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STREAM SAMPLING SURVEY 1970,  
MOUNT NANSEN PROPERTY, YUKON T.

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MOUNT NANSEN PROPERTY, YUKON TERRITORY

By: F. BIANCONI and R. SAAGER

Vancouver, Canada  
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LIST OF CONTENTS	PAGE
Introduction	1
Geology	4
Geochemistry	6
Copper	8
Molybdenum	8
Discussion of the copper and molybdenum distribution	10
Zinc	10
Lead	10
Silver	10
Antimony	16
Discussion of the zinc, lead, silver and antimony distribution	16
Nickel	17
Geophysics	17
K40 and electromagnetic survey	17
Aeromagnetic survey	18
Summary	18
Conclusions	22

#### LIST OF ILLUSTRATIONS

Fig. 1 Location Plan	2
Fig. 2 Claim Map	3
Fig. 3 General Geology of the Mount Nansen Area	5
Fig. 4 Samples Localities	7
Fig. 5A Histogram for Copper	9
Fig. 5B Cumulative Frequency Distribution for Copper	9
Fig. 5C Histogram for Zinc	11
Fig. 5D Histogram for Lead	11
Fig. 5E Cumulative Frequency Distributions for Lead and Zinc	11
Fig. 14 Airborne Magnetic Survey	19

#### IN FOLDER:

Fig. 6 Distribution of Cu
Fig. 7 Distribution of Zn
Fig. 8 Distribution of Pb
Fig. 9 Distribution of Mo
Fig. 10 Distribution of Ag
Fig. 11 Distribution of Sb
Fig. 12 Distribution of Ni
Fig. 13 K40 - contours and electromagnetic crossovers

## INTRODUCTION

The area owned by MOUNT NANSEN MINES LTD. is situated at the southeast end of the Dawson Range, some 100 miles northwest of Whitehorse in the Yukon Territory, Canada (Fig. 1). The whole property consists of 308 claims covering approximately 24 square-miles. Nine claim fractions (HARRY) expire during October 1973, 232 claims expire during 1974 and the remaining 67 claims, which cover the surroundings of the present gold-silver mine, are in good standing up to 1978 (see Fig. 2). The gold-silver mine was in production for six months during 1968/69 and was closed due to its uneconomical performance which entailed heavy losses. Mine camp and mill are mothballed and looked after by a watchman who lives at the site. The 40 miles long gravel access road from Carmacks is in reasonable good condition during the summer and fall months, however no maintenance is carried out during the winter and the spring thaw.

The discovery of a very large porphyry copper mineralization during the summer 1969 at CASINO SILVER MINES LTD., some 60 miles to the north of Mount Nansen, has given raise to a considerable staking rush, which covered the entire Dawson Range. In "The Northern Miner" of March 26, 1970, CASINO SILVER MINES LTD. report:

"an estimated 1,164,000,000 tons having an average grade of 0.30 per cent copper (Cu) and 0.04 per cent molybdenite ( $\text{MoS}_2$ ). Maximum values intersected in drill holes showed 1.29 per cent Cu and 0.03 per cent  $\text{MoS}_2$  over 210 feet."

KAISER RESOURCES are currently drilling approximately 20,000 feet on another copper mineralization at the YUKON REVENUE's Big Creek property 16 miles north of Mount Nansen.

The fact that the Casino copper mineralization occurs in a geological setting almost identical to that of the Mount Nansen area (Tertiary porphyry bodies intruding Mesozoic granites and Palaeozoic to Precambrian metamorphic rocks) has led the authors, earlier this year, to investigate the Cu-, Zn- and Mo-content of 500 soil samples from the Mount Nansen area (Report on an Initial Geochemical Base Metal Exploration Programme Carried out on Soil Samples from the Mount Nansen Area; F. Bianconi and R. Saager, April 9, 1970). The investigated soil samples were obtained from an earlier silver-arsenic survey (Geochemical Soil Survey 1967; R.S. Adamson, April 15, 1968) which covered the southeastern part of the property including the present mine site (Fig. 4). The results revealed five weak and small copper anomalies with soil sample contents higher than 50 ppm Cu. It could be shown that the delineated Cu anomalies are spatially and possibly genetically related to known porphyry bodies and also to the silver-arsenic anomalies detected in the 1967 soil survey. This relatively encouraging results of the soil sample survey was the reason for undertaking a detailed stream sample survey over the entire area held by MOUNT NANSEN MINES LTD. and to commission a comprehensive airborne geophysical investigation involving the gathering of K40-, isomagnetic-and electromagnetic-data.

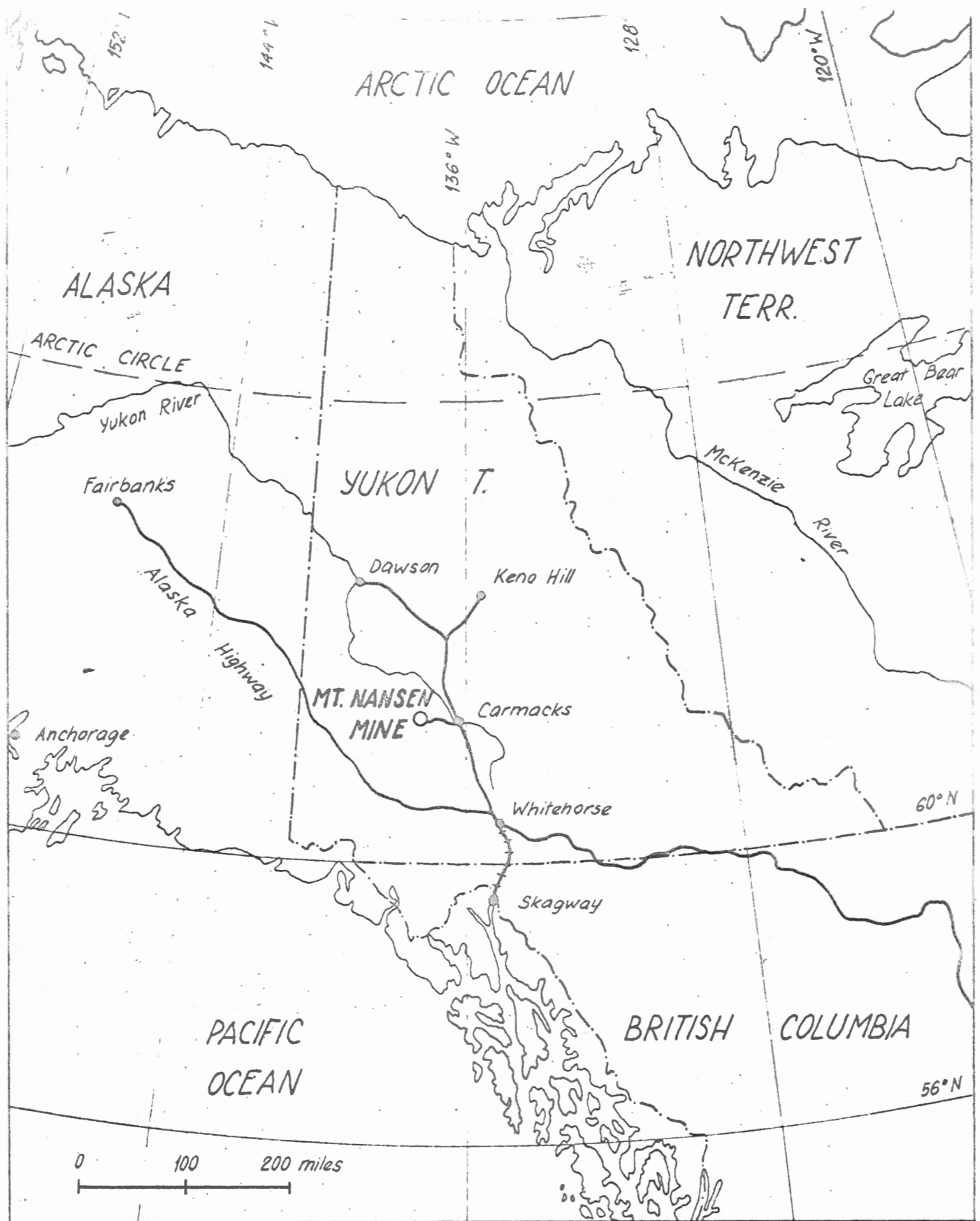


Fig. 1. Mt. Nansen Mines Ltd., Location Plan



Fig. 2. Claim Map

1974  
78

## GEOLOGY (Fig. 3)

Geological data of the Mount Nansen area is scarce and consists essentially of the regional mapping by BOSTOCK (1936) and of a number of unpublished investigations by the staff of MOUNT NANSEN MINES LTD. The Mount Nansen area was not glaciated during the last glacial advance and most of the ground is therefore covered by a thick overburden of disintegrated, relatively undecomposed rock. Outcrops occur almost exclusively on the top of ridges and in ravines. As the area lies in a permafrost zone, soil, disintegrated rock layer and bedrock are permanently frozen to a depth of 150 feet. The geological map accompanying this report is based on BOSTOCK's (1936) and own observations. In describing the different rock units which occur in the investigated area the scheme proposed by BOSTOCK (1936) is followed.

The oldest rocks in the investigated area are represented by the Yukon Group metamorphic rocks, which are believed to be of Precambrian to Palaeozoic age. In the area the Yukon Group is mainly composed of banded medium-grained quartz-hornblende gneisses and hornblende gneisses. Quartzites and biotite schists form minor constituents in the group. These rocks generally have a north to northeast strike and are dipping moderately to steep to the west to northwest.

A thick cover of volcanics overlay discordantly the Yukon Group in the north of the property. These rocks belong to the Mount Nansen Group which is believed to be of Jurassic age. In the area the Mount Nansen Group is essentially composed of andesitic to basaltic lava flows and of andesite-porphyrries.










Mesozoic Intrusive rocks comprising porphyritic granites, granodiorites and diorites intrude the two earlier units and are of late Jurassic to early Eocene age. This granitic episode can be correlated with the main Cordilleran Batholith.

All the rock types of the above described three groups are in turn intruded by a number of porphyry bodies. They vary in size from 100 feet to 1 mile in diameter and commonly display elongated shape. Although believed to be an independent unit of Tertiary age, the possibility that these porphyries are a late phase of the earlier mentioned granitic episode has to be considered. This hypothesis is suggested by the striking spatial relationship which exists between Tertiary porphyries and Mesozoic intrusives. Two main types of porphyries were distinguished, viz. feldspar porphyries and quartz-feldspar porphyries. It is to these younger porphyries that the above mentioned weak copper anomalies, discovered in the soil sample survey, are related.

A complex system of high-angle faults cuts all the rock types and thus is younger than the latest porphyry intrusions. This fault system strikes approximately northwest and dips between  $70^{\circ}$  to  $90^{\circ}$  to the southwest. It comprises tight faults, gauge filled faults, wide shear zones and is partly occupied by the mineralized veins which constitute the Mount Nansen gold-silver ore deposit. It is thought that this fault system is the manifestation of a zone of tectonical weakness which is confined to the highest elevation of the Dawson Range. This weak zone must have



**LEGEND**

	Alluvium	Recent		Fault	
	Porphyry Intrusions	Tertiary (?)		Mineralized Vein	
	Granite - Granodiorite	} Cretaceous		Adit	1 Webber Mine
	Syenite		2 Huestis Mine		} Mt. Nansen Mines
	Mount Nansen Volcanics	Jurassic			3 Brown-McDade Mine
	Yukon Group	Precambrian-Palaeozoic			

0 5000 ft.

