83-390-11422

GEOLOGICAL BRANCH ASSESSMENT REPORT

11,422

GEOLOGICAL INTERPRETATION

OF

DIGHEM III SURVEY

OF WILLOUGHBY CREEK AREA, B.C.

LATITUDE 56°00' N LONGITUDE 129°30' W

FOR VISCOUNT RESOURCES LTD.

BY

DR. G.J. DICKIE

MINEQUEST EXPLORATION ASSOCIATES LTD.

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JULY, 1983

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1. SUMMARY AND RECOMMENDATIONS

A DIGHEM III Survey over the Willoughby Creek area was conducted to evaluate the continuity and extent of sulphide-rich gold-silver-copper showings and to identify other conductors in the area worth ground follow-up.

The best showings, located at the head of Willoughby Creek, are sulphide-rich, but show no response on the DIGHEM III Survey either as conductors or as magnetic bodies. It must be assumed that the showings do not represent a sulphide unit of any significant size.

The strongest conductors lie in a north-northwest trending belt on the eastern margin of the Cambria Icefield parallel to the trend of the stratigraphy. The conductors correlate fairly closely with carbonate alteration zones in the volcanic-argillite sequence, but there is no known mineralization in these zones. These are interesting targets for further exploration in the area and should be checked by mapping and sampling.

A weak conductor coincides with an area of carbonate alteration and a shear zone at the Porter showing at the foot of Porter Glacier. A linear conductor 700 metres east of the Porter showing may be associated with the contact between Hazelton Group volcanics and Bowser Group sediments. This area is worth a brief examination.

2. GEOLOGY

The DIGHEM III survey area covers strata of the Hazelton Group consisting of volcanics and sediments. On the map of the Salmon River Area by Grove (1982), the strata were assigned to the Middle Jurassic Salmon River and Betty Creek Formations and possibly the Lower Jurassic Unuk River Formation. Unpublished mapping places the contact between Hazelton Group and Bowser Group strata on the eastern margin of the survey area. Lithologies in the Hazelton Group are dark coloured andesitic volcanic breccia and tuff alternating with black argillite, siltstone and sandstone. This alteration of volcanics and clastics may be a depositional feature, but may also be caused by repeated thrust along east-dipping fault planes.

Beds strike north-northwest and are steeply dipping so significant sulphide accumulations should respond as conductors in an electromagnetic survey. The argillites may show up as conductive units extending along strike in the generally less conductive volcanics.

3. DIGHEM III SURVEY

Flight lines were originally planned east-west normal to regional strike at a spacing of 300 metres with a line spacing of 200 metres over the known showings. The extreme topography of the survey area required that the initial grid plan be altered in the south-east corner to a north-south pattern. This direction is sub-parallel to the strike of the strata so the EM response will be less well defined than on the rest of the grid.

On both the regional and detailed grids, the topography caused the instrument height above ground to vary considerably along lines and between lines so that correlation of conductor responses is very unreliable. In some cases, identifiable conductors are separated by nul response on intervening lines, but the instrument was too high above ground on those lines to record any bedrock conductor.

In general, because of the topography, the conductors that are defined are real and should be followed-up by a ground investigation. There could well be other conductors in the survey area which have not responded because of the flying conditions, but there would not seem to be any readily available method of definition.

4a. EM CONDUCTORS

There are three reasonably significant conductors defined by the survey:

1) north-west of Nelson Creek Glacier Lines 30, 40, 50 and possibly 80 and 100
2) east of the Porter Creek showing Lines 170, 180, 190, 200, 210
3) east of the Wilby Creek showing Lines 291, 301, 310, 320 and 330

Conductor 1): This conductor is in Hazelton Group volcanics and sediments including a limestone unit across the glacier to the south. It could be caused by carbonaceous material in the sediments or by a sulphide-rich alteration zone cutting slightly across strike. There is a strong magnetic field coincident with the conductor which suggests the presence of sulphides, making the target more attractive. A negative feature is the isolated location surrounded by glaciers.

Conductor 2): There is a one-line conductor coincident with the Porter Creek showing and this may be reflecting the shear zone which contains some gold. Seven hundred metres to the east is a well defined linear conductor at least 1.2km long which may coincide with the contact between Hazelton Group volcanics and Bowser Group sediments. The magnetic field is flat so the conductor probably is poor in sulphides. It may also be a structural or lithological feature in the stratigraphy.

Conductor 3): This conductor is the best defined in the survey and coincides closely with a zone of carbonate alteration in Hazelton Group volcanics. The magnetic field is flat and the alteration zone was not notably rich in sulphides. The conductor is close to a known mineralized area and a ground check would be recommended.

4b. WILBY CREEK SHOWINGS

The Wilby Creek showings consist of lenses of massive sulphides in andesitic volcanics of the Hazelton Group. A unit of coralline limestone with some sulphide replacement is interbedded with the volcanics. Gold, silver and copper values have been recorded from the sulphides and from shear zones in the volcanics. The outcrop area is strongly iron-stained and apparently sulphide-rich.

The showings area was covered by a detailed grid (flight line spacing 200 metres) and the results were generally flat. The only relevant response was a weakly defined zone of conductivity trending north-westerly and extending over 4km which coincides in part with the showing sampled in 1946. It is not well enough defined to provide any specific targets, but the outcrops that it crosses could be examined for any sign of alteration and mineralization.

Certificate of Qualifications

I, Geoffrey J. Dickie, of MineQuest Exploration Associates Ltd. of 311 Water Street, Vancouver certify that:

I graduated with a B.Sc. degree in geology from the University of Queensland, Australia in 1965 and with a Ph.D. in geology from the University of Alberta, Edmonton in 1972.

I am a Fellow of the Geological Association of Canada.

I have practised geology for the past 17 years.

G.J. Dickie

83-#390

Dighem Limited

Job #174-3

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Viscount Resources Ltd.
710 - 475 Howe Street
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Invoice #83-118
July 8, 1983

IN ACCOUNT WITH
DIGHEM LIMITED

To:

Dighem flying of Agreement dated March 15, 1983.

Ferry and mobilization charges	$ 8,000.00
Survey charges, 291 line-km at $85.00/line-km	24,735.00
Stand-by charge, one bad weather day	1,500.00
	34,235.00
Less progress payments pursuant to paragraphs 10(a) and 10(b)	23,160.00
Net this invoice	$ 11,075.00

Cont

DIGHEM LIMITED

Z. Dvorak

Zbynek Dvorak
Vice-President

TERMS: Payment due upon receipt. An interest charge of 2% per month will be applied after 30 days.

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ELECTROMAGNETICS/RESISTIVITY/MAGNETICS
for metal ore, gravel, permafrost, soils

83-#390 -11422

REPORT NO. 174

DIGHEM^{III} SURVEY

OF THE

WILLOUGHBY CREEK AREA, B.C.

FOR

VISCOUNT RESOURCES LTD.

BY

DIGHEM LIMITED

TORONTO, ONTARIO
JULY 11, 1983

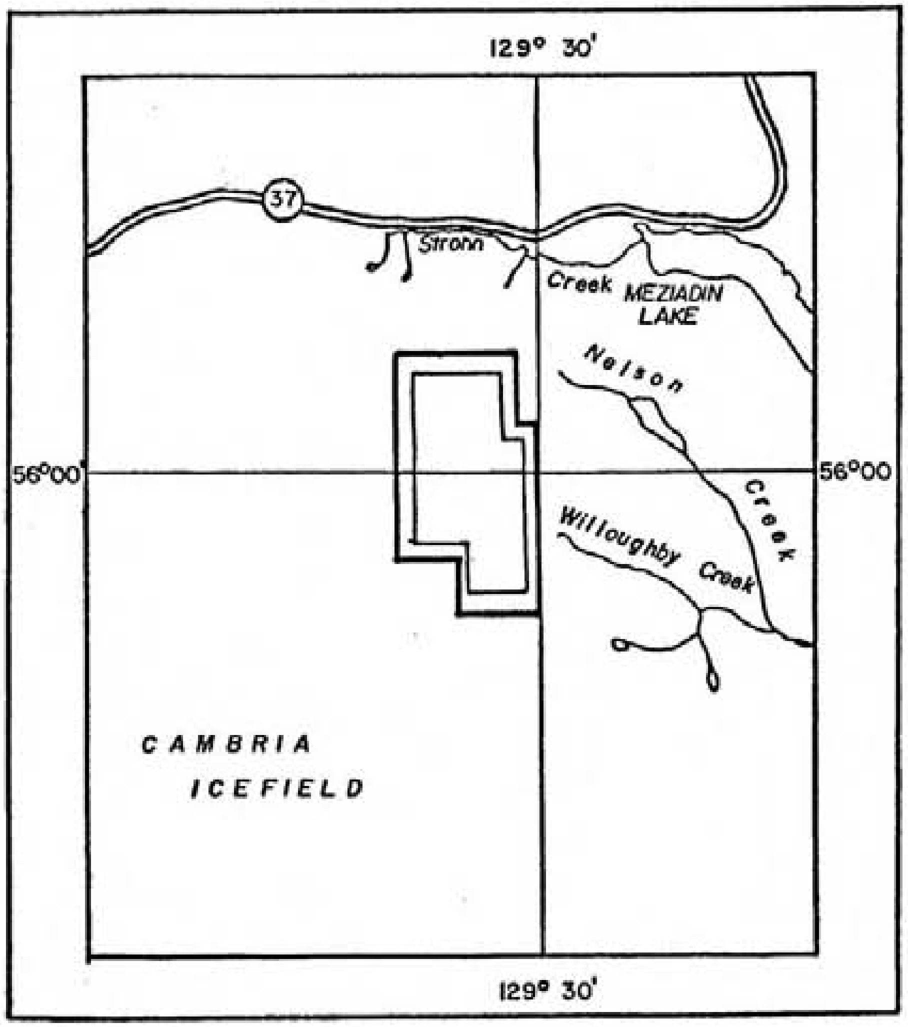
Z. DVORAK
VICE-PRESIDENT

SUMMARY AND RECOMMENDATIONS

A total of 291 km of survey was flown in May 1983, over a property held by Viscount Resources Ltd. in the Willoughby Creek Area, B.C.

The survey outlined several discrete bedrock conductors associated with areas of low resistivity. Most of these anomalies appear to warrant further investigation using appropriate surface exploration techniques. Areas of interest may be assigned priorities for follow-up work on the basis of supporting geological and/or geochemical information.

LOCATION MAP



Scale 1 : 500,000

Figure 1 The Survey Area

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INTRODUCTION

A DIGHEM^{III} survey totalling 291 line-km was flown with a 200 m, 300 m, and 400 m line-spacing for Viscount Resources Ltd. from May 6 to May 28, 1983, in the Willoughby Creek area of British Columbia (Figure 1).

