

REGIONAL STREAM, LAKE SEDIMENT AND WATER GEOCHEMICAL RECONNAISSANCE DATA, BRITISH COLUMBIA 1986, GSC OF1361, NGR 97-1986, NTS 93L

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GEOLOGICAL SURVEY OF CANADA OPEN FILE 1361.
BRITISH COLUMBIA REGIONAL GEOCHEMICAL SURVEY RGS-17.
REGIONAL STREAM SEDIMENT, LAKE SEDIMENT AND WATER GEOCHEMICAL RECONNAISSANCE
DATA, BRITISH COLUMBIA NTS 93L.

THE RECONNAISSANCE SURVEY WAS UNDERTAKEN BY THE BRITISH COLUMBIA MINISTRY OF
ENERGY, MINES AND PETROLEUM RESOURCES (MEMPR) IN CONJUNCTION WITH THE GEOLOGICAL
SURVEY OF CANADA UNDER A "LETTER OF UNDERSTANDING" FOR A CO-OPERATIVE PROJECT.

E.H.W. HORN BROOK DIRECTED GEOLOGICAL SURVEY OF CANADA ACTIVITIES.

W.M. JOHNSON DIRECTED THE BRITISH COLUMBIA MINISTRY OF ENERGY, MINES AND
PETROLEUM RESOURCES ACTIVITIES.

P.W.B. FRISKE COORDINATED THE ACTIVITIES OF THE GEOLOGICAL SURVEY OF CANADA
STAFF.

CONTRACTS LET FOR COLLECTION, SAMPLE PREPARATION AND ANALYSIS WERE THE
RESPONSIBILITY OF, AND WERE SUPERVISED AND/OR MONITORED BY THE STAFF OF THE
BRITISH COLUMBIA GEOLOGICAL SURVEY BRANCH OR EXPLORATION GEOCHEMISTRY
SUBDIVISION AS FOLLOWS:

COLLECTION: - MCELHANNEY ENGINEERING SERVICES LIMITED, VANCOUVER B.C.
- P. MATYSEK, S. ZASTAVNIKOVICH (MEMPR)

PREPARATION: - GOLDER ASSOCIATES, OTTAWA, ONTARIO
- J.J. LYNCH (GSC)

ANALYSIS: - BONDAR - CLEGG AND COMPANY LTD., OTTAWA
- BARRINGER MAGENTA LTD., CALGARY, ALBERTA (WATERS)
- CHEMEX LABS LTD., NORTH VANCOUVER, B.C. (GOLD)
- J.J. LYNCH (GSC)

H.R. SCHMITT COORDINATED OPEN FILE PRODUCTION. (GSC)

A.C. GALLETTA MANAGED THE DIGITAL GEOCHEMICAL DATA AND PROVIDED COMPUTER
PROCESSING SUPPORT. (GSC)

D.J. ELLWOOD DEVELOPED SOFTWARE TO RASTER PLOT OPEN FILE VALUE, SYMBOL AND
REGIONAL TREND MAPS. THE PLOTTING WAS DONE BY CANADA LANDS DATA SYSTEMS
STAFF AT ENVIRONMENT CANADA, HULL QUEBEC. (GSC)

M. MCCURDY AND S. COOK PROCESSED INCOMING AND OUTGOING MATERIALS, SUPPLIES
AND SAMPLES.

COMPUTING, PLOTTING, AND OPEN FILE TEXT LASER PRINTING SERVICES, WERE
PROVIDED BY THE COMPUTER SCIENCE CENTER, E.M.R.

J. YELLE AND F. WILLIAMS OF THE GEOLOGICAL INFORMATION DIVISION
SUPERVISED THE PREPARATION OF OPEN FILE MAPS BY CARTOGRAPHY UNIT A-2. (GSC)

TRUCK, HELICOPTER, AND BOAT SUPPORTED SAMPLE COLLECTION WAS CARRIED OUT DURING THE SUMMER OF 1986. STREAM SEDIMENT AND WATER SAMPLES WERE COLLECTED AT AN AVERAGE DENSITY OF ONE SAMPLE PER 16 SQUARE KILOMETERS THROUGHOUT THE 14,420 SQUARE KILOMETERS OF THE CENTRAL BRITISH COLUMBIA SURVEY AREA NTS 93L. LAKE SEDIMENT AND WATER SAMPLES WERE COLLECTED AT AN AVERAGE DENSITY OF ONE SAMPLE PER 56 SQUARE KILOMETERS THROUGHOUT THE NTS 93L SURVEY AREA. SAMPLE SITE DUPLICATE SAMPLES WERE ROUTINELY COLLECTED IN EACH ANALYTICAL BLOCK OF TWENTY SAMPLES.

IN OTTAWA, FIELD DRIED SAMPLES WERE AIR-DRIED. STREAM SEDIMENT SAMPLES WERE SIEVED THROUGH A MINUS 80 MESH (177 MICRON) SCREEN AND BALL MILLED. LAKE SEDIMENT SAMPLES WERE CRUSHED, BALL MILLED AND SIEVED THROUGH A MINUS 80 MESH (177 MICRON) SCREEN. THE MINUS 80 MESH FRACTION WAS USED FOR SUBSEQUENT ANALYSIS.