0 1 km

Fig. 3. General Geology of the Mt. Nansen Area

acted as avenue for the intruding porphyry melt and entailed, therefore, the striking pattern of occurrence of the porphyry bodies along the culmination of the Dawson Range. A younger second system of high-angle faults, striking north to northeast offset all geological units.

## GEOCHEMISTRY

Since outcrops are scarce in the Mount Nansen area detailed geological and structural studies are severely hampered; geochemical prospecting was therefore used to investigate the property. The conventional stream sampling method was chosen as it represents the most rapid and cheapest way to detect areas of mineral potential in large holdings.

One hundred sixty-four (164) stream samples were collected by the authors in all major creeks and their tributaries within the Mount Nansen property during the period July 23-30, 1970. All sampling points are given on Figure 4.

The samples were dried and the -80 mesh fractions analysed by Bondar-Clegg & Company Ltd. of North Vancouver for copper (Cu), molybdenum (Mo), zinc (Zn), lead (Pb), silver (Ag), antimony (Sb) and nickel (Ni). The elements Cu and Mo were chosen as indicators for porphyry copper type mineralizations, whereas the elements Zn, Pb, Ag and Sb were used as indicators for gold-silver vein mineralizations of the Mount Nansen type.

The Cu-, Mo-, Zn-, Pb-, Ag- and Ni-content was determined by hot Aqua Regia extraction followed by analysis using atomic absorption. The lower limit of detection for Cu, Mo, Zn, Pb and Ni was 1 ppm (part per million) and for Ag it was 0.1 ppm. The Sb-content was analysed by using a  $\text{NH}_4\text{Cl}$  fusion, followed by colorimetric determination. The lower limit of detection for antimony was 1 ppm. All the obtained values together with their sample number are listed in Table 1.

As the results obtained for sampling points in the south portion of the property do not indicate any clear anomalies for all studied elements, only the north portion of the area is interpreted in detail (Figs. 6-14). In this context it is interesting to note, that the south portion of the Mount Nansen property which does not show clear anomalies coincides largely with the area underlined by rocks of the metamorphic Yukon Group (see Fig. 3).

The statistical evaluation of the obtained values followed the graphical methods given by LEPELTIER (1969). Since lognormal distribution patterns are most applicable for geochemical data the values were transformed into logarithmical values and the distributions of the 7 elements plotted on arithmetic-logarithmic graph-paper. The fit of the constructed elemental distribution with an ideal lognormal pattern was checked graphically by plotting the cumulative frequency curves of the distributions on logarithmic probability paper. On such graph-paper the cumulative frequency curve of a lognormal distribution has the form of a straight line. This graphical test allows to elude the time consuming calculation of the Pearson's test for checking the fit of an obtained distribution with a lognormal distribution.

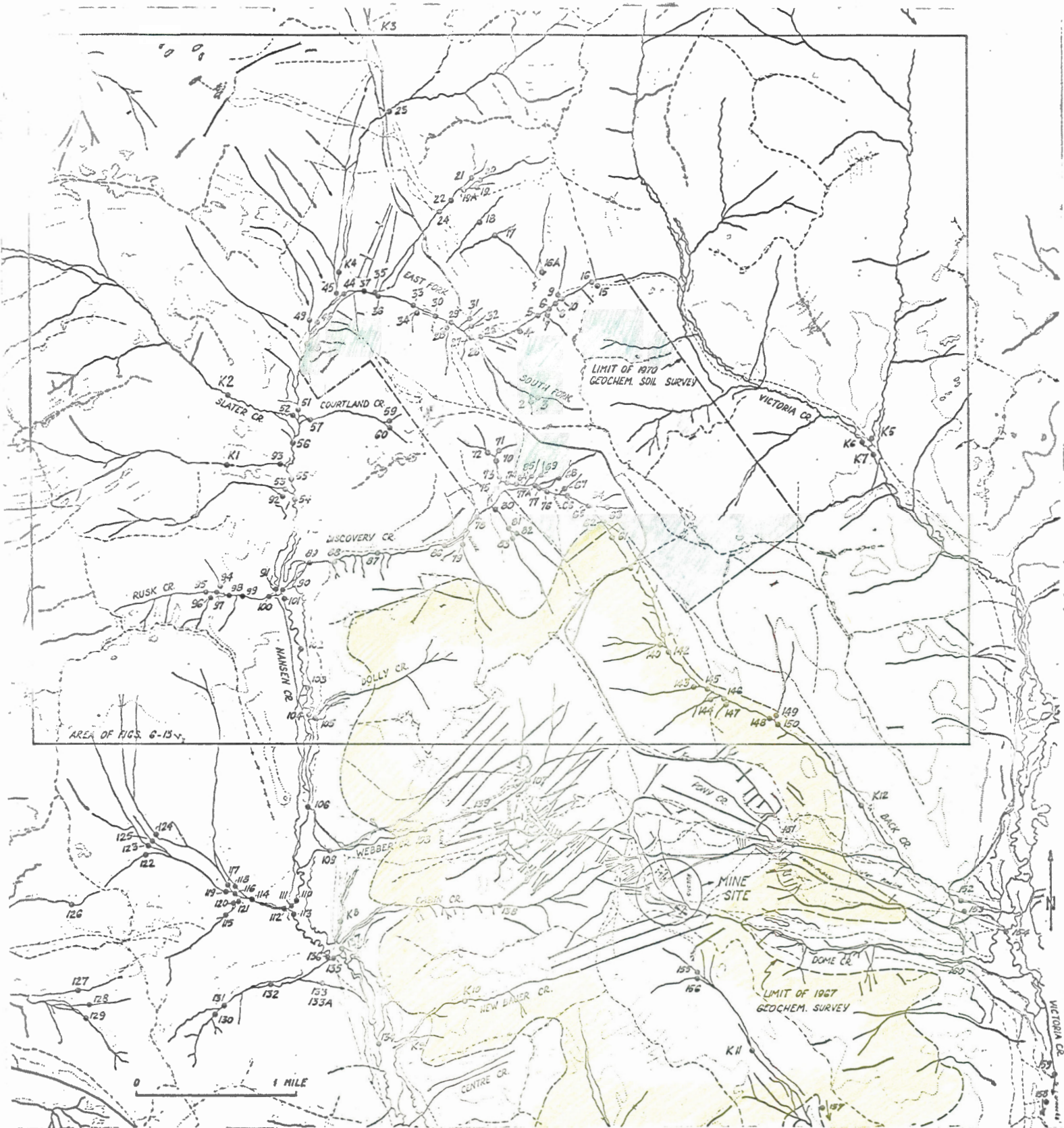


Fig. 4. Samples localities.

At the same time the cumulative frequency curves also allow to find graphically the background value b and the threshold value t of the particular element studied. The value b is found at the intersection of the cumulative frequency curve with the 50 per cent ordinate. In the case of a perfect lognormal distribution b corresponds with the mean, mode and geometric mean. The threshold value t is found at the intersection of the cumulative frequency curve with 2.5 per cent ordinate, since all values which deviate positively more than two standard deviations from b are conventionally considered as distinctly anomalous.

#### COPPER (Figs. 5a, 5b and 6).

The Cu-content of the stream samples shows a variation from 4 ppm to 250 ppm (see Table 1). The Cu-values plotted in a histogram on arithmetic-logarithmic graph-paper show a bell-shaped distribution curve with a distinct excess of high values (Fig. 5a). The cumulative frequency curve possesses accordingly a positive break at about 21 ppm Cu (Fig. 5b). One can therefore anticipate the occurrence of two populations of Cu-values. The background value b (median) lies at 16 ppm Cu and the threshold value t at 78 ppm Cu. Thus all samples having a Cu-content higher than 16 ppm are above background and samples with a Cu-content of more than 78 ppm must be considered strongly anomalous. Since an excess of high Cu-values is present a relative high proportion of Cu-values (9 per cent) is anomalous.

No anomalous high Cu-values were found in the southern part of the Mount Nansen property which therefore is not discussed in detail. In the north portion three distinct areas showing anomalous high Cu-values could be delineated (Fig. 6). Area 1 lies in the central part of the property between the headwaters of Discovery Creek and South Fork Creek. Area 2 lies between South Fork and East Fork Creek and Area 3 lies in the big south bend of Nansen Creek. The highest anomalous Cu-values occur in Area 1 and Area 3. A number of high Cu-values which occur in Nansen Creek below sample point No. 48 must be attributed to downstream dilution caused by the anomalous Areas 2 and 3.

#### MOLYBDENUM (Fig. 9)

Due to the low Mo-content of the soil samples and the limited precision of the analytical method employed no useable graphical statistical evaluation could be performed. The background value b as well as the threshold value t were therefore established arbitrarily at 1 ppm Mo and 4 ppm Mo respectively.

The areal distribution pattern of the Mo-values shows a striking resemblance to that of the above discussed Cu-values (Figs. 6 and 9). Four areas of anomalous Mo-content can be delineated. Area 2 between East Fork and South Fork Creek and Area 3 in the south bend of Nansen Creek are pronounced anomalies with high values lying between 6 ppm and 12 ppm Mo. The two other anomalies, Area 1 between Discovery Creek and South Fork Creek and Area 4 at Rusk Creek are far less distinct, possessing maximum values of 5 ppm Mo.