The Lama CG-DEM turbine helicopter flew at an average airspeed of 85 km/h with an EM bird height of approximately 46 m. Ancillary equipment consisted of a Sonotek PMH 5010 magnetometer with its bird at an average height of 61 m, a Sperry radio altimeter, a Geocam sequence camera, a Barringer 8-channel hot pen analog recorder, a Sonotek SDS 1200 digital data acquisition system and a DigiData 1640 9-track 800-bpi magnetic tape recorder. The analog equipment recorded four channels of EM data at approximately 900 Hz, two channels of EM data at approximately 7200 Hz, one channel of magnetics, and a channel of radio altitude. The digital equipment recorded the EM data with a sensitivity of 0.20 ppm at 900 Hz, and 0.40 ppm at 7200 Hz and the magnetic field to one nT (i.e., one gamma). Three ambient EM noise channels (for one coaxial and two coplanar receivers) were also recorded.

Appendix A provides details on the data channels, their respective sensitivities, and the flight path recovery procedure. Noise levels of less than 2 ppm are generally maintained for wind speeds up to 35 km/h. Higher winds may cause the system to be grounded because excessive bird swinging produces difficulties in flying the helicopter. The swinging results from the 5 m^2 of area which is presented by the bird to broadside gusts. The DIGHEM system nevertheless can be flown under wind conditions that seriously degrade other AEM systems.

It should be noted that the anomalies shown on the Electromagnetic Anomalies map are based on a near-vertical, half plane model, which best reflects "discrete" bedrock conductors. Wide bedrock conductors or flat-lying conductive units, whether from surficial or bedrock sources, give rise to broad anomalous responses on the EM profiles, but may not appear on the Electromagnetic Anomalies map, as they do not meet the criteria for "discrete" conductors. These broad conductors, which more closely approximate a half space model, will be maximum coupled to the horizontal (coplanar) coil pair and should be clearly evident on the resistivity map. The Resistivity map, therefore, may be more valuable than the Electromagnetic Anomalies map, in areas where broad or flat-lying conductors are considered to be of importance.

It should be noted that, in areas where magnetite causes the inphase components to become negative, the apparent conductance and depth of EM anomalies may be unreliable.

There are several areas where EM responses are evident only on the quadrature components, indicating zones of poor conductivity. Where these responses are coincident with strong magnetic anomalies, it is possible that the inphase component amplitudes have been suppressed by the effects of magnetite. Most of these poorly-conductive magnetic features give rise to resistivity anomalies which are only slightly below the theshold value. These weak features are evident on the Resistivity map but may not be shown on the Electromagnetics map. If it is expected that poorly-conductive sulphides may be associated with magnetite-rich units, some of these weakly anomalous features may be of interest.

SECTION I: SURVEY RESULTS

The survey consisted of two perpendicular grids with 291 km of flying, the results of which are shown on a single map sheet. Table I-1 summarizes the EM responses on this sheet. The main grid was flown along east-west oriented lines. The flight lines were spaced 300 m apart in the north portion of the grid and 400 m apart in its south part. Detail flying in the southwest corner of the grid was done with 200 m line spacing. The smaller secondary grid in the southeast part of the survey area was flown along north-south lines spaced 400 m apart.

The ground resistivity in the survey area ranges from about 600 ohm-m to in excess of 8,000 ohm-m. The majority of the low resistivity zones reflect conductors of bedrock origin. They mostly occur in the vicinity of glacier valleys. There are indications that, in several instances (e.g., on line 90 between EM anomalies 80A* and 100B; south of 160xA'; or on line 660 between EM anomalies 650B and 670A), these conductors may extend underneath the glacier. However, the safety precautions in the rugged terrain

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* This denotes EM anomaly A on line 80.

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CONDUCTOR GRADE	CONDUCTANCE RANGE	NUMBER OF RESPONSES
6	> 99 MHOS	0
5	50-99 MHOS	0
4	20-49 MHOS	0
3	10-19 MHOS	0
2	5- 9 MHOS	0
1	< 5 MHOS	18
X	INDETERMINATE	21
TOTAL		39

CONDUCTOR MODEL	MOST LIKELY SOURCE	NUMBER OF RESPONSES
D	DISCRETE BEDROCK	1
T	DISCRETE BEDROCK	0
P	DISCRETE BEDROCK	0
B	DISCRETE BEDROCK	25
E	BEDROCK OR EDGE EFFECT	0
G	ROCK OR COVER	2
H	ROCK OR COVER	1
S	COVER	6
R	CULTURE	0
C	CULTURE	0
L	CULTURE	0
?	QUESTIONABLE	0
(BLANK)		4
TOTAL		39

(SEE EM MAP LEGEND FOR EXPLANATIONS)

necessitated the helicopter flying at higher than usual terrain clearance which resulted in weak EM signals. Consequently, such areas should be investigated on the ground to assess this possibility.

Magnetic field in the area shows a varied degree of activity. The southwestern corner of the main grid and the eastern slopes of Cambria icefield exhibit low magnetic activity. In comparison, the nothwest corner and the eastern half of the main grid, and the east and south parts of the small grid are active. North-northeast trends appear to be of primary importance in these parts of the area, with secondary northwesterly trends being present. Both of these trends become more apparent on the enhanced magnetic map.

CONDUCTORS IN THE SURVEY AREA

The Electromagnetic Anomalies map shows the anomaly locations with the interpreted conductor shape, dip, conductance and depth being indicated by symbols. Direct magnetic correlation is also shown if it exists. The strike direction and length of the conductors are indicated when anomalies can be correlated from line to line. When studying the map sheets for follow-up planning, consult the anomaly listings appended to this report to ensure that none of the conductors are overlooked.

Anomaly 10A,
Responses 10xD, 20xA

This grade 1 anomaly and x-type responses occur along the slopes of a glacier valley. 10A and 10xD reflect bedrock conductors which may extend below the ice flow and beyond the survey boundary.

The x-type response 20xA is defined only on 7200 Hz channels and, as such, it reflects a poorly conductive target, possibly in the bedrock.

Anomalies 30B, 30C,
30D-60A

These grade 1 anomalies reflect conductors of definte or possible bedrock origin. Anomalies 30B, 30C and 30D were detected during a steep and slow ascent of the helicopter along the mountain side. Consequently, the three conductors could occur much closer to each other than as suggested by the digital records.

Anomalies 80B, 100B, 100xA

The resistivity data suggests that 80B and 100B may reflect parts of a single conductor which extends across line 90. Due to rugged topography, the EM system, however, flew high on line 90, out of the ground effect.

Anomaly 120xA-140A

This grade 1 anomaly and x-type response are indicative of a bedrock conductor which extends across three lines. The resistivity patterns and the EM responses on line 130 confirm the continuation of the conductor across this line. Due to large flight altitude on this line the responses are broad, rendering the recognition of an EM anomaly as a discrete target impossible.

Responses 160xA, 160xB

These x-type responses were classified as wide conductive rock units buried under resistive cover (interpretation symbol G). They occur along the slope of an east-west glacial valley, and they may be indicative of a bedrock conductor parallel to the flight line, i.e., parallel to the valley axis.

A somewhat similar situation occurs on line 170 in the vicinity of fiducial 666 where the EM data suggest a weak conductor to occur. These responses appear to be a continuation of similar responses on line 160, near 160xA'.

Response 180xA

A bedrock conductor, which occurs on the some general strike as 160xB and 150xA, is indicated by this x-type response.

Responses 170xA', 190xC

Response 170xA' is associated with a broad low resistivity zone which extends across the glacier valley towards 190xC, suggesting that these x-type responses may be related to a common conductive horizon.

Anomaly 170xA-210xA

These grade 1 anomalies and x-type responses reflect a weak bedrock conductor which may extend further north, towards line 150, fiducial 903.

Anomaly 190A

A single-line bedrock conductor is indicated by this grade 1 anomaly. It occurs along the north slope of a glacier valley, possibly in the same rock unit as other conductors to the north.

Anomalies 281xA-330xD, 301xB-330xC

A pair of bedrock, or possible bedrock, conductors is indicated by these x-type responses and a single grade 1 anomaly, 301A. These conductors have produced an oval-shaped low resistivity zone, but are confined within the magnetically quiet part of the area.

Responses 301xA, 330xB, 340xA, 340xB, 350xA, 380xA, 390xA, 390xB, 680xB,
Anomaly 431A

All these x-type responses and grade 1 anomaly occur along a common poorly defined resistivity trend. They occur in a discontinuous fashion, but may be related to a single conductive horizon. They are all poorly defined, except for 390xA, 390xB, and 431A. The last anomaly is definitely of bedrock origin, while most of the others are difficult to classify properly.

Anomalies 650B, 670A

These grade 1 anomalies reflect weak bedrock conductors. They may reflect parts of a single conductor extending across the valley. The EM system flew too high on line 660 so that a proper line-to-line correlation cannot be made.

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SECTION II: BACKGROUND INFORMATION

ELECTROMAGNETICS

DIGHEM electromagnetic responses fall into two general classes, discrete and broad. The discrete class consists of sharp, well-defined anomalies from discrete conductors such as sulfide lenses and steeply dipping sheets of graphite and sulfides. The broad class consists of wide anomalies from conductors having a large horizontal surface such as flatly dipping graphite or sulfide sheets, saline water-saturated sedimentary formations, conductive overburden and rock, and geothermal zones. A vertical conductive slab with a width of 200 m would straddle these two classes.

The vertical sheet (half plane) is the most common model used for the analysis of discrete conductors. All anomalies plotted on the electromagnetic map are analyzed according to this model. The following section entitled **Discrete conductor analysis** describes this model in detail, including the effect of using it on anomalies caused by broad conductors such as conductive overburden.

The conductive earth (half space) model is suitable for broad conductors. Resistivity contour maps result from the use of this model. A later section entitled **Resistivity mapping** describes the method further, including the effect of using it on anomalies caused by discrete conductors such as sulfide bodies.

Geometric interpretation

The geophysical interpreter attempts to determine the geometric shape and dip of the conductor. This qualitative interpretation of anomalies is indicated on the map by means of interpretive symbols (see EM map legend). Figure II-1 shows typical DIGHEM anomaly shapes and the interpretive symbols for a variety of conductors. These classic curve shapes are used to guide the geometric interpretation.

