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MINERALOGRAPHIC EXAMINATION

OF THE

TORBRIT SILVER ORE

by

J.P. Taylor

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ACKNOWLEDGEMENTS

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The Torbrit silver mine in the Alice Arm mineral district (55^{o} 129^{o} N.W.) is situated 18 miles by road up the Kitsault river valley from Alice Arm. Near the mine the river flows in a small canyon and the valley slopes are steep and covered with dense vegetation.

Torbrit Silver Mines Limited, which has offices at 309 Royal Bank Building, Vancouver, owns four crown granted claims east of the Kilsault river and also holds eight claims, under lease from the owners, to the west of the river.

Silver occurrences in this area were first explored in 1916 but little work was done until 1926 when a mill having a capacity of 50 tons per day was built. This mill proved inefficient in the recovery of silver, but work was continued until 1929 when the property was acquired by Britannia Mining and Smelting Company, Limited. In 1930 work was suspended and the property remained idle until 1946 when it was bought by the present company. Since then the mill has been rebuilt and provided with hydro-electric power and a road built to Alice Arm.

The country rock consists of intrusives of the Hazelton group and according to Black[1] the most common rock type is a slightly schistose greenstone. The mineral zones which have been explored are largely replacement deposits which often contain masses of unreplaced greenstone. The ore samples examined by the writer were taken from a shoot of high grade silver ore within the main deposit.

MACROSCOPIC EXAMINATION

The ore specimens consist mainly of a gangue of white calcite with altered greenstone remnants so that the overall effect is a mottling of dark greenish gray and white, although some specimens show a definite banding. Small quantities of dark watery looking quartz can also be seen in most samples of this ore.

Three metallic minerals can be identified in the hand specimen. Pyrite occurs in Anhedral crystals 1 - 4 m.m. in diameter; anhedral crystals of galena (1 - 1 1/2 m.m.) are present and anhedral pyrargyrite crystals (1 - 1.5 m.m.) can be seen which often show the characteristic ruby red color by light transmitted through thin edges. On close examination of the hand specimen it was noted that pyrite seems to

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1 J.M. Black in Report of Minister of Mines, 1948, pp. 72-75.

bear a negative relation to the other metallics, that is, where the pyrite occurs in abundance the lead and silver mineralization appears to be particularly lacking. The most striking thing about the ore, however, is the reddish stains which are seen on all specimens. Although this red coloration seems to be most intense in areas of pyargyrite mineralization and may be partially due to the internal reflection of that mineral, most of it is believed to be caused by oxides of iron.

No petrological examination of the ore was made but the reaction toward HCl proved that the main body of gangue was calcite. The remainder has suffered too much alteration to be identifiable in the hand specimen. A certain amount of banding and fracturing in these dark minerals was noted, a small quantity of gouge was seen on one specimen.

The specific gravity of the ore is probably about 3.5.

MICROSCOPIC EXAMINATION

The minerals determined are listed below in order of their abundance in polished section:

MINERAL	AVERAGE GRAIN SIZE
Pyrite	2-4 m.m.
Galena	(2 m.m.
Pyrargyrite	(
Polybasite	0.9 m.m.
Sphalerite	0.15 m.m.

(1) Pyrite - Isotropic

Crystals are generally anhedral, fractured and greatly corroded. Color in reflected light is brass-yellow but the surface is rough and pitted. Fractures are often filled with quartz and sometimes other metallic minerals, although pyrite is not generally associated with silver lead mineralization.

(2) Galena - Isotropic

Recognized by color, and characteristic surface with triangular pits, and also by etch tests. The mineral is widespread and is found associated with all minerals except polybasite.

(3) Pyrargyrite - Anistropic

Found in association with all metallic minerals but most commonly with galena when the two shows smooth mutual grain boundaries. Easily recognized by its blue grey color and strong internal reflection. The anistropism is weak and in small grains is masked by the internal reflection of the mineral. Proved by etch tests.

(4) Polybasite - Anisotropic strong

Found in close association with pyrargyrite only. Color gray. Anisotropism distinctive. Internal reflection deep red. Two X-ray analyses by Thompson* confirmed the mineral as polybasite. The second X-ray was made of a grain which showed typical anisotropism but an anomalous tan color in reflected light.

(5) Sphalerite - Isotropic

Found in very small grains associated with galena and pyrite. Surface somewhat pitted and sometimes showing minute inclusions. The mineral was negative to all etch tests and showed no internal reflection in polished section. Tetrahedrite was suspected but grains removed from the section showed the typical resin-colored internal reflection of sphalerite under the arc light.

No gold, native silver, or chalcopyrite, was found in the polished sections examined, but these minerals have been described by previous writers and are no doubt present in some parts of the ore body.

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*R.M. Thompson, Assistant Professor of Mineralogy, U.B.C.

MINERAL RELATIONS AND PARAGENESIS

An early stage of quartz is easily recognized in polished section by surfaces which are dark and pitted. Contact of these grains with the sulphides and other minerals is often sharp and abrupt, although pyrite was observed penetrating fractures for a short distance. Pyrite crystals are badly corroded and often crossed by veinlets of later quartz and carbonate. Fractures are sometimes filled with galena or sphalerite, and the borders are unmatched, indicating partial replacement. Sphalerite sometimes shows small inclusions or solution inlets of galena and therefore is thought to be later than galena. Pyrargyrite usually shows smooth mutual boundaries with galena but one instance was found where pyrargyrite contained small inclusions of galena and seemed to replace it. The contacts between pyrargyrite and polybasite were in general quite smooth. Sharp crystal outlines of a feldspar were developed in contact with galena and, therefore, this feldspar which (from the crystal outline) appeared to be adularia was contemporaneous with galena.

On the slight evidence listed above the paragenesis of this deposit may be as follows:

Quartz

Pyrite

Sphalerite

Quartz

Calcite

Galena

Adularia

Pyrargyrite

Polybasite.

Several stages of fracturing no doubt preceeded and accompanied the mineralization so that the process has been one of fissure filling of a silicious replacement zone. The deposits of the Torbrit mine are probably high mesothermal or of the low epithermal type.