LEGEND

Note: Tectonic framework common to National Geochemical Reconnaissance Map 96-1-YUKON, Open File 1972, Map 14-1970, Open File 824 and Map 15-1970, Open File 825

PHANEROZOIC

[Tv] Unconsolidated glacial and alluvial deposits

CRETACEOUS

[K] Sandstone, shale and coal/lignite; (1) BONNET PLUME FORMATION - sandstone, shale and coal; (2a, 2b)EAGLE PLAINS FORMATION - conglomerate, sandstone, siltstone, shale and coal; (3) ARCTIC RED FORMATION - sandstone and mudstone/argillite; (4) CHANDLER FORMATION - sandstone and conglomerate; (5) CARMACKS GROUP - sandstone, shale, coal, tuff and volcanic breccia

[Kg] Granite and gabbro

JURASSIC

[J] Marine green and maroon shale and brown siltstone

[Jv] VOLCANIC RIVER FORMATION - basalt; (1) HART RIVER FORMATION - shale, siltstone and sandstone

TRIASSIC

[TrJ] LOWER CASSIAR FORMATION - chert, clastic sediments and minor carbonate; UPPER CASSIAR FORMATION - shale, siltstone and basalt

PERMIAN

[P] SEKWI FORMATION - limestone and shale; unnamed clastics and carbonates

DEVONIAN

[D] GRAHAM ISLAND FORMATION - grey chert and limestone; (1a, 2)HALKETT FORMATION - shale, carbonate and clastics; undivided Devonian

CARBONIFEROUS TO PERMIAN

[CP] KINDLE FORMATION - shale and limestone; UPPER HAZEN FORMATION - shale, siltstone and limestone; (1)earlier Hazen undivided; (2a, 2b)earlier, black shale, chert, clastic-matrix conglomerate, and limestone; (3)younger, limestone

[C] Tay River FORMATION - shale; unnamed conglomerate

DEVONIAN TO CARBONIFEROUS

[DC] EARN FORMATION - black shale; UPPER KLOTZ FORMATION - chert, clastic conglomerate and chert-clastic sandstone, shale, argillite, limestone, siltstone and minor chert-clastic conglomerate and sandstone

CAMBRIAN TO MIDDLE ORDOVICIAN

[C-O] ROSELLE FORMATION, Yanorama; (1)BASALTIC FORMATION - limestone, dolomite, shale, siltstone and minor chert; (2)CLASTIC UNDIVIDED - sandstone and conglomerate; (3)CARBONATE UNDIVIDED - limestone, dolomite and conglomerate (black shale)

PROTEROZOIC AND ARCHEAN

[A] Older rocks intruded by granite, shale, limestone, black chert and argillite, (1)Wernecke Mountains and (2)Mackenzie Mountains

[A] Intensely and foliations, argillaceous limestone and dolomite, dark volcanic rocks

YUKON-TANANA

[A] Quartzose and dolomitic, minor red shale, unnamed clastics, (1)Hyland Group - sandstone, conglomerate, shale and local anhydritic and basaltic flows and sills; (2)Upper Proterozoic and Lower Cambrian, Rapitan Group - diamictite, shale and basalt

PROTEROZOIC AND/OR LATER

[A] Dark green volcanic rocks, breccia, tuff, agglomerate, shale, chert, siltstone and limestone

[A] Quartzite, limestone, quartz-pebble conglomerate, marble and gneiss (1)Fairchild Lake Group, (2)Hadrynian Pinguicula Group, (3)Tindir, (4)Pelly Gneiss and Grand Canyon

PROTEROZOIC

[P] Unmapped carbonates and clastics

[P] SAFTLINA GROUP: mudstone, limestone, iron formation and dolomite

ARCHEAN

[A] WITHERSPOON FORMATION: sandstone and dolomite; (1)FAIRCHILD FORMATION: limestone, dolomite, sandstone and conglomerate; (2)ANTLER FORMATION

[A] Rocks dolomitic, clastic, shale, argillite, green schist, gneiss and migmatite; (1)Nahanni Formation, limestone, black shale, (2)Rabbitkettle Formation, limestone, black shale, (3)Sunblood Formation, dolomite, shale and argillite

MILLIGAN AND (?) ORDOVICIAN

[O] Argillite, slate, argillite quartzite, dolomite, conglomerate and siltstone limestone

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

Geology generalized for geochemical maps by W.O. Goodfellow from Nash Creek (1960) and Lenores Creek (1964) By J.G. Green (G.S.C. Mem. 368, 1972), and Wind River (1961) and Hart River (1960) by D.K. Norris (G.S.C. Open File 219, 1973)

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, 1973

Mean magnetic declination 1977, 34°50.7' East, decreasing 3.9' annually. Readings vary from 30°05.5' in the SE corner to 39°05.4' 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 physiography, geology, the sample media and the chemistry of the elements determined.