Discrete conductor analysis

The EM anomalies appearing on the electromagnetic map are analyzed by computer to give the conductance (i.e., conductivity-thickness product) in mhos of a vertical sheet model. This is done regardless of the interpreted geometric shape of the conductor. This is not an unreasonable procedure, because the computed conductance increases as the electrical quality of the conductor increases, regardless of its true shape. DIGHEM anomalies are divided into six

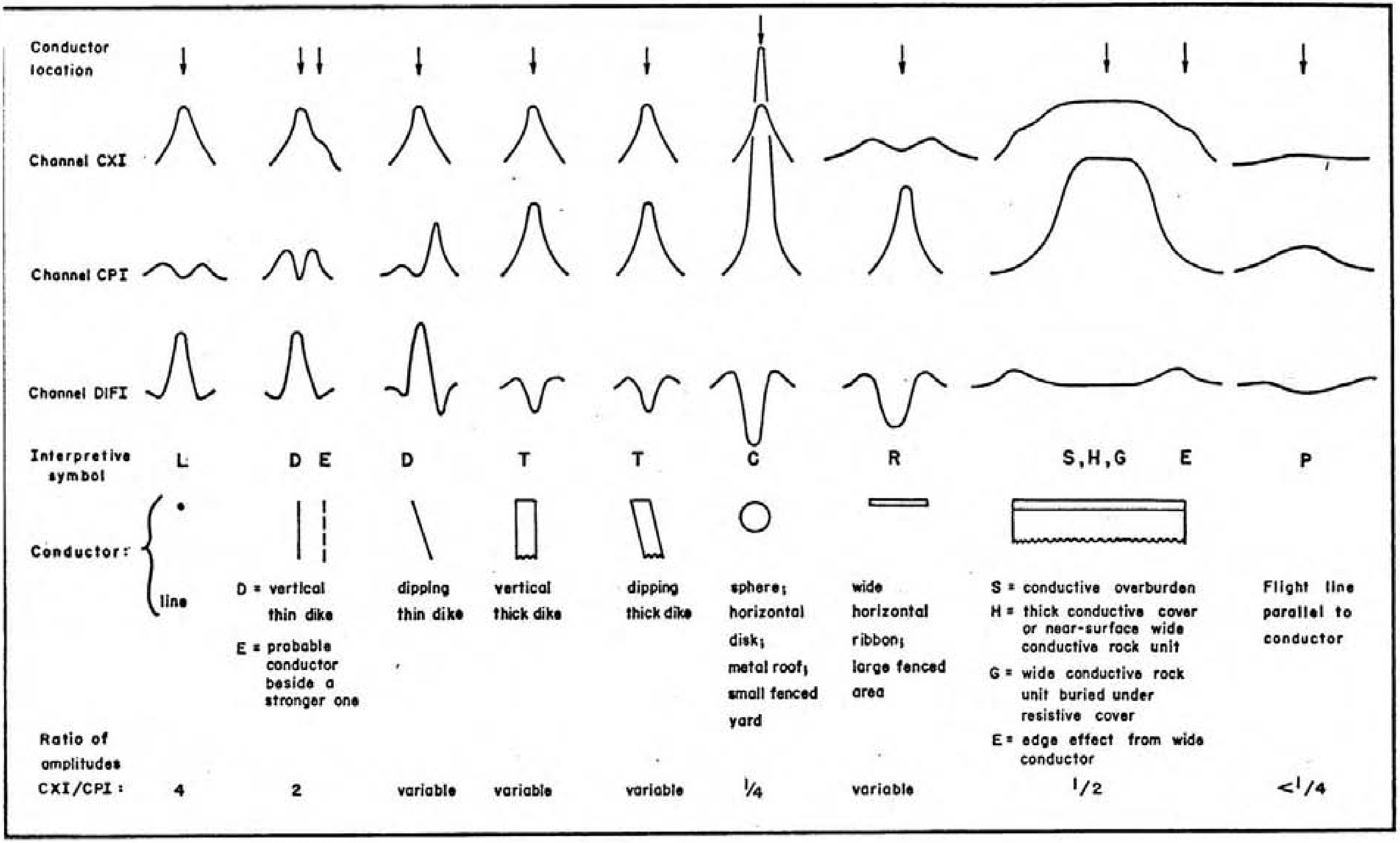

Figure II - 1 Typical DIGHEM anomaly shapes grades of conductance, as shown in Table II-1. The conductance in mhos is the reciprocal of resistance in ohms.

Table II-1. EM Anomaly Grades

Anomaly Grade	Mho Range
6	> 99
5	50 - 99
4	20 - 49
3	10 - 19
2	5 - 9
1	< 5

The conductance value is a geological parameter because it is a characteristic of the conductor alone; it generally is independent of frequency, and of flying height or depth of burial apart from the averaging over a greater portion of the conductor as height increases.[1] Small anomalies from deeply buried strong conductors are not confused with small anomalies from shallow weak conductors because the former will have larger conductance values.

Conductive overburden generally produces broad EM responses which are not plotted on the EM maps. However, patchy conductive overburden in otherwise resistive areas

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[1] This statement is an approximation. DIGHEM, with its short coil separation, tends to yield larger and more accurate conductance values than airborne systems having a larger coil separation.

can yield discrete anomalies with a conductance grade (cf. Table II-1) of 1, or even of 2 for conducting clays which have resistivities as low as 50 ohm-m. In areas where ground resistivities can be below 10 ohm-m, anomalies caused by weathering variations and similar causes can have any conductance grade. The anomaly shapes from the multiple coils often allow such conductors to be recognized, and these are indicated by the letters S, H, G and sometimes E on the map (see EM legend).

For bedrock conductors, the higher anomaly grades indicate increasingly higher conductances. Examples: DIGHEM's New Insco copper discovery (Noranda, Canada) yielded a grade 4 anomaly, as did the neighbouring copper-zinc Magusi River ore body; Mattabi (copper-zinc, Sturgeon Lake, Canada) and Whistle (nickel, Sudbury, Canada) gave grade 5; and DIGHEM's Montcalm nickel-copper discovery (Timmins, Canada) yielded a grade 6 anomaly. Graphite and sulfides can span all grades but, in any particular survey area, field work may show that the different grades indicate different types of conductors.

Strong conductors (i.e., grades 5 and 6) are characteristic of massive sulfides or graphite. Moderate conductors (grades 3 and 4) typically reflect sulfides of a less massive character or graphite, while weak bedrock conductors (grades 1 and 2) can signify poorly connected graphite or heavily disseminated sulfides. Grade 1 conductors may not respond to ground EM equipment using frequencies less than 2000 Hz.

The presence of sphalerite or gangue can result in ore deposits having weak to moderate conductances. As an example, the three million ton lead-zinc deposit of Restigouche Mining Corporation near Bathurst, Canada, yielded a well defined grade 1 conductor. The 10 percent by volume of sphalerite occurs as a coating around the fine grained massive pyrite, thereby inhibiting electrical conduction.

Faults, fractures and shear zones may produce anomalies which typically have low conductances (e.g., grades 1 and 2). Conductive rock formations can yield anomalies of any conductance grade. The conductive materials in such rock formations can be salt water, weathered products such as clays, original depositional clays, and carbonaceous material.

On the electromagnetic map, a letter identifier and an interpretive symbol are plotted beside the EM grade symbol. The horizontal rows of dots, under the interpretive symbol, indicate the anomaly amplitude on the flight record. The vertical column of dots, under the anomaly letter, gives the estimated depth. In areas where anomalies are crowded, the letter identifiers, interpretive symbols and dots may be obliterated. The EM grade symbols, however, will always be discernible, and the obliterated information can be obtained from the anomaly listing appended to this report.

The purpose of indicating the anomaly amplitude by dots is to provide an estimate of the reliability of the conductance calculation. Thus, a conductance value obtained from a large ppm anomaly (3 or 4 dots) will tend to be accurate whereas one obtained from a small ppm anomaly (no dots) could be quite inaccurate. The absence of amplitude dots indicates that the anomaly from the coaxial coil-pair is 5 ppm or less on both the inphase and quadrature channels. Such small anomalies could reflect a weak conductor at the surface or a stronger conductor at depth. The conductance grade and depth estimate illustrates which of these possibilities fits the recorded data best.

Flight line deviations occasionally yield cases where two anomalies, having similar conductance values but dramatically different depth estimates, occur close together on the same conductor. Such examples illustrate the reliability of the conductance measurement while showing that the depth estimate can be unreliable. There are a number of factors which can produce an error in the depth estimate, including the averaging of topographic variations by the altimeter, overlying conductive overburden, and the location and attitude of the conductor relative to the flight line. Conductor location and attitude can provide an erroneous depth estimate because the stronger part of the conductor may be deeper or to one side of the flight line, or because it has a shallow dip. A heavy tree cover can also produce errors in depth estimates. This is because the depth estimate is computed as the distance of bird from conductor, minus the altimeter reading. The altimeter can lock onto the top of a dense forest canopy. This situation yields an erroneously large depth estimate but does not affect the conductance estimate.

Dip symbols are used to indicate the direction of dip of conductors. These symbols are used only when the anomaly shapes are unambiguous, which usually requires a fairly resistive environment.

A further interpretation is presented on the EM map by means of the line-to-line correlation of anomalies, which is based on a comparison of anomaly shapes on adjacent lines. This provides conductor axes which may define the geological structure over portions of the survey area. The absence of conductor axes in an area implies that anomalies could not be correlated from line to line with reasonable confidence.

DIGHEM electromagnetic maps are designed to provide a correct impression of conductor quality by means of the conductance grade symbols. The symbols can stand alone with geology when planning a follow-up program. The actual conductance values are printed in the attached anomaly list for those who wish quantitative data. The anomaly ppm and depth are indicated by inconspicuous dots which should not distract from the conductor patterns, while being helpful to those who wish this information. The map provides an interpretation of conductors in terms of length, strike and dip, geometric shape, conductance, depth, and thickness (see below). The accuracy is comparable to an interpretation from a high quality ground EM survey having the same line spacing.

The attached EM anomaly list provides a tabulation of anomalies in ppm, conductance, and depth for the vertical sheet model. The EM anomaly list also shows the conductance and depth for a thin horizontal sheet (whole plane) model, but only the vertical sheet parameters appear on the EM map. The horizontal sheet model is suitable for a flatly dipping thin bedrock conductor such as a sulfide sheet having a thickness less than 10 m. The list also shows the resistivity and depth for a conductive earth (half space) model, which is suitable for thicker slabs such as thick conductive overburden. In the EM anomaly list, a depth value of zero for the conductive earth model, in an area of thick cover, warns that the anomaly may be caused by conductive overburden.

Since discrete bodies normally are the targets of EM surveys, local base (or zero) levels are used to compute local anomaly amplitudes. This contrasts with the use of true zero levels which are used to compute true EM amplitudes. Local anomaly amplitudes are shown in the EM anomaly list and these are used to compute the vertical sheet parameters of conductance and depth. Not shown in the EM anomaly list are the true amplitudes which are used to compute the horizontal sheet and conductive earth parameters.

