

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 \$ 12,832.39

[Handwritten Signature]

Resident Geologist or
Resident Mining Engineer

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

[Handwritten Signature]

Commissioner of Yukon Territory

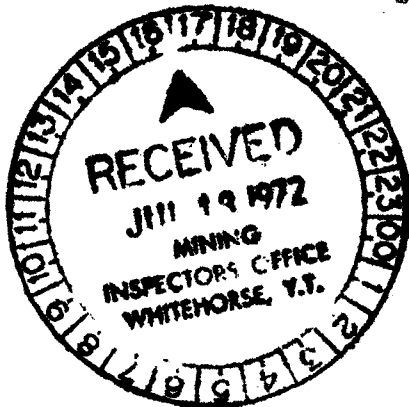
GEOLOGICAL, GEOCHEMICAL and GEOPHYSICAL REPORT

on the

DEF 1 to 32 MINERAL CLAIMS
Dark Creek Area,
Whitehorse Mining District

by

R. J. Joy &
R. E. VanTassell,
United Keno Hill Mines Ltd.,
Exploration Department,
Whitehorse, Y.T.



N.T.S. Sheet 115I-11
Latitude 62°38'N
Longitude 137°15'W
Date: July 30th-Aug.26th, 1971

Dated: December 29th, 1971

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I N T R O D U C T I O N -

The discovery of copper carbonates, principally malachite on July 24th, just north of the Minto 1 to 16 Mineral Claims prompted the staking of the DEF Claim Group. This initial discovery resulted from a two man prospecting crew working the area.

The Claim Group was originally staked as a 32 Claim Block; however, following prospecting and experimental geophysics, a northerly trend was interpreted so an additional 46 claims were staked in mid August, bringing the total to 78 claims.

Work was carried out by a two to six man crew and was concentrated mainly on the discovery showing. This work consisted of mapping, soil sampling, minor line cutting and some test geophysics employing V.L.F., I.P. and magnetometer. The latter work was conducted by the Falconbridge Geophysical Department.

The company's main base of operations for different projects was 1½ miles southeast of Minto on the Yukon River. The Hiller UH 12E helicopter based there on charter was used to support the work on the DEF Claim Group.

H I S T O R Y -

The only activity known in the area was the staking of 16 claims, Coin Group, some 2 miles northwest of the mouth of Big Creek in September of 1970.

Minor mapping and wide spaced geochemical sampling was carried out in the late fall by Archer and Cathro.

The Carmacks sheet was mapped by H. S. Bostock from 1931 to 1934 and released in 1936 as Memoir 189, Carmacks District, Yukon.

The area has been covered by silt sampling by a number of major companies; in 1970, one of these, Silver Standard Mines, employed a sampler hoist cable on an Alouette 11 helicopter.

In mid-July, Silver Standard staked 16 claims, the Minto Group. These claims were staked on the basis of one anomalous silt sample.

The United Keno two man prospecting crew found malachite staining north of the Minto Group on July 24th. This lead to the original staking of the DEF Claim Group.

PROPERTY -

The DEF Claim Group consists of 78 contiguous claims as follows:

| <u>Claim Name</u> | <u>Grant Nos.</u> | <u>Location Date</u> | <u>Record Date</u> | <u>Expiry Date</u> |
|-------------------|-------------------|----------------------|--------------------|--------------------|
| DEF 1-4 | Y61693 - Y61696 | 27/7/71 | 23/8/71 | 23/8/72 |
| DEF 5-12 | Y61697 - Y61704 | 28/7/71 | 23/8/71 | 23/8/72 |
| DEF 13-18 | Y61705 - Y61710 | 19/7/71 | 23/8/71 | 23/8/72 |
| DEF 19-30 | Y61711 - Y61722 | 30/7/71 | 23/8/71 | 23/8/72 |
| DEF 31-32 | Y61723 - Y61724 | 3/8/71 | 23/8/71 | 23/8/72 |
| DEF 33-42 | Y61978 - Y61987 | 19/8/71 | 8/9/71 | 8/9/72 |
| DEF 43-48 | Y61988 - Y61993 | 20/8/71 | 8/9/71 | 8/9/72 |
| DEF 49-68 | Y61994 - Y62013 | 18/8/71 | 8/9/71 | 8/9/72 |
| DEF 69-78 | Y62014 - Y62023 | 19/8/71 | 8/9/71 | 8/9/72 |

LOCATION AND ACCESS -

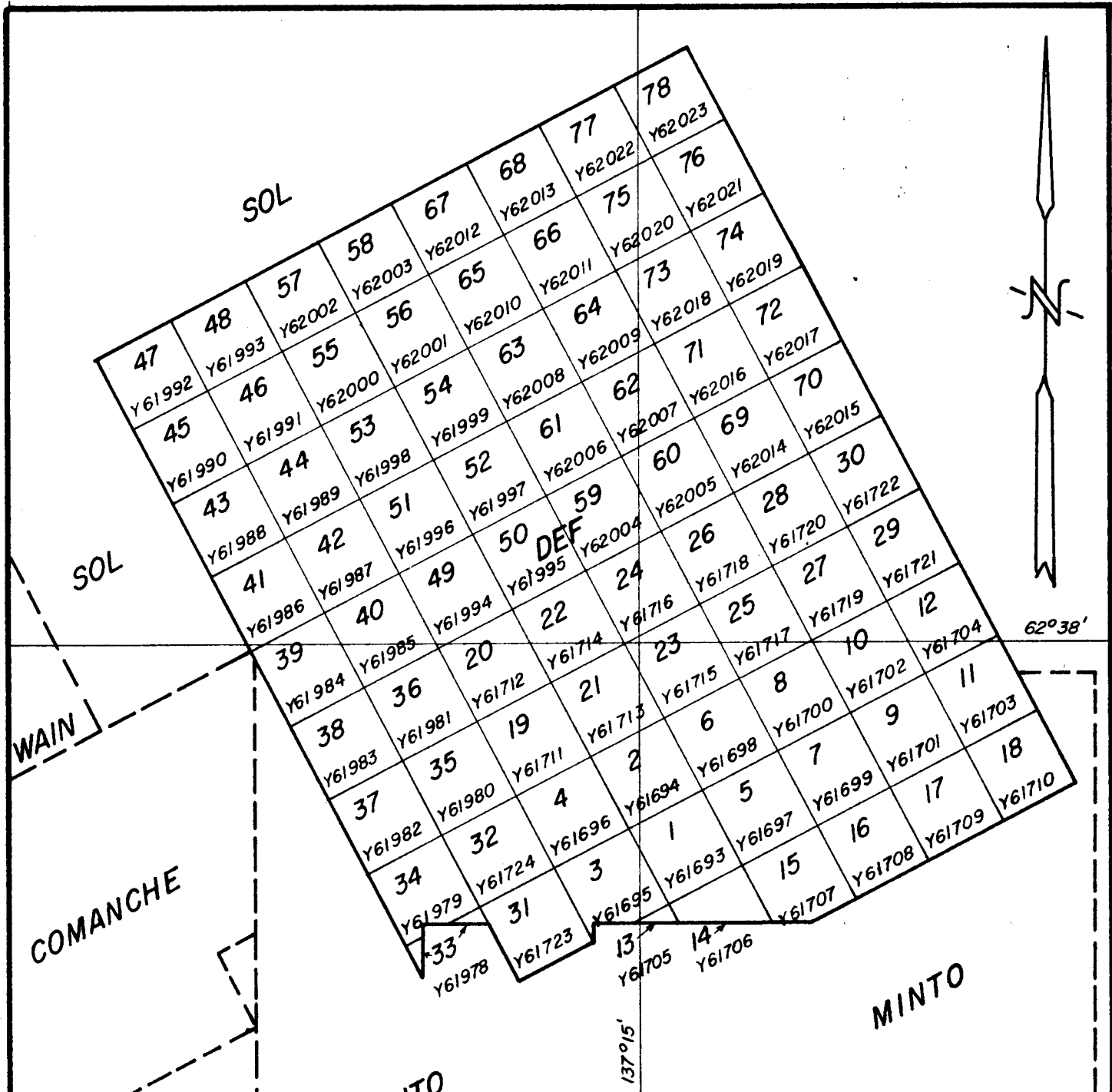
The property is located some 151 miles northwest of Whitehorse and 49 miles northwest of Carmacks. It is approximately 13 miles west northwest of the Dawson-Whitehorse all weather Highway and 4 miles west of the Yukon River, Latitude 62°38'N and Longitude 137°15'W on N.T.S. Sheet 115I-11.

The property is presently accessible by helicopter from the east side of the Yukon River or by foot from the west side of the Yukon River. Five heliports have been prepared on the property which is entirely tree covered.

Should the property be developed, access by boat and/or barge on the Yukon River could conceivably be employed downstream from Minto for 9 to 12 miles, thence west by tote road 5 to 6 miles. Heavier equipment and supplies could be placed on the property in winter using ice cover on the Yukon River. Summer access for personnel and smaller supplies could be made by combining boat and J-5 type Bombardier.

PHYSIOGRAPHY -

The claim group lies on the northeast side of the northwesterly trending Dawson Range. The area lies within the Yukon Plateau province (Bostock 1936). The evenness of the terrain is a result of the physiographically upland surface. This hilly upland surface is fairly well rounded and is steeply to gently rolling with elevations ranging from 2,200 to 3,200 feet. (Figures 1 and 2). Some creeks cut deeply into this upland surface and have fairly sharp valley walls.



UNITED KENO HILL MINES LTD.
EXPLORATION DEPARTMENT
WHITEHORSE - YUKON

DEF CLAIM GROUP

Mining District WHITEHORSE
N.T.S. Sheet No. 115-I-11
Scale 1 inch = 1/2 mile

Drawn by GWG Date 30 SEP. '71



UNITED KENO HILL MINES LTD.
 EXPLORATION DEPARTMENT
 WHITEHORSE, YUKON

LOCATION OF
 DEF CLAIM GROUP

1 Inch = 40 miles



FIGURE 3 —

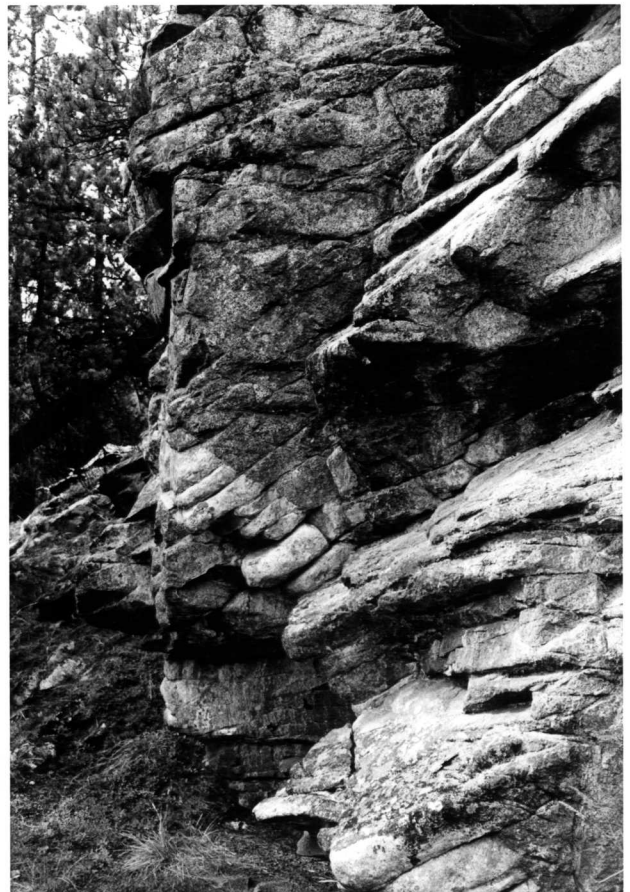
Discovery outcrop showing weathered fault trace with upward drag on joints. Note strong jointing in quartz monzonite.

R. E. V.

FIGURE 4 —

Discovery outcrop showing jointing and narrow low angle aplite dike in quartz monzonite. At least three directions of jointing can be seen.

R. E. V.



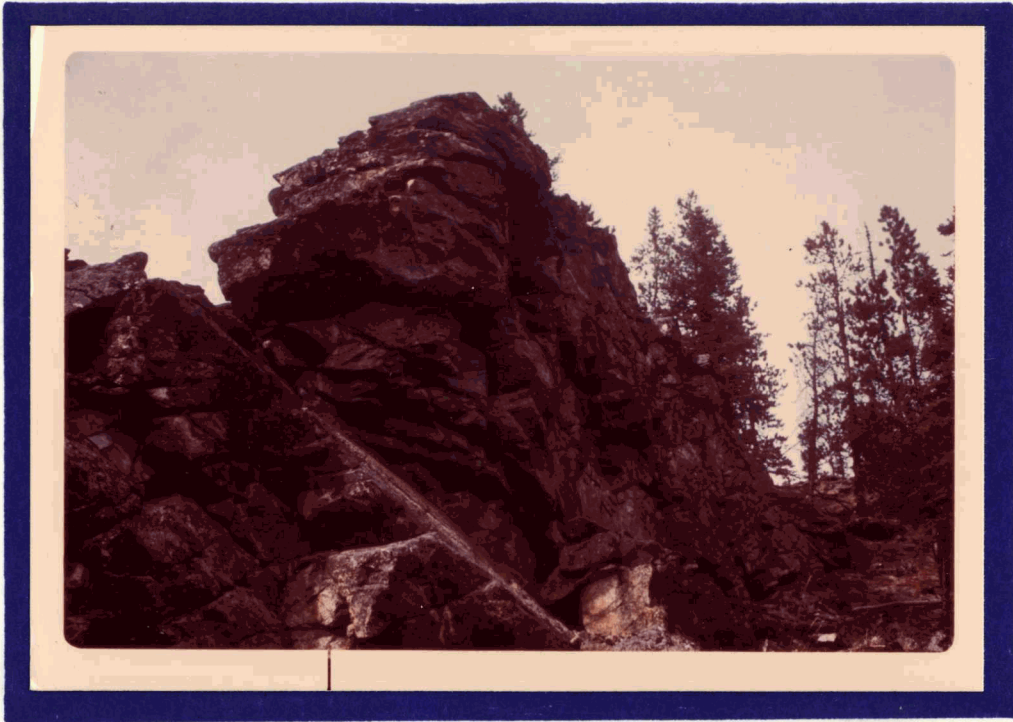


FIGURE 5 — Discovery outcrop looking west shows jointing and malachite staining.

Courtesy - Ivor Elliott

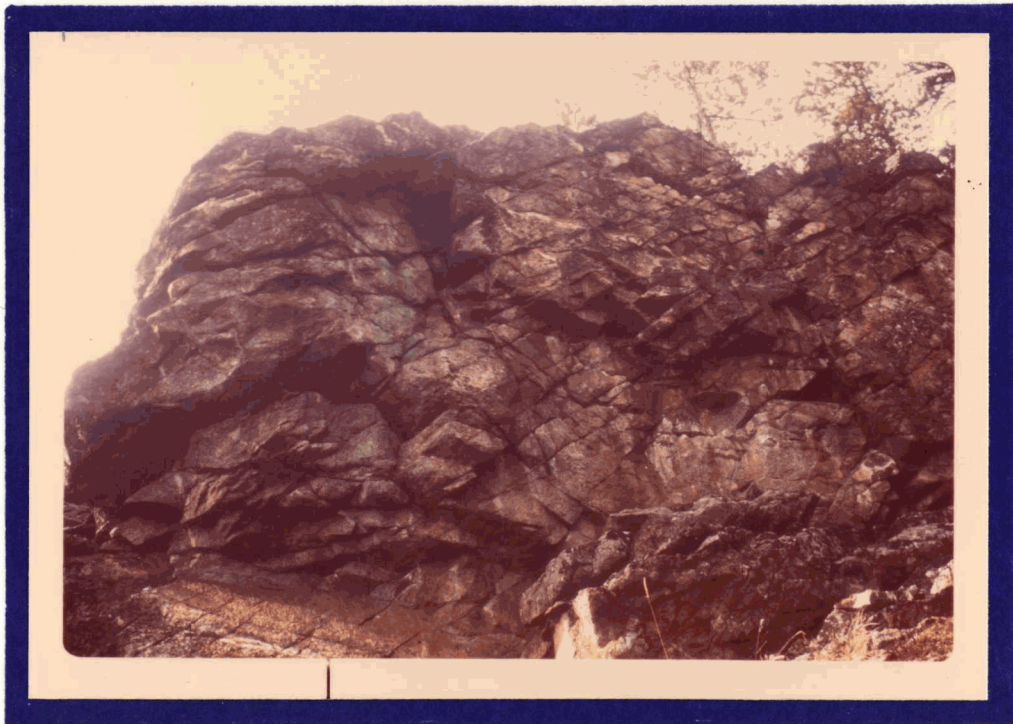


FIGURE 6 — Discovery outcrop looking northwest shows jointing and malachite staining.

