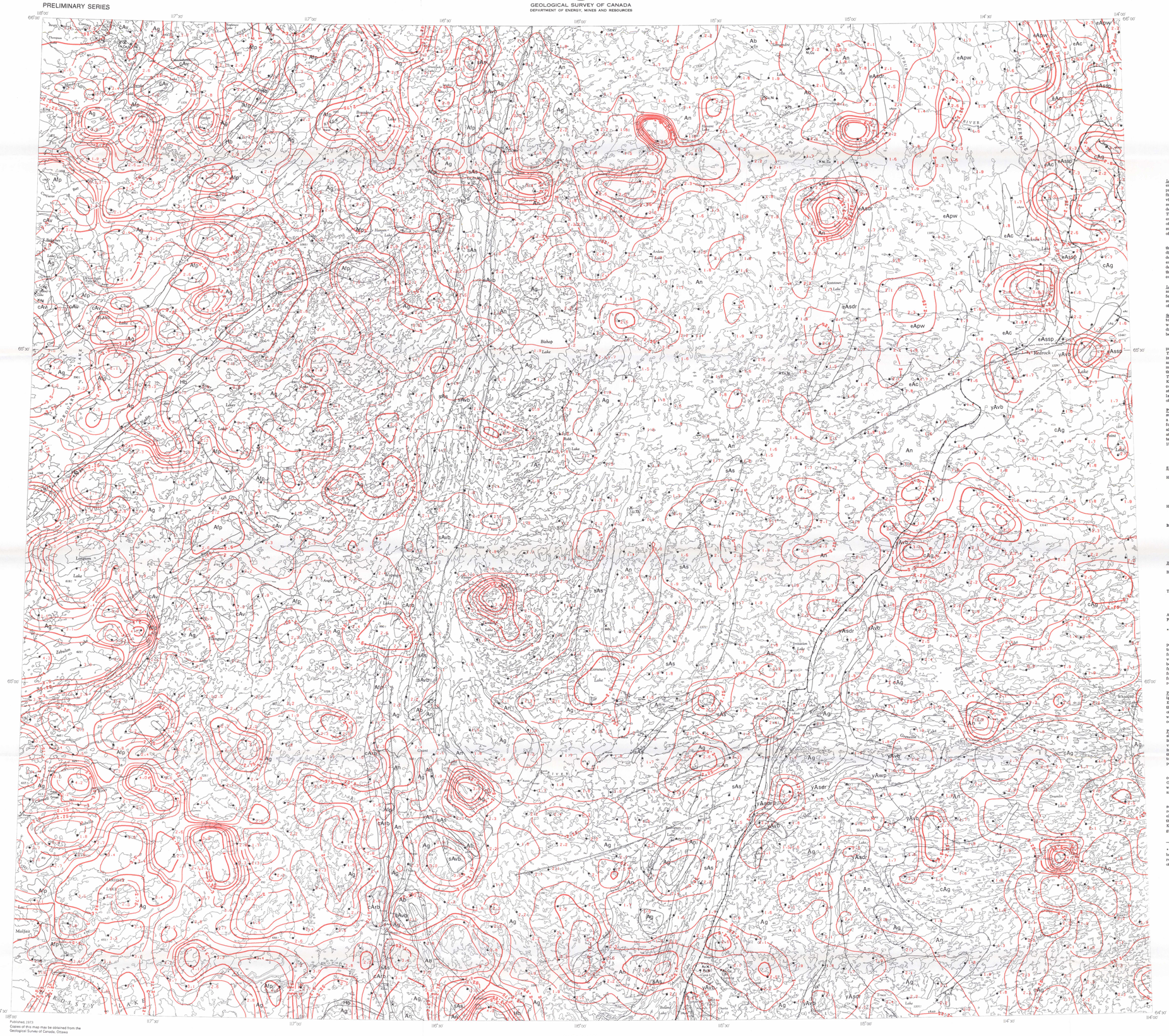
PRELIMINARY SERIES

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES



LEGEND

PROTEROZOIC

HADRYNIAN

- Hb — Gabbro sheets, sills

APHEBIAN

- Afp — Felsite porphyry
- Ag — Granodiorite, diorite, quartz diorite
- An — Migmatite, granitic gneiss

CAMERON BAY GROUP

- cAv — Intermediate porphyritic flow, tuff, agglomerate
- cArb — Red arkose, conglomerate, shale
- Ab — Gabbro, diorite

SNARE GROUP

- sAvb — Basalt, tuff, minor chert
- sAs — Quartzite, dolomite, siltstone, shale

EPWORTH GROUP

- eApw — RECLUSE FORMATION: argillite, shale, greywacke
- eAc — ROCKNEST FORMATION: dolomite
- eAssp — ODJICK FORMATION: sandstone, shale, argillite, andesite
- eAsdr — Metamorphosed Epworth Group

