

REGIONAL LAKE SEDIMENT GEOCHEMICAL RECONNAISSANCE DATA, EAST-CENTRAL SASKATCHEWAN 1984, GSC OPEN FILE 1129, NGR 73-1984

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GEOLOGICAL SURVEY OF CANADA OPEN FILE 1129

REGIONAL LAKE SEDIMENT GEOCHEMICAL RECONNAISSANCE DATA, EAST-CENTRAL SASKATCHEWAN, NTS 63M, 64D, AND PARTS OF 63K, 63L, 63N, 73I, 73O, 73P AND 74A.

THIS OPEN FILE CONSISTS OF NEW DATA FOR GOLD ACQUIRED UNDER THE CANADA-SASKATCHEWAN MINERAL DEVELOPMENT AGREEMENT (1984-1989), IN ADDITION TO PREVIOUSLY PUBLISHED DATA ACQUIRED UNDER THE CANADA-SASKATCHEWAN AGREEMENT ON MINERAL EXPLORATION AND DEVELOPMENT IN NORTHERN SASKATCHEWAN.

THE MAJORITY OF THE DATA IN THIS OPEN FILE WERE RELEASED AS OPEN FILE 266, AUGUST 5, 1975 (HORN BROOK, ET AL., 1975). ADDITIONAL DATA FOR MERCURY AND URANIUM, DETERMINED BY DELAYED NEUTRON COUNTING, WERE RELEASED AS OPEN FILE 488, OCTOBER 5, 1977 (HORN BROOK ET AL., 1977). THIS OPEN FILE CONSISTS OF: 4 SAMPLE LOCATION MAPS (THE SURVEY AREA IS DIVIDED INTO 4 SHEETS); 4 GOLD VALUE MAPS; A LISTING OF FIELD, ANALYTICAL AND STATISTICAL DATA; AND A BRIEF PRELIMINARY INTERPRETATION OF THE GOLD DATA, CONSISTING OF TEXT, FIGURES AND TABLES.

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

P.W.B. FRISKE, E.H.W. HORN BROOK AND H.R. SCHMITT PREPARED THE PRELIMINARY INTERPRETATION REPORT OF THE GOLD DATA.

J.J. LYNCH ARRANGED AND SUPERVISED THE CONTRACT FOR GOLD ANALYSIS WITH NOVATRACK ANALYSTS LTD., VANCOUVER.

N.G. LUND WAS RESPONSIBLE FOR DATA MANAGEMENT AND SUPERVISED OPEN FILE PRODUCTION. D.J. ELLWOOD PREPARED THE GOLD REGIONAL TREND MAP.

J. YELLE SUPERVISED MAP PRODUCTION.

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

CREDITS FOR PREVIOUS CONTRACTS ARE DOCUMENTED IN OPEN FILES 266 AND 488.

HELICOPTER SUPPORTED SAMPLE COLLECTION WAS CARRIED OUT DURING THE SUMMER OF 1974. LAKE SEDIMENT SAMPLES WERE COLLECTED AT AN AVERAGE DENSITY OF ONE SAMPLE PER 13 SQUARE KILOMETERS THROUGHOUT THE APPROXIMATELY 51,000 SQUARE KILOMETER EAST-CENTRAL SASKATCHEWAN SURVEY AREA.

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

IN OTTAWA, SAMPLES COLLECTED DURING THE 1974 SURVEY WERE 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 20 SAMPLES.

ON RECEIPT OF THE GOLD DATA, THEY WERE MERGED WITH THE OTHER FIELD AND ANALYTICAL DATA AND ALL SUBSEQUENT DATA PROCESSING WAS CARRIED OUT USING THE COMPUTER FACILITIES AT THE COMPUTER SCIENCE CENTER, E.M.R., AND SOFTWARE DEVELOPED BY G.S.C. SATFF.

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 STANDARD METHODS 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 U-F, 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 THE OVERNIGHT 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 1 HOUR 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 AND FE WERE DETERMINED BY ATOMIC ABSORPTION SPECTROSCOPY USING AN AIR-ACETYLENE FLAME. BACKGROUND CORRECTIONS WERE MADE FOR PB, NI, CO AND AG. A 0.1 ML ALIQUOT OF THE ABOVE SAMPLE SOLUTION WAS USED TO DETERMINE U BY A FLUOROMETRIC METHOD DESCRIBED BY SMITH AND LYNCH (1969). A TURNER FLUOROMETER WAS USED FOR THE FLUORESENCE MEASUREMENTS IN PLACE OF THE JARREL-ASH DESCRIBED IN THE SMITH AND LYNCH PAPER.

ARSENIC WAS DETERMINED BY COLOURIMETRY. THE SAMPLE WAS DECOMPOSED BY HEATING 0.5 GRAM WITH 10 ML OF 6M HCL AT 90 C FOR 1 HOUR. AS+5 WAS REDUCED TO AS+3 BY THE ADDITION OF A SNCL₂ SOLUTION. ASH₃ WAS FORMED BY THE ADDITION OF GRANULAR METALLIC ZINC. THE ASH₃ WAS BUBBLED THROUGH A CHLOROFORM SOLUTION CONTAINING BRUCINE AND SILVER DIETHYLDITHIOCARBONATE. THE ABSORBANCE OF THE CHLOROFORM SOLUTION WAS MEASURED AT 520 NM USING A 1/2 INCH CELL.

MOLYBDENUM WAS 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 OF 10% W/V SNSO₄ 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 200 MG SAMPLE; SHORTAGE OF MATERIAL DICTATED THIS RELATIVELY SMALL SAMPLE WEIGHT. THE SAMPLE, CONTAINED IN A 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 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 PARRAFIN. 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.

