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REPORT ON THE MAGNETIC AND INDUCED POLARIZATION SURVEY CONDUCTED ON THE CEDAR CLAIMS AT LIKELY, BRITISH COLUMBIA

by

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INTRODUCTION

A geophysical survey was conducted by Union Carbide Exploration Corporation on the Cedar Group of claims at Likely, British Columbia. The latitude is 52°35'N. The longitude is 121°30'W. The N.T.S. is 93A/11. The aeromagnetic map at 1 inch to 4 miles is numbered 7221-G. The geologic map on the same scale is numbered 3-1961. It was published in 1961 and is being updated. The present magnetic declination is about 24°80' east. The claims are a few miles SE of Likely and are accessible on a fair dirt road by a two wheel drive vehicle.

Figures VII, VIII, IX and I show the location of the grid and claims.

LOG OF GEOPHYSICAL WORK

Day	Date	Personnel	Work Done
Monday	13 May 74	D.Bowen, G. Artmont	Drove IP gear to Boston Bar
Tuesday	14 May 74	" "	Drove IP gear to Likely
Wednesday	15 May 74	" "	Mag. survey of grid
Thursday	16 May 74	" "	Mag. survey of grid
Friday	17 May 74	" "	
		R.Black, T. Rehtlane	3 array survey
Saturday	18 May 74	" "	"
Monday	20 May 74	" "	"
Tuesday	21 May 74	D. Bowen, G. Artmont	
		M.DeQuadros, G. Malnis	"
Wednesday	22 May 74	" "	"
Thursday	23 May 74	" "	"
Friday	24 May 74	" "	" and base map
Saturday	25 May 74	" "	" "
Monday	27 May 74	" "	" "
Tuesday	28 May 74	" "	" and dipole-dipole
Wednesday	29 May 74	D.Bowen, L.Bell, J.Grimes G. Diakow, G. Malnis M. DeQuadros	Searching for claim posts
Thursday	30 May 74	D. Bowen, G. Artmont J. Grimes, G. Malnis	Dipole-dipole array
Friday	31 May 74	D. Bowen, G. Artmont	Drove IP gear back to Vancr.

M. DeQuadros has a Ph.D. in geology from Nairobi. G. Artmont, G. Malnis R. Black, T. Rehtlane were summer students. D. Bowen ran the geophysics. D. Bowen has an M.Sc., in geophysics and some years experience in the conduct of field work.

THE MAGNETIC SURVEY

Vertical components of the earth's total field were measured every hundred feet with a Sharpe fluxgate magnetometer, model 321. The values are relative, the response of the greater proportion of the vertical field having been backed out.

Figure 1 shows profiles of the data. On the horizontal scale one inch equals twenty gammas.

All values were corrected for diurnal variation and drift of the instrument by traversing the grid in loops and re-reading every few hours appropriate stations on the base line. The profiles are essentially flat and show very little information other than a uniform nonanomalous distribution of magnetic material.

Isolated spikes are due to scant boulders of pyrrhotite and magnetite in the glacial debris which, according to Dolmage, is from twelve to sixty or seventy feet thick. On line 44+00 NW, at 11+00 SW a pole is 50 to 80 feet deep. A horizontal dipole would be 25 feet deep.

THE INDUCED POLARIZATION SURVEY

The transmitter had a capacity of 2.5 kw. It was made by Huntec of Toronto. It was driven by a Briggs Stratton motor with a capacity of 8 hp. The receiver was built by Crone of Mississauga, Ontario. It was called the IP-IV receiver. The instruments operated in the time domain. The period of the pulse was: two seconds on (positive), two seconds off, two seconds on (negative), two seconds off.

The current electrodes were single bars of stainless steel about three feet long hammered into the ground. The high voltage of the transmitter was always 2200 v. The current varied from about half an ampere to one ampere so that power put into the ground varied from 1.1 kw. to 2.2 kw. With this range the primary voltage at the receiver seldom dropped below 30 mv. and was well above noise levels and gave accurately reproducible chargeabilities. Making electrical contact with the ground was no problem.

The potential electrodes were porous pots filled with a saturated solution of copper sulphate. Contact with the ground was in a small hole scraped with the heel in the A or B horizon. Contact resistances could not be measured directly but always registered in the green part of the meter on the receiver, and so, according to Crone's instruction manual, permitted accurate measurement.

ARRAYS FOR THE INDUCED POLARIZATION SURVEY

The three array was used to survey the grid from line 40+00 NW to line 64+00 NW. "a" spacings of 100 and 200' were used everywhere and on line 56+00 NW an additional spacing of 50' was used. (See Figure 2). On part of line 56+00 NW a dipole-dipole array was used with a spacing of 100' and with n values of 1, 2, 3 and 4.

INTERPRETATION OF CHARGEABILITIES FOR THE THREE ARRAY

There are two distinct chargeability contacts, separating three media of different chargeabilities. One contact extends along the baseline from line 48 NW to line 64NW. Southwest of it is a trough of low chargeabilities flanked by steeply increasing chargeabilities. Northeast of it is a zone of high chargeabilities, from twice to three times the background, extending about fifteen hundred feet to the second conatct which is at line 15 NE and extends from line 44 NW to line 64 NW. Northeast of this contact, on lines 56 NW, 60 NW and 64 NW, is a flat area where background chargeabilities can be estimated at about 30 ms.