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 FIELD DATA WERE RECORDED BY THE FIELD CONTRACT STAFF ON STANDARD STREAM, LAKE WATER AND SEDIMENT FIELD CARDS (REV. 74) USED BY THE GEOLOGICAL SURVEY OF CANADA (GARRETT, 1974). 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 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 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 RGR 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.

STREAM SEDIMENTS AND LAKE SEDIMENTS WERE ANALYZED FOR ZN, CU, PB, NI, CO, AG, MN, AS, MO, FE, HG, LOI, U, CD, V, F, SB, AND AU. IN ADDITION, STREAM SEDIMENTS ONLY WERE ANALYZED FOR W, BA, AND SN. THE SAMPLE DIGESTION PROCEDURE FOR STREAM AND LAKE SEDIMENTS WAS DIFFERENT FOR ZN, CU, PB, NI, CO, AG, MN, FE, CD, AND AS. ANALYTICAL METHODS FOR THESE ELEMENTS AS WELL AS SAMPLE DIGESTION AND ANALYTICAL METHODS FOR MO, V, HG, U, LOI, F, SB, AND AU WERE SIMILAR FOR LAKE AND STREAM SEDIMENTS.

FOR THE DETERMINATION OF ZN, CU, PB, NI, CO, AG, MN, FE, CD, AND AS IN STREAM SEDIMENTS A 1 GRAM SAMPLE WAS REACTED WITH 3 ML CONC. HNO₃ IN A TEST TUBE OVERNIGHT AT ROOM TEMPERATURE. AFTER DIGESTION, THE TEST TUBE WAS IMMERSSED IN A HOT WATER BATH AT ROOM TEMPERATURE AND BROUGHT UP TO 90C AND HELD AT THIS TEMPERATURE FOR 30 MINUTES WITH PERIODIC SHAKING. 1 ML CONC. 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.

FOR THE DETERMINATION OF ZN, CU, PB, NI, CO, AG, MN, FE, CD, AND AS IN LAKE SEDIMENTS A 1 GRAM SAMPLE WAS REACTED WITH 6 ML OF A MIXTURE OF 4M HNO₃ AND M HCL IN A TEST-TUBE OVERNIGHT AT ROOM TEMPERATURE. AFTER DIGESTION, THE TEST-TUBE WAS IMMERSSED IN A HOT WATER BATH AT ROOM TEMPERATURE AND BROUGHT UP TO 90C AND HELD AT THIS TEMPERATURE FOR 2 HOURS WITH PERIODIC SHAKING. 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.

WHEREIN THE HYDRIDE (ASH₃) IS EVOLVED, PASSED THROUGH A HEATED QUARTZ TUBE IN THE LIGHT PATH OF AN ATOMIC ABSORPTION SPECTROPHOTOMETER. THE METHOD IS DESCRIBED BY ASLIN (1976). AS WAS DETERMINED BY ATOMIC ABSORPTION USING A HYDRIDE EVOLUTION METHOD WHEREIN THE HYDRIDE (ASH₃) IS EVOLVED, PASSED THROUGH A HEATED QUARTZ TUBE IN THE LIGHT PATH OF AN ATOMIC ABSORPTION SPECTROPHOTOMETER. THE METHOD IS DESCRIBED BY ASLIN (1976).

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 HNO₃ AT 90C FOR 30 MINUTES. AT THIS POINT 0.5 ML CONCENTRATED HCL WAS ADDED AND THE DIGESTION WAS CONTINUED AT 90C 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.

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 HNO₃ AND 1 ML CONCENTRATED HCL IN A TEST-TUBE FOR 10 MINUTES AT ROOM TEMPERATURE PRIOR TO 2 HOURS OF DIGESTION WITH MIXING AT 90C 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 S₂SO₄ IN M H₂SO₄. 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.

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 500C 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.

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 WAS WEIGHED INTO A 7 DRAM POLYETHYLENE VIAL, CAPPED AND SEALED. THE IRRADIATION WAS PROVIDED BY THE SLOWPOKE REACTOR WITH AN OPERATING FLUX OF 5** 10 NEUTRONS/SQ.CM./SEC. THE SAMPLES WERE PNEUMATICALLY TRANSFERRED FROM AN AUTOMATIC LOADER TO THE REACTOR, WHERE EACH SAMPLE WAS IRRADIATED FOR 20 SECONDS. AFTER IRRADIATION, THE SAMPLE WAS AGAIN TRANSFERRED PNEUMATICALLY TO THE COUNTING FACILITY WHERE AFTER A 10 SECOND DELAY THE SAMPLE WAS COUNTED FOR 20 SECONDS WITH SIX HELIUM DETECTOR TUBES EMBEDDED IN PARAFFIN. FOLLOWING COUNTING, THE SAMPLES WERE AUTOMATICALLY EJECTED INTO A SHIELDED STORAGE CONTAINER. CALIBRATION WAS CARRIED OUT ONCE A DAY AS A MINIMUM, USING NATURAL MATERIALS OF KNOWN URANIUM CONCENTRATION.

