Regional Lake Sediment Geochemistry

Lake sediment geochemical data was collected by the Geological Survey of Canada, as part of the National Geochemical Reconnaissance program. Data for this map area is contained in the Open File Reports referenced below. Compiled digital data is also available from the Geological Survey of Canada. Preliminary interpretations provided in this document were completed by the Manitoba Geological Services Branch.

Schmitt, H.R. 1989: Geochemical results and interpretation of a lake sediment and water survey in the Lynn Lake-Leaf Rapids region, northern Manitoba; Geological Survey of Canada, Open File 1959, 80p.

Geological Survey of Canada 1985: Regional lake sediment and water geochemical reconnaissance data, Province of Manitoba (64B); Geological Survey of Canada, Open File 1103, 1:250 000. 61p.

Geological Survey of Canada 1986: Regional lake sediment and water geochemical reconnaissance data, Manitoba (64B); Geological Survey of Canada, Open File 1287, 1:250 000. 60p.

Regional Controls

In the Uhlman Lake map area, NTS 64B, the primary regional controls on the geochemistry of lake sediments are:

pH

pH in lake waters within NTS 64B is influenced by the high concentration of Paleozoic carbonate contained within glacial till. Carbonate concentration in till increases from west to east across the region, ranging from 0-5% in the west to greater than 60% in the east. This has a profound effect on pH of surface water and mobility of trace elements in the surface environment;

Loss on Ignition (LOI)

LOI is primarily influenced by the distribution and extent of Lake Agassiz clay cover across the region. In general, the thickness and extent of Lake Agassiz clay cover increases from west to east. In areas of extensive cover this clay may act as a blanket, masking the geochemical signature from underlying bedrock...In areas of active drainage, such as the Churchill River system, clay is continually eroded and redeposited within the drainage system, resulting in very low organic content and suppressed geochemical signatures. Conversely, in lakes where LOI is high (>60%), Fe and Mn are often precipitated as hydroxides that effectively scavenge trace elements such as As, Zn, Co and Hg. In these lakes, "false anomalies" may be generated, that are unrelated to bedrock source.

Trace Element Distributions

Fe

Concentrations for Fe range from 0.23% to 6.9%. No strongly anomalous population for Fe has been identified. In general, higher concentrations within the northwestern part of 64B are associated with lower pH in that area. This relationship does not hold true across the map area. In the northeast, high Fe concentrations are weakly associated with high LOI and precipitation of Fe hydroxides.

Zn

Concentrations for Zn range from 13 to 217 ppm. Like Fe, no strongly anomalous population has been identified. In general, higher concentrations within the northwestern part of the area are related to lower pH in

this region. In the northeast, elevated concentrations are associated with higher LOI and Fe concentrations, suggesting scavenging by Fe hydroxides.

Mn

Concentrations for Mn range from 65 to 21 000 ppm. The regional distribution of Mn is relatively flat, with no obvious relationship to pH or LOI. A single sample anomaly in Southern Indian Lake, is associated with an As anomaly, which likely reflects scavenging by Mn hydroxides.

As

Concentrations for As range from 1 to 11ppm. The distribution for As is very similar to Mn. A single sample anomaly associated with Mn is observed in Southern Indian Lake and likely reflects scavenging by Mn hydroxides.

Hg

Concentrations for Hg range from 10 - 136 ppb. Hg does not exhibit a well defined anomalous population. There is no apparent direct relationship between LOI and Hg although general trends appear to be congruent. Elevated concentrations in the Opachuanau Lake area are weakly associated with east trending faults in this region. In the Rusty Lake belt elevated concentrations are also associated with faults or the fault bounded margins of the greenstone belt.

Co

Concentrations for Co range from 2 to 122 ppm. Variation in background concentration demonstrates a negative correlation with pH. Two single sample anomalies do not appear to be associated with any other trace elements.

V

Concentrations for V range from 5 to 80 ppm. V does not exhibit a well defined anomalous population. Background concentrations demonstrate a strong negative correlation with pH.

Ni

Concentrations for Ni range from 2 to 66 ppm. Ni does not exhibit a well defined anomalous population. Background concentrations demonstrate a strong negative correlation with pH.

Pb

Concentrations for Pb range from 2 to 150 ppm. An anomalous population present in the northwestern part of the map area, may reflect variation in sampling and analytical protocol. In fill sampling in this region was carried out several years after the original survey. Higher Pb concentrations in these samples likely reflect analytical variability. Alternately, elevated Pb concentrations may indicate higher background associated with granitic intrusives in this region. Similar trends are also observed for Uranium in this area.

U

Concentrations for U range from 0.4 to 77.8 ppm. A cluster of samples containing elevated concentrations of U appears to be associated with a megacrystic granite just north and east of the Rusty Lake greenstone belt, and likely reflects higher background concentrations within this intrusion.

Mo

Concentrations for Mo range from 2 to 10 ppm. The distribution of Mo in lake sediments is very flat; the only exception, a cluster of 3 samples containing elevated Mo located along the eastern edge of the map area , east of Harding.

Sb

Concentrations for Sb range from 0.1 to 0.4 ppm. The distribution of Sb in lake sediments is very flat. Slightly higher background values are associated with in fill sampling in the northwestern part of the map area. Three sites exhibit elevated Sb concentrations: a site in Southern Indian Lake, with associated As and Mn concentrations; the other two are single sample, single element responses that likely reflect analytical variability at low concentrations ranges.

