Major Ore Types of the Lalor Auriferous VMS Deposit, Snow Lake, Manitoba

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Abstract

The Lalor deposit is a newly discovered auriferous volcanogenic massive sulfide (VMS) deposit located on the East end of the Paleoproterozoic Flin Flon belt within a tectonostratigraphic succession known as the Snow Lake Arc (SLA) assemblage. With combined reserves and resources of 27.1 Mt at 2,82 g/t Au, 25,3 g/t Ag, 0.76% Cu and 5.16% Zn, Lalor stands out as an anomalously sized VMS deposit globally as well as the largest in the SLA. Hydrothermal activity along with superimposed polyphase deformation (D_1-D_3) and upper amphibolite metamorphism have produced an array of ore types; some of which are modified versions of ore types common in VMS deposits while others are atypical. Four main ore types, labelled 1 to 4, have been identified based on geochemistry and mineralogy. Type 1 massive sulfide (Zn±Cu±Ag) is the most common ore type and is characterized by coarse grained pyrite-sphalerite. Type 4 stringer sulfide (Au-Cu) contains chalcopyrite veins hosted in chlorite with sporadic patches of biotite and garnet. Although some recrystallization and remobilization has taken place, these two assemblages are typical of VMS mineralization as they respectively represent the low and high temperature zones. Type 2 mineralized chlorite carbonate schist (Ag-Au-Pb-Cu±Zn) contains stringers of galena and chalcopyrite with complex intergrowths of sulfosalts rimming electrum within a chlorite-dolomite matrix rich in calc-silicates. Type 3 low sulfide ore (Au±Ag) is a sparsely mineralized assemblage dominated by quartz-biotite-staurolite with minor pyrite and pyrrhotite but high Au grades. These latter two precious metal-rich ore types are uncharacteristic of VMS deposits and preliminary results indicate that they result from local remobilization of metals during prograde metamorphism. Studying the Lalor deposit ore types will allow for a better understanding of the original hydrothermal system and precious metal-rich VMS deposits, as well as the role of metamorphism and deformation in concentrating precious metals.