

Two gold-bearing vein styles east of Matheson Ontario

I Chappell, B Lafrance, DJ Kontak

Harquail School of Earth Sciences, Laurentian University, Sudbury, Ontario

The Porcupine-Destor deformation zone (PDDZ) is a major gold-bearing deformation zone in the southern Abitibi greenstone belt. This deformation zone hosts some of Canada's largest lode gold deposits as well as many smaller deposits. Eleven kilometers east of Matheson, Ontario are the Black Fox, Grey Fox and Hislop deposits. These deposits are located within or south of the PDDZ, hosted by variably deformed mafic and ultramafic metavolcanic rocks of the Tisdale assemblage (2710-2704 Ma) and Timiskaming assemblage (2677-2670 Ma). The earliest deformation, D_1 , has been interpreted as the steepening of the Tisdale assemblage to produce a near-vertical stratigraphy, which was then unconformably overlain by Timiskaming assemblage metasediments. D_2 occurred during south-over-north shortening, which formed a penetrative fabric (S_2) with a down-dip stretching lineation (L_2). Continued south-over-north movement produced tight to isoclinal folds (F_{2b}) with axial-planar cleavage (S_{2b}), stretching lineation (L_{2b}), and south-over-north shear zones. Gentle to open north-verging folds deformed the older fabrics (D_2) and occurred during late D_2 . During D_3 , the deformation zone was reactivated by dextral shear, which deformed D_2 fabrics, resulting in the formation of folds with z asymmetry, axial-planar (S_3) cleavage, and dip-slip stretching lineation (L_3). The latest deformation is a south-over-north fault that cross-cuts all older structures. Two distinct types of gold-bearing veins are present in the Black Fox, Grey Fox and Hislop deposits. Gold-bearing quartz-carbonate veins with crustiform texture are present in the Grey Fox and Hislop deposits, hosted by Tisdale intermediate to mafic metavolcanic rocks and Timiskaming metasediments. Although these veins are comparatively undeformed, S_2 fabrics deform the crustiform veins along the contact between mafic and ultramafic metavolcanic rocks. The second style of gold-bearing veins is at the Black Fox deposit, where fault-fill and extensional quartz-carbonate veins indicate mid-crustal deposition. Fault-fill veins contain fragments of foliated ultramafic metavolcanic rock and were folded by F_{2b} folds. Although no direct cross-cutting features were documented between these two styles of mineralizations, the distinct vein textures and overprinting fabrics suggest that two gold mineralization events occurred. The first gold mineralization event occurred at a shallow crustal level prior to D_2 , and a second event took place during early D_2 at a mid-crustal level. The Black Fox, Grey Fox and Hislop deposits are excellent examples of two distinct but spatially associated styles of gold mineralization.