GEOLOGICAL SURVEY OF CANADA OPEN FILE 1962
(105M)
CANADA – YUKON MINERAL DEVELOPMENT AGREEMENT (1985 – 1989)

REGIONAL STREAM SEDIMENT AND WATER GEOCHEMICAL DATA, CENTRAL YUKON

INDEX MAP - LIEU DE LA CARTE

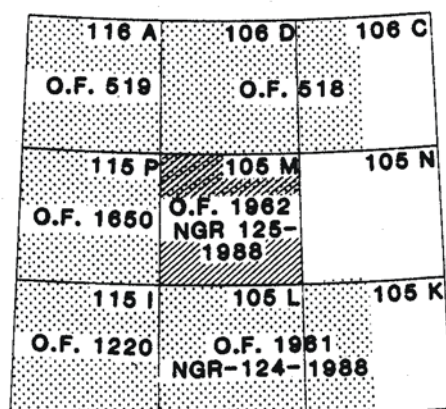|	
Project Director:	**E.H.W. Hornbrook**
Project Coordinator:	**P.W.B. Friske**
Subproject Leaders:	**J.J. Lynch, M. McCurdy**
Members:	**C.C. Durham, A. Galletta, H. Gross, R. Phillips, H.R. Schmitt P. Doyle**

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NATIONAL GEOCHEMICAL RECONNAISSANCE
STREAM SEDIMENT AND WATER GEOCHEMICAL DATA
YUKON 1989
GEOLOGICAL SURVEY OF CANADA OPEN FILE 1962, NGR 125-1988
NTS 105M

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INTRODUCTION

Open File 1962 is one of three open files released in 1989 that cover areas in the Yukon. This report includes data for map sheet 105M previously released in 1988 as GSC Open File 1650, covering map sheet 115P and the north half of 105M. Both the north half of 105M, surveyed in 1987, and the south half, surveyed in 1988, were sampled as part of a program within the Canada - Yukon Mineral Development Agreement. Open File 1962 contains the results of analyses of stream sediments and waters for 24 elements.

The reconnaissance survey were undertaken in 1987 and 1988 by the Geological Survey of Canada in conjunction with the Department of Indian Affairs and Northern Development, and the Government of Yukon under the Canada – Yukon Mineral Development Agreement (1985 - 1989).

National geochemical reconnaissance surveys contribute to a geochemical data base which is 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 by 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: (1987)	Monaghan Delph Miller Don Mills, Ontario E.H.W. Hornbrook P.W.B. Friske
Collection: (1988)	Northway Map Technology Ltd., Don Mills, Ontario E.H.W. Hornbrook C.C. Durham
Preparation: (1987/1988)	Golder Associates, Ottawa, Ontario J.J. Lynch
Analysis: (1987/1988)	Bondar-Clegg and Company Ltd., Ottawa Chemex Labs Limited Vancouver, B.C. (waters and Au) J.J.Lynch

M. 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.

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

DESCRIPTION OF SURVEY AND SAMPLE MANAGEMENT

Helicopter and 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 13 square kilometres throughout the 11,100 square kilometres of the southern central Yukon survey.

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

The field data were recorded by the field contract staff on standard stream sediment field cards (Rev. 74) used by the Geological Survey of Canada (Garrett, 1974).

In Ottawa, field dried samples were air-dried and sieved through a minus 80 mesh (177 microns) 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 1/250,000 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 positions 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 overlayed with the Calcomp map; the two sets of points were checked for coincidence. The dominant rock types in the stream 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 was reacted with 3 mL concentrated HNO_3 in a test-tube overnight at room temperature. After digestion, the test-tube was 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 was added and heating was continued for another 90 minutes. The sample solution was then diluted to 20 mL with metal free water and mixed. Zn, Cu, Pb, Ni, Co, Ag, Mn, Fe and Cd were determined by atomic absorption spectroscopy using an air-acetylene flame. Background corrections were made for Pb, Ni, Co, Ag, and Cd.

