REGIONAL LAKE SEDIMENT AND WATER GEOCHEMICAL RECONNAISSANCE DATA, MANITOBA 1983,GSC-OF 999, NGR 64-1983, NTS 64C

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REGIONAL LAKE SEDIMENT AND WATER GEOCHEMICAL RECONNAISSANCE DATA, MANITOBA 1983,GSC-OF 999, NGR 64-1983, NTS 64C

OPEN FILE 999 COVERS THE LYNN LAKE AREA, MANITOBA, COMPRISING OF NTS 64C.

THE RECONNAISSANCE SURVEY WAS UNDERTAKEN BY THE GEOLOGICAL SURVEY OF CANADA IN CONJUNCTION WITH THE MANITOBA DEPARTMENT OF ENERGY AND MINES UNDER THE CANADA-MANITOBA INTERIM MINERAL AGREEMENT (1983-1985).

E.H.W. HORNBROOK DIRECTED GEOLOGICAL SURVEY OF CANADA ACTIVITIES.

N.G. LUND AND A.C. GALLETTA WERE RESPONSIBLE FOR DATA MANAGEMENT.
N.G. LUND CO-ORDINATED OPEN FILE PRODUCTION.
J. YELLE SUPERVISED MAP PREPERATION.

COMPUTER AND PLOTTING FACILITIES WERE PROVIDED BY THE COMPUTER SCIENCE CENTER OF E.M.R.

CONTRACTS LET FOR SAMPLE COLLECTION, PREPARATION AND ANALYSIS WERE SUPERVISED AND/OR MONITORED BY THE STAFF OF THE GEOCHEMISTRY SUBDIVISION AS FOLLOWS:

COLLECTION	-	WOLLEX EXPLORATION, CALGARY.
	-	E.H.W. HORNBROOK, N.G. LUND
PREPARATION	-	GOLDER ASSOCIATES, OTTAWA.
	-	J.J. LYNCH
ANALYTICAL	-	CHEMEX LABS. LIMITED, VANCOUVER.
	-	ACME ANALYTICAL LABORATORIES LTD, TORONTO.
	-	J.J. LYNCH

OPEN FILE TEXT WAS MANUFACTURED BY CAMPBELL LAZER PRINTING,OTTAWA.

HELICOPTER SUPPORTED SAMPLE COLLECTION WAS CARRIED OUT DURING THE SUMMER OF 1983.
LAKE SEDIMENT AND WATER SAMPLES WERE COLLECTED AT AN AVERAGE DENSITY OF ONE SAMPLE PER 13 SQUARE KILOMETERS IN THE SOUTH HALF OF 64C AND 6.5 SQUARE KILOMETERS IN THE NORTH HALF OF 64C THROUGHOUT THE 13,700 SQUARE KILOMETER LYNN LAKE SURVEY AREA.

SAMPLE SITE DUPLICATE SAMPLES WERE ROUTINELY COLLECTED IN EACH ANALYTICAL BLOCK OF TWENTY SAMPLES.

IN OTTAWA, FIELD DRIED SAMPLES WERE AIR-DRIED, CRUSHED, BALL MILLED AND SEIVED.
THE MINUS 80 MESH (177 MICRONS) FRACTION WAS USED FOR SUBSEQUENT ANALYSES.
AS REQUIRED, AT THIS TIME, CONTROL REFERENCE AND BLIND DUPLICATE SAMPLES WERE INSERTED INTO EACH BLOCK OF TWENTY SEDIMENT SAMPLES. NO OTHER SAMPLE PROCESSING IN OTTAWA WAS CARRIED OUT ON THE WATER SAMPLES.BLIND DUPLICATE SAMPLES WERE NOT USED IN WATER ANALYSIS.

ON RECEIPT, FIELD AND ANALYTICAL DATA WERE PUNCHED ONTO 80 COLUMN CARDS AND ALL SUBSEQUENT PROCESSING WAS CARRIED OUT WITH THE AID OF COMPUTERS.
THE FIELD DATA WERE RECORDED BY THE FIELD CONTRACT STAFF ONTO STANDARD LAKE 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 BY PLOTTING SAMPLING LOCATION MAPS ON A CALCOMP 1051 DRUM PLOTTER FROM THE DIGITIZED COORDINATES AND THEN OVERLAYING THESE OVER THE FIELD CONTRACTOR'S SAMPLE LOCATION BASE MAPS.
THE DOMINANT ROCK TYPES IN THE LAKE 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 GEOLOGICAL DATA WAS UNDERTAKEN BY A STANDARD METHOD USED BY THE RESOURCE GEOCHEMISTRY SUBDIVISION AT THE GEOLOGICAL SURVEY OF CANADA.