ARCHEAN

- Ag — Quartz diorite, quartz monzonite, granodiorite, granite. In part porphyritic
- An — Granite gneiss, migmatite, mixed gneisses involving Yellowknife rocks
- cAg — Complex of plutonic granitic rocks that may be, in part, older than Yellowknife Supergroup

YELLOWKNIFE SUPERGROUP

- yAwp — Greywacke, shale
- yAsdr — Cordierite-andalusite bearing knotted schist and other metamorphic equivalents of yAwp
- yAvb — Intermediate to basic lava, tuff, agglomerate, and undifferentiated acidic volcanic rocks

Boundary between Bear and Slave geological provinces
Fault, observed or assumed
Mineral prospect showing principal element(s) — Cu ×
Lake sample site and metal concentration (sediment sieved to minus 250 mesh) — 2.5
Lake sample site and metal concentration (sediment sieved to minus 100 mesh) — 20
Geochemical concentration contours as ppm — 5 10

MINERALS

Asbestos	asb	Molybdenum	Mo
Bismuth	Bi	Nickel	Ni
Cobalt	Co	Silver	Ag
Copper	Cu	Thorium	Th
Gold	Au	Uranium	U
Lead	Pb	Zinc	Zn

Geology after unpublished map compiled by J.C. McGlynn, 1971

Field work by R. J. Allan, E. M. Cameron, C.C. Durham, R. Benson, R. Colley, B. Cumming, G. Lind, D. Mann, C. Pride, G. Thomas and B. Worcuk

Analyses by J. J. Lynch, R. Horton, W.H. Nelson, W. Alexander and A. Martineau

Marginal notes by R. J. Allan and E. M. Cameron

Geochemical contours and metal concentration numbers drawn by computer drum plotter

Geological cartography by the Geological Survey of Canada

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada

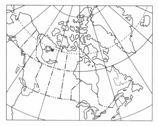
Base-map assembled by the Geological Survey of Canada from maps published at the same scale by the Army Survey Establishment R.C.E. in 1961, 1962

Copies of the topographical maps covering this map-area may be obtained from the Canada Map Office, 615 Booth Street, Ottawa, Ontario K1A 0E9

Mean magnetic declination 1972, 36°31' East, decreasing 8.7' annually. Readings vary from 34°52' in the SE corner to 38°43' in the NW corner of the map area

Elevations in feet above mean sea-level

Published 1973
Copies of this map may be obtained from the Geological Survey of Canada, Ottawa

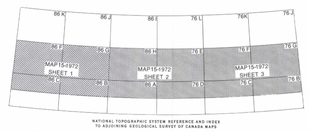


MAP 15 - 1972
SHEET 1

POTASSIUM CONTENT OF LAKE SEDIMENTS
BEAR-SLAVE OPERATION
DISTRICT OF MACKENZIE

Scale 1:250,000

Miles 4 0 4 8 12 Miles
Kilometres 6 0 6 12 18 Kilometres



MARGINAL NOTES*

Lake Sediment Geochemistry The use of lake sediments as an aid to mineral exploration and geological mapping within the Canadian Shield is based on two principal concepts of their origin. The first is that the detrital portion of a fine-grained lake sediment is a good composite sample of the rocks in the vicinity of the lake. In perhaps a majority of cases, the material forming the sediment has passed through an intermediate stage as a component of locally derived tills or other glacial sediments before being transported to the lake. The second concept is that the fine-grained particles of the sediment are an excellent medium for the sorption of metal ions released during the weathering of nearby sulphide ore deposits or similar mineralization. Most of the known sulphide deposits in the Bear-Slave survey area show moderate to high degrees of oxidation.

At the wide, reconnaissance, sampling interval used, it is unlikely that many samples will be taken from lakes within the limits of the secondary dispersion halo of a single ore deposit. However, country containing such deposits may be defined by the trace element dispersion from the much more extensive non-economic mineralization that is often associated with economic deposits. Similar trace metal patterns may also be derived from mineralization that is not associated with ore deposits or from rock units of unusual chemical composition.

Lake Sediment Sampling The lake sediment samples were collected by post-hole auger from a helicopter. They were taken near the edge of the lake in water 3 to 8 feet deep. They comprise approximately the top 8 inches of sediment, less the surface layer. Of the variety of sediment types that may occur in lakes, the type of sample sought was of clay to silt grade and low in organic material.

Sample Preparation and Analysis. The sediment samples were dried, then sieved to minus 150 mesh to give a powder suitable for analysis. A few coarse samples were sieved to minus 100 mesh, then ball-milled. Potassium was analyzed by direct-reading emission spectrometry. The technique summarized below has been described by Timperley, Horton and Lynch, (1973).