FLUORINE WAS DETERMINED AS DESCRIBED BY FICKLIN (1970). A 250 MG SAMPLE WAS SINTERED WITH 1 GRAM OF A FLUX CONSISTING OF TWO PARTS BY WEIGHT SODIUM CARBONATE AND 1 PART BY WEIGHT POTASSIUM NITRATE. THE RESIDUE WAS THEN LEACHED WITH WATER, THE SODIUM CARBONATE WAS NEUTRALIZED WITH 10 ML 10% (W/V) CITRIC ACID AND THE RESULTING SOLUTION WAS 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 WAS THEN MEASURED USING A FLUORIDE ION ELECTRODE. STANDARD SOLUTIONS CONTAIN SODIUM CARBONATE AND CITRIC ACID IN THE SAME QUANTITIES AS THE SAMPLE SOLUTION. A DETECTION LIMIT OF 40 PPM WAS ACHIEVED.

GOLD WAS DETERMINED USUALLY ON A 10 GRAM SAMPLE; DEPENDING ON THE AMOUNT OF SAMPLE AVAILABLE, LESSER WEIGHTS WERE SOMETIMES USED. THIS RESULTED IN A VARIABLE DETECTION LIMIT: 1 PPB FOR A 10 GRAM SAMPLE, 2 FOR A 5 GRAM 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 1 HOUR, COOLED FOR 4 HOURS, AND COUNTED BY GAMMA RAY SPECTROMETRY. CALIBRATION WAS CARRIED OUT USING STANDARD AND BLANK BEADS.

**** FOR STREAM SEDIMENTS ONLY, ****

TUNGSTEN WAS DETERMINED AS FOLLOWS: A 0.2 GRAM SAMPLE OF STREAM SEDIMENT WAS FUSED WITH 1 GRAM K₂S₂O₇ 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% SNCL₂ 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 HEATED FOR 4-6 HOURS AT 80-85°C IN A HOT WATER BATH. 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).

TIN IN STREAM SEDIMENTS ONLY WAS DETERMINED AS FOLLOWS: A 200 MG SAMPLE WAS HEATED WITH NH₄I; THE SUBLINED SNI₄ WAS DISSOLVED IN ACID AND THE TIN DETERMINED BY ATOMIC ABSORPTION SPECTROMETRY.

ANTIMONY WAS DETERMINED AS DESCRIBED BY (ASLIN, 1976). A 500 MG SAMPLE WAS PLACED IN A TEST TUBE; 3 ML CONCENTRATED HNO₃ AND 9 ML CONCENTRATED HCL ARE ADDED AND THE MIXTURE WAS ALLOWED TO STAND OVERNIGHT AT ROOM TEMPERATURE. THE MIXTURE WAS HEATED SLOWLY TO 90°C AND MAINTAINED AT THIS TEMPERATURE FOR AT LEAST 90 MINUTES. THE SOLUTION WAS COOLED AND DILUTED TO 10 ML. A 400 MICRO L ALIQUOT OF THIS TEST SOLUTION WAS REMOVED AND DILUTED TO 10 ML WITH 1.8M HCL. THE ANTIMONY IN AN ALIQUOT OF THIS DILUTE SOLUTION WAS THEN DETERMINED BY HYDRIDE EVOLUTION-ATOMIC ABSORPTION SPECTROMETRY.

**** FOR STREAM SEDIMENTS ONLY, ****

BARIUM WAS DETERMINED AS FOLLOWS: A 0.25 GRAM SAMPLE WAS HEATED WITH 5 ML CONC. HF, 5 ML CONC. HClO₄ AND 2 ML CONC. HNO₃ TO FUMES OF HClO₄; 3 ML OF CONC. HClO₄ WERE ADDED AND HEATED TO LIGHT FUMES; 5 ML OF WATER WERE ADDED AND THE SOLUTION WAS TRANSFERRED TO A CALIBRATED TEST TUBE AND DILUTED TO 25 ML WITH WATER. BARIUM WAS DETERMINED BY ATOMIC ABSORPTION SPECTROSCOPY USING A NITROUS OXIDE ACETYLENE FLAME.

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 SOLUTION (TOTAL IONIC STRENGTH ADJUSTMENT BUFFER). THE TISAB II BUFFER SOLUTION WAS PREPARED AS FOLLOWS: 58 GM NaCl AND 5 GM CDTA (CYCLOHEXYLENE DINITRILE ACETIC ACID) WERE DISSOLVED IN A MIXTURE OF 50 ML METAL FREE WATER AND 57 ML GLACIAL ACETIC ACID. THE SOLUTION WAS COOLED TO ROOM TEMPERATURE AND THE PH ADJUSTED TO BETWEEN 5.0 AND 5.5 BY THE SLOW ADDITION OF 5M NaOH SOLUTION. THE SOLUTION WAS COOLED AND DILUTED TO 1 LITER IN A VOLUMETRIC FLASK.

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 COMMERCIALY AS FLURAN AND COMPOSED OF SODIUM PYROPHOSPHATE AND SODIUM MONOPHOSPHATE, (HALL, G.E.M., 1979) WAS 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 G.S.C. 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 UL 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 UL ALIQUOTS OF EITHER 55 OR 550 PPB U WERE USED). ALL READINGS WERE TAKEN AGAINST A SAMPLE BLANK.