FOR THE DETERMINATION OF ZN, CU, PB, NI, CO, AG, MN FE AND CD, A 1 GRAM SAMPLE WAS REACTED WITH 6 ML OF A MIXTURE OF 4M HCL AND M HNO3 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 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 ABSORTION 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 ARSENIC IS EVOLVED AS ASH3, 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 SPECTROSCPY USING A NITROUS OXIDE ACETYLENE FLAME.
A 0.5 GRAM SAMPLE WAS REACTED WITH 1.5 ML CONCENTRATED HN03 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 W/V SNSO4 IN M H2SO4.
THE HG VAPOUR WAS THEN FLUSHED BY A STREAM OF AIR INTO AN ABSORTION CELL MOUNTED IN THE LIGHT PATH OF AN ATOMIC ABSORTION SPECTROPHOTOMETER.
ABSORTION 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.
WITH THE EXCEPTION OF THE IRRADIATION FACILITY, THE METHOD IS VERY SIMILAR TO THAT USED BY AECL IN PREVIOUS YEARS, A DETAILED DESCRIPTION OF WHICH IS PROVIDED BY BOULANGER ET AL (1975).
A TWO GRAM SAMPLE WAS IRRADIATED FOR 10 SECONDS IN THE TRIGA REACTOR LOCATED AT WASHINGTON STATE UNIVERSITY.
THE OPERATING FLUX WAS 8 X 10**13 NEUTRONS/SQUARE CM/SECOND.
AFTER A 10 SECOND DELAY, THE SAMPLE WAS COUNTED FOR 10 SECONDS.
THE COUNTING EQUIPMENT WAS OF AECL DESIGN. CALIBRATION WAS DONE TWICE A DAY OR AS REQUIRED.
ONE STANDARD WAS ANALYSED AFTER EVERY 20 SAMPLES.

FLUORINE WAS DETERMINED IN LAKE SEDIMENTS AS DESCRIBED BY FICKLIN (1970).
A 250 MG SAMPLE IS SINTERED WITH 1 GRAM OF A FLUX CONSISTING OF TWO PARTS BY WEIGHT SODIUM CARBONATE AND 1 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.
A DETECTION LIMIT OF 40 PPM IS ACHIEVED.

FLUORIDE IN LAKE WATER SAMPLES WAS DETERMINED USING AN ORION FLUORIDE ELECTRODE AND A MODEL 404 ORION SPECIFIC ION METER.
PRIOR TO MEASUREMENT AN ALIQUOT OF THE SAMPLE WAS MIXED WITH AN EQUAL VOLUME OF TISAB SOLUTION (TOTAL IONIC STRENGTH ADJUSTMENT BUFFER).

HYDROGEN ION ACTIVITY (PH) WAS MEASURED WITH A BROADLEY-JAMES COMBINATION ELECTRODE AND A MODEL 404 ORION SPECIFIC ION 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, G.E.M., 1979) IS ADDED TO PRODUCE THE URANYL PYROPHOSATE SPECIES WHICH FLUORESCES WHEN EXPOSED TO THE LASER.
SINCE ORGANIC MATTER IN THE SAMPLE CAN CAUSE UNPREDICABLE 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 DELEAY BETWEEN THE ADDITION OF THE FLURAN AND THE ACTUAL READING WAS INCORPORATED INTO THIS METHOD.
IN PRACTICE, 500UL FLURAN SOLUTION WAS ADDED TO A 5ML 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 (20UL ALIQUOTS OF 55 OR 550 PPB U WERE USED).
ALL READINGS WERE TAKEN AGAINST A SAMPLE BLANK.

CONDUCTIVITY WAS MEASURED USING A RADIOMETER CONDUCTIVITY METER TYPE CDM 2F EQUIPPED WITH ELECTRODE CD 104. WATER SAMPLES WERE STORED AT ROOM TEMPERATURE UNTIL ANALYSED.

