

1973 & 1974 GEOLOGICAL and GEOCHEMICAL REPORT

on the

FED 1 - 228 MINERAL CLAIMS

MINTO AREA

Whitehorse Mining District



by

Alan R. Beavan

and

R. E. VanTassell

United Keno Hill Mines Limited,
Exploration Department,
405 Main Street,
Whitehorse, Yukon



This report has been examined by the Geological Evaluation Unit and is recommended to the Commissioner to be considered as representation work in the amount of $ 91,558

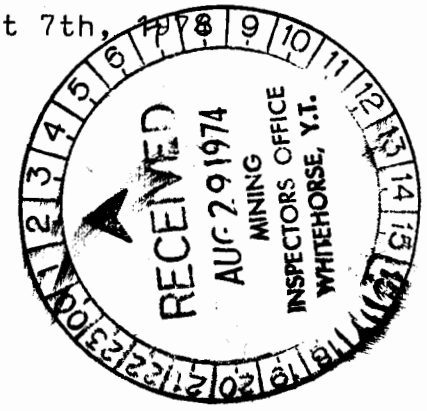
W D Sinclair
acting Resident Geologist or
~~Resident Mining Engineer~~

Considered as representation work under Section 53 (4) Yukon Quartz Mining Act

Commissioner of Yukon Territory

N.T.S. Sheet: 115-I-11
Latitude: 62° 36'N
Longitude: 137° 36'N
Dates: Aug. 2, 1973 -
July 28, 1974

Dated: August 7th, 1974



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INTRODUCTION: -

The FED Claims comprise a group of 228 full claims staked in July and September of 1973. Original staking in July was based on geological favourability, following encouraging diamond drilling results on Keno's DEF Claim Group about 4 miles to the northwest. An additional 24 claims were staked in September on the river flats on the southwest side of the Yukon River, as a possible townsite location.

Geological mapping and reconnaissance soil sampling was completed on some 186 claims. The remaining 42 claims cover recent alluvial deposits on the river flats of the Yukon River, and these were not covered due to thick transported overburden and lack of outcrop.

Field work was carried out in both the 1973 and 1974 seasons. Between August 1st, 1973 to October 11th, 1973, some 92 claims on the west side of the property were covered by two (2) parties of four (4) men. Between May 24th, 1974 to July 28th, 1974, the remaining 94 claims covering the upland area were completed by two (2) parties of three (3) men.

A total of 13,511 soil samples were taken and analyzed for copper.

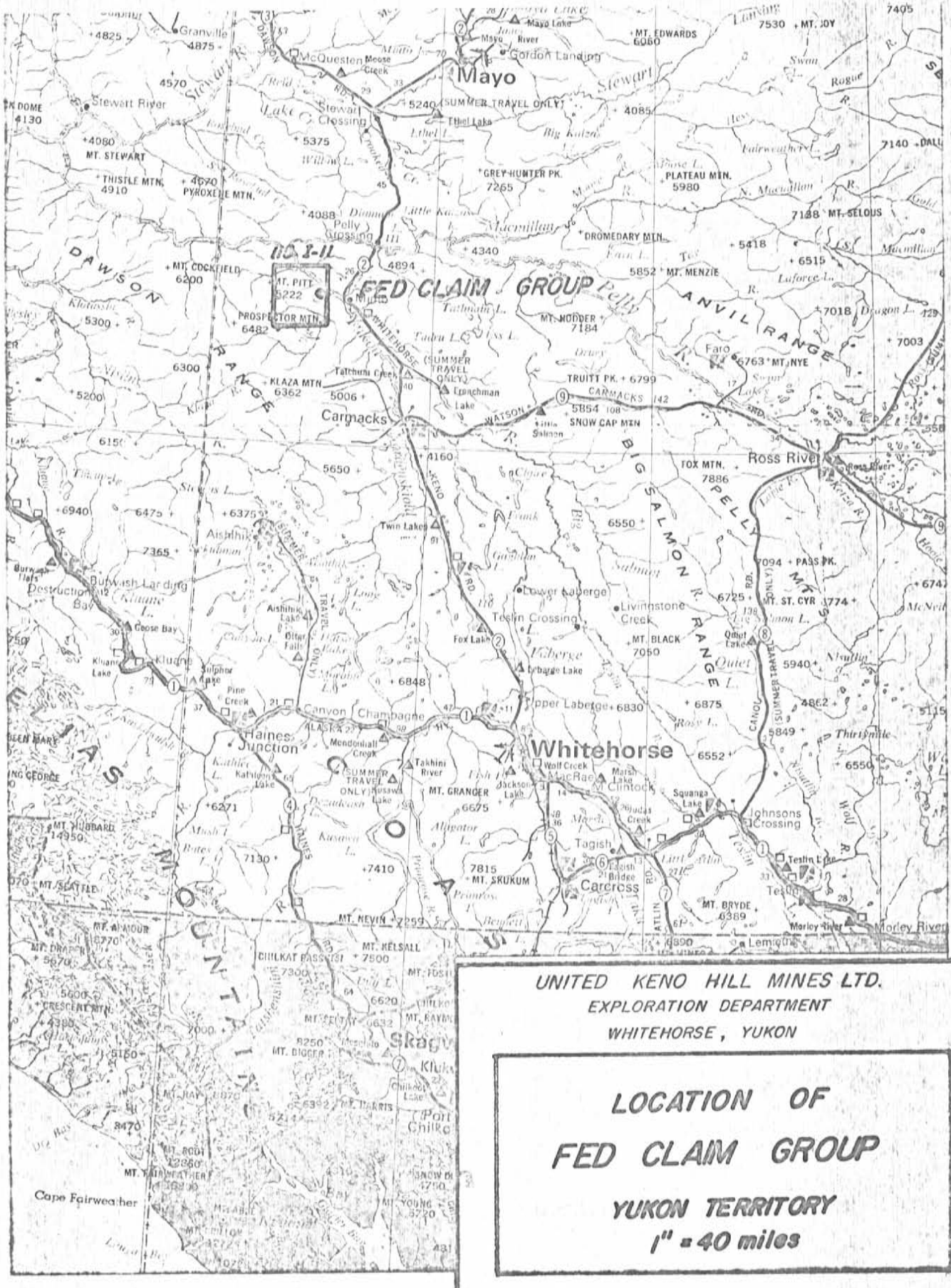
Some 20 minor copper showings, mainly malachite staining were found during geological mapping. Sulphide mineralization was also examined in the trench on the COIN Claims.

LOCATION and ACCESS:-

The property is located some 150 miles northwest of Whitehorse (see Fig. 1), and about 4 miles south southeast of Keno's DEF Claim Group. The northeast corner of the FED Group lies on the south west bank of the Yukon River, about $6\frac{1}{2}$ miles downstream from the Minto airstrip and $2\frac{1}{2}$ miles downstream from the mouth of Big Creek. Approximate location is latitude 62° 36'N and Longitude 137° 36'N, N.T.S. Sheet 115-I-11. The FED Claim Group covers an area of about 18.4 square miles.

Access to the property in 1973 and 1974 was by Hiller 12E helicopter stationed at Minto. A total of 19 heliports are located on the upland area of the property.

An initial access road was constructed between November 1973 and April 1974, to connect DEF campsite with Carmacks. This road passes through the northern and eastern portion of the FED Claims on the river flats. The road is presently impassable.



UNITED KENO HILL MINES LTD.

EXPLORATION DEPARTMENT

WHITEHORSE, YUKON

LOCATION OF FED CLAIM GROUP

YUKON TERRITORY

1" = 40 miles

PROPERTY:-

The FED Claim Group consists of 228 contiguous full claims (see Fig. 2), as follows:

CLAIM NAME	GRANT NOS.	LOCATION DATE	RECORD DATE	EXPIRY DATE
FED 1-22	Y76108-Y76129	11 July, 1973	Aug1/73	Aug.1/78
FED 23-24	Y76130-Y76131	13 July, 1973	Aug1/73	"
FED 25-38	Y76132-Y76145	11 July, 1973	"	"
FED 39-48	Y76146-Y76155	13 July, 1973	"	"
FED 49-64	Y76156-Y76171	11 July, 1973	"	"
FED 65-72	Y76172-Y76179	13 July, 1973	"	"
FED 73-88	Y76180-Y76195	11 July, 1973	"	"
FED 89-96	Y76196-Y76203	13 July, 1973	"	"
FED 97-104	Y76204-Y76211	11 July, 1973	"	"
FED 105-120	Y76212-Y76227	14 July, 1973	"	"
FED 121-162	Y76228-Y76269	15 July, 1973	"	"
FED 163-170	Y76270-Y76277	20 July, 1973	"	"
FED 171-184	Y76278-Y76291	21 July, 1973	"	"
FED 185-204	Y76292-Y76311	14 July, 1973	"	"
FED 205-228	Y77416-M77439	14 Sept.,1973	Oct9/73	Oct.9/78

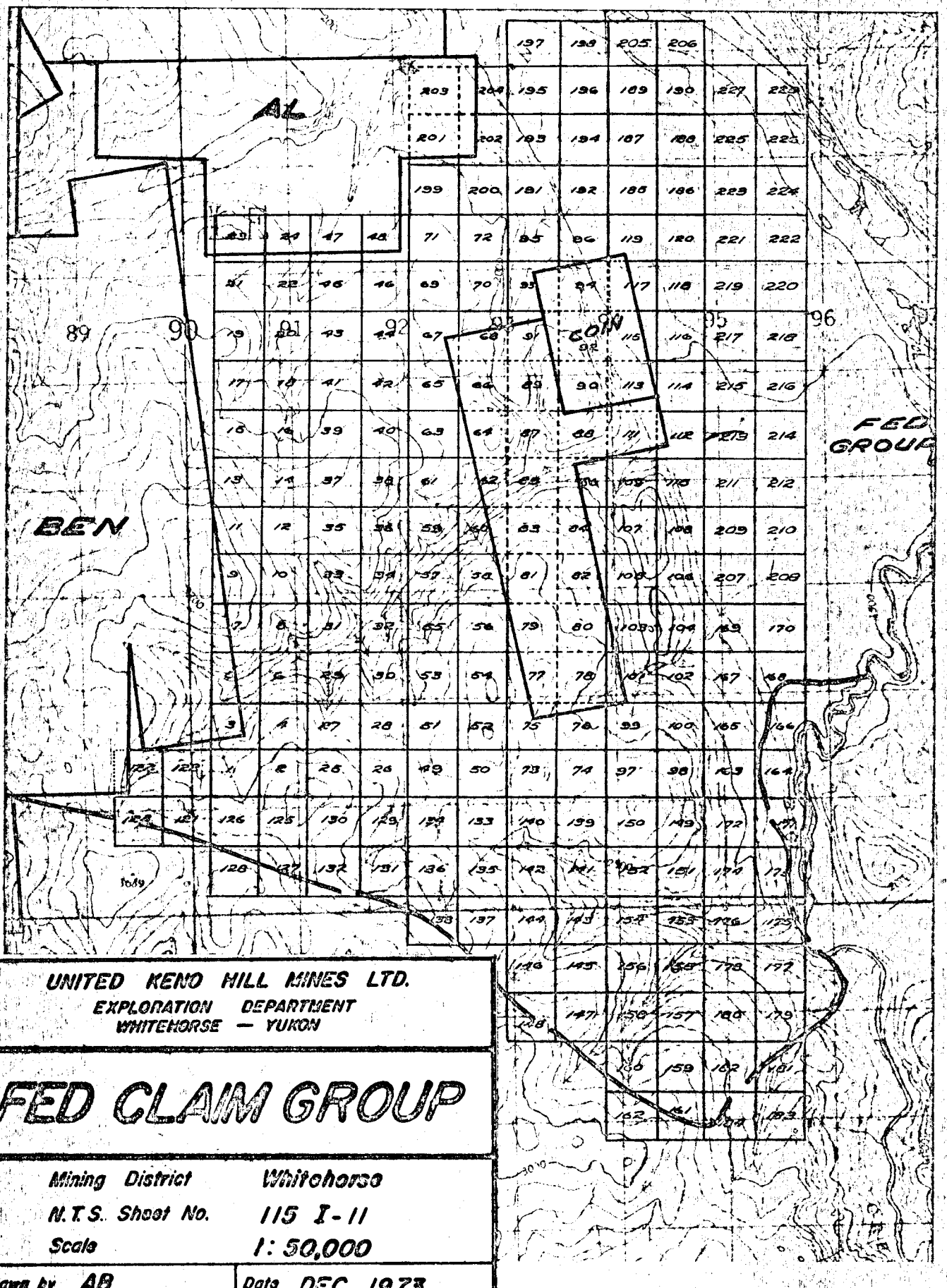
The Claim group is bounded to the north by the AL Claims and to the west by the PAL and BEN Claims. The COIN Group of 24 claims is entirely surrounded by the FED Group.

