REPORT ON THE CONDUCT OF AN AIRBORNE GEOPHYSICAL SURVEY IN THE DISTRICT OF COCHRANE

report 1

On April 29, 1964, Hunting Survey Corporation carried out flying operations on a combined magnetometer and electromagnetometer survey over four small blocks in the townships of Wilhelmina and Geary.

The work was carried out under contract to Mespi Mines Limited.

The locations of the areas surveyed, designated A, B, C and D, are shown on a map accompanying this report.

Flight directions were as follows:

Area A, B - North-South

Area C - North 15°E and reciprocal

Area D - North 40°W and reciprocal.

Two data men were stationed in Timmins to give preliminary information to the client.

Final plotting and preparation of maps were carrried out in Hunting's Toronto office.

FLYING SPECIFICATIONS

Flying was carried out by a Beechcraft 18 with a crew of four, i.e. pilot, instrument operator, electronic technician and aircraft engineer.

The technician and engineer did not accompany the aircraft on all survey flights.

Terrain clearance was maintained between 450 and [illegible] feet, where safety would permit.

Eleven traverses were flown over area A, totalling 24.[illegible] linear miles.

Seventeen traverses were flown over area B totalling 29.75 linear miles.

Nine traverses were flown over area C totalling 27.0 linear miles.

Nine traverses were flown over area D totalling 36.0 linear miles.

Three tie lines were flown between the areas, involving 14.0 linear miles.

INSTRUMENTATION

The following instruments were operated during the survey:

1. Gulf magnetometer.
2. Hunting Survey Corporation - Canadian Applied Research Limited dual frequency electromagnetometer measuring the phase displacement of the resultant field with respect to applied field; for frequencies of 400 and 2,300 cycles per second.
3. Modified APN-1 radio altimeter.
4. C.A.R.L.-H.S.C. 35mm discrete frame positioning camera.
5. A four channel curvilinear recorder, showing from top to bottom:
   (1) Altimeter record and camera fiducial pulses.
   (2) Magnetometer profile showing variations in the strength of the earth's magnetic field, sensitivity 100 gammas per centimeter across a four centimeter channel.
   (3) Phase angle of the resultant field with respect to a 2,300 cycle applied field, sensitivity 2° per centimeter across a four centimeter channel.
   (4) Phase angle of the resultant field with respect to a 400 cycle applied field, sensitivity 1° per centimeter across a four centimeter channel.

6. A two pen rectilinear recorder with a five inch recording width, showing:

(1) In red ink the terrain clearance record and camera fiducial pulses.

(2) In black ink the variations in strength of the earth's magnetic field, sensitivity 100 gammas per inch.

NOTE: A pulse was shown on the altimeter record, co-incident with every tenth exposure of the 35mm camera.

This served to relate the records to the terrain over which they were made.

The magnetometer and E.M. detectors were located in separate "birds" towed behind and below the aircraft.

MAPS AND DATA COMPILATION

Navigation mosaics were prepared on a scale of 1 inch to 2,640 feet utilizing "Overthrust" mosaics available to the contractor.

For preparation of base maps, uncontrolled mosaics were made on a scale of 1 inch to 1,320 feet, utilizing photographs obtained from the Department of Lands and Forests (Year 1961 photography).

Flight path was established by visual comparison of the 35mm film with the above mentioned mosaics.

Base maps were traced from these mosaics also, showing recognizable planimetric features.

Township boundaries shown on the base maps were positioned by reference to Ontario Department of Mines claim maps.

A map was compiled showing:

(a) flight traverses and

(b) magnetic contours referred to an arbitrary datum.

Contour interval was 20 gammas.

A second map was prepared showing:

(a) flight traverses.

(b) extent and location of the peak of the observed low frequency anomalies.

(c) extent of residual low frequency anomalies.

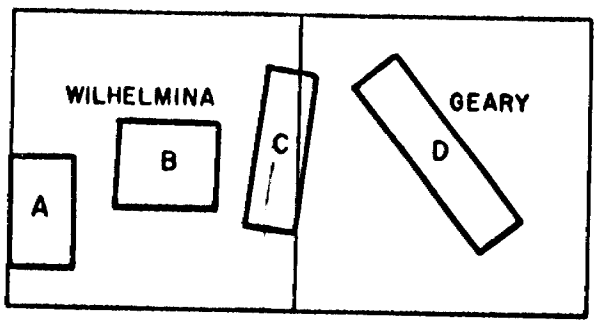
(d) the phase angle of observed high and low frequency anomalies read at peak values.

