

**GEOLOGICAL SURVEY OF CANADA OPEN FILE 1954
(21Ø/1 EAST and 21P/4 WEST)
CANADA – NEW BRUNSWICK MINERAL DEVELOPMENT AGREEMENT (1984 – 1989)**

**REGIONAL STREAM SEDIMENT AND WATER GEOCHEMICAL DATA,
NORTHEASTERN NEW BRUNSWICK**



INDEX MAP

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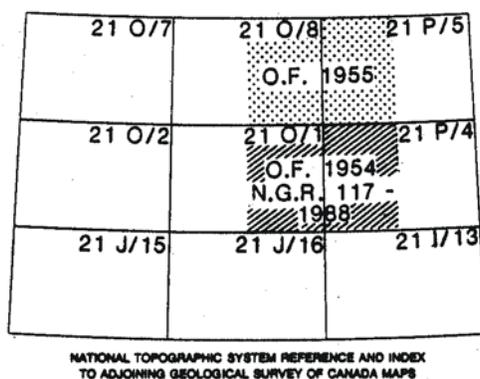
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NATIONAL GEOCHEMICAL RECONNAISSANCE
STREAM SEDIMENT AND WATER GEOCHEMICAL DATA
NEW BRUNSWICK 1989
GEOLOGICAL SURVEY OF CANADA OPEN FILE 1954, NGR 117-1988
NTS 21Ø/1 EAST AND 21P/4 WEST



Open File 1954 represents a contribution to the Canada – New Brunswick Mineral Development Agreement (1984-1989), a subsidiary agreement under the Economic and Regional Development Agreement. This project was funded and managed by the Geological Survey of Canada.

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REGIONAL STREAM SEDIMENT AND WATER GEOCHEMICAL DATA, NEW BRUNSWICK 1989, GSC OF 1954, NGR 117-1988; NTS 21Ø/1 (E) and 21P/4 (W)

Geological Survey of Canada Open File 1954

Regional Stream Sediment and Water Geochemical Reconnaissance Data, Northeastern New Brunswick, consisting of NTS 21Ø/1 (E) and 21P/4 (W).

Analysis: Bondar-Clegg and Company Ltd., Ottawa
Chemex Labs Limited
Vancouver, B.C. (waters and Au)
J.J.Lynch

INTRODUCTION

Open File 1954 is one of three regional geochemical open files covering parts of north-central and northeastern New Brunswick which were sampled in 1988 as part the Canada-New Brunswick Mineral Development Agreement. Open File 1954 represents analyses of stream sediment material and waters for 24 elements.

The reconnaissance survey was undertaken in 1988 by the Geological Survey of Canada in conjunction with the New Brunswick Department of Natural Resources and Energy (Mineral Resources Division) under the Canada - New Brunswick Mineral Development Agreement (1984-1989).

The data base of the survey contributes to a national geochemical reconnaissance and are used for resource assessment, mineral exploration and geological mapping. Regional survey sample collection and preparation procedures, analytical methods and repeatability of results are therefore strictly specified and controlled. In this way, consistent data can be systematically obtained in different areas in different years from different analytical laboratories.

CREDITS

E.H.W. Hornbrook directed the survey.

P.W.B. Friske coordinated the operational activities of contract and Geological Survey of Canada staff.

Contracts were let to the following companies for sample collection, preparation and analysis and were managed by the following staff of the Exploration Geochemistry Subdivision:

Collection: K.D.A. Whaley, Kingsclear, New Brunswick
P.W.B. Friske
M.W. McCurdy

Preparation: Golder Associates, Ottawa, Ontario
J.J. Lynch

M.W. McCurdy coordinated production and edited open files.

A.C. Galletta managed the digital geochemical data and provided computer processing support.

Computing services were provided by the Computer Science Centre, EMR. The plotting was done by Canada Lands Data Systems staff at Environment Canada, Hull, Quebec.

H. Gross developed microcomputer software to produce data listings and summary statistics.

Open file base maps were prepared by Geological Information Division, Cartography Unit A-2 and Terra Surveys Ltd., Ottawa.

C.C. Durham, H.R. Schmitt, R. Phillips and P. Doyle provided technical support.