TABLE -1 DISPLAYS THE DETECTION LIMITS OF THE ANALYTICAL METHODS.
 THE FIGURE TO THE RIGHT OF THE EQUAL SIGN UNDER DETECTION LIMIT HEADING
 CORRESPONDS TO AN ARBITRARILY SET VALUE IF THE RESULTS FALL BELOW THE
 DETECTION LIMIT (USUALLY 1/2 THE DETECTION LIMIT) AND ARE USED FOR
 MATHEMATICAL CALCULATIONS.
 THE ANALYTICAL DATA WERE RECORDED AS FOLLOWS:

TABLE -1

FIELD	UNITS	RECORD	CHARACTERS	DETECTION LIMIT
SEDIMENT				
ZN	PPM	2	16-20	<2=1
CU	PPM	2	21-25	<2=1
PB	PPM	2	26-30	<2=1
NI	PPM	2	31-35	<2=1
CO	PPM	2	36-40	<2=1
AG	PPM	2	41-47	VARIABLE
MN	PPM	2	48-52	<5=3
AS	PPM	2	54-60	<1=.5
MO	PPM	2	61-65	VARIABLE
FE	PCT	2	66-70	<0.02=0.01
HG	PPB	2	71-75	<10=5
LOI	PCT	2	76-80	<1.0=.5
U	PPM	3	16-22	<0.5=0.3
F	PPM	3	23-27	<40=20
V	PPM	3	28-32	<5=3
CD	PPM	3	33-39	VARIABLE
SB	PPM	3	40-46	VARIABLE
* W	PPM	3	47-51	<2=1
* BA	PPM	3	52-56	<40=20
* SN	PPM	3	57-63	<1=.5
AU	PPB	4	31-35	VARIABLE
REPEAT AU	PPB	4	36-40	VARIABLE
AU WEIGHT	GRAMS	4	41-44	
REPEAT AU WEIGHT	GRAMS	4	45-48	
WATER				
F	PPB	4	26-30	<20=10
PH	LOG	4	31-35	
U	PPB	4	36-40	<0.05=0.03

N O T E : * STREAM SEDIMENTS ONLY

PRESENTATION OF GOLD DATA AND COMMENTS REGARDING

INTERPRETATION OF RESULTS

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.

UNDERSTANDING 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 :

- 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 ENSURES 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) AU TYPICALLY OCCURS AT LOW CONCENTRATIONS IN THE PPB RANGE. AU CONCENTRATIONS OF A FEW PPM MAY REPRESENT ECONOMIC DEPOSITS. BACKGROUND LEVELS ENCOUNTERED FOR STREAM AND CENTRE-LAKE SEDIMENTS SELDOM EXCEED 10 PPB, AND COMMONLY ARE NEAR THE DETECTION LIMIT OF 1 PPB.

THE MANY FOREGOING FACTORS CAN RESULT IN A PARTICLE SPARSITY EFFECT WHEREIN VERY LOW CONCENTRATIONS OF AU ARE HETEROGENEOUSLY DISTRIBUTED IN THE SURFICIAL ENVIRONMENT. HENCE, A MAJOR PROBLEM FACING THE GEOCHEMIST IS OBTAINING 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 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. IF THE AU IS PRESENT IN A METALLIC STATE, BALL MILLING MAY NOT REDUCE IT'S PARTICLE SIZE SIGNIFICANTLY BECAUSE OF ITS MALLEABILITY.

GOLD DATA DISCUSSION CONTINUED

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 TWENTY SAMPLES:
 - A) RANDOM INSERTION OF A STANDARD REFERENCE SAMPLE TO MONITOR AND CONTROL ANALYTICAL ACCURACY AND LONG-TERM PRECISION,
 - B) COLLECTION OF A FIELD DUPLICATE (TWO SAMPLES SEPARATELY COLLECTED FROM ONE SITE) TO MONITOR SAMPLING VARIANCE,
 - C) ANALYSIS OF A SECOND SUBSAMPLE (BLIND DUPLICATE) FROM ONE SAMPLE TO MONITOR AND CONTROL SHORT-TERM PRECISION;
- 2) FOR BOTH STREAM SEDIMENTS AND LAKE SEDIMENTS, REPEAT ANALYSES ON A SECOND SUBSAMPLE ARE PERFORMED FOR ALL SAMPLES HAVING VALUES THAT ARE STATISTICALLY ABOVE APPROXIMATELY THE 90TH PERCENTILE OF THE TOTAL DATA SET; WITHIN THE SURVEY AREA
- 3) FOR LAKE SEDIMENTS ONLY, REPEAT ANALYSIS ON A SECOND SUBSAMPLE WAS 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 HIGHLY VARIABLE THAN IN SAMPLES WITH A HIGHER LOI CONTENT.

ARE SOMEWHAT DIFFERENT THAN FOR OTHER ELEMENTS. AU DATA LISTED IN THIS OPEN FILE INCLUDES INITIAL ANALYTICAL RESULTS, VALUES DETERMINED FROM REPEAT ANALYSES, TOGETHER WITH SAMPLE WEIGHTS AND CORRESPONDING DETECTION LIMITS FOR ALL ANALYZED SAMPLES.

