LEGEND

Note: This legend is common to National Geochemical Reconnaissance Map 76-1976, Open File 420, Map 75-1976, Open File 419 and Map 74-1976, Open File 418

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

Parts of 106 E, L and 117 H, I

QUATERNARY

[Q] Unconsolidated glacial and alluvial deposits.

CRETACEOUS

[K] Sandstone, shale and conglomerate; CH, CRANEW FLUME FORMATION, sandstone, shale and conglomerate; EA, EAGLE PLAINS FORMATION, sandstone and coalbeds; ZH, BEAR ROCK FORMATION, shale and siltstone.

[K] Sandstone and basalt/andesitic lavas(ss, commonly porphyritic), conglomerate and minor shale.

[K] Diorite and gabbro.

[K] Mottled green and maroon shale and lenses siltstone.

[K] KING HILL DOMAIN(?): Marine quartzite, minor shale and phyllite

JURASSIC

[J] LOWER TRIASSIC FORMATION: Phyllite, shale, phyllite and minor quartzite, limestone, sandstone and shale

TRIASSIC

[TR] SCHAILY FORMATION: Limestone and shales; unnamed clastics and volcanics

PERMIAN

[PA] TAKHANDIT FORMATION: grey chert and limestone, TAL, JONNELY CREEK FORMATION: limestone, shale, carbonate and clastics; undivided

CARBONIFEROUS TO PERMIAN

[C] Siltstone, limestone, shale and limestone, WOLF CREEK FORMATION: shale, siltstone and limestone; Eagle Plains Group undivided: TAL, limestone, black shale, chert, chert-pebble conglomerate, argillaceous limestone and siltstone.

[C] CAT ARMS FORMATION: shale, sandstone and limestone

DEVONIAN

MIDDLE DEVONIAN TO CARBONIFEROUS

[DA] CANOL FORMATION: black shale; ARTINSKIA FORMATION: cherty limestone, chert, siliceous shale and argillite; ROAD RIVER FORMATION: shale, limestone and minor chert-pebble conglomerate and quartzite.

LOWER TO MIDDLE DEVONIAN

[D] HOLLAY FORMATION: limestone, CRANBACK FORMATION: limestone; MUSKWA FORMATION: limestone and shale; undivided limestone, argillaceous limestone, siltstone, black shale and chert

DEVONIAN AND SILURIAN

[DS] ROAD RIVER FORMATION: shale, limestone, black chert and argillite; minor quartzite and interbedded conglomerate

[DS] Dolomite and limestone; argillaceous limestone and dolomite; minor volcanic rocks

SILURIAN

[S] Limestone and dolomite, minor red shale; undivided clastics: DH, Skiline Formation, conglomerate, shale and minor dolomite; SAM, Sam Formation, shale and siltstone; RI, LAKE RIDGE Formation; undivided dolomite and limestone

PRECAMBRIAN AND/OR LATE

[PC] Dark green volcanic rock; breccia, tuff, agglomerate, shale, argillite, quartzite and limestone

[PC] Clastic sedimentary rocks: quartzite, conglomerate, tuffaceous and green shale; locally schist, quartz-mica schist, phyllite, limestone and black chert

PROTEROZOIC

[PZ] Undivided carbonates and clastics

[PZ] GAYTHEN GROUP: dolostone, limestone, iron formation and dolomite

PROTEROZOIC

[PR] ARTHERIAN FORMATION: sandstone and dolomite; TSICHIYUN FORMATION: sandstone, siltstone, shale and minor limestone; undivided

[PR] Orange dolomite, shale, phyllite, minor grey dolomite, grey and maroon shale, quartzite, conglomerate, limestone, black cherty limestone, and tuffaceous rocks

PRECAMBRIAN AND (?) ARCHEAN

[PA] Argillite, shale, phyllite quartzite, dolomite, conglomerate and tuffaceous limestone

Drift-covered areas
Outcrop boundaries
Faults

Geology generalized for geochemical maps by W.D. Goodfellow from Wind River (106I) and Bear River (106J) by D.K. Norris (G.S.C. Open File 239, 1975); and Eagle River (106K) and Snake River (106L) by D.K. Norris.

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 1964, 1969

Mean magnetic declination 1977, 30°07.1' East, decreasing 2.4' annually. Readings vary from 30°26.6' in the SE corner to 30°31.0' 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 these will vary regionally depending on factors such as the physiography, geology, the sample medium and the analytical method employed.

Physiographical regions within the survey area include the Mackenzie, Selwyn and Richardson Mountains, and the Eagle Plains and Bonnet Plume basins. Most of the sediment in streams intersecting mountainous terrain has been derived by the mechanical breakdown of the underlying rocks and has been transported as particulates during the time of high water discharge. Sediment in streams draining the Eagle Plains and Bonnet Plume basins is organic-water dominant. By contrast, streams intersecting the Eagle Plains and Bonnet Plume basins are commonly discontinuous, flow at low velocities, and deposit fine-grained sediments. Lakes and swamps, which are widespread in the basins, also play a significant role in the transport and deposition of certain elements (eg. Cu, Zn, Co, Ni, Mo, etc.) and may therefore produce spurious anomalies. It is suggested that fluvial deposits such as sediments and waters, present in the base licensing area, are the most representative for geochemical prospecting purposes.