HISTORY: -

The oldest reported mineralization in the immediate area is on the present COIN Group, where copper mineralization was explored by hand trenching and a 20 foot adit prior to 1902. Until 1970 little attention was paid to the area.

In late 1970 the Dawson Range Syndicate announced the discovery of significant copper mineralization at Williams Creek. In September of the same year Archer, Cathro and Associates restaked the original COIN Claims, but investigations revealed only low order copper mineralization in quartz stringers and the claims were allowed to lapse.

In 1971 co-incident discoveries of malachite staining on Keno's DEF and Silver Standard's MINTO properties and a high grade intersection in one of Silver Standard's diamond drill holes led to a minor staking rush in late 1971 with about 700 claims being staked. In September 1971 the COIN Claims were restaked and sold early in 1972 to Taseko Mines Limited. Taseko staked additional claims bringing the number of claims to 24 in May 1972 and conducted a small bulldozer trenching program in September, 1972. In 1973 Taseko carried out soil geochemical and geological surveys.



UNITED KENO HILL MINES LTD.
EXPLORATION DEPARTMENT
WHITEHORSE — YUKON

FED CLAIM GROUP

Mining District	Whitehorse
N.T.S. Sheet No.	115 I-11
Scale	1:50,000
Drawn by AB	Date DEC 1973

Following an encouraging news release in September, 1973 by United Keno Hill Mines Limited on their DEF property, staking in the area became very active. At present the intrusive has been covered by staking as far north as Fort Selkirk.

Diamond drilling of targets on the COIN property was started in July 1974 by Taseko Mines Limited and Laronge Mining Limited.

PHYSIOGRAPHY:-

The claim group lies within the Dawson Range of the Yukon Plateau province (Bostock 1936) and is characterized by rounded hills dissected by gentle to steep sloped stream valleys. Relief on the claim group varies from 3,500 feet to 1,500 feet at the Yukon River. The major physiographic trends in the area are north west - southeast, such as the Yukon River, and northeast-southwest, such as the steep sided valley passing through the FED Group.

All the claim block is tree covered, generally vegetated by thick moss and open to dense forests of small spruce and jack pine. On thick moss covered north facing slopes, some of the ground is permanently frozen. On steep south facing slopes there is grass cover with sparse poplar growth. Upland valleys at the heads of streams are broad, shallow and muskeg-swamp filled. On the Yukon River flats vegetation is open forest with larger spruce, pine, birch and poplar, and dense alder and willow growth along stream channels. The rise from the river flats to the upland surface is abrupt.

Of the 228 claims in the group, about 48 of these are on the river flats.

The upland surface is thought to be unglaciated and a residual soil covers most of the area, with outcrop estimated as about 2%. The river flats and valley floors are covered with recent alluvium and glacial (?) sediments.

ACKNOWLEDGEMENTS:-

The author wishes to thank R. E. VanTassell and R. T. Heard for their supervision and advice on preparation of this report. Also, to R. Joy for valuable discussions of his experience in the area in prospecting and from work on the DEF property. Also, to M. Farrer for her assistance in drafting.

REGIONAL GEOLOGY: -

The Dawson Range is a Northwest trending physiographic province. The basement rocks are the metamorphic rocks of the Yukon Group, which have a predominant northwest structural trend throughout the Yukon Plateau.

The FED Claim Group lies at the southeast end of the same northwest trending granitic complex as the DEF property. This complex is blanketed on three sides by Tertiary or younger volcanic rocks and on the northeast side by recent alluvium of the Yukon River. The exposed area of the complex is about 50 square miles.

The northest trending Teslin Fault lineament follows the Yukon River in this area. The granitic complex lies on the west side and adjacent to the lineament. Total field aeromagnetic maps express the Teslin lineament. A northeast trend is also apparent on aeromagnetic maps, orthogonal to the Teslin lineament. Such trends are topographically expressed by northeast trending stream valleys flowing into the River. Both the DEF property and Williams Creek properties lie near such trends. The northeast valley cutting through the FED Group is also expressed on aeromagnetic maps. This was one consideration given in staking the FED Claims at this location.

GEOLOGICAL SURVEY: -

A. General -

The FED Claims are underlain predominantly by granitic rocks, megascopically similiar to those underlying the DEF property. These rocks are both massive and foliated, and porphyroblastic and non-porphyroblastic. Most commonly it is a weakly to moderately well foliated rock. In the southern and eastern claims the rock is "syenitic" but texturally similiar to the "granite".

Areas of highly altered and granulated granite were mapped along the eastern upland area. Deformation in this rock type is probably associated with shearing along the Teslin lineament.

Isolated outcrops of whitish to yellow oxidized granite were also mapped as a separate unit.

Along the eastern escarpment several slivers of older meta-volcanics were found. These are amphibolite-chlorite-epidote schists and are conformable to the structure in the granites. They are thought to be part of the Upper Triassic 'massive green volcanics' from Templeman-Kluit (1974).

The intrusive is blanketed to the south by Eocene or younger Carmacks volcanics, including andesitic and basaltic flow rocks and minor tuffs.

Other rock types observed on the FED Claims were volcanic dike rocks, granite porphyry dike rock, microgranite, aplite, and pegmatite. No gneissic rocks occuring at DEF were recognized on the FED property.

B. Detailed -

Grey/Pink Granite - Unit 1:

Massive granite was found in a large area at the southern end of the claim group and as isolated outcrops on the western half. These rocks are generally fine grained and mafic poor compared to the foliated granite. Relationships between the massive and foliated granite were not definitive in the western area. It was found that the massive granite occurred in areas of felsic enrichment with abundant aplite and pegmatite dikes.

At the southern end of the claim group Unit 1A is contiguous with weakly foliated numbers of the 2B Unit. The contact is cold, sharp and definitive, and infers that 1A is a pegmatitic phase of 2B. Here the unit consists of quartz-feldspar pegmatite and massive pink fine grained granite symetrically arranged on either side of a quartz core vein. The vein is 5 feet to 15 feet wide and merges into a pegmatite suite. On either side of this, the rocks are massive fine grained granites.

Biotite is the only mafic mineral observed and occurs as fine (0.5 mm to 1 mm), fresh, euhedral grains up to 3% in a quartz-feldspathic groundmass.

Grey/Pink Foliated Granite - Unit 2:

These rocks are grey/pink on fresh and weathered surfaces, and medium grained. They are weakly to moderately foliated and porphyroblastic.

Feldspar, quartz, biotite and hornblende are the main minerals, usually in that order. Mafic minerals are present up to 20% of the rock with hornblende usually less than biotite. In some areas hornblende is the major mafic, and the rock is coarser grained and weakly foliated. Hornblende is more common in rocks on the eastern side of the property. Quartz content varries from 5% to 30%. Other accessory minerals are magnetite and sphene (?). Secondary minerals are chlorite, epidote, limonite, hematite, and muscovite. Chlorite, epidote and limonite are present in all rocks as partial orcomplete alterations of the mafics, and are probably of deuteric origin.

The foliation is defined by allignment of biotite flakes. In weakly foliated rocks the orthoclase porphyroblasts are large (up to 1½"), euhedral to subhedral and a pale pink or white colour. The groundmass is grey, hypidiomorphic equigranular.

In moderately to strongly foliated rock there is evidence of granulation. Porphyroblasts are ruptured and augen shaped and show sub-allignment parallel to the foliation; quartz grains are stretched; and biotite grains appear more smeared assuming an anastamosing type foliation.

In the most strongly foliated rocks they are approaching an augen gneiss.

Whitish to yellow oxidized granite - Unit 3:

These rocks are similiar to the pink/grey granite in texture and mineralogy. The feldspars appear leached and white All crystals in the rock are coated with limonite as well as limonitic coatings on fractures. Mafic minerals account for less than 10%, and biotite is the most common. Biotite is partially or completely replaced by chlorite. Laumontite gives a pinkish colour to some of the rocks. The rock appears to be more friable than the fresh granite. Only a few outcrops of this rock type were recognized. The similiarity in textures suggests that this is an oxidized pink/grey granite, although it is unknown if it resulted from supergene or hypogene oxidation.

Altered Granite - Unit 6:

This unit is characterized by a high degree of granulation and complete alteration of the mafics. It is gradational to the moderately to strongly foliated rocks of Unit 2B, and occurs exclusively along the eastern edge of the upland area. Two distinct types of alteration were observed.

(a) Chlorite, epidote and potash staining -

These rocks are green/pink in colour and are composed almost entirely of chlorite, epidote, and potash stained feldspar. Their texture is gradational from a strongly foliated rock, near the'granite' to a granular caterclastic away from the granite. The structure is conformable to the structure in the granite. The deformation is thought to be caused by shearing along the Teslin lineament and the alteration is thought to be due to hypogene waters.

(b) Limonite, hematite and carbonate -

These rocks are more stongly granulated and original textures and composition are not recognizable. The

rock is fine grained consisting of a limonitic or hematitic matrix with small crushed feldspar grains. Limonite and carbonate are abundant as coatings on fractures.

Granite porphyry dike rock - Unit 7:

This is a dense, grey, porphyritic rock with an aphanitic groundmass. Phenocrysts of feldspar and biotite are most common. Phenocrysts very from 1 to 5 m.m. Quartz and hornblende also occur as phenocrysts. Biotite phenocrysts are small, euhedral hexagonal books. Hornblende also is subhedral. Feldspar phenocrysts are generally larger (3-5 m.m.) and are both euhedral and anhedral.

Quartz eyes are larger (3-5m.m.) and vitreous.

It was observed that quartz and feldspar, biotite and feldspar, and biotite, hornblende and feldspar occur together as phenocrysts.

