



GEOLOGICAL SURVEY OF CANADA  
DEPARTMENT OF ECONOMIC DEVELOPMENT AND REGIONAL PLANNING

URANIUM IN STREAM AND SPRING SEDIMENTS.

KENO HILL DISTRICT, Y.T.

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DESCRIPTIVE NOTES

**Introduction**  
The reconnaissance geochemical survey of Keno Hill area, Yukon covering 1900 square miles was started and completed in the summer of 1964. This survey was the first helicopter supported reconnaissance geochemical survey carried out by the Geological Survey of Canada. For the most part, the sampling teams were carried by helicopter to the heads of the creek after which they traversed on foot down the drainage system. However, in the northeast part of the region (106 D/4) some of the sampling was done using the helicopter with one sampler. In sparsely treed areas this system proved to be fast and efficient.

Initially 5900 stream and spring sediment samples were taken; of these, 2064 have been analyzed for U and plotted on the accompanying map.

Where possible the active stream channel was sampled; however as work progressed it was found that moss on creek banks below the water line had trapped considerable amounts of fine sediment suitable for sampling. The wet sediments and waters were analyzed at the sample site for cold chloride-soluble heavy metals. The results of this work have been described by Gleeson (1967) and published in preliminary maps (Gleeson et al., 1965). In addition, individual metal maps for the stream sediment samples have been published (Gleeson et al., 1966-67). The hydrogeochemistry of the area has been discussed by Gleeson and Boyle (1976), and a paper on gold in the heavy mineral concentrates of stream sediments has also been issued (Boyle and Gleeson, 1972). Papers on the minor and trace element distribution in the heavy minerals of the streams (Gleeson and Boyle) and on the lithochemistry of the Keno Hill area (Gleeson and Boyle) are in press.

Preparation and analysis of samples

The wet sediment was dried in the field at a temperature of about 60°C and sieved through an 80 mesh stainless steel screen. The sieved samples were shipped to Ottawa where they were ground to -100 mesh in a ceramic ball mill.

Samples of spring and stream sediments were analyzed for U using a delayed neutron activation technique (Boulanger et al., 1975) with a detection limit of 0.1 ppm.

General Geology

The regional geology has been described by Bostock (1947, 1964) and Green (1972). More detailed geological studies have been made by Kind (1962), McTaggart (1960), Poole (1965), and Green (1971). The geology, geochemistry and origin of the mineral deposits in the Keno Hill and Dublin Gulch areas are described by Boyle (1965). Reports by Aho (1964) and Cockfield (1921, 1922, 1924a, 1924b, 1925) provide further information on mineral deposits of the area.

The map-area is underlain principally by sedimentary rocks, mainly quartzitic grits, phyllites, slates, chloritic, sericitic and graphitic schists, and minor limestone. The age of these rocks is uncertain; they appear to range from Precambrian to Mesozoic (Poole, 1965; Tempelman-Kluit, 1966).

A dolomite and limestone unit outcrops in the northeastern part of the area. Fossils from these rocks range in age from Late Cambrian to late Silurian or early Devonian (Green and Roddick, 1962).

Mafic igneous sills and lenses now altered to greenschists are inter-layered with the metasediments, and quartz-feldspar porphyry sills and lamprophyre dykes are present locally. Granitic stocks cut and metamorphose the sediments east and north of Mayo Lake, northwest of Kusan Lake, south of Dublin Gulch, and in the vicinity of Mount Haldane. Skarn zones containing scheelite occur in the vicinity of some of the granitic masses particularly around Dublin Gulch, Mount Haldane, and east of Mayo Lake.

Most of the lead-silver ore deposits in the Keno-Galena Hills area occur along northeasterly striking vein faults in thick-bedded quartzite and greenstone (Boyle, 1965). In the Dublin Gulch area quartz arsenopyrite-gold veins with a general northeast strike are present near the contacts of the granitic stocks; easterly striking vein faults in this area are also mineralized with siderite, jamesonite, boulangerite, pyrite, arsenopyrite, galena, tetrahedrite, and chalcocypite. Two cassiterite-tourmaline veins occur on the right limit of Dublin Gulch near 106 D/4 mouth (Boyle, 1965; Poole, 1965). Northerly striking lead-zinc-silver veins are present in Davidson Range (Cockfield, 1922; Aho, 1964). Placer gold has been recovered from Dublin Gulch, Haggart Creek, and Duncan Creek since 1898.

