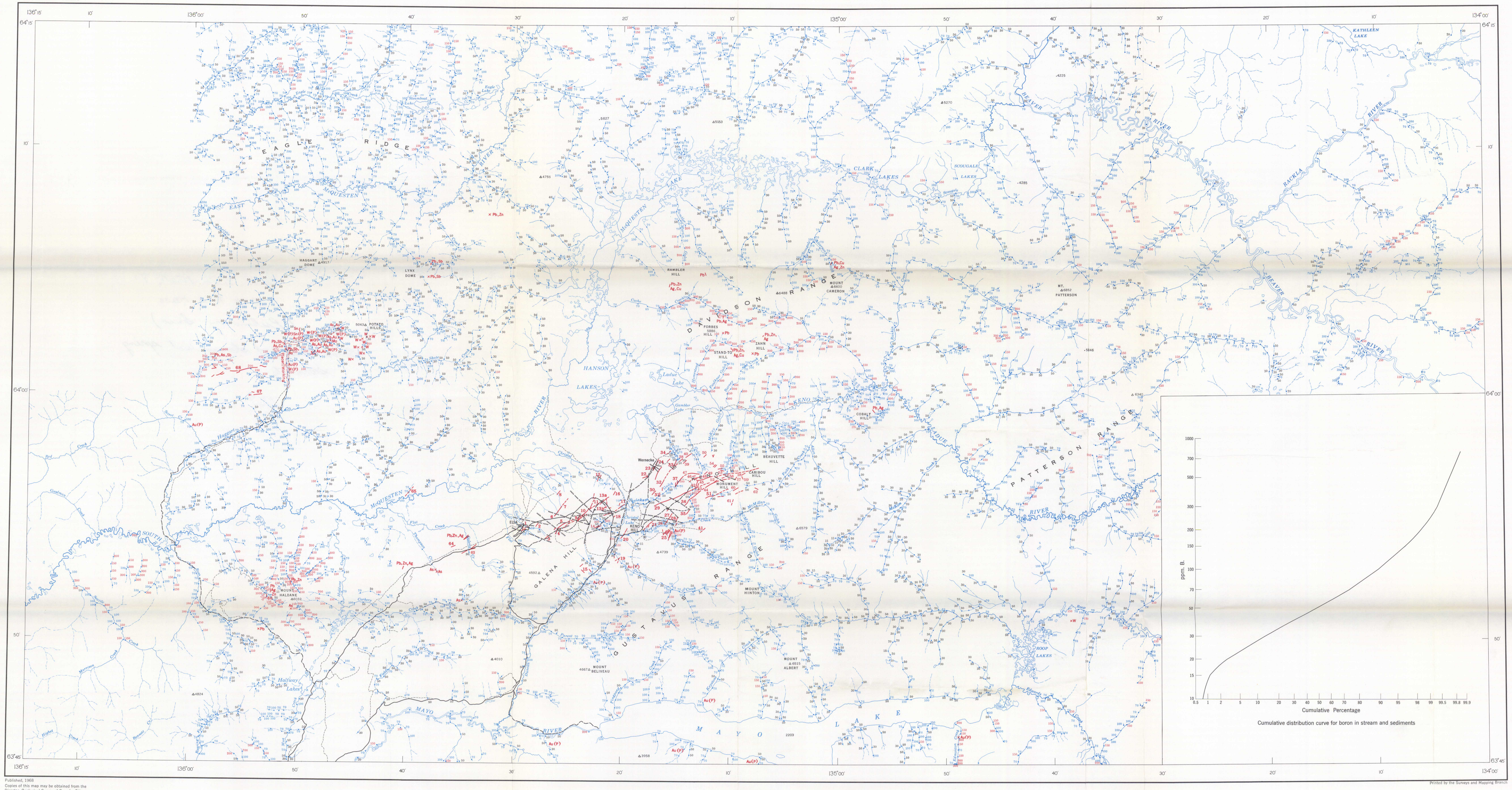
GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF ENERGY, MINES AND RESOURCES

PRELIMINARY SERIES



Published, 1968
Copies of this map may be obtained from the Director, Geological Survey of Canada, Ottawa