Arsenic was determined by atomic absorption using a hydride evolution method wherein the hydride (AsH_3) 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 were determined by atomic absorption spectroscopy using a nitrous oxide acetylene flame. A 0.5 gram sample was reacted with 1.5 mL concentrated HNO_3 at 90° C for 30 minutes. At this point 0.5 mL concentrated HCl was added and the digestion was continued at 90° C for an additional 90 minutes. After cooling, 8 mL of 1250 ppm Al solution were added and the sample solution was diluted to 10 mL before aspiration. Detection limit = Mo – 2 ppm; V – 5 ppm.

Mercury was determined by the Hatch and Ott Procedure with some modifications. The method is described by Jonasson *et al.* (1973). A 0.5 gram sample was reacted with 20 mL concentrated HNO_3 and 1 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 were cooled and diluted to 100 mL with metal free water. The Hg present was reduced to the elemental state by the addition of 10 mL 10% w/v $SnSO_4$ in M H_2SO_4. The Hg vapour was then flushed by a stream of air into an absorption cell mounted in the light path of an atomic absorption spectrophotometer. Absorption measurements were made at 253.7 nm. Detection limit = 10 ppb.

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

Uranium was 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 10** 12 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 was determined as described by Aslin (1976). A 500 mg sample is placed in a test tube; 3 mL concentrated HNO_3 and 9 mL concentrated HCl are added and the mixture is 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 was 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 was usually determined on a 10 g lake sediment sample; depending on the amount of sample available, lesser weights were 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 was fused to produce a lead button, collecting any gold in the sample, which was cupelled in a muffle furnace to produce a silver (dore) bead. The silver beads were irradiated in a neutron flux for one hour, cooled for four hours, and counted by gamma ray spectrometry. Calibration was carried out using standard and blank beads.

Tungsten was determined as follows: A 0.2 g sample of stream sediment was 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 was then leached with 10 mL concentrated HCl in a water bath heated to 85° C. After the soluble material had completely dissolved, the insoluble material was allowed to settle and an aliquot of 5 mL was transferred to another test tube. 5 mL of 20% $SnCl_2$ solution were 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) was added to the test solution and the test solution was 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 was measured at 630 nm using a spectrophotometer. The method is described by Quin and Brooks (1972). Detection limit = 2 ppm.

Tin in stream sediments was determined as follows: A 200 mg sample was heated with NH_4I; the sublimed $SnI4$ was dissolved in acid and the tin determined by atomic absorption spectrometry. Detection limit = 1 ppm.

Barium was determined as follows: 2 mL of concentrated HCl were 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 were added and the pressure tube capped and placed in a hot water bath for one hour to allow digestion. The tube was cooled uncapped and filled with a 2.5% boric acid solution. After shaking, the solution was transferred to a 100 mL volumetric flask and diluted by a factor of 10 with a 10% cesium chloride solution. Barium was determined by DCP spectroscopy. Detection limit = 40 ppm..

Fluoride in water samples was determined using a fluoride electrode. Prior to measurement an aliquot of the sample was 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 5.0 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) was measured with a combination glass-calomel electrode and a pH meter.

Uranium in waters was 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. Further, there have been instances at the GSC where the reaction of uranium with fluran is either delayed or sluggish; for this reason an arbitrary 24 hour time delay between the addition of the fluran and the actual reading was incorporated into this method. In practice, 500 µL of fluran solution were added to a 5 mL sample and allowed to stand for 24 hours. At the end of this period fluorescence readings were made with the addition of 0.0, 0.2 and 0.4 ppb U. For high samples the additions were 0.0, 2.0 and 4.0 (20 µL aliquots of either 55 or 550 ppb U were used). All readings were 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 fluviatile 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 by 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.

STREAM SEDIMENT DATA LIST LEGEND

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

REFERENCES

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Boulanger, A., Evans, D.J.R. and Raby, B.F. (1975) Uranium analysis by neutron activation delayed neutron counting; Proceedings of the 7th Annual Symposium of Canadian Mineral Analysts, Thunder Bay, Ontario, September 22-23, 1975.