The area has undergone several stages of glaciation. Thick glacial deposits occupy the major valleys and hill slopes below an elevation of 3000 feet. Permafrost is present throughout the area.

Results

The accompanying map shows the U content of the spring and stream sediment samples. In addition the data were contoured using CalComp's General Purpose Contouring Program (1973).

The parameters used to prepare the data for contouring included a cell size of 0.48 inches, and weighted averages of 8 neighbouring data points were used to generate grid values.

A histogram and a log probability plot for U are also shown on the map. The uranium content of the stream sediments for the Keno Hill district ranges from 0.1 to 31.8 ppm; the mean (median) value is 3.7 ppm with a standard deviation of 1.0 ppm.

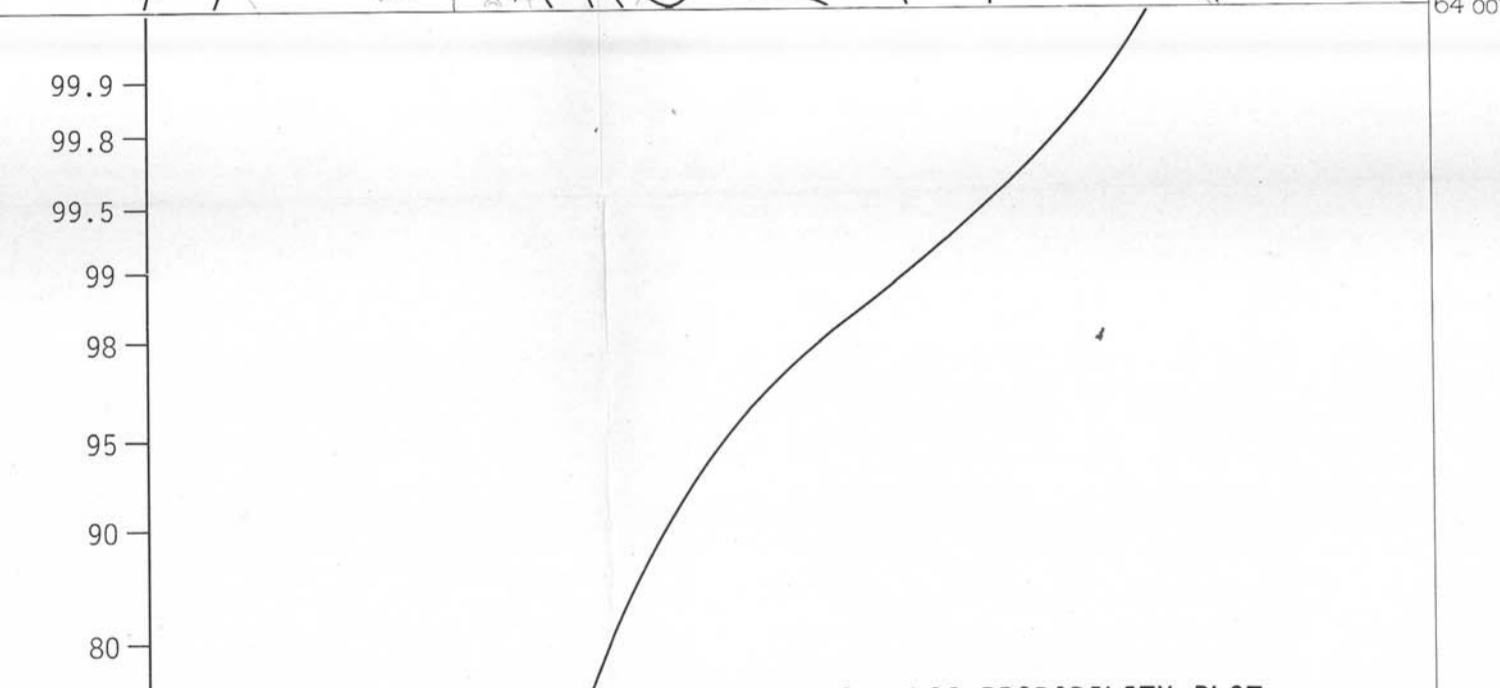