THE GOLD HISTOGRAM, STATISTICAL PARAMETERS, AND REGIONAL TREND MAP ARE DETERMINED USING THE FOLLOWING DATA POPULATION SELECTION CRITERIA:

- 1) ONLY THE FIRST VALUE OF A REPEAT ANALYSIS IS UTILIZED;
- 2) AU VALUES DETERMINED FROM SAMPLE WEIGHTS LESS THAN 10 G ARE EXCLUDED.
- 3) AU VALUES LESS THAN THE DETECTION LIMIT (<1PPB) FOR 10 G SAMPLES ARE SET TO 0.5 PPB.

GOLD DATA DISCUSSION CONTINUED

ON THE VALUE MAPS, REPEAT ANALYSIS VALUES (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 USED 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 METHODOLOGY AND INTERPRETATION.

REFERENCES

- ASLIN, G.E.M. (1976) THE DETERMINATION OF ARSENIC AND ANTIMONY IN GEOLOGICAL MATERIALS BY FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETER
JOURNAL OF GEOCHEMICAL EXPLORATION, VOL. 6, PP. 321-330.
- BOULANGER, A., EVANS, D.J.R. AND RABY, B.F. (1975) URANIUM ANALYSIS BY NEUTRON ACTIVATION DELAYED NEUTRON COUNTING: PROC. OF THE 7TH ANNUAL SYMP. OF CANADIAN MINERAL ANALYSTS. THUNDER BAY, ONTARIO, SEPT. 22-23, 1975.
- CLIFTON, H.E., HUNTER, R.E., SWANSON, F.J. AND PHILLIPS, R.L. (1969)
SAMPLE SIZE AND MEANINGFUL GOLD ANALYSIS. U.S. GEOLOGICAL SURVEY PROFESSIONAL PAPER 625-C.
- FICKLIN, W.H. (1970) A RAPID METHOD FOR THE DETERMINATION OF FLUORIDE IN ROCKS AND SOILS, USING AN ION SELECTIVE ELECTRODE. U.S. GEOL. SURV. PAPER 700C PP. C186-188.
- GARRETT, R.G. (1974) FIELD DATA ACQUISITION METHODS FOR APPLIED GEOCHEMICAL SURVEYS AT THE GEOLOGICAL SURVEY OF CANADA: GEOL SURV. CAN. PAPER 74-52.
- HALL, G.E.M. (1979) A STUDY OF THE STABILITY OF URANIUM IN WATERS COLLECTED FROM VARIOUS GEOLOGICAL ENVIRONMENTS IN CANADA; IN CURRENT
- 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: GEOL. SURV. CAN. PAPER 73-21.
- IN SOILS, STREAM SEDIMENTS, ROCKS AND VEGETATION. ANAL. CHIM. ACTA. 58 PP 301-309.

DATA LIST LEGEND STREAMS

MAP-	NATIONAL TOPOGRAPHIC SYSTEM(NTS)- LETTERED QUADRANGLE (SCALE 1:50000). PART OF SAMPLE NUMBER
ID-	REMAINDER OF SAMPLE NUMBER- YEAR(2), FIELD CREW(1), SAMPLE SEQUENCE NUMBER(3)
UTM COORDINATS-	UNIVERSAL TRANSVERSE MERCATOR(UTM) COORDINATE SYSTEM- SAMPLE COORDINATES
ZN-	ZONE
EAST-	EASTING (METERS)
NORTH-	NORTHING (METERS)
ROCK TYPE-	MAJOR ROCK TYPE OF THE CATCHMENT AREA
AGE-	STRATIGRAPHIC AGE OF ROCK TYPE
WD-	WIDTH OF STREAM(DECIMETER) AT SAMPLE SITE
DT-	DEPTH OF STREAM SAMPLED TO NEAREST DECIMETER
SAMP-	TYPE OF MATERIAL SAMPLED
RP ST-	REPLICATE STATUS- RELATIONSHIP OF SAMPLE TO OTHERS WITHIN THE THE BLOCK OF 20
CONT-	CONTAMINATION
BANK-	BANK TYPE
WCOL-	WATER COLOUR AND SUSPENDED LOAD
RATE-	WATER FLOW RATE
SCOL-	PREDOMINANT SEDIMENT COLOUR
SMP CMP-	SAMPLE COMPOSITION- BULK MECHANICAL COMPOSITION OF SAND, FINES AND ORGANICS RESPECTIVELY
PPPS-	PRECIPITATE OR STAIN ON SEDIMENTS AT SAMPLE SITE
PRPB-	DISTINCTIVE PRECIPITATE, STAIN, WEATHERING, BLOOMS ON ROCKS IN IMMEDIATE CATCHMENT AREA
PHYS-	GENERAL PHYSIOGRAPHY
PATT-	DRAINAGE PATTERN
TYPE-	STREAM TYPE
CLSE-	STREAM CLASS
SRCE-	SOURCE OF WATER

DATA LIST LEGEND STREAMS (CONTINUED)

