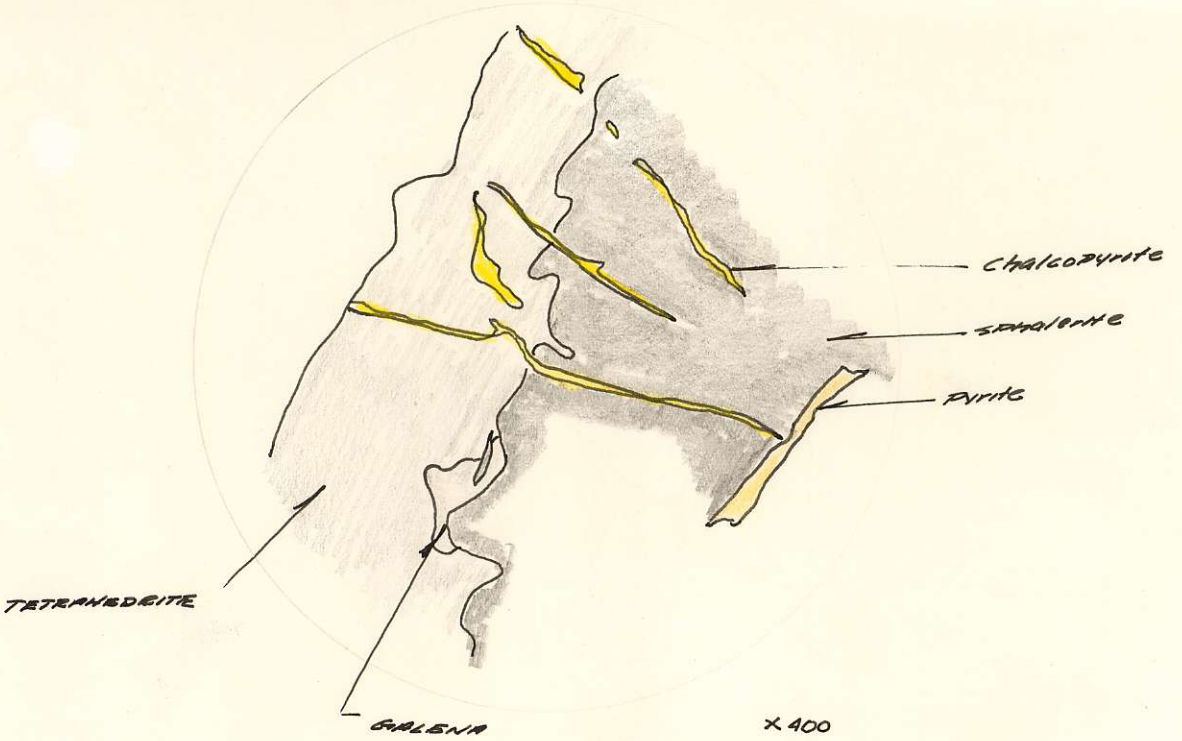
(1) Minister of Mines Report (1936), F44

interstitial filling by the lower temperature minerals. The deposit is either strongly zoned or is a result of extended and perhaps intermittent hydrothermal activity regulated by the cooling of the nearby quartz diorite.

TEXTURES



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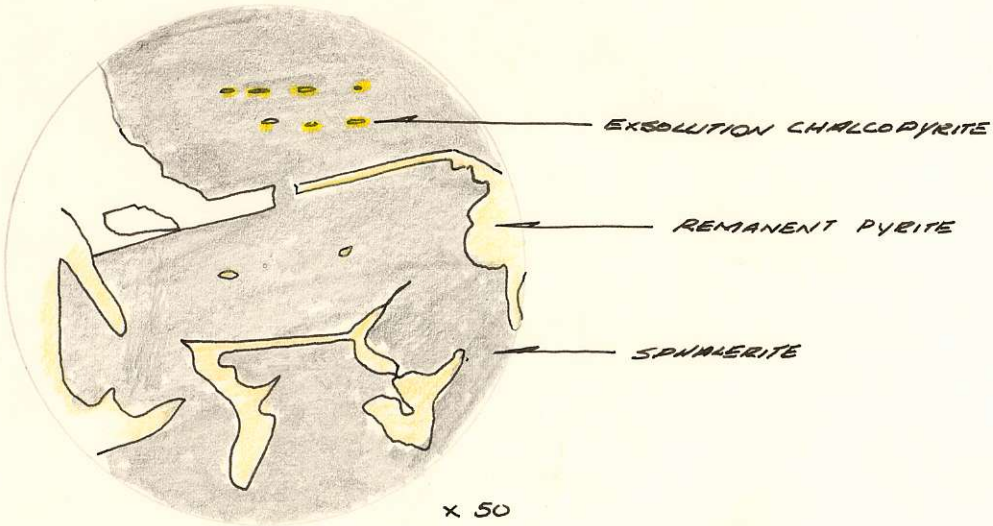

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