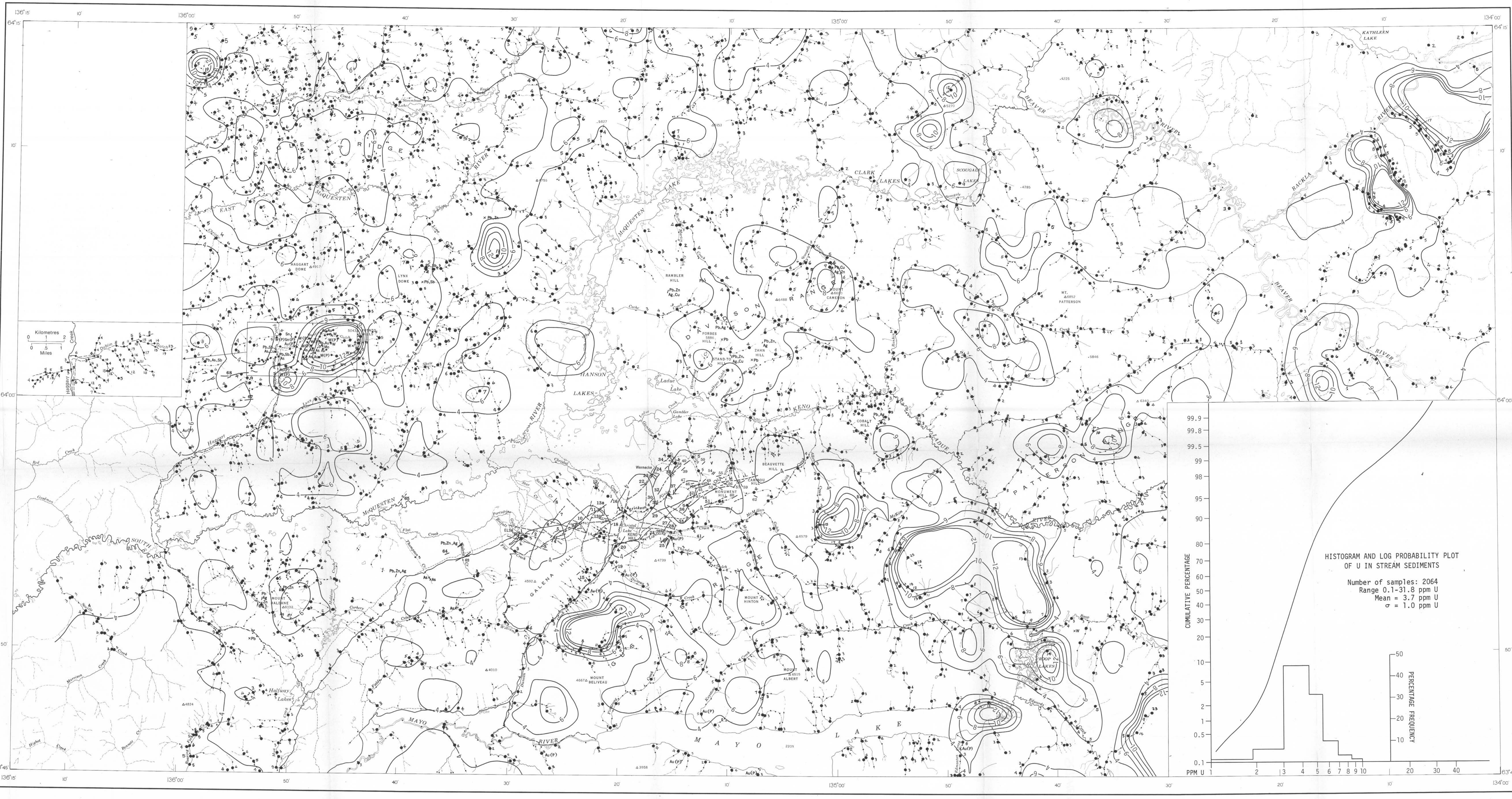
1. Maximum U values in the stream sediments occur over the Mayo Lake granitic batholith north of the east end of Mayo Lake (105 M/15). Other granitic intrusives having associated anomalous U values in their associated stream sediments include a small stock in the southeast corner of the area (105 M/13) and the Dublin Gulch stock (106 D/4). Analyses of the heavy minerals (Gleeson and Boyle, in press) from the stream sediments show that uranium resistant heavy minerals are derived from the granitic rocks. Analysis of granitic rocks (Gleeson and Boyle, in press) from the Dublin Gulch stock and Mayo Lake batholith contained relatively high U values (4-12.7 ppm). These stream sediment anomalies may, therefore, be related to lithology rather than mineral deposits.