Courtesy - Ivor Elliott

(E) Assays -

Selected grab float samples.

| <u>Sample No.</u> | <u>Au oz/ton</u> | <u>Ag oz/ton</u> | <u>Cu%</u> | <u>Mo%</u> |
|-------------------|------------------|------------------|------------|------------|
| 06651 | Nil | 0.60 | 0.47 | Nil |
| 06652 | Nil | 0.12 | 0.24 | Nil |
| 06653 | 0.07 | 0.45 | 1.98 | Tr |
| 06654 | Nil | 0.14 | 0.14 | Nil |
| 06655 | Nil | 0.12 | 0.15 | Nil |
| 06656 | Nil | 0.19 | 0.16 | Nil |
| 06657 | Nil | 0.15 | 0.21 | Nil |
| 06658* | Nil | 0.38 | 0.04 | Nil |
| 06659 | - | 0.9 | 0.35 | Nil |
| 06660 | - | 0.10 | 0.34 | Nil |
| 06661 | - | 0.28 | 0.42 | Nil |
| 06662 | - | 0.23 | 0.45 | Nil |
| 06663 | - | 0.08 | 0.28 | Nil |
| 06664 | - | 0.14 | 0.33 | Nil |
| 06665 | - | 0.08 | 0.28 | Nil |
| 06666 | - | 0.05 | 0.28 | Nil |
| 06667 | - | 0.35 | 1.47 | 0.002 |
| 06668 | - | 0.06 | 0.13 | Nil |
| 06669 | - | 0.38 | 1.53 | 0.001 |
| 06670 | - | 0.46 | 1.50 | 0.001 |

* Sample 06658 consists of the very fine grained dyke material.

GEOCHEMICAL SURVEY -

1. Soil Sampling Program -

(a) GENERAL -

Claim baselines in the course of staking were well cut and blazed and were picketed every 300 feet.

Samples were taken every 100 feet along 300 foot spaced lines. Samples were taken at 100 foot intervals along the baseline.

The main showing area was covered as a top priority, mainly to determine the width and length of mineralization.

A total of 1,306 soil samples and 74 drainage samples were taken.

(b) PEDOLOGY -

A 1 foot to 5 foot thick residual, non podsolized forest brown earth is developed on the 10 to 20 degree hillslopes consisting of a thin 2" to 3" organic layer of leaf litter with little humus development overlying a loamy orange brown B horizon.

Further downslope where the drainage is impeded by colluvial and glacial (?) debris, a thicker 6" to 18" A₀ horizon develops under spruce moss and overlies a dark brown clay. Sampling conditions are generally excellent and all samples were taken from the B horizon.

All samples were analyzed by the Falconbridge Vancouver Geochemical Laboratory for copper, silver and molybdenum.

(c) LAB PROCEDURES -

The initial laboratory techniques and methods were setup and supervised by Dr. Ivor L. Elliott, Chief Geochemist, Falconbridge Nickel Mines Limited, 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.

(ii) Silver 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 silver concentration read at the appropriate wave length.

(iii) Molybdenum Analysis - The samples were dried and screened as above.

0.25 grams of the -80 mesh fraction were taken and fused with an alkaline flux. This fusion was dissolved in demineralized water. An aliquot of this solution was taken for analysis. Molybdenum was determined by forming the colored dithiol complex which was green at temperatures below 30°C. The colored complexes were visually assessed against standards prepared in a similar way.

(d) INTERPRETATION OF RESULTS -

Soil samples have been analyzed for copper, silver and molybdenum. Silver and molybdenum values are low order and erratically distributed but both metals do reflect concentrations of copper values.

Local background values for copper are 10 to 100 p.p.m. with the majority being less than 100 p.p.m.

Of the 1,306 soil samples taken 78% ran less than 100 p.p.m. Values over 100 p.p.m. copper can be considered distinctly anomalous. 3.2% of the values obtained are over 1,000 p.p.m.

The very high values can certainly be attributed to particles of secondary copper minerals in the soil

An east-west trending zone approximately 5,200 feet long extends diagonally up the southern hillside and over the ridge top on Claims DEF 15, 1 & 4. This anomaly is not controlled by drainage or topography. Downslope gravity dispersion appears very limited.

A second anomaly appears to parallel the first about 600 to 800 feet downslope on Claims DEF 14, 13 and 3.

Two further parallel anomalies appear evident on Claims DEF 2 and 5 and DEF 2 and 6. These lie on the north slope of the ridge and may represent downslope dispersion from the ridge top???

It is believed that the soil copper values closely reflect near surface bedrock values and that the absence of pyrite accounts for the survival of secondary carbonates at the surface, mainly malachite and azurite in that order of abundance.

The attitude of the causative mineralization is not known. Careful examination of the copper plot map reveals two other possible anomaly orientations: N40°E and approximately N20°W.

Detailed work consisting of trenching and/or drilling will be required to determine the orientation and type of mineralization causing the strong copper anomalies.

2. Stream Sediment sampling Test -

GENERAL-

The experience of a number of companies in the area suggested that geochemical drainage sampling was an ineffective exploration tool. Further, Silver Standard's discovery was based on one anomalous geochemical sample, and apparently their sampling did not reveal the copper mineralization found on the DEF Claim Group.

It was decided to conduct an experiment in which 37 stream locations, approximately 300 feet apart, were sampled. Two distinctive samples were collected from each location:

- (1) Organic rich channel bottom material.
- (2) Usual active inorganic stream sediment.

These samples were forwarded to Falconbridge Vancouver Geochemical Laboratory for copper analysis.

Both types of samples were air dried and sieved into 2 fractions:

- (1) minus 20 plus 80 mesh
- (2) minus 80 mesh.

The above sample sets were analyzed for copper using 3 methods of analysis:

- (1) hot aqua regia for "total" metal.
- (2) cold 1% E.D.T.A. Solution.
- (3) cold 10% Ammonium citrate solution.

The results of this test work are enclosed as DEF GROUP ORIENTATION PROJECT by I. L. Elliott, October 26th, 1971, (see Appendix E).

A 400 scale map is enclosed showing the hot aqua regia extraction plot.

GEOPHYSICAL SURVEY -

Geophysical test work, employing V.L.F., I.P., and magnetometer was conducted by the Falconbridge Geophysical Crew. The crew was available following completion of work at the company's Elsa operations.

Limited and widespaced lines were used over the main showing area, primarily to see if any of these techniques could be employed as a useful follow-up tool.

For results of this work refer to: REPORT ON THE GEOPHYSICAL ORIENTATION, DEF CLAIM GROUP, BIG CREEK AREA, by S. E. SAPPER and D. B. SUTHERLAND, P. Eng. (see Appendix F).

C O N C L U S I O N S -

There is approximately 1 percent outcrop exposure on the Claim Group.

Rock types seen on the property consist of gneiss, minor schist, granodiorite, quartz monzonite, monzonite, aplite and pegmatite dykes.

A total of 78 claims were staked.

Copper carbonates of malachite and azurite in that order of abundance occurs on the property. No sulphides including pyrite were noted. The attitude of the causative mineralization is not known.

Selected grab samples assayed from 0.15% to 1.98% copper with silver ranging from 0.05 to 0.60 oz per ton.

1,306 soil samples were collected over approximately 28 claims. Sampling conditions were excellent with all samples taken from the B horizon and analyzed for copper, silver and molybdenum.

74 drainage samples were taken from 37 locations on the creek to the south of the property. These samples were analyzed for copper employing three methods of digestion.

Soil sample results show that silver and molybdenum are low order and erratic but do reflect concentrations of copper.

Copper results reveal values from a few p.p.m. to 13,200 p.p.m. with 78% of the samples less than 100 p.p.m. and 3.2% over 1,000 p.p.m.

Four anomalies appear evident, the stronger extending east-west diagonally up the southern hillside for 5,200 feet on Claims 15, 1 and 4. The three weaker anomalies parallel the above and lie on Claims 14, 13 and 3; Claims 2 and 5 and Claims 2 and 6 respectively.

Other possible orientations for the anomalies are N40°E and N20°W.

Silt sampling revealed organic samples contained more copper than inorganic, with the hot aqua regia digestion the best laboratory technique.

The geophysical orientation survey outlined V.L.F. conductors possibly suggesting shears or fractures while I.P. data suggests shallow metallic sources related to V.L.F. with shallow metallic sources which could extend to depth.

Geophysical data is limited and on widely spaced lines.

A fairly representative suite of rocks have been taken from the claim group for possible future petrographic and rock geochemical work.

RECOMMENDATIONS: -

The following progressive steps are recommended for the DEF Claim Group:

1. Cut approximately 35 to 45 miles of line over the main showing and coincident copper soil anomaly for further follow-up work.

Grid to be:

7,000 feet of baseline, orientation east-west
200 foot spaced lines approx. 3,500 feet north and 1,800 feet south (to Silver Standard's boundary)

2. Soil sample and analyze for copper the grid area on a 200 by 200 foot grid for definition. Geologically map the grid area.

3. Soil sample on a reconnaissance basis the remaining 50 claims on a 300 foot by 100 foot grid to check for further areas of interest.

4. Trench by hand and/or cut if the latter is available from Silver Standard to determine orientation and type of mineralization on the main zone.

5. Further follow-up by drilling with initial delineation by a rotary-percussions type drill followed by diamond drilling.

REFERENCES -

Bostock, H. S., 1936: Carmacks District, Memoir 189.

Joy, R. J., 1971, Dec. 20th: Carmacks Prospecting, U.S.K.H.M. files.

APPENDIX A.

SUMMARY OF WORK:

1. GEOLOGICAL MAPPING-

July 27th-Aug. 25th- One man prospected and mapped on DEF 1-32 claims. Pace and compass methods were employed using the claim location line as baselines.

2. GEOCHEMICAL SURVEY -

July 27th-Aug. 25th-1,306 soil samples were taken and analyzed for 3 metals, copper, silver and molybdenum by Falconbridge Nickel Mines Vancouver Geochemical Laboratory. 74 stream sediment samples were taken and analyzed for copper using 3 determinations.

3. GEOPHYSICAL TEST WORK -

Aug. 12th-Aug. 17th, 4 miles of test work was completed on 800 foot spaced lines using Crone V.L.F., McPhar I.P. and Fluxgate Magnetometer. Work was conducted by Falconbridge Nickel Mines Limited Geophysical Department, Toronto.

APPENDIX B

WORK COSTS FOR DEF CLAIM GROUP

A. Labour -

| | |
|-------------------------------------|---------------|
| 20 days Party Chief at 700/month | \$466.67 |
| 20 days Assistant at \$500/month | 333.33 |
| 20 days Field Helper at \$450/month | <u>300.00</u> |
| | 1,100.00 |

B. Geochemical -

| | |
|---|---------------|
| 1306 soil samples for copper at \$0.75 each | \$ 979.50 |
| 1306 soil samples for silver at \$0.75 each | 979.50 |
| 1306 soil samples for molybdenum at \$1.40 each | 1,828.40 |
| 74 silt samples x 6 tests=438 at \$0.75 each | <u>328.50</u> |
| | 4,115.90 |

C. Geophysical -

| | |
|---------------------------------|------------|
| Toronto breakdown in Appendix F | \$2,298.69 |
|---------------------------------|------------|

D. Aircraft Support -

| | |
|---|------------|
| 39.4 hours of Hiller UH 12E Time at \$135.00 per hour | |
| C. E. Ford of Mayo Helicopters | \$5,319.00 |

| | |
|----------------|-------------|
| <u>TOTAL -</u> | \$12,833.59 |
|----------------|-------------|

Note: The above costs do not include food, camp equipment, supervision, office overhead or map and report preparation.

A F F I D A V I T

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

1.

That I am duly appointed agent of United Keno Hill Mines Limited,
and except where otherwise stated have a personal knowledge of the
facts and matters 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 18th day of

July 1972




A Commissioner for Oaths
for Yukon Territory

DATE: October 26, 1971

TO: R. E. Van Tassell

COPIES TO: S. N. Charteris

FROM: I. L. Elliott

SUBJECT: DEF GROUP ORIENTATION PROJECT

Introduction

Three recent discoveries of mineralisation in the Yukon have been characterised by substantial soil geochemical anomalies having no apparent expression in the adjacent drainage.

Keno's DEF group is one of these situations; the others are Silver Standard's Minto group and the Yukon Syndicate's Williams Creek discovery.

The purpose of this orientation work was to see if there is indeed an absence of geochemical expression in the drainage or whether the conventional sampling and analytical methods were unable to detect an anomaly that does, in fact, exist.

General Background

(a) Geology

All the discoveries are in the same general setting; small dioritic intrusives in Mesozoic sediments and volcanics.

(b) Topography

Low elevation, moderate relief, well timbered rolling hills. Creeks have marshy upper reaches in wide shallow valleys but become more active downstream where they cut steep sided valleys in the alluvial terraces of the Yukon River. The higher parts of the area are unglaciated.

(c) Pedology

On the freely drained slopes a good residual forest brown earth profile is developed. In the valley bottoms a thick organic horizon is developed. Recent volcanic ash which is a prominent component of the Williams Creek profile is absent on the Minto and DEF claims. (A sample of ash contained 7 ppm Cu, 4 ppm Zn, 3 ppm Pb, <2 ppm Mo, 1400 ppm Fe.)

Continued:

(d) Discovery

The Williams Creek showing was discovered by landing a helicopter on malachite stained outcrop. The Minto claims were staked as a result of follow-up soil sampling based on a single anomalous drainage sample carrying over 300 ppm copper against a background of about 30 ppm. The DEF claims were staked as a result of finding malachite stained outcrop during systematic prospecting of the intrusives.

Geochemistry

Soil sampling indicates that substantial concentrations of copper are held in the residual soil cover. Whilst local background values range from 10 - 100 ppm copper, in itself a high background for acidic intrusives, extensive areas carrying over 200 ppm Cu have been found with peak values of 4000 - 13,000 ppm Cu.

An organic rich sample from a seepage below the main anomalous zone (Claim 5, 700 S., 250 E.) returned a total copper content of 8%, of which 7.4% was extractable with cold 1% E.D.T.A. solution. This suggests that copper is being moved in the form of readily soluble organic complexes via the groundwater to the surface.

It was assumed that this process would move copper into the permanent drainage and that an organic rich sample might be more indicative of mineralisation than the conventional inorganic sample.

Sampling

A set of samples was collected at approximately 300 - 400 feet intervals down the creek running between the Minto and DEF claims. Organic rich channel bottom material was collected in addition to the usual active inorganic sediment.

Analysis

Both types of sample were air dried and sieved into two fractions, (a) minus 20 plus 80 mesh and (b) minus 80 mesh.

The sample sets were analysed for copper using (i) hot aqua regia for "total" metal, (ii) cold 1% E.D.T.A. solution. EDTA is a powerful complexing agent that could be expected to break up the more stable organic complexes. (iii) Cold 10% ammonium citrate solution. The citrate will release metal from weak organic complexes, stronger iron associated complexes and ion exchange positions on clays and organics.

Continued:

Results

The results of the analyses are given in Table 1 and illustrated in Figures 1, 2 and 3. The organic material contains more copper than the inorganic material.

The aqua regia extract of the plus 80 mesh fraction of the organic material has the highest copper levels.

Table 2 summarises the range and contrast of copper content for the materials analysed.

| Extract | Inorganic | | | | | | Organic | | | | | |
|------------|-----------|----|---|----------|----|---|---------|----|---|----------|----|---|
| | plus 80 | | | minus 80 | | | plus 80 | | | minus 80 | | |
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Citrate | 1-7 | 2 | 3 | 3-15 | 5 | 3 | 1-40 | 10 | 4 | 3-20 | 5 | 4 |
| E.D.T.A. | 2-11 | 3 | 3 | 2-11 | 5 | 2 | 4-70 | 15 | 4 | 4-60 | 20 | 3 |
| Aqua Regia | 6-70 | 10 | 7 | 8-90 | 20 | 4 | 15-180 | 30 | 6 | 18-100 | 25 | 4 |

1 = Range in ppm Cu.

2 = Background in ppm Cu.

3 = Contrast of peak values to background values.

From a prospecting point of view the soil anomaly is indicated by all the materials and extraction systems except E.D.T.A. extracts of the minus 80 organic material.

Anomalies, taken as over three times background levels, range in length from 2500' to 8000'. Inorganic material gives more coherent anomalies closer to the source. Organic anomalies are more erratic and tend to develop further downstream. The inorganic anomalies reflect movement of metal rich soil into the drainage whilst the organic anomalies indicate areas of groundwater entry. It is evident that aqua regia extraction gives the best contrast.

Plus 80 mesh material gives a longer train than minus 80 mesh material, but there is little to choose between the plus 80 mesh fractions of organic or inorganic material.

Continued:

Recommendations

Lack of drainage expression of geochemical soil anomalies is due more to inadequate sampling and analytical procedures than to the absence of drainage anomalies.

It is suggested that during 1972 areas prospected as part of the intrusive checking programme should have their drainages sampled at not greater than 1000 feet intervals. Both the plus and minus 80 mesh fractions of the sample should be analysed.

After a year of use the procedure should be reviewed to assess its effectiveness.



