Canada
Department of Energy, Mines and Resources
Geological Survey of Canada

Parts of 106 E, L and 116 B, I

LEGEND

Note: Text legend is common to Geological Geochemical Reconnaissance Map 10-1976, Open File 426, Map 11-1976, Open File 434 and Map 16-1976, Open File 435

QUATERNARY
Q — Unconsolidated glacial and alluvial deposits

PALEOZOIC
CAMBRIAN
Cc — CANOL FORMATION: shale and conglomerate; Cs, ROMAN FLUME FORMATION: sandstone, shale and coal; Cb, ROMAN FLUME FORMATION: conglomerate and sandstone; Cb, ARTIC RED FORMATION: shale and siltstone
Cm — METAMORPHOSED CAMBRIAN ROCKS: undifferentiated, commonly amphibolite and minor ultramafic rocks

ORDOVICIAN
Om — Marble and gneiss

SILURIAN
Sq — MOSS HILL QUARTZITE: massive quartzites; minor slates and phyllite

DEVONIAN
Dl — LOWER DEVONIAN undifferentiated: slate, phyllite and minor quartzite; Dls, sandstone and shale

TRIASSIC
Tc — CHARLIE FORMATION: limestone and shale; uncleaved clastics and carbonates

JURASSIC
Jg — TANTATAUL FORMATION: grey chert and limestone; Jbs, BIRCH CREEK FORMATION: shale, carbonate and clastics; undivided

CRETACEOUS TO TERTIARY
Kc — CARMACKS GROUP: andesite, shale and limestone; KRBT RIVER FORMATION: shale, siltstone and limestone; Clastic Wedge undivided: Ks, limestone, siltstone and shale; Kc, conglomerate, arkose, limestone, Tchilcotin, sandstone and shale
Tv — TERTIARY VOLCANICS: basalt; undivided sandstone

INTRUSIVE
INTRUSIVE ROCKS TO UNDIVIDED AGES
Ks — KING FORMATION: black shale; METAH-RIVER FORMATION: chert-pebble conglomerate and chert-grain sandstone; shale, argillite, limestone and minor chert-pebble conglomerate and sandstone

LOWER TO MIDDLE DEVONIAN
Dl,Ch — SELWYN FORMATION: limestone; CARBONATE FORMATION: limestone; Dl, MIDDLE FORMATION: limestone and shale; unnamed limestone, dolomite and minor chert; undifferentiated black shale

DEVONIAN AND SILURIAN
Sm — MUSK OXEN FORMATION: shale, limestone, black chert and argillite; minor quartzite and chert-pebble conglomerate
Sv — Undivided mafic volcanics; argillaceous limestone and dolomite; minor intrusives

CARBONIFEROUS
C — Limestone and dolomite; minor red shale; unnamed clastics; Ds, DUO LAKE FORMATION: limestone, shale, chert and argillite; Dsq, quartzite, Flow and Trill; Ds, CROOS RIVER FORMATION: limestone, dolomite and limestone
PRECAMBRIAN AND PALEOZOIC
Pz — Undivided green schists, gneisses, tuff, agglomerate, shale, chert, siltstone and limestone
Pq — Quartzite, conglomerate, quartz-pebble conglomerate, marbles and green schists; intrusive syenite, quartz-albite syenite, phyllite, limestone and black chert

PRECAMBRIAN
A — Undivided carbonaceous and clastics
B — WATSON GROUP: Argillites, limestone, lime formation and dolomite

HELIKIAN
H — GEORGINA FORMATION: Limestone and dolomite; TSICHUTA FORMATION: Sandstone and dolomite; unnamed carbonates, shale and quartzite
Hq — QUARTZITE: Quartzite, minor conglomerate, limestone, shale and marble
Hsch — SCHISTS: Quartz-pebble conglomerate, limestone, black shale, argillite and siltstone
HELIKIAN AND OLDER
Y — Argillites, slates, phyllite quartzites, dolomites, conglomerate and undivided limestones

Drift-covered areas.....
Geological contact.....
Faults.....

