841

GEOPHYSICAL REPORT

ELECTROMAGNETIC SURVEY
AIR SUPPORT
SPARLING AND BANKER GROUPS
TULSEQUAH, B. C.

for

NEW TAKU MINES LTD (NPL)
VANCOUVER, B. C.

by

GEO CAL LIMITED
WEST VANCOUVER, B. C.

DATE: May 8 to June 10, 1966

Geophysicist:

C. S. Selmser, P. Eng.

CERTIFICATE OF QUALIFICATIONS

The formal education of the author consists of undergraduate studies at Union College, Schenectady, N. Y., in engineering and science with a degree conferred as B. Sc. Graduate study was taken at McGill University and at Toronto University in Mining Geology and Geophysics with a degree conferred as M. Sc. He is qualified both in Engineering Geology and Geophysics as a Professional Engineer.

The author has had some twenty years experience in the fields of Geology and Geophysics doing exploration work throughout Canada. He has also worked for a short period of time in the Transvaal region of South Africa.

The author has been a member of the Association of Professional Engineers of Ontario, Alberta and British Columbia for the past 14 years. He is at present an active member of the Association of Professional Engineers of British Columbia with Certificate No. 4683.

My knowledge of the property outlined in this report has been gained from the geophysical survey. Reference has also been made to government reports and tertinent texts.

The author has no financial interest in this property other than the survey work, and is acting wholly as a consultant to the interested principal. Any remuneration received has been for expenses incurred during the survey and for his professional services.

C. B. Selmser

C. B. Selmser, P. Eng.

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TULSEQUAH, B. C.

INTRODUCTION:

The area over which this air support electromagnetic survey was flown is in the extreme northwest sector of British Columbia near the Alaskan boundary (see Location Map). This area is 58° 38' north latitude and 133° 30' west longitude.

The Sparling and Banker groups are located 3 miles northwest of the settlement of Tulsequah, B. C., on the south slope of Manville Mountain and at the fork of the Taku and Tulsequah Rivers.

This survey was carried out in order to find conducting bodies on the Sparling and Banker groups, which might be interpreted as metallic lustre sulphide ores. These would include Pyrite, calcopyrite, galena and sphalerite.

Other large areas were flown with the receiver on to detect locations of prime conductivity. Two of these locations were surveyed on the ground to determine exact cross-overs and boundaries of conductance.

WORK SUMMARY:

This survey was carried out by an experienced operator and assistant under the direct supervision of Mr. Ted Johnson, the engineer working for New Taku Mines Ltd. The operator was also under the supervision and advice of the author. The operator in this case was Mr. Ian Poyntz, who has had several years experience in this line of work.

About 5 days were spent in airborne reconnaissance and the rest of the period was spent doing ground work. This part of the survey included about 25 days spent doing lines on Banker, Sparling and areas 3 and 4.

GENERAL GEOLOGY AND PHYSIOGRAPHY:

The terrain in this sector is mountainous with glaciers in the higher portions. The drainage is through valleys with braided river systems. The river valleys are about 100 feet above mean sea level while the glaciated peaks are more than 5000 feet above sea level.

The main country rocks are composed of Rhyolite and Andesite flows with included limestones. The flows are classified in the Stuhini group of younger age than the limestones. These are of Upper Triassic age.

Mineralization is confined to siliceous banding in shear zones. It consists of stringers and small masses of galena and Sphalerite. Some tetrahedrite stringers are also found at the Banker showings. In the mineralized zones the limestone becomes altered and contains pyritic zones. Siliceous zones with quartz stringers are also quite common.

The Tulsequah valley, where the deposits are located represent a large syncline on the southwest flank of a large anticlinorium. Batholiths of hornblende-andesine granodiorite appear at the upper end of this long plunging syncline. These batholithic intrusions have mineralized the rocks into which they intrude.

Some shearing and small movements took place at the time of the alteration and mineralization of the country rocks. Pyrite was the first mineral deposited and was accompanied by fluorite, albite and quartz. Chalcopyrite, galena and sphalerite replaces the pyrite and other minerals. The deposits lack signs of very high or low temperature conditions so have been classified as mesothermal.

ELECTROMAGNETIC SURVEY:

The survey was done on the ground using a Sharp 250 Electromagnetic instrument. The transmitter and receiver were moved together up

parallel lines with a 200 foot separation between them. Readings were taken on stations at 50 foot intervals.

Conductive zones were found at both locations, but the extent and amplitude of the readings on the Barker showing was very minor. The two decisive readings were obtained just north of the trench marked "F" on the Location Map.

The conductive zone on the Sperling showing has many decisive readings and is of fairly large areal extent (600 by 300 feet). Many of the readings have large amplitude (15 to 20 degrees) which indicates that a prime conductor is present below this location.

The airborne part of the survey was carried out as a reconnaissance program in the district around Tulsequah. This method is outlined in the accompanying detailed summary (see following pages). The areas covered in this survey include the Mount Manville, Whitewater, Metzger and Sittakanay districts. Anomaly centres are marked by a distinctive symbol on each of the maps covering these districts.

Areas 3 and 4 on the Mount Manville map have been surveyed on the ground as shown on the detail maps for these areas. Area number 3 shows a distinct cross-over with high amplitude readings on both sides of the boundary lines. Area 4 has a cross-over with readings of moderate value on both sides. This would indicate that the area is of secondary importance as a conductor.

INTERPRETATION MANVILLE DISTRICT:

There would seem to be certain mineralogical lineaments in this district. These may be set out in groups as follows:

(1) Barker, Sperling, Anomalies 10, 9 and 13

(2) Anomalies 11 and 12

(3) Anomalies 4, 5 and 6

(4) Anomalies 3, 7 and 8

Some of these lineaments or some of the centres follow some of the drainage patterns. This pattern in this locality is orientated northwest or north and south. The northwest to southeast direction which predominates is parallel to the fold axis of the area further to the northeast. These lineaments could mark the existence of thrust faults in the more competent rocks of this area (the extensive intrusion of the coast intrusives.) This situation is analogous with other localities further south (the North Vancouver mainland district).

Any north to south lineaments mark the shear or tension direction of these thrust movements. One of these is filled with quartz monsonite on Mount Erickson (see Geological Map 931A).

Geological Survey Memoir 249, Taku River Map -- Area, B. C. by F. A. Kerr

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You will also note that the cross-over boundaries on both the Sperling and the Area No. 3 detail maps are orientated in a general north to south direction. This is not true for the detail on the Barker and Area No. 4 detail maps where the orientation is much more northwest to southeast.

INTERPRETATION WHITEWATER DISTRICT:

In this locality there are again some mineralogical lineaments. These include as follows:

(1) Polaris Taku Anomalies 23, 24, 25 and 26

(2) Anomalies 19, 20, 27 and 29

The first alignment is following the north to south tension direction. We have already discussed this as being the selected direction for mineralization.