The zone of high chargeabilities between the two contacts is anomalous. It is about 1500' wide and extends from line 48 NW to beyond line 64 NW. The absence of a related magnetic anomaly suggests that the source of the anomaly is nonmagnetic sulphides. This hypothesis matches well Dolmage's section for Drill line 1. There he indicates a horizontal lenticular volume of shattered bedrock and sulphides intersected by Grogan Creek and about 700' long and covered by overburden no thicker than 20' and in one place only 3' thick.

The profiles at a=100', a=200' and a=50' on line 56 NW look very much alike. This suggests that the overburden is much thinner than the smallest a, or 50'. This is borne out by Dolmage's section for drill line 1.

The location of drill line 1 was not known and was made one of the objectives of the IP survey. An old steam drill was found on line 56 NW. On the other hand old, inaccurate maps put it near line 49 NW. The drill line probably lies somewhere between line 48 NW and line 56 NW.

Exceptionally high and low chargeabilities occur at some single stations in the anomalous zone, especially on line 56 NW. Though alarming these are repeatable and the associated L reading equals the high M reading. Boulders bearing pyrite and the thin variable overburden close to highly chargeable material must account for these high readings.

On lines 52 NW and 64 NW are two distinct peaks. These probably indicate two zones of high sulphides.

It is difficult to estimate the dip, if any. The steep rise followed by a fall slowly to the SW on lines 64 NW and 48 NW suggests a dip down to the SW. The two minima of equal chargeability on line 52 suggests rather a vertical body. The similarity of the profiles at spacings of 100 and 200' suggest that the depth to the bottom of the sulphides is greater than 200'.

In short, what is positively known is that between the steep flanks of the anomaly is the top of non-magnetic sulphides covered by overburden no thicker than 50'. These sulphides would appear to extend from 48 NW to 64 NW and to be about 1000' wide.

INTERPRETATION OF THE RESISTIVITY DATA FOR THE 3-ARRAY

There are two resistivity contacts on lines 52 NW, 56 NW, 60 NW and 64 NW. One is at 1 NE on all four lines and separates a band of high resistivities in the SW, typically about 800Ωm from a band of low resistivities, typically about 100Ωm to the NE.

The second contact is at 13 or 14 NE. It persists from 48 NW to 64 NW and separates values of about 50Ωm from values of about 300Ωm.

The proximity of the two resistivity contacts to the two IP contacts cannot be fortuitous. The band of high chargeabilities correlates with the band of low resistivities.

On lines 40 NW and 44 NW the band of really low resistivities has disappeared and the two bands on either side have merged.

INTERPRETATION OF THE METAL FACTORS FOR THE 3-ARRAY

Figure 4 shows the profiles of the metal factors obtained by dividing the resistivities directly into the chargeabilities. On the vertical scale one inch equals one millisecond per ohmmeter.

On 15 NE from 44 NW to 64 NW is a strong contrast between metal factors of about 0.3 and a peak of about 4.0. To the SW is a subsidiary peak on lines 48 NW through 64 NW. At the baseline is a contact between the subsidiary peak and metal factors less than 0.1.

There are two contacts and between the contacts are greater and lesser maxima. The contacts correlate well with the resistivity and IP contacts. Even the most skeptical would have to admit that the greater maximum, and its associated high chargeabilities, must correlate with sulphide mineralization. The subsidiary maximum indicates a second concentration of mineralization, which may or may not be part of the greater mineralization.

INTERPRETATION OF THE DIPOLE-DIPOLE DATA

Figure 5 shows pseudosections of chargeabilities, resistivities and metal factors.

Figure 6 shows profiles for =2. Peaks in the profiles align well with peaks on the profiles for the 3 array. Between 11 and 15 NE is a definite anomaly in M, ρ , and metal factor. Some primary voltages were too low to measure accurately (hence the "less than" sign) and associated chargeabilities could not be measured. A vertical drill hole at 12+50 NE about 200' deep should find the source of the anomaly.

Between 2 and 4 NE is weaker anomaly. It is separated from the main anomaly by a zone of high resistivity and is probably due to a second, weaker source of sulphides. It would probably be worth drilling this too.

CONCLUSIONS FROM THE GEOPHYSICAL DATA

Anomalous chargeabilities, resistivities and metal factors exist from 48NW to and beyond 64 NW and from 0+00 to 15+00 NE. Contacts are at 0+00 and at 15 NE. The very low resistivities at 15 NE suggests a fault or shear. The high chargeabilities SW of the supposed fault suggest non-magnetic sulphides on that side.

Dipole-dipole data and profiles of metal factors suggest two bodies of of sulphides. On line 56 NW one is under 12+50 NE and the other is under 2 to 4 NE. Both parts of the line should be drilled.

Similarity of profiles at 50,100, and 200' on line 56 NW suggest that overburden is much thinner than 50' and also that in some downward direction a dimension of mineralization exceeds 200'.

It is the opinion of the author that little can be known about the dip. The approximate symmetry of the maximum between the two minima of the chargeability on line 52 NW suggests vertical sides. The body may be block shaped or even hemispherical!

There are close similarities between the geophysical data from Likely and that from Krain, B.C. (Hansen, 1959) although the regional geologies are different. Figure 5 of Hansen's paper shows vertical diamond drill holes.