Geology generalized for geochemistries by W.D. Goodfellow from Wind River (1968) and Hart River (1969) by R.G. Morris (G.S.C. Open File 275, 1975); and Coyle River (1961) manuscript unpublished map by O.H. Morris

Geological cartography by the Geological Survey of Canada

Base-map assembled by the Geological Survey of Canada from maps published at the same scale by the Surveys and Mapping Branch in 1954, 1958

Mean magnetic declination 1977, 33°52'-1° East, decreasing 2.4' annually. Readings vary from 29°56.6' in the SE corner to 34°31.6' in the NW corner of the map-area

Elevations in feet above mean sea-level

GEOCHEMICAL SYMBOLS AND DATA PRESENTATION

The absolute background and anomalous concentrations, and the contrast between them will vary regionally depending on factors such as the lithostratigraphy, geology, the sample media and the chemistry of the elements determined.

Within the Mackenzie Mountains, the Selwyn Basin, the Cordillera, the Ogilvie and Richardson Mountains, and the Eagle Plains and Bonnet Plume basins. Most of the sediment in streams intersecting mesozoic terrain has been derived by the mechanical breakdown of the underlying rocks and has been transported as particulates during the heavy spring run-off. Stream sediments range in size from fine silt to boulders with the coarser fractions predominating. Only in the lowland areas underlain by the Peel Plain and Old Crow Flats are there commonly discontinuous, fine silt to clay, organic and deposits organic-rich sediment. Under these conditions, organic matter may be expected to

The geology of the survey area is represented by sedimentary, volcanic and intrusive rocks that range in age from lower(?) Proterozoic to Upper Cenozoic, with almost every period representedin. To date, it has been reported to occur in breccias associated with the Proterozoic sedimentary and volcanic rocks of the Wernecke Mountains, and in the Upper Devonian Canol Formation in the Selwyn Basin. Other potential in the survey area include the following: the Mesozoic alkaline stocks and batholithes; the Paleozoic shales as a source of low grade and high tonnage U; the Proterozoic and Paleozoic clastics as a source of Cu, Pb, Zn, Ag and Au; paleochannels; barite; and structures such as faults and unconformities which may serve as favorable traps for deposition of U.

The dominantly mechanical derivation of stream sediments from mountainous terrain, the geochemistry is strongly influenced by the chemistry of the underlying rocks. For example shales, or their metamorphic equivalents, which are common to Proterozoic, Paleozoic and Mesozoic sedimentary rocks, are characteristically rich in Fe and most minor elements determined on its refractory heavy mineral concentrate of the stream sediments. Therefore, it is suggested that such stream sediments be excluded from the terranes of low local factors affecting the geochemistry of the surficial environment.

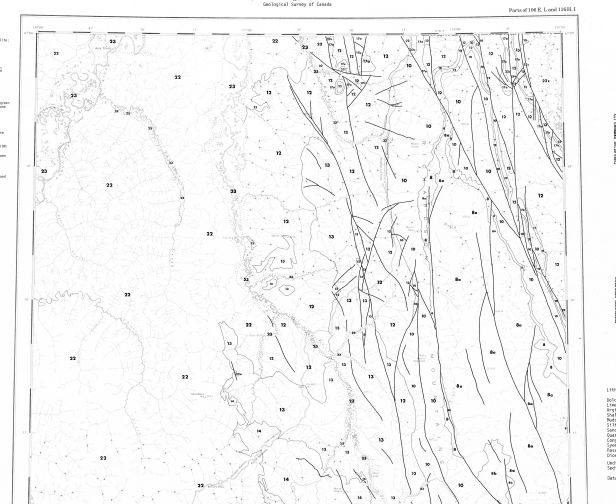
The element associations expected for particular types of U and base metal mineralization should be established from orientation surveys over known mineral occurrences. For example, Ba, Cu, Co and to a lesser extent, Mo, F, and W are associated with the Proterozoic U occurrences whereas Mo, F and to a lesser extent Pb, Zn, Ag and Au are associated with the Mesozoic U occurrences in the Mackenzie Mountains. Furthermore, element associations in stream sediments and waters will be useful in identifying regional geochemical trends that may be, at least in part, controlled by bedrock lithology. Once established, these trends and the element associations may then be evaluated for possible mineralization on the basis of not only the absolute concentrations but also element interrelations.