I. L. Elliott

' ILE: jr

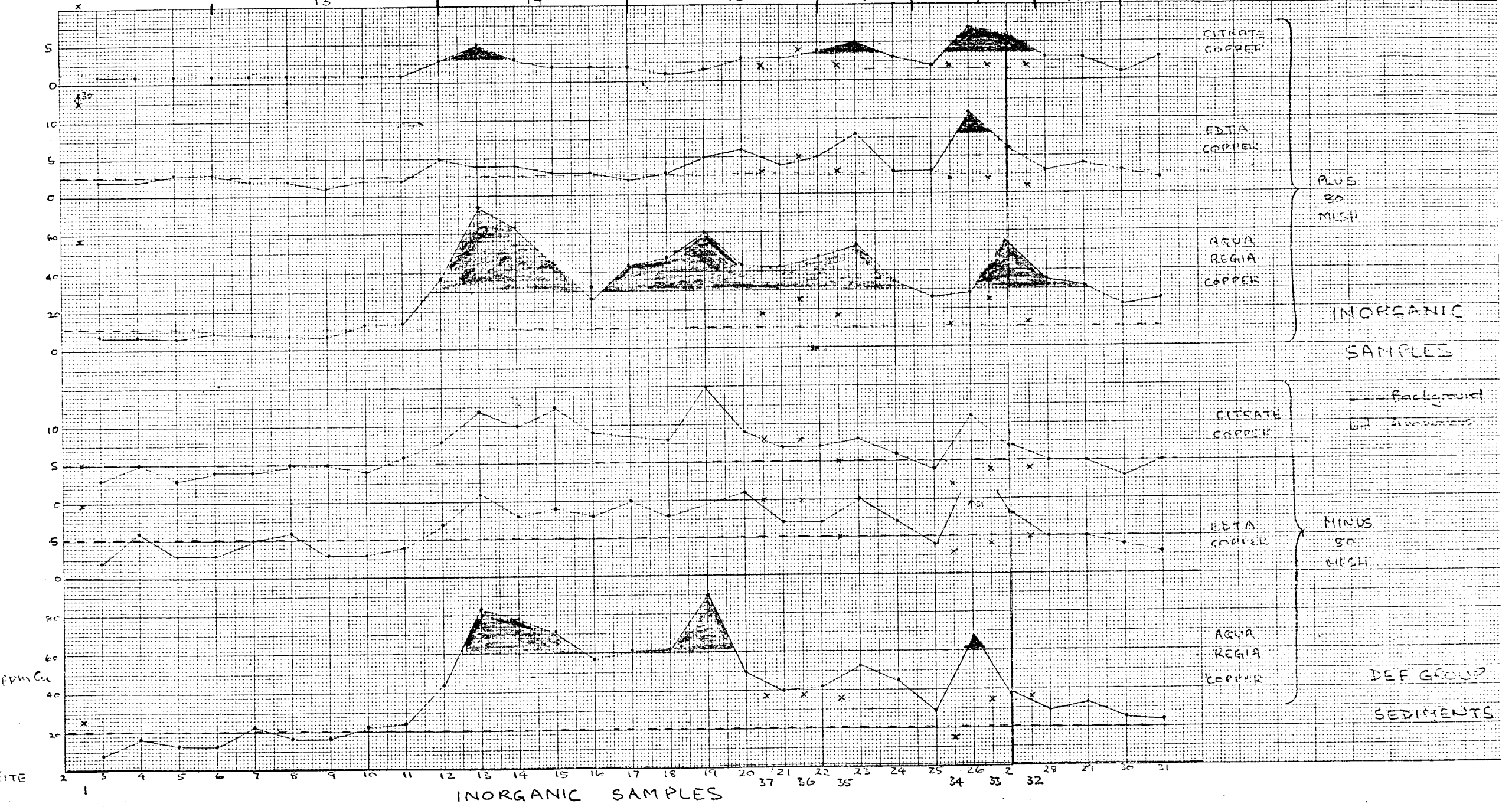
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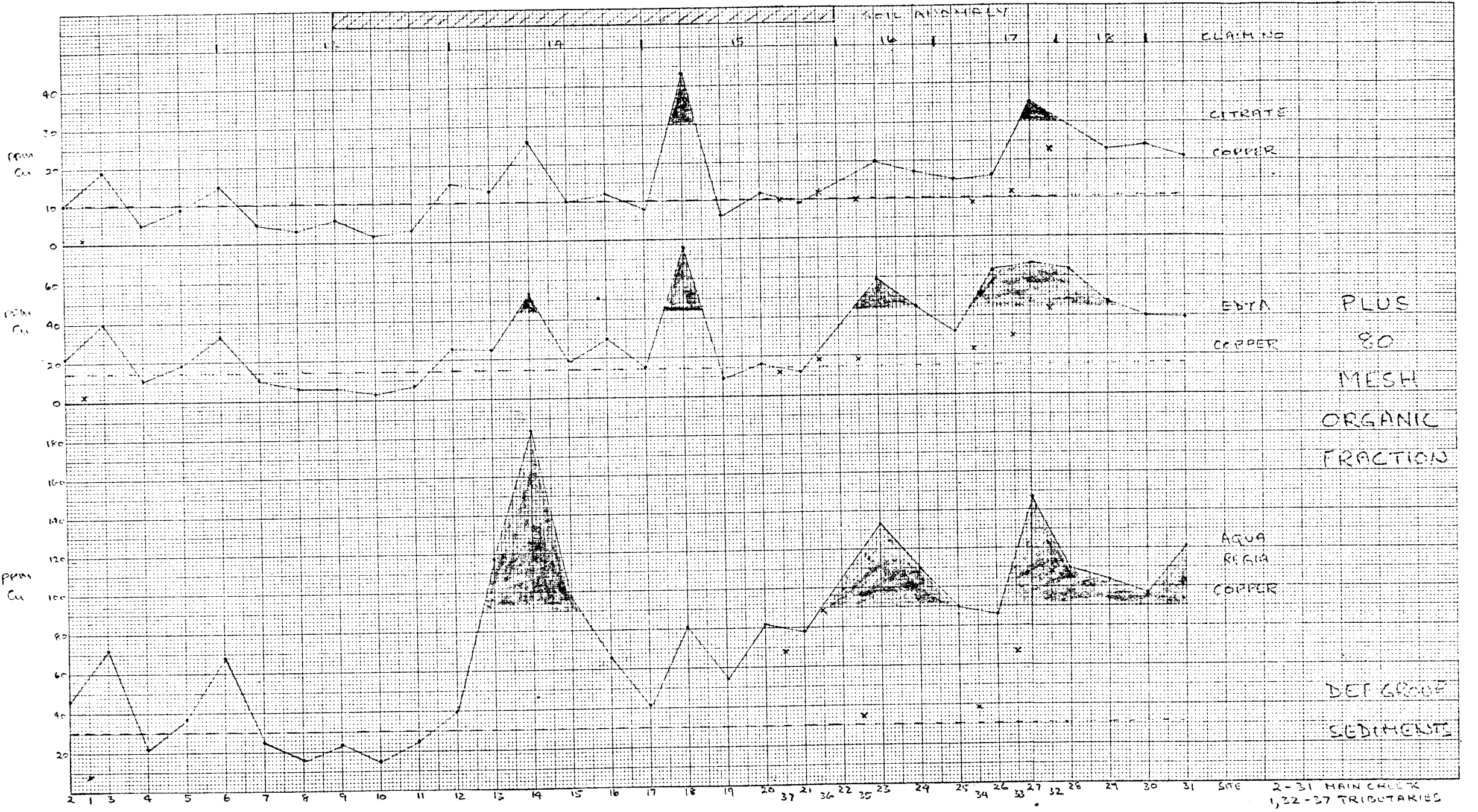
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| Site No. | -80 | | | +80 | | | -80 | | | +80 | | |
|----------|-----|------|-----|-----|------|-----|-----|------|-----|-----|------|-----|
| | AR | EDTA | CIT | AR | EDTA | CIT | AR | EDTA | CIT | AR | EDTA | CIT |
| 1 | 26 | 10 | 5 | 57 | 30 | 13 | 14 | 4 | 3 | 8 | 3 | 1 |
| 2 | | | | | | | 20 | 9 | 5 | 46 | 22 | 10 |
| 3 | 8 | 2 | 3 | 7 | 2 | 1 | 35 | 14 | 7 | 72 | 40 | 19 |
| 4 | 17 | 6 | 5 | 7 | 2 | 1 | 35 | 15 | 9 | 22 | 11 | 5 |
| 5 | 13 | 3 | 3 | 6 | 3 | 1 | 24 | 9 | 5 | 37 | 19 | 9 |
| 6 | 13 | 3 | 4 | 9 | 3 | 1 | 23 | 11 | 4 | 68 | 33 | 15 |
| 7 | 23 | 5 | 4 | 8 | 2 | 1 | 17 | 8 | 3 | 25 | 11 | 5 |
| 8 | 17 | 6 | 5 | 7 | 2 | 1 | 19 | 9 | 3 | 16 | 6 | 3 |
| 9 | 17 | 3 | 5 | 7 | 1 | 1 | 20 | 8 | 5 | 24 | 6 | 6 |
| 10 | 23 | 3 | 4 | 13 | 2 | 1 | 17 | 4 | 3 | 15 | 3 | 2 |
| 11 | 24 | 4 | 6 | 14 | 2 | 1 | 24 | 8 | 5 | 25 | 7 | 3 |
| 12 | 44 | 7 | 8 | 37 | 5 | 3 | 28 | 13 | 8 | 40 | 26 | 15 |
| 13 | 83 | 11 | 12 | 74 | 4 | 5 | 47 | 13 | 9 | 118 | 25 | 13 |
| 14 | 78 | 8 | 10 | 63 | 4 | 3 | 71 | 21 | 13 | 184 | 54 | 26 |
| 15 | 71 | 9 | 12 | 45 | 3 | 2 | 64 | 15 | 12 | 97 | 19 | 10 |
| 16 | 57 | 8 | 9 | 26 | 3 | 2 | 54 | 16 | 13 | 66 | 30 | 12 |
| 17 | 61 | 10 | 15 | 43 | 2 | 2 | 35 | 9 | 6 | 41 | 15 | 8 |
| 18 | 62 | 8 | 8 | 47 | 3 | 1 | 72 | 12 | 21 | 81 | 76 | 43 |
| 19 | 90 | 15 | 15 | 60 | 5 | 2 | 70 | 21 | 13 | 55 | 9 | 6 |
| 20 | 50 | 11 | 9 | 43 | 6 | 3 | 59 | 10 | 11 | 82 | 16 | 12 |
| 21 | 40 | 7 | 7 | 42 | 4 | 3 | 77 | 14 | 12 | 78 | 12 | 9 |
| 22 | 42 | 7 | 7 | 47 | 5 | 4 | 15 | 15 | 15 | 15 | 15 | 15 |
| 23 | 53 | 10 | 8 | 53 | 8 | 5 | 56 | 17 | 8 | 133 | 59 | 20 |
| 24 | 45 | 7 | 6 | 34 | 3 | 3 | 60 | 14 | 10 | 110 | 45 | 17 |
| 25 | 29 | 4 | 4 | 26 | 3 | 2 | 63 | 23 | 10 | 90 | 32 | 15 |
| 26 | 67 | 31 | 11 | 28 | 13 | 7 | 102 | 59 | 14 | 86 | 63 | 16 |
| 27 | 38 | 8 | 7 | 54 | 6 | 6 | 62 | 19 | 12 | 147 | 66 | 35 |
| 28 | 29 | 5 | 5 | 35 | 3 | 3 | 69 | 24 | 15 | 110 | 63 | 29 |
| 29 | 33 | 5 | 5 | 32 | 4 | 3 | 47 | 17 | 10 | 104 | 47 | 23 |
| 30 | 25 | 4 | 3 | 22 | 3 | 1 | 50 | 14 | 9 | 97 | 40 | 24 |
| 31 | 24 | 3 | 5 | 25 | 2 | 3 | 43 | 13 | 9 | 121 | 39 | 21 |
| 32 | 36 | 5 | 4 | 13 | 1 | 2 | 61 | 33 | 17 | 108 | 44 | 23 |
| 33 | 35 | 4 | 4 | 25 | 2 | 2 | 55 | 17 | 10 | 67 | 30 | 12 |
| 34 | 15 | 3 | 2 | 12 | 2 | 2 | 26 | 10 | 5 | 39 | 23 | 9 |
| 35 | 26 | 5 | 5 | 17 | 3 | 2 | 31 | 8 | 5 | 35 | 18 | 10 |
| 36 | 29 | 10 | 8 | 25 | 5 | 4 | 94 | 18 | 18 | 89 | 18 | 12 |
| 37 | 38 | 10 | 8 | 18 | 3 | 2 | 45 | 13 | 12 | 64 | 12 | 10 |

TABLE 1

Copper (ppm) in Drainage Samples





2-31 MAIN CHANNEL, 1, 22-27 TRIBUTARIES

SOLID RESIDUITY

CLAIM NO

ppm Cu

CITRATE COPPER

ppm Cu

EDTA COPPER

MINUS 80 MESH

ppm Cu

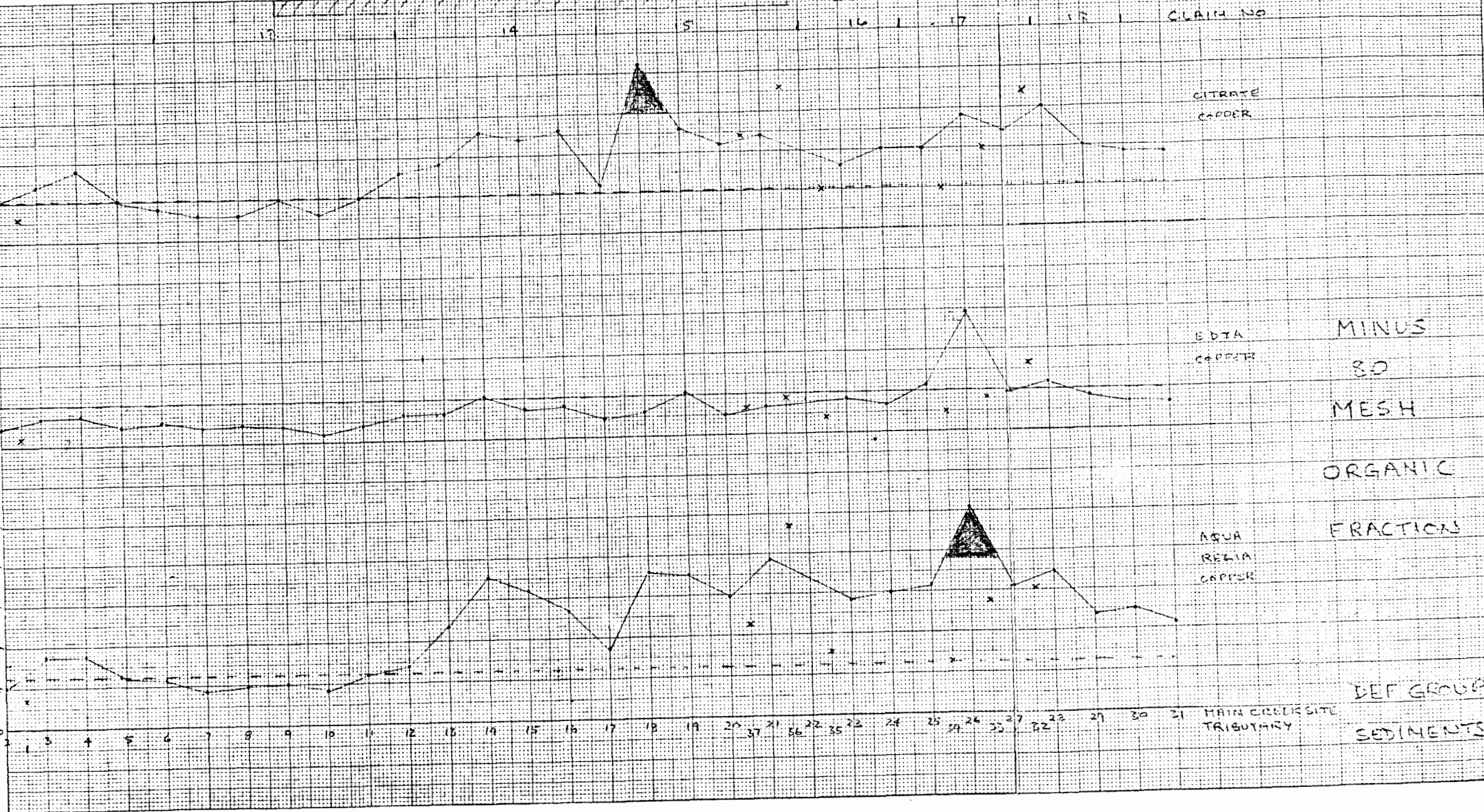
AQUA REGIA COPPER

ORGANIC FRACTIONS

DEF GROUP SEDIMENTS

13 14 15

16 17 18



REPORT ON

THE GEOPHYSICAL ORIENTATION

D.E.F. CLAIM GROUP

BIG CREEK AREA, YUKON TERRITORY

FOR

UNITED KENO HILL MINES LTD.