Printed by the Surveys and Mapping Branch

LEGEND

Concentration of boron, 7 to 50 ppm in stream sediments	20	in spring sediments	20
Concentration of boron, 70 to 100 ppm in stream sediments	80	in spring sediments	80
Concentration of boron, 150 ppm and greater in stream sediments	180	in spring sediments	180

Location of known veins

Mineral occurrence .... Mo ×

Mineral deposit 12

Mineral Symbols

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

INDEX TO MINES AND PROSPECTS

1. Elsa
2. Dixie
3. Coral and Wigwam
4. Arctic and Mastiff
5. Ruby
6. No Cash
7. Betty
8. Cream
9. Hector
10. Calumet
11. Dragon (UN)
12. Formo
13a. Galkeno (McLeod vein)
13b. Galkeno (Sime and Sugiyama veins)
14. Eagle
15. Fisher Creek
16. Bluebird
17. Tin Can
18. Rico
19. Duncan Creek
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21. Onek
22. Klondyke-Keno
23. Sadie-Friendship
24. Ladue
25. Bellekeno
26. Mount Keno (Hogan vein)
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28. Mount Keno (Runer vein)
29. Dorothy
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31. Croesus No. 1
32. Black Cap and Shepherd
33. Lucky Queen
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36. Apex
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52. Gold Hill No. 2
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58. Alice
59. Caribou
60. Divide
61. Devon
62. Faith
63. Silver King
64. Gerlitsky
65. Shanghai
66. Lookout
67. Rex
68. Peso Silver

Field work by C. F. Gleeson, W. M. Tupper, A. Suparman, K. Domai, M. Shafiqullah, J. A. Colwell, J. R. Deighton, C. H. Yurchak, J. K. Worth, H. R. James, A. G. Troup, G. Wind, L. Hogg, and F. R. Campbell

Analyses by C. C. Durham.

Compilation and text by C. F. Gleeson

Geological cartography by the Geological Survey of Canada, 1966

Roads, all weather

Other roads

Trail

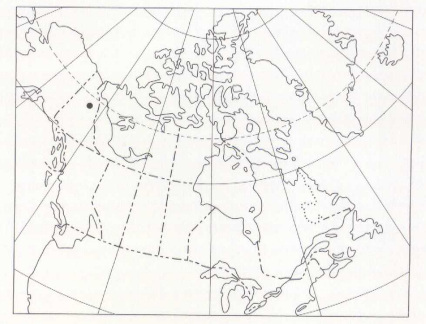
Intermittent lake and stream

Horizontal control point

Elevation in feet above mean sea-level 2095

Base-map cartography by the Geological Survey of Canada, 1966 from maps published by the Surveys and Mapping Branch and by the Army Survey Establishment, R. C. E.

Approximate magnetic declination, 34° 45' East, decreasing 4.2' annually



INDEX MAP

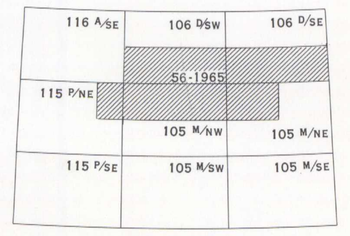
MAP 56-1965

BORON CONTENT OF STREAM AND SPRING SEDIMENTS

KENO HILL AREA

YUKON TERRITORY

Scale 1:126,720
1 inch to 2 miles



N. T. S. REFERENCE
KENO HILL AREA
YUKON TERRITORY

DESCRIPTIVE NOTES

Introduction

The reconnaissance geochemical survey of Keno Hill area, Yukon Territory was started and completed in the summer of 1964. The creeks not accessible by roads were reached by helicopter. An attempt was made to maintain a sample interval of 1,500 feet along all rivers, creeks, and their tributaries.

The data on this map are based on 5,900 samples of stream sediment collected from the channels of the streams and on the sediments and precipitates in the vicinity of springs from an area of approximately 1,900 square miles. Where possible the active channel was sampled; however as work progressed it was found that moss on the 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 citrate-soluble heavy metals. The results of this work have been published in a series of 14 preliminary maps (Gleeson, et al., 1965). Field observations on the character of the stream, composition of the sediment, pH and temperature of the water, and rock types in the vicinity of the sample station were entered in code on special geochemical field cards. Subsequently, this information was punched on cards for electronic data processing.