The rock in places showed minor alteration but most commonly it appeared fresh. All granite porphyry dikes trended northeasterly.

Volcanics -(a) dikes, (b) flows, (c) tuffs - Unit 8:

(a) dikes - both andesitic and basaltic dike rocks were found intruding units 1A and 2B. These were generally dark grey/green or black,and aphanitic.

(b) flows - These rocks occur at the southern extremity of the FED property and are thought to be part of the Carmacks volcanics as mapped by Bostock (1936).

A variety of rock types were found including pillowed andesetic feldspar porphyry, basaltic augite porphyry, and massive basalt. The rocks generally weathered dark grey or black although one variety weathered a buff brown colour. Most of the rocks were weakly magnetic.

(c) tuffs - Only a few outcrops of tuffs were found. These were fine to medium grained with stubby augite phenocrysts.

Amphibolite - chlorite - epidote schists - Unit 9:

These rocks are black on fresh and weathered surfaces. Hornblende occurs as small euhedral phenocrysts (2-3mm) in a fine grained chlorite and epidote matrix. The rock cleavage is defined by allignment of chlorite. In places the rock has a fissility and breaks in slabs about 2 inches thick.

Near the granite-amphibolite contact, bands about $\frac{1}{2}$" to 1" thick and veinlets of epidote are common. In some places

dikes, bands and veinlets of aplite, pegmatite, and granite up to several feet thick are common.

In two localities zenoliths of the amphibolite schists were found in the granite. The xenoliths were stretched parallel to the foliation and were partly assimilated to a depth of about $\frac{1}{2}$" around the edges.

In one location, where the granite-amphibolite schist contact was observed, the granite was found to be hornblende rich with about 40% well formed hornblende crystals. This evidence of assimilation is possible evidence of an intrusive origin of the granite.

BRECCIA -

An area of hematite breccia was found on claims 175 and 177. This rock is dark purple/brown on fresh and weathered surface and rubble weathering. Large and small fragments of foliated granite, quartzite, and volcanics were found in a fine to medium grained hematitic matrix with small (1-2mm) grains of anhedral white leached feldspar grains.

The origin of the breccia is undetermined.

Microgranite, aplite, and pegmatite dikes -

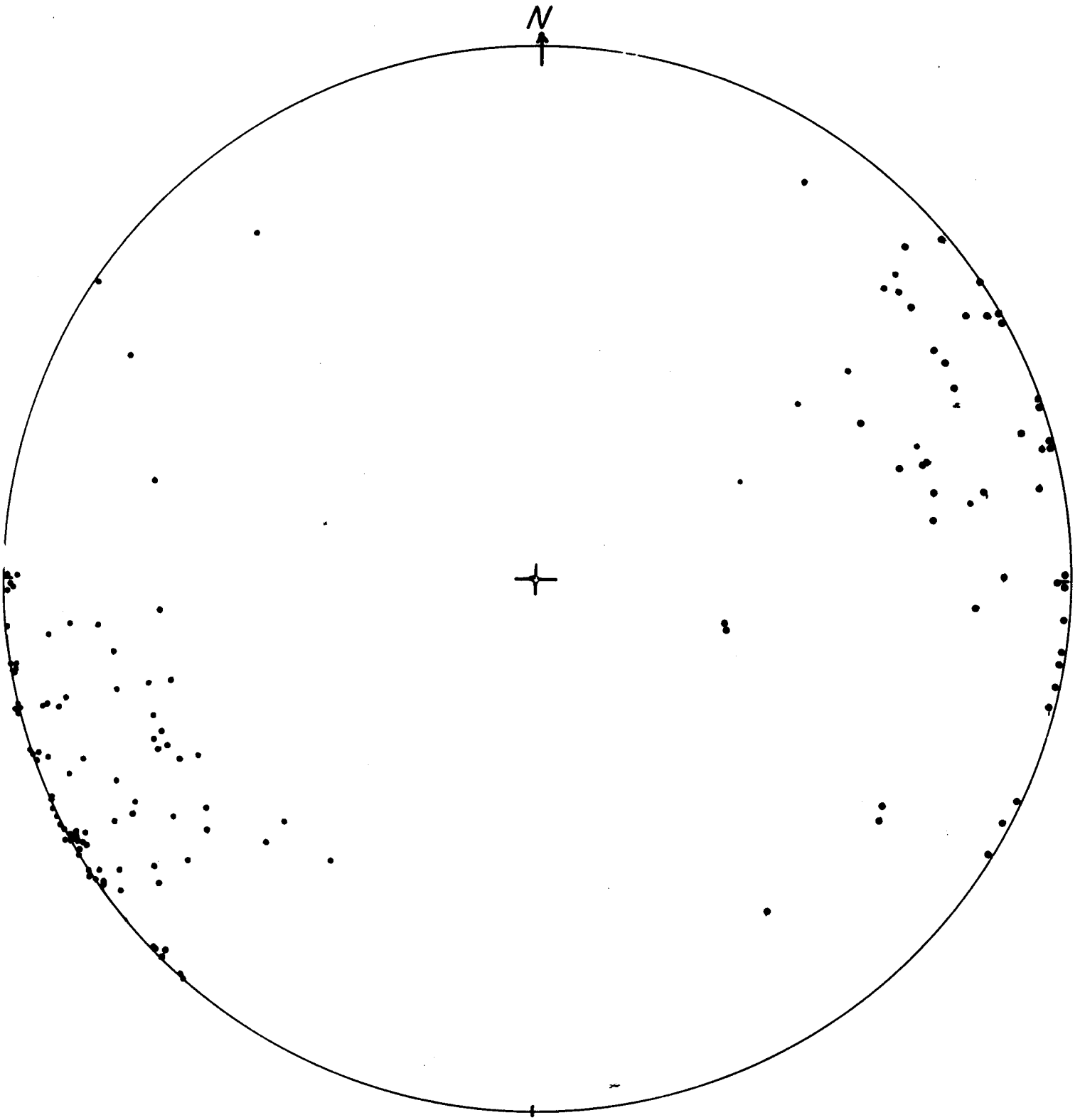
These dike rocks are mafic poor with biotite less than 5%. Some microgranite dikes showsmeared biotite/chlorite flakes giving a vague foliation. The aplite dikes are very acidic, with quartz about 50% and sucrose textured.

C. STRUCTURE and METAMORPHISM -

Structure in the foliated granite is isoclinal with consistent northwesterly strikes and steep or vertical dips (see Fig. 3). Due to poor exposure the nature of any folding or faulting in the granite is undetermined. A list of foliation attitudes is included in Appendix A.

Outcrops of granitic rocks are generally moderately well jointed and fractured. Fig. 4, shows a large scatter of joint attitudes and no well defined joint set can be picked out. The majority of joints have similar attitudes as the foliation. A list of joint attitudes measured is included in Appendix B. Many joints are coated with crystalline epidote up to 1" thick. Other less common joint coatings are limonite and hematite, carbonate, and chlorite. Many joint surfaces are polished but well developed slickensides were only observed in a few locations.

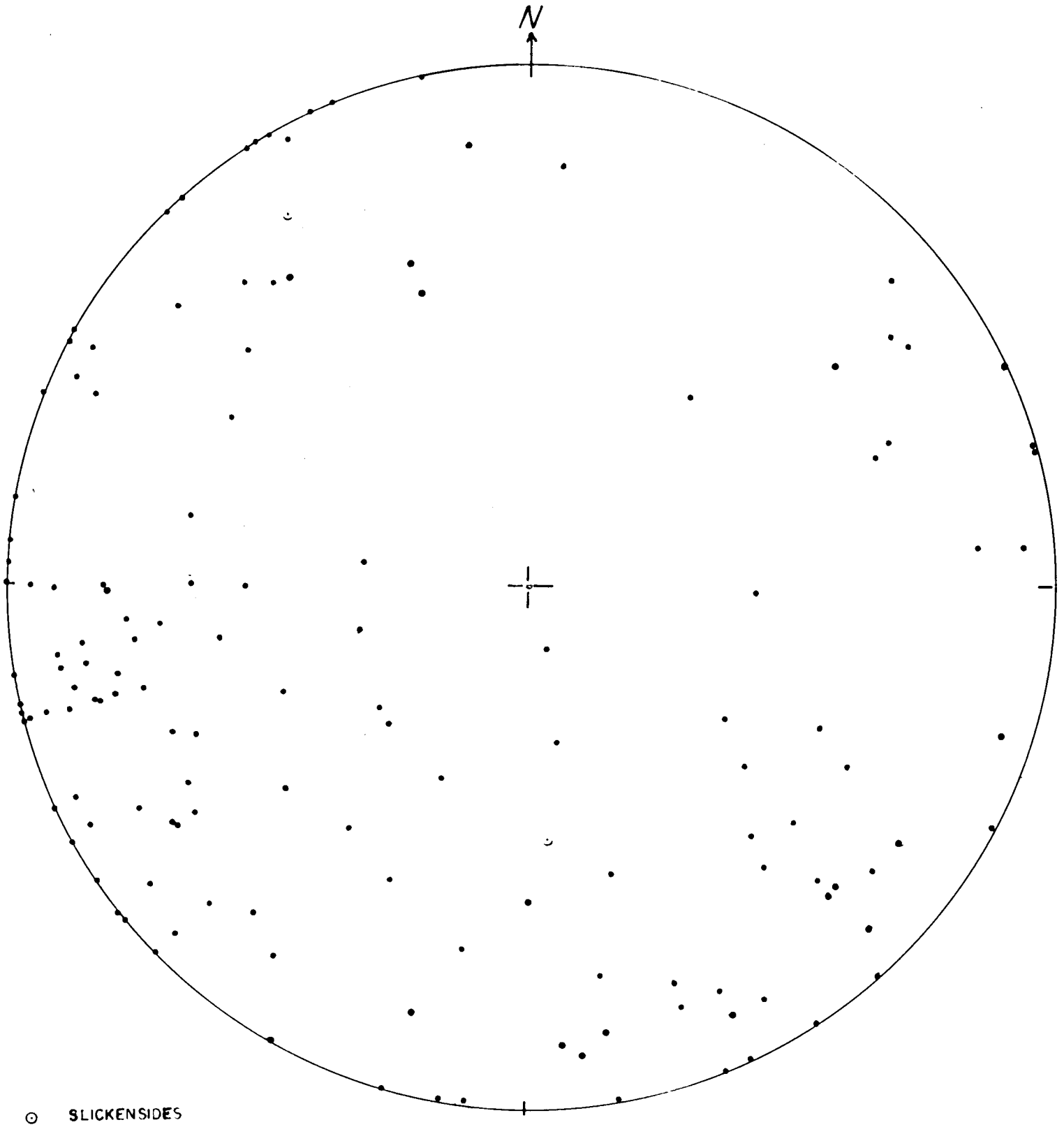
FED CLAIM GROUP - POLES TO FOLIATIONS



Lower Hemisphere
Equal Area Net Plot
60 points

Fig. 3

FED CLAIM GROUP - POLES TO JOINTS



⊙ SLICKENSIDES

• JOINTS

Lower Hemisphere
Equal Area Net Plot
119 points

Fig.

Structure in the amphibolite schist is conformable to the granite. Minor folds were seen in one location in the schist with vertical plunges.