BY

FALCONBRIDGE NICKEL MINES LTD.

S. E. Sapper

D. B. Sutherland

December, 1971

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1. INTRODUCTION

A geophysical orientation program was carried out by a Falconbridge crew of three operators, S. Sapper, M. Conron and J. Leclerc with the assistance of a student helper, Paul Baker, during August, 1971 on part of the D.E.F. claim group, for United Keno Hill Mines Limited.

Three methods, Magnetics, VLF EM and Induced Polarization were used on 4 lines on the southern part of the claims to cover the area of malachite and azurite showing and of geochemical highs.

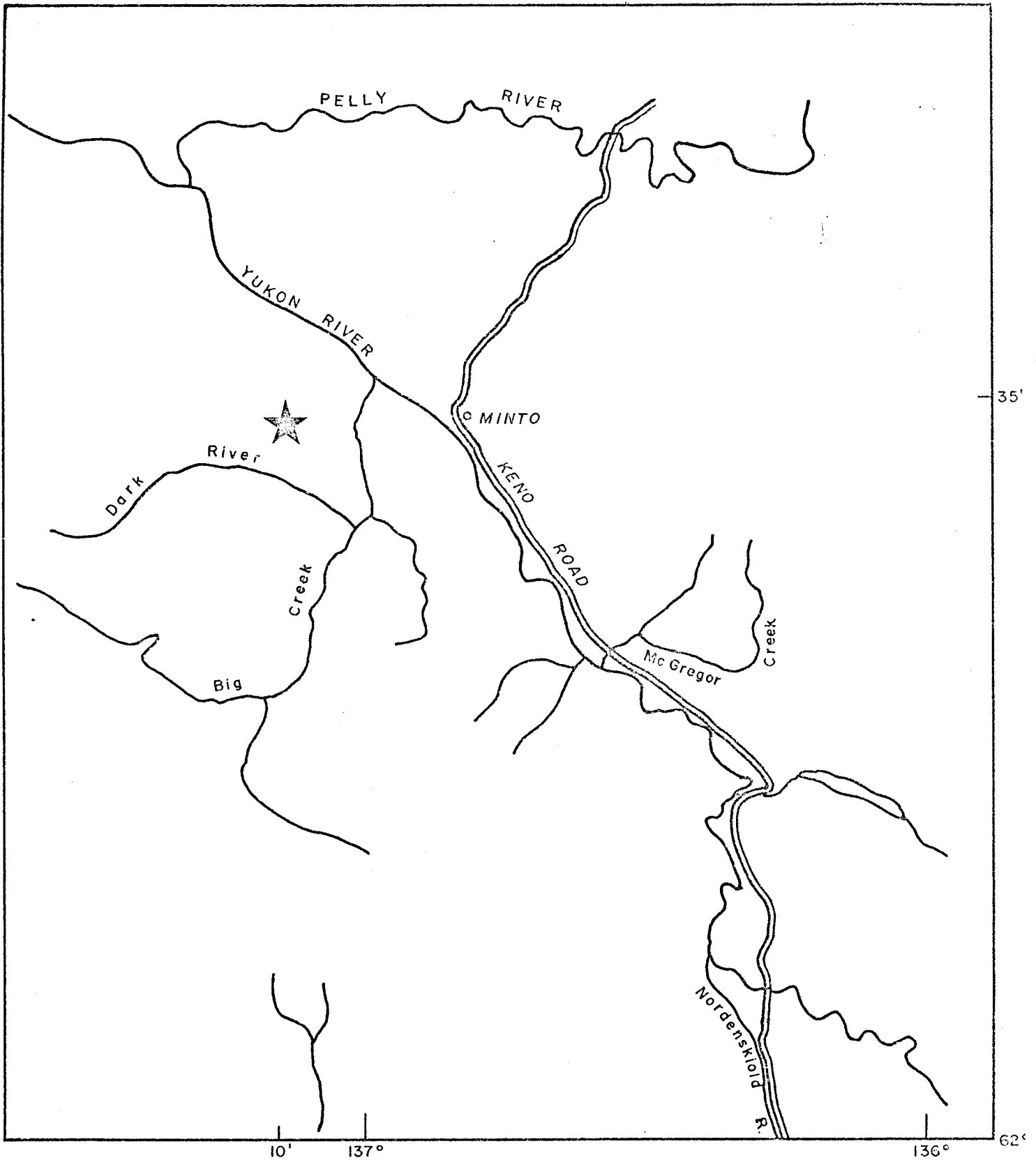
2. LOCATION AND ACCESS

The D.E.F. claims are located in the Big Creek Area 20 miles west of Minto near latitude $62^{\circ}35'N$, and longitude $137^{\circ}10'W$ (N.T.S. 115-I-11), Yukon Territory. The property is accessible by helicopter from Minto.

Approximate location of the D.E.F. Claim group in relation to Minto district and surrounding area is shown in Figure 1.

3. GEOLOGY AND PREVIOUS WORK

Exposures of medium grained biotite granodiorite form distinctive tors on the high ground. The rocks is well fractured and jointed and has been sheared by vertical faults. One of the fault planes carries impressive malachite stains. At lower elevations, outcrops are very scarce and no coherent geological picture is available. In the vicinity of the highest copper values, outcrops are foliated and fractured quartz diorite or monzonite. The rock is frequently malachite and azurite stained. On the west end of the property, staining dies out and the rock appears to be a grey medium grained syenite with minor hornblende. Elsewhere a medium grained porphyritic biotite granodiorite carrying very large (1") K-feldspar crystals occurs. The above massive rocks are cut by oplitic veins and contain coarse pegmetitic phases. Although secondary copper carbonates



UNITED KENO HILL MINES LTD.

LOCATION MAP

D.E.F. CLAIMS, Y.T.

Figure 1

SCALE : 1 inch to 8 miles

were relatively abundant, no sulphides have been seen.

Malachite and azurite stained outcrop and float were discovered in the area as a result of systematic geological survey. Detailed soil sampling has delineated a zone of very anomalous copper values on the above basis, the D.E.F. claims were staked to protect the U.K.H.M. discovery.

The analysis of subsequent soil sampling on the D.E.F. group has indicated the presence of copper values ranging up to 3000 ppm with a few values between 4000 and 13,000 ppm. Silver and molybdenum values were low.

4. SURVEY METHODS AND PRESENTATION OF RESULTS

The theory of the methods are given in the notes which are appended to this report.

4. (a) Magnetic Survey

A McPhar M-700 fluxgate magnetometer was used to measure the relative intensity of the vertical component of the earth's magnetic field in gammas.

Readings were taken at 100 foot intervals. Diurnal variations were corrected by means of repeated base-station readings at approximately 60 minute intervals.

The results are shown in contour form of 100 gamma intervals, and a scale of 1" = 400' on the accompanying Fig. No. 2.

4. (b) V.L.F. Electromagnetic Survey

A Crone Radem receiver was used to measure the dip angle and horizontal field strength. The transmitter used for the survey was Seattle Washington operating at a frequency of 18.6 KHZ.

Two sets of readings were taken at 100 foot intervals, the dip angle and the Horizontal field strength.

The dip angle data are profiled and shown on the accompanying Fig. 3

The horizontal field strength data are contoured and shown on the accompanying Fig. 4.

In addition, the dip angle data were filtered following the procedure outlined by D.C. Fraser, to enhance the weaker trends, and shown contoured on the accompanying Fig. 5. The position of some effects that have been defined only by a sharp variation in dip angles have been more clearly defined by this treatment.

4. (c) Induced Polarization and Resistivity Survey

A McPhar P-660 frequency type I.P. unit operating at frequencies 0.3 and 5 Hz. was used for the survey. Dipole-dipole configuration was used and taking values of $n = 1, 2, 3$ and 4 , the detail data plots are shown on the accompanying Figures.

| <u>Line</u> | <u>Electrode Interval</u> | <u>Figure No.</u> |
|-------------|---------------------------|-------------------|
| 0+00 | 100 foot | 7 |
| 8+00N | 100 foot | 8 |
| 16+00N | 200 foot | 9 |
| 24+00N | 200 foot | 10 |

The I.P. anomalies are shown together with the V.L.F. and geochemical results on a composite map Figure 6.

5. DISCUSSION OF RESULTS

The data obtained with the three methods were on four lines spaced at 800 foot intervals and consequently line-to-line correlation is difficult.

5. (a) Induced Polarization and Resistivity Survey

The I.P. survey is considered the most positive method for detecting sulphide mineralization. Unfortunately, coverage is the least of all of the methods tried.

No strong, positive I.P. anomalies were encountered in the survey and only three responses are classed as probable; the remainder are based on weak indications that are essentially resistivity lows.

Line 0

This line was surveyed with 100 foot dipoles to $n = 4$ for an effective depth of penetration of approximately 200 feet.

The highest metal factors encountered in the survey occur on the west end of the line and suggest a shallow source of low to moderate metallic content. However, the data are incomplete and consequently it is not certain whether this is the edge of a broad weak source or a stronger, more interesting, confined response. It does correspond with a weak V.L.F. indication from Zone C and there are high geochemical values to the southeast but none that correlates directly with the I.P. anomaly. Further I.P. surveying should be done to assess its importance.

The weak response at 1+50W suggests a shallow source that is essentially a resistivity low and is reflected in the V.L.F. data.

Indications of shallow narrow sources occur at 1+50E, 4+50E and 6+50E, the latter two may in fact represent a single source located at 5+50E. These are very weak indications and may represent narrow sources of minor metallic content.

Between 10E and 14E there is a broad area of shallow low valued metal factors that could represent a very minor increase in metallic content but this change could be caused by less than 1 percent sulphides and is more likely to represent a change in rock type. It is interesting that this very weak effect occurs in the vicinity of moderate geochem values.

Line 8N

One hundred foot dipoles were used to survey this line.

A broad shallow I.P. response of low to moderate metallic content is shown to extend from 5E to 8E. The higher metal factors along the western edge near 5+50E suggest higher concentration of metallics in this vicinity. The anomaly corresponds with higher geochemical values and correlates quite closely with V.L.F. Zone A and definitely warrants further investigation.

A shallow, poorly defined I.P. source is indicated between 2 and 4W by metal factor values that are less than twice local background. It is thought to be of minor importance.

Line 16N

A probable anomaly is centered near 11W that indicates a narrow steeply dipping source of low metallic content that appears to correlate with V.L.F. Zone C as well as a single high geochem value that occurs in a broad background. Additional I.P. survey should be carried out to assess its importance.

The I.P. effects in the vicinity of 2W to 2E are unusual. They may represent two sources separated by several hundred feet but it seems more likely that this is the typical bi-lobate pattern indicative of a narrow shallow source located in the vicinity of 1W. Using the 1W interpretation, it is noted that there is a weak change in the V.L.F. dip angle profile in this vicinity and a local but quite high valued geochemical anomaly.

Weak increases in the metal factor values suggest a broad source of minor metallic content extending from 8E to 12E that corresponds with a weak resistivity low. There are stronger geochemical values along this weak I.P. response but its significance is difficult to evaluate.

Line 24N

This line was surveyed with 200 foot dipoles and shallow resistivity zones are shown to extend from 6W to 10W and from 2E at least as far as 6E. Both of these are corroborated by V.L.F. responses but their significance is not known.

The single high value on the $n = 3$ metal factor and the associated resistivity low suggests a weak source located at depth but the data is questionable due to poor electrode contacts.

5. (b) V.L.F. E.M.

Strike direction is presently uncertain on the claim group but was originally expected to be northwesterly and the initial grid was run in a north-easterly direction. It is customary in an orientation program to measure V.L.F. values in orthogonal directions from two transmitters that give field azimuths at 90° and avoid the condition of zero coupling from conductors lying parallel to the primary field. However, the most suitable station was found to be Seattle, located to the southeast. The field from this station is roughly parallel to the traverse lines and will favour conductors trending in the perpendicular (i.e. northwesterly) direction. It is possible for conductors striking parallel to the lines, that is northeasterly, to be undetected by the survey.

None of the V.L.F. anomalies display strong dip angles and large increases in field strength typical of high conductive zones such as massive sulphides or graphites. On the contrary, most of the field strength values are less than 25% above background and the dip angles are typical of those obtained from faults, shears, or zones of fracturing that may be mineralized.

Zone A

On Zone A, the steep slope dip angle profiles indicate a shallow source and the small increase in field strength is typical of a fault or shear. It

appears to strike N45°W and probably represents a shear similar to the malachite stained one observed near 8N. A moderate I.P. response is also located on 8N and further prospecting in this vicinity may reveal the cause of the combined indications that could extend to depth. V.L.F. and I.P. surveying on adjacent 400 foot lines should be done to determine its extent.

Zone B

The data on Zone B are not complete but it appears to be due to a similar fracture or shear zone with a strike N70°W. There is an interesting increase in field strength on Line O and this anomaly should be checked by either conventional E.M. or I.P.

Zone C

Zone C appears to strike N60°W and continue across three lines. The best I.P. responses encountered in the survey are associated with this zone on 16N and O; it was not covered by I.P. on Line 8N. It is interesting that the sharpest field strength variations occur on Zone C near 12W and correlate with the narrow I.P. indication. Further prospecting or shallow trenching in this vicinity may establish the cause of these combined geophysical indications that occur in an area of moderately high geochemical values. Additional I.P. and V.L.F. surveying should be carried out on 400 foot lines to further evaluate this interesting anomaly.

Zone D

Zone D also suggests a weak shear zone that could be mineralized. As shown, it suggests a trend that is almost east-west. There is no strong geochemical values in this vicinity and the I.P. coverage does not extend far enough east to cover it.

There are other weak V.L.F. zones that are difficult to evaluate with present data.

5. (c) Magnetics

The magnetic contours suggest a trend of N45°W but this maybe strongly influenced by the wide line spacing used for the survey. There is a broad magnetic high that appears to follow the baseline between 8N and 24N that does not correlate with either of the other methods used.

The narrow magnetic high near 24E on all four lines suggest a narrow shallow source of slightly increased magnetite content and could represent a northwesterly trending dyke.

A similar weaker feature crosses Line 0, 8N and 16N in the vicinity of 19E.

6. SUMMARY

There is very strong evidence of copper mineralization on the grid in the form of secondary copper carbonates. There are no visible sulphides and weathering may be deep, similar to the Williams Creek area, 25 miles to the south.

The geophysical orientation was restricted to 5 days work and was terminated prior to the completion of the 4 lines, with any of the methods. In addition, the wide line spacing makes correlation difficult.

A series of fractures that may be mineralized is suggested as the cause of the V.L.F. conductors. Four zones have been tentatively correlated with strikes varying from N45°W to essentially E-W. Similar V.L.F. responses on the Williams Creek property, let to the sulphide mineralization at depth and data on 400 foot lines should be obtained to better define these zones and confirm the indicated strikes.

The limited I.P. surveying carried out indicated three moderate shallow sources of metallic mineralization all of which could extend to depth. One of these correlates with V.L.F. Zone A on 8N and warrants further investigation and detail on intermediate lines. The I.P. responses on Lines 0 and 16N both correlate with V.L.F. Zone C and Line 12N did not extend far enough to cover it; Zone C should be detailed with 400 foot lines. Drilling is difficult to recommend with present limited data but surface prospecting may reveal the cause of these 3 shallow anomalies.

V.L.F. Zones B and D are quite well defined and should be checked by I.P. surveying.

7. CONCLUSIONS AND RECOMMENDATIONS

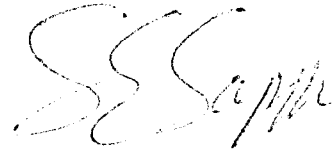
The orientation survey has outlined V.L.F. conductors suggesting shears or fractures that could be important for the localization of sulphides at depth. In addition, I.P. data indicates shallow metallic sources that could extend to depth and appear to be related to the V.L.F. anomalies.

However, present data is limited and on widely spaced lines. Because of the strong evidence of copper mineralization, an intensive program on closely spaced lines is warranted to evaluate the property.

The following program is recommended:-

- (1) Surface investigation of the three shallow I.P. and V.L.F. responses to establish whether copper sulphides are associated with the indicated weak metallics. These localities are at 5W on Line 0, 5E to 8E on Line 8N and 11W on Line 16N.
- (2) V.L.F. surveying using Seattle (18.6 KHz.) on the existing northeasterly grid but with 400 foot line interval over the entire width of the property from 8S at least as far as 32N. In addition, repeated attempts should be made to obtain readings in the orthogonal direction from Cutler Maine or other suitable stations.

- (3) I.P. surveying with 300 foot dipoles on the 400 foot lines from 8S to 32N outlined in (2) above to explore for a deep sulphide source. However, the dipole interval may be critical and 200 foot dipoles more suitable. Initial tests with 300 foot dipoles should be carried out on the anomaly on Line 8N.
- (4) The remainder of the property that is considered of geologic interest should be covered with V.L.F. and I.P. on a reconnaissance grid using a line interval no greater than 600 feet and preferably 400 feet.
- (5) Magnetic surveying should be carried out on the entire property to assist with geologic interpretation.