DESCRIPTION OF SURVEY AND SAMPLE MANAGEMENT

Truck-supported sample collection was carried out during the summer of 1988.

Stream sediment and water samples were collected at an average density of one sample per 2 square kilometres throughout the 1,055 square kilometres of the northeastern New Brunswick survey.

The field data were recorded by the field contract staff on standard stream sediment field cards (Rev. 77) used by the Geological Survey of Canada (Garrett, 1974).

Sample site duplicate samples were routinely collected in each analytical block of twenty samples.

In Ottawa, field dried samples were air-dried and sieved through a minus 80 mesh (177 micron) screen, and ball-milled before analyses. At this time, control reference and blind duplicate samples were inserted into each block of twenty sediment samples. For the water samples, only control reference samples were inserted into the block. There were no blind duplicate water samples.

On receipt, field and analytical data were processed with the aid of computers.

The sample site positions were marked on appropriate 1:50 000 scale NTS maps in the field. These maps were digitized at the

Geological Survey in Ottawa to obtain the sample site UTM coordinates.

The sample site coordinates were checked as follows: a sample location map was produced on a Calcomp 1051 drum plotter using the digitized coordinates; the field contractor's sample location map was then overlaid with the Calcomp map; the two sets of points were checked for coincidence. The dominant rock types in the catchment basins were identified on appropriate geological maps used as the bedrock geological base on NGR maps.

Thorough inspections of the field and analytical data were made to check for any missing information and/or gross errors.

Quality control and monitoring of the geochemical data was undertaken by a standard method used by the Exploration Geochemistry Subdivision at the Geological Survey of Canada.

ANALYTICAL PROCEDURES

Atomic Absorption Spectroscopy (AAS) and Other Analyses

For the determination of Zn, Cu, Pb, Ni, Co, Ag, Mn, Fe, Cd and As a 1 gram sample reacts with 3 mL of a mixture of HNO₃ in a test-tube overnight at room temperature. After digestion, the test tube is immersed in a hot water bath at room temperature and brought up to 90° C and held at this temperature for 30 minutes with periodic shaking. 1 mL concentrated HCl is added and heating continued for another 90 minutes. The sample solution is then diluted to 20 mL with metal-free water and mixed. Zn, Cu, Pb, Ni, Co, Ag, Mn, Fe and Cd are determined by atomic absorption spectroscopy using an air-acetylene flame. Background corrections are made for Pb, Ni, Co, Ag, and Cd.

Arsenic is determined by atomic absorption using a hydride evolution method wherein the hydride (AsH₃) is evolved and passed through a heated quartz tube in the light path of an atomic absorption spectrophotometer. The method is described by Aslin (1976). Detection limit = 1 ppm.

Molybdenum and vanadium are determined by atomic absorption spectroscopy using a nitrous oxide acetylene flame. A 0.5 gram sample reacts with 1.5 mL concentrated HNO₃ at 90° C for 30 minutes. At this point 0.5 mL concentrated HCl is added and the digestion continued at 90° C for an additional 90 minutes. After cooling, 8 mL of 1250 ppm Al solution are added and the sample solution diluted to 10 mL before aspiration. Detection limit = Mo – 2 ppm; V – 5 ppm.

Mercury is determined by the Hatch and Ott procedure with some modifications. The method is described by Jonasson *et al.* (1973). A 0.5 gram sample reacts with 5 mL concentrated HNO₃ and 0.3 mL concentrated HCl in a test tube for 10 minutes at room temperature prior to 2 hours of digestion with mixing at 90° C in a hot water bath. After digestion, the sample solutions are cooled and diluted to 100 mL with metal-free water. The Hg present is reduced to the elemental state by the addition of 10 mL 10% w/v SnCl₂ in a 10% solution of HCl. The Hg vapour is then flushed by a stream of air into an absorption cell mounted in the light path of an atomic absorption spectrophotometer. Absorption measurements are made at 253.7 nm. Detection limit = 10 ppb.

Loss-on-ignition is determined using a 500 mg sample. The sample, weighed into 30 ml beaker, is placed in a cold muffle furnace and brought up to 500° C over a period of 2 - 3 hours. The sample is left at this temperature for 4 hours, then allowed to cool to room temperature for weighing. Detection limit = 1.0 pct.

