PRELIMINARY REPORT ON THE MINERALOGY OF THE TULKS MASSIVE SULFIDE DEPOSIT, BUCHANS AREA, NEWFOUNDLAND

by

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The Tulks prospect, held jointly by Abitibi-Price and ASARCO, is a pyritite-type massive sulfide deposit in felsic metavolcanics about 40 km southwest of Buchans. Extensive diamond drilling begun in 1963 has delineated four massive sulfide lenses, designated T-1 to T-4, which total 700,000 to 800,000 tonnes grading about 5.6% Zn, 2.0% Pb, 1.3% Cu, 41 g/t Ag, and 0.4 g/t Au. The T-3 lens has been penetrated by underground workings, from which a bulk sample taken for milling tests gave unsatisfactory metal recoveries. Remnants of the feed for these milling tests and diamond-drill cores from the T-1, T-2 and T-3 lenses have been examined in polished sections to provide a reconnaissance evaluation of the Tulks mineralogy and its pertinence to the metallurgical problems.

Pyrite is the principal sulfide in all of the Tulks lenses, and sphalerite, galena and chalcopyrite account for all but trace amounts of the primary base metal values. Nearly all of the silver contents are attributable to argentian tetrahedrite, and electrum is sufficiently common to account for all of the gold values. Electron microprobe analyses of the sphalerite generally give iron contents of 2 to 3 wt.%, but values up to 8.6% Fe have been obtained for sphalerite in contact with pyrrhotite. Silver contents of tetrahedrite vary up to 10.3 wt.% Ag, and Sb-As values indicate that compositions extend from tetrahedrite to almost end-member tennantite. Analyses of two grains of electrum gave 67 and 69 wt.% Au.

In addition to the main sulfides, variable but generally small amounts of arsenopyrite, pyrrhotite, marcasite, magnetite, ilmenite and hematite are present in proportions that differ from lens to lens. The principal translucent minerals in the massive sulfide zones are quartz, muscovite (some grains containing percentage amounts of BaO), chlorite, barite, calcite, dolomite and celsian; others present in small amounts are rutile, sodic plagioclase, and unidentified barium silicates.

The textures and grain sizes of the sulfide minerals are suitable for ore-mineral liberation: most of the base metal sulfides are relatively coarse; finer fractions, even those in compact masses of pyrite, are predominantly interstitial to pyrite crystals or are along the grain boundaries of anhedral pyrite. Textures are generally simple and grain boundaries are smooth; complex sulfide intergrowths, although fairly commonly observed, are quantitatively rare. The principal negative factor for liberation is that some of the coarse grained pyrite contains small inclusions of galena, sphalerite and chalcopyrite which will not be separable.

Difficulties in processing the Tulks ore seem to be related mainly to supergene alteration and to oxidation of the sulfides, but at this stage of study the superior importance of one versus the other has not been established. Supergene alteration is evident from the presence of digenite, accompanied by minor covellite, which occurs in all lenses as thin rinds and hairline veinlets in chalcopyrite and sphalerite. Numerous microscopic masses of marcasite alteration are present in the T-1 and T-2 lenses, but have not yet been found in the incompletely studied T-3 lens. Oxidation of the sulfides is evident from goethite rims around voids, indistinct peripheral alteration of galena (to cerussite?), and in some cases the local presence of abundant anglesite. Supergene and oxidation effects are not continuous across the thickness of a lens, and more work is needed to establish the extent of these alterations and their quantitative importance.

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