The second alignment closely follows a drainage pattern. This direction corresponds with neither the tension or thrust directions.

INTERPRETATION OF THE SITTAKANAY DISTRICT:

The clearest and strongest electromagnetic response of the whole district occurred in this area over anomaly centres 32 and 33. The area was also observed to be very altered and oxidized at the surface. The areas which gave promise of mineralization were at anomaly centres 30 and 31.

Here, there are again certain mineralogical lineaments which have a predominant direction as follows:

(1) Anomalies 31, 38, 39 and 40

(2) Anomalies 32, 33, 40, 41 and 30

(3) Anomalies 31, 34 and 35

Alignment (1) is in a north to south direction, which has been designated as the tension direction. Alignments (2) and (3), however, are in a thrust or compression direction.

CONCLUSION:

I would like to comment on the designated directions which have been outlined above. In no individual case does the author select one direction as more favorable than the other for structural reasons. What has been a tension direction at one time in geological history may in another epoch be a compressional direction.

Directions of alignment, however, that follow obvious drainage patterns may be suspect. These could be caused by secondary conductive

processes such as ground water of a low dielectric constant in gravels or the selective deposition of clays with high water content. Also it is probable that heavy minerals may be selectively deposited in certain locations.

The following alignments with the area and anomalies are thought to be the most favorable for mineral deposition:

A. Manville

(1) Sparling

(4) Anomaly 3

B. Whitewater

(1) Anomalies 23, 24, 25 and 26

C. Sittakaney

(1) Anomaly 31

(2) Anomaly 32 and 33, 30

RECOMMENDATION:

That the above preferred anomalies be checked on the ground with a self potential instrument to discover the probability of sulphide mineralization. This could be carried out rapidly by a party of two men. This could be followed by trenching and sampling. Those locations which show good returns could then be drilled for economic assessment.

Respectfully submitted,

GEO CAL LIMITED

C. B. Selmser

C. B. Selmser, P. Eng.

PRIMARY FIELD FROM ROTOR BLADES OF A 47G-3B-1 BELL HELIOCOPTER

INTRODUCTION:

The author while making installation tests on a 47G-38-1 Bell heliocopter discovered an interesting primary field developed by the rotors on this aircraft. It was found that this field is adequate for searching near the surface of the ground with an operator using an electromagnetic search coil.

This primary field has an effective size to reach at least 150 feet below the elevation of the search coil. It also has an approximate frequency of 100 cycles per second, which provides maximum penetration into overburden and rock material to a depth of about 100 feet.

Search is made in mountain country by flying lines along contour levels and on more level terrain with a parallel configuration. With the aircraft at a 50 to 75 foot elevation above the terrain the path covered is about 100 feet wide.

PRACTICAL THEORY:

A careful examination of figures 1 and 2 will show that because of the shape of the rotor blades on the aircraft, two distinctive fields are generated when the rotor is turning. These fields are generated from eddy currents in the rotors as they turn rapidly across the earth's magnetic field, which in northern latitudes is nearly vertical to the earth's surface.

An elementary study of physics tells us that a conductor cutting across a magnetic field will generate electric current. If this current is not drawn off then eddy currents will form and a secondary field which has a frequency depending on the speed of the rotors will be developed.

Since the two blades are turning and will reach opposite sides of the shaft, the currents and thus the field will be changing direction with every revolution of a blade. The blades rotate at a speed of 3 20 R.P.M. and since there are two blades the primary rotor field has a frequency of approximately 10· cycles per second.

The blades which are made of alluminum alloy are long and thin. This shape promotes a rotor field, which is normal to the flat surface of the blade. As the blade turns, the field which is effectively about 150 feet in radius, forms a conicle shape. A second field is built up transverse to the rotor field. This field as it turns with the blades forms a sphere shaped configuration.

When the rotor field comes in contact with a tabular ore body it sets up a secondary field from the conducting ore body. This field then joins the transverse field to give a resultant field direction that is quite different from the original and now no longer perpendicular to the axis of the search coil.

THE DETECTOR COIL:

The operator sits in the seat beside the pilot and holds a search coil with its axis vertical. Attached to the tuned coil is an audio amplifier. This is in turn attached to a pair of head phones, which the operator wears over his ears.

The audio amplifier, which is tuned to a signal of 100 C.P.S. has a gain

switch and a feed back squelcher switch. The gain switch is regulated so that the signal is just audible when the coil is held with its axis vertical. The squelcher circuit is adjusted so that only the 100 C.P.S. signal goes through the amplifier.

When the aircraft is flown close to the surface of the ground without a conductor present the field signal will have minimum amplitude. When a conductor is present in the rotor field the signal strength will suddenly increase in amplitude warning the operator that he is crossing a conductor. The aircraft then hovers over the spot until the observer has investigated the change in orientation.

TESTS MADE IN THE FIELD:

(1) Tests were made for extraneous fields inside and outside of the aircraft.
(2) Tests were made of the rotor and transverse fields inside and outside the bubble.
(3) The aircraft was flown at various elevations over the observer so that he could measure the amplitude of the rotor field at the various levels.
(4) A known external field was mounted below the rotor using a motor generator set for power. Tests were made both on the ground and in the aircraft, and while the aircraft was airborne. This enabled the author to study the relative strength of the magnetic field.
(5) Tests flown over Keno Hill ore bodies gave positive verification with orientation changes of 10 degrees.

CONCLUSION:

The primary field generated by the 47G-38-1 Bell aircraft may be used for reconnaissance electromagnetic surveys. The search is not as deep as some ground methods, but is deep enough for bodies exposed in outcrops or under light overburden. The method is as effective for finding conductors as the self potential method, but with greater speed and mobility.

It is obvious that since the method can be used in an aircraft such as this it is very adaptable to surveys over all kinds of terrain. The survey requires no line cutting and coverage may be done rapidly and with as much detail as required.

COST RELATIVE TO GROUND METHODS:

The survey which is continuous in nature may be flown at a cost of $12.50 per mile. Surveys on the ground could cost as much as $100.00 per mile in very rough and inaccessible locations.

The cost of the aircraft, which in most cases amounts to $3.00 per mile is much less than that for line cutting. Line cutting and marking costs usually $40.00 per mile.

The total cost of the survey then is $15.50 per mile. This means that the claim is totally covered with continuous reading on lines 100 feet apart. The equivalent cost on the ground would be $250.00 with readings 100 feet apart and lines having a 200 foot separation.

Respectfully submitted,

GEO CAL LIMITED
C. B. Selmser
C. B. Selmser, P. Eng.

