## Till Geochemistry and Lithogeochemical Exploration for a Concealed Kimberlite

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Research at the Kelvin kimberlite, Canada is defining surface exploration practices and developing new host rock lithogeochemical exploration tools that will result in reduced costs and improved discovery success. In regions where recent glaciation has buried kimberlites under glacial sediments, surface geochemical detection methods are best interpreted when coupled with a comprehension of the landscape formation processes. The glacial, post-glacial, and cryoturbation processes that have affected the landscape have, in turn, affected the dispersal of geochemical signatures in the till that can be detected and exploited by detailed surface mapping, sampling, and geochemical analysis.

The Kelvin kimberlite, Northwest Territories, is an inclined pipe that sub-crops beneath a lake and shallowly dips into country rock towards the northwest with a surface projection of more than 700m long. Relative uniformity of surficial material (<6m thick till veneer) allows for extensive b-horizon soil sampling above the kimberlite, up-ice, and up to 1 km in the down-ice direction. Results indicate the presence of subtle elevated Ni-Cr-Mg-Nb trains originating from the kimberlite subcrop location extending for >1km from source following two dominant recent ice directions. The material for the train was abraded from the kimberlite by glacial ice and would have provided additional support to drill what was initially targeted from geophysics.

Additional research is being carried out to detect alteration signatures in the country rock induced by the emplacement of the kimberlite. Lithogeochemical data from four drill holes aims to identify and quantify the metasomatic enrichment and depletion of elements sourced from the kimberlite, while hyperspectral imaging will aim to detect secondary mineralogy and subtle changes in mineral composition. This data will be used to generate mineralogical and geochemical vectors beneficial in near-miss situations when drilling kimberlites and defining diatreme geometries.