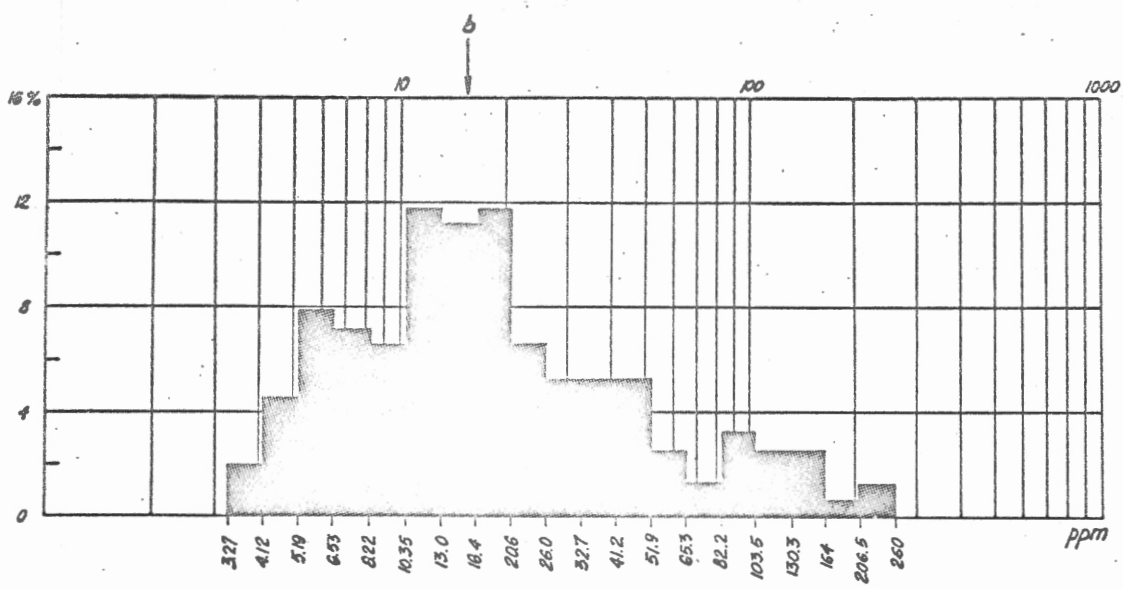


Fig. 5A: Histogram for Copper  $N=162$   $b=16$  ppm

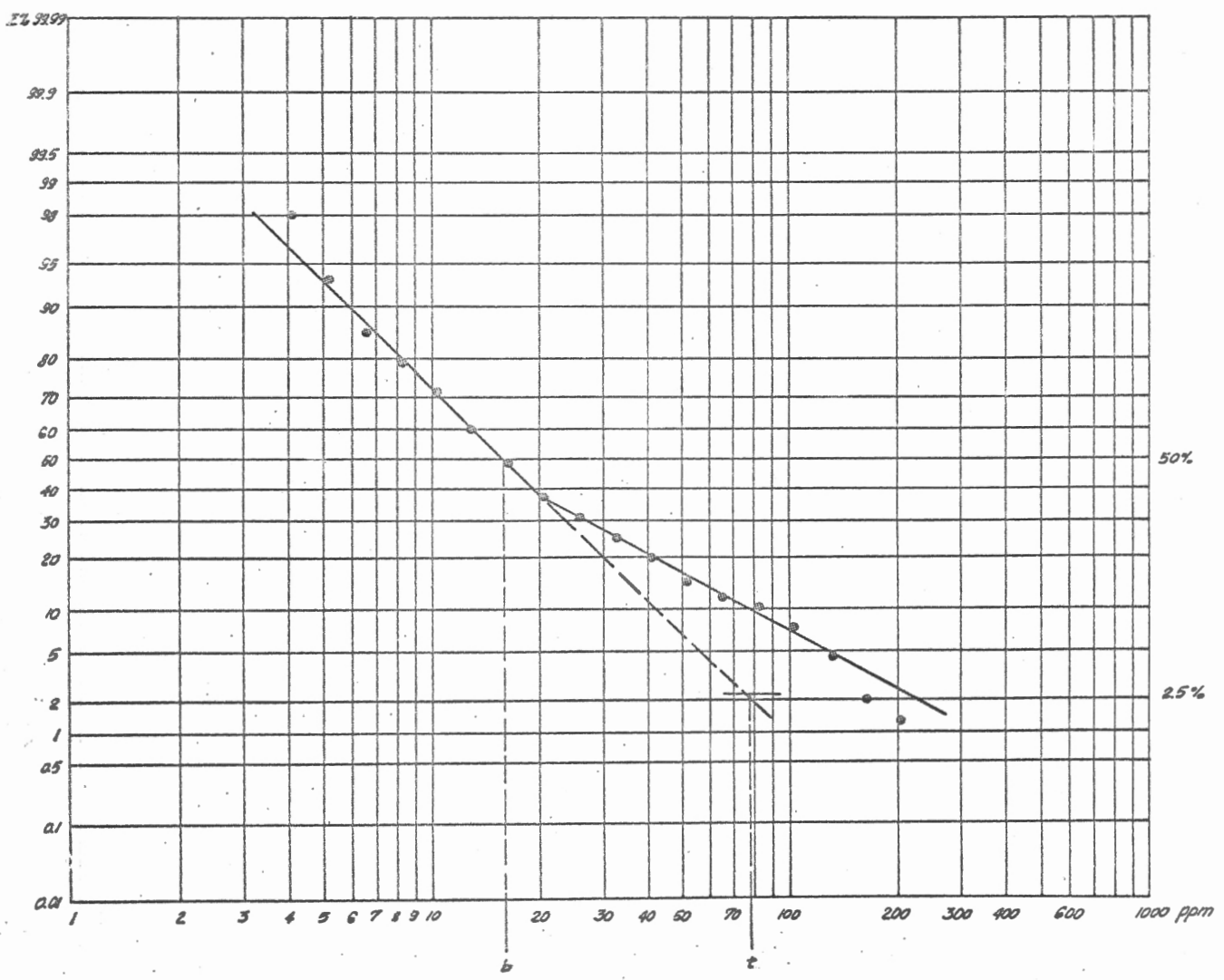


Fig. 5B: Cumulative Frequency Distribution for Copper

## DISCUSSION OF THE COPPER AND MOLYBDENUM DISTRIBUTION

The Cu and Mo anomalies have been found to coincide over large portions (Areas 1, 2 and 3) and occur in these instances over terrain underlain by Tertiary porphyries (Figs 3, 6 and 9). Since both elements Cu and Mo are indicative for porphyry copper mineralizations and since they occur geologically in the right setting, one can assume that the anomalies are caused by such a type of mineralization occurring in the drainage areas above the sample points. The areal distribution pattern indicates that a possible zone of porphyry copper mineralization stretches from the watershed north of Back Creek along the road northwards to the south bank of East Fork Creek with a possible extension westwards to Nansen Creek (Figs. 6 and 9). The areal distribution pattern of anomalous silver values furthermore underlines the above conclusions, since silver occurs in minor amounts in porphyry copper deposits (Fig. 10).

## ZINC ( 5c, 5e and 7)

The Zn-contents of the samples reveal a variation from 8 ppm to 138 ppm (see Table 1). The Zn-histogram on arithmetic-logarithmic paper has a bell-shaped form with a weak excess of low values (Fig 5c). The cumulative frequency curve possess therefore a negative break at 48 ppm Zn (Fig. 5e). The background value b lies at 49 ppm Zn and the threshold value t at 128 ppm Zn.

Stream samples containing above background and distinct anomalous Zn-contents occur in 4 different areas which are marked as Area 4, 5, 6 and 7 on Figure 7. The highest anomalous contents occur in Area 4 at Rusk Creek with values between 108 and 138 ppm Zn. It is possible that Area 4 extends northwards to sample point No. K1 where other high values of 130 ppm Zn has been found. The anomalous Area 5, south of Discovery Creek has maximum values of 112 and 126 ppm Zn. Two further anomalous areas were found northwest of Back Creek, Area 6, and north of East Fork Creek, Area 7. The maximum values in these areas lie also around 130 ppm Zn. It is quite apparent that with the exception of Area 4 all other anomalous Zn-zones do not overlap with anomalous Cu-Mo-zones.

## LEAD ( 5d, 5e and 8)

The soil samples show a variation of Pb-contents ranging from 5 ppm to 145 ppm. The distribution curve on logarithmic-arithmetic graph-paper shows an excess of low values (Fig. 5d), the positive break in the cumulative frequency curve occurs at 7.4 ppm Pb (Fig. 5e). The background value b has been found at 17 ppm Pb and the threshold value t at 60 ppm Pb.

The areal distribution pattern of the above background and anomalous Pb-values is identical to that of the earlier discussed Zn-value, indicating a high degree of correlation (Figs. 7 and 8). The same 4 anomalous zones can be distinguished. Area 4 possesses the highest Pb-value of 138 ppm. Area 6 has the second highest value of 134 ppm Pb with two other high values of 92 and 91 ppm Pb. Area 5 has a maximum value of 56 ppm Pb and Area 7 a maximum value of 134 ppm Pb.

## SILVER (Fig. 10)

The Ag-contents in stream samples were found to vary between 0.2 ppm and 3.7 ppm.