GEOPHYSICAL REPORT
ADDENDUM
SPARLING & BANKER GROUPS
TULSEQUAH, B.C.

INTRODUCTION:

This self potential survey was made over the same areas that had been detailed with the Sharp EM-250 Instrument. In all cases the same stations were occupied in both surveys.

This survey used a sensitive current meter with a shunt circuit. The shunt circuit was uncalibrated, but was about 100 times the 0 to 100 micro ammeter main scale. In order to promote the greatest sensitivity on this meter the meter was read as a difference in reverse swings.

The resistance of the circuit was read on a sensitive portable ohmeter. This resistance was used to convert the readings to millivolts. In each case the polarity of the reading was observed and recorded.

The calculated millivolt readings with their polarities are used in this case to find the exact centres of the sulphide deposition. These locations can be used to direct a drilling program for further development of any ore zones.

SURVEY:

The survey was made over the Banker, Sparling and Bull groups of the claims held by New Taku Mines Ltd. In each case the numbered lines and the base line were read using a 50 foot spread length between the jug positions. The non polarizing electrodes (jugs), used copper sulphide solution and copper electrodes in porous pots.

The potential between the pots was increased somewhat by the change in elevation. A higher elevation giving a high normal reading. Also the results were affected by high resistance between the electrodes and ground in spite of using salt water at the contacts. A high resistance also tends to give a higher reading, but is compensated by the lowering of the current factor.

BANKER GROUP:

The centres for the current reversal have been marked on the SP map on long heavy lines. These constitute 3 main zones for adequate current reversal to designate the presence of the mineralized rock material.

When the SP map is coordinated with the EM map it is noted that the two main zones are in close proximity with the conductive zone marked on the EM map. A third zone occurs west of the conductive zone, but is bordered by very swampy ground that the crew were not able to operate over.

SPARLING GROUP:

The EM conductive zone coordinates with zones 3 and 4 on the SP map. However, there are very productive zones occurring east of the base lines marked zones 1 and 2. Additional zones marked 5 and 6 are northeast of the conductive zone on the EM map and zones 7 and 8 are found well east of the main conductive area.

BULL GROUP:

The current reversal marked zone 1 on the SP map occurs very near the cross-over on the EM map. This is the typical example denoting both a conductor and a sulphide zone at this point. The current reversal marked Zone 2 is north of the main response in an area not covered by the EM survey.

CONCLUSION:

No actually definite criteria can be cited from the interpretation of the SP curves, but it is felt by the author that the most probable position of the ore emplacement is nearly vertical. This means that in most cases the sulphide mineralization would occur vertically beneath the current reversal centres..

Although the values for the SP are not absolute, they are relatively accurate with a great deal of sensitivity. The most indicative relationship is the reversed currents of appreciable value, which may be coordinated with the EM survey.

RECOMMENDATION:

It is recommended that the SP maps be used as the final detailed analysis for spotting the position of a drilling program or a trenching program. If time warrants such a procedure the trenching program should precede the drilling programwith the alignment of the trenches normal to the strike of the current reversal centres.

