

Stratigraphy, structure, and mafic sills in a section through the Halifax Group, Black River area, Kings County, Nova Scotia

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Field mapping was done in an essentially complete section through the Cambrian-Ordovician Halifax Group in the Black River area to investigate stratigraphy and structure compared to other areas, and the petrochemistry of associated mafic sills. The section is 3.5 km long and oriented NW-SE, approximately perpendicular to regional structural trends. It includes approximately 1 km of continuous outcrop in a

recently constructed canal adjacent to Black River. The canal, part of the Black River hydroelectric system, has vertical walls ca. 5 – 10 metres in height.

The Halifax Group in the section is bounded on the southeast by metawacke of the underlying Goldenville Group, and on the northwest by quartzite of the overlying White Rock Group. At least two lithological units were recognised in the

Halifax Group. The contacts between units appear to be conformable and gradational. The lower unit consists of parallel laminated interlayered dark grey silty slate and light grey metasiltstone, and minor beds of massive, impure quartzite (metawacke), 0.5 to 2 m thick. Abundant sedimentary structures, including ripples and graded bedding, consistently indicate younging to the north. The upper unit consists of dark grey silty slate with light grey and locally light brown metasiltstone lenses. Only two quartzite beds, both less than 20 cm thick, were observed, and sedimentary structures are poorly developed. Quartz and quartz-carbonate veins and lenses are abundant in both units, and mainly occur in proximity to mafic sills. Below the lower unit and close to the contact with the Goldenville Group, a single outcrop of finer grained, massive, black slate suggests that a third lithologic unit may be present. Similarly, slate outcrops above the upper unit but beneath the White Rock quartzite may represent a fourth unit. Outcrop is insufficient in the study corridor to confirm the presence of the latter units.

Throughout the section, cleavage dips steeply to the south, and bedding dips steeply to the north, consistent with the presence of an unfolded stratigraphic section. Minor strike-slip and oblique-slip faults cut the section, but lack of

brecciation or apparent repetition of rare marker units suggest limited movement. A disjunctive shear foliation observed in both hand specimen and thin section is interpreted to represent Carboniferous reactivation of folds in the Meguma Supergroup, as has been reported elsewhere in the Meguma terrane.

The section contains at least 15 metamorphosed and moderately to highly altered mafic sills that vary in width from less than 1 m to 6 m, although one sill exposed in Black River is 65 m wide. Like their host rocks, the sills show evidence for greenschist facies metamorphism, as indicated by the mineral assemblage chlorite, actinolite, epidote, and albitic plagioclase. Interpretation of geochemical data from the sills, emphasizing least mobile elements, indicates that they are alkalic and formed in a within-plate tectonic setting. They have compositions similar to those reported for "type 1" sills in the Meguma Supergroup elsewhere in western Nova Scotia that have been interpreted to be penecontemporaneous with the Halifax Group. However, they are also chemically similar to volcanic rocks of the overlying Silurian New Canaan Formation. Hence their age and tectonic implications remain uncertain.