2.2454

REPORT No. D70E

010

DIGHEM SURVEY

OF

MONTCALM TOWNSHIP AREA, ONTARIO

FOR

GEOPHYSICAL ENGINEERING LIMITED

BY

DIGHEM LIMITED

TORONTO, ONTARIO
JULY 11, 1977

D. C. FRASER
PRESIDENT

G. REITMAYR
GEOPHYSICIST

2.2454

INTRODUCTION

A DIGHEM^{II} survey of 1126 line-miles was flown with a 100 m line-spacing for Geophysical Engineering Limited from February 23 to March 19, 1977, in the Montcalm Township area of Ontario (Figure 1). The Alouette II jet helicopter C-GNQX flew with an average airspeed of 60 mph and EM bird height of 110 feet. Ancillary equipment consisted of a Geometrics 803 magnetometer with its bird at an average height of 160 feet, a Sperry radio altimeter, Geocam sequence camera, 60 hz monitor, Barringer 8-channel hot pen analog recorder, and a Geometrics G-704 digital data acquisition system with a Cipher 70 7-track 200-bpi magnetic tape recorder. The analog equipment recorded six channels of EM data at approximately 900 hz and one of magnetics and radio altitude. The digital equipment recorded the EM data with a sensitivity of 0.2 ppm/bit and the magnetic field to an accuracy of one gamma.

LOCATION MAP

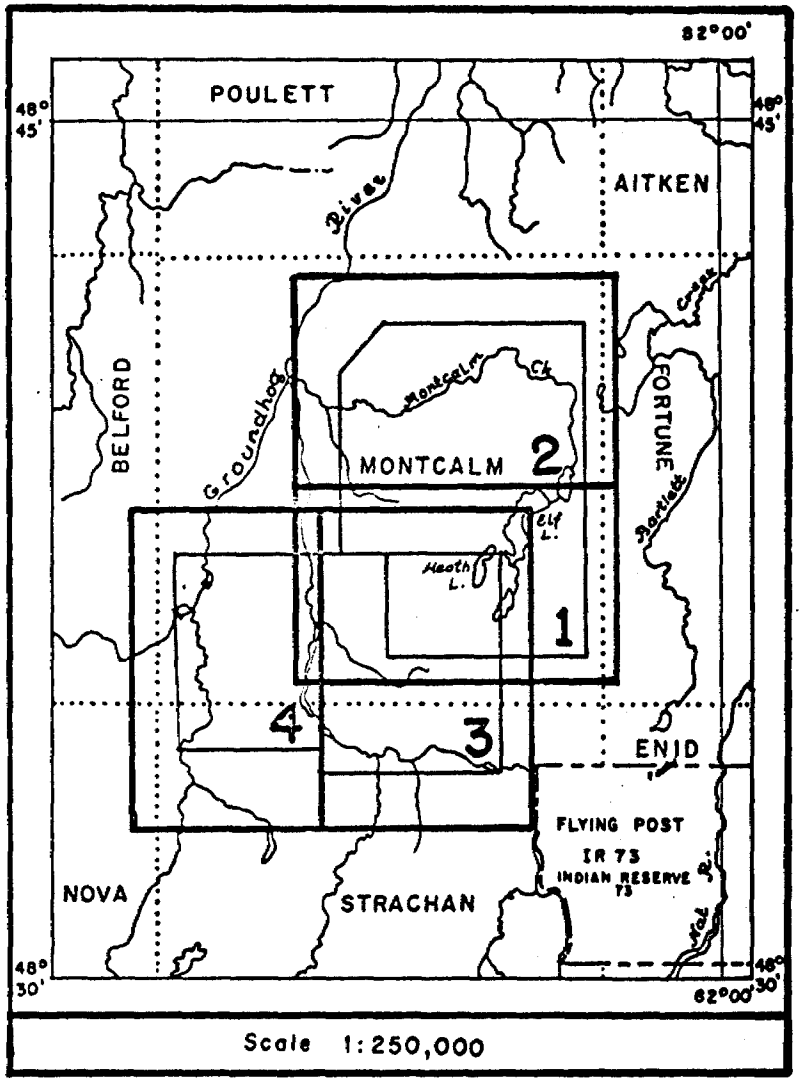

Fig. 1. The survey area.

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The Appendix provides details on the data channels, their respective noise levels, and the data reduction procedure. The quoted noise levels are generally valid for wind speeds up to 20 mph. Higher winds may cause the system to be grounded because excessive bird swinging produces control difficulties in piloting the helicopter. The swinging results from the 50 square feet 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.

DATA PRESENTATION

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) model is the most common model used for the analysis of discrete conductors. All anomalies plotted on the electromagnetic map are interpreted 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 the most suitable model for broad conductors. Resistivity contour maps result from the use of this model. Resistivity contour maps should be prepared when the EM responses predominantly are of the broad class. 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.

Discrete conductor analysis

The EM anomalies appearing on the electromagnetic map are interpreted by computer to give the conductance (i.e., conductivity-thickness product) in mhos of a vertical sheet model. DIGHEM anomalies are divided into six grades of conductance, as shown in Table I. The conductance in mhos is the reciprocal of resistance in ohms.

Table I. EM Anomaly Grades

Anomaly Grade	Mho Range
6	$\geq$ 100
5	50 - 99
4	20 - 49
3	10 - 19
2	5 - 9
1	$\leq$ 4

The mho 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. Small anomalies from deeply buried strong conductors are not confused with small anomalies from shallow weak conductors because the former will have larger mho values.

Conductive overburden generally produces broad EM responses which are not plotted on the EM maps. However, patchy conductive overburden can yield discrete-like anomalies with a conductance grade (cf. Table I) of 1, or even of 2 for highly conducting clays. The anomaly shapes from the multiple coils often allow surface conductors to be recognized, and these are indicated by the letter S on the map. The remaining grade 1 and 2 anomalies could be weak bedrock conductors. The higher grades indicate increasingly higher conductances. Examples: DIGHEM's New Insco copper discovery (Noranda, Quebec) yielded a grade 4 anomaly, as did the neighbouring copper-zinc Magusi River ore body; Mattabi (copper-zinc, Sturgeon Lake, Ontario) and Whistle (nickel, Sudbury, Ontario) gave grade 5; and DIGHEM's Montcalm nickel-copper discovery (Timmins, Ontario) 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, New Brunswick, 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.

On the electromagnetic map, the actual mho value and a letter are plotted beside the EM grade symbol. The letter is the anomaly identifier. The horizontal rows of dots, beside each anomaly symbol, indicate the anomaly amplitude of the flight record. The vertical column of dots gives the estimated depth. In areas where anomalies are crowded, the identifiers, dots and mho values 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 be accurate whereas one obtained from a small ppm anomaly (no dots) could be inaccurate.

The absence of amplitude dots indicates that the anomaly from the standard (coaxial maximum-coupled) coil 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 mho value and depth estimate will illustrate which of these possibilities best fits the recorded data. The depth estimate, however, can be erroneous. The anomaly from a near-surface conductor, which exists only to one side of a flight line, will yield a large depth estimate because the computer assumes that the conductor occurs directly beneath the flight line.

Flight line deviations occasionally yield cases where two anomalies, having similar mho 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 further interpretation is presented on the EM map by means of the line-to-line correlation of anomalies. This provides conductor axes which may define the geological structure over portions of the survey area.

The majority of massive sulfide ore deposits have strike lengths of a few hundred to a few thousand feet. Consequently, it is important to recognize short conductors which may exist in close proximity to long conductive bands. The high resolution of the DIGHEM system, and the line-to-line correlation given on the EM map, are especially important for a proper strike length evaluation.

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 followup program. The actual mho values are plotted 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 direction, conductance and depth. The accuracy is comparable to an interpretation from a ground EM survey having the same line spacing.

The attached EM anomaly list provides a tabulation of anomalies in ppm, and in mhos and estimated depth for the vertical sheet model. The anomalies are listed from top to bottom of the map for each line. Ungraded anomalies (see map legend) do not appear in the anomaly list. Such conductors yielded anomalies which were too weak (on the flight chart) to allow a reasonable estimate of their conductance grade.

The EM anomaly list also shows the conductance in mhos and the 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 50 feet. 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 deep cover, warns that the anomaly may be caused by conductive overburden.

Resistivity mapping

Areas of widespread conductivity have been encountered while surveying for base metals. In such areas, anomalies can be generated by decreases of only 20 feet 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 peaks reflect either increases in conductivity of the earth or decreases in survey altitude. For such conductive areas, apparent resistivity contour maps can aid the interpretation of the airborne data. The advantage of the contour maps is that anomalies caused by altitude changes are considerably reduced, and the contours reflect mainly those anomalies caused by conductivity changes. In areas of widespread conductivity, many anomalies on the EM map may be caused by altitude variations. The majority of these "anomalies" are flagged by S or S? (see map legend). A more quantitative approach is to prepare a resistivity contour map. Such a map improves the interpreter's ability to differentiate between conductive trends in the bedrock and those patterns typical of conductive overburden. Discrete conductors will appear as narrow lows on the contour map and broad conductors will appear as wide lows.

Conductive overburden diminishes the ability of an EM system to effectively explore the bedrock. For example, the lower the resistivity of the cover, the more active the EM channels, and the less the likelihood of recognizing that a particular anomaly might be caused by a bedrock conductor. As a general rule of thumb, the effectiveness of the DIGHEM system for base metal

exploration is given in Table II.

Table II. Influence of Conductive Cover On Base Metal Surveys.

Resistivity	Exploration effectiveness at 900 hz
> 300 ohm-m	excellent
100 to 300	good
30 to 100	moderate
< 30	poor

Apparent resistivity maps should be constructed when the exploration effectivenss (Table II) is moderate to poor, because the contour patterns can be helpful in differentiating between bedrock and overburden conductors. Wide resistivity lows may be caused by broad (e.g., flatly dipping) bedrock conductors or by conductive overburden. The two can only be differentiated on the basis of the resistivity contour patterns coupled with knowledge of the geology. For example, a wide east-west resistivity low might suggest the existence of a bedrock conductor in an area of flatly dipping stratigraphy which strikes east-west, whereas it would be suspect if the geological strike was north-south.

