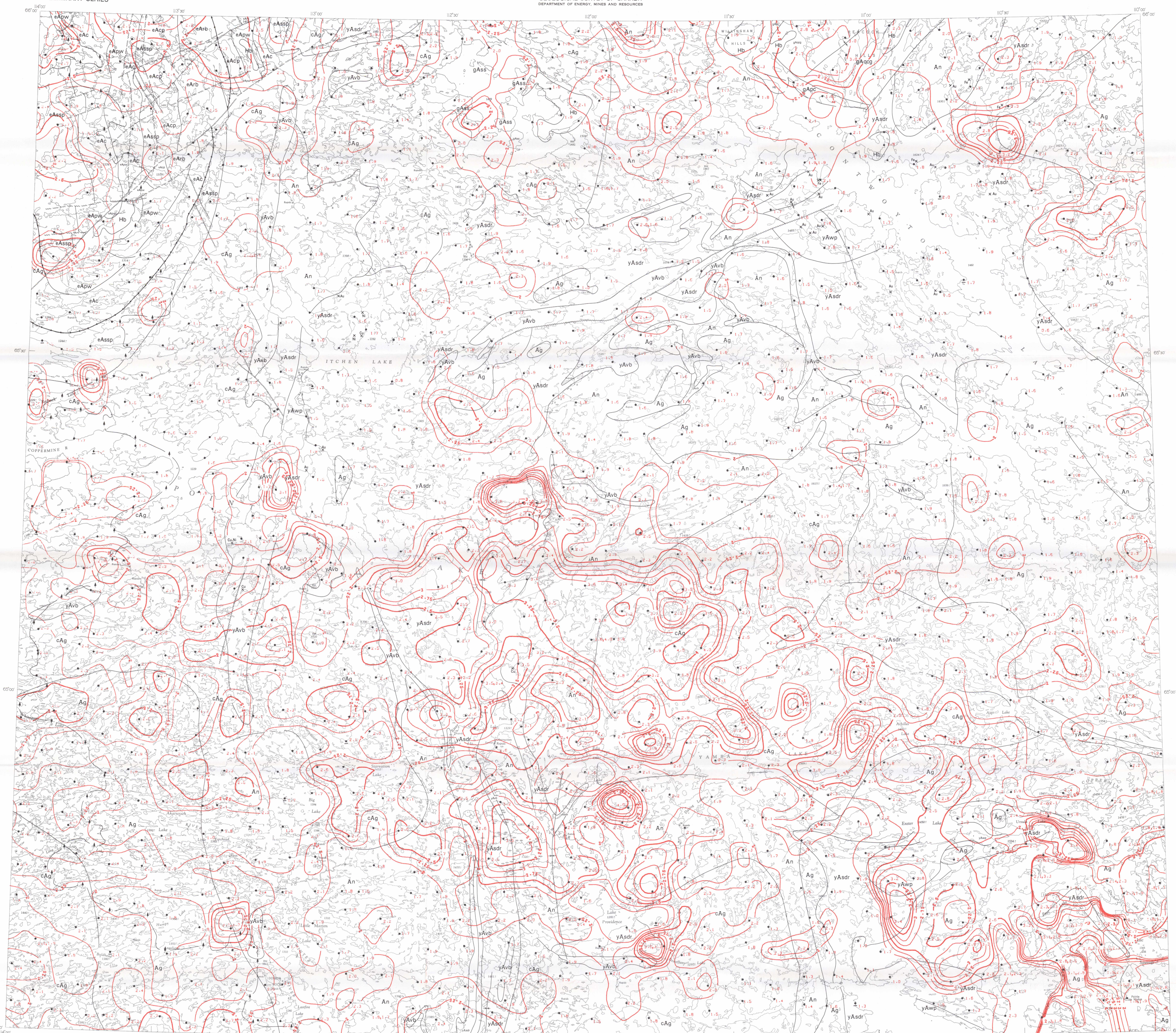
PRELIMINARY SERIES

GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES



LEGEND

PROTEROZOIC

HADRYNIAN

Hb	Gabbro sheets, sills

APHEBIAN

GOULBURN GROUP

gAss	BROWN SOUND FORMATION: red siltstone, shale, sandstone
gApc	PEACOCK HILLS FORMATION: shale, dolomite, sandstone
gAqcg	BURNSIDE RIVER FORMATION: quartzite, conglomerate

EPWORTH GROUP

eArb	TAKIYUAK FORMATION: red sandstone, shale
eAcp	COWLES LAKE FORMATION: limestone, shale
eApw	RECLUSE FORMATION: argillite, shale, greywacke
eAc	ROCKNEST FORMATION: dolomite
eAssp	ODJICK FORMATION: sandstone, shale, argillite, andesite