A 100 mg sediment sample was mixed with buffer composed of 1 part Na_2CO_3 and 7 parts graphite and containing Pd and Rb as internal standards. The sample mixture was packed in $^1/_{16}$" preformed anodes. These were burned in a D. C. arc enclosed in a chamber, through which there was a flow of oxygen-argon. The arc burnt at 5 amps for 15 and 15 amps for 50 sec. An 8K minicomputer terminated measurement of the K 4044 line after volatilization of this metal was complete, but prior to development of measurable background. The minicomputer converted the accumulated light energy of the K line to ppm K in real time using calibration curves derived from standards. Background corrections were made and Pd 3421 served as an internal standard. A control standard was run after every tenth sample. For 254 replicate analyses of a lake sediment sample containing 1.5% K a standard deviation of 0.2% was obtained. This is equivalent to a coefficient of variation of 10%.

Potassium in Rocks and Ores of the Survey Area During the 1971 orientation survey (Allan, Cameron and Durham, 1972) rock samples were collected from a number of areas within the Bear and Slave Provinces. A selection of the data for these rocks and lake sediments from the same areas is given below as an aid to the interpretation of the lake sediment data. The analyses were made by atomic absorption spectrophotometry after fusion of the sample with lithium tetraborate. The results are directly comparable with data obtained during the 1972 program.

	Number of Samples	Arithmetic Mean, K_2O %	Arithmetic Mean, K %
SLAVE PROVINCE			
High Lake:			
basic volcanics	22	1.27	1.05
intermediate volcanics	54	1.21	1.09
acid volcanics	16	2.01	1.67
lake sediments	31	3.53	2.10
Hackett River:			
volcanics and sedimentary	37	1.90	1.58
lake sediments	28	1.87	1.55
Bolin Lake:			
basic volcanics	55	0.36	0.30
intermediate volcanics	21	1.61	1.34
acid volcanics	21	2.50	2.08
sedimentary rocks	81	2.05	1.70
granites	5	1.69	1.33
lake sediments	35	3.49	2.97
BEAR PROVINCE			
Bode Lake:			
porphyries	57	3.80	3.15
lake sediments	12	2.92	2.42
Terra Mine:			
volcanic, sedimentary and intrusive rocks	65	3.31	2.75
lake sediments	39	3.79	3.15
Archean rock average*	-	2.70	2.24
Proterozoic rock average*	-	3.51	2.91

* From Eade and Fahrig (1971)

The above data show that there is a significant difference in the potassium content of rocks and lake sediments from the Bear Province compared to the Archean of the Slave Province. The data also show the well-known trend for potassium to increase in igneous rocks with increasing silica content. The very low content of potassium in the basic volcanic samples from Bolin Lake should be noted. The much higher content of this element in the basic volcanic samples from High Lake may, in part, be caused by metamorphism associated with the formation of the massive sulphide deposit in this area. The lake sediment data for potassium appear to fairly closely reflect the composition of the surrounding rocks.

Potassium in the Surficial Environment. The principal potassium minerals of igneous rocks—orthoclase and micas—are relatively stable during weathering. Examination of the silt fraction of lake sediments from the survey area shows that there is an appreciable amount of potassium feldspar and micas present in many of the samples. Potassium that is released from primary minerals during weathering is very largely incorporated into clays, although lake and river waters contain a small amount of potassium in solution.

Potassium in Lake Sediments, This Sheet. The Wopmay Fault marks a rather sharp demarkation in the potassium content of lake sediments. West of the fault, in the area underlain by granitic rocks of the Great Bear Batholith, potassium values generally exceed 2.5% K. Within this batholith there is an irregular increase in potassium content westward to the margins of the map-sheet. The data indicate that the rocks of the batholith have a rather uneven potassium content. Those near to and somewhat below the horizontal centre-line of the map-sheet contain low potassium contents on the evidence of the lake sediment data.

The migmatized terrane to the east of the Wopmay Fault has a lower content, with much of the area being less than 2.0% K. There are, however, exceptions. One of the most interesting of these is on the north part of the belt near Calder River, where levels rise to 2.5% or more. These areas also contain higher than average amounts of lead and zinc.

In the northeastern portion of the map-sheet, underlain by Epworth sediments, there are also higher levels of potassium. These values are very likely related to shales, sandstones and greywacke that are relatively enriched in the element. Within the Slave Province on the southeastern corner of the map-sheet the potassium contents are rather variable. Much of this area has contents of 2.0% K or less, but there are a number of small areas with 2.5% K or greater over granitic rocks.

* Geological Survey Paper 73-50, contains a detailed description of the experimental basis for lake sediment sampling in the Shield; the geology and metallogeny of the region; the organization, methods, and costs of the sampling operation; the methods of sample analysis and the references for the articles quoted above.

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POTASSIUM
BEAR-SLAVE OPERATION
DISTRICT OF MACKENZIE