Several small shear zones with chloritic, hematitic and limonitic mud were seen in the COIN trench. Two other shear zones were interpreted on Claim 92, cutting off two areas of amphibolite schist.

Granite porphyry dikes strike consistently northeast at approximately right angles to the foliation. These dikes appear to be moderately dipping. Volcanic dikes have no consistent attitudes.

The main body of the granite is weakly foliated with little or no evidence of caterclasis. Near the eastern edge of the upland area the degree of granulation, strenth of foliation and alteration increase going east. This trend is gradational from moderately foliated granite, through strongly foliated granite to altered granite and caterclastite.

This general trend is thought to indicate localization of a regional shearing stress along the Teslin lineament.

D. ALTERATIONS -

Chlorite, epidote, and limonite occur in almost all foliated granitic rocks as deuteric alterations of mafics. There is a gradational increase in alteration from the weakly foliated, non altered granite to the west, to the moderately to strongly foliated altered granite to the east. Chlorite completely replaces mafics in the eastern areas in the varying amounts of epidote and potash staining. This zonation of alteration is probably related to hypogene waters circulating through the rock during shearing adjacent to the Teslin lineament.

Potash staining, imparting a pinkish colour to the feldspars was most common in the altered granite, Unit 6. In the western are, when potash staining was a major alteration, blebs of blue-white secondary (?) quartz were also found.

Limonite and hematite were common as supergene alteration products in the weathered granite. In the whitish to yellow oxidized granite limonite was the major alteration product. Limonite and hematite were also major alterations in some altered granite of Unit 6.

Epidote, chlorite, limonite, hematite and carbonate occurred frequently as joint coatings. Epidote also occurred as veinlets, most predominantly near the granite-amphibolite schist contact.

Laumontite was found only in the whitish to yellow oxidized granite as an alteration of feldspar.

E. MINERALIZATION -

Primary copper minerals observed were bornite and chalcopyrite. Bornite was identified as trace specks in a few outcrops of foliated granite, and as blebs in the amphibolite schist in the COIN trench.

Chalcopyrite was seen on Claim 111 as trace specks in highly altered granite of Unit 6 and on Claim 88 with bornite in a pegmatite quartz vein.

Secondary minerals observed were malachite and azurite. Most commonly malachite occurred as small patches on fracture surfaces in the foliated granite. Azurite stain occurs only on Claim 88 in the granitic rocks intruded by a quartz vein. In two locations several specks of pyrite were found with malachite. One of these was in a small quartz vein on Claim 96 and the other was in altered granite near the amphibolite schist contact on Claim 112.

Where secondary minerals were observed the granitic rocks were generally altered. Copper mineralization was most abundant, along the eastern escarpment.

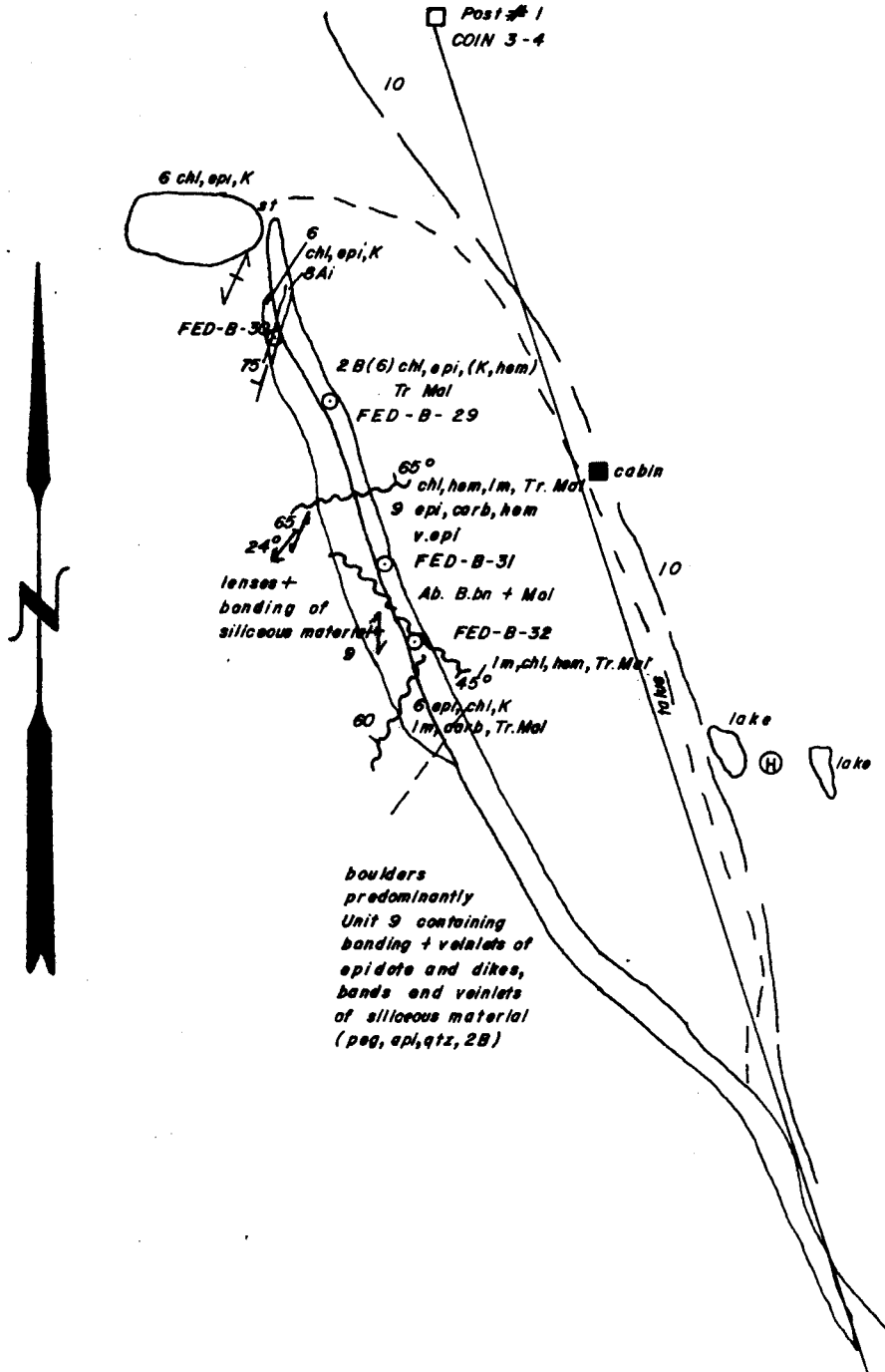
COIN TRENCH -

Mineralization observed in the trench included blebs of bornite in amphibolite-chlorite-epidote schist; patches of malachite on fractures in the amphibolite schists and foliated granite; and malachite in small shear zones. The amphibolite schist in the trench is highly intruded by small siliceous dikes generally 2 to 3 inches thick.

Veinlets and bands of epidote are common in the amphibolite schist. Three small shear zones were seen about 2" wide with chlorite, limonite, and hematite mud.

Traces of malachite were found along the whole length of the trench. The area of best mineralization where blebs of bornite are abundant is only about 100 feet long, the trench in the amphibolite schist. Fig. 5 shows the trench geology.

Seven soil samples were taken at 100 foot intervals above the trench (see Fig. 6). Copper values varied from 90 to 800 p.p.m. The highest value of 800 p.p.m. occurs above the area of best mineralization in the trench.



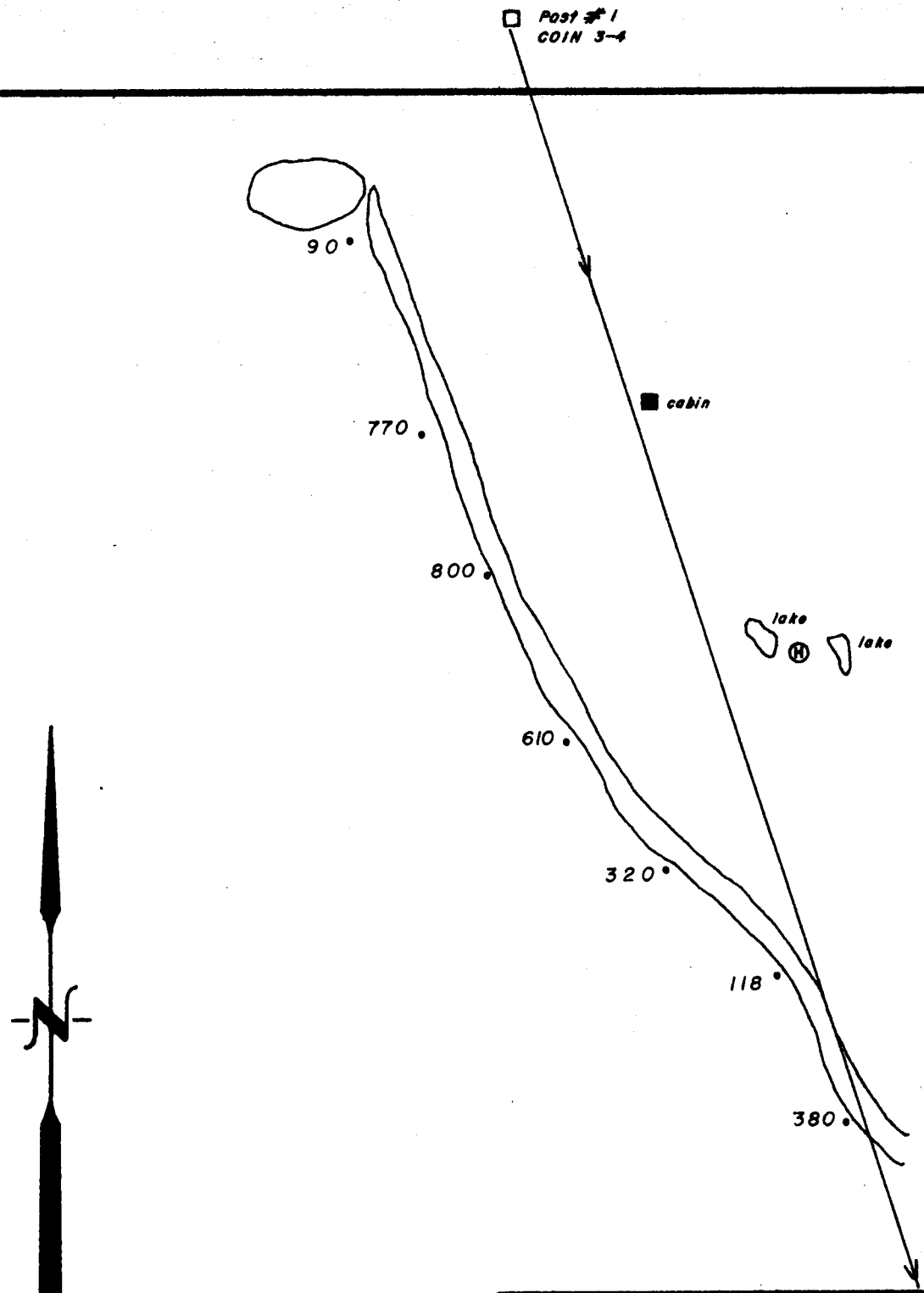
UNITED KENO HILL MINES LTD.
EXPLORATION DEPARTMENT
WHITEHORSE — YUKON

GEOLOGY of COIN TRENCH

Mining District	WHITEHORSE
N.T.S. Sheet No.	115-1-11
Scale	1" = 100'
Drawn by P.A.F.	Date JULY 12, 1974

BCIL - 3042 - U.K.H.M.