X-type electromagnetic responses

DIGHEM maps contain x-type EM responses in addition to EM anomalies. An x-type response is below the noise threshold of 3 ppm, and reflects one of the following: a weak conductor near the surface, a strong conductor at depth (e.g., 100 to 120 m below surface) or to one side of the flight line, or aerodynamic noise. Those responses that have the appearance of valid bedrock anomalies on the flight profiles are indicated by appropriate interpretive symbols (see EM map legend). The others probably do not warrant further investigation unless their locations are of considerable geological interest.

The thickness parameter

DIGHEM can provide an indication of the thickness of a steeply dipping conductor. The amplitude of the coplanar anomaly (e.g., CPI) increases relative to the coaxial anomaly (e.g., CXI) as the apparent thickness increases, i.e., the thickness in the horizontal plane. (The thickness is equal to the conductor width if the conductor dips at 90 degrees and strikes at right angles to the flight line.) This report refers to a conductor as thin when the thickness is likely to be less than 3 m, and thick when in excess of 10 m. Thin conductors are indicated on the EM map by the interpretive symbol "D", and thick conductors by "T". For base metal exploration in steeply dipping geology, thick conductors can be high priority targets because many massive sulfide ore bodies are thick, whereas non-economic bedrock conductors are often thin. The system cannot sense the thickness when the strike of the conductor is subparallel to the flight line, when the conductor has a shallow dip, when the anomaly amplitudes are small, or when the resistivity of the environment is below 100 ohm-m.

Resistivity mapping

Areas of widespread conductivity are commonly encountered during surveys. In such areas, anomalies can be generated by decreases of only 5 m in survey altitude as well as by increases in conductivity. The typical flight record in conductive areas is characterized by inphase and quadrature channels which are continuously active. Local EM peaks reflect either increases in conductivity of the earth or decreases in survey altitude. For such conductive areas, apparent resistivity profiles and contour maps are necessary for the correct interpretation of the airborne data. The advantage of the resistivity parameter is that anomalies caused by altitude changes are virtually eliminated, so the resistivity data reflect only those anomalies caused by conductivity changes. The resistivity analysis also helps the interpreter to differentiate between conductive trends in the bedrock and those patterns typical of conductive overburden. For example, discrete conductors will generally appear as narrow lows on the contour map and broad conductors (e.g., overburden) will appear as wide lows.

The resistivity profile (see table in Appendix A) and the resistivity contour map present the apparent resistivity using the so-called pseudo-layer (or buried) half space model defined in Fraser (1978)[2]. This model consists of a resistive layer overlying a conductive half space. The depth channel (see Appendix A) gives the apparent depth below surface of the conductive material. The apparent depth is simply the apparent thickness of the overlying resistive layer. The apparent depth (or thickness) parameter will be positive when the upper layer is more resistive than the underlying material, in which case the apparent depth may be quite close to the true depth.

The apparent depth will be negative when the upper layer is more conductive than the underlying material, and will be zero when a homogeneous half space exists. The apparent depth parameter must be interpreted cautiously because it will contain any errors which may exist in the measured altitude of the EM bird (e.g., as caused by a dense tree cover). The inputs to the resistivity algorithm are the inphase and quadrature components of the coplanar coil-pair. The outputs are the apparent resistivity of the

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[2] Resistivity mapping with an airborne multicoil electromagnetic system: Geophysics, v. 43, p. 144-172.

conductive half space (the source) and the sensor-source distance. The flying height is not an input variable, and the output resistivity and sensor-source distance are independent of the flying height. The apparent depth, discussed above, is simply the sensor-source distance minus the measured altitude or flying height. Consequently, errors in the measured altitude will affect the apparent depth parameter but not the apparent resistivity parameter.

The apparent depth parameter is a useful indicator of simple layering in areas lacking a heavy tree cover. The DIGHEM system has been flown for purposes of permafrost mapping, where positive apparent depths were used as a measure of permafrost thickness. However, little quantitative use has been made of negative apparent depths because the absolute value of the negative depth is not a measure of the thickness of the conductive upper layer and, therefore, is not meaningful physically. Qualitatively, a negative apparent depth estimate usually shows that the EM anomaly is caused by conductive overburden. Consequently, the apparent depth channel can be of significant help in distinguishing between overburden and bedrock conductors.

The resistivity map often yields more useful information on conductivity distributions than the EM map. In comparing the EM and resistivity maps, keep in mind the following:

(a) The resistivity map portrays the absolute value of the earth's resistivity. (Resistivity = 1/conductivity.)

(b) The EM map portrays anomalies in the earth's resistivity. An anomaly by definition is a change from the norm and so the EM map displays anomalies, (i) over narrow, conductive bodies and (ii) over the boundary zone between two wide formations of differing conductivity.

The resistivity map might be likened to a total field map and the EM map to a horizontal gradient in the direction of flight[3]. Because gradient maps are usually more sensitive than total field maps, the EM map therefore is to be preferred in resistive areas. However, in conductive areas, the absolute character of the resistivity map usually causes it to be more useful than the EM map.

---

[3] The gradient analogy is only valid with regard to the identification of anomalous locations.

Interpretation in conductive environments

Environments having background resistivities below 30 ohm-m cause all airborne EM systems to yield very large responses from the conductive ground. This usually prohibits the recognition of discrete bedrock conductors. The processing of DIGHEM data, however, produces six channels which contribute significantly to the recognition of bedrock conductors. These are the inphase and quadrature difference channels (DIFI and DIFQ), and the resistivity and depth channels (RES and DP) for each coplanar frequency; see table in Appendix A.

The EM difference channels (DIFI and DIFQ) eliminate up to 99% of the response of conductive ground, leaving responses from bedrock conductors, cultural features (e.g., telephone lines, fences, etc.) and edge effects. An edge effect arises when the conductivity of the ground suddenly changes, and this is a source of geologic noise. While edge effects yield anomalies on the EM difference channels, they do not produce resistivity anomalies. Consequently, the resistivity channel aids in eliminating anomalies due to edge effects. On the other hand, resistivity anomalies will coincide with the most highly conductive sections of conductive ground, and this is another source of geologic noise. The recognition of a bedrock conductor in a conductive environment therefore is based on the anomalous responses of the two difference channels (DIFI and DIFQ) and the two resistivity channels (RES). The most favourable situation is where anomalies coincide on all four channels.

The DP channels, which give the apparent depth to the conductive material, also help to determine whether a conductive response arises from surficial material or from a conductive zone in the bedrock. When these channels ride above the zero level on the electrostatic chart paper (i.e., depth is negative), it implies that the EM and resistivity profiles are responding primarily to a conductive upper layer, i.e., conductive overburden. If both DP channels are below the zero level, it indicates that a resistive upper layer exists, and this usually implies the existence of a bedrock conductor. If the low frequency DP channel is below the zero level and the high frequency DP is above, this suggests that a bedrock conductor occurs beneath conductive cover.

Channels REC1, REC2, REC3 and REC4 are the anomaly recognition functions. They are used to trigger the conductance channel CDT which identifies discrete conductors. In highly conductive environments, channel REC2 is deactivated because it is subject to corruption by highly conductive earth signals. Similarly, in moderately conductive environments, REC4 is deactivated. Some of the automatically selected anomalies (channel CDT) are discarded by the geophysicist. The automatic selection algorithm is intentionally oversensitive to assure that no meaningful responses are missed. The interpreter then classifies the anomalies according to their source and eliminates those that are not substantiated by the data, such as those arising from geologic or aerodynamic noise.

Reduction of geologic noise

Geologic noise refers to unwanted geophysical responses. For purposes of airborne EM surveying, geologic noise refers to EM responses caused by conductive overburden and magnetic permeability. It was mentioned above that the EM difference channels (i.e., channel DIFI for inphase and DIFQ for quadrature) tend to eliminate the response of conductive overburden. This marked a unique development in airborne EM technology, as DIGHEM is the only EM system which yields channels having an exceptionally high degree of immunity to conductive overburden.

Magnetite produces a form of geological noise on the inphase channels of all EM systems. Rocks containing less than 1% magnetite can yield negative inphase anomalies caused by magnetic permeability. When magnetite is widely distributed throughout a survey area, the inphase EM channels may continuously rise and fall reflecting variations in the magnetite percentage, flying height, and overburden thickness. This can lead to difficulties in recognizing deeply buried bedrock conductors, particularly if conductive overburden also exists. However, the response of broadly distributed magnetite generally vanishes on the inphase difference channel DIFI. This feature can be a significant aid in the recognition of conductors which occur in rocks containing accessory magnetite.

EM magnetite mapping

The information content of DIGHEM data consists of a combination of conductive eddy current response and magnetic permeability response. The secondary field resulting from conductive eddy current flow is frequency-dependent and consists of both inphase and quadrature components, which are positive in sign. On the other hand, the secondary field resulting from magnetic permeability is independent of frequency and consists of only an inphase component which is negative in sign. When magnetic permeability manifests itself by decreasing the measured amount of positive inphase, its presence may be difficult to recognize. However, when it manifests itself by yielding a negative inphase anomaly (e.g., in the absence of eddy current flow), its presence is assured. In this latter case, the negative component can be used to estimate the percent magnetite content.

A magnetite mapping technique was developed for the coplanar coil-pair of DIGHEM. The technique yields channel "FEO" (see Appendix A) which displays apparent weight percent magnetite according to a homogeneous half space model.[4] The method can be complementary to magnetometer mapping in certain cases. Compared to magnetometry, it is far less sensitive but is more able to resolve closely spaced magnetite zones, as well as providing an estimate of the amount of magnetite in the rock. The method is sensitive to 1/4% magnetite by weight when the EM sensor is at a height of 30 m above a magnetitic half space. It can individually resolve steeply dipping narrow magnetite-rich bands which are separated by 60 m. Unlike magnetometry, the EM magnetite method is unaffected by remanent magnetism or magnetic latitude.

---

[4] Refer to Fraser, 1981, Magnetite mapping with a multi-coil airborne electromagnetic system: Geophysics, v. 46, p. 1579-1594.

The EM magnetite mapping technique provides estimates of magnetite content which are usually correct within a factor of 2 when the magnetite is fairly uniformly distributed. EM magnetite maps can be generated when magnetic permeability is evident as indicated by anomalies in the magnetite channel FEO.

Like magnetometry, the EM magnetite method maps only bedrock features, provided that the overburden is characterized by a general lack of magnetite. This contrasts with resistivity mapping which portrays the combined effect of bedrock and overburden.

Recognition of culture

Cultural responses include all EM anomalies caused by man-made metallic objects. Such anomalies may be caused by inductive coupling or current gathering. The concern of the interpreter is to recognize when an EM response is due to culture. Points of consideration used by the interpreter, when coaxial and coplanar coil-pairs are operated at a common frequency, are as follows:

1. Channels CXS and CPS (see Appendix A) measure 50 and 60 Hz radiation. An anomaly on these channels shows

that the conductor is radiating cultural power. Such an indication is normally a guarantee that the conductor is cultural. However, care must be taken to ensure that the conductor is not a geologic body which strikes across a power line, carrying leakage currents.

