# Using surficial geochemical methods to detect anomalous concentrations of indicator metals as a method for blind VMS deposit exploration

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The golden age of geophysical exploration of blind Volcanogenic Massive Sulfide (VMS) ore deposits has come to an end. Since about 1985 the number of new ore bodies discovered by airborne geophysical exploration has fallen to nearly zero, causing exploration geologists to turn to other methods for detecting these blind VMS deposits from the surface. Surficial geochemistry has shown promise in detecting anomalous concentrations of metals overlying blind VMS deposits, although refinement is needed to target the most efficient methods of detection. This study is centered on the McIlvenna Bay Zn-Cu-Au-Ag VMS deposit in east central Saskatchewan, which is steeply dipping, and overlaid by Paleozoic dolostones, Ordovician glacial till, and a peat bog. As the deposit is oxidized, metals migrate upwards through the dolostones and till where they are bound to organic ligands. Such peat bogs are often recognized as “geochemical sieves” and they allow a small signal from below to become amplified over time, resulting in a detectable anomaly at the surface.

Samples of both pore water and peat cores were taken at the surface, and at a depth of 50 cm to determine where an anomaly in metal concentration is strongest and most easily detectable, for application in future exploration sites. Preliminary results do not show any significant trends in metal concentrations in the pore water. The labile phase of the peat samples at 50cm depth, however display a spike in indicator metals directly over the surface projection of the ore body. Further chemical testing is ongoing to discern any additional significant trends in the more strongly bound phases of the peat.