The close resemblance between the three array profiles and the dipole-dipole profiles on line 56 NW suggests that each spike has some geological significance at the station at which it is plotted. In particular, the lining up of three minor peaks in the resistivity at about 6 NE on lines 56 NW, 60 NW, and 64 NW strongly suggests a thin strip of material of higher resistivity separating two zones of sulphide mineralization all the way from 56 to 64 NW.

GEOLOGICAL NOTES WITH REFERENCE TO GEOPHYSICS

No outcrop occurs on the grid. Outcrop occurs in the steep side of Cedar Creek some thousands of feet to the south west of the grid. SW of line 56 NW, in the cliff, was found andesite in situ with about 0.5% of pyrite. Most of the rock exposed is andesite. At 48 NW, 4 SW is a bulldozed trench showing about 7' of soil and boulders and under that bedrock of shattered andesite with some calcite deposited in the cracks and porphyritic pyroxene, but no pyrite. Many boulders along the main road across the creek contain large cubes of pyrite.

Referring to the outcrop in Cedar Creek Canyon, Dolmage (1931) finds andesite with phenocrysts of augite, a band of cherty sediments, a band of "greenish volcanic rocks", and a band of argilaceous and calcareous sediments extending to the Spanish Mountain Ridge. Bedrock everywhere is rich in pyrite.

In the course of prospecting for placer gold, Dolmage drilled drill line 1 down to bedrock, somewhere between 48 NW and 56 NW. He found that glacial overburden was less than 20' thick and that these two "buried channels." Conceivably one of these channels, the most NE one, could coincide with a fault and the pronounced low in the resistivity. He also found a shallow, horizontal strip of "shattered bedrock and sulphides" intersected by Grogan Creek. This lead to the geophysical survey.

Primac Exploration studied some adjacent claims along Cedar Creek. They found volcanic andesites, of middle or upper Jurassic, bearing pyroxene. Regional trends are all from NW to SE. Grogan and Cedar Creeks essentially run in that direction. Airborne magnetics indicate a trough of low flat magnetic intensities paralleling the Quesnel Trough.

A few miles NE of the Cedar claims is the Pinchi Fault. Ramani says that the government airborne magnetic map No. 1533-G indicates a fault coincident with Cedar Creek. This is not proven on accounrt of incomplete airborne mapping.

According to the report of the Minister of Mines for B.C. for 1922, mineralized sheared zones were found striking 144° from true north and dipping gently to the north east, about one mile upstream Cedar Creek.

REFERENCES

Dolmage, V., 1931, "Report on the Properties of Cedar Creek Placer Gold Company Ltd."

Hansen, D.A., 1959, "Exploration Case History of a Disseminated Copper Deposit."

S.E.G. Mining Geophysics, Vol. I, 1966, page 306.

Report of Minister of Mines, B.C., 1922-23, page A 131.

Figure VIII INDEX MAP SHOWING APPROXIMATE LOCATION OF CEDAR CLAIMS, LIKELY, B.C. UNION CARBIDE EXPLORATION CORPORATION.