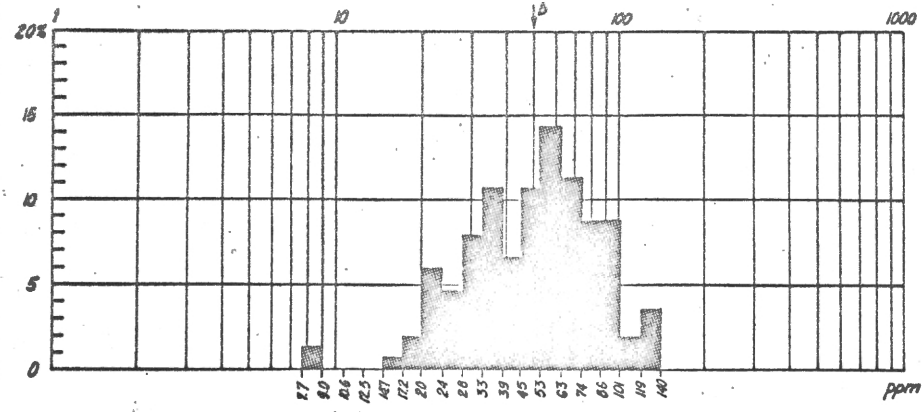


Fig. 5C : Histogram for Zinc  $N=162$   $b=50$  ppm

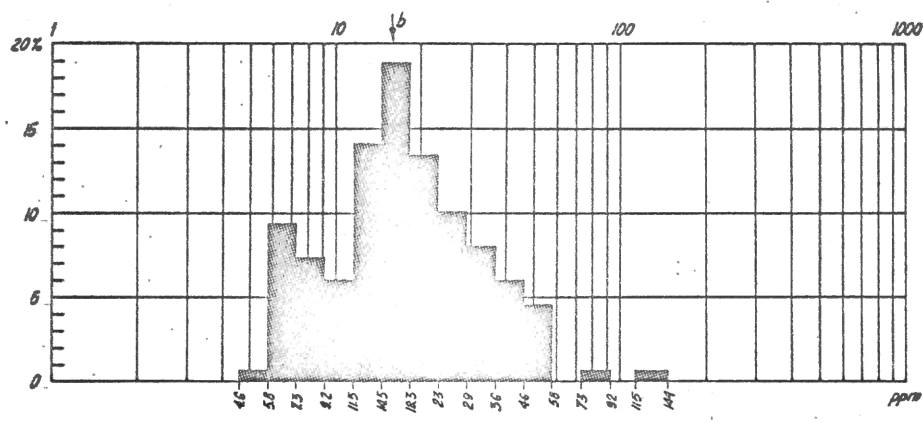


Fig. 5D : Histogram for Lead  $N=162$   $b=16$  ppm

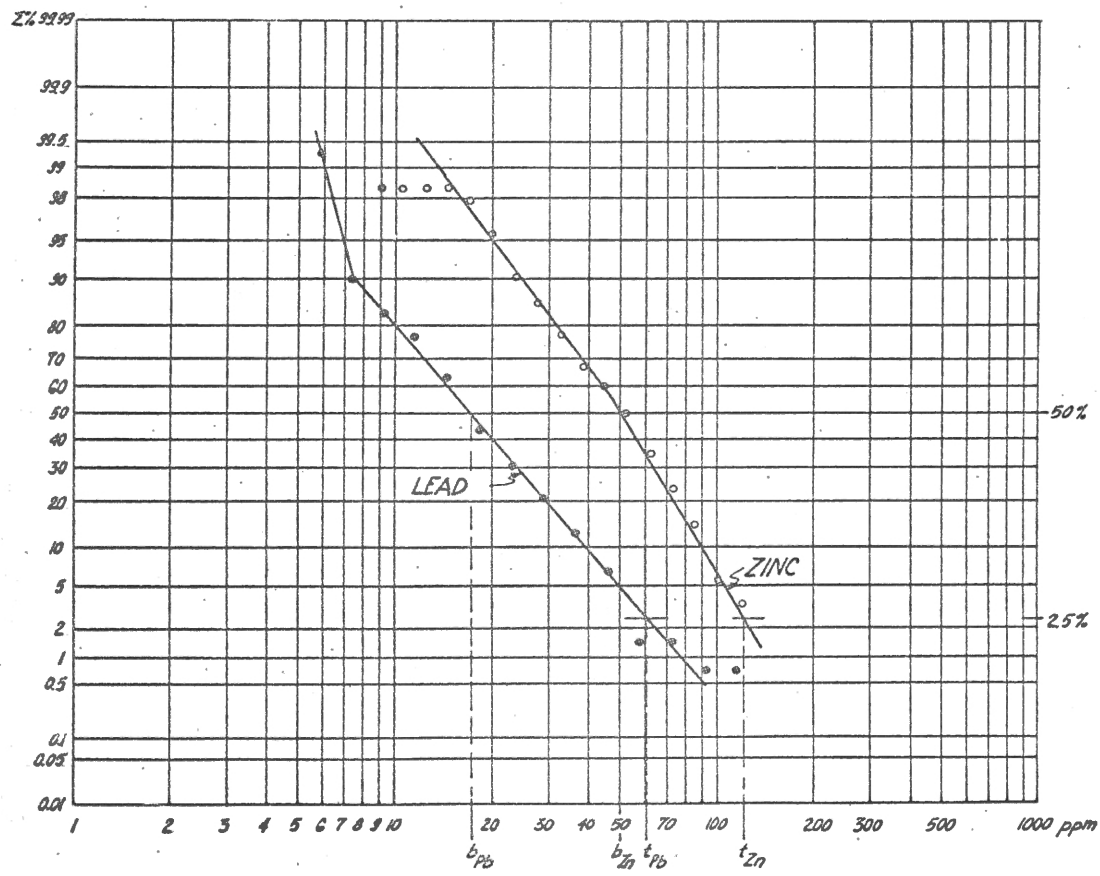


Fig. 5E : Cumulative Frequency Distributions for Lead and Zinc

TABLE 1 GEOCHEMICAL RESULTS

Sample	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Ag ppm	Sb ppm
1	12	20	37	1	6	0.8	4
2	117	18	25	2	8	2.4	14
3	42	16	32	4	10	2.3	4
4	42	12	20	8	8	.8	4
5	13	7	8	2	3	.5	4
6	55	35	77	7	11	2.0	6
7	128	32	30	12	7	3.5	13
8	28	23	60	3	9	1.0	5
9	17	9	36	ND	7	.7	3
10	17	18	43	2	8	1.2	5
15	8	6	8	1	5	.3	ND
16-1	8	10	22	1	6	.2	ND
16-2	14	27	72	ND	7	1.0	ND
16A	18	40	98	1	10	1.5	ND
17	26	50	134	2	13	2.5	ND
18	25	42	82	1	10	2.0	ND
19	12	37	80	1	10	.7	ND
19A	13	38	64	1	8	1.0	ND
20	15	26	52	ND	12	1.0	ND
21	14	29	54	2	10	1.3	ND
22	13	30	70	1	13	1.0	3
23	16	40	96	2	10	1.5	2
24	10	31	49	1	10	.7	3
25	20	13	42	2	8	.7	ND
26	68	18	34	4	9	.7	3
27	25	10	29	2	6	.7	4
28	34	19	24	1	10	.9	4
29	43	14	40	3	7	.8	4
30	95	22	65	4	8	.9	3
31	89	34	84	4	12	1.3	2
32	15	22	39	1	9	.9	2
33	135	16	53	6	7	1.0	2
34	8	14	24	1	6	.6	4
35	87	17	56	3	7	1.0	2
36	167	24	62	4	6	1.2	2
37	142	19	60	4	8	1.3	2
44	128	18	56	4	6	1.1	2
45	14	12	43	ND	5	.8	3
46	155	24	74	4	10	1.0	4
48	93	17	68	4	9	1.3	3
49	9	14	38	1	8	.6	4
51	85	24	88	3	10	1.5	4
52	5	12	40	ND	5	.9	2

Sample	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Ag ppm	Sb ppm
53	12	24	73	1	8	1.5	4
54	42	27	89	3	10	1.0	3
55	43	24	75	2	10	1.0	3
56	17	16	52	1	7	.9	3
57	11	12	34	1	5	.6	3
59	19	14	20	ND	8	1.4	5
60	15	9	15	ND	5	.5	2
61	11	16	72	ND	10	1.0	4
62	12	24	92	1	10	2.3	3
63	40	16	62	1	10	3.7	3
64	22	16	48	ND	10	2.1	5
65	51	11	25	ND	7	1.5	3
66	15	12	56	1	8	1.0	3
67	41	11	18	1	8	1.4	3
68	25	14	20	1	5	2.3	5
69	35	16	28	1	9	2.0	4
70	82	20	50	3	10	1.0	5
71	56	22	38	4	10	2.6	4
72	136	13	24	3	8	2.5	4
73	46	12	30	1	6	1.6	4
74	57	22	42	1	10	1.3	4
75	55	14	42	1	9	1.0	4
76	20	16	59	1	10	1.3	4
77	110	40	72	2	10	2.3	3
77A	225	21	69	1	10	2.0	2
78	29	14	37	1	7	.9	ND
79	4	24	55	ND	6	1.0	4
80	11	34	77	1	7	1.6	4
81	17	39	112	2	10	3.1	5
82	18	30	67	2	9	2.5	4
83	24	56	126	1	9	2.0	5
84	250	18	62	2	10	1.5	2
85	40	15	26	4	10	1.4	4
86	28	23	76	1	10	.8	3
87	16	20	58	ND	7	.8	2
88	18	22	72	ND	7	.8	3
89	30	25	91	1	8	1.3	4
90	6	6	19	1	7	.5	2
91	27	14	62	2	6	.5	5
92	12	12	38	2	6	.8	6
93	8	22	77	2	9	1.2	4
94	15	34	68	2	10	2.5	6
95	41	40	106	5	11	2.3	6
96	33	53	120	4	9	2.4	5
97	11	145	138	2	8	3.6	6

Sample	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Ag ppm	Sb ppm
98	11	22	62	2	6	1.0	5
99	13	29	78	2	7	1.5	6
100	17	49	98	2	8	1.9	2
101	21	18	67	2	8	1.0	2
102	22	20	72	2	9	1.0	1
103	17	18	60	1	7	.6	ND
104	26	22	66	1	7	1.0	2
105	6	10	36	ND	7	.5	1
106	15	17	53	1	9	.5	2
107	10	46	94	ND	10	1.4	6
108	6	19	41	ND	9	.5	2
109	5	14	30	ND	10	.6	2
110	12	17	52	ND	8	.8	2
111	12	16	52	1	7	.7	2
112	6	10	48	ND	7	.6	5
113	17	15	62	1	7	.4	4
114	5	12	32	ND	6	.5	5
115	12	7	51	1	11	.5	5
116	25	39	86	2	19	1.0	10
117	20	14	84	1	9	1.0	10
118	6	17	48	1	6	1.3	6
119	8	12	105	2	14	1.0	8
120	12	8	54	1	14	1.0	3
121	5	6	34	1	6	1.0	6
122	9	6	44	1	11	.9	5
123	7	11	54	ND	11	1.0	8
124	7	6	20	ND	5	.4	1
125	9	6	53	ND	9	.7	5
126	45	8	33	1	20	.6	6
127	17	7	37	1	10	.6	5
128	7	7	30	ND	6	.5	5
129	4	5	28	ND	6	.5	3
130	6	6	31	ND	8	.4	4
131	6	8	36	ND	7	.6	5
132	6	8	34	1	9	.5	4
133	22	9	23	2	23	1.6	3
133A	4	7	23	1	7	.3	2
134	27	32	91	2	17	1.0	6
135	11	18	44	1	5	.5	1
136	24	22	62	1	10	1.0	2
137	5	8	29	1	10	.6	ND
138	12	26	50	1	10	.8	6
139	6	18	53	ND	8	1.0	4
140	14	52	92	ND	6	1.6	5
141	40	84	134	4	10	1.7	5
142	16	54	91	2	7	1.7	6

Sample	Cu ppm	Pb ppm	Zn ppm	Mo ppm	Ni ppm	Ag ppm	Sb ppm	
143	12	26	90	1	15	1.5	4	
144	9	20	84	ND	9	1.4	5	
145	6	17	50	ND	5	.7	2	
146	12	23	77	1	8	1.2	4	
147	6	8	37	2	7	.7	4	
148	10	19	64	2	8	.9	3	
149	17	31	92	1	11	2.0	6	
150	9	18	63	2	7	.9	5	
151	8	15	56	ND	10	.5	4	
152	7	10	31	ND	10	.6	1	
153	6	8	19	1	9	.5	1	
154	5	8	28	ND	7	.5	1	
155	10	7	49	ND	5	.7	5	
156	8	7	39	ND	8	.8	6	
157	5	7	30	ND	7	.5	1	
158	10	105	180	ND	7	2.7	22	contaminated by mining operation
159	18	285	530	1	6	2.9	45	
160	20	285	490	1	10	2.9	20	
H-1	90	19	56	4	15	1.2	ND	Andesite porphyry
H-2	185	28	121	ND	15	2.3	ND	Andesite
H-3	58	16	43	13	17	1.3	ND	Acidic porphyry
H-4	8	20	25	2	3	1.0	2	Acidic porphyry
K 1	12	48	130	ND		1.4		
K 2	8	11	55	ND		.3		
K 3	23	10	60	ND		.8		
K 4	34	28	105	2		.8		
K 5	15	8	56	ND		.5		
K 6	27	10	115	ND		.6		
K 7	21	11	90	ND		.5		
K 8	13	7	67	ND		.9		
K 9	10	4	53	ND		.3		
K10	6	2	32	ND		.1		
K11	7	3	49	ND		.4		
K12	13	16	70	ND		.3		

Due to these low values and the relatively low precision no graphical evaluation was attempted. The background value b was set at 1.0 ppm Ag and the threshold value t at 3.0 ppm Ag.

The areal distribution of the Ag-values does not reveal so distinct patterns as for the earlier discussed elements which might partly be due to the geochemistry of Ag. However, two strongly and anomalous zones can be distinguished. One at Area 4 with values of 3.6 ppm Ag and 1.9 ppm Ag. Area 5 is another Ag anomaly with a maximum value of 3.1 ppm Ag. It shows a distinct extension eastwards towards sample point No.63, which has a value of 3.7 ppm Ag. A further zone of anomalous values occurs at East Fork Creek and overlaps Areas 2 and 7, the maximum Ag-content found in this zone is 3.5 ppm Ag. Zones of above background Ag-contents can be delineated in the Cu-Mo anomalous Areas 1 and 2.