ALKALINITY WAS TITRATED TO PH 4.5 END POINT WITH 0.02 N SULPHURIC ACID USING A RADIOMETER SEMI-AUTOMATIC TITRATOR 11/PH METER M28 EQUIPPED WITH GLASS ELECTRODE G202C AND CALOMEL ELECTRODE K401. WATER SAMPLES WERE STORED AT ROOM TEMERATURE UNTIL ANALYSED.

CALCIUM CASE1- FOR VALUES GREATER THAN 0.5 PPM --- ICP
CASE2- FOR VALUES LESS THAN 0.5 PPM --- AIR-ACETYLENE

MAGNESSIUM CASE1- FOR VALUES GREATER THAN 0.5 PPM --- ICP
CASE2- FOR VALUES LESS THAN 0.5 PPM --- AIR-ACETYLENE

IRON (INDUCTIVELY COUPLED PLASMA -- ICP)

THE FOLLOWING TABLE DISPLAYS THE DATA RECORD FORMAT SPECIFICATIONS. THE DETECTION LIMITS OF THE ANALYTICAL METHODS ARE ALSO GIVEN WITH THE SECOND FIGURE UNDER DETECTION LIMIT USED AS AN ARBITRARILY SET VALUE IF THE RESULT FELL BELOW THE DETECTION LIMIT.

ELEMENT	CARD	COLUMNS
FIELD		
MAP	1	01-06
ID	1	07-12
UTM ZONE	1	13-14
UTM EAST (METER)	1	15-20
UTM NORTH (METER)	1	21-27
ROCK TYPE	1	28-31
LAKE AREA	1	32-35
SAMPLE DEPTH (FEET)	1	36-38
REPLICATE STATUS	1	39-40
RELIEF	1	41-43
CONTAMINATION	1	48-51
SAMPLE COLOUR	1	52-57
SUSPENDED MATTER	1	58-59

THE ANALYTICAL DATA WERE RECORDED AS FOLLOWS:

ELEMENT	UNITS	CARD	COLUMNS	DETECTION LIMIT	
SEDIMENT					
ZN	PPM	2	21-25	2	1
CU	PPM	2	26-30	2	1
PB	PPM	2	31-35	2	1
NI	PPM	2	36-40	2	1
C0	PPM	2	41-45	2	1
AG	PPM	2	46-50	0.2	0.1
MN	PPM	2	51-55	5	2
AS	PPM	2	56-60	1	0.5
MO	PPM	2	61-65	2	1
FE	PCT	2	66-70	0.02	0.01
HG	PPB	2	71-75	10	5
LOI	PCT	2	76-79	1.0	0.5
U	PPM	3	21-25	0.2	0.1
F	PPM	3	26-30	40	20
V	PPM	3	31-35	0.5	0.2
CD	PPM	3	36-40	0.2	0.1
WATER					
F	PPB	4	26-30	20	10
PH		4	31-35		
U	PPB	4	36-40	0.05	0.002
COND	UMHOS/CM	4	41-45		
HCO3	PPM	4	46-50	20	10
CA	PPM	4	51-55		
MG	PPM	4	56-60		
FE	PPB	4	61-65	0.02	0.01

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DATA LEGEND

MAP- NATIONAL TOPOGRAPHIC SYSTEM(NTS)- LETTERED QUADRANGLE (SCALE 1:250000). PART OF SAMPLE NUMBER

ID- REMAINDER OF SAMPLE NUMBER- YEAR(2), FILED CREW(1), SAMPLE SEQUENCE NUMBER(3)

UTM COORDINATES- UNIVERSAL TRANVERSE MERCATOR(UTM) COORDINATE SYSTEM- SAMPLE COORDINATES

ZN- ZONE
EAST- EASTING(METERS)
NORTH- NORTHING(METERS)

ROCK TYPE- MAJOR ROCK TYPE OF LAKE CATCHMENT AREA

LAKE AREA- AREA OF LAKE SAMPLED

SMP DTH- SAMPLE DEPTH MEASURED TO THE NEAREST FOOT

RP ST- REPLICATE STATUS- RELATIONSHIP OF SAMPLE WITH RESPECT TO OTHERS WITHIN THE SURVEY

RELF- RELIEF OF THE SURROUNDING LAKE CATCHMENT BASIN

CONT- CONTAMINATION- HUMAN OR NATURAL(WORK-DRILL/TRENCH, CAMP,FUEL,OR GOSSAN)