.....
S. E. Sapper



APPENDIX I

NOTES ON THEORY OF V.L.F. PROSPECTING

V.L.F. Survey

In carrying out this survey, the Crone Geophysics Radem E.M. receiver was used. The system may be regarded as a Vertical Loop E.M. System with the transmitter located at infinity. It operates in accordance with the Laws of Electromagnetic induction, that is, if an E.M. field is produced on the surface of the ground, currents will flow in subsurface conductors, and will give rise to secondary E.M. fields which distort the primary field at any point on the surface above the conductor.

The system employs the V.L.F. radio communication stations operating in 12 to 24 KHz. frequency band as source of primary field (i.e. as transmitters), the V.L.F. communication broadcast stations are positioned throughout the world. At present, 12 of these stations broadcast steadily. The Radem receivers receive any 7 of these stations with selection by means of a switch.

The usable range of the stations varies widely with power and transmission conditions but is usually between 1000 and 5000 miles. Two types of signals are broadcast "keyed" (on and off) and "frequency shift" (FM). Frequency shift provides a steady signal and is most suitable for field strength measurements.

Best coupling and strong signals will be received from the station that is located in the same direction as the regional strike.

Seattle Washington operating in 18.6 KHz. was employed in this survey. Excellent coupling was achieved which suggest that the regional strike may be east and west to N-West S-East.

The unit consists of a tuned coil amplifier.

Field Procedure

The field procedure was as follows:

A null was observed on the field strength meter by rotating the instrument in a horizontal plane until the base of the instrument aligned in the direction of the V.L.F. field. Then the instrument was raised vertically and rocked back and forth until minimum was obtained on the field strength meter. The instrument in this position, the inclinometer was read for the dip angle reading. The direction of the bottom of the instrument (i.e. the search coil) points towards the conductor.

The field strength measurements were obtained by rotating the instrument in a horizontal plan until a maximum reading was obtained. Readings were taken at one hundred foot intervals. Only one set of readings was taken at each reading point as the receiver was tuned to the Seattle, Washington transmitting station.

Plotting Procedure

The dip angle data are profiled at a scale of 1" = 400' and 1" = 10° dip with East dips position (above the line and West dips negative (below the line). The crossovers are designated by graded ovals. Those crossovers are at location of the detected conductors. The crossovers are connected to outline the conductive zones. Horizontal field strength data are contoured at 25 unit intervals.

The first differences of the above dip angle data are contoured at the interval of 10 units (2-5 degrees) and 1" = 400' scale, to outline the crossover conductor as well as the strong regional effects and to define clearly their position.

APPENDIX II

NOTES ON THE THEORY OF INDUCED POLARIZATION

AND THE METHOD OF FIELD OPERATION

The following is in large part taken from the manuals of McPhar Geophysics Limited, originators of the technique, and manufacturers of the equipment.

Theory

Induced Polarization as a geophysical measurement refers to the blocking action or polarization of metallic or electronic conductors in a medium of ionic solution conduction.

This electro-chemical phenomenon occurs wherever electrical current is passed through an area which contains metallic minerals such as base metal sulphides. Normally, when current is passed through the ground, as in resistivity measurements, all of the conduction takes place through ions present in the water content of the rock, or soil, i.e. by ionic conduction. This is because almost all minerals have a much higher specific resistivity than ground water. The group of minerals commonly described as "metallic", however, have specific resistivities much lower than ground waters. The induced polarization effect takes place at those interfaces where the mode of conduction changes from ionic in the solutions filling the interstices of the rock to electronic in the metallic minerals present in the rock.

The blocking action or induced polarization mentioned above, which depends upon the chemical energies necessary to allow the ions to give up or receive electrons from the metallic surface, increases with the time that a d.c. current is allowed to flow through the rock, i.e. as ions pile up against the metallic interface the resistance to current flow increases. Eventually,

there is enough polarization in the form of excess ions at the interfaces to effectively stop all current flow through the metallic particle. This polarization takes place at each of the infinite number of solution-metal interfaces in the mineralized rock.

When the d.c. voltage used to create this d.c. current flow is cut off, the Coulomb forces between the charges ions forming the polarization cause them to return to their normal position. This movement of charge creates a small current flow which can be measured on the surface of the ground as a decaying potential difference. This is the principle on which are based "Time Domain" I.P. Surveys.

From an alternate viewpoint it can be seen that if the direction of the current through the system is reversed repeatedly before the polarization occurs, the effective resistivity of the system as a whole will change as the frequency of the switching is changed. This is a consequence of the fact that the amount of current flowing through each metallic interface depends upon the length of time that current has been passing through it in one direction. This phenomenon is the basis for "Frequency Domain" I.P. surveys and the McPhar System.

Since the I.P. effect is caused by electronic, i.e. metallic, conductivity only, induced polarization measurements are an indication of the total amount of metallic constituents in the rock. Thus all of the metallic minerals in the rocks, such as pyrite, as well as the ore minerals, chalcopyrite, chalcocite, galena, etc. are responsible for the induced polarization effect. Some oxides such as magnetite, pyrolusite, chromite, and some forms of hematite also conduct by electrons and are metallic. All of the metallic minerals in the rock will contribute to the induced polarization effect measured on the surface.

Field Procedure

Current is applied to the ground at two points a distance (X) apart. The potentials are measured at two other points (X) feet apart, in line with the current electrodes. The distance between the nearest current and potential electrodes is an integer number (N) times the basic distance (X).

The measurements are made along a surveyed line, with a constant distance (NX) between the nearest current and potential electrodes. In most surveys, several traverses are made with various values of (N): i.e. (N) = 1, 2, 3, 4, etc. The kind of survey required decides the number of values of (N) used.

Three sets of data are recorded. The Apparent Resistivity ($\rho_a/2\pi$) is, as the name implies, a measurement of the resistivity of the rock, and normally taken at a frequency of 5 c.p.s. The Frequency Effect (F.E.) is a measurement, expressed as a percentage, of the change in resistivity with frequency change, usually at 0.3 c.p.s. The third, Apparent Metal Factor (M.F.) is a calculated figure $\frac{\text{Resistivity}}{\text{Frequency Effect} \times 1000}$, which by experience has been found best to combine the two measurements and to illustrate the induced polarization effect.

The metal factor increases much more rapidly with metal content of the rock than either frequency effect increases or resistivity decreases.

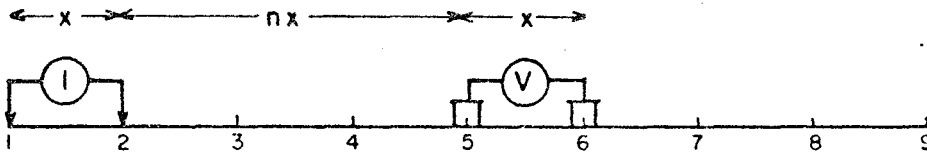
Plotting Procedure

In plotting the results, the three sets of values measured for each set of electrode positions are plotted at the intersection of grid lines, one from the center point of the current electrodes and the other from the center point of the potential electrodes. The lateral displacement of a given value is determined by the location along the survey line of the center point between the current and potential electrodes. The distance of the value from the line

is determined by the distance (NX) between the current and potential electrodes when the measurement was made.

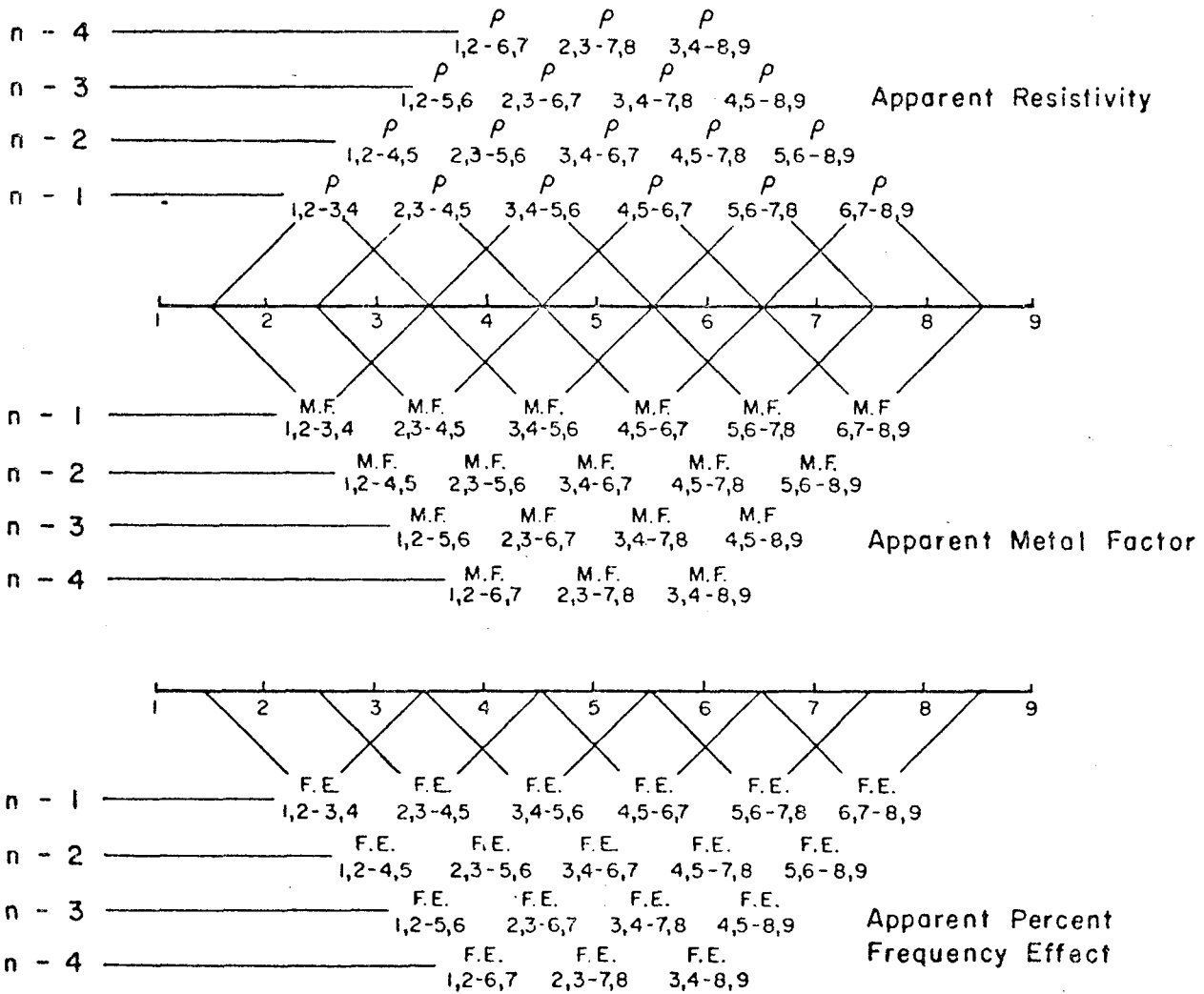
It should be emphasized that the resulting plot is merely a convenient method of presentation of results and not a vertical section along the survey line. The sketch on Page 17 illustrates a typical electrode configuration and plotting procedure.

METHOD USED IN PLOTTING DIPOLE-DIPOLE INDUCED POLARIZATION AND RESISTIVITY RESULTS



Stations on line

x = Electrode spread length
 n = Electrode separation



ASSESSMENT DETAILS

PROPERTY: D.E.F. Claim Group Project
 SPONSOR: United Keno Hill Mines Limited
 LOCATION: Big Creek Area, NTS 115-1-11
 OPERATING MAN DAYS: 20
 EQUIVALENT 8 HR. MAN DAYS: 30
 CONSULTING MAN DAYS: 5
 DRAFTING MAN DAYS: 6
 TOTAL MAN DAYS: 41

DATE STARTED: August 13th, 1971 DATE FINISHED: August 17th, 1971

| <u>Type of Survey</u> | <u>No. of Stations</u> | <u>No. of Readings</u> | <u>Miles of Line Surveys</u> |
|------------------------|------------------------|------------------------|------------------------------|
| Induced Polarization | 73 | 280 | 2.1 |
| V.L.F. Electromagnetic | 506 | 506 | 5.06 |
| Magnetic | 176 | 176 | 3.5 |

Survey Costs

| | |
|------------------|---------------|
| Labour | \$ 1,716.19 |
| Equipment Rental | 350.00 |
| Reports | <u>232.50</u> |
| Total | \$ 2,298.69 |

Costs do not include drafting, camp costs, helicopter services, etc.

CONSULTANT: D.B. Sutherland, 2136 Pineneedle Row, Mississauga

EXPLORATION GEOPHYSICISTS: Sam E. Sapper, 200 Gateway Blvd., Apt. 1508, Don Mills
204, Ontario

M.W. Conron, 1257 Tecumseh Park Drive, Mississauga, Ont.

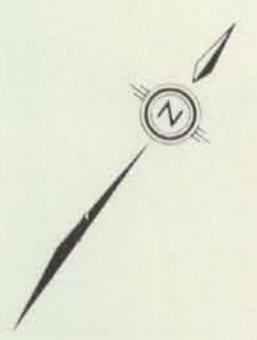
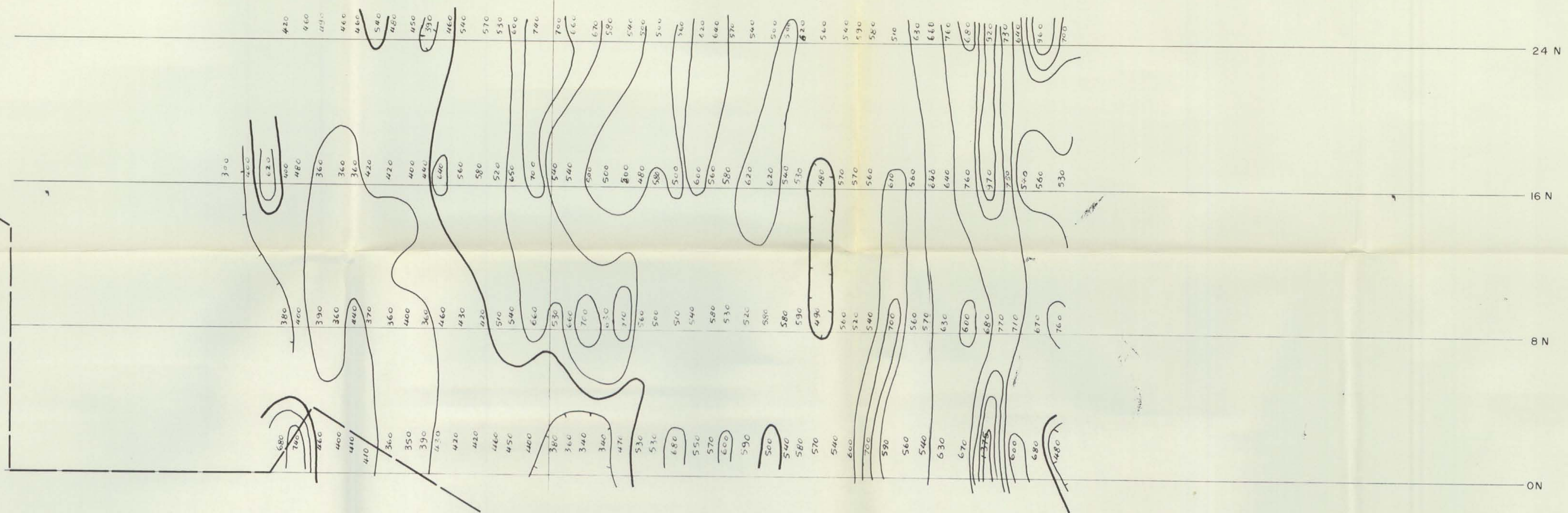
FIELD TECHNICIANS: John Leclerc, 28 Horne St., Rouyn, Quebec.

Plus one student, Paul Baker, P.O. Box 125, Noranda, Que.

DRAFTSMEN: S.E. Sapper and Miss S. Currie, R.R.#2, Claremont, Ont.