Uranium is determined using a neutron activation method with delayed neutron counting. A detailed description of the method is provided by Boulanger *et al.* (1975). In brief, a 1 gram sample is weighed into a 7 dram polyethylene vial, capped and sealed. The irradiation is provided by the Slowpoke reactor with an operating flux of 10¹² neutrons/sq cm/sec. The samples are pneumatically transferred from an automatic loader to the reactor, where each sample is irradiated for 60 seconds. After irradiation, the sample is again transferred pneumatically to the counting facility where after a 10 second delay the sample is counted for 60 seconds with six BF₃ detector tubes embedded in paraffin. Following counting, the samples are automatically ejected into a shielded storage container. Calibration is carried out twice a day as a minimum, using natural materials of known uranium concentration. Detection limit = 0.5 ppm.

Antimony is determined as described by Aslin (1976). A 500 mg sample is placed in a test tube; 3 mL concentrated HNO₃ and 9 mL concentrated HCl are added and the mixture allowed to stand overnight at room temperature. The mixture is heated slowly to 90° C and maintained at this temperature for at least 90 minutes. The solution is cooled and diluted to 10 mL with 1.8 M HCl. The antimony in an aliquot of this dilute solution is then determined by hydride evolution-atomic absorption spectrometry. Detection limit = 0.2 ppm.

Fluorine is determined as described by Ficklin (1970). A 250 mg sample is sintered with 1 g of a flux consisting of two parts by weight sodium carbonate and one part by weight potassium nitrate. The residue is then leached with water. The sodium carbonate is neutralized with 10 mL 10% (w/v) citric acid and the resulting solution is diluted to

100 mL with water. The pH of the resulting solution should be from 5.5 to 6.5. The fluoride content of the test solution is then measured using a fluoride ion electrode. Standard solutions contain sodium carbonate and citric acid in the same quantities as the sample solution. Detection limit = 20 ppm.

Gold is usually determined on a 10 g sediment sample; depending on the amount of sample available, lesser weights are sometimes used. This results in a variable detection limit: 2 ppb for a 5 g sample, 1 ppb for a 10 g sample... The sample is fused to produce a lead button, collecting any gold in the sample, which is cupelled in a muffle furnace to produce a silver (dore) bead. The silver beads are irradiated in a neutron flux for one hour, cooled for four hours, and counted by gamma ray spectrometry. Calibration is carried out using standard and blank beads.

Tungsten is determined as follows: a 0.2 g sample of sediment is fused with 1 g $K_2S_2O_7$ in a rimless test tube at 575° C for 15 minutes in a furnace. The cooled melt is then leached with 10 mL concentrated HCl in a water bath heated to 85° C. After the soluble material has completely dissolved, the insoluble material is allowed to settle and an aliquot of 5 mL transferred to another test tube. 5 mL of 20% $SnCl_2$ solution are then added to the sample aliquot, mixed and heated for 10 minutes at 85° C in a hot water bath. A 1 mL aliquot of dithiol solution (1% dithiol in iso-amyl acetate) is added to the test solution and the test solution then removed from the hot water bath, cooled and 2.5 mL of kerosene added to dissolve the globule. The colour intensity of the kerosene solution is measured at 630 nm using a spectrophotometer. The method is described by Quin and Brooks (1972). Detection limit = 2 ppm.

Tin is determined as follows: A 200 mg sample is heated with NH_4I ; the sublimed SnI_4 is dissolved in acid and the tin determined by atomic absorption spectrometry. Detection limit = 1 ppm.

Barium is determined as follows: 2 mL of concentrated HCl are added to a 0.2 g sample in a pressure tube and allowed to stand 20 minutes to drive off sulphides. Then, 1 mL HNO_3 , 1 mL $HClO_4$ and 2 mL HF are added and the pressure tube capped and placed in a hot water bath for one hour to allow digestion. The tube is cooled, uncapped and filled with a 2.5% boric acid solution. After shaking, the solution is transferred to a 100 mL volumetric flask and diluted by a factor of 10 with a 10% cesium chloride solution. Barium is determined by DCP spectroscopy. Detection limit = 40 ppm.