The concentration of an element at a sample site is graphically represented on one of 15 symbols; if a sample was collected but there is no data available a dot is plotted. The largest symbol is used to represent the highest 2.5% of the data, the next largest symbol and then increase in blackness to the lightest 2.5%. The two small circles at the low end of the scale are used to respectively denote concentrations below the analytical limit of detection and at the limit of detection. Where the range of the data are grouped on a semi-logarithmic scale, i.e. 1,2,4,10,20,40,100 etc. Five decades can be spanned and this arbitrary division has been chosen for the continuing study of the data. Other divisions may be more appropriate for individual elements.

The choice of symbols and the data groups they represent for any particular element is based on the histogram and cumulative frequency plot for the total survey area, as discussed in the accompanying text. This choice covered in one field season the full known spectrum of the data, most groups are defined by the histogram, this group also includes the median or the mode group as discussed in the text. Finally the cumulative frequency plot. Some, or all, of the remaining 15 symbols are chosen to achieve an appropriate graphical impact.

The symbol maps are primarily intended to assist the rapid inspection of the data for gross regional features. To fulfil the need for a more specific and thorough interpretative, the field and analytical data provided in the data listings should be used. Where the data is adequate, as in the case of the Mackenzie Mountains bedrock geology, a table of summary statistics for the drainage samples desirably derived from within each bedrock unit, or broad lithologic unit, is presented in the text. Where the data is inadequate to establish such lithologic units, more closely spaced sampling is recommended. The dependence of mean geochemical values on lithology has also been observed but whilst the total data appears to approximate a lognormal distribution the data for individual map-on lithologic units appears to approximate a normal distribution except where the concentration of an element at or below the limit of detection. In such circumstances the data may be skewed to the right (positively). In these situations, the frequency distribution will be positively skewed and the mean will not represent the total population. Therefore, caution should be exercised when using mean values and standard deviations to establish background and anomalous concentration ranges for a given element.

To comprehensively study an area, all available geological, environmental and geochemical data for the area should be compiled to bedrock-type can often be improved by constructing new data subsets and deriving local threshold levels based on the most detailed and up-to-date knowledge available.



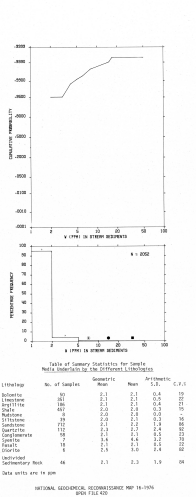


Table of Summary Statistics for Sample Media Underlain by the Different Lithologies

Lithology	No. of Samples	Geometric Mean	Mean	Arithmetic S.D.	C.V.
Dolomites	93	2.1	2.1	0.4	19
Limestone	263	2.1	2.1	0.5	22
Argillites	186	2.2	2.3	0.5	22
Shale	463	2.0	2.0	0.3	15
Siltstone	7	2.0	2.0	0.2	9
Limestone	39	2.0	2.1	0.3	14
Sandstone	112	2.1	2.2	1.3	86
Quartzite	77	2.1	2.2	0.4	20
Conglomerate	10	2.2	2.2	0.3	13
Cherts	7	3.6	4.6	3.2	73
Basalt	19	2.3	2.4	0.5	22
Diorite	5	2.5	3.0	1.4	46
Undivided Sedimentary Rock	46	2.1	2.3	1.9	84

Data units are in ppm

NATIONAL GEOCHEMICAL RECONNAISSANCE MAP 16-1976
OPEN FILE 435

Resource Geophysics and Geochemistry Division

Geological Survey of Canada, Ottawa

Planning and coordination by staff of the
Geochemistry Section, Resource Geophysics and Geochemistry
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Sample preparation by Geochemistry Section
Data processing and compilation by R.G. Garrett, N.C. Lund
and D.D. Eltbaum.

Contractors

Sample preparation by Golder Associates
Chemical analyses by Chemex Labs Ltd.

This map forms one of a series of 45 sheets released under Geological Survey of Canada, Open Files 410, 435, 426. The Open Files consists of data for 13 elements each for stream sediments, percent loss on ignition, 2 elements for stream waters and sample site location

The data are also available in digital form. For further information please contact:

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NATIONAL GEOCHEMICAL RECONNAISSANCE MAP 16-1976
TUNGSTEN IN STREAM SEDIMENTS
URANIUM RECONNAISSANCE PROGRAM

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NATIONAL GEOCHEMICAL RECONNAISSANCE MAP 16-1976
OPEN FILE 435
NORTHERN YUKON TERRITORY, 1976
TUNGSTEN