Au

Concentrations for Au range from 1 to 9 ppb, with a small anomalous population of 6 sites in the 7 to 9 ppb range. Four of these sites are clustered north of the Rusty Lake belt and may be associated with mineralization observed at:
M64B12-002
M64B12-004
M64B12-007
M64B12-008
Site M64B12-002, is a vertical shear zone, 1.8m wide containing visible gold. A sample from this shear zone assayed 18.1 g/T Au. Mineralization associated with a fault zone at site M64B12-007 contains 13 cm of solid pyrrhotite, near solid pyrrhotite +/- chalcopyrite, and a chloritic quartz vein. No geochemistry has been reported from this site. Other sites in this general area expose sulphide facies iron formation (M64B12-004, and 008). Assays at M64B12-008 did not return detectable gold.

Two other sites containing elevated Au, are not directly associated with known mineralization. A single sample occurrence northeast of Fraser Lake, may suggest mineralization similar to that observed at nearby Fraser Lake, M64B13-003, where minor pyrite and traces of molybdenite occur in a limonite-stained quartz vein. Another single sample occurrence along the southeast shore of Harding Lake, may reflect mineralization similar to that observed elsewhere in the region, primarily sulphide iron formation and disseminated sulphide at sites M64B01-005, 006, and 007.

Cu

Concentrations for Cu range from 4 to 89 ppm. Variation in background concentrations exhibit an inverse relationship with pH. Two samples containing elevated Cu concentrations occur in the Rusty Lake greenstone belt and are likely related to mineralization observed at M64B05-002, and 009. At site M64B05-009, sulphide facies iron formation contains elevated concentrations of Zn, up to 2.5% Zn. Elevated Cu has not been reported from this site. At site M64B05-002, disseminated sulphide in drill core returned assays of up to 0.12% Cu and 0.01% Zn.

pH

pH
- 5.7 - 6.4
- 6.4 - 6.8
- 6.8 - 7.2
- 7.2 - 7.5
- 7.5 - 8.8

5 0 5 10 15 20 Kilometers

L.O.I.

LOI
- 2 - 16.6
- 16.6 - 29.2
- 29.2 - 42.8
- 42.8 - 60.2
- 60.2 - 90.4

5 0 5 10 15 20 Kilometers

Iron

Fe
- 0.23 - 1.34
- 1.34 - 2.3
- 2.3 - 3.35
- 3.35 - 4.34
- 4.34 - 6.9

5 0 5 10 15 20 Kilometers

Zinc

Zn
- 13 - 73
- 73 - 103
- 103 - 127
- 127 - 155
- 155 - 217

5 0 5 10 15 20 Kilometers

Manganese

Mn
- 65 - 340
- 340 - 600
- 600 - 1150
- 1150 - 2650
- 2650 - 21000

5 0 5 10 15 20 Kilometers

Arsenic

As
- 1
- 1 - 2
- 2 - 4
- 4 - 8
- 8 - 11

INDIAN LAKE
SOUTHERN
Opachuanau Lake
Issett Lake
South Bay
HARDING LAKE
CHURCHILL RIVER
RAT RIVER
Pemichigamau Lake
Mynarski Lake
Macheewin Lake
Leftrook Lake
Uhlman Lake
Cousins Lake
Sandhill Bay
Gauer River
Barlow Lake
Fraser Lake
MacBride Lake
Rusty Lake
Broughton Lake
Tetroe Lake
Barnet Lake
Gauer Lake
Chapman Lake

5 0 5 10 15 20 Kilometers

Mercury

Hg
- 10 - 36
- 36 - 46
- 46 - 59
- 59 - 76
- 76 - 136

5 0 5 10 15 20 Kilometers

Cobalt

Co
- 2 - 8
- 8 - 13
- 13 - 18
- 18 - 46
- 46 - 122

5 0 5 10 15 20 Kilometers

Vanadium

V
- 5 - 22
- 22 - 36
- 36 - 47
- 47 - 57
- 57 - 80

5 0 5 10 15 20 Kilometers

Nickel

Ni
- 2 - 16
- 16 - 27
- 27 - 35
- 35 - 42
- 42 - 66

5 0 5 10 15 20 Kilometers

Lead

Pb
- 2 - 4
- 4 - 8
- 8 - 12
- 12 - 21
- 21 - 150

5 0 5 10 15 20 Kilometers

Uranium

U
- 0.4 - 4.3
- 4.3 - 8.6
- 8.6 - 16.5
- 16.5 - 33.4
- 33.4 - 77.8

5 0 5 10 15 20 Kilometers

Molybdenum

Mo
- 2
- 2 - 3
- 3 - 4
- 4 - 6
- 6 - 10

5 0 5 10 15 20 Kilometers

Antimony

Sb
- 0.1
- 0.1 - 0.2
- 0.2 - 0.3
- 0.3 - 0.4

5 0 5 10 15 20 Kilometers

Gold

Au
- 1
- 1 - 3
- 3 - 5
- 5 - 7
- 7 - 9

5 0 5 10 15 20 Kilometers

Copper

Cu
- 4 - 15
- 15 - 23
- 23 - 31
- 31 - 50
- 50 - 89

5 0 5 10 15 20 Kilometers