

Structural geology and mineralisation in the McLeod Road - Birch Lake thrust panel hosting the New Britannia Mine, Snow Lake, Manitoba

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The McLeod Road – Birch Lake (MB) sequence is a fault bounded panel of bimodal volcanics and volcanoclastic rocks in the Paleoproterozoic Flin Flon – Snow Lake greenstone belt of the southeastern Trans-Hudson Orogen (THO). It is bounded to the north by the Birch Lake Fault and to the south by the McLeod Road Thrust (MRT). It hosts the past gold-producing Snow Lake Mine (1.4 M oz) and is immediately north of the major volcanogenic massive sulphide camp of Snow Lake. The MB sequence underwent three major deformational events. Early D1 collision of the Flin Flon – Snow Lake greenstone belt with the Sask craton produced early thrust faults that repeat the stratigraphy of the MB sequence. The latter is folded by the F1 Nor-Acme anticline (NAA), which formed during thrusting and has a strong axial planar NE trending S1 foliation and coaxial NE plunging L1 stretching lineation. D1 is a progressive deformation event and later during D1, the NAA is cut by the MRT, which juxtaposes the (1835 – 1842 Ma) Burntwood turbidites with the (1.89 Ga) MB sequence volcanics. The Birch Lake Fault is parallel to the MRT, but it juxtaposes younger Missi conglomerates (1845 Ma) over the MB sequence volcanic rocks and has normal shear sense indicators. During D2 collision with the Superior craton, a NNE-striking, regional S2 cleavage formed transecting the NAA and MRT and reactivating the MRT as a sinistral shear zone. Continued shortening and ongoing collision of the Superior craton during D3 forms broad open NE trending map scale F3 folds. At each of the main mineralised zones on the property, gold bearing quartz veins are emplaced in the hinge of the NAA, as saddle reef veins during folding and in sinistral shear zones that formed during syn-folding flexural slip along the north limb of the NAA. Mineralisation is early and associated with the NAA, however the exception is the main mine mineralisation. The main mine mineralisation may have been emplaced with shearing associated with the Howe Sound Fault; a later fault, which offsets the MRT.