2. There are several additional anomalies containing more than 10 ppm U in the stream sediments. Most of these areas are underlain by a grit unit. They include: an easterly flowing tributary of Beaver River north of Scougal Lake (106 D/2); a stream at the headwaters of Lynx Creek and west of McQueen Lake (106 D/4); and two streams on the north side of East McQueen River (106 D/4). A heavy mineral sample from a creek between the last two streams contained 233 ppm U and 2144 ppm Th (Gleeson and Boyle, in press).

3. Several anomalous U values (11-16 ppm) occur in the vicinity of Parent Creek (105 M/13) in an area underlain by phyllitic quartzite and schist. A regional increase in U in the region of the Gustavus Range is apparent since most values in the stream sediments are in excess of 5 ppm.

References

Aho, A.E. 1964: Mineral potential of the Mayo district; Western Miner., vol. 37, No. 10, p. 80-88.  
Bostock, W.S. 1947: Mayo, Yukon Territory; Geol. Surv. Can., Map 890A.  
Bostock, W.S. 1964: McQueen, Yukon Territory; Geol. Surv. Can., Map 1143A.  
Boulanger, A., Evans, D.J.R., and Raby, B.F. 1975: Uranium analysis by neutron activation delayed neutron counting. Proc. 7th Ann. Symp. on Canadian Nuclear Analysis, Thunder Bay, Ontario, September 22 and 23, pp. 75-75.  
Boyle, R.W. 1965: Geology, geochemistry and origin of the lead-zinc-silver deposits, Keno Hill-Galena Hill area, Yukon Territory; Geol. Surv. Can., Bull. 111, 302 p.  
Boyle, R.W. and Gleeson, C.F. 1972: Gold in the heavy mineral concentrates of stream sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Paper 71-51, 8 p.  
CalComp's General Purpose Contouring Program User's Manual - Publ. by California Computer Products Inc., Anaheim, California.  
Cockfield, W.E. 1921: Silver-lead deposits of the Keno Hill area, Mayo, Yukon; Geol. Surv. Can., Summ. Rept. 1920, pt. A, p. 1-6.  
1922: Silver-lead deposits of Davidson Mountains, Mayo district, Yukon Territory; Geol. Surv. Can., Summ. Rept. 1921, pt. A, pl. 4.  
1924a: Geology and ore deposits of Keno Hill, Mayo District, Yukon; Geol. Surv. Can., Summ. Rept. 1923, pt. A, p. 1-21.  
1924b: Silver-lead deposits of Beaver River area, Yukon; Geol. Surv. Can., Summ. Rept. 1923, pt. A, p. 22A-28A.  
1925: Upper Beaver River area, Mayo District, Yukon; Geol. Surv. Can., Summ. Rept. 1923, pt. A, p. 1A-18A.  
Gleeson, C.F. 1967: The distribution and behaviour of metals in stream sediments and waters of the Keno Hill area, Yukon Territory; Proceed. Symp. Geochem. Prospecting, Ottawa, April 1966, Editor, E.M. Cameron, Geol. Surv. Can., Paper 66-54, p. 134-144.  
Gleeson, C.F. et al. 1965: Heavy metal content of stream and spring waters, Mayo Lake, Yukon Territory; Geol. Surv. Can., Map 18-1964.  
Heavy metal content of stream and spring sediments, Mayo Lake, Yukon Territory; Geol. Surv. Can., Map 19-1964.  
Heavy metal content of stream and spring sediments, Keno Hill, Yukon Territory; Geol. Surv. Can., Map 20-1964.  
Heavy metal content of stream and spring sediments, Keno Hill, Yukon Territory; Geol. Surv. Can., Map 21-1964.  
Heavy metal content of stream and spring waters, Mount Haldane, Yukon Territory; Geol. Surv. Can., Map 22-1964.  
Heavy metal content of stream and spring sediments, Mount Haldane, Yukon Territory; Geol. Surv. Can., Map 23-1964.  
Heavy metal content of stream and spring waters, Rackla River, Yukon Territory; Geol. Surv. Can., Map 24-1964.  
Heavy metal content of stream and spring sediments, Rackla River, Yukon Territory; Geol. Surv. Can., Map 25-1964.  
Heavy metal content of stream and spring waters, Scougal Lake, Yukon Territory; Geol. Surv. Can., Map 26-1964.  
Heavy metal content of stream and spring sediments, Scougal Lake, Yukon Territory; Geol. Surv. Can., Map 27-1964.  
Heavy metal content of stream and spring waters, McQueen Lake, Yukon Territory; Geol. Surv. Can., Map 28-1964.  
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Uranium content of stream and spring sediments, Keno Hill area, Yukon Territory.