December, 1971

30W 26W 22W 18W 14W 10W 6W 2W 0 2E 6E 10E 14E 18E 22E 26E 30E 34E 38E 42E 46E 50E

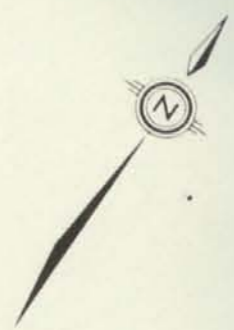
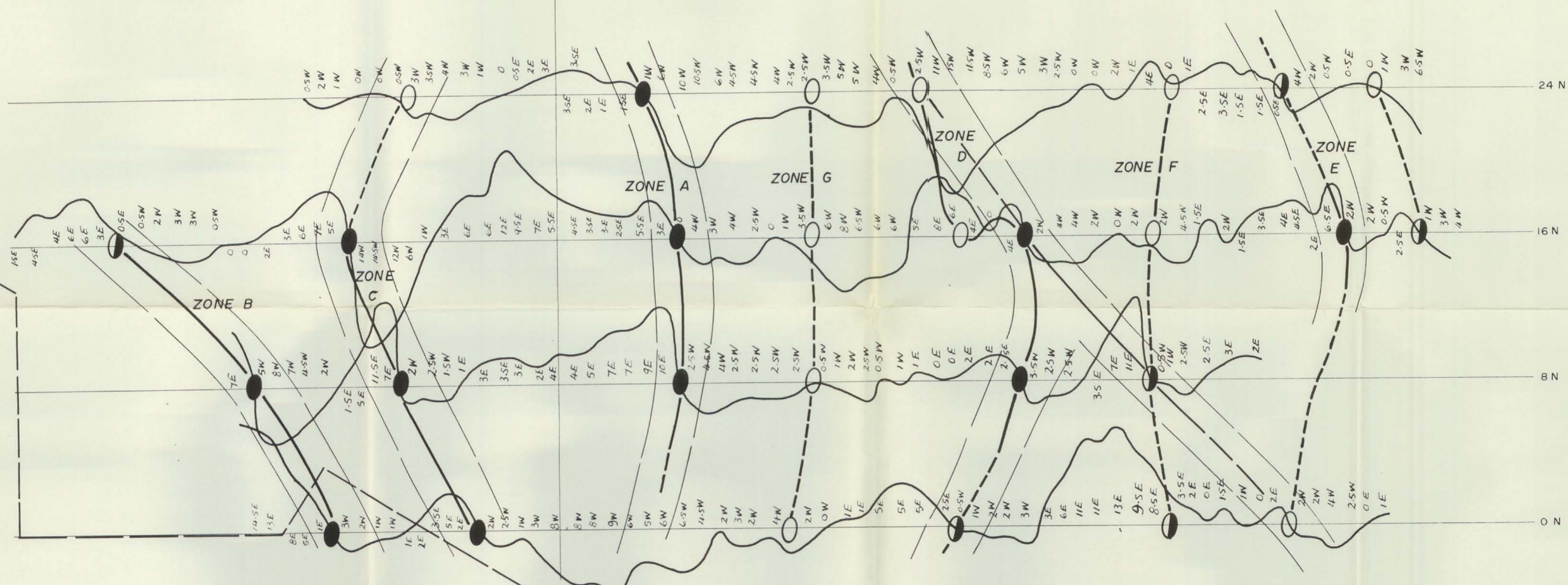


Contour interval 100 gammas

Figure 2

| | |
|-----------------------------------|---|
| FALCONBRIDGE NICKEL MINES LIMITED | |
| Property: | Exploration Department, Whitehorse, Y. T. |
| D.E.F CLAIM GROUP | |
| Plan: | MAGNETIC SURVEY |
| Scale: | 0 400 800 1200 Scale in feet |
| Date: December 1971 | By: |
| N.T.S. Ref.: | |

30W 26W 22W 18W 14W 10W 6W 2W 0 2E 6E 10E 14E 18E 22E 26E 30E 34E 38E 42E 46E 50E



Station SW
Dip 1" : 10°

V.L.F. E.M. CROSSOVER

- Strong ●
- Medium ○
- Poor ○

V.L.F. E.M. Profile

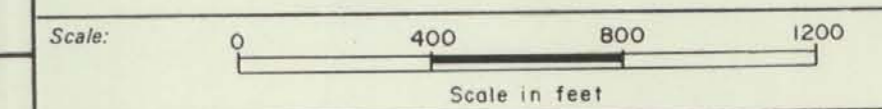
V.L.F. E.M. Conductors

Figure 3

FALCONBRIDGE NICKEL MINES LIMITED

Property:
Exploration Department, Whithorse, Y.T.
D.E.F CLAIM GROUP

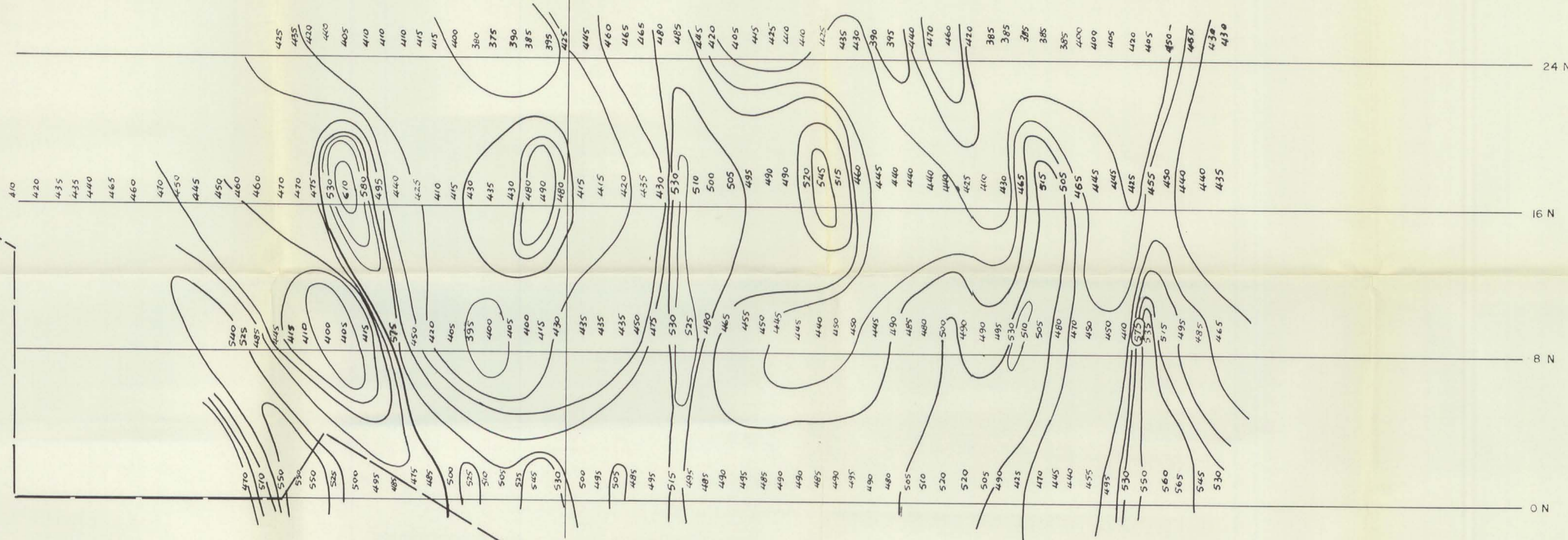
Plan:
V.L.F. ELECTROMAGNETIC SURVEY
PROFILE MAP



Date: December 1971 By:

N.T.S. Ref.:

30W 26W 22W 18W 14W 10W 6W 2W 0 2E 6E 10E 14E 18E 22E 26E 30E 34E 38E 42E 46E 50E

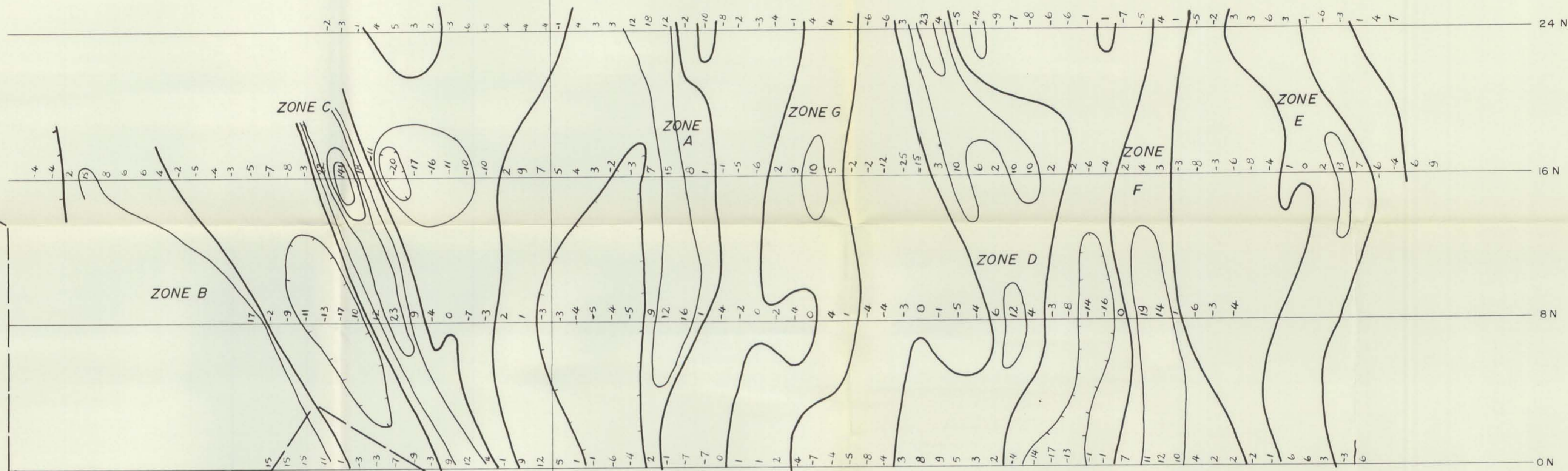


Reference value 400 units
Contour interval 25 units

Figure 4

| | |
|--|----------------------|
| FALCONBRIDGE NICKEL MINES LIMITED | |
| Property: Exploration Department, Whitehorse, Y.T. D.E.F CLAIM GROUP | |
| Plan: V.L.F. E.M. HORIZONTAL FIELD STRENGTH | |
| Scale: | <p>Scale in feet</p> |
| Date: December 1971 | By: |
| N.T.S. Ref.: | |

30W 26W 22W 18W 14W 10W 6W 2W 0 2E 6E 10E 14E 18E 22E 26E 30E 34E 38E 42E 46E 50E



ZONE B

ZONE C

ZONE A

ZONE G

ZONE D

ZONE F

ZONE E

24 N

16 N

8 N

0 N



Dip = first difference
Contour interval 10 units

Figure 5

| | |
|--|-----|
| FALCONBRIDGE NICKEL MINES LIMITED | |
| Property: Exploration Department, Whitehorse, Y. T. D.E.F. CLAIM GROUP | |
| Plan: V.L.F. ELECTROMAGNETIC SURVEY | |
| Scale: Scale in feet | |
| Date: December 1971 | By: |
| N.T.S. Ref.: | |

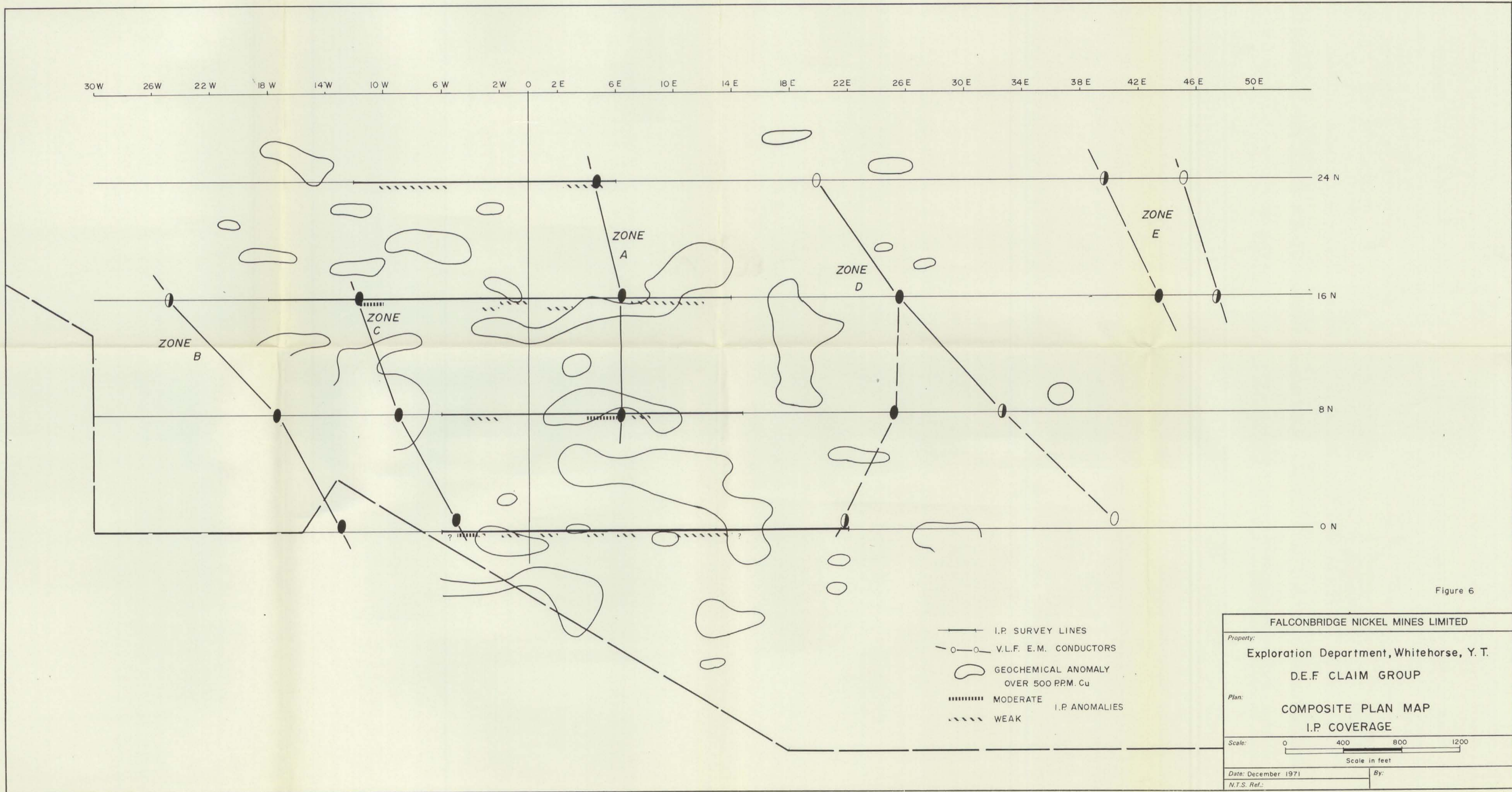
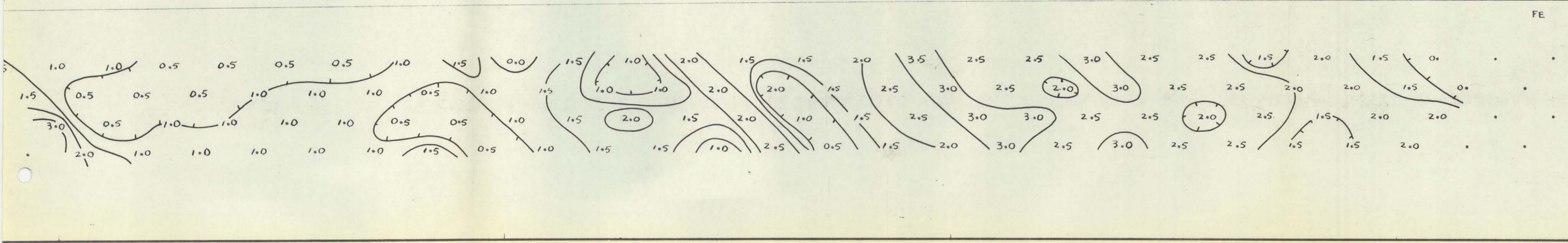
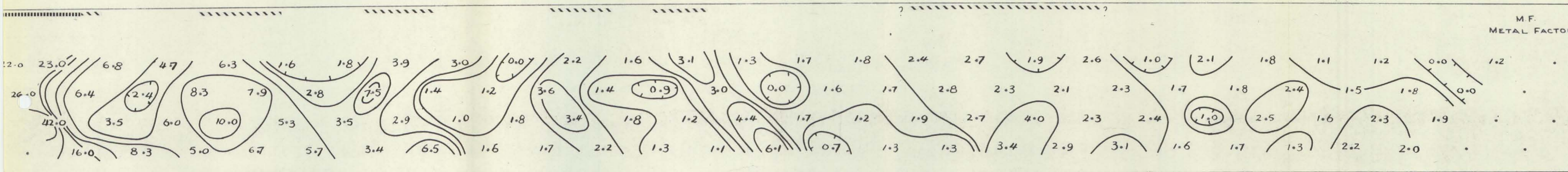
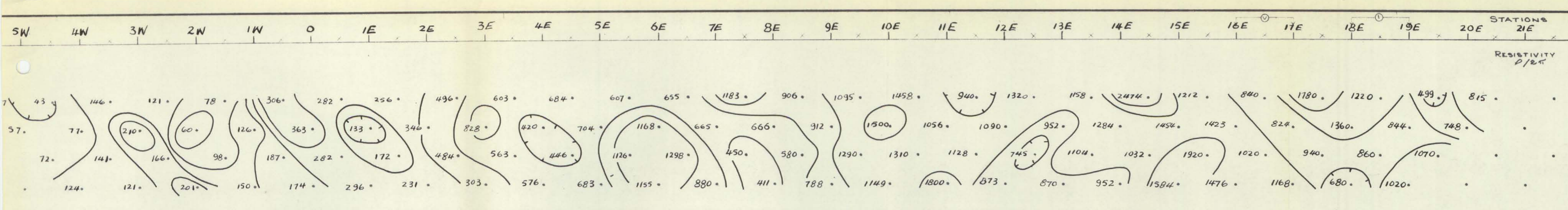