In the present survey area, the highest stream sediments occur in the Wernecke, Ogilvie and Richardson, and the Eagle Plains and Dement Plain basins. Most of the sediment in streams intersecting mountainous terrain has been derived by the mechanical breakdown of the bedrock and consists of a wide range of particle sizes that are moved by heavy spring run-off. Stream sediments range in size from fine silts to boulders with only minor organic matter present. By contrast, streams intersecting the Eagle Plains and Dement Plain basins are characterized by abundant clay, silt, and fine sand, and by organic-rich sediment. Under these conditions, organic matter may be expected to play a significant role in the transport and deposition of certain elements (eg. Cu, Zn, Ni, Co, Mn, Fe, Mo, U) and in the development of anomalous values. It is suggested that field observations, such as sediment composition, present in the data listing be considered when examining the metal content of any specific site.

Rocks in the Wernecke Mountains are characterized by abundant limestone and dolomite rocks that range in age from Lower(?) Proterozoic to Upper Cretaceous, but almost every period represented. To date, it has been reported to occur in tensiles associated with the Proterozoic sedimentary and volcanic rocks of the Wernecke Mountains. Other geological environments that are considered to have a high potential for the occurrence of stratiform lead-zinc deposits are Proterozoic and Paleozoic shales as a source of Pb grade and high tonnage in the Mesozoic and Cenozoic sedimentary basins such as the Eagle Plains and Dement Plain basins, where there are faults and unconformities which may serve as favourable traps for deposition of Pb.

Because of the mechanical derivation of stream sediments from mountainous terrain, the concentrations of many elements will reflect the composition of the source rocks. Mineralized rocks, or their metamorphic equivalents, which are common in Proterozoic, Paleozoic and Mesozoic rocks, have high background concentrations for Ba and most other elements, and may be expected to contribute anomalous values to stream sediments. Therefore, it is suggested that each stream sediment be evaluated in terms of the local factors affecting the geochemistry of the surficial environment.

The presence of hydrous Fe and Mn oxides (limonite, goethite) and base metal mineralization should be considered when evaluating geochemically anomalous stream sediments. For example, Ba, Co, Cu and to a lesser extent, Mn, Fe, and Ag are associated with the Proterozoic(?) occurrences whereas Mn, Fe and to a lesser extent, Ba should be expected to be associated with primary hydromorphic alteration in siliceous sediments and volcanic rocks. Secondary hydromorphic dispersion may be a factor in identifying regional geochemical trends that may be, or may not be, part of structurally controlled lithologically. Anomalous geochemical trends within these regional patterns should be considered as being of significant importance 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 of 10 symbols. The range of values for each symbol is shown on the legend of the plotted. The symbols are arranged so that the first increase in size to the eighth symbol and then increase in blackness to the fifteenth. The two small crosses at the bottom of the legend are for the 16th and 17th symbols respectively. The 16th is statistical detection limit, or in the data group containing the anomalous levels. The data are grouped on a semi-logarithmic scale, i.e. 1.2,3,4,5,6,7,8,9,10 etc. Five decades are represented on the legend, i.e. 1 to 10, 10 to 100, 100 to 1000, etc. The symbols combine a series of maps constituting the National Geochemical Reconnaissance Program.

The choice of symbols and the data groups they represent for any specific element is based on the histogram and cumulative frequency plot for the total survey data from one, or more contiguous, open file sheets covered in one field season.

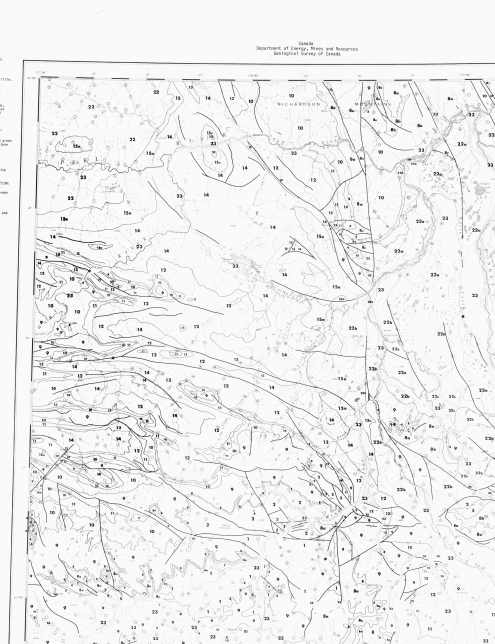
The histogram is a plot of the number of samples in a data group versus the group itself to indicate the mode of the data as defined by Tukey (1977) and by the cumulative frequency plot. Some, or all, of the remaining 16 symbols are chosen to represent the data on the basis of these plots.

