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A MINERALOGRAPHIC INSPECTION
OF THE CRONIN BABINE ORE SMITHERS, B. C.

By

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PURPOSE

The general purpose of this investigation was to determine the minerals present and the way in which they occured. Such information as this should aid in determining a future mineral dressing procedure on the ore. It was also desirable to attempt to determine the paragenesis and type of deposit.

The specimens studied had been selected by Dr. Thompson and Professor Howard from a sample that had been sent to the University of British Columbia from the Cronin Babine Mine. The specimens so selected were intended to be representative of the larger sample.

LOCATION AND HISTORY OF THE CRONIN BABINE MINE

This property is about 17 miles northeast of Smithers, British Columbia, and is at an altitude of between 4,750 and 5,250 feet. Early in the century veins containing lead, zinc and silver minerals were found on the eastern slopes of the Babine Mountains. In 1909 some of the claims which had been located to include the mineralized area were acquired by a company managed by J. Cronin. This property then became known as Cronin's Mine. Exploration and development started in 1909 and continued intermittently until 1930. During that time the property was explored by several shafts and raises and by four levels called the 5095, 5065, 5000 and 4775 which corresponded to their altitudes. A small amount of ore was shipped to the smelter in 1917 and 1929.

In 1948 the present company which is known as "Cronin Babine Mines, Limited" and is comprised of the Crown-granted claims Lucky Strike, Homestake, Bonanza, Eureka, Babine Chief, Bulkley Pioneer, Sunflower and Sunflower Fraction carried out an exploration program. In December 1948 a sample of ore was sent to Ottawa and mineral dressing tests were carried out on it by the Mineral Dressing and Metallurgical Laboratories of the Department of Mines.

Following these tests a fifty-ton mill was constructed and commenced operation in the late spring 1952. However, due to the drop in base metal prices, coupled with the fact

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that the smelter refused to accept the zinc concentrates because of their soluble silica content, the mine ceased operation in the fall of 1952. ?

GEOLOGY

In 1949 Dr. J.M. Black logged the cores of the holes drilled in 1948 and examined the surface and underground exposures of this property. He described the veins as being in a stock-like body of rhyolite and at its contact with surrounding sediments. These sediments include argillites, quartzites, phyllites, tuffs and a few beds of pebble conglomerate.

The rhyolite intrusive is roughly elliptical in plan, with its longest axis extending northeastward. The stock-like body is light-coloured rhyolite being fairly fine grained. Most of the contacts between rhyolite and argillite are faulted, and the adjoining argillites are fractured and crumpled. The fault zones consist generally of several nearly parallel faults, separated by gouge and due to the mineralization found in them are of economic importance. The fault zones strike northeasterly and dip moderately northwestward roughly parallel to the contact of the rhyolite stock.

The majority of the veins with sulphide mineralization are in contact fault zones or in a fault zone cutting part way across the north end of the stock. The veins in the workings range in width from one to three feet, although widths up to fifteen feet are exposed. Most of the wider parts of the veins have argillite as the hanging wall and rhyolite as the footwall. The veins are usually mineralized, the sulphide content being higher in the wider portions of the veins.

MEGASCOPIC EXAMINATION OF THE ORE

The hand specimens were examined megascopically in order to determine any minerals recognizable by eye or lens. During this examination representative or unusual samples were picked out for polished sections. It was noted that of the specimens studied that galena and sphalerite were the most abundant minerals present and that the ratio of galena to sphalerite was roughly 2:1. However, in the report by Dr. Black it is stated that "on the whole sphalerite is more abundant than galena". This difference may be due to a change in mineralogy while mining or it may only be due to the fact that the specimens studied came from sections of the mine containing more galena than sphalerite.

The main gangue minerals observed were quartz and siderite. A schist mineral was also observed in a few hand specimens.

no idea of size shape & mutual relations, structures or texture

MICROSCOPIC EXAMINATION OF THE MINERALS

The metallic minerals observed were:
(in decreasing order of abundance)

NAME	GRAIN SIZE	
1. Galena	Massive	
2. Sphalerite	2 microns - massive	99% > 10 microns
3. Bournonite	Massive	
4. Pyrite	2 microns - massive	99% > 10 microns
5. **Meneghinite**	10 - 300 microns	95% > 50 microns
6. Arsenopyrite	10 - 150 microns	90% > 50 microns
7. Tetrahedrite	5 - 150 microns	95% > 20 microns
8. Chalcopyrite	5 - 100 microns	90% > 20 microns

GALENA

Galena is the most common mineral. It was readily determined by the presence of triangular pits and its brilliant white colour. The specimens observed were found to be definitely isotropic and the etch tests conformed to those for galena. It appears that the galena is replacing the sphalerite. This conclusion was reached after noting the inclusions in the sphalerite. In some sections galena has completely replaced the sphalerite as indicated by the islands of sphalerite left in the galena. The galena generally occurs massive.