Fluoride in water samples is determined using a fluoride electrode. Prior to measurement an aliquot of the sample is mixed with an equal volume of TISAB II buffer solution (total ionic strength

adjustment buffer). The TISAB II buffer solution is prepared as follows: to 50 mL metal-free water add 57 mL glacial acetic acid, 58 gm NaCl and 4 gm CDTA (cyclohexylene dinitrilo tetraacetic acid). Stir to dissolve and cool to room temperature. Using a pH meter, adjust the pH between 4.0 and 5.5 by slowly adding 5 M NaOH solution. Cool and dilute to one litre in a volumetric flask. Detection limit = 20 ppb.

Hydrogen ion activity (pH) is measured with a combination glass-calomel electrode and a pH meter.

Uranium in waters is determined by a laser-induced fluorometric method using a Scintrex UA-3 uranium analyser. A complexing agent, known commercially as fluran and composed of sodium pyrophosphate and sodium monophosphate (Hall, 1979) is added to produce the uranyl pyrophosphate species which fluoresces when exposed to the laser. Since organic matter in the sample can cause unpredictable behaviour, a standard addition method was used. In the past, there have been instances at the GSC where the reaction of uranium with fluran was either delayed or sluggish; for this reason an arbitrary 24 hour time delay between the addition of the fluran and the actual reading is incorporated into this method. In practice, 500 μ L of fluran solution are added to a 5 mL sample and allowed to stand for 24 hours. At the end of this period fluorescence readings are made with the addition of 0.0, 0.2 and 0.4 ppb U. For high samples the additions are 0.0, 2.0 and 4.0 (20 μ L aliquots of either 55 or 550 ppb U are used). All readings are taken against a sample blank. Detection limit = .05 ppb.

Table 1 provides a summary of analytical data and methods.

PRESENTATION AND INTERPRETATION OF GOLD DATA

The following discussion reviews the format used to present the Au geochemical data and outlines some important points to consider when interpreting this data. This discussion is included in recognition of the special geochemical behaviour and mode of occurrence of Au in nature and the resultant difficulties in obtaining and analyzing samples which reflect the actual concentration level at a given site.

To correctly interpret Au geochemical data from regional stream sediment or lake sediment surveys requires an appreciation of the unique chemical and physical characteristics of Au and its mobility in the surficial environment. Key properties of Au that distinguish its geochemical behaviour from most other elements include (Harris, 1982):

- (1) Au occurs most commonly in the native form which is chemically and physically resistant. A high proportion of the

metal is dispersed in micron-sized particulate form. Gold's high specific gravity results in heterogeneous distribution, especially in stream sediment and clastic-rich (low LOI) lake sediment environments. Au distribution appears to be more homogeneous in organic-rich fluvial and lake sediment environments.

- (2) Gold typically occurs at low concentrations in the ppb range. Whereas gold concentrations of only a few ppm may represent economic deposits, background levels encountered from stream and centre-lake sediments seldom exceed 10 ppb, and commonly are near the detection limit of 1 ppb.

These factors result in a particle sparsity effect wherein very low concentrations of Au are heterogeneously enriched in the surficial environment. Hence, a major problem facing the geochemist is to obtain a representative sample. In general, the lower the actual concentration of Au the larger the sample size, or the smaller the grain size required to reduce uncertainty over whether subsample analytical values truly represent actual values. Conversely, as actual Au concentrations increase or grain size decreases, the number of Au particles to be shared in random subsamples increases and the variability of results decreases (Clifton *et al.*, 1969; Harris, 1982). The limited amount of material collected during the rapid, reconnaissance-style regional surveys and the need to analyze for a broad spectrum of elements, precludes the use of a significantly large sample weight for the Au analyses. Therefore, to the extent that sample representivity can be increased, sample grain size is reduced by sieving and ball milling of all samples.