Respectfully submitted,

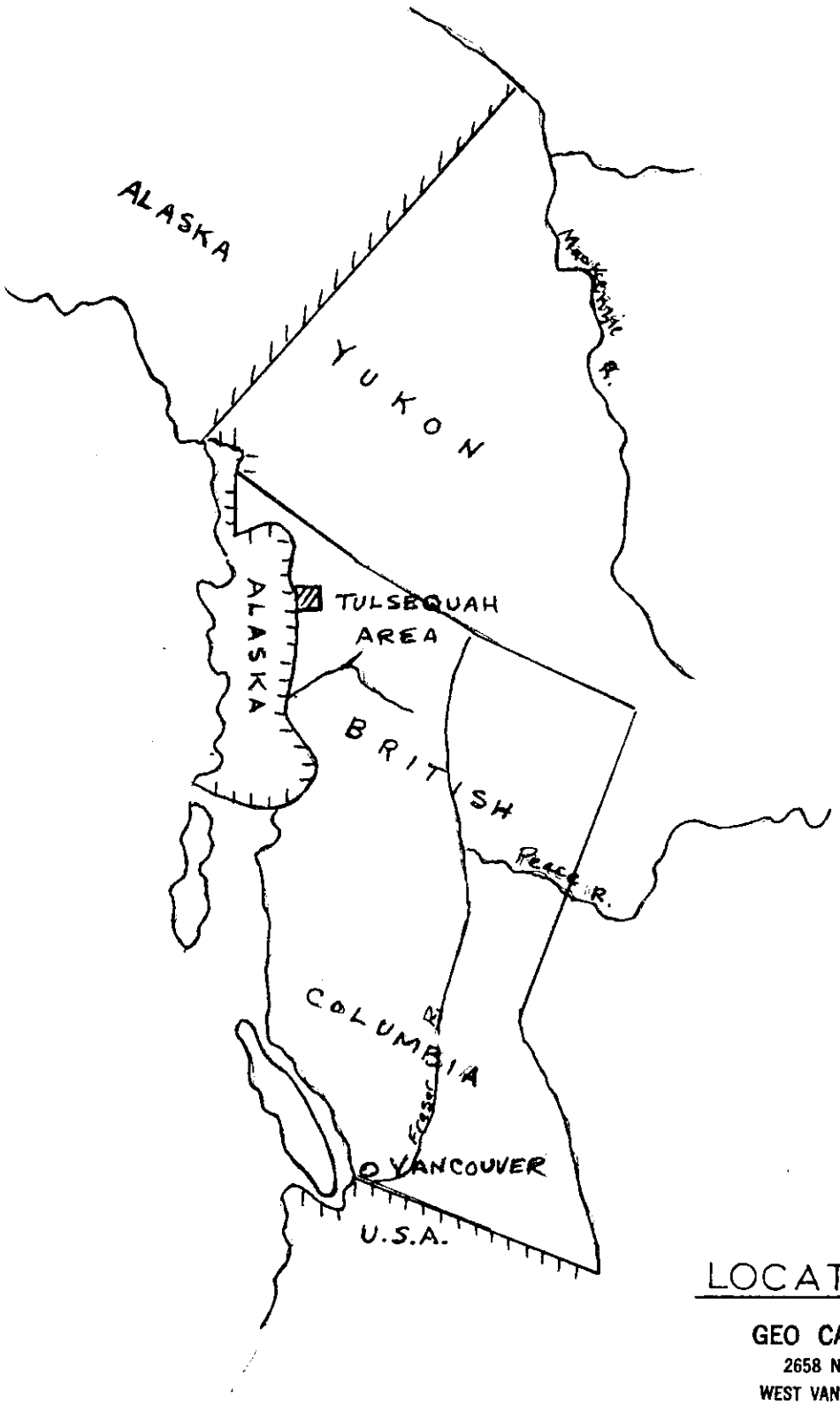
C. B. Selmser

C. B. Selmser, P. Eng.

Department of
Mines and Petroleum Resources

ASSESSMENT REPORT

NO. 841 MAP # 2



LOCATION MAP

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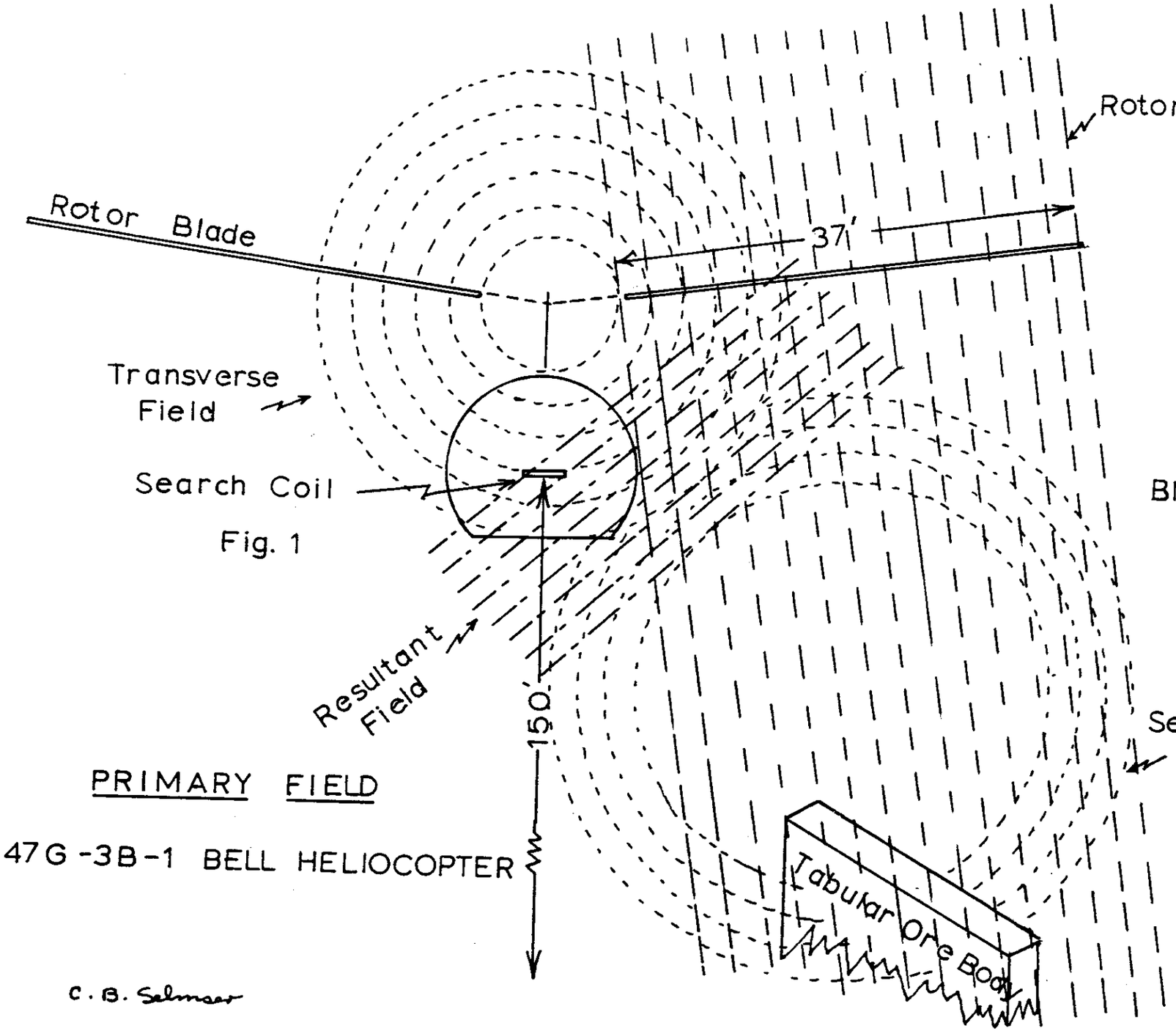