Elimination of conductive overburden response

The DIGHEM^{II} system yields four channels which generally are free of the response of conductive overburden. These are the inphase channel 33, the quadrature channel 34, and the two amplitude function channels 35 and 36. Channels 35 and 36 are used to trigger the conductance channel 37 which identifies discrete conductors.

Discrete conductors usually occur in the bedrock, such as sulfides or graphite, rather than in the overburden, such as conductive clay. Only discrete conductors are plotted on the EM map. Broad (i.e., non-discrete) conductors are not plotted on this map, but are indicated by lows on the resistivity contour map.

The thickness parameter

DIGHEM^{II} can provide an indication of the thickness of a steeply dipping conductor. The ratio of the anomaly amplitude of channel 24/channel 22 increases as the apparent thickness increases, i.e., the thickness in the horizontal plane. On the EM map, those conductors are circled (see map legend) which are believed to have an apparent thickness greater than 30 feet. When the geological dip is greater than 45 degrees, the circled conductors can be high priority targets because most massive sulfide ore bodies are at least this thick, whereas non-economic bedrock conductors are often thinner. An estimate of thickness cannot be obtained when the strike of the conductor is subparallel to the flight line.

Magnetics

The existence of a magnetic correlation with an EM anomaly is indicated directly on the EM photomosaic. 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., Kidd Creek near Timmins, Ontario) as well as magnetic (e.g., Mattabi).

The magnetometer data are digitally recorded in the aircraft to an accuracy of one gamma. The digital tape is processed by computer to yield a standard total field magnetic map contoured at 25 gamma intervals. The magnetic data also are treated mathematically to enhance the magnetic response of the near-surface geology, and an enhanced magnetic map is produced with a 100 gamma contour interval. The response of the enhancement operator in the frequency domain is shown in Figure 2.

The enhanced magnetic map bears a resemblance to a ground magnetic map. It therefore simplifies the recognition of trends in the rock strata and the interpretation of geological structure. The contour

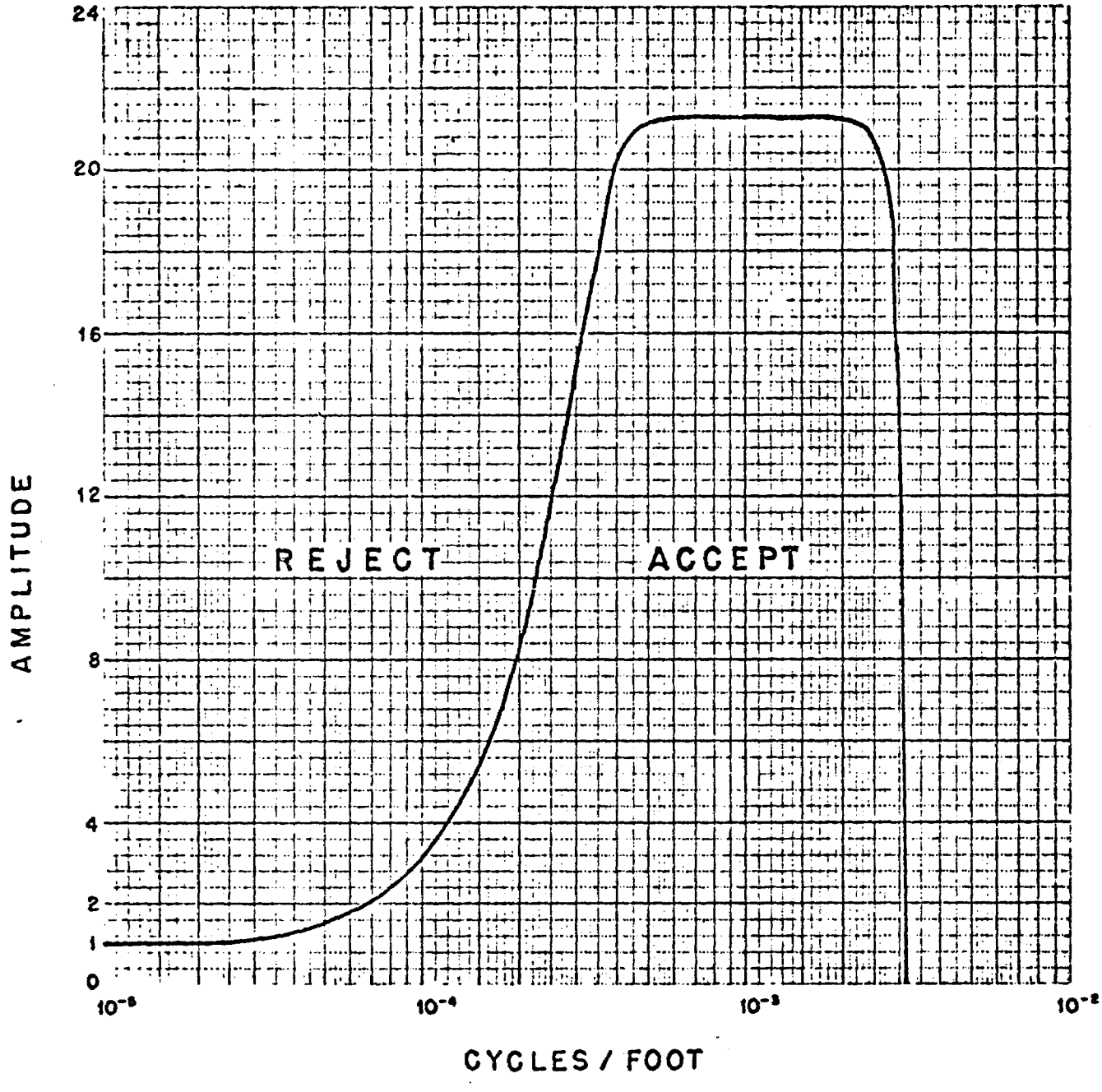


Figure 2 Frequency response of magnetic operator

CONDUCTORS IN THE SURVEY AREA

The DIGHEM maps provide an interpretation of conductors, as to their length, strike direction, depth, and conductance quality or conductivity-thickness product in mhos. There remains only to correlate these conductors with the known geology to provide the next step in the exploration program.

When studying the EM maps for followup planning, consult the anomaly listings appended to this report to ensure that none of the conductors are overlooked. Conversely, the original maps may be printed with topography burned out, leaving only the anomalies which then will be clearly visible.

The survey area comprises four sheets. Sheet 2 includes the Montcalm Township copper-nickel ore body which was discovered by an earlier DIGHEM survey.

The digitally recorded geophysical data were processed to produce maps of electromagnetics, resistivity, magnetics and enhanced magnetics for each of the four sheets. Changes were made later to the computer program, and sheet 2 was reissued to provide approximately twice the sensitivity to both the electromagnetic and resistivity maps. Sheet 2 also shows x-type EM responses in addition to EM anomalies. An x-type response is below the noise threshold of 2 ppm, and reflects one of the following: a weak conductor near the surface, a strong conductor at depth (e.g., 400 feet

below surface), or noise. Such a response should not be followed up unless its location is of considerable geological interest.

Sheets 1, 3 and 4 may be reissued, dependent on the client's assessment of the usefulness of the x-type responses and the greater sensitivity of the EM and resistivity maps.

The survey area was quite active as a result of a fairly extensive cover of conductive overburden. The overburden typically has a resistivity of the order of 200 ohm-m. The contour patterns on the resistivity maps generally are governed by the distribution of conductive overburden, where the lower resistivities probably indicate thicker overburden. Areas where resistivities are greater than 1000 ohm-m have thin overburden and, perhaps, outcrop. The lowest resistivity (20 ohm-m) occurs over the Montcalm Township ore body. Other bedrock-generated resistivity lows correlate with the EM conductors.

There were no EM anomalies detected on sheet 1. Anomalies of possible interest on the other sheets are listed below:

SHEET 2

GROUP 1 — A sporadically magnetic weak conductor, of grades 1 and 2, has a length of 300 m. There is a possibility that it could be caused by conductive overburden, which is prevalent in this area.

GROUP 2 — This group consists of a single-line grade 1 anomaly plus one x-type response. The anomaly has the appearance of a thick near-surface bedrock conductor of poor conductivity. It occurs in an area of fairly resistive cover, but it could be caused by a pocket of conductive overburden.

Anomaly 161A — A single-line grade 5 anomaly occurs on the southwest flank of a folded magnetic structure. The anomaly is barely above the noise threshold and so could be suspect. However, it is believed to reflect a bedrock conductor in gabbro, and should be followed up.

Anomaly 164A — This single-line grade 5 non-magnetic anomaly probably reflects noise. However, it correlates with an x-type response

on the overlapping line 165. If it is a bedrock conductor, it may extend northward to the x-type response on line 166.

GROUP 3

The single-line grade 1 anomaly 166A probably is caused by noise, but may actually reflect a moderately conductive body at depth. The poor conductance rating may be caused by the overlying conductive overburden.

GROUP 4

Sporadically magnetic grade 1 and 2 anomalies appear to occur on a common geological horizon. The x-type response on line 180 is caused by the same conductor, but the x-type response on line 177 may occur to the east of the weakly conductive horizon.

GROUP 5

A conductor of length 450 m is indicated solely by x-type responses. It probably reflects a good conductor at depth rather than a poor conductor at surface. It correlates directly with a 500 gamma elliptical magnetic anomaly.

GROUP 6

A pair of conductive bands, with conductance grades of 1 to 5, correlate with a magnetic high of 1300 gammas. The zone has a length of 900 m and the conductive material at 186A has an apparent thickness in excess of 50 feet. One of the conductors was drilled, yielding a 50 m core length of massive and disseminated pyrite and pyrrhotite with iron formation. There is a possibility that the other conductor of the pair is part of the main conductor, with the pair representing heavily disseminated sulfides with several massive sections over a total width of up to 100 m.