#### ANTIMONY (Fig. 11)

The low Sb-contents and the relatively low precision did not allow a graphical statistical evaluation to be carried out. The background value b has been chosen at 4 ppm Sb and the threshold value t at 6 ppm Sb.

The areal distribution of the Sb-value shows only one conspicuously anomalous zone; Area 2 between East Fork and South Fork Creek with values of 14 and 13 ppm Sb. A weak anomalous zone occurs in Area 4 at Rusk Creek with values of 8 to 11 ppm Sb. Areas 1, 5 and 6 possess all above background values ranging from 4 to 5 ppm Sb, however they are not regarded as anomalous.

#### DISCUSSION OF THE ZINC, LEAD, SILVER AND ANTIMONY DISTRIBUTION (Figs. 7, 8, 10 and 11)

The four elements Zn, Pb, Ag and Sb are grouped and discussed together as they are regarded as indicative for gold-silver vein mineralizations of the Mount Nansen type. It is interesting to note that the Zn and Pb anomalies found in the investigated area are absolutely identical (Areas 4, 5, 6 and 7). Ag anomalies were found to overlap Zn-Pb-anomalies in the three Areas 4, 5 and 7. Sb-anomalies are less distinct but were found in Areas 2 and 4. The distribution of this group of 4 elements quite clearly points to Area 4 at Rusk Creek as the most conspicuous potential zone for a gold-silver vein mineralization. It is quite interesting to note that this area also contains weakly anomalous Mo-values (Fig.9). According to the regional geological map (Fig. 3) Area 4 occurs within rocks belonging to the Mount Nansen Group. Areas 5 and 7 and possibly also Area 6 are further potential zones of gold-silver vein mineralizations. In the drainage systems of all three areas (East Fork Creek, Discovery Creek and Back Creek) placer operations have been or are still in operation pointing to gold occurrences in their catchment areas. Areas 5, 6 and 7 occur in rocks belonging to the Mount Nansen Group, Mesozoic Intrusives or Tertiary porphyries. No relationship with a particular rock type or unit is therefore apparent for the Zn-Pb-Ag-Sb anomalies.

Zones showing above background or anomalous Sb-values coincide partly with Cu-Mo anomalies (Areas 1 and 2) and partly with Pb-Zn-Ag anomalies (Areas 4, 5 and 6). It seems therefore that this element is not only an indicator for gold-silver vein mineralizations but shows also affinities to Cu-Mo mineralizations as already discussed earlier. The same feature possibly also applies for Ag.

#### NICKEL (Fig. 12)

No graphical statistical evaluation for Ni has been carried out due to the low Ni-content of the stream samples and due to the relatively low precision of the Ni-analyses. The Ni-values range from 3 to 23 ppm and the background value b has been set at 8 ppm Ni and the threshold value t at 13 ppm Ni.

Three zones of anomalously high Ni-content have been found. Areas 6 and 7 possess values of 15 and 13 ppm Ni and Area 4 possesses a Ni-content of 11 and 12 ppm. The distribution pattern of Ni resembles to a large extent that of Zn, Pb, Ag and Sb. It seems therefore possible that Ni can be used as an indicator for gold-silver vein-mineralizations. The reason for this relationship is not entirely understood, as no Ni-carrying minerals were found to occur in the ore of the Mount Nansen deposit. It is however possible that some of the pyrite present in such vein deposits might contain anomalously high amounts of Ni in solid solution, which would agree with the strong anisotropy observed in some of the Mount Nansen pyrites.

#### GEOPHYSICS

As mentioned earlier a geophysical survey, embracing an airborne potassium 40 (K40), electromagnetic and isomagnetic survey, has been committed to Geo-X Surveys Ltd. of Vancouver. This survey was part of a package survey covering the Dawson Range between Mount Nansen and the Quintana property some 100 miles to the northwest. The data of the entire package will be available to all subscribers at a later date.

At the moment we only have a map showing the major electromagnetic crossovers and the K40 contours. Due to technical difficulties delivery of the aeromagnetic map has been delayed at least until the beginning of October.

#### K40 AND ELECTROMAGNETIC SURVEY (Fig. 13)

The Mount Nansen - Brown-McDade area was flown in a N - S direction. The flight lines were spaced approximately 700 feet and the flight altitude was 500 feet above ground level where terrain permitted. Figure 13 covers the same area as the geochemical maps, Figures 6-12. The K40 values are plotted in 5 counts per second intervals.

The K40 activity is related to the availability of potassium in the investigated area, i.e. high K40 counts represent areas underlain by rocks containing a relatively high K-content. High K-content in rocks can be primary features as in certain acid intrusives, or secondary features which are caused by metasomatic or hydrothermal processes. K40 contours must be interpreted with care, since the measured K40 activity is affected

by the thickness of the overburden and also by the flight altitude. Therefore outcrops of ridges will yield relatively high K40 values as it is west of Nansen Creek on Figure 13. This area of general high K40 activity coincides with the topographically accentuated Mount Nansen ridge. Similar features are also visible in the central part of Figure 13. However, it is interesting to note that the area of highest activity recorded, 35 c.p.s., in the Mount Nansen Ridge, is very close to the geochemical anomalous Area 4 at Rusk Creek. A further relatively high K40 area, 25 c.p.s. is located in the central part of the map and lies close to the geochemical anomalies, Areas 1 and 2.

The electromagnetic crossovers do not reveal any major geological structures.

#### AEROMAGNETIC SURVEY (Fig. 14)

The regional aeromagnetic map, published by the Geological Survey of Canada, reveals three relatively pronounced magnetic depressions, which more or less coincide with the geochemical anomalous Areas 1, 2, 3, 4 and 6. These magnetic depressions can result from altitude or overburden effects, or can be caused by a deficiency of magnetic minerals. Such a deficiency can be of primary or secondary nature, in the latter case for instance as a result of supergenic and/or hypogenic alteration of the magnetic minerals. Such an interpretation can be applied to the two magnetic depressions coinciding with the geochemical anomalous Cu-Mo Areas 1, 2 and 3. These areas would then possibly represent leached porphyry copper mineralizations.

The areas of higher magnetism on Figure 14 coincide fairly close to the terrains underlain by the volcanic rocks of the Mount Nansen group. Thin and polished sections made from these rocks (especially in the andesite-porphyrries) revealed a rather high magnetite content.

#### SUMMARY

Geochemical and geophysical data gathered during the stream sampling programme (Cu, Pb, Zn, Mo, Ag, Sb, Ni) and the airborne geophysical survey (K40, electromagnetic) as well as the aeromagnetic map of the Geological Survey of Canada indicates the presence of seven anomalous areas in the northern half of the property (Table 2). The southern half of the Mount Nansen ground does not show any conspicuous anomalies. (See Table 2).

##### i) Area 1

Area 1, north of the headwaters of Discovery Creek, is characterized by high Cu-values, accompanied by moderate Mo-, Ag-, Sb-, K40-values and by a magnetic depression. The area is underlain by Tertiary porphyry.

##### ii) Area 2

Area 2, between South Fork and East Fork Creek shows high Cu-, Mo-, Ag- and Sb-values. It is overlapped by a strong magnetic depression and occurs close to a K40 anomaly.



Scale: One Inch to One Mile =  $\frac{1}{63,360}$   
Miles



1-7: Areas of Geochemical Anomaly

ISOMAGNETIC LINES (total field):

- 500 gammas . . . . .
  - 100 gammas . . . . .
  - 20 gammas . . . . .
  - 10 gammas . . . . .
  - Magnetic depression . . . . .
  - Flight lines . . . . .
- Flight altitude: nominally 1000 feet above ground level where terrain permitted.

Fig. 14: Airborne Magnetic Survey, published by the Geological Survey of Canada

TABLE 2

Grouping Of The Geochemical and Geophysical Anomalies

<u>Area</u>	<u>Cu</u>	<u>Mo</u>	<u>Zn</u>	<u>Pb</u>	<u>Ag</u>	<u>Ni</u>	<u>Sb</u>	<u>K40</u>	<u>Magnetic Depression</u>
1	++	(+)			(+)		(+)	(+)	+
2	+	++			+		++	(+)	+
3	++	++							++
4		+	++	++	++	+	+	+	(+)
5			++	++	++		(+)		
6			+	+		+	(+)		(+)
7			+	+	+	++			

(+): "weak", + : "strong", ++ : "very strong"

The area is underlain by Tertiary porphyry. It is possible that Area 2 is connected with Area 1 and therefore part of a large anomaly (Areas 1 and 2).

iii) Area 3

Area 3, in the south bend of Nansen Creek, possesses high Cu-, Mo-values and coincides with a strong magnetic depression. Also this area is underlain by Tertiary porphyry.

iv) Area 4

Area 4, at Rusk Creek, is a very distinct anomalous zone with high Zn-, Pb-, Ag-values and moderate Ni- and Mo-values. This zone coincides with the highest encountered K40 anomaly and also with a small magnetic depression. The area is underlain by Mount Nansen group rocks which are possibly intruded by Tertiary porphyry.

v) Area 5

Area 5, south of the headwaters of Discovery Creek, has high Zn-, Pb-, Ag-values and moderate Sb-values. No distinct geophysical anomalies occur in this area, which is underlain by rocks of the Mount Nansen group.

vi) Area 6

Area 6, at the headwaters of Back Creek, is characterized by high Zn-, Pb-, Ni-values, moderate Sb-values and is situated close to a magnetic depression. The area occurs close to the contact of Mount Nansen group rocks, granitic intrusions and Tertiary porphyries.

vii) Area 7

Area 7, north of East Fork Creek, shows high Zn-, Pb-, Ag- and Ni-values. No distinct geophysical anomalies were found in this zone which is underlain by Tertiary porphyry.

From Table 2 as well as from the above description of the seven anomalous areas a distinct division into two groups of different geochemical, geological and possibly geophysical nature is evident.

Group I embraces Areas 1, 2 and 3. These areas are distinguished by Cu- and Mo-values. In addition they all contain marked Ag-values and erratic Sb-values. A further conspicuous feature is a strict lithological control, since all the anomalous areas, belonging to this group, occur within Tertiary porphyries. Geophysically they all show up as clear magnetic depressions. All these facts point to a altered and leached disseminated porphyry copper type mineralization. The currently undertaken detailed soil sampling programme should give some answers on the dimensions of the mineralizations which apparently have a stock-type shape.