ARCHEAN

Ag	Quartz diorite, quartz monzonite, granodiorite, granite. In part porphyritic
An	Granitic 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

Approximate position of treeline

Syncline

Mineral prospect showing principal element(s) .... Au ×

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

MINERALS

Copper	Cu	Iron	Fe
Gold	Au	Nickel	Ni

Geology after unpublished map compiled by J. C. McGlynn, 1971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. Lund, D. Mann, C. Pride, G. Thomas and B. Woronuk

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 1962, 1964

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, 34°20' East, decreasing 8.2' annually. Readings vary from 31°54' in the SE corner to 37°11' in the NW corner of the map-area

Elevations in feet above mean sea-level

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 250 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 In as internal standards. The sample mixture was packed in 3/16" 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 10 sec. 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 excessive 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 1.9% 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	1.31	1.09
acid volcanics	16	2.01	1.67
lake sediments	31	2.53	2.10
Hackett River:			
volcanics and sedimentary	37	1.90	1.58
lake sediments	28	1.87	1.55
Indin Lake:			
basic volcanics	55	0.36	0.30
intermediate volcanics	21	1.61	1.34
acid volcanics	31	2.50	2.08
sedimentary rocks	81	2.05	1.70
granites	5	1.59	1.32
lake sediments	35	2.49	2.07
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 Indin 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 metasomatism 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.

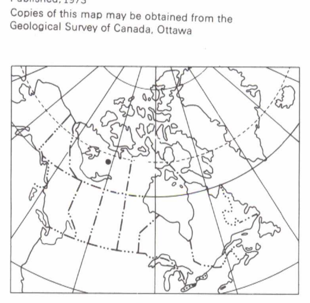
Potassium in Lake Sediment, This Sheet. There is a noticeable contrast in the potassium contents of the north and south halves of this sheet. Most of the sediment samples from the former area contain 2.0% K or less, whereas those from the south generally contain more than this amount. In the north part of the sheet there are exceptions to this generality. There are a number of areas enclosed by the 2.5% K contour. These are mainly underlain by Aphebian sediments of the Epworth and Goulburn groups and presumably owe their higher potassium content to shales and sandstones that contain moderate to high amounts of this element.

From an economic standpoint on often more interesting features of this map are potassium anomalies in places along the margins of the greenstone belts. In a number of these cases the anomalies are near anomalies for zinc and other trace metals. Since potassium is more abundant in the acidic volcanic rocks that are usually associated with Archean massive sulphide deposits, the coincidence of a potassium and ore-related trace metal anomalies, is a good indication of economic potential.

The largest continuous area on this map-sheet enclosed by the 3.5% K contour is between Yamba Lake and the eastern end of Point Lake. This region of granitic rocks has been referred to elsewhere in the marginal notes for this map set as being anomalous for a variety of elements including uranium, lithium, zinc, lead, iron and manganese. It has been reported that the granitic rocks in the region of the anomaly tend to be coarse-grained, subporphyritic to porphyritic. The high levels of potassium in this area strongly suggests that the granitic rocks are of unusual composition. These rocks merit more detailed examination both for economic and scientific interest. Granites of Archean age rarely contain high contents of uranium or potassium. It is possible that this body is of Proterozoic age. There are also small sharp potassium anomalies in the granites lying near the southeastern corner of the map-sheets. In this region there are anomalies for a number of the same metals as were noted above for the granitic area near Yamba Lake. It is possible that similar rock types are present in the southeastern part of the sheet.

* Geological Survey Paper 72-50, 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.

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



INDEX MAP

MAP 15 - 1972

SHEET 2

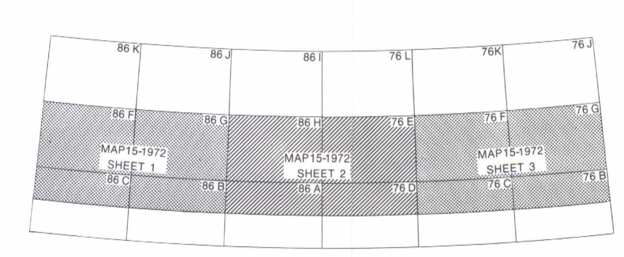
POTASSIUM CONTENT OF LAKE SEDIMENTS
BEAR-SLAVE OPERATION

DISTRICT OF MACKENZIE

Scale 1:250,000

Miles 4 0 4 8 12 Miles

Kilometres 6 0 6 12 18 Kilometres



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND INDEX TO ADJOINING GEOLOGICAL SURVEY OF CANADA MAPS

MAP 15 - 1972
SHEET 2
POTASSIUM
BEAR-SLAVE OPERATION
DISTRICT OF MACKENZIE