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Harris, J.F. (1982) Sampling and analytical requirements for effective use of geochemistry in exploration for gold; *In* Levinson, A.A., Editor, Precious Metals in the Northern Cordillera, proceedings of a symposium sponsored by the Association of Exploration Geochemists and the Cordilleran Section of the Geological Association of Canada, pp. 53-67.

Jonasson, I.R., Lynch, J.J. and Trip, L.J. (1973) Field and laboratory methods used by the Geological Survey of Canada in geochemical surveys; No. 12, Mercury in Ores, Rocks, Soils, Sediments and Water, Geological Survey of Canada Paper 73-21.

Quin, B.F., and Brooks, R.R. (1972) The rapid determination of tungsten in soils, stream sediments, rocks and vegetation; Analytical Chimica Acta, Vol. 58, pp. 301-309.

TABLE 1. Summary of Analytical Data and Methods

Element		Detection level		Method(s)
SEDIMENTS:				
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	0.02	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
WATERS:				
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. 105E, 105K, 105L, 105M
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 a 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: Quaternary glacial and surficial deposits......	Qs
	Selkirk Group: basalt, andesite flows, breccia, tuff........................	Rs
	Tertiary rhyolite, trachyte...........................	Mvr
	rhyolite porphyry, granite granodiorite......................................	LTg
	Carmacks Group: andesite, basalt, breccia..	OMCV
	granite and syenite porphyry, rhyolite..	Etf
	conglomerate, sandstone, shale	ITs
	Cretaceous syenite, monzonite..........................	Ky
	granite......................................	Kg
	South Fork: andesite, dacite, basalt	KSF
	quartz monzonite, granodiorite; CASSIAR quartz monzonite, alaskite	Kqm
	Jurassic and Cretaceous Keno Hill: quartzite (may be older)	JKKH
	diorite, hornblende diorite..............	JKdi
	gabbro, diorite, some ultramafic rocks..	Jkb
	Jurassic graphitic phyllite, quartzite, greenstone......................................	Jp
	Mesozoic conglomerate, tuff, chert.................	Mcg
	andesite, trachyte............................	Mvd
	Paleozoic greywacke, argillite, limestone; includes local basic volcanics and volcaniclastic sediments.................	Ps
	Carboniferous and Permian Anvil Range Group: andesite, basalt, slate, chert, limestone........	CPAv
	schist, gneiss, includes Big Salmon Metamorphic Complex....................	CPsn
	Devonian and Mississippian Crystal Peaks: chert pebble conglomerate................................	DMCP
	Devonian Earn Group (lower): slate, quartzite, limestone.......................	Del
	Ordovician, Silurian and Lower Devonian Road River: black graphtolitic shale, chert.................	OSDR
	Paleozoic Pelly Gneiss: foliated to gneissic granodiorite......................................	Pgdn
	limestone..	Pc
	Hadrynian crystalline limestone..........................	Hc
	gritty quartzite, argillite, shale, phyllite..	Hqp
	graphitic phyllite, quartzite..............	Hpq
	greenstone..	Hv

TABLE 2 – Continued

FIELD RECORD	DEFINITION	TEXT CODE
ROCK AGE	Stratigraphic age of dominant rock type in catchment basin: Quaternary Tertiary (Miocene) Tertiary (Oligocene) Tertiary (Eocene) Tertiary (Paleocene) Cretaceous Jurassic-Cretaceous Jurassic Mesozoic (undivided) Permian Carboniferous-Permian Devonian-Carboniferous Devonian Ordovician-Silurian Paleozoic (undivided) Hadrynian	 64 61 60 59 58 52 51 47 41 36 35 29 25 19 09 07
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-Blu Pink Bf-Bn Brown

TABLE 2 – Continued

FIELD RECORD	DEFINITION	TEXT CODE
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
BOTTOM PCPT.	Precipitate or stain; the presence of any coatings 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	Destinctive 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 D.scnt 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	*