Fig. 1

PRIMARY FIELD

47G-3B-1 BELL HELIOCOPTER

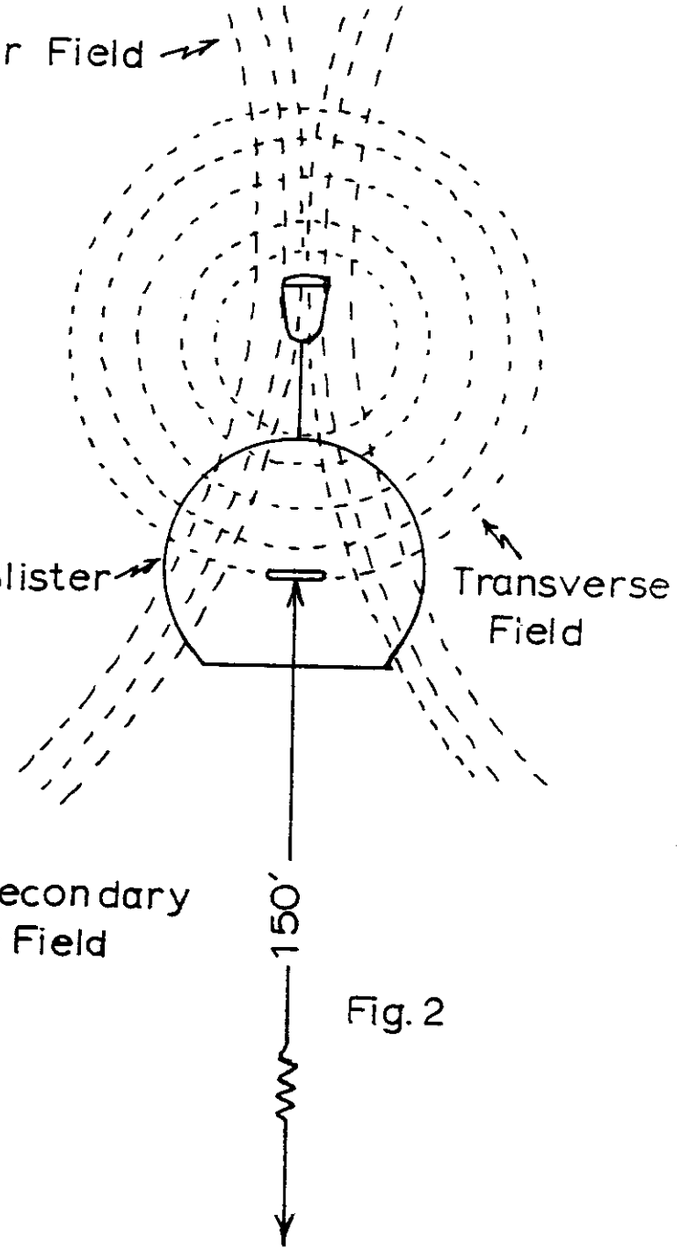
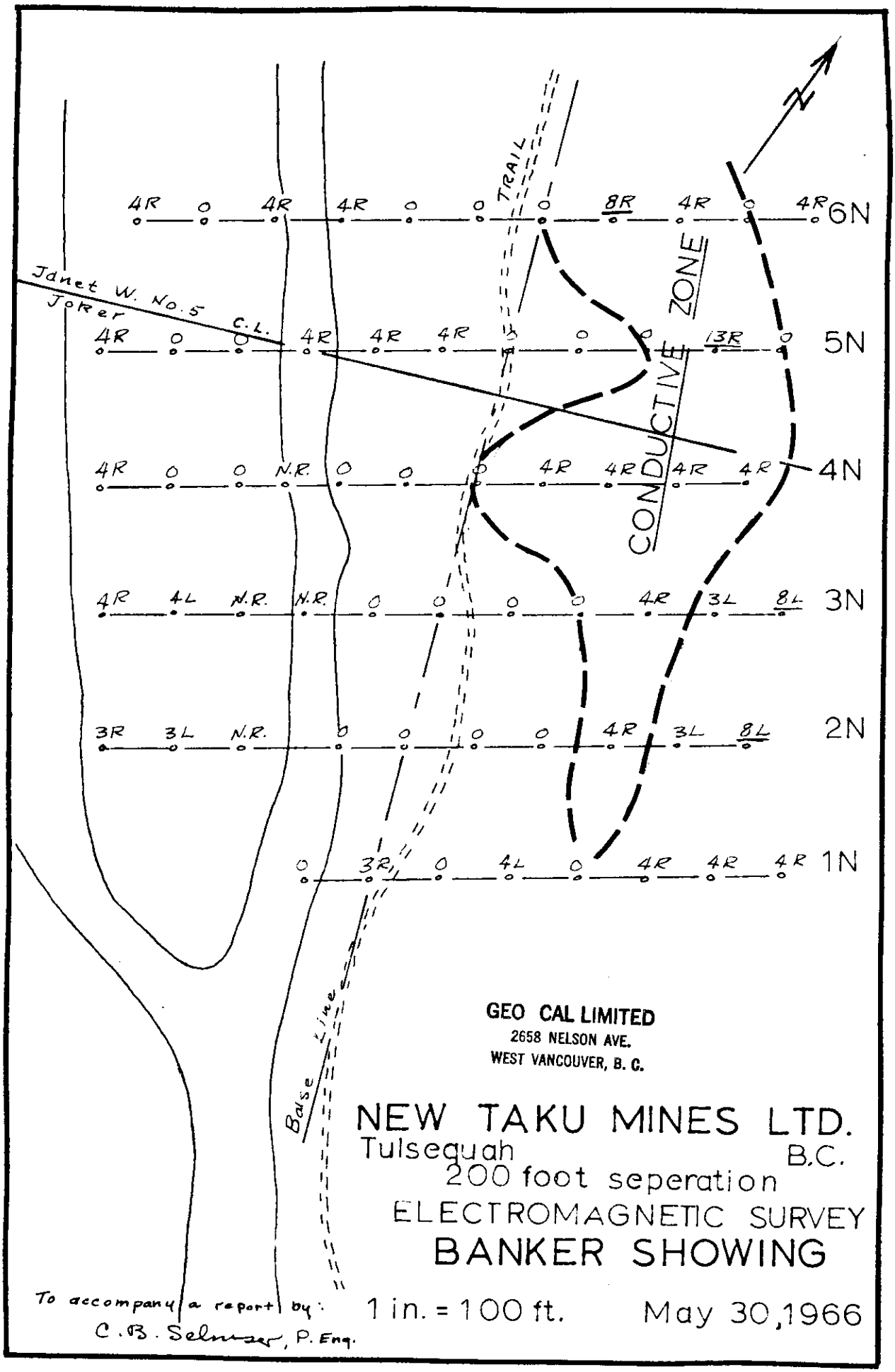


Fig. 2

C. B. Selmser



GEO CAL LIMITED
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NEW TAKU MINES LTD.

Tulsequah B.C.