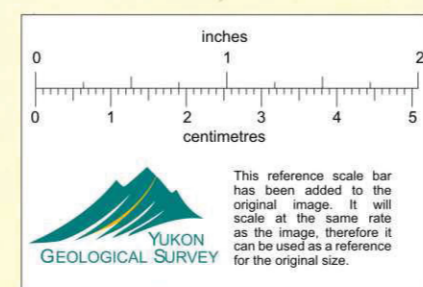
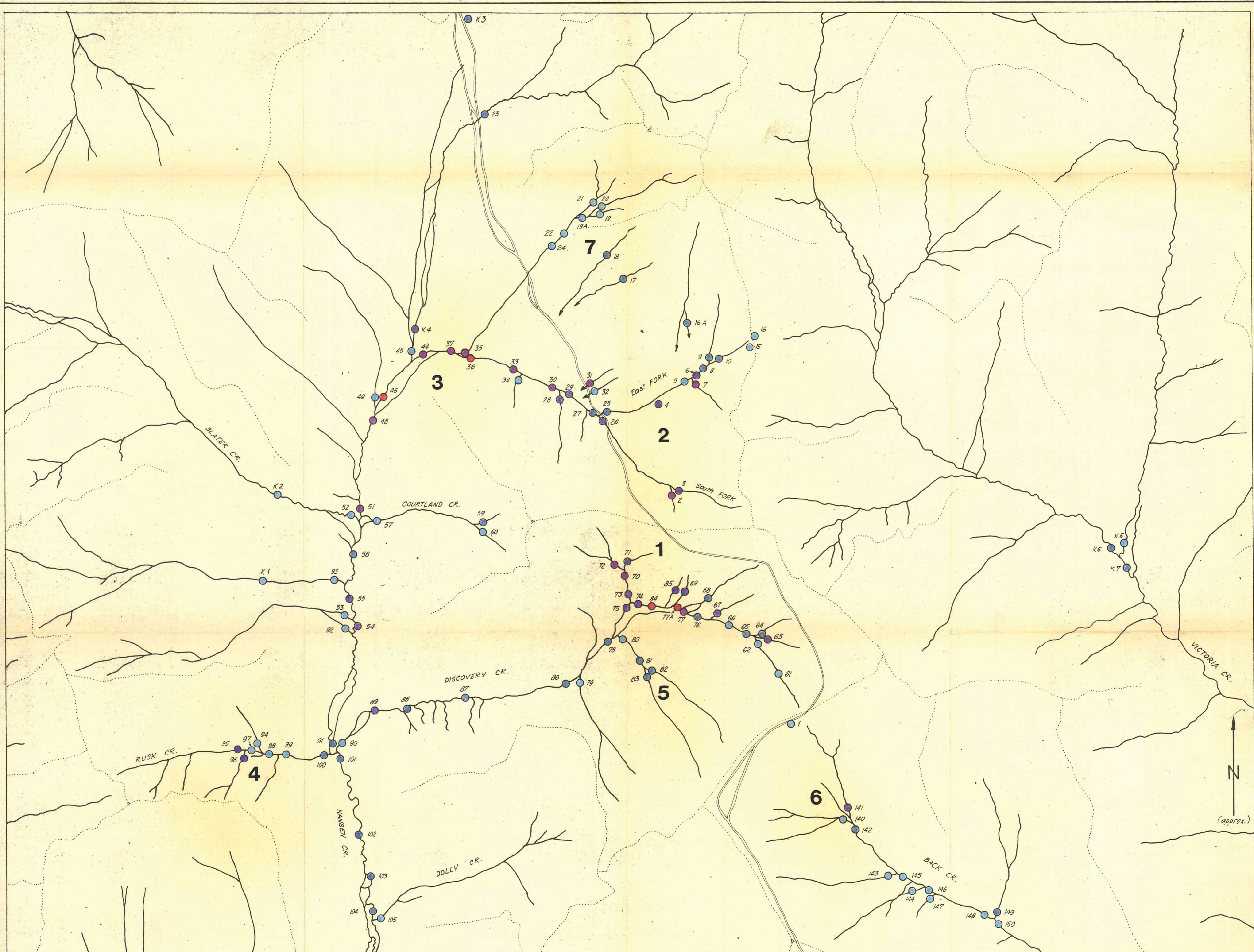
Group 2 is comprised by Areas 4, 5, 6 and 7. They are characterized by highly anomalous Zn- and Pb-contents. In addition Areas 4 and 5 show strongly anomalous Ag-values and Area 7 possesses moderately anomalous Ag-values. Sb- and Ni do not exhibit such a striking distribution pattern, however, they are present in marked

amounts in all four areas. This group is not related to a particular lithological unit and with exception of Area 4, does not show any apparent geophysical response. These features seem to indicate massive narrow vein silver-lead-zinc deposits of the Mount Nansen type. From the stream samples a clear north to northwest strike of the anomalous zones is especially apparent in Areas 4 and 7.

## CONCLUSIONS

The stream sampling programme has revealed the presence of seven anomalous areas, of these, four must be considered as first order exploration targets, namely Areas 1, 2, 3 and 4. A detailed soil sampling programme on a quadratic 400 feet grid is currently undertaken on Areas 1, 2 and 3 (see Fig. 4) with the aim to obtain more information on a possible Cu-Mo-bearing disseminated porphyry mineralization. It must however be stressed that the discussed Cu-Mo-anomalies are not necessarily caused by economical mineralization but might merely reflect a relatively higher Cu-and Mo-content of the particular porphyries in respect to the surrounding rocks. An answer to this problem can only be found after extensive drilling subsequent to a successful outcome of the current soil sampling programme.

Attention should also be given to Area 4 where more detailed silt sampling upstream followed by soil sampling of the zone is warranted.

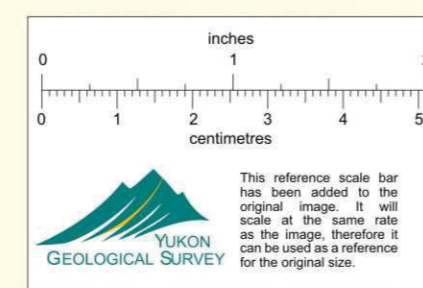
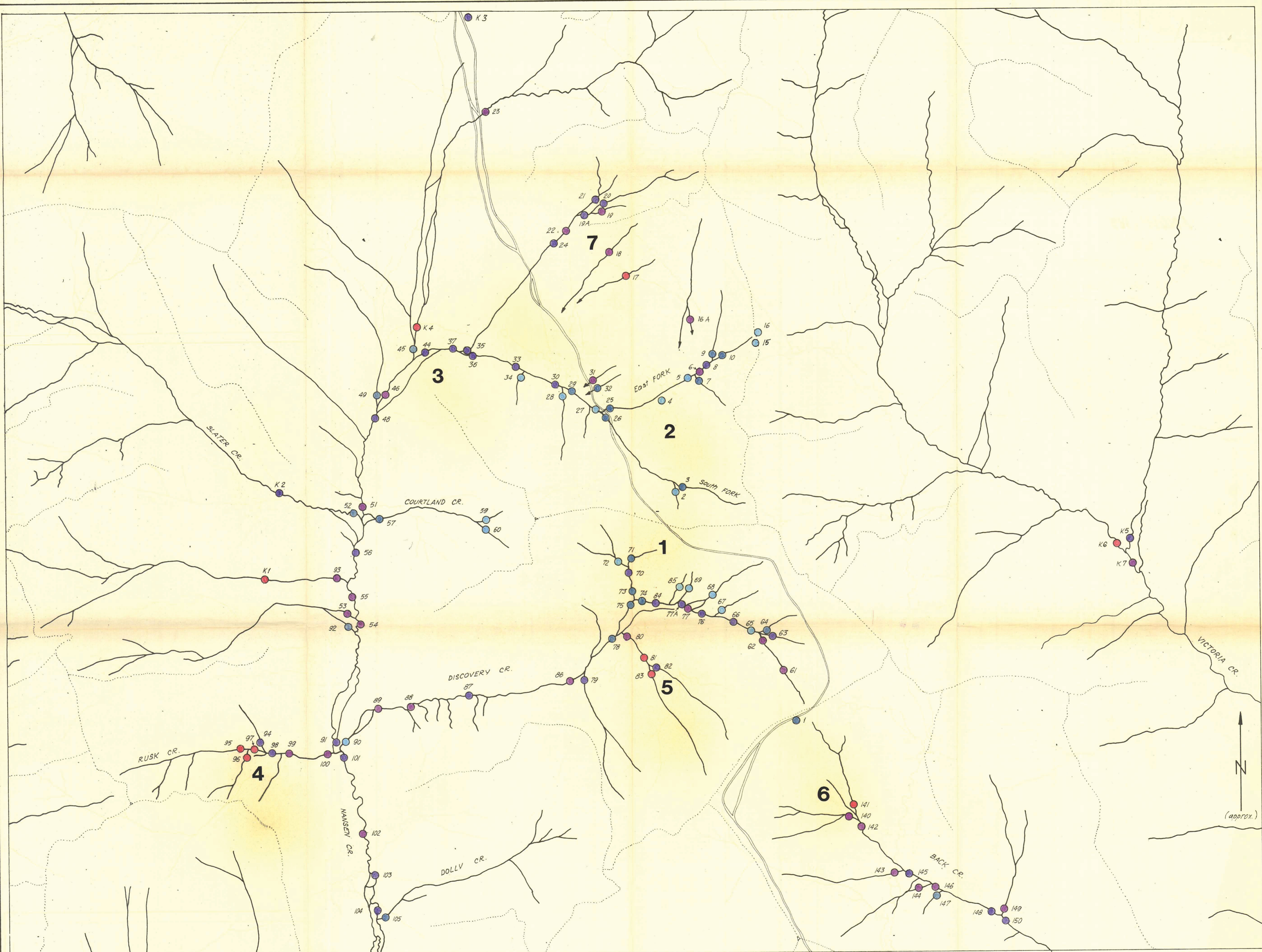


**LEGEND**

- Creek
- Divide
- Road
- 124 ○ Sample site and number

- 150 + ppm
- 70-149 ppm
- 30-69 ppm
- 16-29 ppm
- 0-15 ppm

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**GEOCHEMICAL STREAM SAMPLING**  
 1970  
**COPPER**  
 Scale ca. 1" = 1000'    Aug. 27, 1970    FIG. 6