AGE:	RATE:	PATT:
44 - QUATERNARY	0 - ZERO	0 - POORLY DEFINED, HAPHAZARD
42 - TERTIARY	1 - SLOW	1 - DENDRITIC
41 - CRETACEOUS AND TERTIARY	2 - MODERATE	2 - HERRINGBONE
36 - CRETACEOUS	3 - FAST	5 - DISCONTINUOUS SHIELD TYPE
34 - JURASSIC	4 - TORRENTIAL	(CHAINS OF LAKES)
32 - TRIASSIC		
24 - PERMIAN		
	SCOL:	TYPE:
	1 - RED, BROWN	1 - PERMANENT, CONTINUOUS
SAMP:	2 - WHITE, BUFF	2 - INTERMITTENT, SEASONAL
1 - STREAM BED SEDIMENT	3 - BLACK	3 - RE-EMERGENT, DISCONTINUOUS
6 - SIMULTANEOUS STREAM WATER	6 - GREY, BLUE GREY	
AND SEDIMENT		
	SMP CMP:	CLSE:
RP ST:	PORTION OF EACH COMPONENT IS	2 - SECONDARY
00 - ROUTINE REGIONAL SAMPLE	INDICATED AS A FRACTION OF THE	3 - TERTIARY
10 - FIRST OF FIELD DUPLICATE	TOTAL OF ALL THREE COLUMNS.	4 - QUATERNARY
20 - SECOND OF FIELD DUPLICATE	EXAMPLES:	
	013-NO SAND, 25% FINES, 75% ORGANICS	SRCE:
CONT:	122-20% SAND, 40% FINES, 40% ORGANICS	0 - UNKNOWN
0 - NONE	030-NO SAND, 100% FINES, NO ORGANICS	1 - GROUNDWATER
1 - POSSIBLE		2 - SNOW MELT OR SPRING RUNOFF
2 - PROBABLE	PPPS:	3 - RECENT PRECIPITATION
3 - DEFINITE	0 - NONE	4 - ICE CAP OR GLACIER MELT WATER
6 - AGRICULTURAL	1 - RED, BROWN, BLACK	
8 - FORESTRY ACTIVITY	2 - WHITE OR BUFF	
	6 - GREY	
BANK:	PRPB:	
0 - UNDEFINED, UNCONSOLIDATED MATERIAL	0 - FEATURELESS	
1 - ALLUVIAL		
2 - COLLUVIAL	PHYS:	
3 - GLACIAL TILL, TILLITE	1 - MUSKEG, SWAMPLAND	
4 - GLACIAL OUTWASH SEDIMENTS	2 - PENEPLAIN, PLATEAU	
5 - BARE ROCK	3 - HILLY, UNDULATING	
6 - TALUS, SCREE	4 - MOUNTAINOUS, MATURE	
7 - ORGANIC PREDOMINANT	5 - MOUNTAINOUS, YOUTHFUL	
	(PRECIPITOUS)	
WCOL:		
0 - CLEAR		
1 - BROWN TRANSPARENT		
2 - WHITE CLOUDY		
3 - BROWN CLOUDY		

DATA LIST LEGEND LAKES

MAP-	NATIONAL TOPOGRAPHIC SYSTEM (NTS) - LETTERED QUADRANGLE (SCALE 1:50000). PART OF SAMPLE NUMBER	
ID-	REMAINDER OF SAMPLE NUMBER- YEAR(2), FIELD CREW(1), SAMPLE SEQUENCE NUMBER(3)	
UTM COORDINATS-	UNIVERSAL TRANSVERSE MERCATOR (UTM) COORDINATE SYSTEM- SAMPLE COORDINATES	
ZN-	ZONE	
EAST-	EASTING (METERS)	
NORTH-	NORTHING (METERS)	
ROCK TYPE-	MAJOR ROCK TYPE OF LAKE CATCHMENT AREA	
AGE-	STRATIGRAPHIC AGE OF ROCK TYPE	
LAKE AREA-	AREA OF LAKE SAMPLED	
SMP DTH-	LAKE DEPTH AT SAMPLE SITE MEASURED TO THE NEAREST METER	
RP ST-	REPLICATE STATUS- RELATIONSHIP OF SAMPLE TO OTHERS WITHIN THE BLOCK OF TWENTY	
RELF-	RELIEF OF THE SURROUNDING LAKE CATCHMENT BASIN	
CONT-	CONTAMINATION- HUMAN OR NATURAL (WORK-DRILL/TRENCH, CAMP, FUEL OR GOSSAN)	
SMPL COLOR-	SEDIMENT COLOUR	
SUSP-	SUSPENDED MATTER	
LAKE AREA:	POND- POND LT 1- 1/4 TO 1 SQ KM 1-5- 1 TO 5 SQ KM GT 5- GREATER THAN 5 SQ KM	
RP ST:	00- ROUTINE REGIONAL SAMPLE 10- FIRST OF FIELD DUPLICATE 20- SECOND OF FIELD DUPLICATE	
RELF:	L- LOW M- MEDIUM H- HIGH	
CONT:	BLANK- NONE 1- PRESENT	
SMPL COLOR:	TN- TAN	GY- GREY
	YL- YELLOW	BR- BROWN
	GN- GREEN	BK- BLACK
SUSP:	BLANK- NONE L- LIGHT H- HEAVY	

ROCK TYPES:

NOTE: ROCK MNEMONICS AND AGE CODES ON THE LEFT (E.G. BSLT 42) WERE RECORDED ON THE FIELD CARDS, ARE LISTED IN THE DATA LISTINGS, AND WERE USED FOR STATISTICAL SUMMARIES.