GROUP 7

The single-line grade 2 anomaly correlates with an x-type response to the north. It is non-magnetic, and is believed to reflect a bedrock conductor.

GROUP 8

The anomalies of this group result from the massive pyrrhotite copper-nickel ore body. Conductances of 3 to 6 occur over a length of 300 m. An x-type response from the ore body yields a total length of 400 m for the conductor.

GROUP 8(a)

The x-type responses on lines 185 and 186 south of the ore body are not believed to be caused by the known ore mineralization. It is possible that they reflect non-magnetic mineralization at a depth greater than 100 m. These x-type responses appear to correlate with a very weak IP anomaly on line 4 + 00 S, which is the southern-most line on the grid.

Anomaly 190B

A single-line grade 1 non-magnetic anomaly occurs 200 m east of the Montcalm ore body. It correlates with a weak metal factor response and a weak horizontal loop EM response. It is an interesting target because of its proximity to the ore body. Note the x-type response which occurs 150 m north on strike with 190B.

GROUP 9

The weak anomalies in this grouping are mentioned only because of their proximity to the ore body. They lie outside of the ore-related feature on the enhanced magnetic map. The EM responses in this group 9 are believed to be of no economic significance.

Consideration might be given to extending the PEM and MaxMin surveys to cover these anomalies.

GROUP 10

This grouping consists of anomalies having conductance grades of 3 to 5, and magnetic correlation in the range 60 to 200 gammas. The southern section 198A-199A provides the strongest target. The northern section (lines 2010-206) consists of one anomaly of small amplitude plus five x-type responses. Anomaly 200A is questionable and appears to be separate from the main band. One drill hole to the south of 198A intersected metadacite with 10 feet of pyrrhotite, pyrite and trace chalcopyrite. The center of the conductor (at 1980A, 17 mhos) has a width which could be of the order of 50 feet.

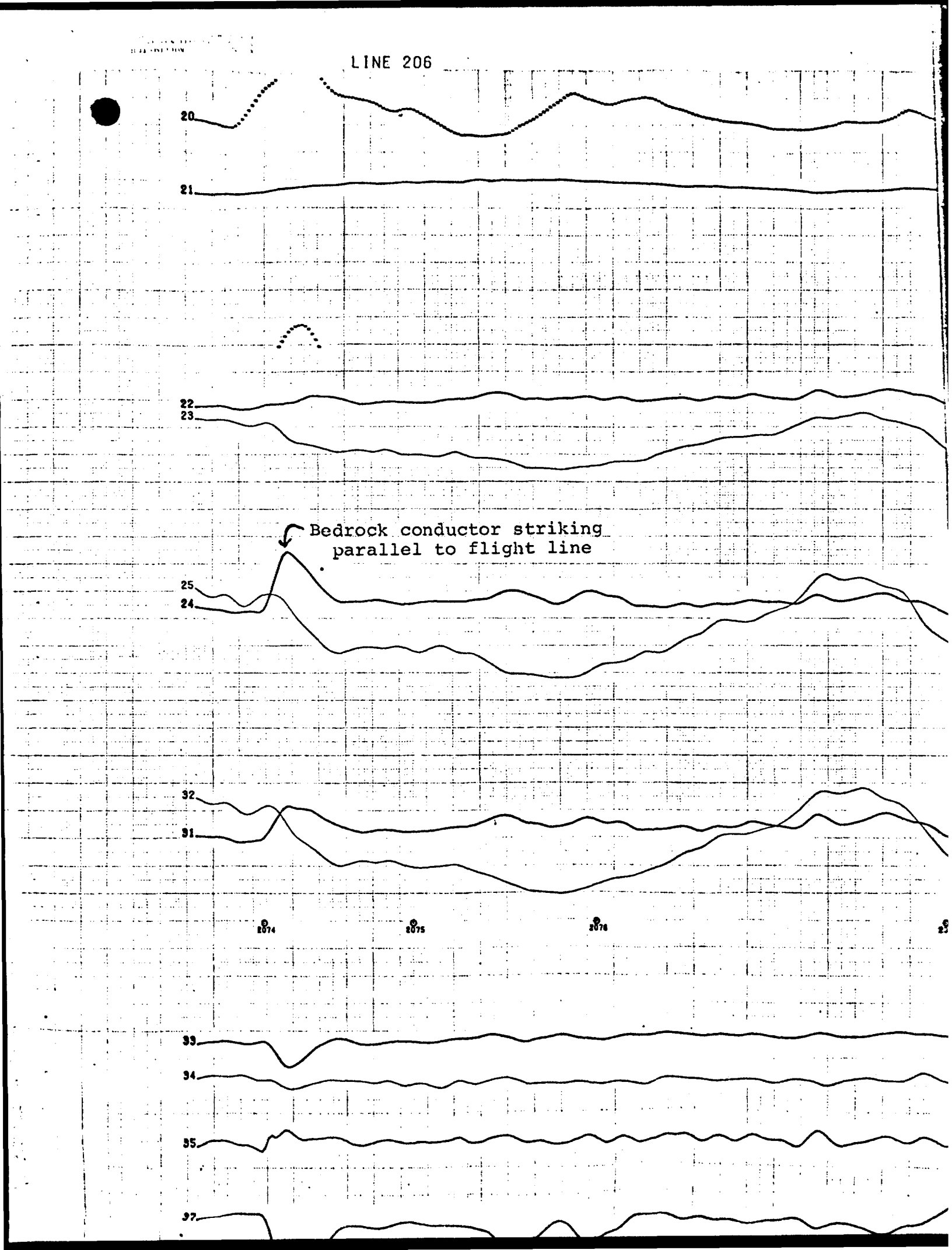
This group 10 may appear to be on strike with the iron formation of group 6, but it is believed that the two groups represent different geological horizons.

GROUP 11

Group 11 consists of a grade 1 anomaly plus two x-type responses. The strike is parallel to the magnetic trend. The conductor occurs in an area of conductive overburden, and there is a possibility that its source is in the overburden.

GROUP 12

The DIGHEM^{II} system flew parallel to the conductors of this group. The earlier DIGHEM^{I} survey defined these conductors better because this system crossed the conductors at right angles to their strike. The following xerox of a DIGHEM^{II} flight profile shows that the whaletail coil-pair (channel 24) can yield a strong anomaly from a parallel conductor when the standard coil-pair (channel 22) gives no anomaly. However, it is believed that this occurs only when the system passes within 30 m of the conductor. Anomaly 208A is a third grade conductor which was not detected by the earlier DIGHEM^{I} survey.


LINE 206
20
21
22
23
Bedrock conductor striking
parallel to flight line
25
24
32
31
2074
2075
2076
33
34
35
37

Anomaly 190C — A single-line grade 2 anomaly occurs on a long magnetic band. The anomaly is barely above the noise threshold but looks real. However, another line passed over the anomaly location without detecting it. Consequently, the anomaly must be considered to be questionable.

SHEET 3

Anomaly 334A — There is a possibility that this single-line grade 2 anomaly is caused by conductive overburden.

SHEET 4

Anomaly 372A — This single-line grade 1 anomaly may reflect conductive overburden.

Anomaly 380A — A poorly conductive bedrock source probably is the cause of this single-line non-magnetic grade 1 anomaly.

Respectively submitted,

Toronto, Ontario
July 11, 1977
/ap

D. C. Fraser
President
Qualifications: 63.2078 Vol. 1

G. Reitmayr
Geophysicist
Qualifications: Not on record

Sixteen maps accompany this report:

Electromagnetics	4 map sheets
Resistivity	4 map sheets
Magnetics	4 map sheets
Enhanced magnetics	4 map sheets

A P P E N D I X

THE FLIGHT RECORD AND PATH RECOVERY

The flight record is a roll of chart paper containing the geophysical profiles. The profiles were generated by computer at a scale identical to the geophysical maps. The flight record consists of 15 channels of information, as follows:

Channel Number	Parameter	Scale units/mm	Noise
20	magnetics	10 gamma	2 gamma
21	altitude	10 feet	5 feet
22	standard* coil-pair inphase	1 ppm	1-2 ppm
23	standard coil-pair quadrature	1 ppm	1-2 ppm
24	whaletail** coil-pair inphase	1 ppm	1-2 ppm
25	whaletail coil-pair quadrature	1 ppm	1-2 ppm
28	ambient noise monitor	1 ppm	
31	sums function inphase	1 ppm	1-2 ppm
32	sums function quadrature	1 ppm	1-2 ppm
33	differences function inphase	1 ppm	1-2 ppm
34	differences function quadrature	1 ppm	1-2 ppm
35	first amplitude function	1 ppm	1-2 ppm
36	second amplitude function	1 ppm	1-2 ppm
37	conductance	1 mho	
40	log resistivity	.03 decade	

* coaxial
** horizontal coplanar

The log resistivity scale of 0.03 decade/mm means that the resistivity changes by an order of magnetude in 33 mm. Thus, the resistivities at 0, 33, 67 and 100 mm up from the bottom of the chart are respectively 1, 10, 100 and 1000 ohm-m.

The fiducial marks on the flight record represent points on the ground which were recognized by the aircraft navigator. 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 changes often 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.