**LEGEND**

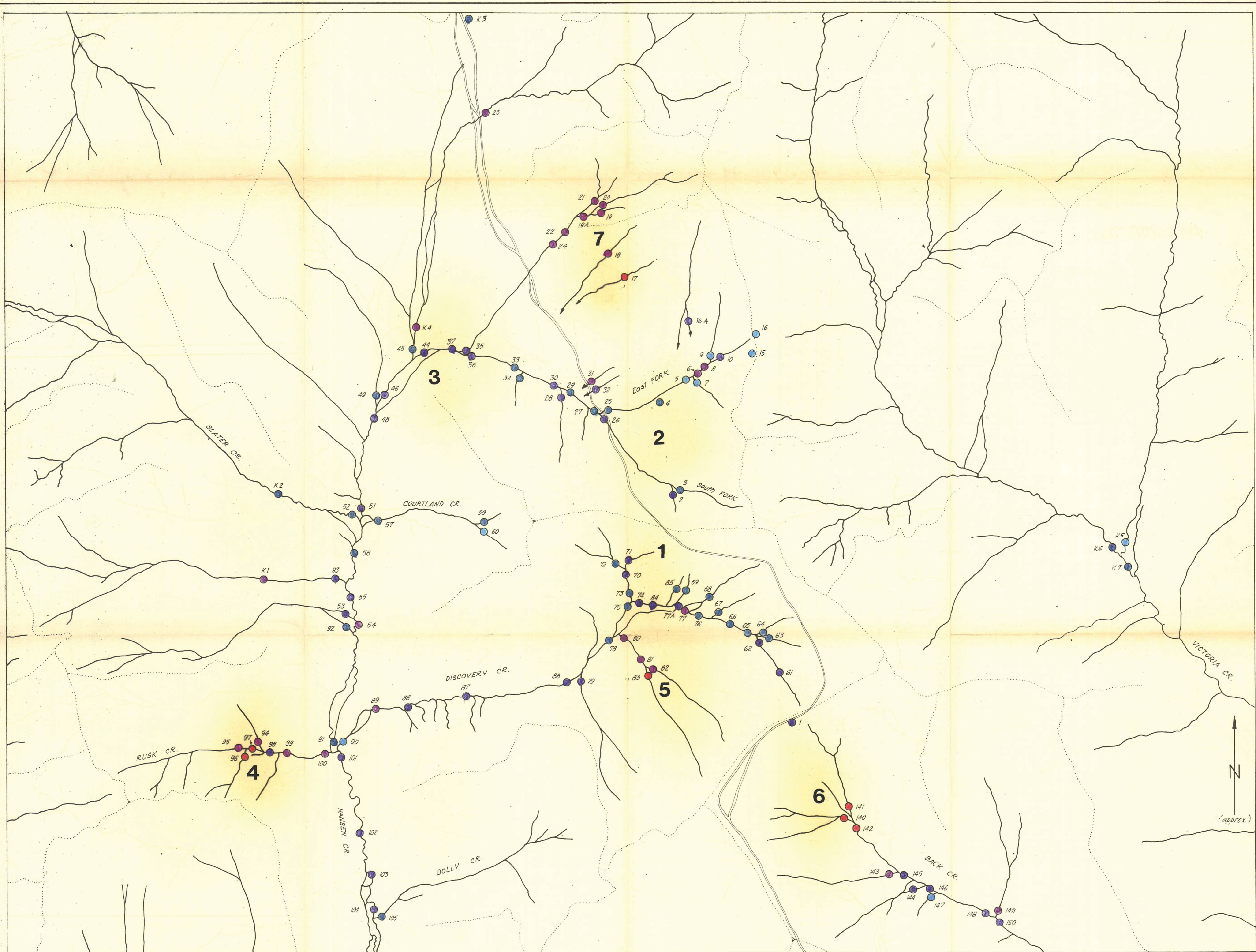
- Creek
- Divide
- Road
- Sample site and number

- 100 + ppm
- 70 - 99 ppm
- 50 - 69 ppm
- 30 - 49 ppm
- 0 - 29 ppm

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**GEOCHEMICAL STREAM SAMPLING  
1970  
ZINC**

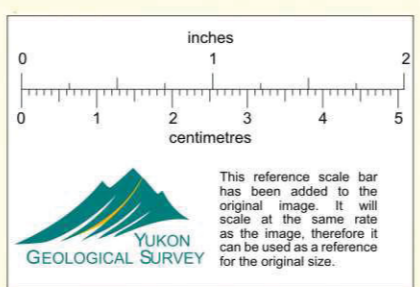
Scale ca 1" = 1000'    Aug. 27, 1970    FIG. 7



**LEGEND**

- Creek
- Divide
- Road
- Sample site and number

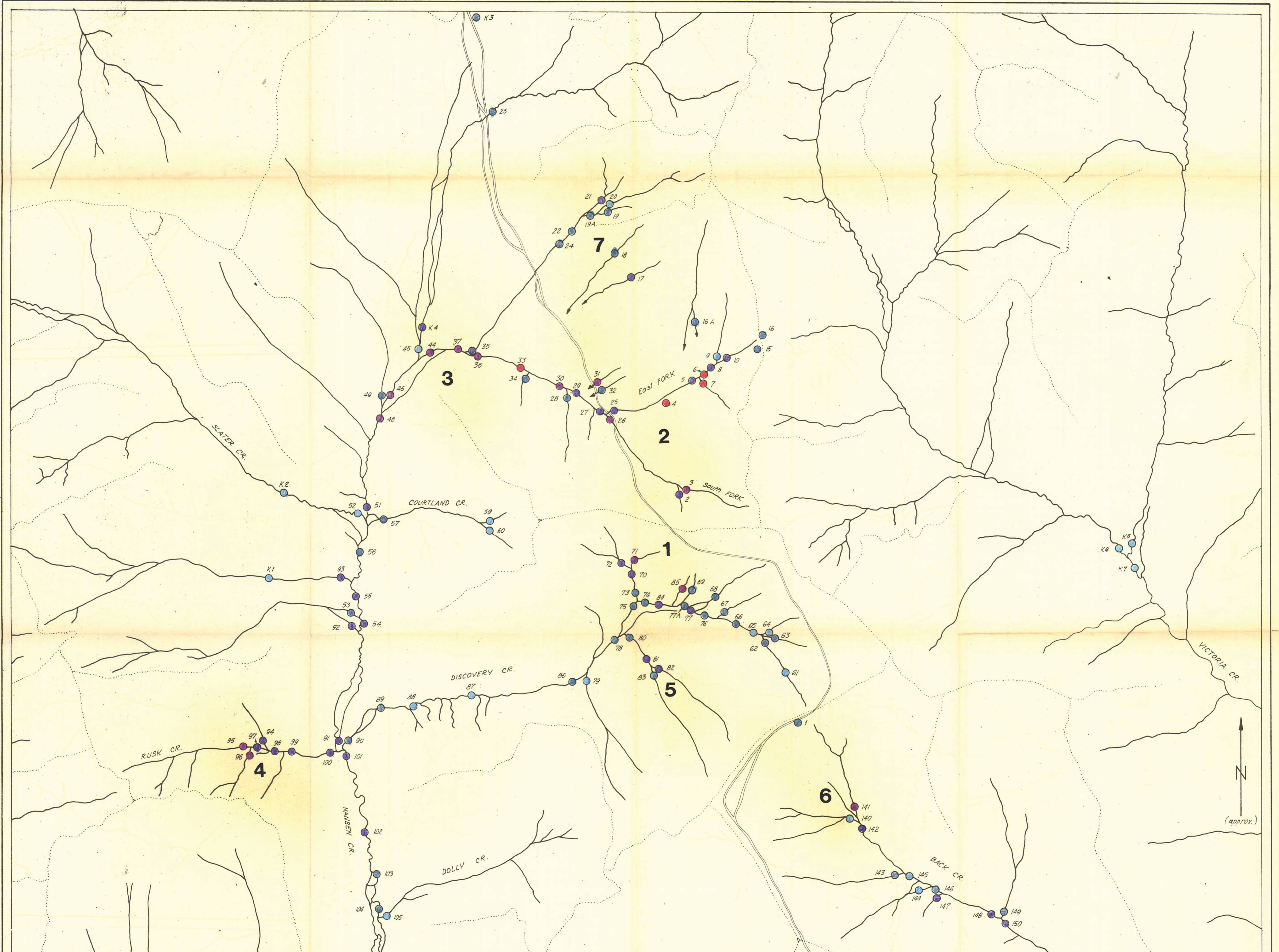
- 50 + ppm
- 25 - 49 ppm
- 17 - 24 ppm
- 10 - 16 ppm
- 0 - 9 ppm



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**GEOCHEMICAL STREAM SAMPLING  
 1970  
 LEAD**

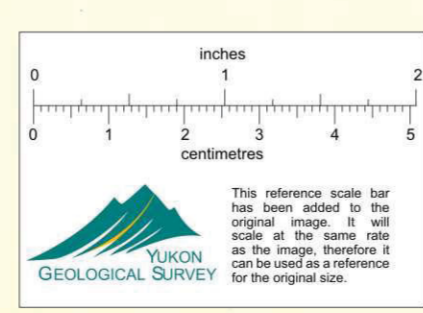
Scale ca. 1" = 1000'    Aug. 27, 1970    FIG. 8



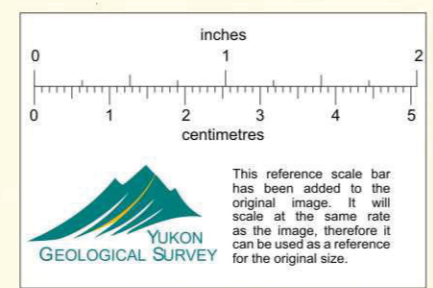
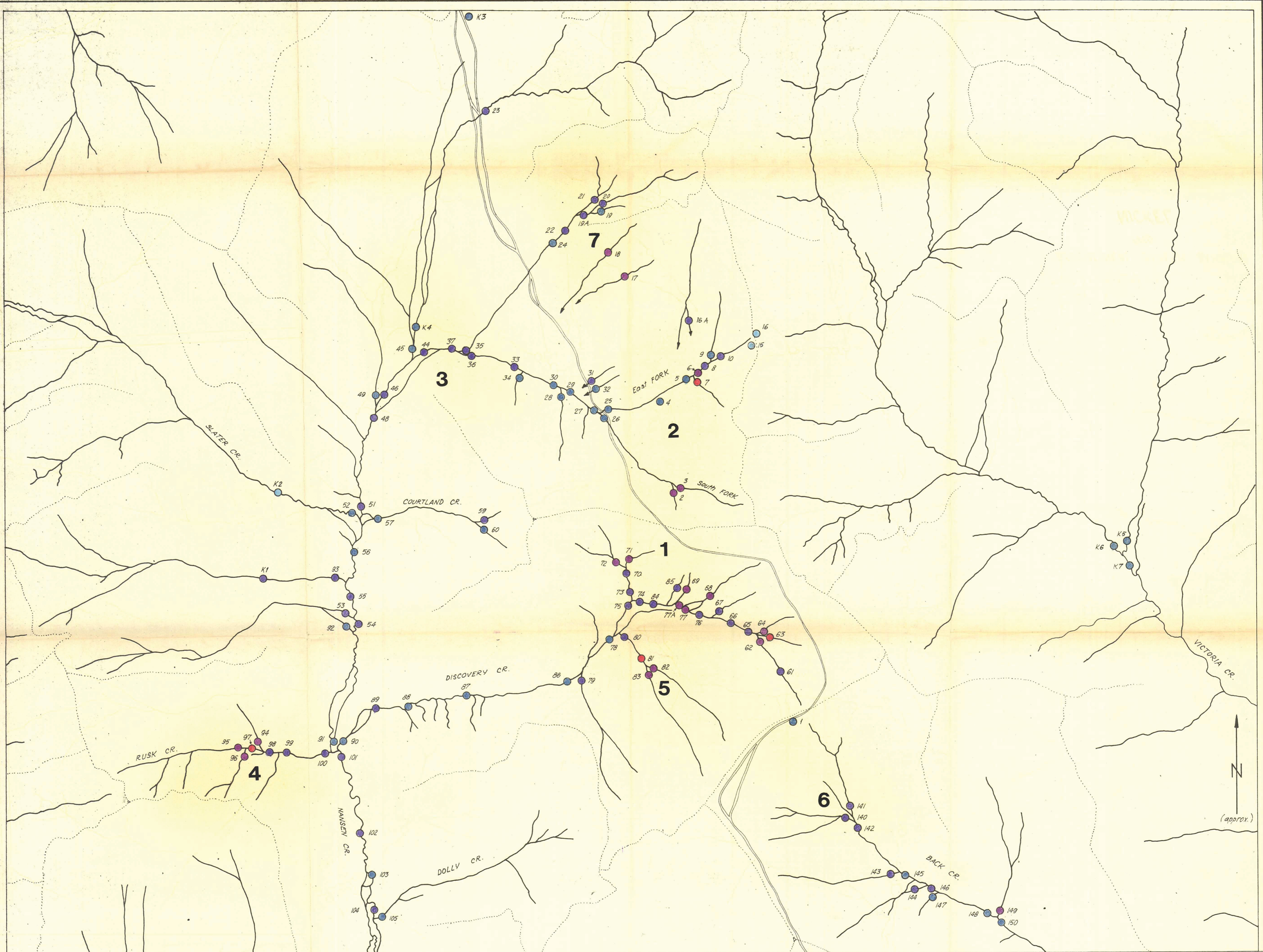
**LEGEND**