SPHALERITE

The next most abundant mineral is sphalerite. It should be noted here that the galena and sphalerite comprise over 90% by volume of the minerals observed in the specimens. The sphalerite was also readily recognizable by its mouse-gray colour, internal reflection and by its isotropism as seen under polarized light. Although the sphalerite occurs massive, it contains a large number of gangue particles ranging in size from 5 microns to 20 microns. Upon carrying out the etch tests and obtaining the hardness which was estimated as "C" the mineral was definitely determined as sphalerite.

BOURNONITE

Size? Association.

This mineral occurs massive, and although in one specimen it comprises over 50% of the minerals present it does not appear to occur in most of the specimens observed. The colour was gray and the hardness "B" or "B+". It was definitely anisotropic, the polarization colours being purple, blue, gray, brown and green. The etch tests conformed to bournonite and Sb and Pb were proved to be present by microchemical tests, but it was not until a portion of the mineral was X-rayed by Dr. Thompson that the mineral was proved to be bournonite. The boundary between the bournonite and galena is fairly smooth hence times of relative deposition could not be determined.

PYRITE

The identification of pyrite was not difficult. It was determined by its hardness, colour and etch tests. Under polarized light it appeared to be faintly anisotropic. The pyrite occurs as fairly well crystallized grains, varying in size from 2 microns to 150 microns as observed in the polished sections. In some of the hand specimens however grains up to 2 mm. were observed. Due to the occurance of a number of well formed crystals in the galena and sphalerite it was concluded that the pyrite was formed before either the sphalerite or the galena.

MENEGHINITE

This mineral is associated with bournonite and tetrahedrite and occurs in places as a rim around the bournonite. Islands of **meneghinite** were observed in the bournonite but as what appeared to be inclusions of **meneghinite** in the bournonite and bournonite in the **meneghinite** were noticeable it was not possible to determine the times of relative deposition between these two minerals. This mineral was galena white and had a hardness of "B", being noticeably softer than the bournonite. It was distinctly anisotropic showing polarization colours of brown, green and blue. The etch tests complied with those for **meneghinite** but it was not until a portion of the mineral was X-rayed by Dr. Thompson that the mineral was proved to be meneghinite.

ARSENOPYRITE

The arsenopyrite was readily identified. It occurs as fairly well crystallized grains varying in size from 10 microns to 150 microns as observed in the polished sections.

Due to the occurance of a number of well formed crystals in the sphalerite and galena it was concluded that the arseno-pyrite was formed before either the sphalerite or the galena. It was observed that this mineral is associated mainly with the galena.

TETRAHEDRITE

The identification of tetrahedrite was not difficult. It was determined by its olive gray colour, isotropism and etch tests. The hardness of this mineral was estimated as "C" and not "D". It was not possible to determine the relative age of this mineral other than the possibility of being contemporaneous with the galena and meneghinite This mineral was observed to occur mainly in the galena, however a small amount was noticed in the meneghinite. The grain size of the tetrahedrite ranged from 5 microns to 150 microns, 95% of the mineral occuring as grains larger than 20 microns. Although silver was shown by microchemical tests to be present either in the tetrahedrite or the galena adjacent to it, it was not possible to determine if the tetrahedrite was the actual carrier of the larger amount of silver for galena carried silver also.

CHALCOPYRITE

The chalcopyrite was identified by its creamy yellow colour, hardness, etch tests, anisotropism and polarization colours of gray and greenish yellow. This mineral occurs in both the galena and the bournonite. The grain size varies from 5 microns to 100 microns, 90% of the mineral occuring as grains larger than 20 microns.

PARAGENESIS

It was not possible to determine the sequence of *Why?* deposition of the ore minerals. However due to the observance of well formed crystals of both pyrite and arsenopyrite in the galena and sphalerite it was concluded that these two minerals were formed before either the galena or the sphalerite.

It was also observed in some sections that the galena has replaced the sphalerite. In other sections, inclusions of galena were observed in the sphalerite. From this information it was concluded that the sphalerite was formed before the galena.

Other than this above information the writer was unable to determine the sequence of deposition.

TYPE OF DEPOSIT

It would appear that due to the mineral assemblages such as arsenopyrite, galena, sphalerite, bournonite, pyrite, **meneghinite,** tetrahedrite, chalcopyrite and siderite, this deposit according to Lindgren's Classification would be of the mesothermal type. The property would be described as a lead-zinc fissure filling deposit.

CONCLUSIONS

It can be concluded that this mineralographic inspection of the Cronin Babine ore has shown that the mineral dressing of this ore should not prove difficult. Although a number of mineral grains were observed to be as small as 2 microns no complicated interlocking of minerals was noticed. Hence the ore from this mine would not have to be ground excessively fine to free over 95% of any one mineral.

It should be noted that it was not proved in this examination whether the tetrahedrite was a high carrier of silver or not. If some later examination shows that the tetrahedrite carries high silver values it is obvious that any mineral dressing procedure would have to be such that the tetrahedrite is not lost. However, as the smallest free particles of this mineral are 5 microns the recovery of tetrahedrite should not prove difficult.

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