/ap

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LINE & ANOMALY	STANDARD COIL REAL PPM	STANDARD COIL QUAD PPM	COPLANAR COIL REAL PPM	COPLANAR COIL QUAD PPM	VERTICAL DIKE COND MHOS	VERTICAL DIKE DEPTH* FEET	HORIZONTAL SHEET COND MHOS	HORIZONTAL SHEET DEPTH FEET	CONDUCTIVE EARTH RESIS OHM-M	CONDUCTIVE EARTH DEPTH FEET
157A	5	8	2	16	2	56	1	186	107	69
157B	5	0	1	6	14	210	4	468	13	379
157C	6	2	4	5	15	194	4	426	11	344
157D	2	10	4	19	1	45	1	151	182	34
157E	2	6	1	5	1	97	1	249	233	96
158A	4	6	3	6	4	129	1	303	67	175
159A	2	0	0	0	8	334	2	722	39	574
159B	3	9	4	15	2	84	1	207	131	88
159C	0	0	3	11	1	139	1	311	319	136
160A	3	2	2	5	5	192	2	427	60	291
160B	2	5	1	3	2	90	1	263	163	110
161A	5	0	1	0	61	258	13	532	2	486
164A	7	0	1	0	95	204	18	453	1	418
165A	4	2	0	3	7	191	2	444	37	328
165B	3	6	3	13	2	90	1	227	151	98
165C	4	4	1	6	4	158	1	351	72	214
166A	2	4	2	4	3	155	1	350	105	198
170A	4	4	1	10	3	91	1	257	99	120
171A	2	1	0	0	7	311	2	665	40	522
174A	4	0	1	0	53	248	11	531	2	479

* 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.

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LINE & ANOMALY	STANDARD COIL REAL PPM	STANDARD COIL QUAD PPM	COPLANAR COIL REAL PPM	COPLANAR COIL QUAD PPM	VERTICAL DIKE COND MHOS	VERTICAL DIKE DEPTH* FEET	HORIZONTAL SHEET COND MHOS	HORIZONTAL SHEET DEPTH FEET	CONDUCTIVE EARTH RESIS OHM-M	CONDUCTIVE EARTH DEPTH FEET
176A	4	3	1	7	4	140	1	339	71	200
179A	4	1	1	5	9	208	3	480	26	367
179B	4	3	2	5	5	140	2	352	54	224
182A	3	3	0	3	4	177	1	408	87	252
183A	11	6	9	9	13	127	4	305	12	230
184A	7	4	5	9	7	130	2	318	29	223
185A	3	3	0	5	3	146	1	342	122	185
185B	1	0	6	0	40	310	7	610	6	560
186A	7	3	16	6	27	122	7	320	4	258
1860A	5	0	3	1	73	213	15	476	1	435
1860B	0	0	6	0	20	300	5	710	15	540
1860C	4	1	1	0	31	250	7	553	5	476
187A	2	4	4	5	3	99	1	285	94	140
188A	0	0	4	0	13	336	3	703	18	586
189A	15	3	38	1	217	84	40	229	1	212
190A	5	3	6	1	17	178	4	418	9	341
190B	2	4	1	1	3	175	1	400	150	300
190C	3	2	2	4	5	179	2	408	61	272
1900A	16	3	17	2	117	125	23	291	1	265

* 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.

D70E DIGHEM SYND MONTCALM SH.2 APR/77

LINE & ANOMALY	STANDARD COIL REAL PPM	STANDARD COIL QUAD PPM	COPLANAR COIL REAL PPM	COPLANAR COIL QUAD PPM	VERTICAL DIKE COND MHOS	VERTICAL DIKE DEPTH* FEET	HORIZONTAL SHEET COND MHOS	HORIZONTAL SHEET DEPTH FEET	CONDUCTIVE EARTH RESIS OHM-M	CONDUCTIVE EARTH DEPTH FEET
191A	0	0	1	2	2	257	1	740	130	540
191B	5	2	3	7	9	170	3	396	24	295
191C	2	4	1	1	3	174	1	398	101	237
191D	6	1	0	0	45	243	10	513	2	452
193A	2	4	1	0	2	155	1	378	146	202
194A	2	3	0	0	2	178	1	420	196	223
196A	1	3	0	0	1	120	1	390	360	179
196B	2	7	4	9	2	54	1	189	165	58
196C	0	2	2	9	1	47	1	191	410	27
197A	1	1	0	0	3	240	1	600	150	540
198A	6	3	1	1	17	192	4	442	9	362
1980A	3	0	9	6	17	197	4	442	10	363
1980B	0	5	4	13	1	23	1	129	335	0
1980C	5	2	0	1	10	211	3	476	20	372
199A	3	0	5	1	59	250	12	526	2	480
200A	4	0	0	0	37	278	8	586	4	512
200B	3	2	2	3	5	157	2	398	61	261
202A	5	1	0	0	28	243	6	535	5	455
203A	2	2	3	7	3	138	1	335	113	179
204A	1	2	7	5	7	173	2	413	39	300

* 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.

D70E DIGHEM SYND MONTCALM SH.2 APR/77

LINE & ANOMALY	STANDARD COIL REAL PPM	STANDARD COIL QUAD PPM	COPLANAR COIL REAL PPM	COPLANAR COIL QUAD PPM	VERTICAL DIKE COND MHOS	VERTICAL DIKE DEPTH* FEET	HORIZONTAL SHEET COND MHOS	HORIZONTAL SHEET DEPTH FEET	CONDUCTIVE EARTH RESIS OHM-M	CONDUCTIVE EARTH DEPTH FEET
204B	3	0	0	0	21	303	5	641	8	544
204C	2	1	3	0	18	252	4	558	10	463
205A	2	1	9	3	30	250	7	610	9	460
206A	0	0	17	6	24	199	6	438	6	365
206B	2	1	4	0	40	290	7	540	6	540
206C	1	0	5	1	30	310	6	640	9	540
206D	3	3	3	6	5	176	2	392	63	256
207A	0	0	3	3	4	301	1	658	10^2	482
207B	4	6	4	6	4	100	1	272	65	145
207C	3	0	2	0	37	288	8	596	4	522
208A	2	2	3	1	13	246	3	549	17	448
209A	4	1	2	2	30	245	7	533	5	456
210A	4	0	1	1	42	279	9	578	3	512

* 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.

D70E DIGHEM SYND MONTCALM SH.3 APR/77

LINE & ANOMALY	STANDARD COIL REAL PPM	STANDARD COIL QUAD PPM	COPLANAR COIL REAL PPM	COPLANAR COIL QUAD PPM	VERTICAL DIKE COND MHOS	VERTICAL DIKE DEPTH* FEET	HORIZONTAL SHEET COND MHOS	HORIZONTAL SHEET DEPTH FEET	CONDUCTIVE EARTH RESIS OHM-M	CONDUCTIVE EARTH DEPTH FEET
344A	2	2	0	0	8	277	2	612	1007	0

* 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.

NOTE: Ungraded anomaly occurs on line 347.

D70E DIGHEM SYND MONTCALM SH.4 APR/77

LINE & ANOMALY	STANDARD COIL REAL PPM	STANDARD COIL QUAD PPM	COPLANAR COIL REAL PPM	COPLANAR COIL QUAD PPM	VERTICAL DIKE COND MHOS	VERTICAL DIKE DEPTH* FEET	HORIZONTAL SHEET COND MHOS	HORIZONTAL SHEET DEPTH FEET	CONDUCTIVE EARTH RESIS OHM-M	CONDUCTIVE EARTH DEPTH FEET
372A	2	10	2	7	1	42	1	151	287	21
380A	3	12	3	7	2	54	1	173	165	50

* 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.

NOTE: Ungraded anomalies occur on lines 363 and 376.

Ontario

File 2.2454

900

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Electromagnetic, Magnetometer

Township or Area Montcalm

Claim Holder(s) Geophysical Engineering Limited
Suite 4900 Toronto Dominion Centre

Survey Company DIGHEM LTD.

Author of Report D.C. Fraser

Address of Author Suite 4900 Toronto Dominion Centre

Covering Dates of Survey January 1 to July 18, 1977
(linecutting to office)

Total Miles of Line Cut

MINING CLAIMS TRAVERSED
List numerically

(prefix) (number)

see attached list

If space insufficient, attach list

SPECIAL PROVISIONS
CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

DAYS per claim

Geophysical
--Electromagnetic
--Magnetometer
--Radiometric
--Other
Geological
Geochemical

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer 40 Electromagnetic 40 Radiometric
(enter days per claim)

DATE: July 18/77 SIGNATURE: D.C. Fraser
~~Author of Report~~ Agent

L.D.

Res. Geol. Qualifications 63.1050

Previous Surveys

File No.	Type	Date	Claim Holder

TOTAL CLAIMS 628

OFFICE USE ONLY

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS - If more than one survey, specify data for each type of survey

Number of Stations _____ Number of Readings _____

Station interval _____ Line spacing _____

Profile scale _____

Contour interval _____

MAGNETIC

Instrument _____

Accuracy – Scale constant _____

Diurnal correction method _____

Base Station check-in interval (hours) _____

Base Station location and value _____

_____

ELECTROMAGNETIC

Instrument _____

Coil configuration _____

Coil separation _____

Accuracy _____

Method: ☐ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line

Frequency _____
(specify V.L.F. station)

Parameters measured _____

GRAVITY

Instrument _____

Scale constant _____

Corrections made _____

_____

Base station value and location _____

_____

Elevation accuracy _____

INDUCED POLARIZATION
RESISTIVITY

Instrument _____

Method ☐ Time Domain ☐ Frequency Domain

Parameters – On time _____ Frequency _____

– Off time _____ Range _____

– Delay time _____

– Integration time _____

Power _____

Electrode array _____

Electrode spacing _____

Type of electrode _____

P.393395	-	40 Days	P.452683	-	40 Days	P.479575	-	40 Days
393396	-	40	452684	-	40	479576	-	40
393397	-	40	452685	-	40	479577	-	40
393398	-	40	452686	-	40	479578	-	40
P.393400	-	40	452687	-	40	479579	-	40
393401	-	40	452688	-	40	479580	-	40
393402	-	40	452689	-	40	479581	-	40
393403	-	40	452690	-	40	479582	-	40
393404	-	40	452691	-	40	479583	-	40
393405	-	40	P.452738	-	40	479584	-	40
393406	-	40	452739	-	40	479585	-	40
393407	-	40	452740	-	40	479586	-	40
393408	-	40	452741	-	40	479587	-	40
393409	-	40	452742	-	40	479588	-	40
393410	-	40	452743	-	40	479589	-	40
393411	-	40	P.452918	-	40	479590	-	40
393412	-	40	452919	-	40	P.479854	-	40
393413	-	40	P.458298	-	40	479855	-	40
393414	-	40	458299	-	40	P.479900	-	40
393415	-	40	458300	-	40	479901	-	40
393416	-	40	458301	-	40	479902	-	40
393417	-	40	458302	-	40	479903	-	40
393418	-	40	458303	-	40	P.479909	-	40
393419	-	40	458304	-	40	479910	-	40
393420	-	40	458305	-	40	479911	-	40
393421	-	40	P.479561	-	40	479912	-	40
393422	-	40	479562	-	40	479913	-	40
393423	-	40	479563	-	40	479914	-	40
P.437992	-	40	479564	-	40	479915	-	40
437993	-	40	479565	-	40	479916	-	40
437994	-	40	479566	-	40	479917	-	40
437995	-	40	479567	-	40	479918	-	40
P.437998	-	40	479568	-	40	479919	-	40
437999	-	40	479569	-	40	479920	-	40
437800	-	40	479570	-	40	479921	-	40
P.452679	-	40	479571	-	40	479922	-	40
452680	-	40	479572	-	40	479923	-	40
452681	-	40	479573	-	40	479924	-	40
452682	-	40	479574	-	40	479925	-	40