200 foot seperation

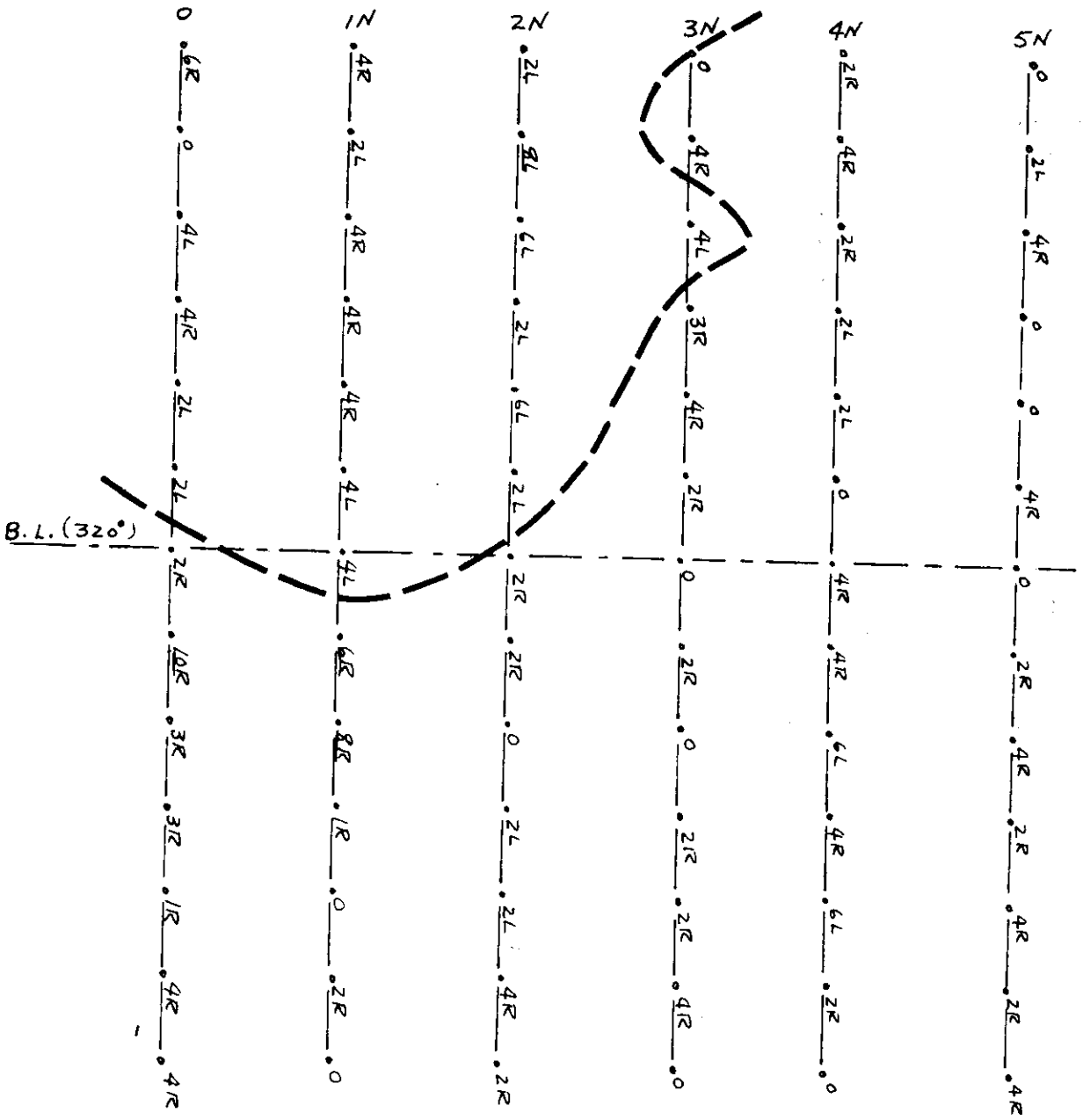
ELECTROMAGNETIC SURVEY

BANKER SHOWING

To accompany a report by:
C. B. Selmser, P. Eng.

1 in. = 100 ft.

May 30, 1966



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TULSEQUAH B.C.

ELECTROMAGNETIC SURVEY

Area No. 4

To accompany a report by: C. B. Delmser, P. Eng.

1 inch = 100 Feet

June 1966

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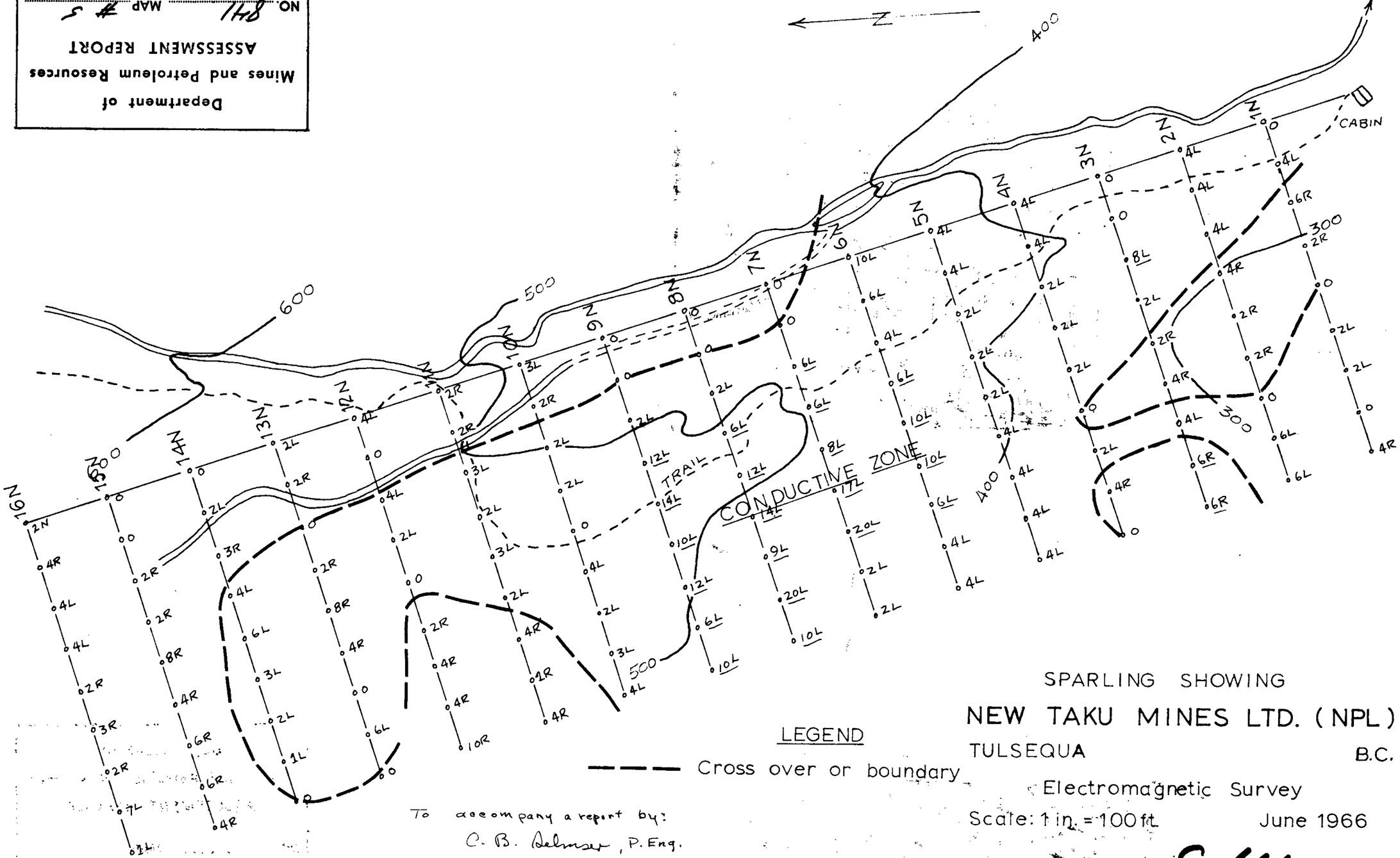
Mines and Petroleum Resources
ASSESSMENT REPORT

NO. 841 MAP # 2



LEGEND

Cross over or boundary

To accompany a report by:
C. B. Delmage, P. Eng.

