

THE ASPEN MINE

A Dolostone-Breccia-Hosted Silver Deposit Near Salmo, B.C.

by Mel de Quadros, Vancouver, B.C.

The Aspen Mine is one of several carbonate-hosted deposits in the Kootenay Arc, lying between the H B Mine (to the south) and the Hunter V - Standard and Jackpot Mines (to the north). These deposits are stratabound and occur in dolostone-breccia units of the Reeves Limestone, a member of the Cambrian Laib Formation. The deposits have been strongly affected by faulting, folding and by the emplacement of the Cretaceous Nelson Batholith.

Certain of these carbonate-hosted deposits are anomalous in silver. This is reported to occur as argentiferous tetrahedrite, proustite and native silver, with little or no associated lead and zinc, in a gangue of silicified limestone. The Hunter V - Standard Mines produced 62,634 tons grading 0.02 oz/ton gold and 4.34 oz/ton silver, while the Meadow View, (15 kms. to the south) is reported to carry between 4 and 69 oz/ton silver in poorly mineralized and silicified carbonate rocks.

Recent work on the Aspen property by Extotal Resources Inc. revealed the existence of three mineralized, stratabound dolostone-breccia horizons in the carbonate units of the mine. These are:

- a) The Upper Zinc-Bearing Dolostone Breccia: consisting of sphalerite-pyrite-pyrrhotite in a calcite-dolomite-olivine-serpentine talc gangue. The sphalerite grains often display pyrrhotite exsolution lamellae.
- b) The Middle Silver-Bearing Siliceous Dolostone-Breccia: consisting of pyrrhotite-sphalerite-galena-tetrahedrite in a diopside-quartz-calcite-wollastonite-serpentine-humite gangue. The total sulphide content is generally less than 1.5%, with the sphalerite grains often displaying chalcopyrite ex-solution lamellae. This unit is 1 to 8 metres thick, and has been traced on the surface for about 1100 metres.
- c) The Lower Lead-Zinc-Silver-Bearing Dolostone-Breccia: consisting of sphalerite, galena and tetrahedrite in a calcite-dolomite-olivine-wollastonite gangue. Assays range from 8.5 to 60 oz/ton silver with 2.3% to 6.6% zinc and 2% to 24% lead.

The middle argentiferous horizon contains numerous greenish, grey or bluish rounded elongated fragments of siliceous dolostone in a sparry calcitic matrix. The fragments are elongated parallel to the bedding and tend to be larger near the base. They range from a few centimetres to a metre in size. Blebs of tetrahedrite occur both in the fragments and in the matrix. Sulphide content is low except in fracture zones near noses of folds where sulphides can increase to 60%, with about 15% zinc and up to 0.4 oz/ton gold and 40 oz/ton silver.

There is a general relationship between copper and silver values; the absolute copper values are however low. Silver values show a strong relationship with silica content. The ranges in some elements are:

| | | | |
|-----|-------------|------|--------------|
| | 19-30% | MgO: | 7-20% |
| Ba: | 75-1600 ppm | | |
| As: | 4- 150 ppm | Sb: | n.d.-675 ppm |
| Cu: | 3-2300 ppm | | |
| Zn: | 0.1-30% | Pb: | 0.1-9% |

The modes for the As, Ba, Cu, Pb, Sb, and Zn are close to the lower limits of the ranges. The CaO:MgO ratio is generally 2:1, indicating host-rock's original dolomitic composition. The argentiferous dolostone-breccia horizon trends NNW-SSE, dipping about 40-50° to the N.E. It is cut into separate blocks by two distinct sets of faults. The metasomatic effect of the Nelson granite is seen to be restricted to a few centimetres of diopside-garnet skarn.

Two possible sources of the silver mineralization are suggested:

- a) Syngenetic: introduction of SiO₂ and Ag during deposition of the dolostone breccia in rather special physical and chemical conditions followed by later mobilization during folding and emplacement of the Nelson Batholith.
- b) Epigenetic: hydrothermal introduction of SiO₂ and Ag as a result of the emplacement of the small granitic plugs of Cretaceous Age that occur in the Kootenay Arc.

At this stage, insufficient data exists on which to base a definite conclusion but the following observations are pertinent at Aspen;

- 1) the silver mineralization is restricted to a single, very siliceous dolostone-breccia horizon. The assay boundaries conform closely to the limits of the bedding.
- 2) the tetrahedrite occurs as small, irregular aggregates in an otherwise unmineralized rock, and may be easily mistaken for carbonaceous matter in an environment where prospecting is biased towards high sulphide content.
- 3) these features are characteristic of the three occurrences that are known to occur within a 20 km. strike length within the Reeves Limestone.

In conclusion, the writer views the strong relationship between silica content and silver values and bedding as indicating an unusual type of ~~syngenetic~~ deposit, within the broad framework of Mississippi-Valley-type lead-zinc-silver deposits.

References:

- | | | | |
|-----------------|--------|---------------------|---------------------------------------|
| Fyles & Hewlett | (1959) | Bull. 41 | B.C. Dept. of Mines |
| Green | (1954) | Bull. 29 | Geological Survey of Canada |
| Sargent | (1936) | Unpublished Report, | B.C. Dept. of Mines |
| Walker | (1934) | Memoir 172, | Geological Survey of Canada |
| Weissenborn | (1970) | Bull. 61 | Washington Dept. of Mines and Geology |

Acknowledgements for many discussions and assistance to my partner, John Mirko, to Dave Peterson of RioCanex, Fred Gill of Cominco, Mohan Vullimiri of Serem, and to JoAnne Nelson for the Petrology.

October 27, 1981
Vancouver, B.C.