P.479926 - 40 Days	P.479967 - 40 Days	P.480033 - 40 Days
479927 - 40	479968 - 40	480034 - 40
479928 - 40	479969 - 40	480035 - 40
479929 - 40	479970 - 40	480036 - 40
479930 - 40	479971 - 40	480037 - 40
479931 - 40	479972 - 40	480038 - 40
479932 - 40	479973 - 40	480039 - 40
479933 - 40	479974 - 40	480040 - 40
479934 - 40	479975 - 40	480041 - 40
479935 - 40	479976 - 40	480042 - 40
P.479937 - 40	479977 - 40	480043 - 40
479938 - 40	479978 - 40	480044 - 40
479939 - 40	479979 - 40	480045 - 40
479940 - 40	479980 - 40	480046 - 40
479941 - 40	479981 - 40	480047 - 40
479942 - 40	479982 - 40	480048 - 40
479943 - 40	479983 - 40	480049 - 40
479944 - 40	479984 - 40	480050 - 40
479945 - 40	479985 - 40	P.480060 - 40
479946 - 40	479986 - 40	480061 - 40
479947 - 40	479987 - 40	480062 - 40
479948 - 40	479988 - 40	480063 - 40
479949 - 40	479989 - 40	480064 - 40
479950 - 40	479990 - 40	480065 - 40
479951 - 40	479991 - 40	480066 - 40
479952 - 40	479992 - 40	480067 - 40
479953 - 40	479993 - 40	480068 - 40
479954 - 40	P.480020 - 40	480069 - 40
479955 - 40	480021 - 40	480070 - 40
479956 - 40	480022 - 40	480071 - 40
479957 - 40	480023 - 40	480072 - 40
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479960 - 40	480026 - 40	480075 - 40
479961 - 40	480027 - 40	480076 - 40
479962 - 40	480028 - 40	480077 - 40
479963 - 40	480029 - 40	480078 - 40
479964 - 40	480030 - 40	480079 - 40
479965 - 40	480031 - 40	480080 - 40
479966 - 40	480032 - 40	

P.480084 - 40 Days
480085 - 40
480086 - 40
480087 - 40
480088 - 40
480089 - 40
P.480093 - 40
480094 - 40
480095 - 40
480096 - 40
480097 - 40
480098 - 40
480099 - 40
480100 - 40
480101 - 40
480102 - 40
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480114 - 40
480115 - 40
480116 - 40
480117 - 40
480118 - 40
480119 - 40
480120 - 40
480121 - 40
480122 - 40
P. 480140 - 40
480141 - 40
480142 - 40

P. 480143 - 40 Days
480144 - 40
480145 - 40
480146 - 40
480147 - 40
480148 - 40
480149 - 40
480150 - 40
480151 - 40
480152 - 40
480153 - 40
480154 - 40
p.480180 - 40
480181 - 40
480182 - 40
480183 - 40
480184 - 40
480185 - 40
480186 - 40
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480199 - 40
480200 - 40
480201 - 40
480202 - 40
480203 - 40
480204 - 40
480205 - 40
480206 - 40
480207 - 40

P.480208 - 40 Days
480209 - 40
480210 - 40
480211 - 40
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480218 - 40
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480243 - 40
480244 - 40
480245 - 40
480246 - 40
480247 - 40

P.480248	-	40 Days	P.480421	-	40 Days	P.480461	-	40 Days
480249	-	40	480422	-	40	480462	-	40
480250	-	40	P.480425	-	40	480463	-	40
480251	-	40	480426	-	40	480464	-	40
480252	-	40	480427	-	40	480465	-	40
480253	-	40	480428	-	40	480466	-	40
480254	-	40	480429	-	40	480467	-	40
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480256	-	40	480431	-	40	480469	-	40
480257	-	40	480432	-	40	480470	-	40
480258	-	40	480433	-	40	480471	-	40
480259	-	40	480434	-	40	480472	-	40
P.480395	-	40	480435	-	40	480473	-	40
480396	-	40	480436	-	40	480474	-	40
480397	-	40	480437	-	40	480475	-	40
480398	-	40	480438	-	40	480476	-	40
480399	-	40	480439	-	40	480477	-	40
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480407	-	40	480447	-	40	480485	-	40
480408	-	40	480448	-	40	480486	-	40
480409	-	40	480449	-	40	480487		40
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480411	-	40	480451	-	40	480489	-	40
480412	-	40	480452	-	40	480490	-	40
480413	-	40	480453	-	40	480491	-	40
480414	-	40	480454	-	40	480492	-	40
480415	-	40	480455	-	40	480493	-	40
480416	-	40	480456	-	40	480494	-	40
480417	-	40	480457	-	40	~~P.480540~~	-	~~40~~ Rebal Weight
480418	-	40	480458	-	40	P.480635	-	40
480419	-	40	480459	-	40	480636	-	40
480420	-	40	480460	-	40	480637	-	40
	-							

P.480638 - 40 Days	P.480677 - 40 Days	P.480726 - 40 Days
480639 - 40	480678 - 40	480727 - 40
480640 - 40	480679 - 40	480728 - 40
480641 - 40	480680 - 40	480729 - 40
480642 - 40	480681 - 40	480730 - 40
480643 - 40	480682 - 40	480731 - 40
480644 - 40	P.480684 - 40	480732 - 40
480645 - 40	P.480688 - 40	480733 - 40
480646 - 40	480689 - 40	P.480901 - 40
480647 - 40	480690 - 40	480902 - 40
480648 - 40	480691 - 40	480903 - 40
480649 - 40	P.480698 - 40	480904 - 40
480650 - 40	480699 - 40	480905 - 40
480651 - 40	480700 - 40	480906 - 40
480652 - 40	480701 - 40	480907 - 40
480653 - 40	480702 - 40	480908 - 40
480654 - 40	480703 - 40	P.480921 - 40
480655 - 40	480704 - 40	480922 - 40
480656 - 40	480705 - 40	480923 - 40
480657 - 40	480706 - 40	480924 - 40
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480663 - 40	480712 - 40	480930 - 40
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480668 - 40	480717 - 40	480945 - 40
480669 - 40	480718 - 40	480946 - 40
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480671 - 40	480720 - 40	480948 - 40
480672 - 40	480721 - 40	480949 - 40
480673 - 40	480722 - 40	480950 - 40
480674 - 40	480723 - 40	480951 - 40
480675 - 40	480724 - 40	480952 - 40
480676 - 40	480725 - 40	P.480972 - 40