FIGURE 5



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EXPLORATION DEPARTMENT
WHITEHORSE — YUKON

COIN TRENCH GEOCHEMISTRY

Mining District	WHITEHORSE
N.T.S. Sheet No.	115-1-11
Scale	1" = 100'
Drawn by P.A.F.	Date JULY 12, 1974

BCIL - 3042 - U.K.H.M.

FIGURE 6

GEOCHEMICAL SURVEY: -

GENERAL -

Soil sampling was carried out at 100 foot intervals on lines spaced at 300 feet. Blazed claim lines were used as baselines. Some 186 claims were covered by soil sampling and a total of 13,511 samples were taken and analyzed for copper. A small detailed grid was also sampled over a small showing of malachite on Claim 78 to determine the copper dispersion in the soil.

PEDOLOGY -

The area is covered by a 1' to 4' residual soil. Volcanic ash covers some of the ground in isolated patches. The soil cover in open forests consists of a thin (2-3") organic cover with little development of humus. The B horizon is a non podsolized loamy brown soil.

In areas of poor drainage, the organic cover was thicker, up to 12" of moss and debris. Below this the B horizon was non podsolized clayey and sandy grey-brown soil. In some muskeg areas permafrost did not permit the sampling of B horizon. It is estimated that 3-4% of the samples were totally organic (in some cases organic samples were not taken and are marked as no sample); and that possibly 20% of the samples had an organic content of about 50%.

LABORATORY PROCEDURES -

The laboratory techniques and methods used to analyze these samples were set up and supervised by Dr. I. L. Elliot, Chief Geochemist, Falconbridge Nickel Mines Ltd., Vancouver,B.C.

(i) Copper Analysis - The samples were dried in a gas-fired hot air drier and then hand screened through 80 mesh nylon screens.

1 gram of sample was weighed into a calibrated pyrex test tube and boiled for one hour with 10 mls. of 10% nitric acid. After cooling the volume was restored to 10 mls. to compensate for evaporation loss. The sample was then filtered through Whatman No. 1 Filter Papers. The filtrate was aspirated into the atomic absorption unit and the copper concentration was read at the appropriate wave length.

INTERPRETATION OF RESULTS -

The distribution plot (Fig. 7) shows that 98% of the samples contained less than 40 p.p.m. copper. This value was chosen as the local threshold and contour intervals were determined as a geometric progression. The highest value obtained was 300 p.p.m. copper.

FED CLAIM GROUP

HISTOGRAM OF COPPER RESULTS IN SOILS

1973 - 74 TOTAL = 13,511 SAMPLES

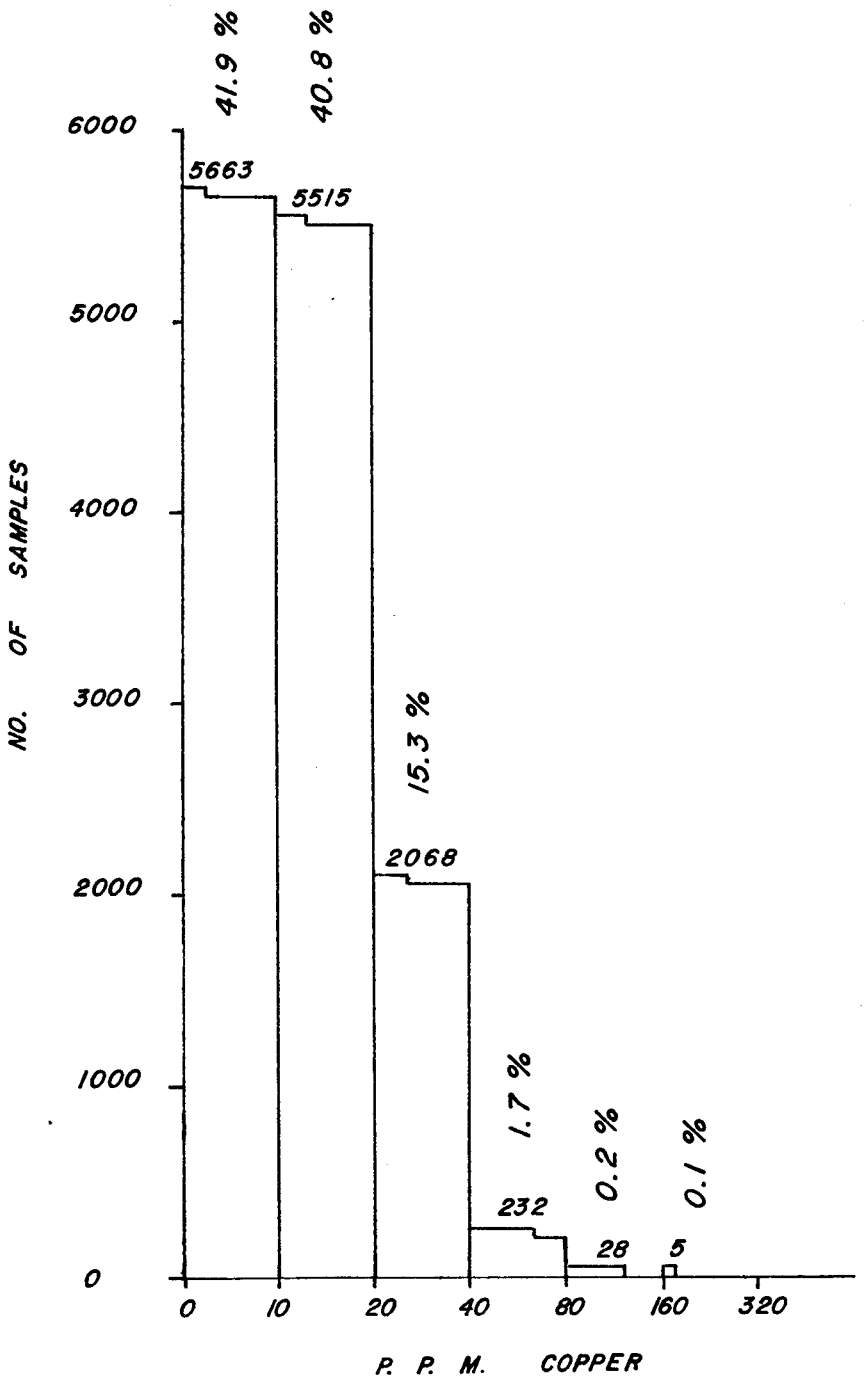


FIGURE 7

The geochemical distribution is flat with only small isolated erratic highs.

All of the anomalies are considered low order and do not indicate any major areas of copper mineralization.

Some low order anomalies occur over short lengths and parallel the general strike trends in the area, indicating minor restricted copper mineralization.

Areas where malachite staining were found by mapping were shown to be isolated and small by geochemical results.

There are no apparent geochemical differences over various rock types.

DETAILED GRID - CLAIM 78 -

Some 82 soil samples were taken in a 200 foot x 200 foot area to determine the extent of copper dispersion in the soil around a showing having minor malachite staining.

Results show that the mineralization is very limited with the highest value being 37 p.p.m.

SUMMARY and CONCLUSIONS:-

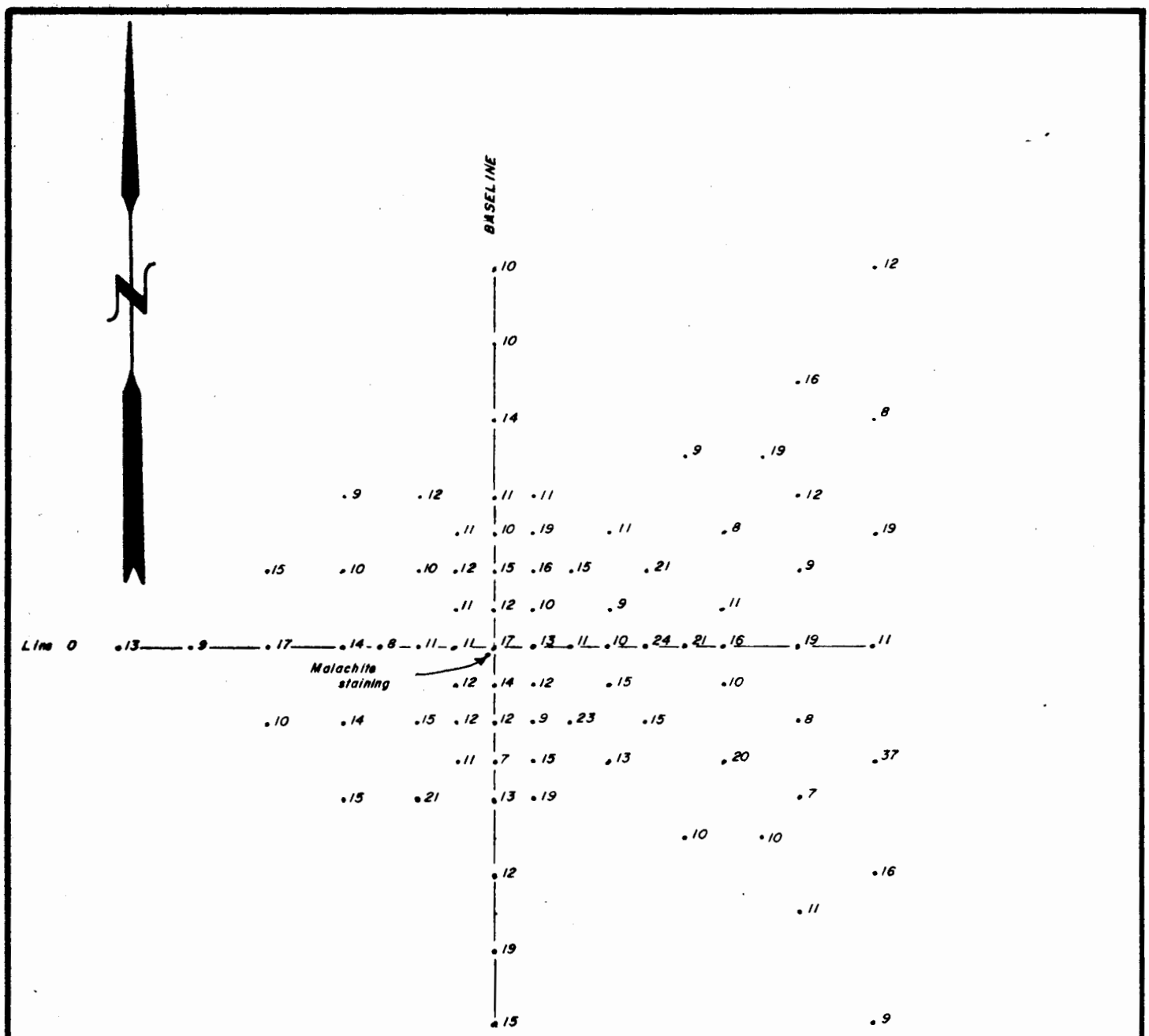
(1) 228 claims were staked in 1973 on the basis of geology. The 186 claims covering the upland area were covered by reconnaissance geological and soil geochemical surveys in 1973 and 1974.