SPARLING SHOWING

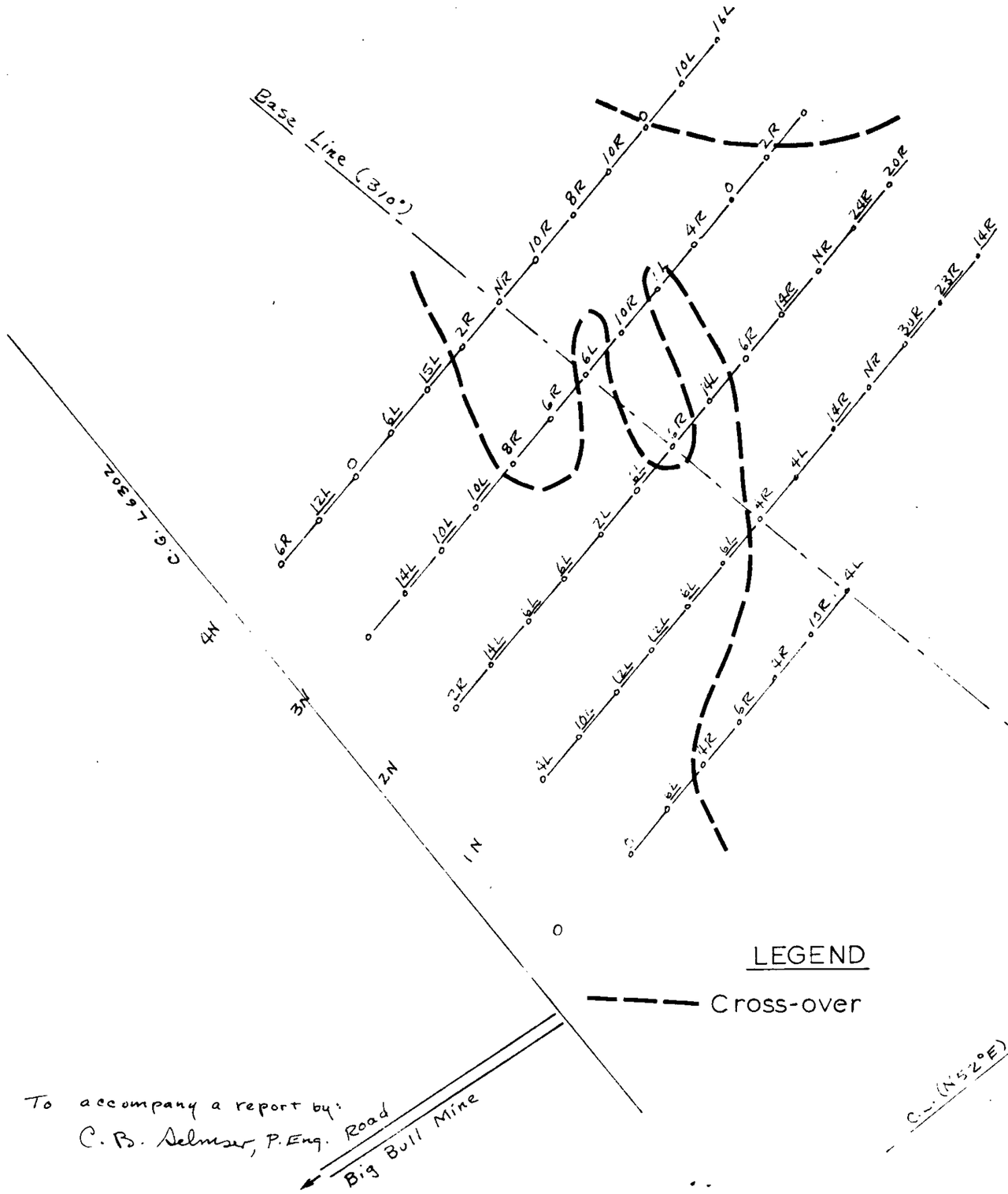
NEW TAKU MINES LTD. (NPL)

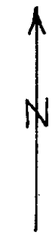
TULSEQUA B.C.

Electromagnetic Survey

Scale: 1 in. = 100 ft. June 1966

841





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ASSESSMENT REPORT
NO. 841 MAP # 6

To accompany a report by:
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WEST VANCOUVER, B. C.

NEW TAKU MINES LTD.

TULSEQUAH B.C.

ELECTROMAGNETIC SURVEY

Area No. 3

1 inch = 100 Feet June 1966

841

MT.
MANVILLE

133°30'

Tulsequah

TAKU RIVER

58°38'

58°38'

4883'

MT.
ERICKSON

5000'

N

STUHINI CREEK

2500'

FLANNIGAN SLOUGH

31

4A

35

2500'

30

38

41

4120'

39

SITTAKANAY MTN.

5000'

40

37

36

32

33

SITTAKANAY RIVER

42

2500'

2500'

2500'

2500'

6001'

133°30'

LEGEND

⊗ Anomaly center

Cross-over or boundary

SITTAKANAY MT. AREA

NEW TAKU MINES LTD.

TULSEQUAH B.C.

ELECTROMAGNETIC SURVEYS

Air Supported

1 in= 2300 ft. June 1966

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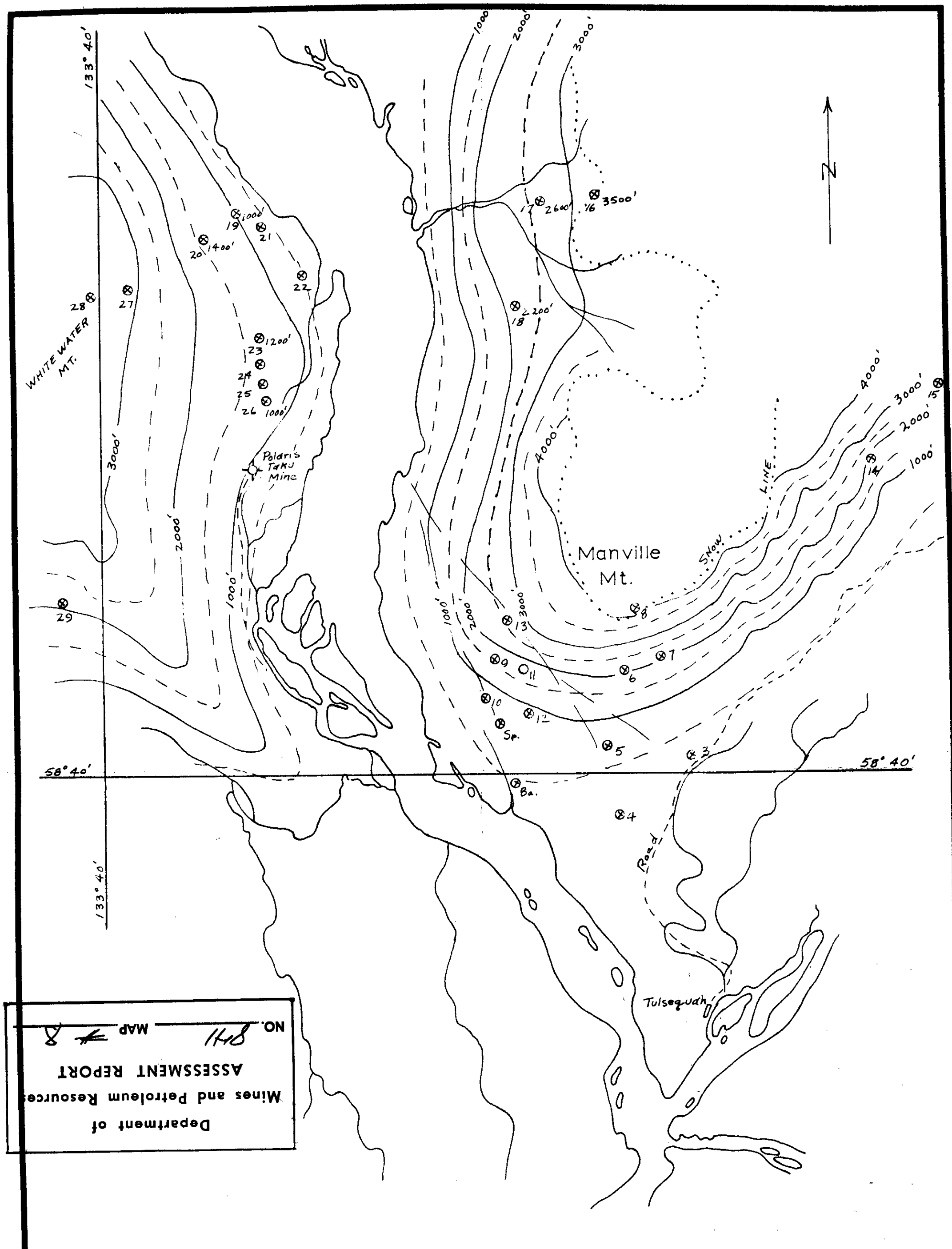
WEST VANCOUVER, B. C.

