

## **Tectonic evolution of the Beardmore-Geraldton Belt and its implication for the relative timing of gold mineralization**

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The Beardmore-Geraldton greenstone belt is a transitional terrane between the granite-greenstone Wabigoon subprovince and the metasedimentary Quetico subprovince of the Archean Superior Province. The Geraldton camp in the eastern end of the belt was at the center of debates in the 1980's on the origin of gold mineralization in banded iron formation. Over the past century, the belt produced over 4.1 Moz gold from multiple mines across the belt. Renewed exploration outlined an additional 2.43 Moz indicated and 1.37 Moz inferred gold resource along the Hard Rock Mine - Consolidated Mosher Mine trend, south of Geraldton. The ore will be extracted as an open-pit mine operation. The main goal of the project is to determine the structural and lithological controls on gold mineralization. Detailed structural mapping of several large stripped outcrops within the outline of the future open pit suggest that a previously unrecognized sinistral transpression event ( $D_2$ ) postdates  $D_1$  thrusting and imbrication of the belt and predate regional  $D_3$  dextral transpression across the belt. Gold was emplaced during two mineralization events. The first mineralization event is expressed by bedding-parallel quartz-carbonate-tourmaline veins with sericite-carbonate-sulphide alteration haloes that are folded by  $F_1$  and refolded by  $F_2$  folds, thus the first gold emplacement took place at the beginning of  $D_1$  thrusting. The second mineralization event is defined by en-echelon arrays of northeast- to east-trending quartz-carbonate-sulphide-tourmaline±gold veins surrounded by sericite-carbonate-sulphide alteration haloes. The veins cut across S-shaped  $F_2$  and are overprinted by later S-shaped folds with similar orientation, suggesting that they were emplaced during  $D_2$  sinistral transpression. These results completely differ from previous studies which attributed the emplacement of gold mineralization in the belt to a single pulse during  $D_3$  dextral transpression.