

**Deep-seeking geophysics over the Lalor Lake deposit, northwest Manitoba:
Discovery and follow-up test case study
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HudBay Minerals' Lalor Lake deposit, one of the most significant Canadian mineral discoveries of the last decade, is a polymetallic VMS deposit, zoned from a Zn-rich upper zone through a copper and gold rich footwall zone. Current (October 2009) indicated and inferred resources stand at 17.3 MT @ 8.8% Zn, 0.65% Cu, 1.5 g/T Au and 24 g/T Ag, as well as a recently identified deeper, higher grade gold zone that has not been drilled off. The deposit is a challenging target, lying at a depth of 600 m - 1000 m and overlain by an unmineralized cover sequence.

In 2003, HudBay carried out a surface geophysical exploration program, targeting deep conductors in an under-explored but geologically prospective area of the Snow Lake Belt. Using large double-turned transmitter loops, as well as very long stacking times to improve signal to noise ratios, high-quality data was obtained from a Crone PEM system using a standard induction coil sensor. The Lalor Lake deposit was detected and modeled as large conductor at a depth of ~700 m and dipping shallowly to the NE.

The first drillhole to test the anomaly in March 2007 successfully intersected 24 m of 13% zinc at a depth of 780 m, as well as narrower mineralized zones deeper in the hole. Subsequent drilling has confirmed the overall extent and dip of the deposit. Structural complexities and individual sub-zones within the deposit are not resolvable from surface, but can be broken out by borehole electromagnetic surveys, an essential exploration tool at these depths.

Additional surface electromagnetic surveys over the deposit were recently carried out at lower frequencies using induction coil, SQUID and fluxgate sensors. Digital recording of streamed full waveform data has enabled the main sources of survey noise to be clearly identified, and in some cases, greatly reduced through statistically robust post-processing methods. Sensors that directly measure the magnetic field (or B-field), such as fluxgates and SQUIDs, detected the deposit over a larger number of channels and with a reduced background compared to sensors measuring the magnetic field rate of change (or dB/dt).

Forward modeling suggests, with other factors being equal, that the Lalor Lake deposit could have been detected at depths exceeding 1000 m.