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 841 MAP # 7

841

To accompany a report by:
C. B. Delmar, P. Eng.



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ASSESSMENT REPORT

MAP 8 NO. 841

LEGEND

⊗ Anomaly center

To accompany a report by:
C. B. Delmar, P. Eng.

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WHITEWATER MT. AREA
NEW TAKU MINES LTD.
TULSEQUAH B.C.
ELECTROMAGNETIC SURVEY
Air Supported
1 in.=4000ft. June 1966

841

133° 35'

N

Snow Line

500

1000

2000

3000

4000

MANVILLE MT.

RIVER

TULSEQUAH

Snow Line

Sparling

Banker

58° 40'

133° 35'

LEGEND

⊗ Anomaly center

— — Cross over or boundary

To accompany a report by:
C. B. Delmar, P. Eng.

MANVILLE MT. AREA

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WEST VANCOUVER, B. C.

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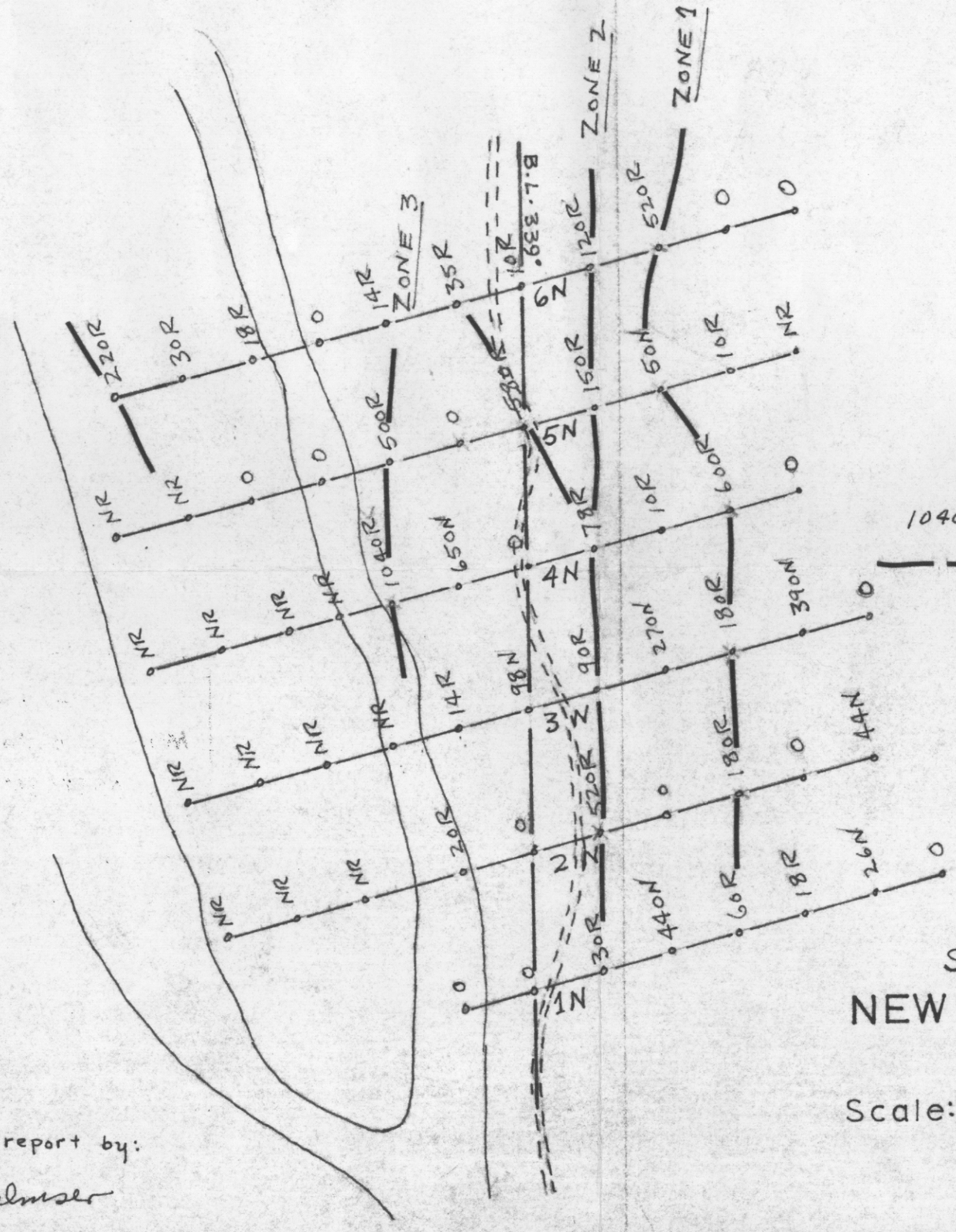
TULSEQUAH B.C.

ELECTROMAGNETIC SURVEYS

Air Supported

1 inch = 500 Feet June 1966

841



LEGEND

1040R Values in millivolts + polarity

—— Current reversal

S. P. SURVEY

NEW TAKU MINES LTD.

BANKER AREA

Scale: 1 in = 100 ft. July 19, 1966

To accompany a report by:

C. B. Delmser

MAP No. 9

841