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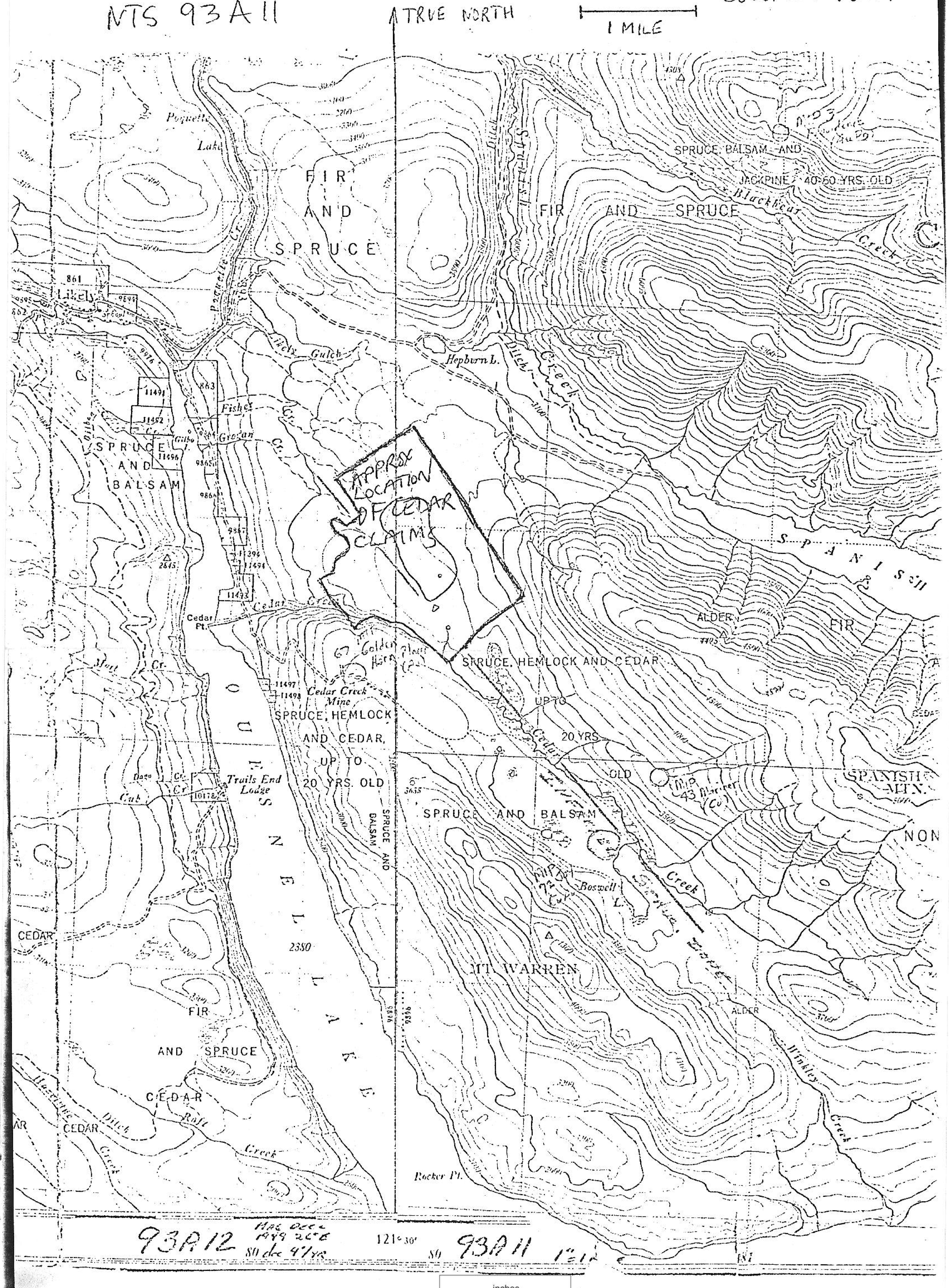
