

Main structural controls on the nature and distribution of gold in polytectonized Precambrian volcanic-sedimentary successions: An example from the Whale Tail zone, Amaruq project, Nunavut

P Grondin LeBlanc¹, P Mercier-Langevin², M Malo¹, O Côté-Mantha³, M Simard³, P Barbe³, M Valette⁴, S De Souza⁴

¹Institut national de la recherche scientifique, Centre Eau Terre Environnement, Quebec, Quebec; ²Geological Survey of Canada, Quebec, Quebec; ³Agnico Eagle Mines; ³Université du Québec à Montréal, Montreal, Quebec

The Amaruq gold project, located in northwestern Churchill Province (Nunavut), comprises two main auriferous zones, the Whale Tail and IVR zones, along with a series of other gold occurrences, all of which are hosted in Neoproterozoic volcanic and sedimentary rocks of the Woodburn Lake group. These rocks are polydeformed and characterized by upper greenschist facies mineral assemblages. The Whale Tail zone is predominantly hosted by a steeply dipping metasedimentary succession that strikes E-NE and consists of orthochemical (iron formation and chert) and clastic (greywacke) rocks. The host sedimentary succession is flanked to the north by tholeiitic komatiites intercalated with silicate-facies iron formations and to the south by transitional to calc-alkaline ultramafic and mafic volcanic rocks. Two main styles of gold mineralization are present at Whale Tail: (1) stratabound mineralization characterized by arsenopyrite and silicification/diffuse quartz veining in chert and by abundant pyrrhotite in iron formations; and (2) discordant mineralization characterized by gold- and arsenopyrite-bearing quartz veins with and without galena. The presence of both styles of mineralization at Whale Tail lends itself to a variety of hypotheses with regards to their genesis and relative chronology. To better understand these aspects, detailed descriptions of fabrics present in drill core, petrographic analysis of fabrics in thin section, and structural analysis were undertaken. Drill core from nine drill holes on three sections transecting the heart of the Whale Tail zone was selected as well as oriented drill core from an additional hole transecting the easternmost section. Preliminary results, which are insufficient at this time to define a clear relative chronology, suggest at least two important fold structures in the study area: (1) a northeasterly plunging, asymmetrical fold associated with a strong foliation (main schistosity); and (2) a northwest verging, shallowly-plunging, overturned fold with an associated axial planar fabric coinciding with the orientation of discordant mineralization corridors. Detailed descriptions of fabrics in drill core also suggest the presence of a late, locally penetrative, axial planar cleavage with no apparent outcome on mineralized zones. Further work will help define the relative chronology of these structural elements and their impact on the gold distribution at Whale Tail.