

The Cortaderas Ag-Zn-Sn-In Deposit at Pirquitas Mine, NW Argentina: Integrated Ore Mineralogy and Textures with Fluid Inclusion Microthermometry

E. T. Slater¹, D. J. Kontak¹, A. M. McDonald¹

¹Department of Earth Sciences, Laurentian University, Sudbury, Ontario P3E2C6

The Cortaderas ore body is a recently discovered (2010) and unexploited sulfide-rich vein breccia at the Pirquitas Mine, NW Argentina. This Miocene Ag-Zn-Sn-In-rich ore body is characterized by a diversity of epithermal textures and minerals which include colloform- and skeletal-textured ores of principally sphalerite, pyrite, arsenopyrite, cassiterite, galena, and numerous sulfosalts of Ag, Sn, As, Sb, Pb, Zn, Fe, Cu, and Bi (e.g., pirquitasite). Here the mineralogy and textures of ore samples are integrated with fluid inclusion (FI) microthermometric data to constrain the PTX conditions of ore formation and to develop a genetic model for the deposit. Colloform sphalerite in high-grade ore samples contains two populations of aqueous FIs: Type I are equant-shaped and L-rich with consistent V:L ratios of 0.1-0.2, whereas Type II are irregular-shaped and V-rich. Fluid inclusion assemblages (FIAs) of Type I inclusions, which cross-cut primary growth zones and are thus secondary or pseudosecondary in origin, have salinities of 0.18-4.80 wt. % eq. NaCl and T_h values of 207°-227°C. These data are consistent with dilution of a magmatic fluid with heated meteoric water. The FIAs of Type II inclusions may be primary and record the instantaneous boiling of the ore-fluid during transient fluctuations from lithostatic to hydrostatic conditions (i.e., flashing). Silver mineralization occurs as a variety of sulfosalts locally intergrown with the colloform sphalerite. Sulfosalts with cusped interfaces are interpreted to have unmixed from a heterogeneous phase during cooling following initial deposition. For example, kesterite exsolution lamellae are common in the stannite-like mineral pirquitasite; the two phases were deposited as a solid solution and exsolution resulted from structural differences at lower temperature. Re-heating of these sulfosalts, using a calibrated thermometric stage, until they have homogenized provides minimum temperature estimates for their initial deposition, which is inferred to be at least 300°C. These conditions are consistent with temperatures estimated from Ag-rich tetrahedrite, which was used as a mineral thermometer, constraining formation to ~250°-300°C. Episodic fracturing along the mineralized structure is a likely mechanism to facilitate flashing and subsequent mixing of magmatic and meteoric fluids by reducing the confining pressure and creating conduits for fluids to mix.