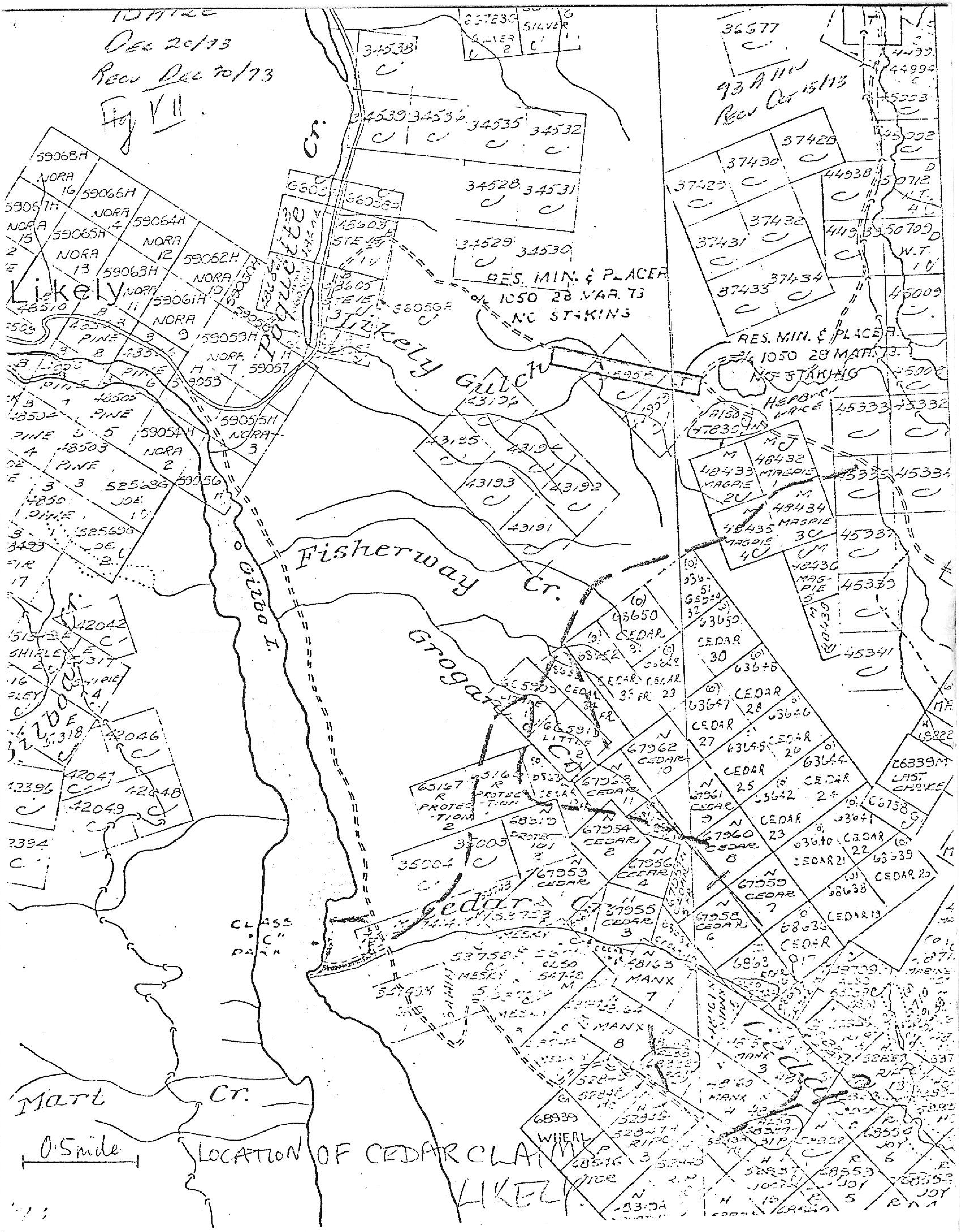
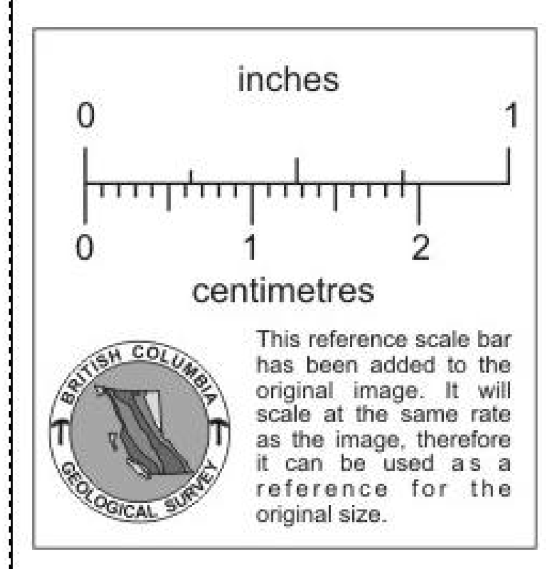