GOLD WAS DETERMINED ON A 5 OR 10 GRAM LAKE SEDIMENT SAMPLE, DEPENDING ON AMOUNT OF SAMPLE AVAILABLE. THIS RESULTED IN A VARIABLE DETECTION LIMIT; 2 PPB WITH A 5 GRAM SAMPLE, 1 PPB WITH A TEN 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.

THE ANALYTICAL AND FIELD DATA WERE RECORDED AS DESCRIBED BELOW. FOR CONVENIENCE, THE DETECTION LIMITS OF THE ANALYTICAL METHODS USED ARE ALSO GIVEN. THE SECOND FIGURE UNDER DETECTION LIMIT IS THE FIGURE TO WHICH VALUES WERE SET IF THEY FELL BELOW THE DETECTION LIMIT.

DATA FORMAT SPECIFICATIONS

FIELD	VARIABLE	CARD	COLUMNS
	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
	COMPOSITION	1	44-46
	GEL	1	47-47
	CONTAMINATION	1	48-51
	SAMPLE COLOUR	1	52-57
	SUSPENDED MATTER	1	58-59
	SAMPLE WEIGHT FOR GOLD ANALYSIS (GRAM)	1	60-62

VARIABLE	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
CO	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 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-N	PPM	3	21-25	0.2 0.1
U-F	PPM	3	26-30	0.5 0.2
AU	PPB	3	41-45	1 0.1
				OR 2 0.2

REFERENCES

- 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.
- HORN BROOK, E.H.W., GARRETT, R.G., LYNCH, J.J., BECK, L.S.
1975: REGIONAL GEOCHEMICAL LAKE SEDIMENT RECONNAISSANCE DATA, EAST-CENTRAL SASKATCHEWAN; GEOLOGICAL SURVEY OF CANADA, OPEN FILE 266, 52 MAPS, 108 P.
1977: REGIONAL GEOCHEMICAL LAKE SEDIMENT RECONNAISSANCE DATA, EAST-CENTRAL SASKATCHEWAN; GEOLOGICAL SURVEY OF CANADA, OPEN FILE 488.
- 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.
- SMITH, A.Y. AND LYNCH, J.J. (1969) FIELD AND LABORATORY METHODS USED BY THE GEOLOGICAL SURVEY OF CANADA IN GEOCHEMICAL SURVEYS; NO. 11, URANIUM IN SOIL, STREAM SEDIMENT AND WATER; GEOL. SURV. CAN. PAPER 69-40.

DATA LIST LEGEND

MAP-	NATIONAL TOPOGRAPHIC SYSTEM(NTS)- LETTERED QUADRANGLE (SCALE 1:250000). PART OF SAMPLE NUMBER		
ID-	REMAINDER OF SAMPLE NUMBER- YEAR(2), FIELD CREW(1), SAMPLE SEQUENCE NUMBER(3)	ROCK TYPE:	PSCS- PELITIC SCHIST AMPB- AMPHIBOLITE MVCC- METAVOLCANIC GRNT- GRANITE UMFC- ULTRAMAFIC MGMT- MIGMATITE MARK- META-ARKOSE MSDM- METASEDIMENT MRBL- MARBLE
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:	POND- POND LT 1- 1/4 TO 1 SQ KM 1-5- 1 TO 5 SQ KM GT 5- GREATER THAN 5 SQ KM
LAKE AREA-	AREA OF LAKE SAMPLED		
SMPL DPTH-	SAMPLE DEPTH MEASURED TO THE NEAREST FOOT		
RP ST-	REPLICATE STATUS- RELATIONSHIP OF SAMPLE WITH RESPECT TO OTHERS WITHIN THE SURVEY	RP ST:	00- ROUTINE REGIONAL SAMPLE 10- FIRST OF FIELD DUPLICATE 20- SECOND OF FIELD DUPLICATE 32- ROUTINE SAMPLE-LAYERED WITH LAYER POSITION
RELF-	RELIEF OF THE SURROUNDING LAKE CATCHMENT BASIN	RELF:	L- LOW M- MEDIUM H- HIGH
SMP CMP-	SAMPLE COMPOSITION- BULK MECHANICAL COMPOSITION OF SAND, FINES AND ORGANICS RESPECTIVELY	SMP CMP:	BLANK- ABSENT 1- MINOR- LESS THAN 33% 2- MEDIUM- 33% TO 67% 3- MAJOR- GREATER THAN 67%
CONT-	CONTAMINATION- HUMAN OR NATURAL(WORK-DRILL/TRENCH, CAMP,FUEL OR GOSSAN)		
SMPLE COLOR-	SEDIMENT COLOUR	CONT:	BLANK- NONE 1- PRESENT
SUSP-	SUSPENDED MATTER	SMPLE COLOR:	TN- TAN YL- YELLOW GN- GREEN GY- GREY BR- BROWN BK- BLACK
ZN-	ZINC BY ATOMIC ABSORPTION SPECTROSCOPY(PPM)	SUSP:	BLANK- NONE L- LOW H- HIGH
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 COLOURIMETRY(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-F-	URANIUM BY FLUOROMETRY(PPM)		
U-N-	URANIUM BY DELAYED NEUTRON COUNTING(PPM)		
AU-	GOLD BY SOMETHING(PPB)		
DL-	GOLD DETECTION LIMIT BASED ON ANALYSIS SAMPLE WEIGHT (1=10 GRAMS, 2=5 GRAMS)		