(2) An initial access road connecting DEF campsite to Carmacks was built during the winter of 1973-1974. This road passes through the northern end of the FED property on the river flats, but is presently impassable.

(3) Rock types observed on the property are fine to medium grained granitic and syenitic rocks, oxidized granite, altered granite, amphibolite-chlorite-epidote schist, volcanic flows, dikes and tuffs, hematite breccia, granite porphyry dikes, microgranite, aplite, and pegmatite. No gneissic rocks as occur at DEF were observed on the FED property.

(4) Most of the granitic rocks are weakly to moderately foliated. The more strongly foliated rocks show evidence of granulation.

(5) There is a zonation in the degree of alteration, degree of granulation and strength of foliation. All of these increase from west to east, near the eastern edge of the upland area. This zonation is thought to indicate localized strong shearing of a regional shear stress along the Teslin lineament accompanied by hypogene alteration.



UNITED KENO HILL MINES LTD. EXPLORATION DEPARTMENT WHITEHORSE — YUKON	
COPPER PLOT FED CLAIM No. 78	
Mining District Whitehorse N.T.S. Sheet No. 115-I-11 Scale 1 inch = 40 feet	
Drawn by r.e.v.	Date 12/8/74

(6) Stretched and partly assimilated xenoliths of amphibolite schist and apparent assimilation at the granite-amphibolite contact are possible evidence of the intrusive nature af the granite.

(7) Volcanic flows blanket the intrusive at the southern end of the FED property.

(8) Structure in the granitic rocks is isoclinal with consistent northwesterly strikes and steep or vertical dips.

(9) Secondary alteration minerals observed in the granitic rocks are chlorite, epidote, limonite, hematite, laumontite and muscovite. Chlorite, epidote, and limonite occur in all foliated granitic rocks as partial deuteric alterations of the mafic minerals.

(10) Some twenty minor occurrences of copper mineralization were observed on the property. Most of these are related to moderately foliated and moderately altered granite particularly along the eastern boundary of the upland area. No significant surface copper showings were found.

(11) Primary copper minerals observed were chalcopyrite and bornite. These were only seen related to small quartz veins and as trace speeks in foliated granite. Also blebs of bornite occur in amphibolite schist related to siliceous dikes and epidote veinlets in the COIN trench.

(12) Secondary copper minerals found were malachite and azurite. Small patches of malachite stain were found on fracture surfaces. In two instances traces of pyrite were found along with the malachite.

(13) Some 13,511 soil samples were taken and analyzed for copper. Copper values ranged from 1 to 300 p.p.m. and the threshold value was taken as 40 p.p.m. copper. 98% of the samples were less than 40 p.p.m.

(14) The copper plot is flat with only isolated highs. No significant soil anomalies were found.

RECOMMENDATIONS:-

It is recommended that a full evaluation of the data collected at FED be made. This evaluation will be aided by information gathered from the nearby DEF property.

REFERENCES:-

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(1971) Geological, Geochemical and Geophysical Report on the DEF 1-32 Mineral Claims, Dark Creek Area, Whitehorse Mining District, N.T.S. Sheet 115-I-11, United Keno Hill Mines Ltd., U.K.H.M. files.

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(1973) 1-84 Mineral Claims, Minto Area, Whitehorse Mining District, United Keno Hill Mines Ltd., U.K.H.M. files.

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Beavan, A.R. - 1973 Geological and Geochemical Report on the
(1973) FED Mineral Claims, Minto Area. U.K.H.M. files

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(1972) Northern Cordillera Mineral Inventory.

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(1973) Territory, and N.W.T., Highlights 1973, unpublished.

Map 3314G - Airborne Magnetic Survey Map, Dark Creek, Y.T.
(1966) N.T.S. Sheet 115-I-11.

Templeman-Kluit, D. J. -
(1974) Compilation map of Carmacks, Yukon Territory. Geological Survey of Canada, Open file 200.

APPENDIX A

FOLIATIONS

STRIKE	DIP	STRIKE	DIP
324°	85°E	322°	85-90°E
337°	84°NE	320°	73°E
338°	80°E	331°	90°
345°	90°	346°	90°
334°	76°E	322°	79°E
340°	90°	333°	90°
335°	90°	332°	90°
325°	90°	331°	?
303°	80°W	320°	90°
328°	90°	328°	90°
326°	90°	334°	90°
340°	90°	326°	70°E
342°	90°	335°	90°
319°	74°W	170°	72°W
319°	78°W	321°	76°W
345°	85°E	331°	90°-75°E
350°	90°	350°	90°
345°	90°	345°	90°
330°	90°	335°	90°
160°	90°	150°	90°
140°	?	165°	?
154°	?	160°	65°NE
175°	60°E	140°	60°NE
140°	?	150°	90°
130°	90°	150°	75°NE
145°	90°	140°	80°NE
135°	90°	150°	90°
148°	?	130°	57°NE
160°	?	145°	50°SW
165°	?	145°	60°SW
140°	?	145°	90°
135°	55°NE	150°	90°
125°	55°NE	165°	85°NE
160°	65°SW	165°	80°NE
135°	60°NE	145°	90°
165°	70°NE		
32°	90°	320°	90°
0°	90°	330°	90°
0°	90°	325°	65°NE
0°	90°	345°	90°
0°	90°	5°	90°
0°	90°	10°	90°
350°	90°	55°	65°NW
355°	90°	15°	90°
0°	90°	35°	68°NW
35°	90°	330°	90°
345°	60°E	15°	30°W
315°	90°	28°	90°
4°	72°W	0°	90°
330°	75°SW	335°	75NE
320°	90°	350°	75°W
340°	90°	340°	90°
350°	90°	12°	90°
325°	90°	0°	90°

APPENDIX A

FOLIATIONS

STRIKE	DIP	STRIKE	DIP
350°	90°	345°	90°
340°	90°	0°	90°
330°	90°	9°	90°
340°	90°	25°	90°
330°	90°	320°	90°
350°	70NE	345°	90°
348°	65°SW	330°	81°E
345°	65°SW	333°	64°E
8°	90°	355°	77°E
340°	90°	332°	76°W
330°	90°	336°	66°E
352°	64°W	343°	61°W
335°	57°W	336°	77°W
330°	76°E	328°	84°W
324°	86°W	135°	90°
138°	82°SW	326°	90°
322°	67°E	195°	63°E
212°	67°NW	325°	82°E
343°	84°W	355°	85°W
337°	77°E	338°	76°E
232°	74°E	345°	82°E
354°	81°E	330°	90°
336°	65°E	354°	72°E
344°	75°W	344°	75°W

APPENDIX B

JOINTS

STRIKE	DIP	SPACING
355°	66°E	3-6 inches
345°	80°E	
2°	90°	6-12 inches
0°	15°W	6-12 inches
57°	90°	
57°	90°	slickenside 327°/16°NW
330°	64°NE	3-6 inches
346°	90°	
98°	90°	6-18 inches
2°	36°W	12-18 inches
29°	85°E	
325°	90°	12-18 inches
58°	90°	12-18 inches
78°	90°	2-4 feet
354°	60°E	3-6 inches
315°	90°	
340°	60°W	
336°	59°E	6-8 inches
336°	42°E	9-12 inches
254°	48°N	8-24 inches
338°	63°SW	8-24 inches
306°	48°E	3-6 inches
320°	30°NE	
315°	75°NE	
345°	90°	
338°	63°E	
48°	90°	
325°	66°NE	
320°	90°	
350°	50°E	
280°	60°N	
340°	?	
346°	90°	6 inches
47°	69°SE	6-18 inches
346°	27°E	2 feet
331°	85°E	1-3 inches
22°	90°	3 feet
345°	75°E	
49°	54°NW	6-12 inches
46°	68°NW	6-12 inches
348°	69°E	3-8 inches
68°	90°	1-1.5 feet
325°	73°W	1 foot
360°	85°E	
360°	80°E	1-3 inches
360°	55°E	1-3 inches
12°	56°E	4-6 inches
68°	90°	1-2 feet
345°	75°	1-3 inches

JOINTS

STRIKE	DIP	SPACING
330°	75°E	
352°	80°E	
360°	90°	
360°	70°E	
295°	52°N	1-4 feet
40°	45°NW	
42°	58°NW	
65°	75°NW	
350°	80°E	
320°	90°	
240°	80°NW	3 feet
46°	90°	1-2 feet
8°	26°E	1-2 feet
354°	75°E	
325°	70°E	
360°	90-80°E	3-6 inches
2°	?	3-6 inches
326°	70°E	
24°	80°E	3-6 inches
354°	?E	
355°	?E	
315°	30°NE	
345°	65°NE	3-6 inches
355°	?	
342°	45-60°	3-6 inches
350°	75°E	
354°	60-70°E	3 inches
208°	90°	
286°	90°	
206°	52°W	
228°	90°	
214°	38°N	
319°	80°W	
340°	?	
345°	85°E	
321°	81°E	1-3 feet
241°	87°S	1-3 feet
294°	33°NE	6 inches
28°	90°	
5°	80°	
350°	90°	
345°	90°	
345°	90°	
345°	90°	
330°	90°	
65°	90°	
167°	78°E	
10°	90°	6 inches
135°	84°NE	
130°	70°NE	4 inches
65°	90°	
172°	65°NE	

JOINTS

STRIKE	DIP	SPACING
140°	50°NE	
130°	40°SW	
155°	90°	
70°	70°NW	
165°	75°SW	
30°	55°SE	
155°	85°NE	
25°	85°SE	
60°	90°	
80°	25°N	
50°	65°SE	4 feet
165°	70°NE	
80°	90°	
39°	75°SE	
40°	60°NW	
110°	90°	
40°	75°NW	
0°	45°E	
95°	70°S	
125°	75°NE	
50°	60°NW	
70°	75°N	
175°	85°W	Slickensides 175°/40°S
147°	75°SW	
30°	60°SE	
30°	90°	
75°	10°NW	
80°	65°NW	
55°	70°NW	
55°	70°NW	
65°	55°NW	
300°	90°	
70°	56°SE	
65°	79°NE	
86°	77°S	
324°	61°SW	
45°	82°NW	
18°	84°W	
232°	64°E	
80°	76°N	
264°	80°NW	
115°	74°N	
90°	50°N	
82°	75°S	
36°	75°NW	
335°	90°	
70°	50°SE	
0°	70°SE	

APPENDIX C - A

PERSONNEL EMPLOYED

GEOLOGICAL MAPPING by -

Manford Mallory, Party Chief - Geologist, 361 Johnston St., Kingston, Ontario	August 1 - August 30/73
Mr. Dick Eastman, Party Chief, Prospector, Box 4411, Whitehorse, Y.T.	July 30 - October 31/73
Alan Beavan, Party Chief - Geologist, 405 Main Street, Whitehorse, Y.T.	September 17 - December 11/73
J. Moreau, Assistant - Prospector, General Delivery, Whitehorse, Y.T.	August 1 - November 6/73
E. Brethour, Assistant - Geologist, Box 115, Hamiota, Manitoba	July 30 - November 9/73

GEOCHEMICAL SAMPLING by:-

Kim MacFarlane, 402 Mayfair Ave., Chilliwack, B.C.	August 1 - November 9/73
Dave Pettigrew, General Delivery, Whitehorse, Y.T.	August 4 - September 1/73
John Tomlinson, Mile 850, Alaska Highway, Y.T.	September 8 - November 9/73
Paul Atton, General Delivery, Whitehorse, Y.T.	July 30 - September 7/73
Rick Hobbs, 178 Industrial Road, Whitehorse, Y.T.	July 30 - August 9/73
Henri Simeon, Pelly Crossing, Y.T.	August 15 - October 4/73

PERSONNEL EMPLOYED

Gordie MacLeod,
General Delivery,
Whitehorse, Y.T.