The following control methods are currently employed to evaluate and monitor the sampling and analytical variability which are inherent in the analysis of Au in geochemical mediums:

- (1) For each block of 20 samples:
 - (a) random insertion of a standard reference sample to control analytical accuracy and long-term precision;
 - (b) collection of a field duplicate (two samples from one site) to control sampling variance;
 - (c) analysis of a second subsample (blind duplicate) from one sample to control short-term precision.
- (2) For both stream sediments and lake sediments, routine repeat analyses on a second subsample are performed for all samples having values that are statistically above approximately the 90th percentile of total data set. This applies only to gold analyses by fire

assay preconcentration followed by neutron activation. **Such routine repeat analyses are not performed for INA analyses of archived samples.**

- (3) For lake sediments only, a routine repeat analysis on a second subsample is performed on those samples with LOI values below 10%, indicating a large clastic component. On-going studies suggest that the Au distribution in these samples is more likely to be variable than in samples with a higher LOI content. **Again, routine repeat analyses are performed only when the fire assay preconcentration/neutron activation method is used.**

Au data presentation, statistical treatment and the value map format are different than for other elements. Au data listed in the open file may include initial analytical results, values determined from repeat analyses, together with sample weights and corresponding detection limits for all analyzed samples. The gold, statistical parameters and regional symbol-trend plots are determined using the following data population selection criteria:

- (1) Only the first analytical value is utilized.
- (2) Au values determined from sample weights less than 10 g are excluded, except where determined by instrumental neutron activation analyses.
- (3) Au values less than the detection limit (<1 ppb) for 10 g samples are set to 0.5 ppb.

On the value map, repeat analysis values, where determined (not field duplicates), are placed in brackets following the initial value determination. All values determined on a sample less than 10 g are denoted by an asterisk. Actual sample weight can be determined from the text. Following are possible variations in data presentation on a value map:

*	No data
+ 27	Single analysis, 10 g sample weight
+ 27*	single analysis, < 10 g sample weight
+ 27 (14)	Repeat analysis, both samples 10 g
+ 27 (14*)	Repeat analysis, first sample 10 g, repeat < 10 g
+ <1	Single analysis, 10 g sample, less than detection limit of 1 ppb

In summary, geochemical follow-up investigations for Au should be based on a careful consideration of all geological and geochemical information, and especially a careful appraisal of gold geochemical data and its variability. In some instances, prospective follow-up areas may be indirectly identified by pathfinder element associations in favourable geology, although a complementary Au response due to natural variability may be lacking. Once an anomalous area has been identified, field

investigations should be designed to include detailed geochemical follow-up surveys and collection of **large** representative samples. Subsequent repeat subsample analyses will increase the reliability of results and permit a better understanding of natural variability which can then be used to improve sampling methods and interpretation.

SEDIMENT DATA LIST LEGEND

Table 2 lists code for the field and map information which is recorded at each sample site and printed in the accompanying data listings.

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TABLE 1. Summary of Analytical Data and Methods

Element	Detection level	Method(s)
<u>SEDIMENTS:</u>		
Zn Zinc	2 ppm	AAS
Cu Copper	2 ppm	AAS
Pb Lead	2 ppm	AAS
Ni Nickel	2 ppm	AAS
Co Cobalt	2 ppm	AAS
Ag Silver	0.2 ppm	AAS
Mn Manganese	5 ppm	AAS
As Arsenic	1 ppm	AAS
Mo Molybdenum	2 ppm	AAS
Fe Iron	0.2 pct	AAS
Hg Mercury	10 ppb	AAS
LOI Loss-on-ignition	1.0 pct	GRAV
U Uranium	0.5 ppm	NADNC
F Fluorine	20 ppm	ISE
V Vanadium	5 ppm	AAS
Cd Cadmium	0.2 ppm	AAS
Sb Antimony	0.2 ppm	AAS
W Tungsten	2 ppm	COL
Ba Barium	40 ppm	DCP
Sn Tin	1 ppm	AAS
Au Gold	1 ppb	FA-NA
<u>WATERS:</u>		
F Fluoride	20 ppb	ISE
pH Hydrogen ion activity		GCM
U Uranium	0.05 ppb	LIF

