

New perspectives on the stratigraphy, structure and metallogeny of island-arc volcanic rocks in the Ordovician Roberts Arm Group, Notre Dame Bay

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A new interpretation of the Roberts Arm Group suggests that it comprises five basalt-dominated tectonic terranes (*s.l.*), which are separated by variably steepened, south to southeast-dipping, north-directed thrust faults. The structural base of the group is the Boot Harbour terrain, which contains well-preserved submarine felsic volcanic rocks, possibly erupted under deep marine conditions. The structurally overlying Pilley's Island terrane contains distinctly different fragmental felsic rocks representing more violent (shallow-water?) volcanism, associated with significant VMS mineralization and alteration. These are structurally overlain by basalts of the Mud Pond terrane, which have a regional hematite (\pm epidote) alteration signature. The structural top of the calc-alkaline sequence is the Triton terrane, containing fresh basalts and voluminous mafic intrusive rocks. These four terranes are probably in turn structurally overlain by tholeiitic basalts and associated sedimentary rocks of the Crescent terrane. The structural polarity in the area is directly opposite to previous proposals, and the four calc-alkaline terranes are logically viewed as the disrupted, lower limb of a northward-overtaken anticlinal nappe structure. The Springdale Group rests unconformably upon different Robert's Arm Group terranes, suggesting some pre-Middle

Silurian deformation and imbrication. Later deformation is largely brittle, and is related to dextral transcurrent and/or southeast-directed reverse motions along the Lobster Cove Fault and similar structures.

The most significant VMS mineralization is restricted to the Pilley's Island terrane, and is associated with structurally modified, sericitized dacitic pyroclastic rocks. Recent exploration activity has demonstrated the potential for "blind" ore bodies, and for structural repetition of ore horizon rocks. Elsewhere, VMS mineralization appears to be restricted to stockwork-style occurrences associated with chloritized tholeiitic basalts of the Crescent Lake terrane. Minor VMS mineralization is also associated with sericitized felsic rocks at the Handcamp prospect. Epigenetic mineralization within the Robert's Arm Group is extensive and consists of structurally-controlled quartz veins and disseminated mineralization, locally superimposed upon pre-existing VMS occurrences. This style is particularly well developed within the Mud Pond terrane. Examples include Cu (\pm Ag)-bearing quartz veins at the Crescent Lake mine, Au-bearing pyritic quartz veins at the Chignic showing, and disseminated auriferous pyrite at the Handcamp prospect.