September 8 - October 31/73

HELICOPTER SUPPORT by:-

Mr. C. E. "Chuck" Ford,
31 Alsek Rd.,
Whitehorse, Y.T.

GEOCHEMICAL ANALYSIS by:-

Falconbridge Nickel Mines Ltd.,
Geochemical Laboratory,
1314 West 171st Ave.,
Vancouver 14, B.C.

ASSAY DETERMINATIONS by:-

Whitehorse Assay Office,
P. O. Box 346,
Whitehorse, Y.T.

SUPERVISED by:-

R. E. VanTassell and
R. T. Heard

APPENDIX C - B

PERSONNEL EMPLOYED 1974

GEOLOGICAL MAPPING by:-

Alan Beavan,
Project Geologist,
405 Main Street,
Whitehorse, Y.T.
— May 25th - July 28th/74

Peter Cross,
Party Chief - Geologist,
P. O. Box 523,
Pictou, Nova Scotia
— June 1st - July 28th/74

GEOCHEMICAL SAMPLING by:-

Andre Ouellette,
405 Main Street,
Whitehorse, Y.T.
— May 24th - July 28th, 1974

Tom Mustapic,
405 Main Street,
Whitehorse, Y.T.
— May 24th - July 28th/74

Ken Watson,
2 Hampton Gardens,
Point Claire,
Quebec
— May 25th - July 28th/74

Steve Atkins,
405 Main Street,
Whitehorse, Y.T.
— May 25th - July 28th/74

HELICOPTER SUPPORT by:-

Mr. C. E. "Chuck" Ford,
31 Alsek Rd.,
Whitehorse, Y.T.

GEOCHEMICAL ANALYSIS by:-

Falconbridge Nickel Mines Ltd.,
Geochemical Laboratory,
1314 West 171st Ave.,
Vancouver 14, B.C.

ASSAY DETERMINATIONS by:-

Whitehorse Assay Office,
P. O. Box 346,
Whitehorse, Y. T.

SUPERVISED by:-

R. E. VanTassell and R. T. Heard

APPENDIX D (A)

COST SUMMARY for FED GROUP, 1973

PROPERTY ACQUISITION	$ 6,790.00	$ 6,790.00
GEOLOGICAL MAPPING:-		
3 Party Chiefs for a total of 210 days @ $750/month	5,250.00	
1 Assistant for a total of 98 days @ 600/month	1,960.00	
1 Assistant for a total of 103 days @ 550/month	1,888.00	
Geologist & dfaftsman on report and map preparation - 1½ months	2,025.00	
Geology Equipment & Supplies, including assaying	1,648.00	
	12,771.00	12,771.00
GEOCHEMICAL SURVEY:-		
4 samplers for total of 286 days at 475/month	4,528.00	
3 samplers for total of 103 days at 450/month	1,672.00	
Geochem supplies	461.00	
7,246 samples at 1.00 each for analysis plus freight	8,298.00	
	14,959.00	14,959.00
CAMP EXPENSE:-		
Equipment & supplies	908.00	
Food	3,244.00	
	4,152.00	4,152.00
AIRCRAFT SUPPORT:-		
Hiller 12E 30.7 @ 140/hr and Hughes 500	5,526.00	
Gas & Oil	618.00	
	6,144.00	6,144.00
SUB TOTAL	44,816.00	
20% for office overhead including supplies, typing, supervision, vehicles, expediting, etc., etc. (not including acquisition of ground)		7,605.00
1973 TOTAL		$52,421.00

APPENDIX D (B)

COST SUMMARY FOR FED GROUP, 1974

GEOLOGICAL MAPPING:-		
2 Party Chief for a total of 166 days and 1 Party Chief 30 days preparation at 925/ month and 900/month	$ 5,915.00	
1 Draftsman for 2 months @ 600/month	1,200.00	
Equipment & supplies, including assaying	603.00	
	7,718.00	
		$ 7,718.00
GEOCHEMICAL SURVEY:-		
4 samplers for total of 274 days from 500 to 600/month	5,071.00	
Geochem supplies	512.00	
6,265 samples at 1.00 each for analysis plus freight	6,820.00	
	12,403.00	
		12,403.00
CAMP EXPENSE:-		
Equipment & supplies	1,013.00	
Food	3,792.00	
Radio	104.00	
	4,909.00	
		4,909.00
AIRCRAFT SUPPORT:-		
Hiller 12E 31.1 hrs @ 160/hr	4,976.00	
Fuel, oil and freight	451.00	
	5,427.00	
		5,427.00
SUB TOTAL	30,457.00	
30% for office overhead including supplies, typing, vehicles, expediting, etc., etc.		9,137.00
1974 TOTAL		$39 137.00
1973 and 1974 PROGRAM TOTAL		$91,558.00

SILT / SOIL SAMPLE STATISTICS

1973 - 1974 PROGRAM

Project: 13 - FED GROUP *Dates of Program:* July 31st to November 9th, 1973
May 24th to July 28th, 1974

Number of Samples Collected: 13,511

Metals Analyzed: Cu

Samplers: Kim MacFarlane, Dave Pettigrew, John Tomlinson, Paul Atton, Rick Hobbs, Henri Simeon, Gordie MacLeod, Ken Watson, Steve Atkins, Andre Ouellette, Tom Mustapic.

Man days: 633

Samples collected / man-day: 21.3

Pb

Values in ppm	No. in Range	% of Total

Cu

Values in ppm	No. in Range	% of Total
0 - 10	5,663	41.9
11 - 20	5,515	40.8
21 - 40	2,068	15.3
41 - 80	232	1.7
81 - 160	28	0.2
161 - 320	5	0.1

Zn

Values in ppm	No. in Range	% of Total

Mo

Values in ppm	No. in Range	% of Total

Ag

Values in ppm	No. in Range	% of Total

AFFIDAVIT

I, Robert E. VanTassell, of Whitehorse, in the Yukon Territory, Exploration Superintendent, do solemnly declare:

That I am duly appointed agent of United Keno Hill Mines Limited, and except where otherwise stated have a personnal knowledge of the facts, matters and costs on the FED 1 to 228 Mineral Claims herein declared.

And I make this solemn declaration conscientiously believing it to be true and knowing that it is of the same force and effect as if made under oath and by virtue of the Canada Evidence Act.

Declared before me at Whitehorse, in the Yukon Territory, this 26 day of August 1974

Notary Public

R.E. VanTassell

R.E. VanTassell



UNITED KENO HILL MINES LTD.

EXPLORATION DEPARTMENT
WHITEHORSE, YUKON

FED CLAIM GROUP

WHITEHORSE MINING DISTRICT
N.T.S. SHEET 115 I 11

SCALE: 1 INCH = 1/2 MILE

July 20th, 1973
October 5th, 1973

Underhill & Underhill
Engineers & Surveyors
Vancouver, B.C
Whitehorse, Yukon

DRG. NO. 13-1

M.M.

36-8

JY - 374

FED 197
Y 76210
FED 203
Y76184
FED 204
Y76185
FED 195
Y76208
FED 201
Y76182
FED 202
Y76183
FED 193
Y76206
FED 199
Y76180
FED 200
Y76181
FED 191
Y76204
FED 23
Y 76130
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FED 30
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FED 53
Y 76160
FED 54
Y 76161
FED 3
Y 76110
FED 4
Y 76111
FED 27
Y 76134
FED 28
Y 76135
FED 51
Y 76158
FED 52
Y 76159
FED 124
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Y 76229
FED 1
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FED 26
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Y 76156
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Y 76228
FED 126
Y 76233
FED 125
Y 76232
FED 130
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Y 76238
FED 136
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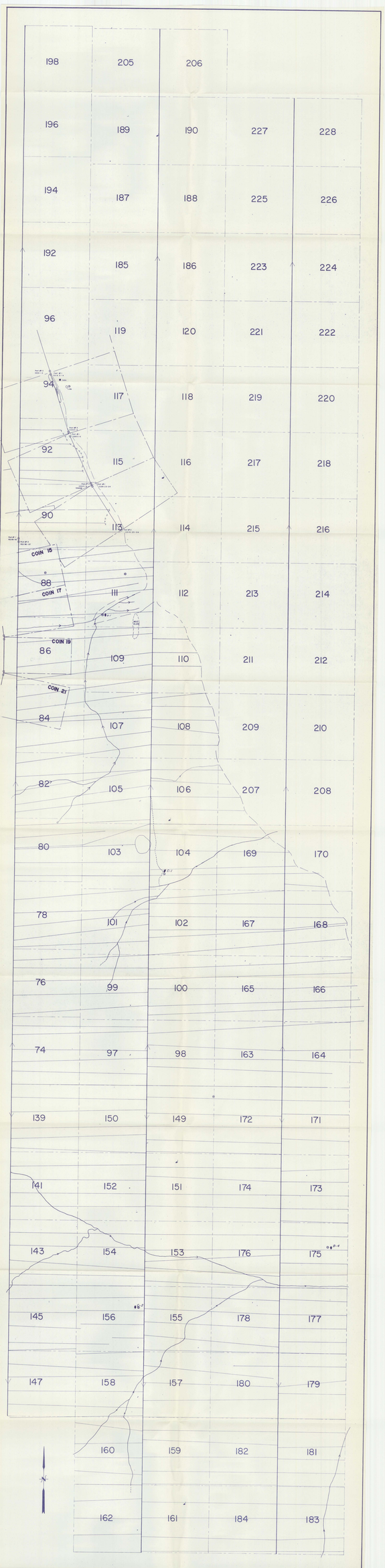
FED 135
Y 76242
FED 138
Y 76245
FED 137
Y76244
FED 14
Y76251
FED 6
Y76253
FED 1
Y 76255
COIN 7
COIN 8
Y 68219
COIN 9
Y68218
COIN 10
Y68220
COIN 11
Y 68221
COIN 12
Y68222
COIN 13
Y 68223
COIN 14
Y68224
COIN 15
Y 68225
COIN 16
Y 68226
COIN 17
Y 68227
COIN 18
Y 68228
COIN 19
Y 68229
COIN 20
COIN 21
Y 68231
COIN 22
Y 68232
FED 83
Y 76190
FEI 81
Y 6188
FEI 79
Y 786
FEI 77
Y 784
FED 75
Y 762
FED 73
Y 7618
FED 40
Y 762
FED 12
Y 7624
N
LEGEND
LOCATION LINE
CLAIM BOUNDARY
STREAM
SOIL SAMPLE LINE
HELICOPTER PAD
E-1
CAMPSITE LOCATION
CLAIM POSTS
20
SILT SAMPLE LOCATION & ppm COPPER
UNITED KENO HILL MIN. LTD
EXPLORATION DEPARTMENT
WHITEHORSE Y.T.
FED CLAIM GRID
BIG CREEK AREA — N.T.S. SHEET 1-H
SURFACE PLAN (1/2)
DWG. KK-3a



LEGEND

- LOCATION LINE
- CLAIM BOUNDARY
- STREAM
- SOIL SAMPLE LINE
- HELICOPTER PAD
- CAMPSITE LOCATION
- CLAIM POSTS
- SILT SAMPLE LOCATION & ppm COPPER

UNITED KENO HILL MINES LTD.
EXPLORATION DEPARTMENT WHITEHORSE Y.T.