- AAS - Atomic absorption spectrometry
- COL - Colorimetry using dithiol
- DCP - Direct current plasma emission spectroscopy
- FA-NA - Fire assay preconcentration-neutron activation
- GCM - Glass Calomel electrode and pH meter
- GRAV - Gravimetry
- ISE - Ion selective electrode
- LIF - Laser-induced fluorescence
- NADNC - Neutron Activation delayed neutron counting

TABLE 2. FIELD DATA DESCRIPTIONS

FIELD RECORD	DEFINITION	TEXT CODE
MAP SHEET	National topographic system (NTS): lettered quadrangle (1:250,000 scale or 1:50,000 scale). Part of sample number.	e.g. 21Ø, 21P
SAMPLE ID	Remainder of sample number: Year (of collection)..... Field crew..... Sample sequence number.....	88 1,3,5 or 7 001 - 999
REP STAT	Replicate status; relationship of the sample to others within the survey: Routine sample site..... First of duplicate pair..... Second of a duplicate pair	00 10 20
UTM	Universal Transverse Mercator (UTM) Coordinate system; digitized sample location coordinates.	
ZN	Zone 7 to 22	
EASTING	UTM Easting in metres	
NORTHING	UTM Northing in metres	
ROCK TYPE	Major rock type of stream catchment area: Jurassic olivine diabase..... Pennsylvanian Clifton Formation: grey and red sandstone, conglomerate, siltstone and shale; minor coal..... Bathurst Formation: red and grey sandstone, siltstone, shale and conglomerate; minor coal..... Mississippian red and brown sandstone, shale and conglomerate..... Devonian maroon and orange flow-banded and massive rhyolite, rhyolite agglomerate, tuff, breccia, and dacite(?)..... amygdaloidal basalt, basaltic tuff and breccia, palagonite tuff, andesite, minor shale, mudstone and siltstone..... calcareous mudstone, siltstone, sandstone, maroon and green sandstone, siltstone, conglomerate, limestone; includes minor felsic and mafic volcanic rock..... granite, adamellite, granodiorite, quartz monzonite, quartz feldspar porphyry and related rocks..... gabbro and diabase..... Silurian Chaleur Group: calcareous siltstone, sandstone and shale, minor limestone, red slate, conglomerate (includes Perham Formation)..... Ordoevician and/or Silurian argillaceous limestone, calcareous shale..... Ordoevician gneissic and cataclastic granite..... rhyolite and quartz feldspar metaporphry (includes rocks of Ofv1 and Ofv2)..... metagabbro and metadiabase..... Ordoevician and Older (?) dark grey phyllite, graphitic slate, red and green manganiferous slate and chert, feldspathic lithic and quartzose greywacke and iron formation, minor limestone and conglomerate..... metabasalt, pillowed metabasalt, basaltic metatuff, minor metatrachyte (may include rocks of Os2, Ofv1, and Ofv2)..... quartz and quartz feldspar metaporphry, quartz sericite schist, quartz chlorite sericite schist, crystal metatuff (includes rocks of Os2 and Omv1)..... rhyolite metatuff, metaphyllite, rhyolite metaporphry, quartz sericite, quartz chlorite sericite schist (includes rocks of Ofv2, Omv, Os1 and Of1)..... grey phyllite, metaquartzite, meta-greywacke, minor limestone, graphitic schist, hornfels (may include rocks of Os3, Ofv and Omv).....	Jm Ps2 Ps1 Ms Dfv Dmv Ds1 Df Dm Ss2 OSs Of2 Of1 Omv1 Os3 Omv2 Ofv2 Ofv1 Os2