2. A flight which crosses a line (e.g., fence, telephone line, etc.) yields a center-peaked coaxial anomaly and an m-shaped coplanar anomaly.[5] When the flight crosses the cultural line at a high angle of intersection, the amplitude ratio of coaxial/coplanar (e.g., CXI/CPI) is 4. Such an EM anomaly can only be caused by a line. The geologic body which yields anomalies most closely resembling a line is the vertically dipping thin dike. Such a body, however, yields an amplitude ratio of 2 rather than 4. Consequently, an m-shaped coplanar anomaly with a CXI/CPI amplitude ratio of 4 is virtually a guarantee that the source is a cultural line.

3. A flight which crosses a sphere or horizontal disk yields center-peaked coaxial and coplanar anomalies with a CXI/CPI amplitude ratio (i.e., coaxial/coplanar) of 1/4. In the absence of geologic bodies of this geometry, the most likely conductor is a metal roof or

5 See Figure II-1 presented earlier.

small fenced yard.[4] Anomalies of this type are virtually certain to be cultural if they occur in an area of culture.

4. A flight which crosses a horizontal rectangular body or wide ribbon yields an m-shaped coaxial anomaly and a center-peaked coplanar anomaly. In the absence of geologic bodies of this geometry, the most likely conductor is a large fenced area.[4] Anomalies of this type are virtually certain to be cultural if they occur in an area of culture.

5. EM anomalies which coincide with culture, as seen on the camera film, are usually caused by culture. However, care is taken with such coincidences because a geologic conductor could occur beneath a fence, for example. In this example, the fence would be expected to yield an m-shaped coplanar anomaly as in case #2 above. If, instead, a center-peaked coplanar anomaly occurred, there would be concern that a thick geologic conductor coincided with the cultural line.

---

[4] It is a characteristic of EM that geometrically identical anomalies are obtained from: (1) a planar conductor, and (2) a wire which forms a loop having dimensions identical to the perimeter of the equivalent planar conductor.

6. The above description of anomaly shapes is valid when the culture is not conductively coupled to the environment. In this case, the anomalies arise from inductive coupling to the EM transmitter. However, when the environment is quite conductive (e.g., less than 100 ohm-m at 900 Hz), the cultural conductor may be conductively coupled to the environment. In this latter case, the anomaly shapes tend to be governed by current gathering. Current gathering can completely distort the anomaly shapes, thereby complicating the identification of cultural anomalies. In such circumstances, the interpreter can only rely on the radiation channels CXS and CPS, and on the camera film.

MAGNETICS

The existence of a magnetic correlation with an EM anomaly is indicated directly on the EM map. An EM anomaly with magnetic correlation has a greater likelihood of being produced by sulfides than one that is non-magnetic. However, sulfide ore bodies may be non-magnetic (e.g., the Kidd Creek deposit near Timmins, Canada) as well as magnetic (e.g., the Mattabi deposit near Sturgeon Lake, Canada).

The magnetometer data are digitally recorded in the aircraft to an accuracy of one nT (i.e., one gamma). The digital tape is processed by computer to yield a total field magnetic contour map. When warranted, the magnetic data also may be treated mathematically to enhance the magnetic response of the near-surface geology, and an enhanced magnetic contour map is then produced. The response of the enhancement operator in the frequency domain is illustrated in Figure II-2. This figure shows that the passband components of the airborne data are amplified 20 times by the enhancement operator. This means, for example, that a 100 nT anomaly on the enhanced map reflects a 5 nT anomaly for the passband components of the airborne data.

The enhanced map, which bears a resemblance to a downward continuation map, is produced by the digital bandpass filtering of the total field data. The enhancement is equivalent to continuing the field downward to a level (above the source) which is 1/20th of the actual sensor-source distance.

Because the enhanced magnetic map bears a resemblance to a ground magnetic map, it simplifies the recognition of trends in the rock strata and the interpretation of

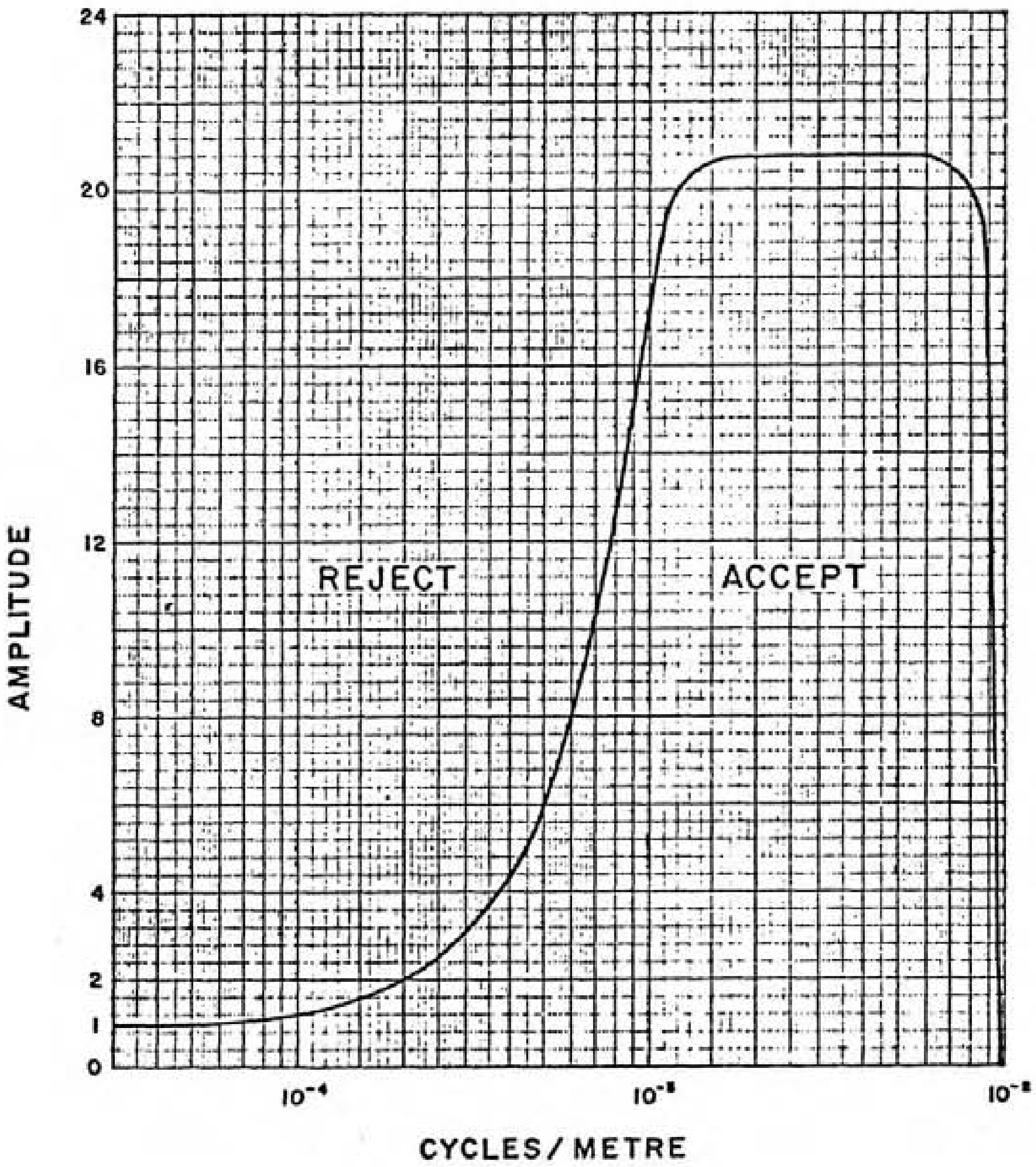


Figure II-2 Frequency response of magnetic enhancement operator.

geological structure. It defines the near-surface local geology while de-emphasizing deep-seated regional features. It primarily has application when the magnetic rock units are steeply dipping and the earth's field dips in excess of 60 degrees.

MAPS ACCOMPANYING THIS REPORT

Four map sheets accompany this report:

Electromagnetic Anomalies	1 map sheet
Resistivity	1 map sheet
Magnetics	1 map sheet
Enhanced Magnetics	1 map sheet

Respectfully submitted,
DIGHEM LIMITED

Z. Dvorak

Z. Dvorak
Vice-President

U ZD-155

A P P E N D I X A

THE FLIGHT RECORD AND PATH RECOVERY

Both analog and digital flight records were produced. The analog profiles were recorded on chart paper in the aircraft during the survey. The digital profiles were generated later by computer and plotted on electrostatic chart paper at a scale of 1:20,000. The digital profiles are listed in Table A-1.

In Table A-1, the log resistivity scale of 0.03 decade/mm means that the resistivity changes by an order of magnitude in 33 mm. The resistivities at 0, 33, 67, 100 and 133 mm up from the bottom of the digital flight record are respectively 1, 10, 100, 1,000 and 10,000 ohm-m.

The fiducial marks on the flight records represent points on the ground which were recovered from camera film. Continuous photographic coverage allowed accurate photo-path recovery locations for the fiducials, which were then plotted on the geophysical maps to provide the track of the aircraft.

The fiducial locations on both the flight records and flight path maps were examined by a computer for unusual helicopter speed changes. Such speed changes may denote an error in flight path recovery. The resulting flight path locations therefore reflect a more stringent checking than is provided by standard flight path recovery techniques.