The geology of the survey area is dominated by sedimentary, volcanic and intrusive rocks that range in age from Lower(?) Proterozoic to Upper Cretaceous, with almost every period represented. In detail, it has been reported to occur in brecciated limestone, in fissure veins, disseminated in sandstone, shale and in the Mackenzie Mountains. Other geological environments that are considered to have a high potential in the survey area include the following: the Mesozoic alkaline stocks and dykes; the Mesozoic and Cenozoic fold belts; the Mesozoic and Cenozoic basins; Mesozoic and Cenozoic sedimentary basins such as the Eagle Plains and Bonnet Plume basins and structures such as faults and unconformities which may serve as favourable traps for hydrocarbons.

Because of the 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 in Proterozoic, Palaeozoic and Mesozoic rocks, have high background concentrations for U and most other elements when compared to the average for all rock types in the earth's crust. Therefore, it is suggested that each stream system be evaluated in terms of the local factors affecting the geochemistry of the surficial environment.

Certain elements (eg. Cu, Co, Ni, Mo, Fe, Mn, Pb, Zn, U and base metal alteration halos) should be considered when evaluating geochemically anomalous stream sediments. For example, Cu, Co, Zn and to a lesser extent, Mo, Y, and W are associated with the Proterozoic U occurrences whereas Mo, Y and to a lesser extent Pb, would be expected to be associated with primary U mineralization in alkaline plutons. Consideration of the above factors is important in the evaluation of the data and in identifying regional geochemical trends that may be, at least in part, controlled lithologically. Anomalous geochemical trends within these regional patterns should be regarded as the most favourable exploration targets 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 as one or more symbols. The range of concentrations for each element is divided into 15 or 16 classes. The classes are arranged so that they first increase in size to the eighth symbol and then increase in blackness to the fifteenth. The two shaft crosses at the top and at the sides are used to respectively denote concentrations below the analytical detection limit, or in the data group containing the detection limit. The class limits are determined empirically from the data. The class limits for the data tables can be spanned and this arbitrary division has been chosen for the contouring Canada wide series of maps constituting the National Geochemical Reconnaissance.

The class limits for each element are tabulated on the data sheets. They are derived from a histogram and cumulative frequency plot for the total survey data from one, or more contiguous, open file sheets covered in one field season.

Selection of the class limits is dependent on the form of the histogram. The arithmetic mean would include the modes of the data as defined by the 2.5 (SD) point on the cumulative frequency plot. Some, or all, of the remaining 14 symbols are chosen to achieve an appropriate graphical impact.

The raw data symbol maps are only intended to assist the rapid inspection of the data. Before any detailed study of the data is undertaken, or before any more thorough interpretation, the field and analytical data pertained to the data listings should be consulted. To assist in the appraisal of the data in terms of the symbol maps, histograms of the data are presented on the data sheets. Histograms are entirely derived from within each bedrock unit, or broad lithologic unit, is presented below the histogram. In many instances, the table will also illustrate, more clearly than the histogram, the presence of bimodal or polymodal populations. The table will also be observed that whilst the total data appears to approximate a log-normal distribution the data for individual map or lithologic units appears to approximate a normal distribution except where the concentration of an element at or below the detection limit for a large number of samples (e.g. U and F in water; Ag, Mo and Au in sediments). In such cases the mode will approximate the lower limit of the data viewed and the mean will not represent the total population. Therefore, caution must be exercised when using the table of summary statistics to establish background and threshold values for elements in the data for individual units.

To comprehensively study an area, all available geological, environmental and recorded data should be utilized. The data separable by 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 Inscribed by the Different Lithologies

Lithology	No. of Samples	Geometric Mean	Geometric S.D.	Arithmetic Mean	Arithmetic S.D.	C.V.%
Dolomite	50	14	16	11	69	
Limestone	151	11	14	10	65	
Argillite	106	29	58	210	364	
Shale	1144	29	58	210	364	
Mudstone	8	21	29	35	99	
Siltstone	88	21	30	33	107	
Sandstone	212	16	24	18	68	
Quartzite	111	14	20	15	68	
Conglomerate	50	14	18	8	47	
Gypsum	7	18	50	26	111	
Basalt	10	85	49	10	37	
Granite	6	38	41	37	86	
Undivided Sedimentary Rock	65	19	22	14	61	

Data units are in ppm

NATIONAL GEOCHEMICAL RECONNAISSANCE MAP 16-1976
OPEN FILE 420

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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 418, 419, 420. The Open Files consists of data for 12 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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