Dec 20/73
Recv Dec 20/73
Fig VII
93 A 11W
Recv Oct 15/73
Likely
Likely Gulch
Poquette Cr.
RES. MIN. & PLACER
1050 28 MAR. 73
NO STAKING
HEPBURN LAKE
Fisherway Cr.
Grogan Cr.
Cedar Cr.
CLASS "C" PARK
Mart Cr.
0.5 mile
LOCATION OF CEDAR CLAIMS
LIKELY



inches
0
1
0
1
2
centimetres
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BRITISH COLUMBIA GEOLOGICAL SURVEY

Fig I

PROFILES OF MAGNETIC DATA.
LIKELY, CEDAR CLAIMS, BRITISH COLUMBIA.
SHARPE MAGNETOMETER, MEASURING VERTICAL FIELD.
UNION CARBIDE EXPLORATION CORPORATION

20γ
500ft

| inch = 500 feet
| inch = 20 γ

DATA ACQUIRED BY D. BOWEN and G. ARTMONT, 16th and 17th MAY. 1974
PROFILES SUBMITTED BY D. BOWEN
D.M.T. Bowen, 5th June 1974

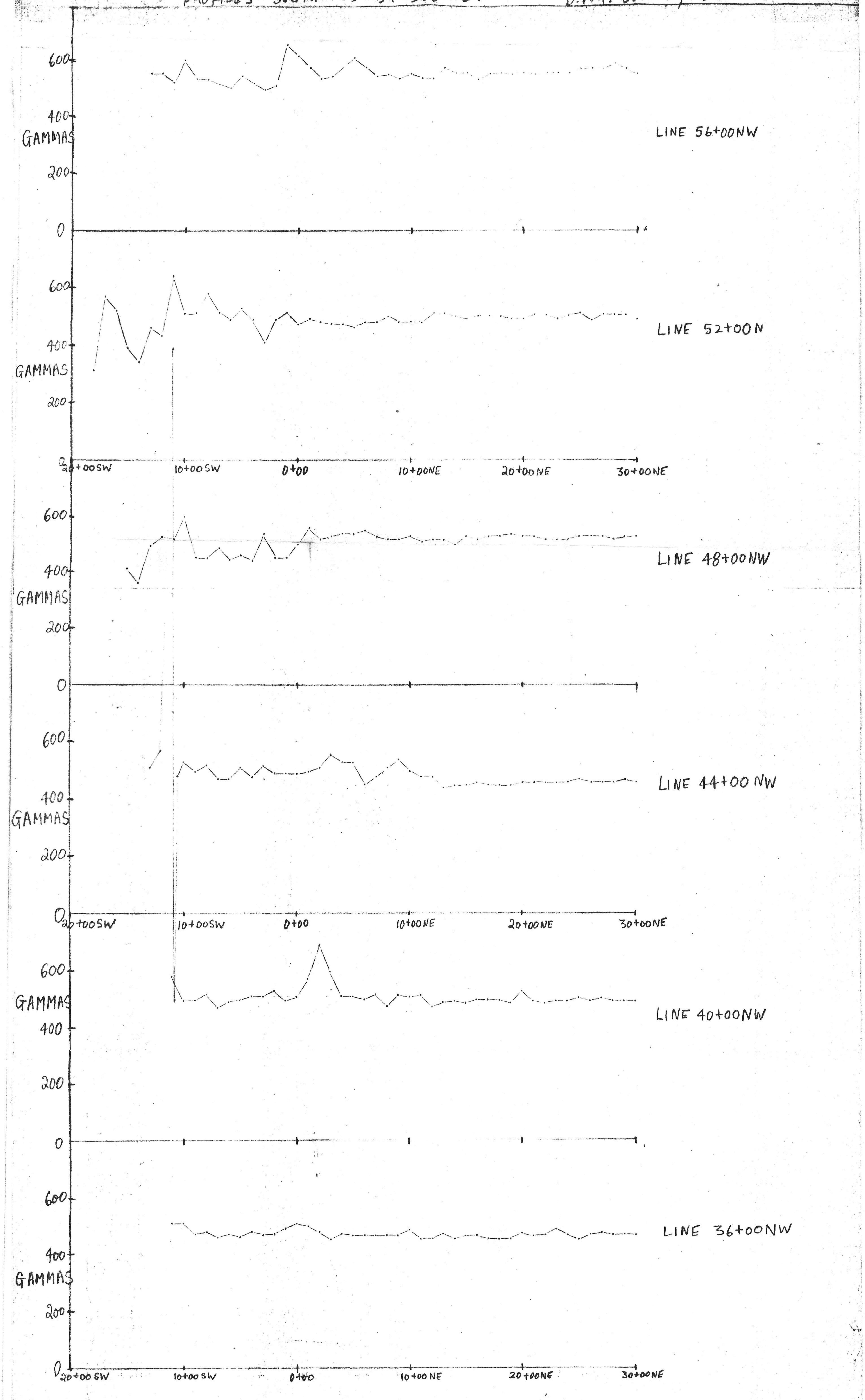


Fig. 2

PROFILES OF CHARGEABILITIES OBTAINED WITH THE 3 ARRAY

CEDAR CLAIMS, LIKELY, BRITISH COLUMBIA

UNION CARBIDE EXPLORATION CORPORATION

D. Bowen 7 June 1974

1 inch = 500 ft

1 inch = 20 ms

Fig III

PROFILES OF RESISTIVITY DATA

LIKELY, CEDAR CLAIMS, BRITISH COLUMBIA
HUNTEC IP TRANSMITTER, CRONE IP RECEIVER
UNION CARBIDE EXPLORATION CORPORATION
D. Bowen, 7th June 1974.

1 inch = 500 ft.
1 inch = 200 Ω m.

RESISTIVITY
CEDAR

RESISTIVITY
CEDAR

Fig IV

PROFILES OF METAL FACTORS

LIKELY, CEDAR CLAIMS, BRITISH COLUMBIA

UNION CARBIDE EXPLORATION CORPORATION

1 inch = 500 ft

1 inch = 1 ms/Ωm

1 ms/Ωm

500 ft

D Bowen 7 June, 1974.

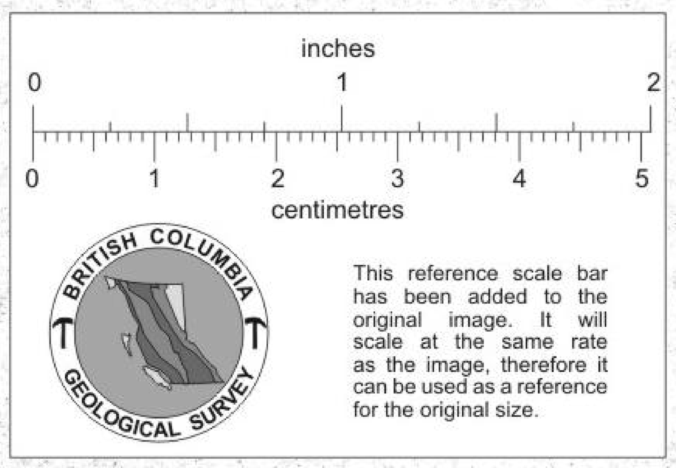
Fig V

DIPOLE-DIPOLE PSEUDOSECTIONS $x = 100$ ft ; $n = 1, 2, 3, 4$

LINE 56NW UNION CARBIDE EXPLORATION CORPORATION.