The raw data symbol maps are only intended to assist the reader in the analysis of the data for gross regional features. To fulfil the need for a more specific and detailed geochemical study, the data listing for the area of interest to the reader should be consulted. To assist in the appraisal of the data in terms of the symbol map isotrend geology, a table of summary statistics for the drainage samples dookeyed to lithology is included. Histograms for selected elements are also included below the histogram. In many instances, the table will show illustrate, more clearly than the maps, the dependence of mean geochemical levels on bedrock type. It may also be observed that whilst the total data appears to approximate a lognormal distribution the data for individual map or lithologic units appears to approximate a normal distribution. The mean plus two standard deviations is often used as the detection limit for a large number of samples (e.g. 1 ppm Ag, 1 ppm U and 5 ppm Mo and W undetect). In these situations, the frequency distribution will be positively skewed. Where the mean plus two standard deviations is greater than the detection limit we recommend when using the table of summary statistics to establish background and anomalous concentration ranges for a given element.

Any unusual features noted during the course of topographical, environmental and recorded data should be utilized. The data conservation 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.

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

Parts of 106 D, E and 116 A, B



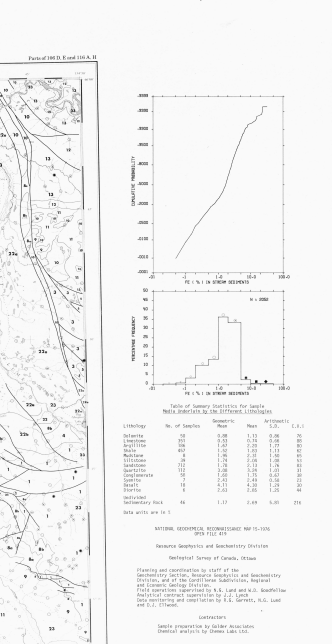


Table of Summary Statistics for Sample Media Subdivided by the Different Lithologies

Lithology	No. of Samples	Geometric Mean	Mean	Arithmetic S.D.	C.V.
Dataruta	50	0.08	1.11	0.06	55
Undetermined	50	1.08	1.08	0.00	0
Argillite	106	1.67	2.20	1.77	81
Shale	497	1.92	1.93	1.13	61
Limestone	1	2.00	2.00	1.00	50
Siltstone	38	1.76	2.28	1.08	63
Sandstone	712	1.78	2.13	1.74	81
Conglomerate	10	1.00	1.00	0.00	0
Carbonate	10	1.00	1.15	0.41	35
Granite	7	2.43	2.43	0.58	23
Gabbro	15	4.31	4.20	1.29	30
Unknown	6	2.63	2.85	1.25	44
Undetected					
Sedimentary Rock	46	1.37	2.69	5.01	216

Data units are in %

NATIONAL GEOCHEMICAL RECONNAISSANCE MAP 15-1976
OPEN FILE 419

Resource Geophysics and Geochemistry Division

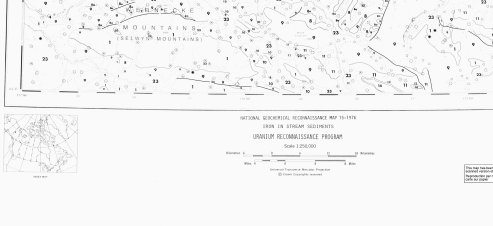
Geological Survey of Canada, Ottawa

Planning and coordination by staff of the Geochemistry Section, Resource Geophysics and Geochemistry Division, Geological Survey of Canada, Subdivision, Regional and Economic Geology Division.
Field operations supervised by R.G. Lund and W.O. Goodfellow
Data processing by Dynamic Systems Ltd.
Data reviewing and compilation by E.E. Garrett, R.G. Lund and D.J. O'Connor.

Contractors

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

This map forms one of a series of 45 sheets released under Geological Survey of Canada, Open Files 416, 418, 421. 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:

The Director,
Resource Analysis Centre,
Department of Energy, Mines and Resources
Ottawa, Ontario K1A 0E8