Figure 6

- I.P. SURVEY LINES
- V.L.F. E.M. CONDUCTORS
- GEOCHEMICAL ANOMALY OVER 500 PPM. Cu
- MODERATE I.P. ANOMALIES
- ~~~~~ WEAK I.P. ANOMALIES

| | |
|---|------------|
| FALCONBRIDGE NICKEL MINES LIMITED | |
| <i>Property:</i> Exploration Department, Whitehorse, Y. T. | |
| D.E.F CLAIM GROUP | |
| <i>Plan:</i> COMPOSITE PLAN MAP I.P. COVERAGE | |
| <i>Scale:</i> 0 400 800 1200 ————— ————— ————— ————— Scale in feet | |
| <i>Date:</i> December 1971 | <i>By:</i> |
| <i>N.T.S. Ref.:</i> | |



FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION SURVEY

DEF PROJECT

LINE NO 0.00

LEGEND

UNIT USED P-660
 ARRAYS Dipole-Dipole
 FREQUENCIES 0.3 & 5 HZ.
 SCALE 1"=100 Ft.
 DATE August 13, 1971
 CREW

Figure 7

CONTOUR INTERVALS 1, 1.5, 2, 3, 5, 7.5, 10,
 ANOMALY, STRONG
 MODERATE
 WEAK

6W 5W 4W 3W 2W 1W 0 1E 2E 3E 4E 5E 6E 7E 8E 9E 10E 11E 12E 13E 14E 15E STATIONS

FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION SURVEY

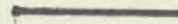


D.E.F. PROJECT

LINE NO 8N

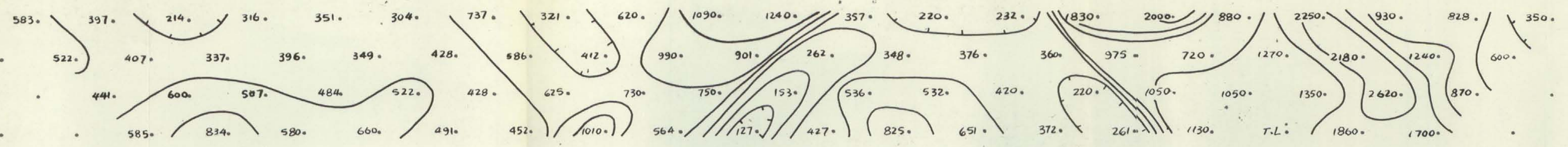
LEGEND

UNIT USED P-660
 ARRAYS Dipole-Dipole
 FREQUENCIES 0.3 & 5 HZ.
 SCALE 1"=100'
 DATE August 14, 1971
 CREW Falconbridge Nickel

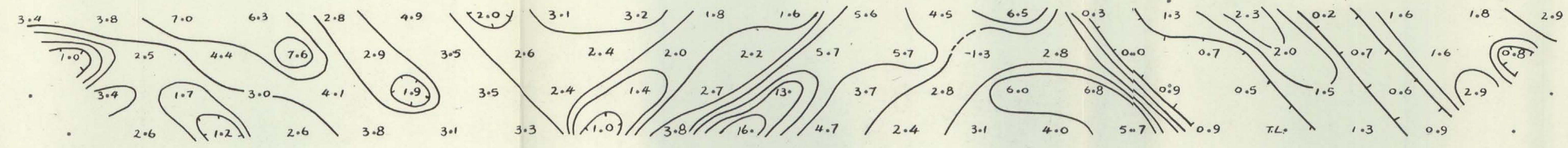
Figure 8

CONTOUR INTERVALS: 1, 1.5, 2, 3, 5, 7.5, 10,
 ANOMALY: STRONG 
 MODERATE 
 WEAK 

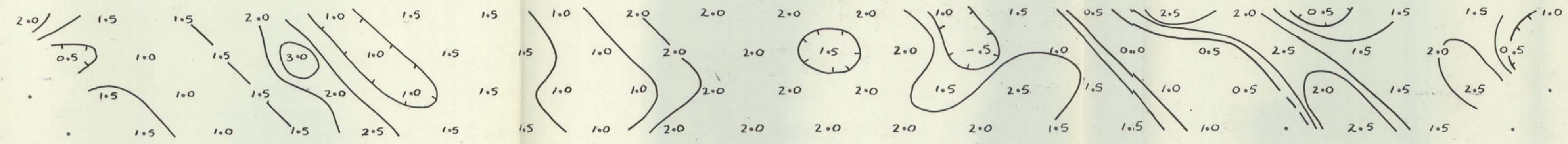
RESISTIVITY $\rho_{1/2K}$



M.F. METAL FACTOR

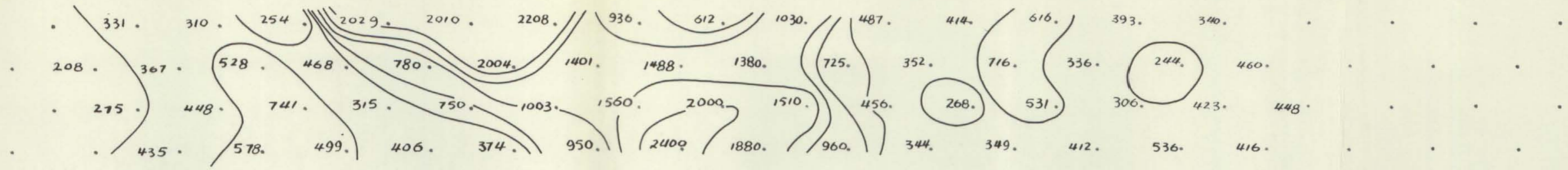


Fe

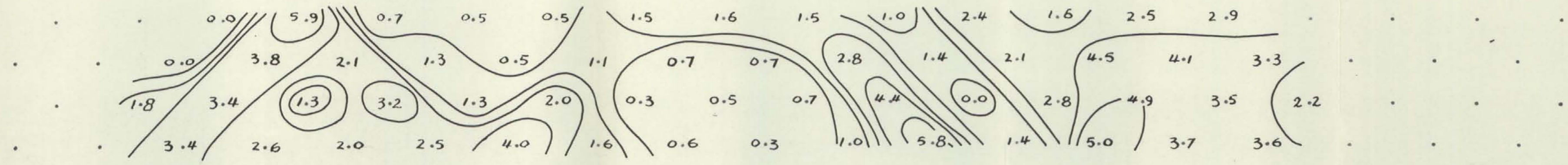


18W 16W 14W 12W 10W 8W 6W 4W 2W 0 2E 4E 6E 8E 10E 12E 14E 16E STATIONS

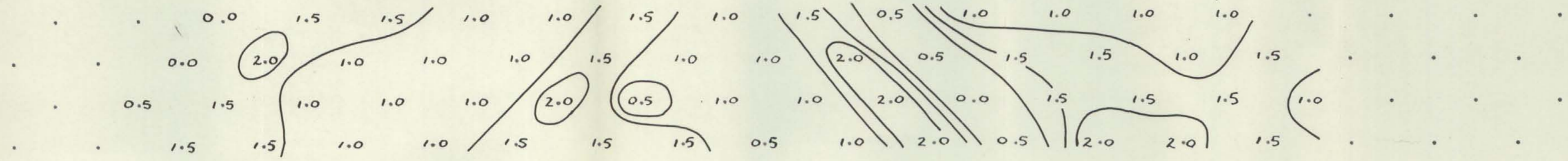
RESISTIVITY
P/25



M.F.
METAL FACTOR



FE



FALCONBRIDGE NICKEL MINES LIMITED

INDUCED POLARIZATION SURVEY

D.E.F PROJECT

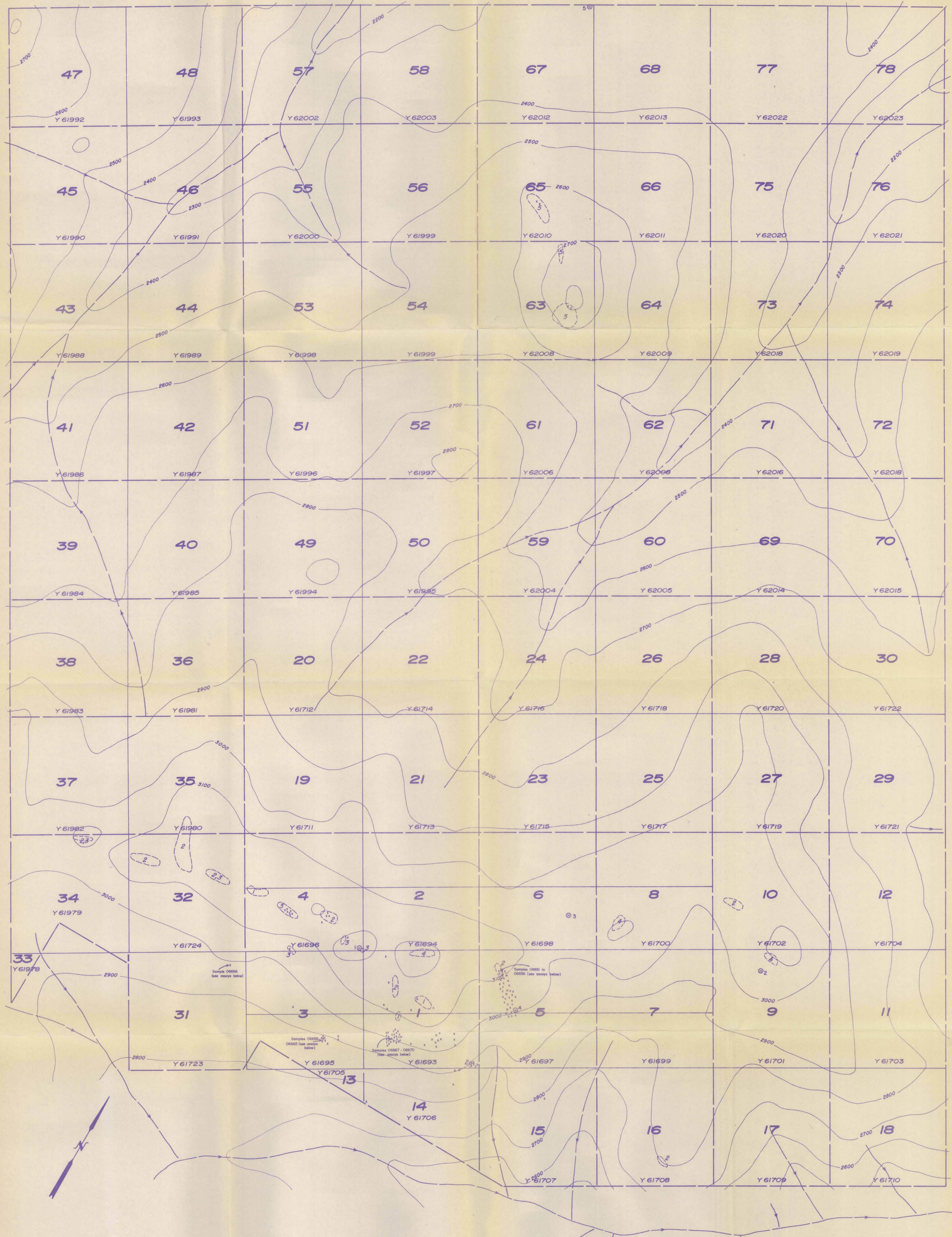
LINE NO 16N

LEGEND

UNIT USED P. 660
 ARRAYS Dipole-Dipole
 FREQUENCIES 0.325 HZ.
 SCALE 1" = 200 FT.
 DATE August 15, 1971.
 CREW Falconbridge Nickel

Figure 9

CONTOUR INTERVALS 1, 1.5, 2, 3, 5, 7.5, 10.
 ANOMALY: STRONG ———
 MODERATE - - - - -
 WEAK



- LEGEND**
- 1 Porphyritic granite, minor pegmatite and fine-grained acid intrusive dykes
 - 2 Quartz-felspar-biotite gneiss, minor pegmatite and fine-grained acid intrusive dykes. Felspar plagioclase and porphyroblasts may be present.
 - 3 Porphyritic quartz monzonite, monzonite and granodiorite, minor acid rocks
 - 4 Gneiss rock composed of pink felspar, hornblende and biotite minor acid rocks
 - 5 Gneiss, schist, porphyritic granodiorite, quartz monzonite and monzonite. Fine-grained acid intrusives
- approximate outcrop boundary
 x Copper staining (malachite and/or azurite)

ASSAYS

| Sample | % Cu | % Mo | oz. Au | oz. Ag |
|--------|------|-------|--------|--------|
| 0660 | 0.47 | all | all | 0.80 |
| 0662 | 0.24 | all | all | 0.12 |
| 0663 | 1.88 | TR | 0.07 | 0.45 |
| 0664 | 0.14 | all | all | 0.14 |
| 0665 | 0.18 | all | all | 0.12 |
| 0666 | 0.16 | all | all | 0.19 |
| 0667 | 0.31 | all | all | 0.18 |
| 0668 | 0.04 | all | all | 0.38 |
| 0669 | 0.33 | all | all | 0.09 |
| 0670 | 0.34 | all | all | 0.10 |