SAMPL COLOR- SEDIMENT COLOUR

SUSP- SUSPENDED MATTER

L A K E S E D I M E N T

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 ATOMIC ABSORPTION SPECTROSCOPY(PPM)
MO- MOLYBDENUM BY ATOMIC ABSORPTION SPECTROSCOPY(PPM)
FE- IRON BY ATOMIC ABSORPTION SPECTROSCOPY(%)
HG- MERCURY BY ATOMIC ABSORPTION SPECTROSCOPY(PPB)
LOI- LOSS ON IGNITION BY WEIGHT DIFFERENCE(%)
U- URANIUM BY DELAYED NEUTRON ACTIVATION(PPM)
F- FLOURINE BY SPECIFIC ION ELECTRODE(PPM)
V- VANADIUM BY ATOMIC ABSORPTION SPECTROSCOPY(PPM)
CD- CADMIUM BY ATOMIC ABSORPTION SPECTROSCOPY(PPM)

L A K E W A T E R

F-W- FLOURINE IN WATERS BY FISSION TRACK(PPB)
PH- PH BY COMBINATION GLASS - CALOMEL ELECTRODE
U-W- URANIUM IN WATERS BY SCINTREX(PPB)
COND- CONDUCTIVITY (UMHOS/CM)
HCO3 - ALKALINITY (PPM)
CA-W - CALSIUM BY INDUCTIVELY COUPLED ARGON PLASMA(PPB)
MG-W - MAGNESIUM IN WATERS BY AIR-ACETYLENE(PPM)
FE-W - IRON BY INDUCTIVELY COUPLED ARGON PLASMA(PPB)

ROCK TYPE :
- AHIU- GRANITIC INTRUSIVE ROCKS, POST-SICKLE (HUDSONIAN)
- AHIA- LEUCOTONALITE PLUS MAGNETIC
- AHIB- MEGACRYSTIC GRANITE
- AHIC- GRANITE,GRANODIORITE PLUS HORNBLENDE
- AHID- LEUCOGRANITE,GRANODIORITE
- AHIE- MONZONITE,SYENITE
- AHIF- PEGMATITE
- AHIG- GRANITE,GRANODIORITE
- AHIT- TONALITE,GRANODIORITE, QUARTZ DIORITE
- AHIP- PYROXENE TONALITE
- AHIR- GABBRO,MINOR ULTRAMAFIC ROCK
- ATIQ- QUARTZ DIORITE,DIORITE
- ASAC- CONGLOMERATE
- ASAS- ARKOSIC SANDSTONE
- ASAN- SANDSTONE-DERIVED GNEISS, MIGMATITE
- APIR- GABBRO,NORITE,ULTRAMAFIC ROCK
- APIT- TONALITE,GRANODIORITE,DIORITE
- APIG- GRANITE
- AGMC- CONGLOMERATE,GREYWACKE
- ABMM- MAFIC GNEISS,VOLCANIC ROCK, GREYWACKE,QUARTZITE,MARBLE

ROCK TYPE (CONT.) :
- AIMA- AMPHIBOLITE,TUFF
- AWSW- GREYWAKE,CONGLOMERATE, MAFIC MUDSTONE
- ABSW- GREYWAKE-DERIVED GNEISS,MIGMATITE
- AISW- GREYWACKE-DERIVED GNEISS, AND MIGMATITE
- AWVI- FELSIC,INTERMEDIATE VOLCANICS
- AWVD- DACITE,RHYOLITE
- AWVM- MAFIC,INTERMEDIATE VOLCANICS
- AWVA- BASALT,ANDESITE
- AWVB- BASALT

LAKE AREA :
- POND- POND
- LT 1- 1/4 TO 1 SQ KM
- 1-5- 1/4 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

SAMP COLOR :
- TN- TAN
- GN- GREEN
- YL- YELLOW
- GY- GREY
- BR- BROWN
- BK- BLACK

SUP :
- BLANK- NONE
- L- LIGHT
- H- HEAVY