



Contamination of beat and moss samples 199 by to the Fin Flon Cu-Zn smeller Canada Indications for exploration

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Location of the Harmin and Fenton deposits relative to Flin Flon and Snow Lake





Harmin Deposit – 3M tons of Cu and Zn mineralisation



Mineralization occurs beneath 40 to 60 m of Ordovician dolomite.....

..... and 20cm to >200cm of moss and peat.



Sphagnum Moss

- Two species of Sphagnum moss are readily identified.
 - One has a distinct preference for open sun, and is light grey in colour.
 - The other prefers full shade and is bright green in colour.



- Sphagnum moss takes up nutrients from water by cation exchange.
- Elements are sequestered and remains in the plants cells even after death.
- Sphagnum moss has potential as an sampling media for base metals.

Peat

- Peat varies from ~ 20 cms to > 2 m in thickness.
- Upper levels are "peaty Sphagnum", lower levels are "humic soil".
- Peat has a high surface:volume ratio, which allows it to accumulate and concentrate metals.









Easting





Summed Response Ratios (Value/Median)



Summed Response Ratios (Value/Median)

East



East

Summary of results

- Geochemical anomalies could not be reproduced
- False anomalies occurred in all surveys
- Sampling depth affects results

• Why?

Moss - Loss On Ignition versus Al



Moss - Al versus Zr, Fe, Cu, Pb



Pb (ppm)

Moss

- AI (and low LOI) correlates with Cu, Zn, Cd, Pb, Ag, Fe, As, Co, Cr, Ni, Bi, S, Zr, Nb, Ce, Y, Ga, La, Li, Cs, B, Hg, Mo, W, Sn, U, Rb, Mn, K, Mg, Na, Ba, and Ca.
- This relationship suggests that these elements are ?adsorbed to a fine grained common mineral (clay?).
- A positive trend at these low concentrations suggests that even slight contamination by clay size particles has the potential to mask true anomalies created by base metal mineralisation in this area.



Deep Peat (40 cm)



Shallow Peat



Peat

- LOI and AI correlate in both the deep and shallow peat.
- In SHALLOW peat, Al correlates with Zr, Nb, Hf, Th, Ce, Y, Ga, La, Ce, V, Cr, Bi, U, Sn, Hg, Fe, Zn, Sb, Pb, Ag, Cd and Ni: high field strength and REE (relatively immobile) and some chalcophile elements (relatively mobile).
- In DEEP peat, Al correlates with Zr, Nb, Th, Hf, Ce, Y, Sc, Ga, La, Cs and V: all high field strength and REE (relatively immobile).
- Interpretation most elements were transported and deposited as a discrete mineral phases and these mineral phases have retained their original trace element geochemistry.



Possible sources of moss and peat contamination

Between 1930 and 1995, ca. 7150 t/yr of particulates were released from the low (30 m) and later high (251 m) stacks.

Since 1995 the high stack has emitted ca. 632 t/yr of particulate matter.

Wind and water transported particles from nearby basement



SEM images from moss (from a nearby prospect)



SEM images of Harmin peat



Grid plots suggest that base metals are introduced to the area and are later removed from the acidic peat environment during spring and summer run-offs.





Water transportation and translocation of elements is most efficient in sapwood - this results in smeared signals in the event of environmental change (fire, insect infestation, drought, disease or anthropogenic pollution).

Alternatively, heartwood is "relatively" dead and has lower permeability allowing it to trap and fix key elements and record macro-environmental trends.



Suparary and conclusion

The moss and peat suffer from clay, silt and micro-particle contamination, which include Cu and Zn minerals.

Element zonation where chalcophile elements dominate near the surface and high field strength and REE dominate at depth suggest contamination from the air (?water) and later mineral leaching during burial in an acidic environment.

The majority of the contamination is air-borne and some of this likely originates from the Flin Flon smelter.

The correlation between elements suggests that contamination by micron sized particles has the potential to mask or generate false positive anomalies that mimic base metal mineralisation in this area.

This study highlights the need to be vigilant for contamination in areas believed to be pristine and demands that new techniques that eliminate contamination are developed.