

Mineralogical Association of Tourmaline-Pyrite in Orogenic Gold Deposits, Val d'Or Mining District, Quebec, Canada: Characterization of the Association and its Implications

L Daver¹, C Sasseville¹, M Jébrak¹

¹Department of Earth Sciences and Atmosphere, University of Quebec in Montreal, Montreal, QC

Six gold-mineralized samples have been studied from four mines in the Val d'Or mining district in the deformation corridor of the Cadillac Fault, Quebec, Canada. They are situated on a 30 km diagonal across the Bourlamaque pluton in ore vein system: Goldex, Lamaque, Lac Herbin and Beaufor. This study is part of the FQRNT-MRN Corridor project which attempts to decipher the hydrothermal evolution of the large Archean breaks that control the gold deposits in the eastern part of the Abitibi greenstone belt. This study aims to determine if there is mineralogical pattern along the Cadillac fault and its implication in the setting of such ore deposit types. Size and density separations allow the division of the samples into eight fractions of light and heavy materials. These minerals are subsequently analyzed using binocular microscope and Hitachi TM3000 SEM coupled to a Bruker Quantax 70 EDX. For each size fractions, 15ml is kept dry and analyzed using XRF technique with a XL3 Nitton. The four mines display similar mineralogical associations of pyrite and tourmaline in quartz-carbonate-tourmaline veins. Gold is associated predominantly with cubique pyrite grains in > 100 µm size-fraction. In Goldex and Lamaque's Parallel zone, gold is associated with tellurium as inclusions within the pyrite. Native gold is associated with silver in Lamaque's Triangle zone, Lac Herbin and Beaufor. Three tourmaline types are distinguished: schorl, uvite and dravite. They are associated with specific size fractions and pyrite habits: in > 250 µm schorl is associated with massive pyrite, in 60-100 µm uvite is associated with intermediate pyrite habit and in < 40 µm dravite is associated with cubic pyrite habit. The wide variation of tourmaline in orogenic gold deposits reflects the abundance of boron at each step of mineralization. The three specific associations may be related to three different mineralization phases. The crystallization order of dravite-uvite-schorl indicates mineralization in an alkali solid solution tourmaline context with a fluid ranging from Mg-rich- to an Fe-rich solution. Otherwise, documentation of dravite in orogenic gold deposits is nearly unseen. Its occurrence facilitates the use of hyperspectral application in order to recognize this type of sample.