Base-map cartography by the Geological Survey of Canada, 1966 from maps published by the Surveys and Mapping Branch and by the Army Survey Establishments, etc. etc.

Scale 1:126,720  
Kilometres 0 3 6 9  
Miles 0 2 4 6  
Universal Transverse Mercator Projection  
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Magnetic declination 1979 varies from 33°16.9' easterly at centre of west edge to 34°56.3' easterly at centre of east edge. Mean annual change -2.8'

NTS REFERENCE  
KENO HILL AREA  
YUKON TERRITORY

References (cont'd)  
Gleeson, C.F. et al. 1966-1967: Lead content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 45-1965.  
Silver content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 46-1965.  
Zinc content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 47-1965.  
Arsenic content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 48-1965.  
Antimony content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 49-1965.  
Copper content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 50-1965.  
Molybdenum content of stream and spring sediments; Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 51-1965.  
Tungsten and tin content of stream and spring sediment, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 52-1965.  
Nickel content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 53-1965.  
Cobalt content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 54-1965.  
Manganese content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 55-1965.  
Barium content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 56-1965.  
Boron content of stream and spring sediments, Keno Hill area, Yukon Territory; Geol. Surv. Can., Map 57-1965.

Gleeson, C.F. and Boyle, R.W. 1976: The hydrogeochemistry of the Keno Hill area, Yukon Territory; Geol. Surv. Can., Paper 75-14, 22 p.  
In press: Minor and trace elements in the heavy minerals of the rivers and streams of the Keno Hill District, Yukon Territory; Geol. Surv. Can., Paper 76-31.  
In press: The lithochemistry of the Keno Hill District, Yukon Territory; Geol. Surv. Can., Paper 77-31.  
Green, L.H. 1971: Geology of Mayo Lake, Scougal Lake and McQueen Lake map-areas, Yukon Territory; Geol. Surv. Can., Mem. 367, 72 p.  
1972: Geology of Nash Creek, Larsen Creek, and Dawson map-areas, Yukon Territory; Geol. Surv. Can., Mem. 364, 157 p.  
Green, L.H. and Roddick, J.A. 1962: Dawson, Larsen Creek, and Nash Creek map-areas, Yukon Territory; Geol. Surv. Can., Paper 62-7, 20 p.  
Kindle, E.D. 1962: Keno Hill, Yukon Territory; Geol. Surv. Can., Map 1105A.  
McTaggart, K.C. 1960: The Geology of Keno and Galena Hills, Yukon Territory; Geol. Surv. Can., Bull. 58, 37 p.  
Poole, W.H. 1965: Mount Haldane (105 M/13) and Dublin Gulch (106 D/4) map-areas; Geol. Surv. Can., Paper 65-1, p. 32-35.  
Tempelman-Kluit, D. 1966: Report of activities, May to October, Geol. Surv. Can., Paper 66-1, p. 48-49.

**LEGEND**  
Sample site with uranium content in ppm.....  
Sediment sample location (stream, spring).....  
Contours of uranium values in ppm.....  
Location of known veins.....  
Mineral occurrence.....  
Mineral deposits.....

**MINERAL SYMBOLS**  
Antimony.....Sb Silver.....Ag  
Arsenic.....As Tin (lode).....Sn  
Copper.....Cu Tin (placer).....Sn(P)  
Gold (lode).....Au Tungsten (lode).....W  
Gold (placer).....Au(P) Tungsten (placer).....W(P)  
Lead.....Pb Zinc.....Zn  
Molybdenum.....Mo

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Field work by C.F. Gleeson, W.H. Tupper, A. Suparnam, K. Donal, M. Shaifullah, J.A. Ghewil, J.K. Beithon, G.H. Yurchak, J.K. Worth, H.R. James, A.G. Troup, G. Wind, L. Hogg, and F.R. Campbell

Uranium analyses by Commercial Products Division, Atomic Energy of Canada, Ltd., Ottawa

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