Petrology of drill core from the Taylors Brook property in the Stirling belt, southeastern Cape Breton Island, Nova Scotia: implications for tectonic setting and economic potential

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The Stirling belt in southeastern Cape Breton Island, Nova Scotia, is one of several belts of Precambrian rocks in the Avalonian Mira terrane of the northern Appalachian orogen. It consists of ca. 670 Ma volcaniclastic rocks, flows, porphyries, breccias, and clastic sedimentary rocks (Stirling Group), intruded by ca. 620 Ma dioritic to granitic plutons and overlain by Cambrian sedimentary rocks. The Stirling belt has high potential for economic sulphide mineralization but outcrop is limited and hence the geology and tectonic setting are not well understood. This project is the first petrological study of rocks in core from three new holes that were drilled in 2012, along with data from two holes that were drilled in 1991, to depths of 500 m at the Taylors Brook property, site of a copper-gold mineral occurrence in the southern part of the Stirling belt. Logging of the core showed that the rock types include basalt flows, mafic dykes, mafic and felsic tuffs, quartz-feldspar porphyry, rhyolite, and volcanogenic and pyritic siltstone and wacke. Over 500 analyses were obtained from all rock units in the drill core using a portable X-ray fluorescence instrument. The data show consistent some chemical differences between basalt flows and mafic dykes, corroborating the distinction between these two major components of drill core which in some cases were not easily distinguished from one another during logging. In addition to the portable XRF data, whole-rock chemical data were obtained from 27 samples representative of the main rock types in the core for comparison with published data from elsewhere in the Stirling belt. Preliminary assessment of the chemical data suggests that the mafic and felsic rocks are calc-alkalic and formed in a volcanic-arc setting.

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