TABLE 2 – Continued

FIELD RECORD	DEFINITION	TEXT CODE
ROCK AGE	Stratigraphic age of dominant rock type in catchment basin: Jurassic Pennsylvanian..... Mississippian..... Devonian-Lower Devonian Silurian Ordovician and/or Silurian Ordovician..... Ordovician and Older (?).....	47 33 31 26 25 20 19 15 15
SAMPLE TYPE	Sample material collected: Stream bed sediment only Spring or sediment seep..... Heavy mineral concentrate Stream water only..... Natural groundwater, spring seep.. Simultaneous stream sediment and water..... Simultaneous spring or seep water and sediment.....	Sed only Spg Sed Only Hv Mn Cn Strm Gr Wat Sed/Water Spg Sep/ Sed
STREAM WIDTH	Stream width in decimetres	001-999
STREAM DEPTH	Water depth in decimetres	001-999
SAMPLE CONT.	Contamination; human or natural None Possible Probable Definite..... Mining activity Industrial Sources Agricultural..... Domestic or household..... Forestry activity Burned areas.....	- Possible Probable Definite Mining Industry Agricult Domestic Forestry Burn
BANK TYPE	Bank type; the general nature of the bank material adjacent to the sample site: Alluvial Colluvial (bare rock, residual or mountain soils)..... Glacial till Glacial outwash sediments..... Bare rock Talus scree..... Organic predominant (debris, peat, muskeg, swamp).....	Alluv Colluv Till Outwash Bare Rk Tal/Scr Organic
WATER COLOUR	Water colour; the general colour and suspended load of the sampled water: Clear Brown transparent..... White cloudy..... Brown cloudy.....	Clear Bn Trans Wh Cl'dy Bn Cl'dy
STREAM FLOW	Water flow rate: Stagnant..... Slow..... Moderate Fast..... Torrential.....	Stagnt Slow Modert Fast Torrnt
SAMPLE COLOUR	Predominant sediment colour Red, brown..... White, buff Black Yellow..... Green Grey, blue grey..... Pink..... Buff to brown..... Brown.....	Rd-Bn Wh-Bf Black Yellow Green Gy-Bu Pink Bf-Bn Brown
SAMPLE COMP.	Sediment composition; description of the bulk mechanical composition of the collected sample on a scale of 0 to 3, the total of the columns must add to 3 or 4 or 5: Size fractions are divided as follows: Column 1 - >0.125 mm-sand Column 2 - <0.125 mm-fines, silt and clay organics Column 3 - organics Amount of size fraction: sum of amounts= 3 4 5 Absent 0 0 0 Minor <33% 25% 20% Medium 33-67% 50% 40% Major >67% 75% 60%	0 1 2 3

TABLE 2 – Continued

FIELD RECORD	DEFINITION	TEXT CODE
BOTTOM PCPT.	Precipitate or stain; the presence of any coating on pebbles, boulders or stream bottoms: None..... Red-brown..... White or buff..... Black Yellow..... Green Grey..... Pink..... Buff to brown.....	Rd-Bn Wh-Bf Black Yellow Green Grey Pink Bf-Bn
BANK STAIN	Distinctive precipitate, stains weathering on rocks in immediate catchment basin or stream banks: None..... Red, brown (e.g., Fe) White buff (e.g., Co ₃ Zn)..... Black (e.g., Fe, Mn, sulphides).. Yellow (e.g., Pb, U, Fe, Mo, REE).... Green (Cu, Ni, U, Mo, As, Fe).... Bluish (Zn, P)..... Pink (Co, As).....	- Red-Bn Wh-Bf Black Yellow Green Blue Pink
STREAM PHYSIOG.	General physiography of drainage basin: Plain Muskeg, swampland Peneplain, plateau Hilly, undulating Mountainous, mature..... Mountainous, youthful (precipitous)	Plain Swamp Penpln Hill Moun/M Moun/Y
STREAM DRAINAGE	Drainage pattern: Poorly defined, haphazard..... Dendritic Herringbone..... Rectangular Trellis Discontinuous shield type (chains of lakes)..... Basinal (closed)..... Others.....	Poor Dendritic Herrbn Rectln Trellis Discnt Closed Other
STREAM TYPE	Stream type: Undefined..... Permanent, continuous Intermittent, seasonal Re-emergent, discontinuous.....	Undfnd Permnt Intermit Re-emerg
STREAM CLASS	Stream type: Undefined..... Primary Secondary Tertiary..... Quaternary.....	Undfnd Pri'ary Sec'ary Ter'ary Qua'ary
STREAM SOURCE	Source of water: Unknown..... Groundwater..... Snow melt or spring run-off..... Recent precipitation Ice-cap or glacial meltwater.....	Unknown Ground Sp'g Melt Rec Rain Glacier
MISC.	Refers to missing data in any field	*