

Discovery of Cretaceous basins in Nova Scotia and the potential for kaolin mining

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Lower Cretaceous deposits of unconsolidated, quartz-rich sediment, kaolinitic, variegated clays and lignite occur in the Carboniferous and Triassic basins of Nova Scotia and New Brunswick. At present these deposits are mined for brick, aggregate and glass-sand, and the potential uses include ceramics and refractory clay. The goal of a joint NSDNR-GSC surficial mapping program within these basins was to construct a three-dimensional model of the Quaternary and Cretaceous sedimentary cover using previous water well, mineral assessment and geotechnical drilling data, new diamond drilling and refraction-reflection seismic data. We have substantially increased the known areal extent of these deposits, and have shown that these basins harbour substantial quantities of light-grey kaolin, potentially suitable for use in the paper industry.

The Cretaceous sediments occur in asymmetric, steep-sided basins with a maximum thickness of 200 m. The sedimentary architecture can be characterized by cyclic 0.5 to 10 m thick sections of white to light-grey, coarse to fine

gravel-sand capped by 0.5 to 2 m of light-grey or variably-coloured silty clay. Several widespread, correlative black lignite horizons up to 2 m thick and a light-grey, calcium carbonate-cemented silica sand occur within the Cretaceous section. The sand units are dominated by subangular quartz grains (95-99% SiO₂), with poor roundness sorting. Heavy minerals are dominated by opaques, mostly ilmenite, pyrite and hematite.

Fining-upward cycles, armoured clay balls and channel geometries suggest a fluvial origin. The lack of feldspar and abundant kaolin in these sediments suggests intense source area weathering prior to deposition. Source areas of the kaolinite and silica sand are believed to be deeply weathered, crystalline Appalachian and Shield bedrock terranes to the north, with an input from local Carboniferous quartzose sandstones. Regional grain-size variation insinuates west to east paleoflow. Post-depositional tectonism is indicated by the juxtaposition of mineralogically-mature, fluvial sediments in steep sided (faulted?), brecciated basins.