

Characterization of Au mineralization in the Benny greenstone belt footwall rocks of the Parkin offset dike in the North Range of the Sudbury Igneous Complex, Canada

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The Parkin offset dike is a radial intrusion linked to the Whistle embayment at the base of the Sudbury Igneous Complex (SIC) along the NE lobe of the Sudbury impact structure. It formed by the injection of impact melt into the basement footwall rocks shortly following the ca. 1.85 Ga Sudbury impact event. Ni-Cu-PGE mineralization along the Parkin offset dike has been the main exploration focus of Wallbridge Mining Limited but exploration efforts also discovered unexpected Au mineralization. Gold-bearing quartz-carbonate-epidote veins with minor pyrite and chalcopyrite are hosted in metavolcanic rocks of the Archean Benny Greenstone Belt adjacent to the dike. Little is known about this style of gold mineralization in the Sudbury mining camp. Detailed core logging, transmitted light microscope and scanning electron microscope (SEM) petrography, and whole-rock geochemical analysis were conducted to characterize the gold mineralization. The gold mineralization is contained by 5-50 cm thick veins primarily hosted by greenschist facies mafic metavolcanic rocks. These veins contain euhedral pyrite rimmed or cut by fractures filled by chalcopyrite. Associated trace metals, e.g., Mo, Ag, and Hg increase in concentration by factors of two or three times next to the veins. Further studies on the host rocks, their alteration mineralogy, geochemistry, and trace metal association is in progress and will help exploration efforts for this new style of mineralization in the Sudbury mining camp.