ROCK MNEMONICS ON THE RIGHT CORRESPOND TO THE ROCK UNIT LABEL ON THE OPEN FILE GEOLOGY BASE.

STRATIFIED ROCKS

QUATERNARY

PLEISTOCENE AND RECENT

(TILL 44) - QAL - ALLUVIUM, TILL, GRAVEL.

TERTIARY

(BSLT 42) - UTP - POPLAR BUTTE VOLCANICS: OLIVINE BASALT.
ENDAKO GROUP
(ANDS 42) - LMC - CHINA NOSE BRECCIAS: BASALTIC BRECCIA, MINOR
WATERLAIN SEDIMENTS.
(ANDS 42) - EOB - BUCK CREEK VOLCANICS: ANDESITE, DACITE FLOWS
AND BRECCIAS; MINOR BASALT AND SEDIMENTS.

CRETACEOUS AND TERTIARY

OOTSA LAKE GROUP

(RYLT 41) - EGV - GOOSLY LAKE VOLCANICS: TRACHYTIC FLOWS AND SILLS.
(RYLT 41) - ENV - NEWMAN VOLCANICS: DACITIC TO RHYOLITIC BRECCIAS
AND FLOWS.
(RYLT 41) - UKEV - UNDIVIDED RHYOLITE AND DACITE FLOWS, TUFFS, AND
BRECCIAS; MINOR ANDESITE; RELATED INTRUSIONS.
(RYLT 41) - UKET - TIPTOPHILL VOLCANICS: ANDESITE, ANDESITIC DACITE
FLOWS AND FRAGMENTALS.

SUSTUT GROUP (?)

(WCKE 41) - PES - SHALE, ACID TUFF; MINOR GREYWACKE, COAL, CONGLOMERATE.
(WCKE 41) - UKS - GREYWACKE, CONGLOMERATE, SHALE.

ROCK TYPES (CONTINUED) :

NOTE: ROCK MNEMONICS AND AGE CODES ON THE LEFT (E.G. BSLT 42) WERE RECORDED ON THE FIELD CARDS, ARE LISTED IN THE DATA LISTINGS, AND WERE USED FOR STATISTICAL SUMMARIES.

ROCK MNEMONICS ON THE RIGHT CORRESPOND TO THE ROCK UNIT LABEL ON THE OPEN FILE GEOLOGY BASE.

STRATIFIED ROCKS

CRETACEOUS

SKEENA GROUP

- (SLSN 36) - LKB - BRIAN BORU FORMATION: VARI-COLOURED PORPHYRITIC TUFF, BRECCIA AND FLOWS.
- (SLSN 36) - LKV - ANDESITE TO DACITIC BRECCIAS.
- (SLSN 36) - LKR - RED ROSE FORMATION: SHALE, CHERT PEBBLE CONGLOMERATE, MICACEOUS GREYWACKE.
- (SLSN 36) - LKS - MICACEOUS GREYWACKE, SHALE, MINOR CONGLOMERATE AND COAL.
- (SLSN 36) - LKRV - ROCKY RIDGE VOLCANICS: AUGITE PORPHYRY FLOWS AND BRECCIAS, RED TUFF AND ANDESITE.
- (SLSN 36) - LKKS - KITSUN CREEK SEDIMENTS: POLYMIC TIC CONGLOMERATE, GREYWACKE, SHALE, COAL, MINOR TUFF.

JURASSIC

BOWSER LAKE GROUP

- (SHLE 34) - UJV - NETALZUL VOLCANICS: BASALTIC TO ANDESITIC TUFF, BRECCIAS AND FLOWS.
- (SHLE 34) - UJS - TROUT CREEK ASSEMBLAGE: GREYWACKE, CONGLOMERATE, SILTSTONE, LIMY GREYWACKE.
- (SHLE 34) - MUJA - ASHMAN FORMATION: SHALE, QUARTZOSE SANDSTONE, GREYWACKE, AND CHERT PEBBLE CONGLOMERATE.

HAZELTON GROUP

- (TUFF 34) - MJS - SMITHERS FORMATION: GREYWACKE, LITHIC SANDSTONE, SILTSTONE, SHALE, TUFF BRECCIA, GLAUCONITIC SANDSTONE.
- (TUFF 34) - LJN - NILKITKWA FORMATION: SHALE, ANDESITIC TO RHYOLITIC TUFF, MINOR GREYWACKE.
- (TUFF 34) - LJR - REDTUFF MEMBER: TUFF AND BRECCIA.
- (TUFF 34) - LJT - TELKWA FORMATION: VARIEGATED RHYOLITIC TO BASALTIC BRECCIA, TUFF AND FLOWS.
- (TUFF 34) - LJSS - STERRETT ISLAND SEDIMENTS: FOSSILIFEROUS SHALE.