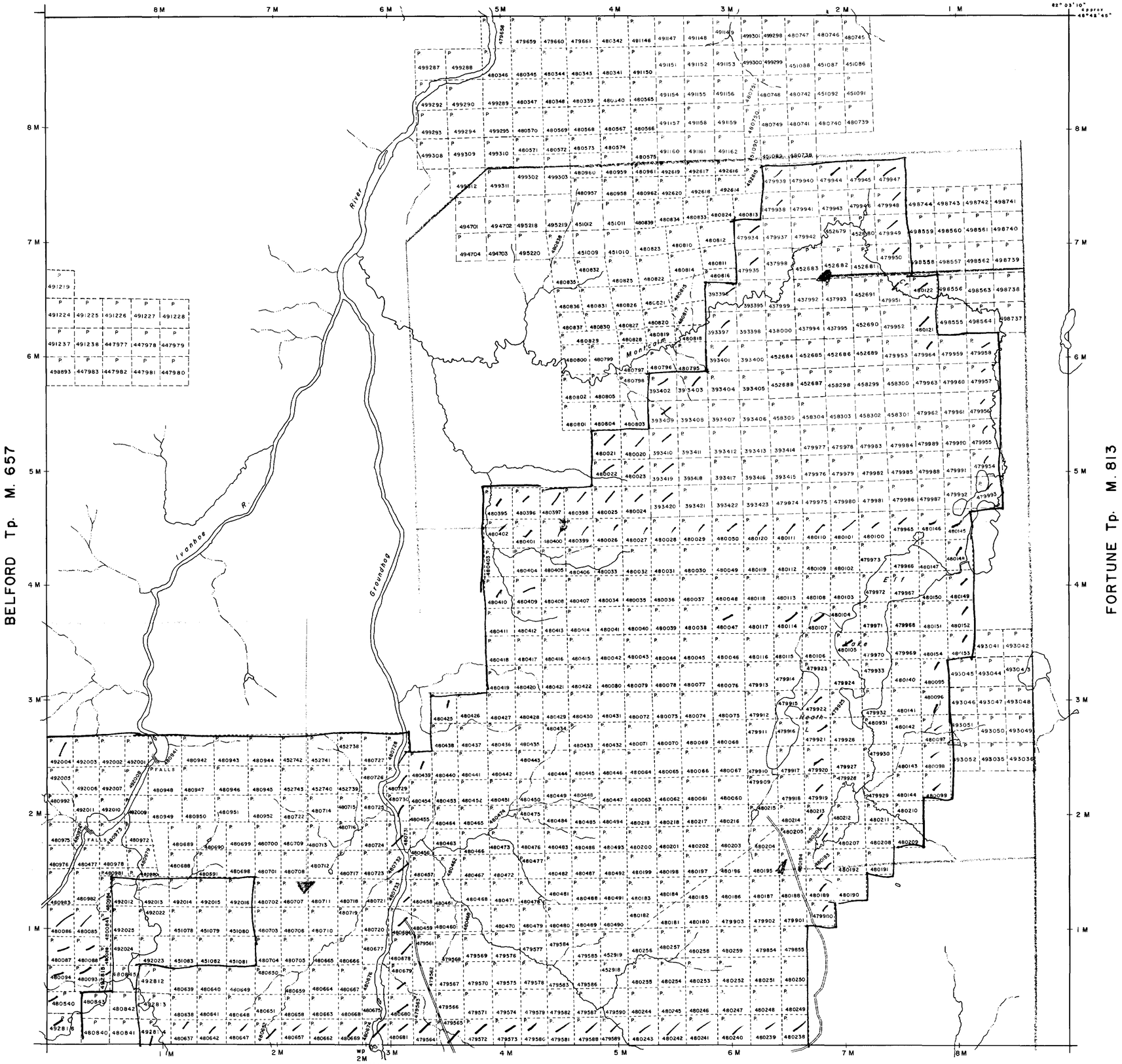
P.480973	-	40 Days	P.492001	-	40 Days
480974	-	40	492002	-	40
480975	-	40	492003	-	40
480976	-	40	492004	-	40
480977	-	40	492005	-	40
480978	-	40	492006	-	40
480979	-	40	492007	-	40
480980	-	40	492008	-	40
480981	-	40	492009	-	40
480982	-	40	492010	-	40
480983	-	40	492011	-	40
480984	-	40	~~P.492812~~		~~40~~
P.480992	-	40	~~492813~~	-	~~40~~
P.491163	-	40	~~492814~~	-	~~40~~
491164	-	40	~~492815~~	-	~~40~~
491165	-	40	~~492816~~	-	~~40~~
491166	-	40			
491167	-	40			
491168	-	40			
491169	-	40			
491170	-	40			
491171	-	40			
491172	-	40			
491173	-	40			
491174	-	40			
491175	-	40,			

Robert J. Wright

NOTES

400' surface rights reservation along the shores of all lakes and rivers.

POULETT Tp. M.1063



DATE OF ISSUE
JUL 26 1977
SURVEYS AND MAPPING BRANCH

LEGEND

- HIGHWAY AND ROUTE No.
- OTHER ROADS
- TRAILS
- SURVEYED LINES:
  - TOWNSHIPS, BASE LINES, ETC.
  - LOTS, MINING CLAIMS, PARCELS, ETC.
- UNSURVEYED LINES:
  - LOT LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
" SURFACE RIGHTS ONLY	◒
" MINING RIGHTS ONLY	◒
LEASE, SURFACE & MINING RIGHTS	■
" SURFACE RIGHTS ONLY	■
" MINING RIGHTS ONLY	■
LICENCE OF OCCUPATION	▼
CROWN LAND SALE	C.S.
ORDER-IN-COUNCIL	OC
RESERVATION	(R)
CANCELLED	(X)
SAND & GRAVEL	(G)

SCALE : 1 INCH 40 CHAINS

FEET 0 500 1000 2000 4000 6000 8000
METRES 0 700 400 600 800 1KM 2KM

ACRES	HECTARES
40	16

TOWNSHIP 2.2454

MONTCALM

DISTRICT
COCHRANE

MINING DIVISION
PORCUPINE

Ministry of Natural Resources
Ontario Surveys and Mapping Branch

Date 12.74.
Whitney Block Queen's Park, Toronto

Plan No. M.872

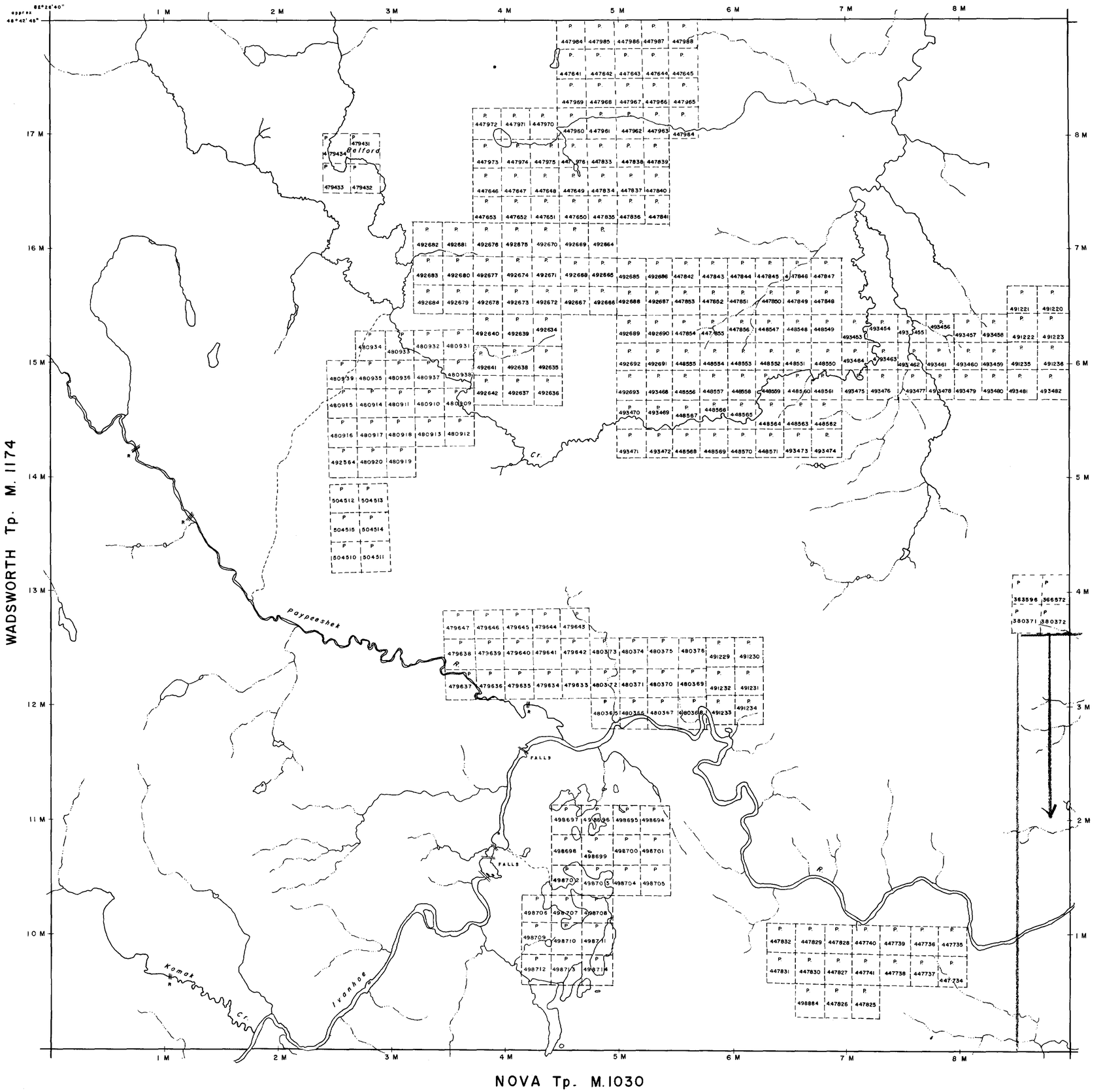
200

NOTES

400' surface rights reservation along the shores of all lakes and rivers.

SAND AND GRAVEL

WATSON Tp. M. 1178



LEGEND

- HIGHWAY AND ROUTE No.
- OTHER ROADS
- TRAILS
- SURVEYED LINES:
  - TOWNSHIPS, BASE LINES, ETC.
  - LOTS, MINING CLAIMS, PARCELS, ETC.
- UNSURVEYED LINES:
  - LOT LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
" SURFACE RIGHTS ONLY	◒
" MINING RIGHTS ONLY	◒
LEASE, SURFACE & MINING RIGHTS	■
" SURFACE RIGHTS ONLY	◨
" MINING RIGHTS ONLY	◨
LICENCE OF OCCUPATION	▼
CROWN LAND SALE	C.S.
ORDER-IN-COUNCIL	OC
RESERVATION	ⓡ
CANCELLED	ⓒ
SAND & GRAVEL	ⓢ

SCALE : 1 INCH = 40 CHAINS

FEET 0 500 1000 2000 4000 6000 8000
METRES 0 200 400 600 800 1 KM 2 KM

ACRES	HECTARES
40	16

TOWNSHIP 2.2454

BELFORD

DISTRICT
COCHRANE

MINING DIVISION
PORCUPINE

Ministry of Natural Resources
Ontario Surveys and Mapping Branch

Date 1E.74.
Whitney Block Queens Park. Toronto

Plan No. M. 657

BELFORD TWP. (M.657)

OSSIN TWP. (M.1031)

STRACHAN TWP. (M.1142)

VP. (M.1033)

OSWALD TWP. (M.1042)

THE TOWNSHIP OF

NOVA

DISTRICT OF COCHRANE

PORCUPINE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	P
CROWN LAND SALE	C.S.
LEASES	L
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES CANCELLED	C.

