Tectonostratigraphic development and economic geology of the Sops Head Complex, western Notre Dame Bay, Newfoundland

E. John Clarke
Department of Earth Sciences, Memorial University of Newfoundland, St. John's, Newfoundland A1B 3X5, Canada

The Sops Head Complex has been previously interpreted as a lower Silurian tectonic/olistrostromal mélange developed above a coarsening-upwards flysch sequence derived from the emergent Notre Dame Subzone. Detailed mapping coupled with geochemical and palaeontological studies indicate that the Sops Head Complex is actually an imbricate fold and thrust belt developed on the periphery of the Exploits Subzone. Flyschoid greywackes and conglomerates of the Sansom-Goldson type can be shown to be derived from the Exploits Subzone.

The Burnt Creek Fault has been previously thought to be part of the Red Indian Line, an Ordovician fault system marking the boundary of the Exploits and Notre Dame subzones. The Burnt Creek Fault can be demonstrated to be a Silurian, sinistral, strike-slip fault that dissects the imbricate sequence. Displacement along the Burnt Creek Fault is in the order of 4 km.

Facies relationships and palaeontology demonstrate the existence of rocks of Exploits Subzone affinity to the west side of the Burnt Creek Fault, thus rendering it obsolete as a terrane-bounding fault. Stratigraphic and facies relationships coupled with rare-earth element geochemistry suggest the tholeilitic terrane of the Robert's Arm Group may also represent part of the Exploits Subzone, requiring the Red Indian Line be moved further to the northwest.

Molybdenite-gold-arsenopyrite-stibnite mineralization within the Sops Head Complex is directly related to two small peraluminous granodiorite stocks of presumed Silurian age. Au-As-Sb mineralization is largely restricted to faults and fractures within sedimentary rocks but elevated concentrations also occur within the heavily altered stocks. Rare-earth element geochemistry of fresh, altered and altered/mineralized rocks suggests that mineralization was a result of late-stage, deuteric alteration of the granodiorite. The low-potassium, peraluminous, fluorine-deficient nature of the intrusions precludes the application of an anorogenic, Climax-type model of ore genesis.