Table A-1. The Digital Profiles

Channel Name (Freq)	Observed parameters	Scale units/mm
MAG	magnetics	10 nT
ALT	bird height	3 m
CXI (900 Hz)	vertical coaxial coil-pair inphase	1 ppm
CXQ (900 Hz)	vertical coaxial coil-pair quadrature	1 ppm
CXS (900 Hz)	ambient noise monitor (coaxial receiver)	1 ppm
CPI (900 Hz)	horizontal coplanar coil-pair inphase	1 ppm
CPQ (900 Hz)	horizontal coplanar coil-pair quadrature	1 ppm
CPS (900 Hz)	ambient noise monitor (coplanar receiver)	1 ppm
CPI (7200 Hz)	horixontal coplanar coil-pair inphase	1 ppm
CPQ (7200 Hz)	horizontal coplanar coil-pair quadrature	1 ppm
CPS (7200 Hz)	ambient noise monitor (coplanar receiver)	1 ppm
	Computed Parameters	
DIFI (900 Hz)	difference function inphase from CXI and CPI	1 ppm
DIFQ (900 Hz)	difference function quadrature from CXQ and CPQ	1 ppm
REC1	first anomaly recognition function	1 ppm
REC2	second anomaly recognition function	1 ppm
REC3	third anomaly recognition function	1 ppm
REC4	fourth anomaly recognition function	1 ppm
CDT	conductance	1 grade
RES (900 Hz)	log resistivity	.03 decade
RES (7200 Hz)	log resistivity	.03 decade
DP (900 Hz)	apparent depth	3 m
DP (7200 Hz)	apparent depth	3 m
FEO% (900 Hz)	apparent weight percent magnetite	0.25%

A P P E N D I X   B

EM ANOMALY LIST

174 WILLOUGHBY CREEK

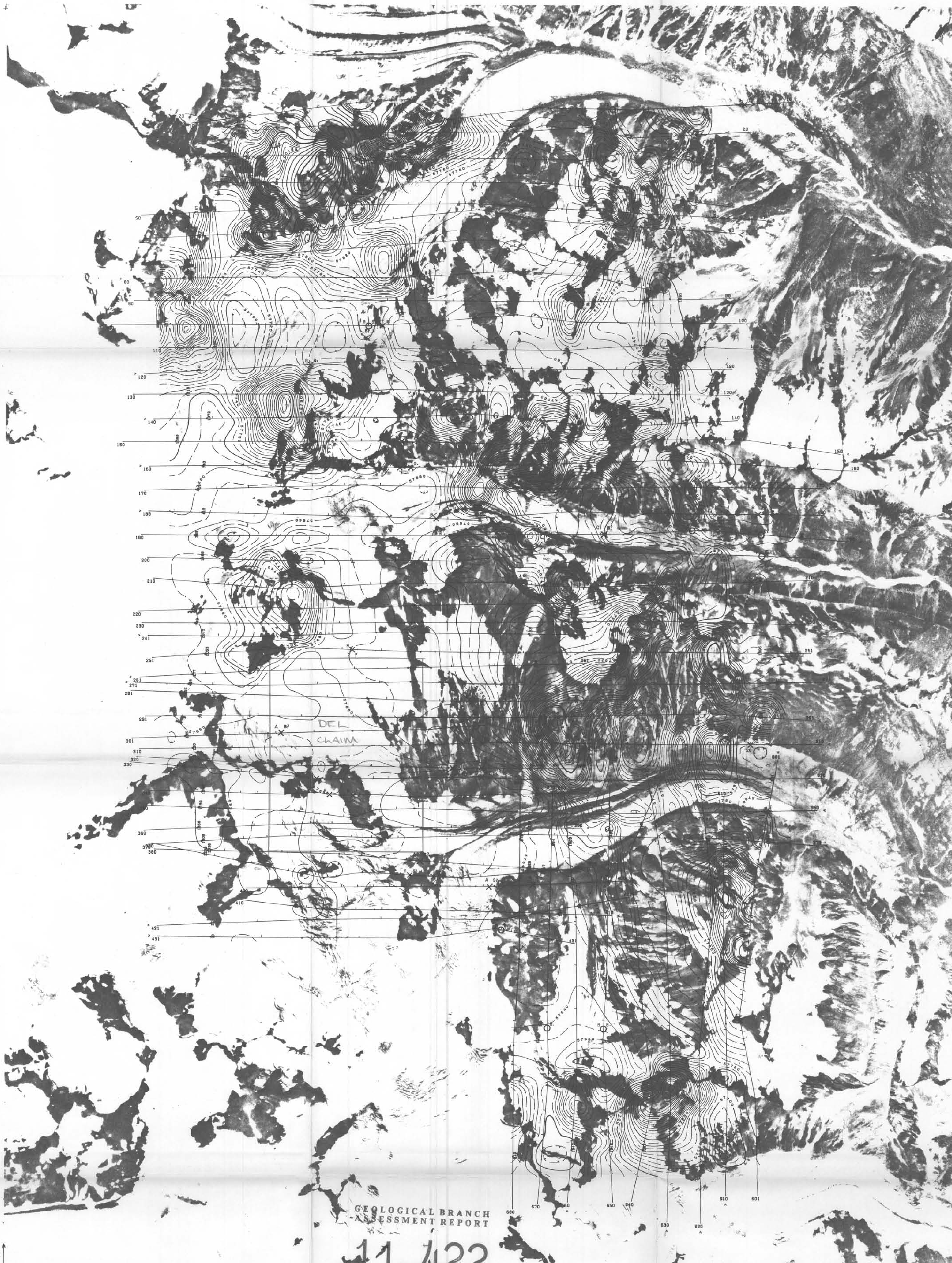
ANOMALY/ FID/INTERP	COAXIAL 900 HZ REAL PPM	COAXIAL 900 HZ QUAD PPM	COPLANAR 900 HZ REAL PPM	COPLANAR 900 HZ QUAD PPM	COPLANAR 7200 HZ REAL PPM	COPLANAR 7200 HZ QUAD PPM	VERTICAL DIKE COND MHOS	VERTICAL DIKE DEPTH* M	HORIZONTAL SHEET COND MHOS	HORIZONTAL SHEET DEPTH M	CONDUCTIVE EARTH RESIS OHM-M	CONDUCTIVE EARTH DEPTH M
LINE 10 (FLIGHT 5)												
A 290 B	1	1	1	6	12	9	1	26	1	77	333	44
LINE 30 (FLIGHT 5)												
B 764 B?	4	13	0	29	72	100	1	0	1	3	669	0
C 754 B?	2	13	1	14	48	36	1	0	1	2	596	0
D 746 B?	0	25	0	33	68	142	1	0	1	17	163	0
LINE 40 (FLIGHT 5)												
A 866 B	1	2	0	2	8	7	1	0	1	54	286	21
LINE 50 (FLIGHT 5)												
A 1111 B	7	18	2	19	47	55	2	0	1	17	707	0
LINE 60 (FLIGHT 9)												
A 821 B	3	7	1	6	18	16	2	0	1	79	1035	0
LINE 80 (FLIGHT 5)												
A 62 B	0	1	0	4	7	14	1	2	1	70	481	32
LINE 100 (FLIGHT 4)												
A 1761 S?	0	3	0	4	8	19	1	0	1	34	522	0
B 1779 B	0	4	0	5	8	13	1	7	1	68	659	27
LINE 140 (FLIGHT 4)												
A 1100 B	0	1	0	3	6	9	1	9	1	76	618	34
LINE 190 (FLIGHT 4)												
A 189 B	3	3	2	3	8	4	2	0	1	57	291	25
B 173 B?	1	3	1	7	13	26	1	4	1	42	409	13
LINE 200 (FLIGHT 5)												
A 1321 B	2	3	2	3	7	14	1	0	1	71	189	42
LINE 301 (FLIGHT 7)												
A 362 B?	1	2	0	3	9	12	1	0	1	48	482	11
LINE 431 (FLIGHT 8)												
A 73 B	1	2	0	4	10	17	1	0	1	53	549	15
LINE 650 (FLIGHT 10)												
B 1452 B	0	5	0	3	8	23	1	0	1	58	552	22

* ESTIMATED DEPTH MAY BE UNRELIABLE BECAUSE THE STRONGER PART OF THE CONDUCTOR MAY BE DEEPER OR TO ONE SIDE OF THE FLIGHT LINE, OR BECAUSE OF A SHALLOW DIP OR OVERBURDEN EFFECTS.

174 WILLOUGHBY CREEK

	COAXIAL 900 HZ		COPLANAR 900 HZ		COPLANAR 7200 HZ		VERTICAL DIKE		HORIZONTAL SHEET		CONDUCTIVE EARTH	
ANOMALY/ FID/INTERP	REAL PPM	QUAD PPM	REAL PPM	QUAD PPM	REAL PPM	QUAD PPM	COND MHOS	DEPTH* M	COND MHOS	DEPTH M	RESIS OHM-M	DEPTH M
LINE 670	(FLIGHT	10)										
A 953 B?	1	0	1	1	8	4	2	23	1	62	289	31

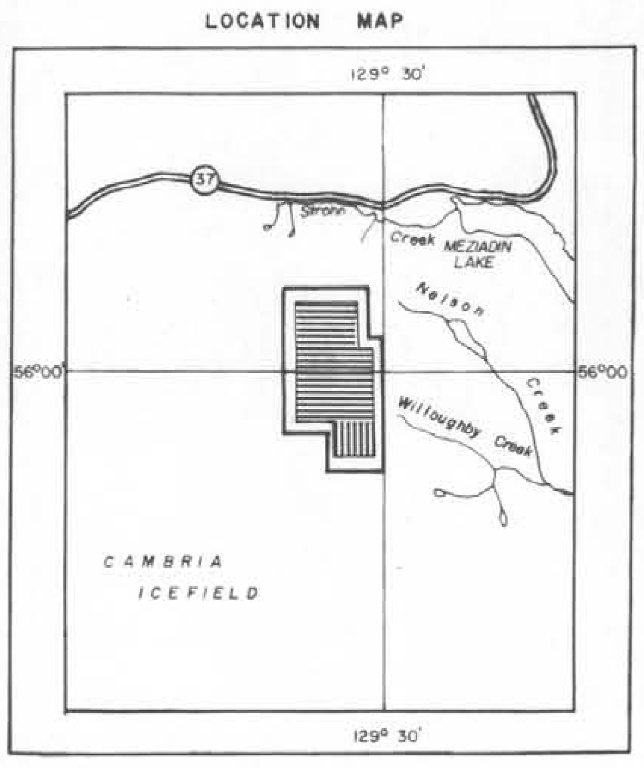
* ESTIMATED DEPTH MAY BE UNRELIABLE BECAUSE THE STRONGER PART OF THE CONDUCTOR MAY BE DEEPER OR TO ONE SIDE OF THE FLIGHT LINE, OR BECAUSE OF A SHALLOW DIP OR OVERBURDEN EFFECTS.



GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,422

LOCATION MAP



Scale 1:500,000

DIGHEM III SURVEY

WILLOUGHBY CREEK AREA, B.C.

MAGNETICS

FOR

VISCOUNT RESOURCES LTD.