NOTES

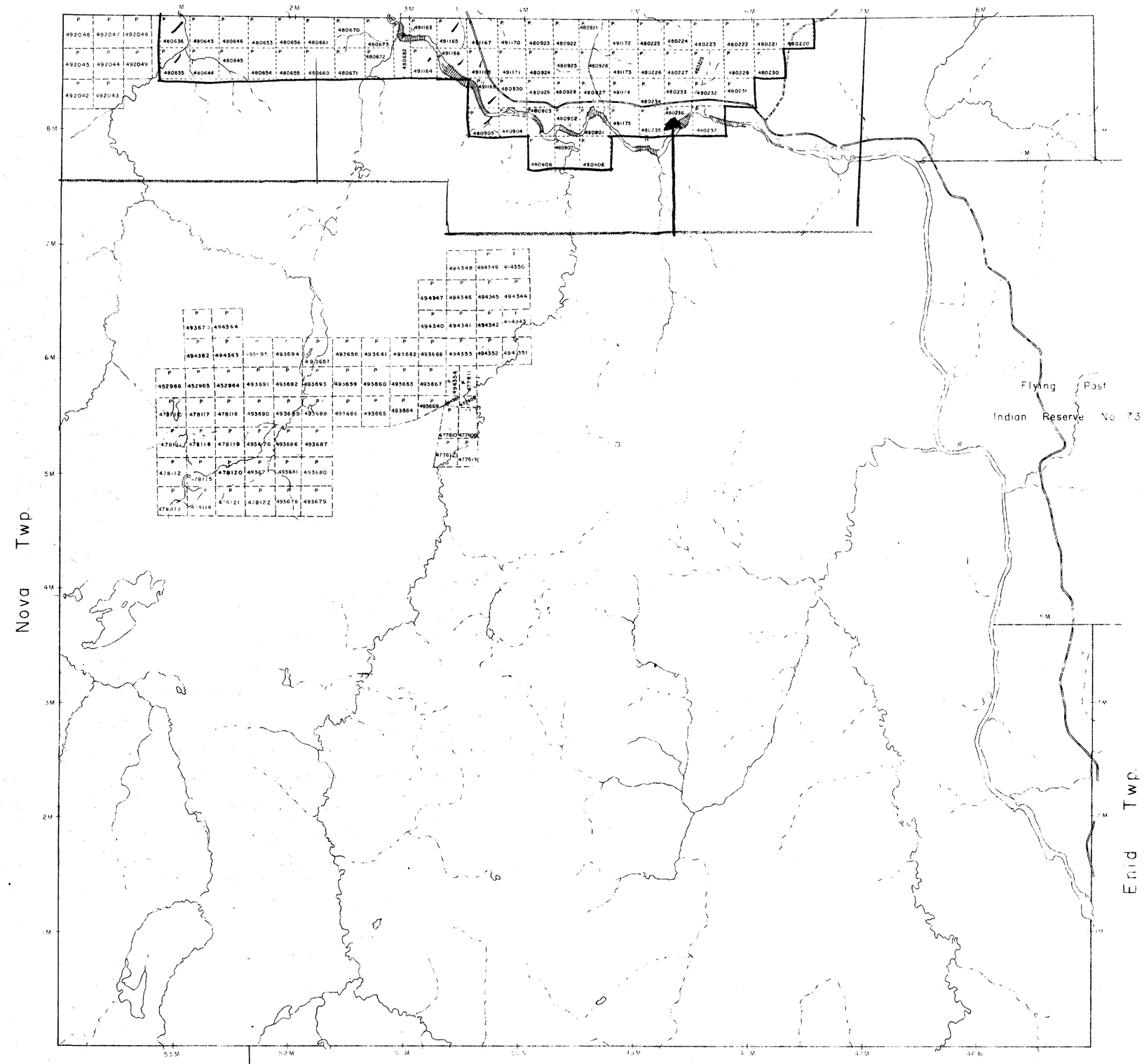
400' surface rights reservation along the shores of all lakes and rivers.

2.2454

PLAN NO.- M.1030

MINISTRY OF NATURAL RESOURCES

484821, 485821
484822, 485822



THE TOWNSHIP
OF

STRACHAN

DISTRICT OF
COCHRANE

PORCUPINE
MINING DIVISION

SCALE: 1-INCH 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S.
LEASES	(L)
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	

NOTES

400' Surface Rights Reservation around all lakes & rivers.

2.2454

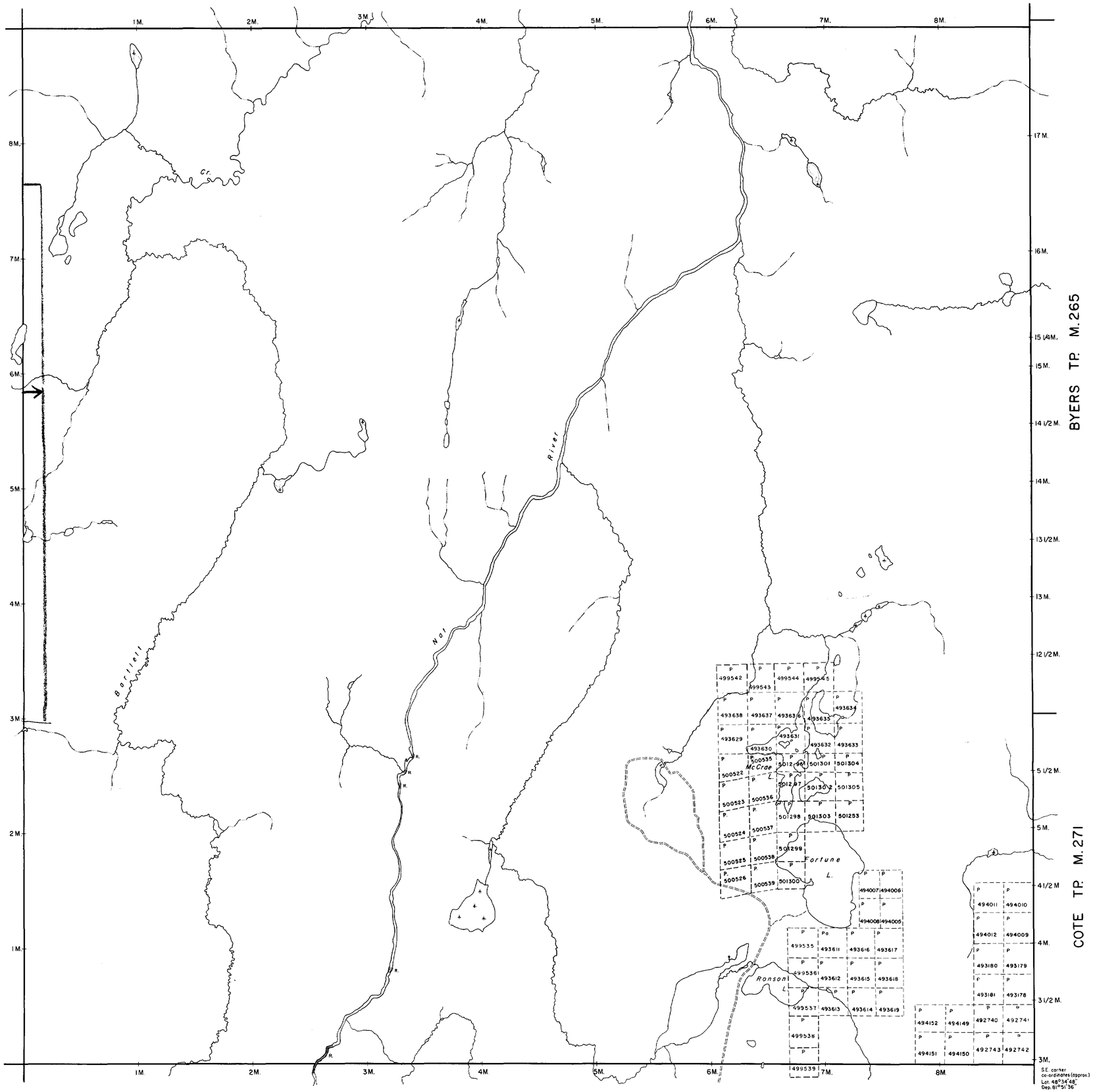
PLAN NO M-1142

MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH

NOTES

400' surface rights reservation along the shores of all lakes and rivers.

AITKEN TP. M.623



DATE OF ISSUE
JAN - 6 1978
SURVEYS AND MAPPING BRANCH

LEGEND

- HIGHWAY AND ROUTE No.
- OTHER ROADS
- TRAILS
- SURVEYED LINES:
  - TOWNSHIPS, BASE LINES, ETC.
  - LOTS, MINING CLAIMS, PARCELS, ETC.
- UNSURVEYED LINES:
  - LOT LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
" SURFACE RIGHTS ONLY	◒
" MINING RIGHTS ONLY	◒
LEASE, SURFACE & MINING RIGHTS	■
" SURFACE RIGHTS ONLY	■
" MINING RIGHTS ONLY	■
LICENCE OF OCCUPATION	▼
CROWN LAND SALE	C.S.
ORDER-IN-COUNCIL	OC
RESERVATION	(R)
CANCELLED	(X)
SAND & GRAVEL	(S)

SCALE : 1 INCH 40 CHAINS

FEET 0 500 1000 2000 4000 6000 8000
METRES 0 200 400 600 800 1 KM 2 KM

ACRES	HECTARES
40	16

TOWNSHIP 2.2454

FORTUNE

DISTRICT
COCHRANE

MINING DIVISION
PORCUPINE

Ministry of Natural Resources
Ontario Surveys and Mapping Branch

Date	Plan No.
JAN 1977	M.813

Whitney Block
Queen's Park, Toronto

42B09NE0009 2.2454 MONTCALM

240

POULETT TWP.
M-1063

MONTCALM TWP.
M-872

STRACHAN TWP.
M-1142

Group EE-2

PRESENT DAYS APPLIED TO CLAIMS 80-10-15 ALLIED IN THE SUBMISSION

Group EE-1

THE SURVEY TO COMPLETE THE REQUIRED 200 DAYS.