ROCK TYPES (CONTINUED) :

NOTE: ROCK MNEMONICS AND AGE CODES ON THE
LEFT (E.G. BSLT 42) WERE RECORDED ON THE
FIELD CARDS, ARE LISTED IN THE DATA
LISTINGS, AND WERE USED FOR STATISTICAL
SUMMARIES.

ROCK MNEMONICS ON THE RIGHT CORRESPOND
TO THE ROCK UNIT LABEL ON THE OPEN FILE
GEOLOGY BASE.

STRATIFIED ROCKS

TRIASSIC

TAKLA GROUP

(VCCB 32) - UTRT - AUGITE PORPHYRY FLOWS, BRECCIA AND TUFF, GREY
SHALE, MINOR CONGLOMERATE.

PERMIAN

(LMSN 24) - PC - LIMESTONE.

ROCK TYPES:

NOTE: ROCK MNEMONICS AND AGE CODES ON THE
LEFT (E.G. BSLT 42) WERE RECORDED ON THE
FIELD CARDS, ARE LISTED IN THE DATA
LISTINGS, AND WERE USED FOR STATISTICAL
SUMMARIES.

ROCK MNEMONICS ON THE RIGHT CORRESPOND
TO THE ROCK UNIT LABEL ON THE OPEN FILE
GEOLOGY BASE.

GRANITOID ROCKS

TERTIARY

EOCENE

- (GRNT 42) - EG - GOOSLY LAKE INTRUSIONS: SYENOMONZONITE
AND PORPHYRITIC GABBRO.
- (GRNT 42) - EB - BABINE INTRUSIONS: PORPHYRITIC GRANODIORITE
OR QUARTZ DIORITE.
- (GRNT 42) - EN - NANIKA INTRUSIONS: QUARTZ MONZONITE, FELSITE.

EOCENE AND OLDER

- (QRZD 41) - ECP - COAST PLUTONIC COMPLEX: QUARTZ DIORITE.

LATE CRETACEOUS

- (GRDR 36) - LKB - BULKLEY INTRUSIONS: PORPHYRITIC GRANODIORITE AND
QUARTZ MONZONITE.

LATE CRETACEOUS AND EOCENE

- (GRDR 36) - KEG - UNDIVIDED; QUARTZ DIORITE, QUARTZ MONZONITE AND
GRANODIORITE, SMALL FELSITE PLUTONS.

EARLY JURASSIC

- (QZMZ 34) - EJT - TOPLEY INTRUSIONS: QUARTZ MONZONITE, QUARTZ
DIORITE, GRANODIORITE, MONZONITE.
- (QZMZ 34) - EJTR - TOPLEY INTRUSIONS (RHYOLITE PHASE): FINE-
GRAINED PINK TO CREAM-COLOURED RHYOLITE OR
FELSITE.

ZN-	ZINC BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
CU-	COPPER BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
PB-	LEAD BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
NI-	NICKEL BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
CO-	COBALT BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
AG-	SILVER BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
MN-	MANGANESE BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
AS-	ARSENIC BY HYDRIDE EVOLUTION-ATOMIC ABSORPTION SPECTROSCOPY (PPM)
MO-	MOLYBDENUM BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
FE-	IRON BY ATOMIC ABSORPTION SPECTROSCOPY (%)
HG-	MERCURY BY FLAMELESS SPECTROSCOPY (PPB)
LOI-	LOSS ON IGNITION BY WEIGHT DIFFERENCE (%)
U-	URANIUM BY NEUTRON ACTIVATION - DELAYED NEUTRON COUNTING (PPM)
F-	FLUORINE BY SPECIFIC ION ELECTRODE (PPM)
V-	VANADIUM BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
CD-	CADMIUM BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
W-	TUNGSTEN BY COLORIMETRY USING DITHIOL (PPM)
SN-	TIN BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
SB-	ANTIMONY BY HYDRIDE EVOLUTION-ATOMIC ABSORPTION SPECTROSCOPY (PPM)
BA-	BARIUM BY ATOMIC ABSORPTION SPECTROSCOPY (PPM)
AU-	GOLD BY FIRE ASSAY PRECONCENTRATION-NEUTRON ACTIVATION (PPB)
AU-R-	GOLD REPEAT ANALYSIS BY FIRE ASSAY PRECONCENTRATION- NEUTRON ACTIVATION (PPB)
AU WT1-	WEIGHT IN GRAMS OF ORIGINAL GOLD SAMPLE ANALYZED
AU WT2-	WEIGHT IN GRAMS OF REPEAT GOLD SAMPLE ANALYZED
DL1-	GOLD DETECTION LIMIT BASED ON ANALYSIS SAMPLE WEIGHT FOR INITIAL GOLD ANALYSIS
DL2-	GOLD DETECTION LIMIT BASED ON ANALYSIS SAMPLE WEIGHT FOR REPEAT GOLD ANALYSIS
F-W-	FLUORIDE IN WATERS BY SPECIFIC ION ELECTRODE (PPB)
PH-	PH BY COMBINATION GLASS-CALOMEL ELECTRODE
U-W-	URANIUM IN WATERS BY LASER INDUCED FLUORESCENCE (PPB)