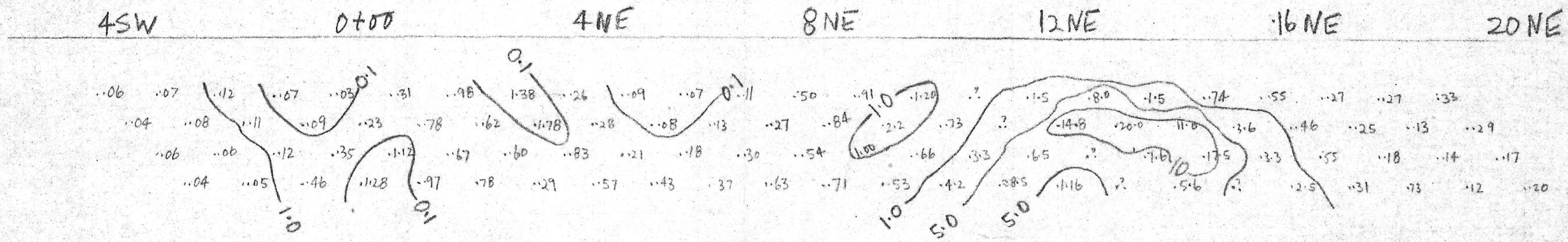
LIKELY, CEDAR CLAIMS, BRITISH COLUMBIA

1 inch = 200 feet

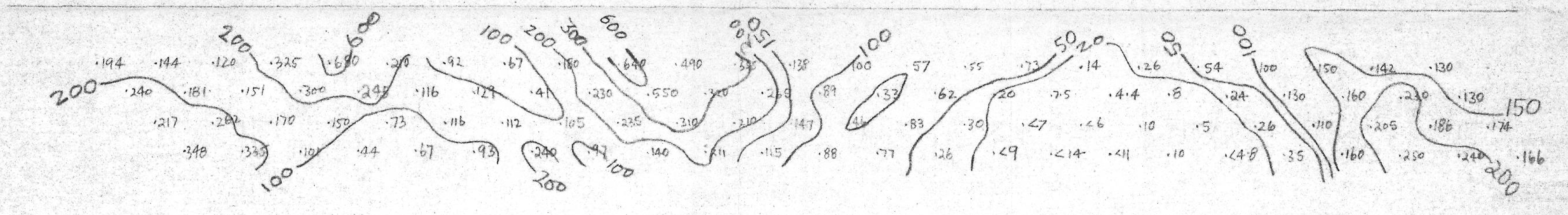


200ft

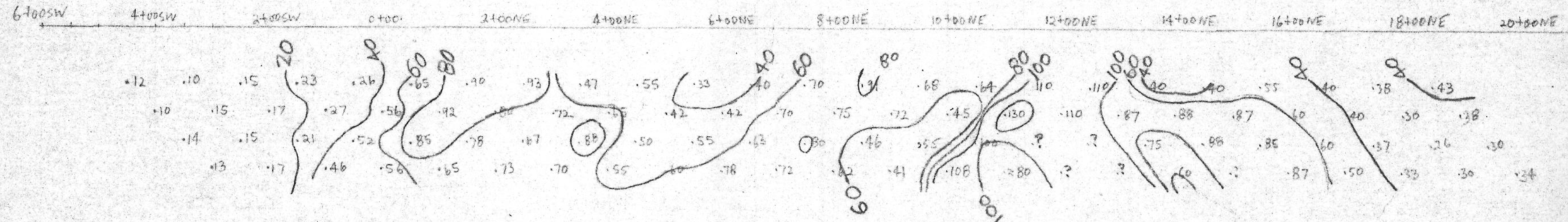
DMT Bowen 7 June, 1974



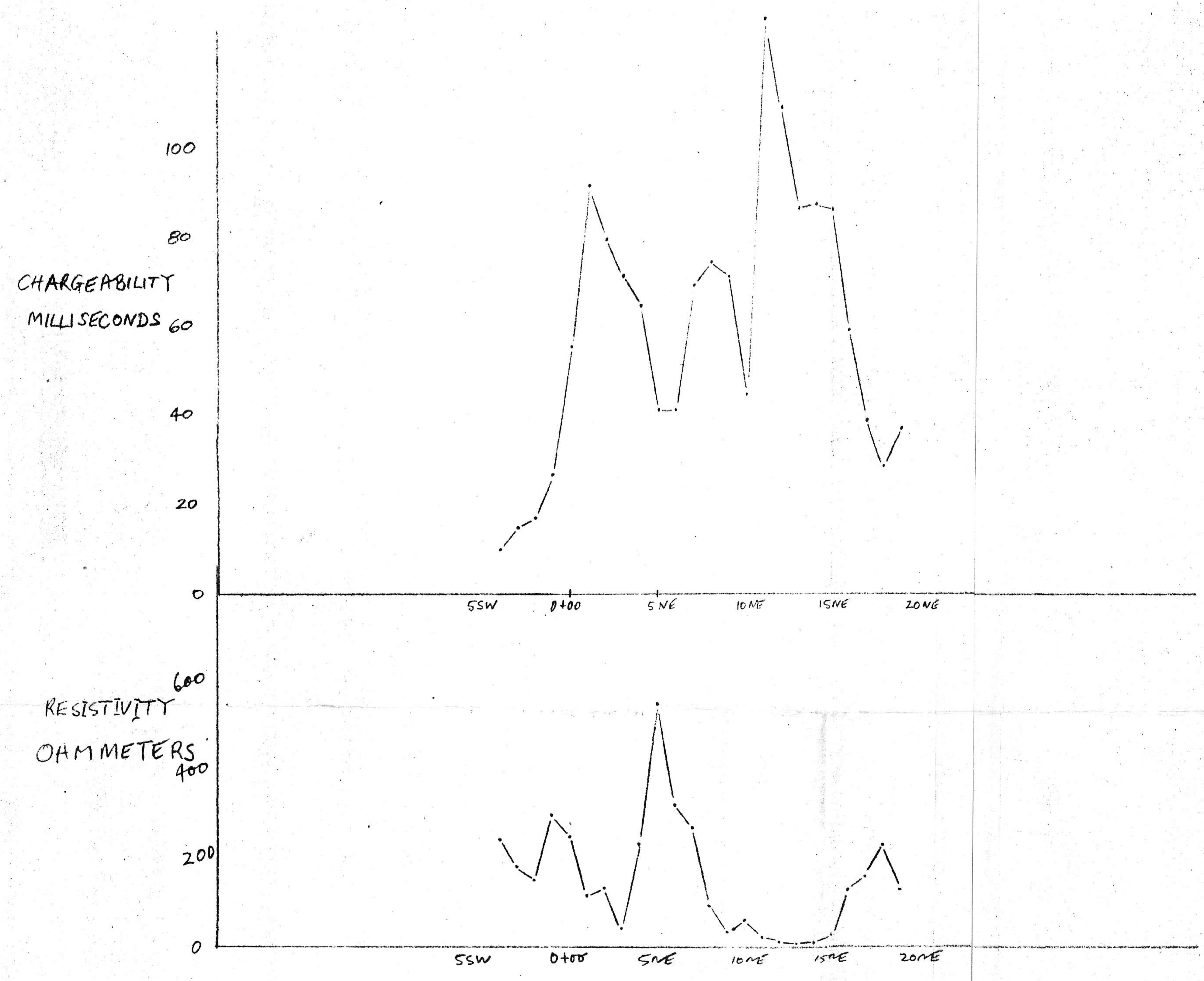
LINE 56NW METAL FACTORS MILLISECONDS PER OHMMETER



LINE 56NW RESISTIVITY OHMMETERS



LINE 56NW CHARGEABILITY MILLISECONDS



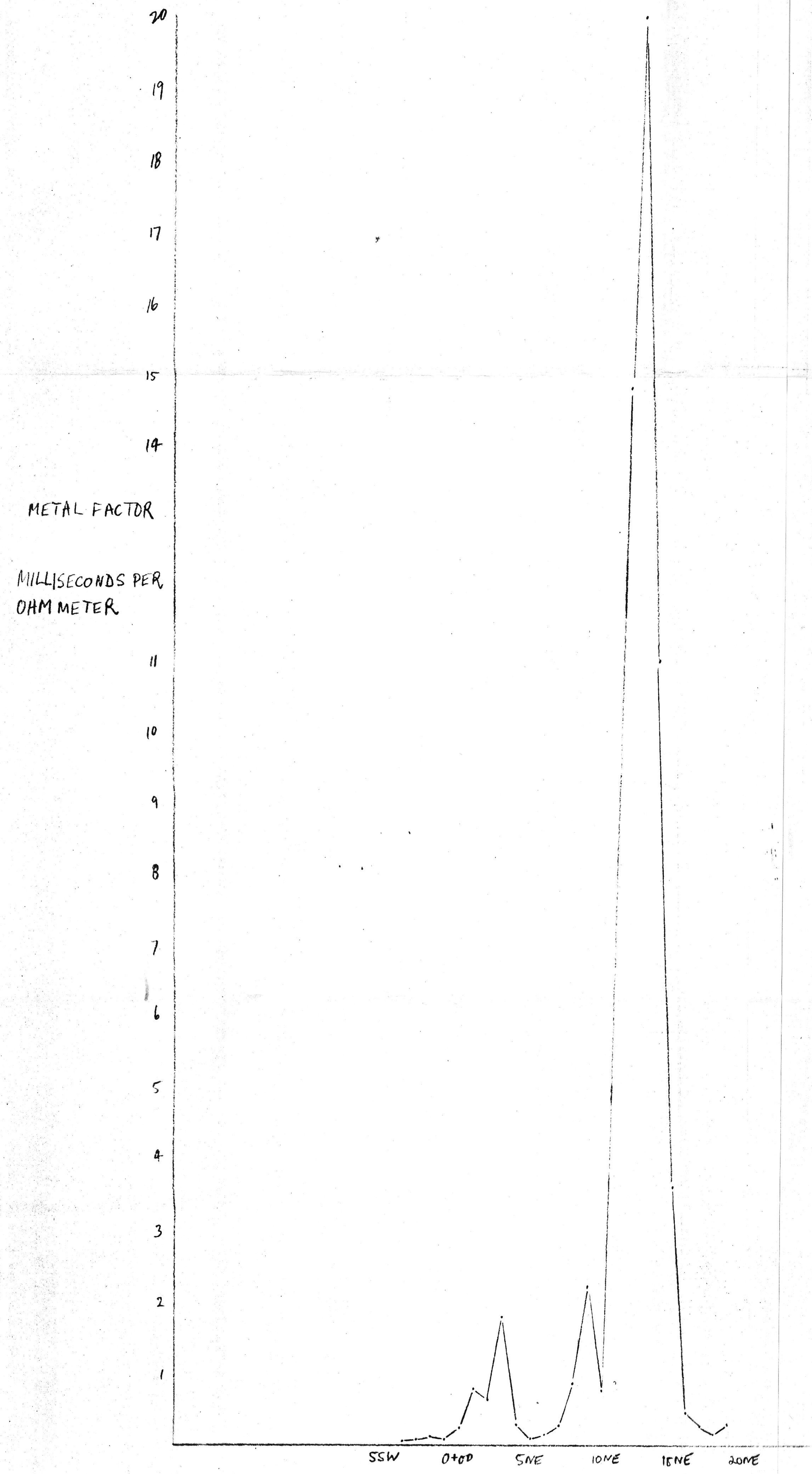


Fig VI

PROFILES OF DIPOLE-DIPOLE DATA FOR n=2

CEDAR, LIKELY, BRITISH COLUMBIA
LINE 56NW

1 inch = 500ft. 1 inch = 20ms 1 inch = 200 Ωm
1 inch = 1 ms/Ωm

500ft

20ms 200 Ωm 1 ms/Ωm

Dent Bauer 7 June 1974

Fig IX

LEGEND

Contour Interval – 50 FT.

■ Claim Posts (hardrock)

UNION CARBIDE EXPLORATION CO.

GENERAL PLAN OF CEDAR CREEK VALLEY CLAIMS

Drawn by

Date

Scale – 1 IN = 1000 FT