

Geological and geophysical investigation of the western St. Mary's Basin, central mainland Nova Scotia: implications for palaeoplacer potential

L.C. Jennex, J.B. Murphy and A.J. Anderson

Department of Geology, St. Francis Xavier University, P.O. Box 5000, Antigonish, Nova Scotia B2G 2W5, Canada

Horton Group clastic rocks in the St. Mary's Basin are predominantly derived from auriferous Meguma terrane lithologies to the south. Lithological and sedimentological criteria indicate the contact between the lacustrine Little Stewiacke River Formation and the fluviatile Barrens Hills Formation represents a shoreline facies which is a potentially favourable palaeoplacer gold horizon. The contact is marked by the occurrence of a thick sequence (<10 m) of quartz-pebble conglomerate beds. Micron-scale (<150 μm) gold present in the matrix of the conglomerates displays a "nuggety" appearance and flaky micro-texture indicative of a detrital origin. Other minerals identified within the conglomerates are also typical of palaeoplacer deposits.

The orientation of the contact has been affected by northeast-trending D_1 periclinal structures, which are locally kinked by north-northwest-trending D_2 folds and fractures. A series of magnetic surveys enabled more precise definition of the contact, which is recognized as an abrupt 5 to 10 nT "drop" from the Little Stewiacke River Formation to the Barrens Hills Formation.

Geochemical analyses indicate the near-contact siltstones were derived predominantly from the Meguma Group

metasediments, while the near-contact sandstones are comprised primarily of Meguma terrane granitic detritus. The matrix of the quartz-pebble conglomerates consists predominantly of granitic Meguma detritus, while the quartz pebbles were likely derived from Meguma vein quartz. Minerals within the quartz-pebble conglomerates indicate source regions included both the granitic and metasedimentary rocks of the Meguma terrane, along with lithologies of the Liscomb Complex and the tin domain of southwestern Nova Scotia. The near-contact rocks exhibit several geochemical features which distinguish them from other intra-basinal lithologies, including an accumulation of zircon grains within the lacustrine littoral system.

Lithological, sedimentological, and geochemical characteristics of rocks in the vicinity of the contact, along with other intra-basinal lithologies, indicate a wet-dry seasonality related to orographically-induced precipitation effects which are attributed to the Late Devonian uplift of the Meguma terrane. A gradual reduction of orographic precipitation effects may account for the increasing dominance of arid conditions in the later depositional history of the region.