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

Analysis

Boron was analyzed spectrographically by total energy D. C. arc semi-quantitative method using a Jarrell Ash optical spectrograph with a 1.5 metre grating. A 10 milligram sample of ground stream sediment was mixed with 20 milligrams of graphite, packed into a carbon electrode, and capped with a 20 milligram buffer mixture of calcium carbonate and graphite. The loaded electrode was preheated at 450° C to oxidize the organic matter in the sample and thus allow the arcing to proceed smoothly without loss of material from the electrode cavity. The electrode was then removed from the furnace after 45 minutes and cooled. Two drops of a saturated solution of magnesium nitrate in absolute ethyl alcohol were added in order to promote the smooth burning of the sample. The electrode was placed under an infrared lamp for at least five minutes to evaporate the alcohol. The samples were arced at 15 amps, and the spectra recorded on 35 mm Kodak Spectrum Analysis Film Number 1. The unknown spectra were then compared with a synthetically prepared series of spectra; the limit of detectability for Boron was 7 ppm

General Geology

The regional geology has been described by Bostock (1947, 1964), and Green and Roddick (1962). More detailed geological studies have been made by Kindle (1962), McTaggart (1960, Poole (1965), and Green (1957, 1958). The geology, geochemistry, and origin of the mineral deposits in Keno Hill and Dublin Gulch areas have been described by Boyle (1965). Reports by Aho (1964) and Cockfield (1922) provide further information on mineral deposits of the area.

The map-area is underlain by a series of metamorphosed sedimentary rocks, mainly quartzites, phyllites, slates, chlorite, sericite and graphite schists, also grits and minor limestone. The age of these rocks is uncertain and appears to range from Precambrian to Mesozoic (Poole, 1965; Tempelman-Kluit, 1966).

A dolomite and limestone unit outcrops in the northeast 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 greenstones are interlayered with the metamorphosed sediments. Quartz-feldspar porphyry sills and lamprophyre dykes are present locally. Granitic stocks cut the metamorphosed sediments east and north of Mayo Lake, northwest of Hanson Lake, south of Dublin Gulch and in the vicinity of Mount Haldane.

Scarn 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 occasionally in 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. Also easterly striking vein faults are mineralized with siderite, jamesonite, boulangerite, pyrite, arsenopyrite, galena, tetrahedrite, and chalcopyrite. Two cassiterite-tourmaline veins occur on the right limit of Dublin Gulch near its mouth (Boyle, 1965; Poole, 1965). Also 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.

Results

Statistical studies using electronic computation are still in progress, and until this phase of the work is completed adequate assessment of the results will be difficult. However, cumulative distribution curves have been constructed from the information supplied by the computer. The curve for boron is illustrated on this map.

Two distributions are indicated by a distinct break in the slope which occurs at about 150 ppm. Both parts of the curve approximate straight lines suggesting that the data in each segment may be distributed lognormally.

Values for boron range from less than 7 ppm to 1100 ppm. For this map the samples have been grouped as follows: less than 50 ppm, 70 to 100 ppm, and greater than 150 ppm.

Little has been published on the boron content of stream sediments. However it is commonly known that boron is concentrated in shaly rocks of marine origin, in pegmatite, and in contact metamorphic rocks. Boyle (1965) has found boron values (up to 2700 ppm) in soils on the Dublin Gulch area to be associated with known cassiterite veins. The boron is related to tourmaline which occurs in the veins. Also McTaggart (1960) describes occasional grains of tourmaline in the phyllitic rocks around Keno Hill.

Reynolds (1965) has shown that increasing metamorphism causes the release of boron from illite in marine sedimentary rocks resulting in the formation of magnesian tourmaline (dravite). This process of dravite formation is completed at greenschist facies metamorphic conditions.

High concentrations of boron have been found in the stream sediments from Dublin Gulch-Secret Creek area. The boron here is probably related to tourmaline derived from contact metamorphic rocks in the vicinity of granite intrusions which occur in this region.

Mount Haldane is also anomalous in boron. Again the boron here is in part probably related to contact zones in the vicinity of granitic rocks. High boron in other regions of the map area probably are related to tourmaline in the phyllitic rocks which have been altered by regional metamorphism to the greenschist facies. Such anomalous areas include streams draining Davidson Range, those west of Mount Haldane and parts of Keno Hill.

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