- Creek
- Divide
- Road
- Sample site and number

- 6 + ppm.
- 4 - 5 ppm
- 2 - 3 ppm
- 1 ppm
- Not detected



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**GEOCHEMICAL STREAM SAMPLING**  
 1970  
**MOLYBDENUM**  
 Scale ca. 1" = 1000'    Aug. 27, 1970    FIG. 9

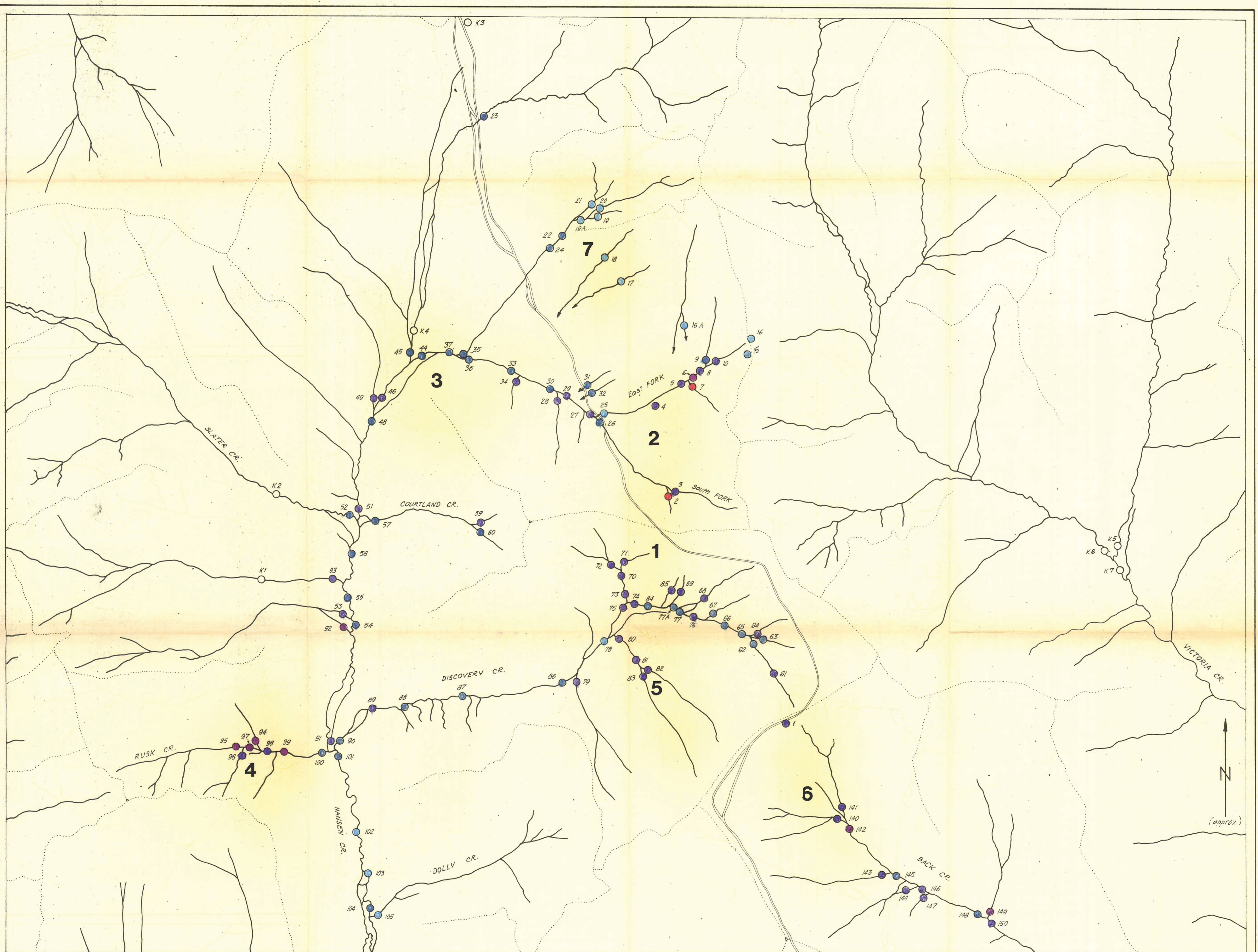


**LEGEND**


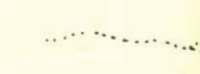

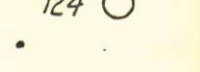
- Creek
- Divide
- Road
- 124 Sample site and number




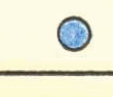

- 30 + ppm
- 20 - 29 ppm
- 10 - 19 ppm
- 0.5 - 0.9 ppm
- 0 - 0.4 ppm

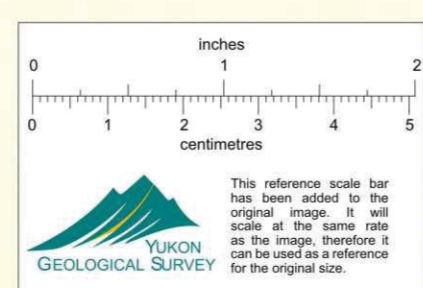
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**GEOCHEMICAL STREAM SAMPLING**  
 1970  
**SILVER**  
 Scale ca. 1" = 1000'    Aug. 27, 1970    FIG. 10



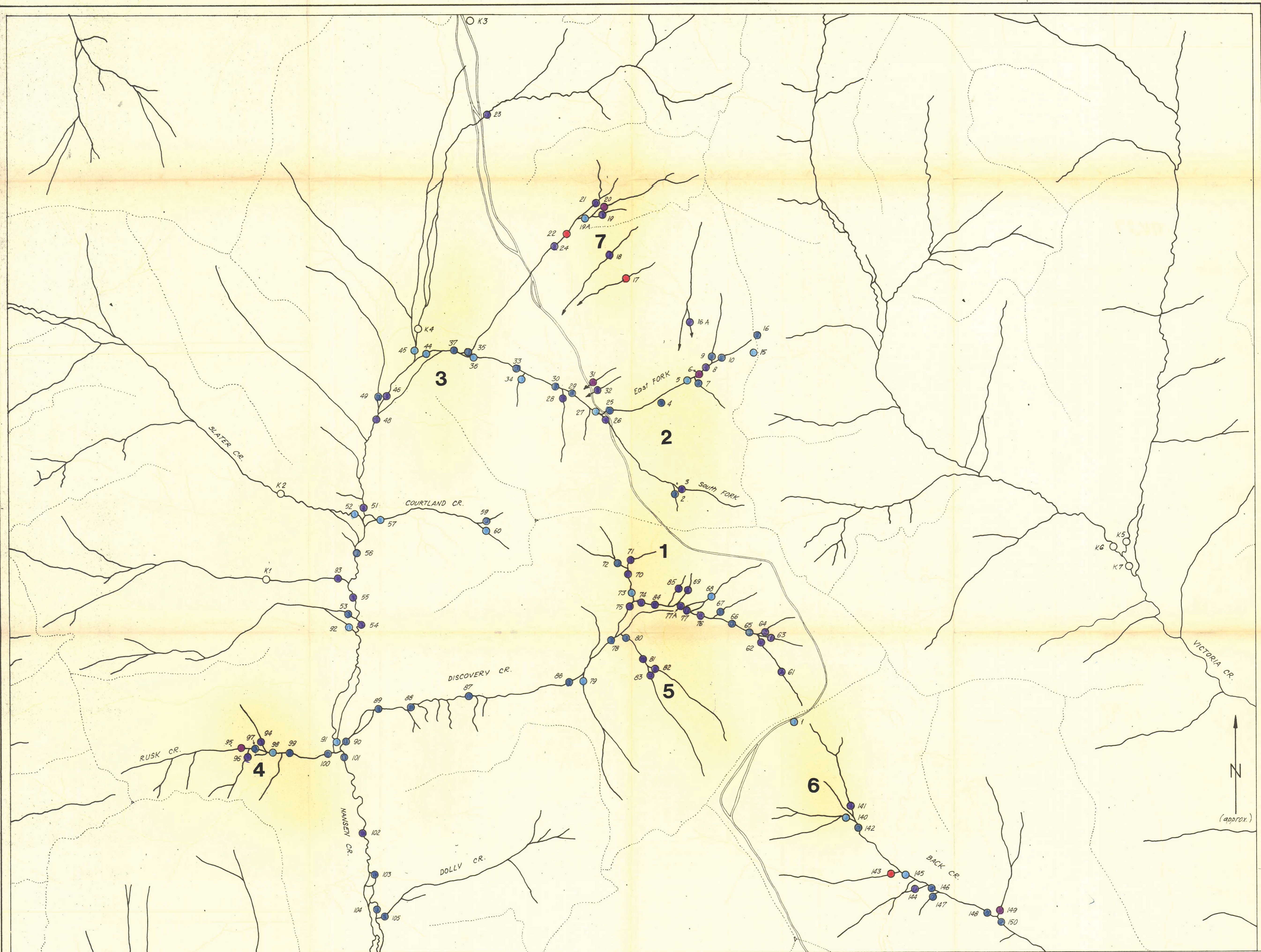
**LEGEND**

-  Creek
-  Divide
-  Road
-  Sample site and number


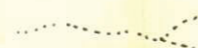

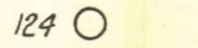
-  10+ ppm
-  6-9 ppm
-  4-5 ppm
-  2-3 ppm
-  0-1 ppm








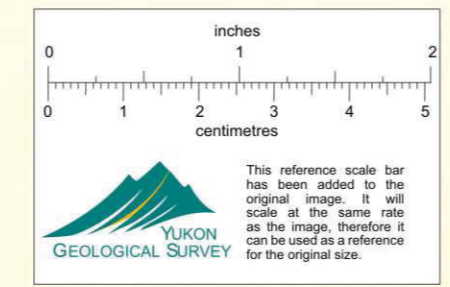
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**GEOCHEMICAL STREAM SAMPLING**  
 1970  
**ANTIMONY**  
 Scale ca. 1" = 1000'    Aug. 27, 1970    FIG. 11



**LEGEND**

-  Creek
-  Divide
-  Road
-  124 ○ Sample site and number

-  13 + ppm
-  11 - 12 ppm
-  9 - 10 ppm
-  7 - 8 ppm
-  0 - 6 ppm



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**GEOCHEMICAL STREAM SAMPLING**  
 1970  
**NICKEL**  
 Scale ca. 1" = 1000'    Aug. 27, 1970    FIG. 12