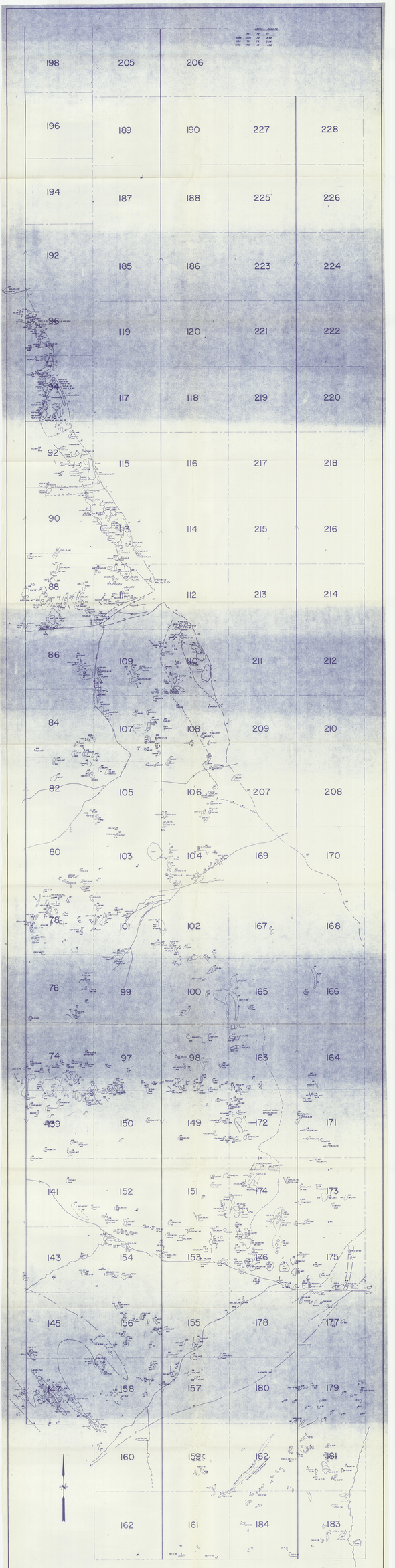
FED CLAIM GROUP

BIG CREEK AREA — N.T.S. SHEET 115-2-11

SURFACE PLAN (E. 1/2)

Scale — inch to 400 feet

DWG. NO. 15-39



LEGEND

1. GREY/PINK GRANITE (A) Massive (B) Porphyritic
2. GREY/PINK FOLIATED GRANITE (A) Moderately chloritic (B) Porphyroblastic
3. WHITISH/YELLOW OXIDIZED GRANITE (A) Foliated (B) Massive (C) Porphyritic
4. BIOTITE GNEISS (A) Porphyroblastic (B) Porphyroblastic
5. QUARTZ/FELDSPATHIC GNEISS (A) Quartz Rich (B) Feldspar Rich
6. ALTERED/WEATHERED GRANITE - no primary consp. features recognized
7. GRANITE PORPHYRY Grey with 1-5 mm Feldspar & Biotite Phenocrysts
8. VOLCANIC ROCKS (A) Dykes (a) andesite (b) basalt (B) Flows (a) andesite (b) basalt (C) Tuffaceous cherts
9. AMPHIBOLITE - CHLORITE - EPIDOTE SCHIST
10. RECENT SEDIMENTS

ABBREVIATIONS

FEP - Feldspathic dike
APG - Aplite dike
QTZ - Quartz vein
FELS - Felsite
STKWK - Stockwork
CONG - Conglomerate

TYPE of ALTERATION

silic - silicification
ser - sericite
ch - chlorite
ep - epidote
carb - carbonate

MINERALIZATION

py - pyrite
po - pyrrhotite
cp - chalcopyrite
sph - sphalerite
gal - galena
mal - malachite
az - azurite
hem - hematite
lim - limonite
clim - limonite
ox - oxides
sec - secondary

FOLIATION

ss - weak ; ms - moderate ; s - strong

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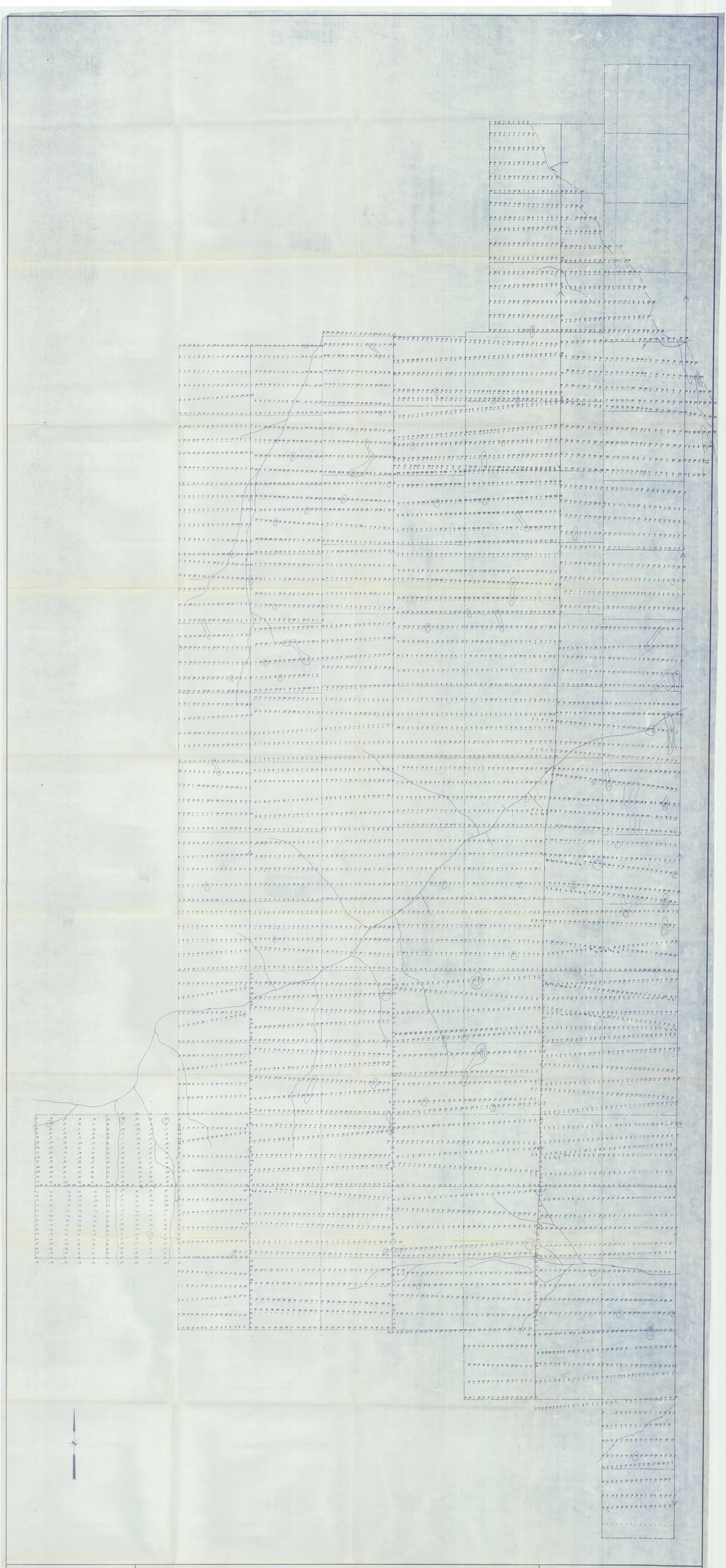
FED CLAIM GROUP
BIG CREEK AREA — N.T.S. SHEET 115-2-11

GEOLOGY (E 1/2)

Scale 1 inch = 400 feet

DWG NO. 12-49



GENERAL LEGEND

LOCATION LINE

CLAIM BOUNDARY

STREAM

GEOCHEMICAL LEGEND

SOIL SAMPLE LOCATION and VALUE in ppm

CONTOUR INTERVALS in ppm Cu

	0 - 40
	41 - 80
	81 - 160
	160 - 320
	+ 320

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FED CLAIM GROUP

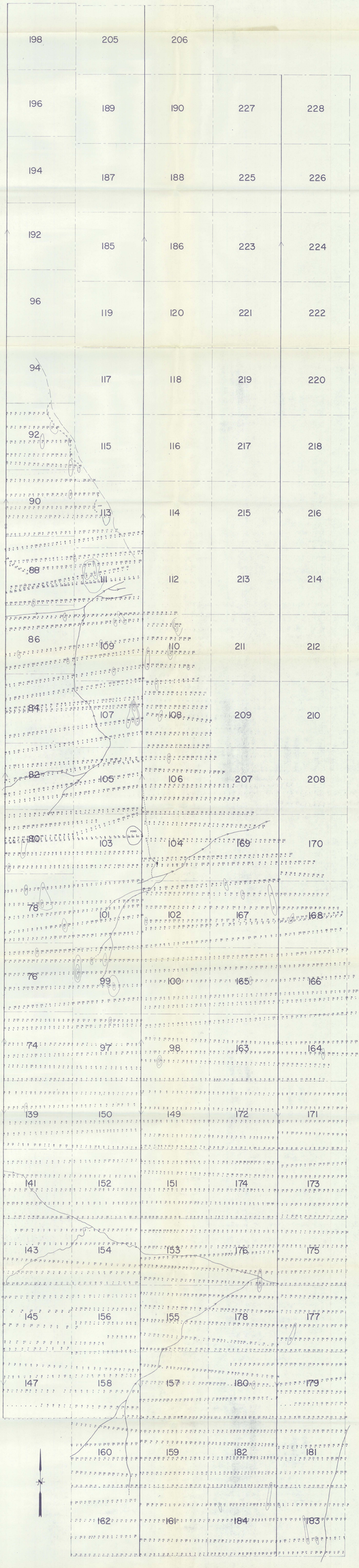
BIG CREEK AREA — N.T.S. SHEET 116-I-11

COPPER PLOT (W 1/2)

400 0 400 800 1200 1600 2000

Scale - 1 inch to 400 feet

DWG NO. 13-58



GENERAL LEGEND

LOCATION LINE

CLAIM BOUNDARY

STREAM

GEOCHEMICAL LEGEND

2 SOIL SAMPLE LOCATION and VALUE in ppm

CONTOUR INTERVALS in ppm Cu

	0 - 40
	41 - 80
	81 - 160
	160 - 320
	+ 320

UNITED KENO HILL MINES LTD

EXPLORATION DEPARTMENT WHITEHORSE Y.T.

FED CLAIM GROUP

BIG CREEK AREA — N.T.S. SHEET 105-D-11

COPPER PLOT (E 1/2)

Scale 1 inch = 600 feet

DWG. NO. 13-5b