Volcanogenic massive sulphides of the southern Tulks Volcanic Belt, central Newfoundland: environments and styles of mineralization

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The Tulks Volcanic Belt, of the Victoria Lake Supergroup, central Newfoundland, is dominated by quartz ± feldspar porphyritic felsic volcaniclastic rocks and lesser amounts of mafic volcanic rocks and intercalated sedimentary rocks. The belt has traditionally been viewed as a single stratigraphic sequence of ca. 498 Ma age, but recent geochronological studies imply that it may be a composite and include rocks as young as 453 Ma.

The southern portion of the belt is host to three important clusters of VMS deposits known as the Tulks East, Tulks Hill, and Boomerang deposits, as well as a number of smaller sulphide prospects. The major deposits are characterized as "replacement-style" massive sulphides, hosted by felsic pyroclastic and volcaniclastic rocks. In contrast, the Curve Pond and Dragon Pond showings are more typical classic exhalative-type sulphide mineralization associated with exhalative horizons and regional iron formations. As such, the southern Tulks Volcanic Belt contains a continuum of VMS deposit types. The recent discovery of the high-grade polymetallic Boomerang deposit cluster, coupled with additional exploration data, resulting in higher grades and improved understanding of the Tulks Hill and Tulks East deposit clusters, highlights the exploration potential of the belt. It has been suggested that the Boomerang mineralized horizon occurs within a younger stratigraphic panel than the Tulks East and Tulks Hill deposits. Geochronological studies have been initiated to test this hypothesis, the results of which may have significant implications for exploration.

VMS deposits in the southern Tulks Volcanic Belt are interpreted to have formed in volcaniclastic-and sediment-rich basins during transitional tectonic regimes as conditions changed from convergent (e.g., active-arc environment) to extensional (e.g., back-arc or arc-rift). The change from compressional to extensional regimes would allow for active rifting, conduit formation, and high levels of focused heat flow, which are ideal conditions for the development of large and potentially ore producing hydrothermal systems.