Scale 1:20,000

1 0 1 2 Kilometres

1/2 0 1/2 1 Miles

Flight Line

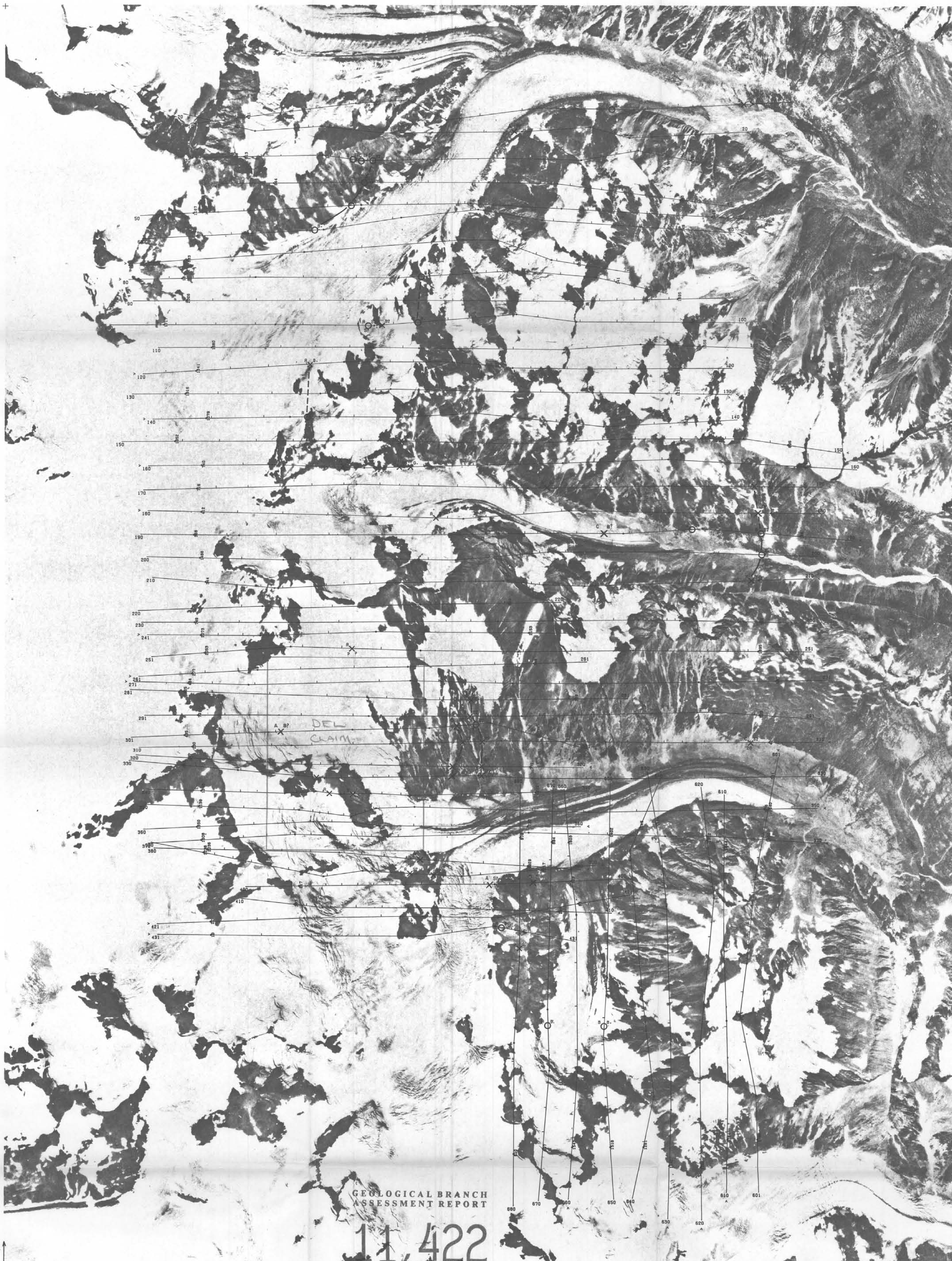
- Fiducial 2120 (Not recovered from film)
- Fiducial 2118 (Recovered from film)
- Fiducial 2110 (Not recovered from film)
- Fiducial 2104 (Recovered from film)
- 301 Line number and Flight direction

ISOMAGNETIC LINES
(total field)

- 1000 — 1 000 nT
- 100 — 100 nT
- 20 — 20 nT
- 10 nT
- magnetic depression

Magnetic inclination within the survey area: 74°

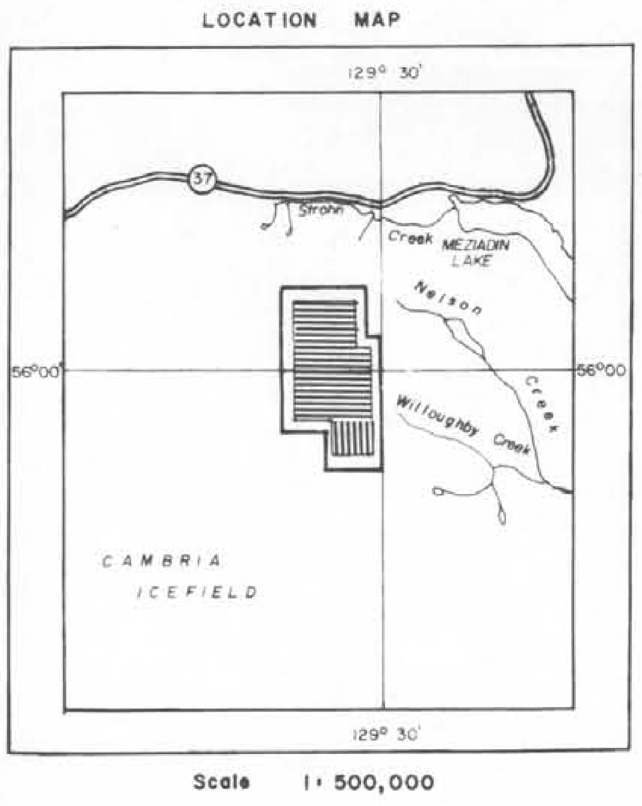
JOB	DATE	DRAWN BY	CHECKED BY
174	JULY 1983	DD.	Z.Q.



GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,422

LOCATION MAP



Scale 1 : 500,000

DIGHEM III SURVEY

WILLOUGHBY CREEK AREA, B.C.

ELECTROMAGNETIC ANOMALIES

FOR

VISCOUNT RESOURCES LTD.

REGISTERED PROFESSIONAL ENGINEER
D.C. FRASER
PROVINCE OF ONTARIO

Flight Line

- Fiducial 2120 (Not recovered from film)
- 2118 Fiducial 2118 (Recovered from film)
- Fiducial 2110 (Not recovered from film)
- 2104 Fiducial 2104 (Recovered from film)
- 301 ^ Line number and Flight direction

Scale 1:20,000

1 0 1 2 Kilometres

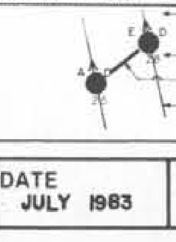
1/2 0 1/2 1 Miles

ANOMALY GRADE	EM GRADE SYMBOL	CONDUCTANCE RANGE (MHOS)
6	●	> 99
5	●	50 – 99
4	●	20 – 49
3	◉	10 – 19
2	○	5 – 9
1	○	< 5
—	×	indeterminate

DIGHEM anomalies are divided into six grades of conductivity – thickness product. This product in mhos is the reciprocal of resistance in ohms. The mho is a measure of conductance, and is a geologic parameter.

The interpretation is shown by the interpretive symbol (see legend below). The left letter is the anomaly **identifier**. The horizontal rows of **dots** indicate anomaly amplitude on the flight record, and the vertical column gives the estimated depth. This depth may be unreliable because the stronger part of the conductor may be deeper or to one side of the flight line, or because of a shallow dip or conductive overburden effects.

SYMBOL	GEOPHYSICAL MODEL	BEDROCK CONDUCTOR	or	NON BEDROCK CONDUCTOR	MOST LIKELY
D	steeply dipping thin dike	steeply dipping planar conductor	or	metal culture which contacts conductive ground	discrete bedrock conductor
T	thick dike	thick conductor with thickness greater than 10 m	or		
B	indeterminate	bedrock conductor	or		
P	conductor to one side of flight line	flight line passed off the end or side of conductor		flight line passed off the end or side of culture	
E	indeterminate	discrete conductor close to a much stronger conductor	or	edge of large conductive zone	
H	half space close to surface	conductive rock unit		thick conductive weathering or thick conductive cover	conductive rock or cover
G	buried half space	conductive rock unit (buried under non-conductive cover or under a dense forest canopy)	or	thick conductive weathering or thick conductive cover (buried under a dense forest canopy)	
S	horizontal sheet	weak bedrock conductor masked by conductive cover		thin conductive cover or occasionally culture which contacts conductive cover	conductive cover
R	horizontal ribbon	flatly dipping narrow conductor (not computer picked)	or	surface conductor, e.g. stream sediments or large fenced area	
C	sphere, horizontal disk	steeply plunging compact conductor		metal roof or fenced yard	culture
L	line	bedrock conductor masked by culture		fence, pipeline, power line	
a?	"a" is one of the above symbols. "a?" means that the correct identification of the geophysical model is only a reasonable possibility rather than being a reasonable probability.				
*	probable aerodynamic noise, meaning that conductive trends may in fact not exist				



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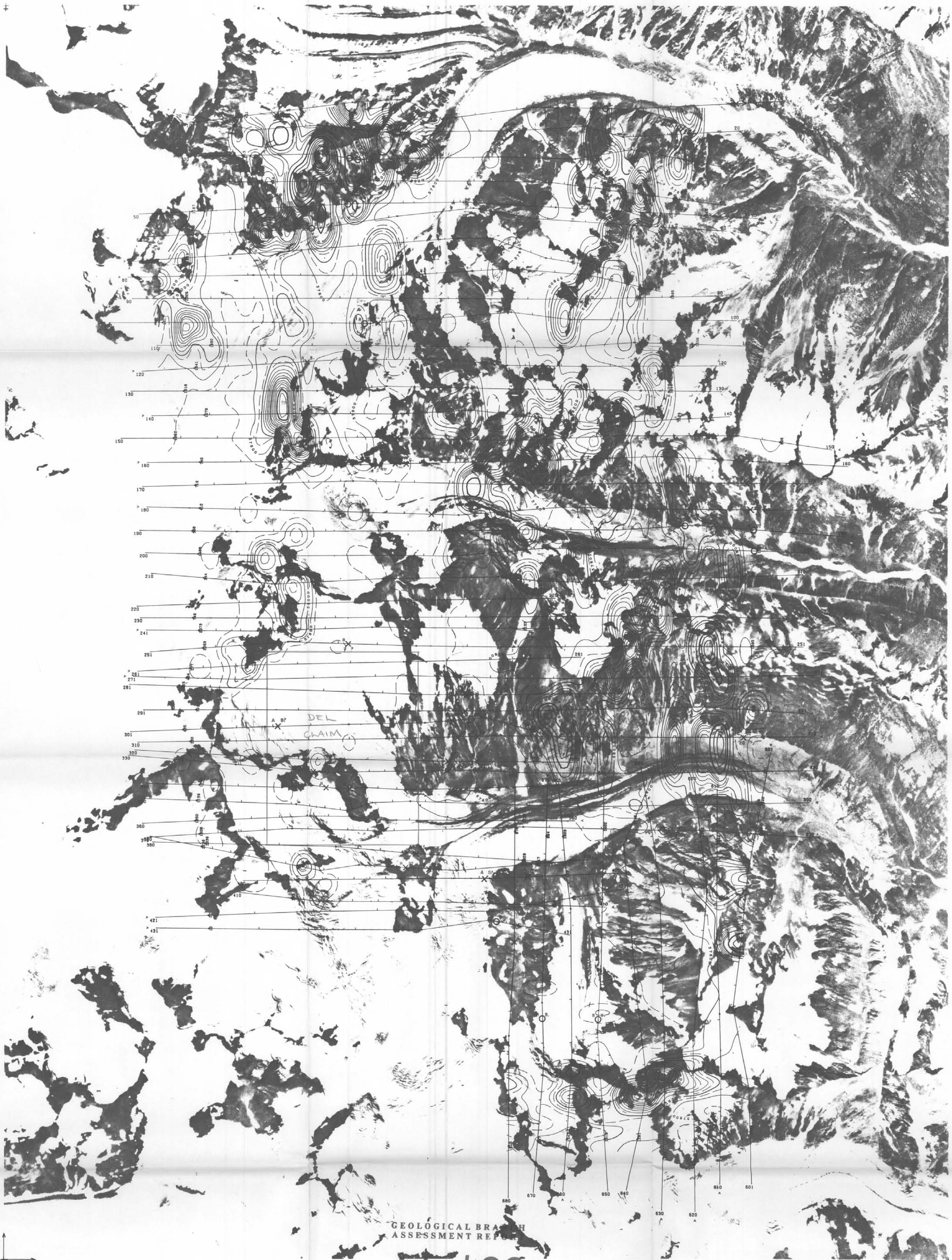
174	JULY 1983	BD.	Z.D.



