The Au-Ag-Cu-Zn-bearing mineralized zones at the Horne deposit No. 5 zone, Rouyn-Noranda, Québec – new observations and preliminary results

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The Horne deposit is the single largest gold-rich volcanogenic massive sulphide deposit in the world, with 325.4 t Au extracted from the Upper H and Lower H zones. Total resources (indicated and inferred) of the unexploited No. 5 zone, located down-plunge of the H orebodies, currently amount to 113.4 Mt of ore grading at 1.54 g/t Au (174.9 t Au). The deposit is hosted in a steeply dipping succession composed primarily of felsic volcaniclastic units that are bounded by the Andesite and Horne Creek faults within the Blake River Group of the Abitibi greenstone belt. Thick layers of lapilli tuffs intruded by a swarm of sterile mafic dykes represent the main host rock of the gold-bearing intervals in the No. 5 zone, which comprises a series of massive to semi-massive sulphide lenses of variable thickness containing mostly pyrite, sphalerite, chalcopyrite, and magnetite, alternating with zones of disseminated and stringer sulphides. Detailed core logging during summer 2016 of a selection of five new holes drilled by Falco Resources, in conjunction with recent petrographic analyses, led to many important observations: 1) felsic fragments in the host volcaniclastic rocks are composed of fine recrystallized quartz and 1 to 10% sericite, while the matrix is altered to fine sericite-quartz-pyrite with trace chlorite, indicating intense alteration in the entire succession; 2) two major types of mineralization are recognized, consisting of massive pyrite clast-bearing felsic breccia with stringer sulphides and disseminated pyrite, and intervals of semi-massive to massive sulphides replacing the matrix of the host rock; 3) sphalerite is preferentially associated with matrix-hosted pyrite, while chalcopyrite is generally remobilized in secondary sites within the mineralized intervals; 4) gold distribution is relatively variable, but higher gold contents are generally present in the massive to semi-massive sulphide intervals; and 5) a few competent felsic units of lesser permeability most likely influenced the distribution of the mineralization. Further work will test the hypothesis of a relationship between gold and primary sulphide deposition, with possible deformation-induced modifications, and will include lithogeochemical analyses of sulphides, host rocks and altered samples, LA-ICP-MS analyses on sulphides, 3D modelling of metal distribution and alteration, and geochronology. The objectives are to determine the precise relationships between gold mineralization, sulphide phases, host rocks, and deformation, and to establish controls on gold distribution within the No. 5 zone of the Horne deposit, leading to a better understanding of Archean synvolcanic gold-bearing systems.