Group EE-6

EXTENTED

EXTENTED DUE DATE 81-10-20

Rapids

AREA MONTCALM NORTH

MONTCALM TOWNSHIP, ONTARIO

DIGHEM SURVEY

MAGNETICS

FOR

GEOPHYSICAL ENGINEERING LIMITED

SHEET 1

260

MAGNETIC LINES

2000 gammas

500 gammas

250 gammas

magnetic depression

MONTCALM TWP.

FORTUNE TWP.

AREA MONTCALM NORTH

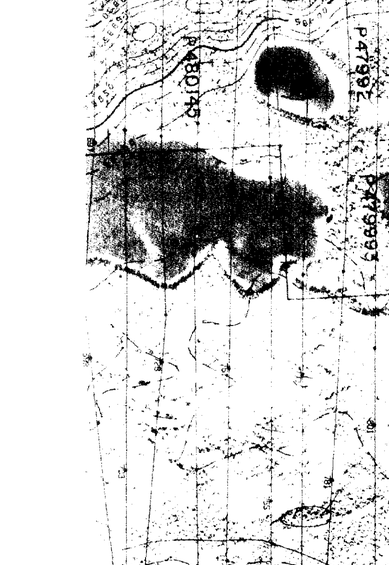
MONTCALM TOWNSHIP, ONTARIO

DIGHEM SURVEY

MAGNETICS

FOR

GEOPHYSICAL ENGINEERING LIMITED



270

AREA MONTCALM SOUTH

DIGHEM SURVEY

MAGNETICS

MONTCALM TWP.

STRACHAN TWP.

AREA MONTCALM SOUTH

MONTCALM TOWNSHIP, ONTARIO

DIGHEM SURVEY

MAGNETICS

FOR

GEOPHYSICAL ENGINEERING LIMITED

SHEET 4

LOCATION MAP

290

REGISTERED PROFESSIONAL ENGINEER
R.C. FRASER
PROVINCE OF ONTARIO

ISOMAGNETIC LINES

(total field)

1000 gammas

200 gammas

50 gammas

25 gammas

magnetic depression

PROFESSIONAL ENGINEER
H. O. McLEOD

[W.O. 5318-4-b]

AREA MONTCALM NORTH

MONTCALM TOWNSHIP

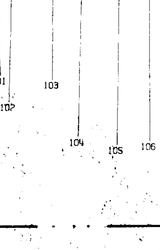
DIGHEM SURVEY

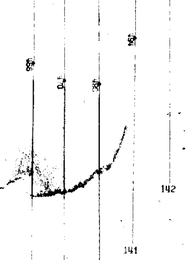
ELECTROMAGNETICS

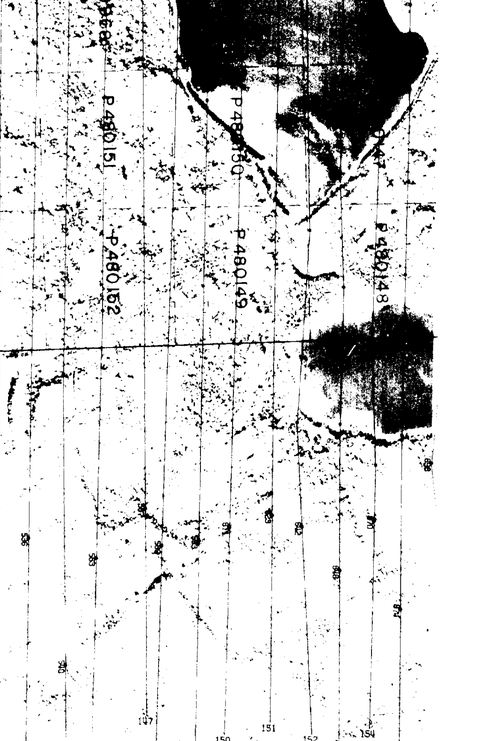
FOR

GEOPHYSICAL ENGINEERING LIMITED

SHEET 1







5318 - 1-a

AREA MONTCALM NORTH

MONTCALM TOWNSHIP, ONTARIO

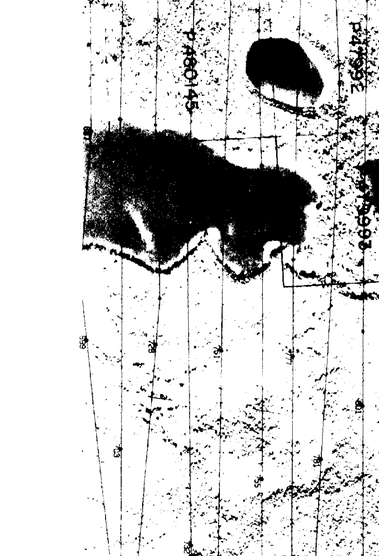
DIGHEM SURVEY

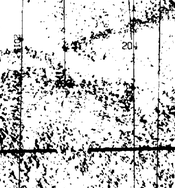
ELECTROMAGNETICS

FOR

GEOPHYSICAL ENGINEERING LIMITED

SHEET 2





MONTCALM TWP.

FORTUNE TWP.

5318-2a

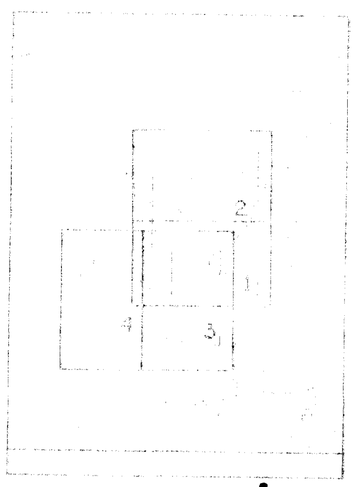
MONTCALM TWP.

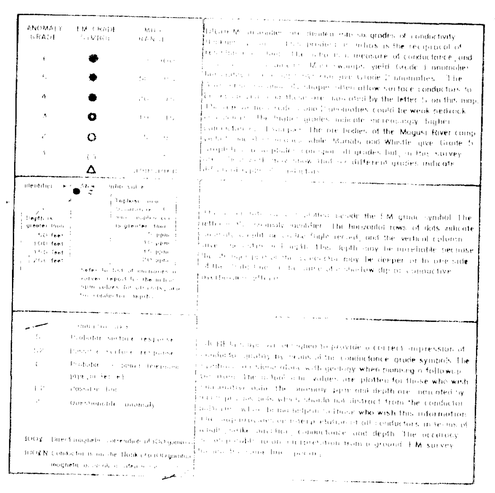
STRACHAN TWP.

AREA MONTCALM SOUTH

DIGHEM SURVEY

ELECTROMAGNETICS





AREA MONTCALM SOUTH

MONTCALM TOWNSHIP, ONTARIO

DIGHEM SURVEY

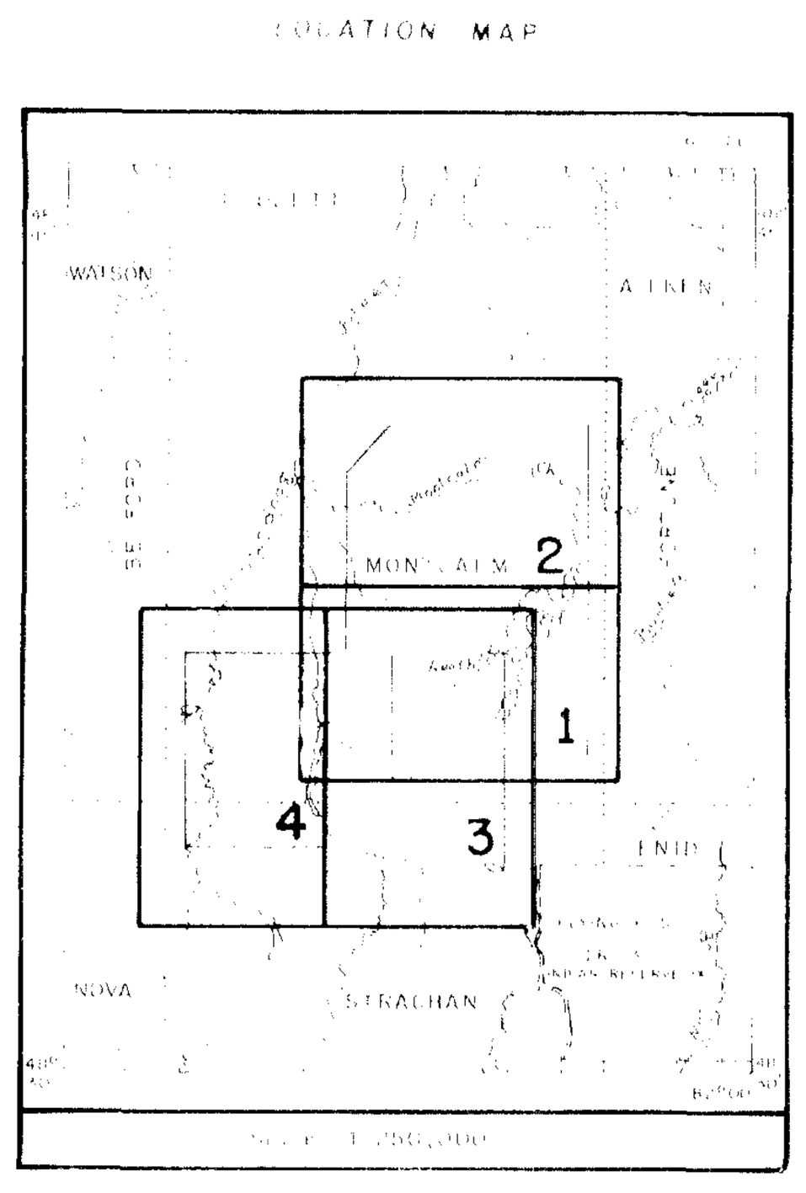
ELECTROMAGNETICS

FOR

GEOPHYSICAL ENGINEERING LIMITED

SHEET 4

LOCATION MAP



330

REGISTERED PROFESSIONAL ENGINEER D. C. FRASER PROVINCE OF ONTARIO

DATE May 1977 JOB 984

DWG 5318-4-a