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DIGHEM III SURVEY

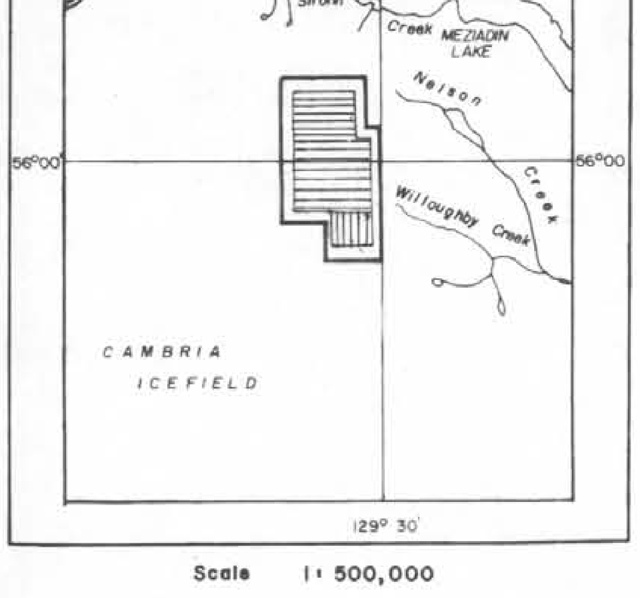
WILLOUGHBY CREEK AREA, B.C.

ENHANCED MAGNETICS

FOR

VISCOUNT RESOURCES LTD.

LOCATION MAP



Scale 1 : 500,000

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Scale 1:20,000

1 0 1 2 Kilometres

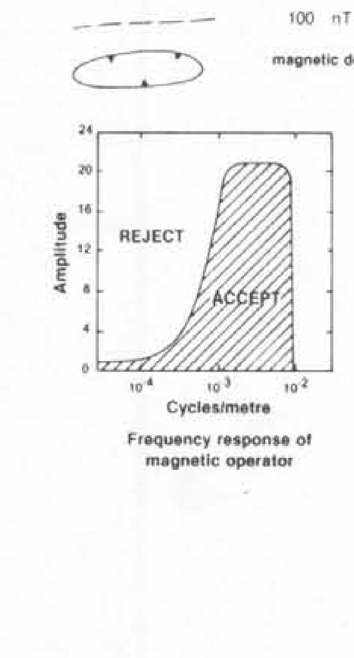
1/2 0 1/2 1 Miles

Flight Line

- Fiducial 2120 (Not recovered from film)
- 2118 Fiducial 2118 (Recovered from film)
- Fiducial 2110 (Not recovered from film)
- 2104 Fiducial 2104 (Recovered from film)
- 301 ^ Line number and Flight direction

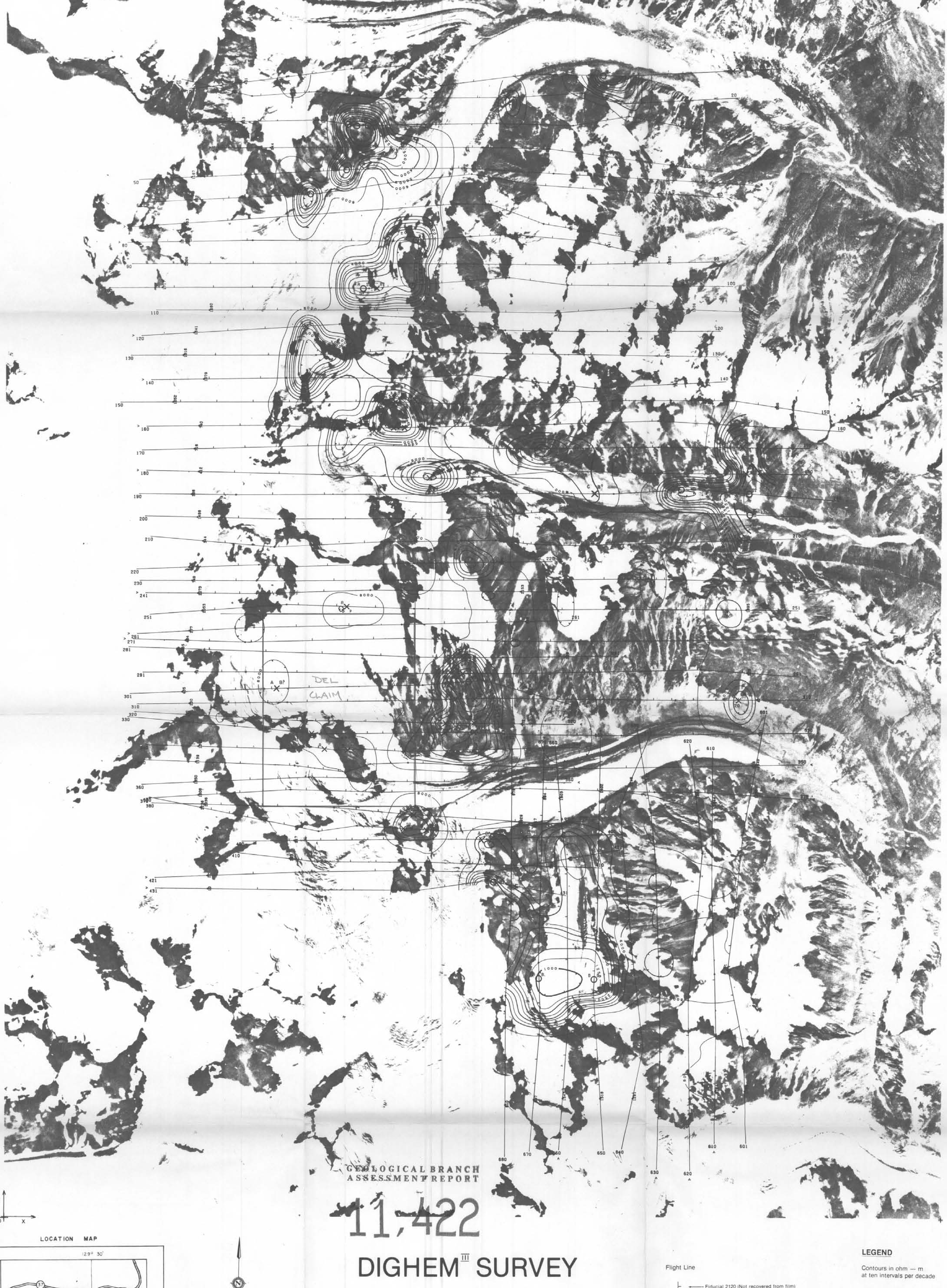
ISOMAGNETIC LINES
(enhanced field)

5000	5 000 nT
1000	1 000 nT
200	200 nT
- - - -	100 nT
(ellipse)	magnetic depression



Frequency response of magnetic operator

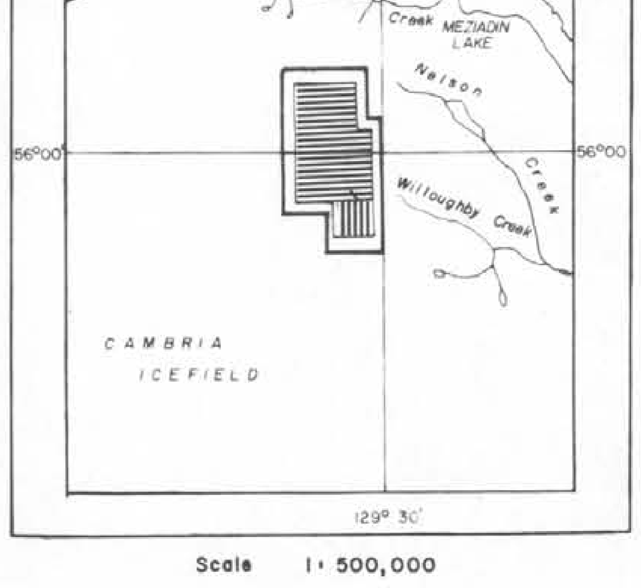
JOB	DATE	DRAWN BY	CHECKED BY
174	JULY 1983	DD.	ZD.



GEOLOGICAL BRANCH
ASSESSMENT REPORT

11,422

LOCATION MAP



Scale 1 : 500,000

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D. C. FRASER
PROVINCE OF ONTARIO

DIGHEM III SURVEY

WILLOUGHBY CREEK AREA, B.C.

RESISTIVITY

FOR

VISCOUNT RESOURCES LTD.

Scale 1:20,000

1 0 1 2 Kilometres

1/2 0 1/2 1 Miles

Flight Line

- Fiducial 2120 (Not recovered from film)
- Fiducial 2118 (Recovered from film)
- Fiducial 2110 (Not recovered from film)
- Fiducial 2104 (Recovered from film)
- 301 Line number and Flight direction

LEGEND

Contours in ohm — m
at ten intervals per decade

1000
800
600
500
400
300
250
200
150
125
100

Note

The numbers face in the direction of increasing value.

JOB	DATE	DRAWN BY	CHECKED BY
174	JULY 1983	D.D.	Z.Z.