| 0671 | 0.42 | all | all | 0.25 |
| 0672 | 0.46 | all | all | 0.22 |
| 0673 | 0.29 | all | all | 0.08 |
| 0674 | 0.43 | all | all | 0.14 |
| 0675 | 0.33 | all | all | 0.14 |
| 0676 | 0.48 | all | all | 0.08 |
| 0677 | 1.47 | 0.002 | 0.35 | 0.35 |
| 0678 | 0.13 | all | 0.06 | 0.06 |
| 0679 | 1.52 | 0.001 | 0.38 | 0.38 |
| 0670 | 1.80 | 0.001 | 0.48 | 0.48 |

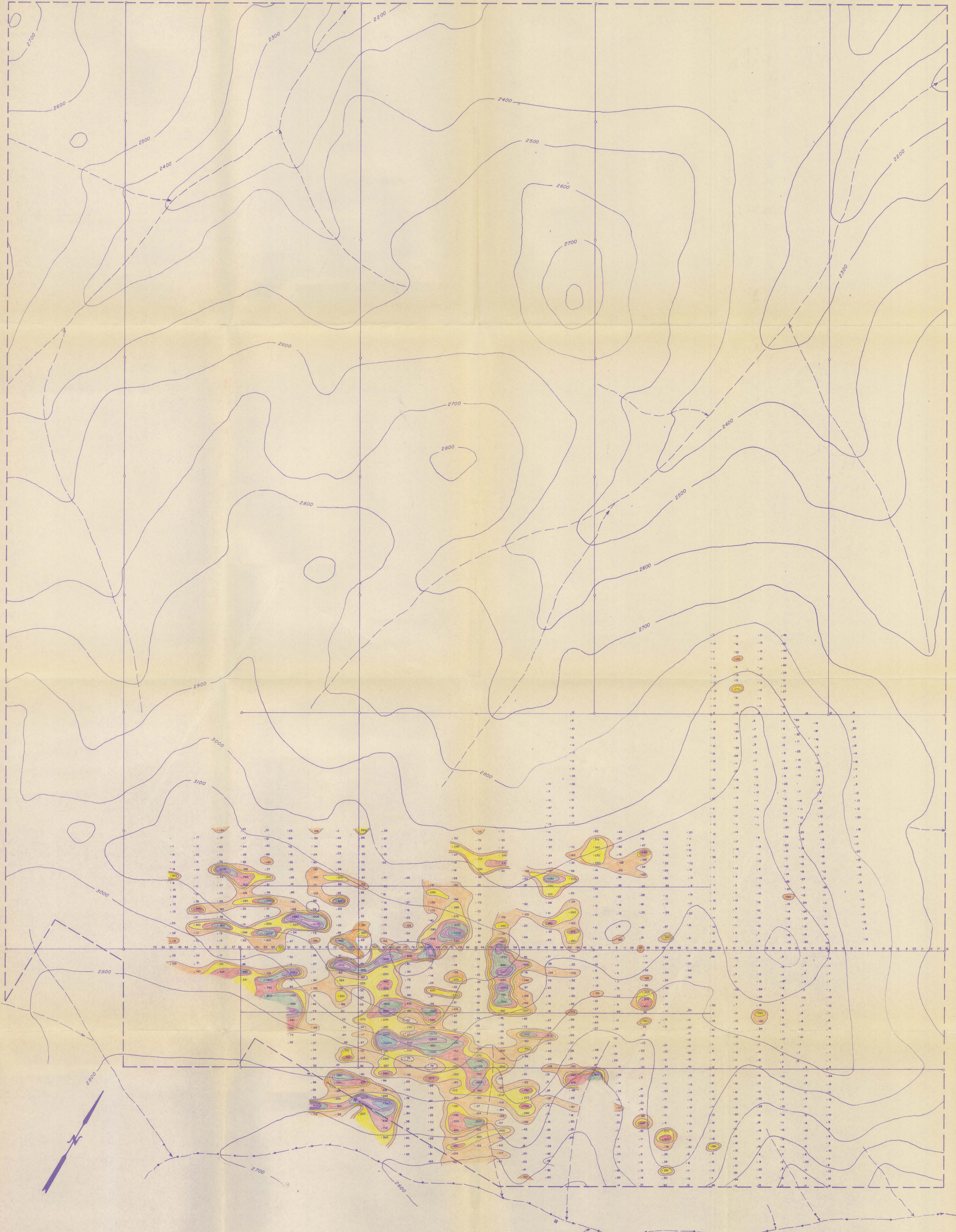
2⊙ HELIPORT WITH NUMBER
 --- CLAIM LINE
 --- CUT OR BLAZED LINE (in most cases, claim line also)
Topographic contours approximate

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

DEF CLAIM GROUP
 N.T.S. SHEET 115-I-11

GEOLOGY

Scale in feet
 0 200 400 600 800 1000 1200



GENERAL LEGEND

- Cut and/or blazed lines
- o Claim post location
- Silver Standard claim posts
- Creek
- - - Boundary of DEF claims
- NOTE Contours taken from 1:50,000 map

GEOCHEMICAL LEGEND

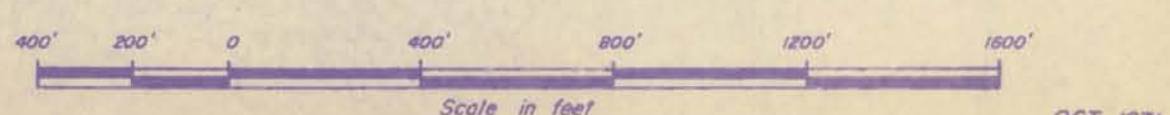
- Soil sample location with value in p.p.m.
- Silt sample location 2 types Active / Muck and ooze

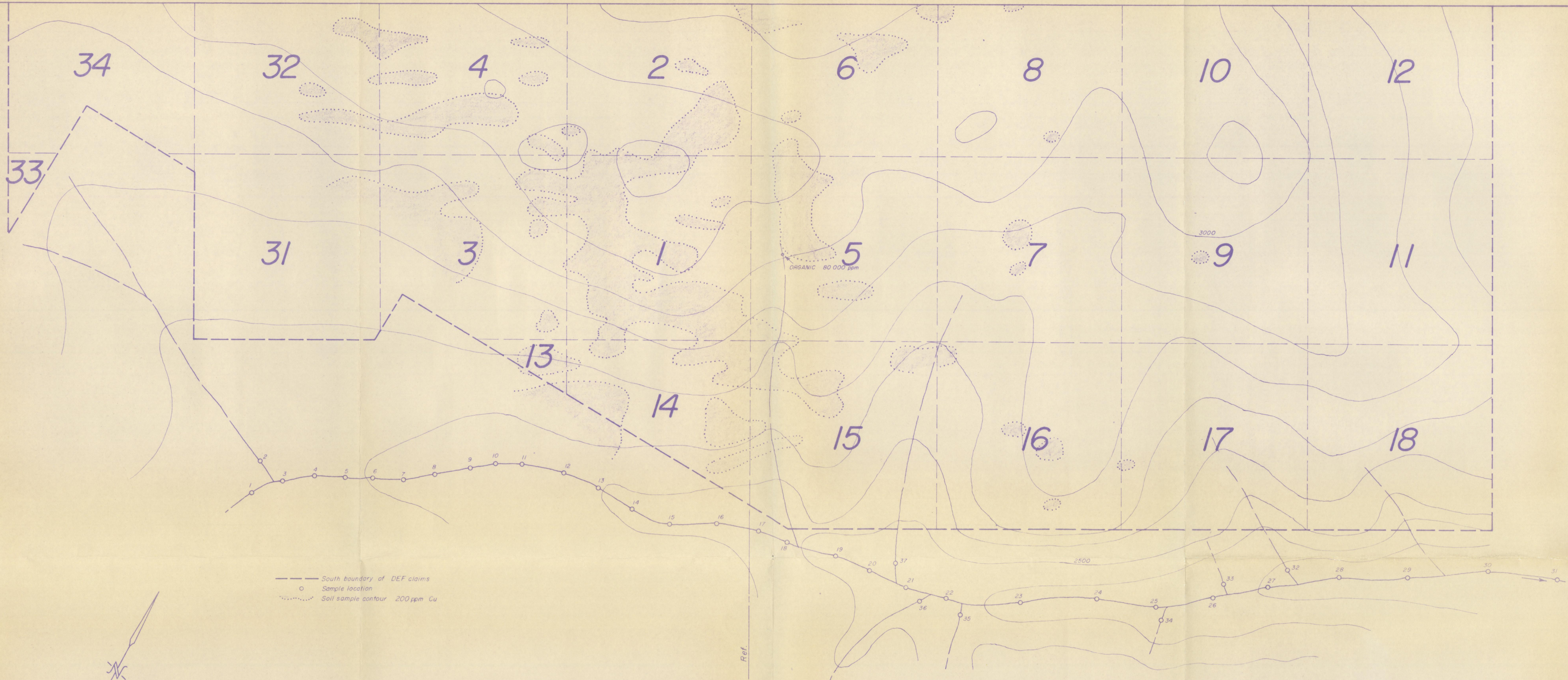
CONTOUR INTERVAL IN P.P.M.

| P.P.M. Cu | |
|-----------|-------------|
| 0 - 100 | 800 - 1600 |
| 100 - 200 | 1600 - 3200 |
| 200 - 400 | 3200 - 6400 |
| 400 - 800 | over 6400 |

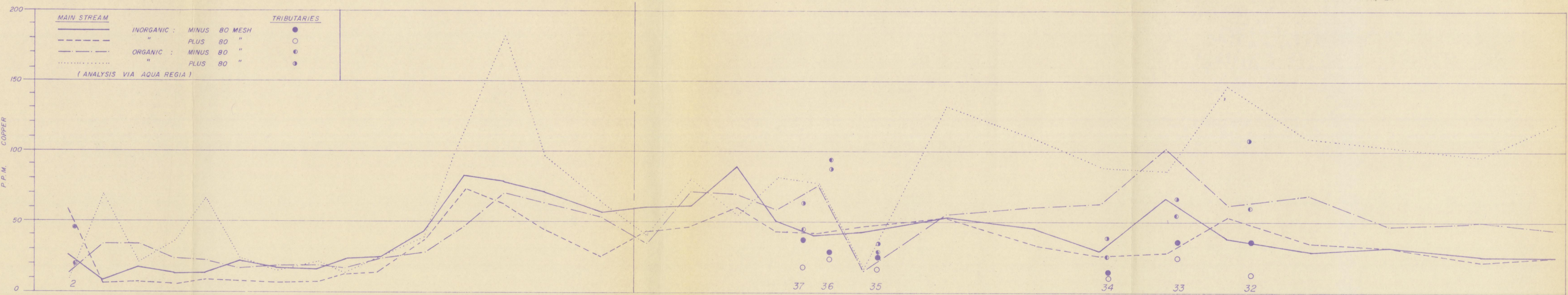
UNITED KENO HILL MINES LTD.
EXPLORATION DEPARTMENT WHITEHORSE, Y.T.

DEF CLAIM GROUP
N.T.S. SHEET 115-I-II
COPPER PLOT





- - - South boundary of DEF claims
 ○ Sample location
 Soil sample contour 200 ppm Cu



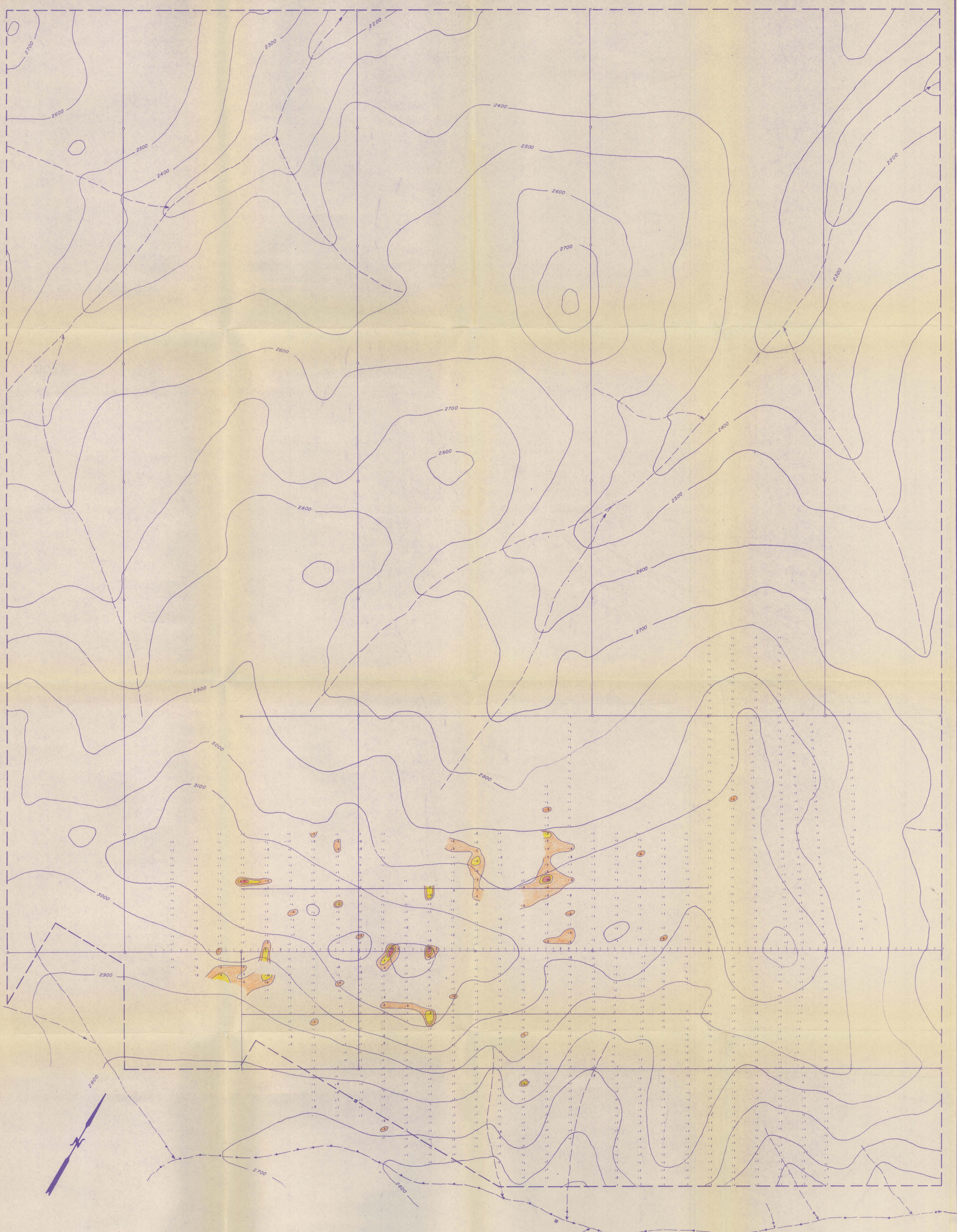
| MAIN STREAM | | TRIBUTARIES |
|-------------|---------------------------|-------------|
| — | INORGANIC : MINUS 80 MESH | ● |
| - - - | " PLUS 80 " | ○ |
| | ORGANIC : MINUS 80 " | ◐ |
| - · - · - | " PLUS 80 " | ◑ |

(ANALYSIS VIA AQUA REGIA)

SOUTH PART OF
DEF CLAIM GROUP
 115 1 11

SHOWING POST-DISCOVERY SEDIMENT SAMPLES
 IN RELATION TO SOIL SURVEY
 (INVESTIGATION BY I.L. ELLIOTT - F.N.M.L.)

Scale: 1" = 400'



GENERAL LEGEND

- Cut and/or blazed lines
 - o Claim post location
 - Silver Standard claim posts
 - Creek
 - - - Boundary of DEF claims
- NOTE:** Contours taken from 1:50,000 map

GEOCHEMICAL LEGEND

- Soil sample location with value in p.p.m.
 - Silt sample location 2 types Active / Muck and ooze
- CONTOUR INTERVAL IN P.P.M.**
- | |
|--------|
| 0 - 2 |
| 3 - 5 |
| 6 - 10 |
| > 10 |

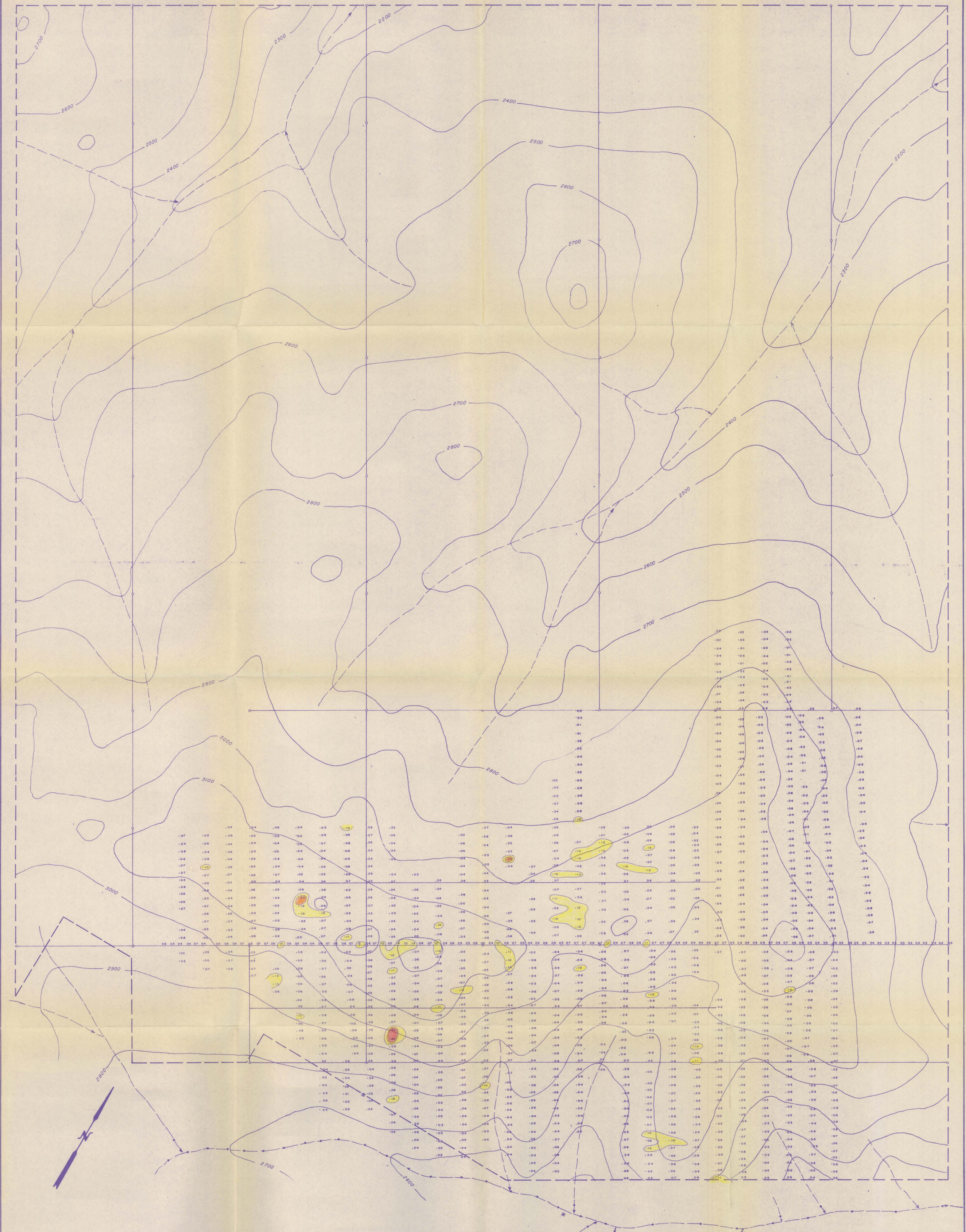
UNITED KENO HILL MINES LTD.
EXPLORATION DEPARTMENT WHITEHORSE, Y.T.

DEF CLAIM GROUP
N.T.S. SHEET 115-I-11

MOLYBDENUM PLOT

Scale in feet

NOV. 1971



GENERAL LEGEND

- Cut and/or blazed lines
- o Claim post location
- Silver Standard claim posts
- Creek
- Boundary of DEF claims
- NOTE: Contours taken from 1:50,000 map

GEOCHEMICAL LEGEND

- o Soil sample location with value in p.p.m.
- Silt sample location 2 types Active / Muck and ooze

CONTOUR INTERVAL IN P.P.M.

- P.P.M. Ag
- 0 - 10
 - 10 - 20
 - 20 - 40
 - over 40

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

DEF CLAIM GROUP
N.T.S. SHEET 115-I-11
SILVER PLOT

Scale in feet
OCT. 1971