(e) the phase angle of residual high and low frequency anomalies read at peak values.

(f) value and location of magnetic peaks and lows, referred to on arbitrary datum.

R. N. Parkinson P. Eng.

HUNTING SURVEY CORPORATION LIMITED



SCALE : 1 Inch to 4 Miles

020

REPORT ON
AIRBORNE GEOPHYSICAL SURVEY
of the
WILHELMINA TOWNSHIP AREA, Ontario
for
B. W. LANG

by

CANADIAN AERO MINERAL SURVEYS LIMITED

Project No. 5044

T-956

~~T-787~~,

~~A.M.S. #4, E, O, D.~~

May 13/65.

Map #1

63.1347

REPORT ON

AIRBORNE GEOPHYSICAL SURVEY

OF THE

WILHELMINA AND GEARY TOWNSHIPS AREA, ONTARIO

FOR

MESPI MINES LTD.

BY

CANADIAN AERO MINERAL SURVEYS LIMITED

Project No. 5044

63.1347

Ottawa, Ontario
May 13, 1965

A. R. Rattew, P. Eng.
Geophysicist

020C

TABLE OF CONTENTS

Accompanying this Report:-

One EM Plan Map at the scale of 1" - 1/4 mile.

Assessment Work
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REPORT ON AIRBORNE GEOPHYSICAL SURVEY OF THE WILHELMINA AND GEARY TOWNSHIPS AREA, ONTARIO FOR MESPI MINES LTD.

I. INTRODUCTION

This report pertains to the combined airborne EM and magnetic survey flown on behalf of Mespi Mines Ltd. over a block of ground in Wilhelmina and Geary Townships, District of Cochrane, Ontario. The flying was accomplished March 11, 1965 by the Canadian Aero Mineral Surveys Limited geophysically-equipped Otter (registration CF-IGM) based at Timmins, Ontario.

Some 31 line miles of data were acquired along 15 lines oriented approximately N10°E (astr.). The nominal spacing was 1/8 mile, with a gap of 3/4 mile occurring between traverses 7 and 8.

Canadian Aero Mineral Surveys Limited personnel associated with this project were as follows:

G.A. Curtis	- Project Manager
J. Gaudry	- Pilot
D. McDonell	- Navigator
D. Graham	- Operator
R. Sarsfield	- Mechanic
D. Sarazin	- Data Compiler
G. Granger	- Draftsman
A. Martin	- Draftsman
P. Tallyhoo	- Data Chief

The project was supervised by A. R. Rattew, P. Eng., author of this report.

The EM data and all magnetic anomalies in excess of 100 gammas are plotted on a plan map at the scale of 1 inch equals 1/4 mile. An airphoto laydown provided the base for this map.

Appendix I is a complete listing of all EM anomalies detected. Appendix II describes the equipment, the records, the survey and map compilation procedures, and the data presentation system.

II. GEOLOGY

The area is unmapped.

III. RESULTS

Four conductive zones have been outlined in this block.

Zones 1, 2, and 3 are all along the same horizon and all are related to a continuous belt of magnetic activity. The EM anomalies are uniformly weak and the response is mainly out-of-phase, indicating low conductivity. Note that the anomaly which has been designated conductor 3 is very weak and is considered questionable. These are clearly formational conductors but it is difficult to say what the conductive material is. Although the EM anomalies are associated with a magnetic high, pyrrhotite is clearly not the source of the EM anomalies because the EM response is too weak. This leaves pyrite or other sulphides, graphite or perhaps even magnetite as a possible source.

Assessment Work

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Conductor 4 was indicated only by a single out-of-phase anomaly. It could be a surface conductor but the rather sharp shape suggests a weak bedrock conductor.

IV. RECOMMENDATIONS

Ground followup is recommended to determine the source of the four conductive zones detected in this block. Sampling of zone 2, which contains the most clearcut response, should suffice to explain the source of zones 1 and 3 as well. Since all anomalies are quite weak no large occurrence of massive sulphides is anticipated.

Respectfully submitted

A. R. Rattew, P. Eng.
Geophysicist

Ottawa, Ontario
May 13, 1965

Assistant Work

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PROJECT NO. 5044 - WILHELMINA AND GEARY TOWNSHIPS AREA

Anomaly	Fiducials	In-Phase Quad	Altitude	Magnetics	Rate	Comments
1A	3699/70.1	40/20	150	Nil	X	Multiple, Quad
2A	36195/220	30/30	150	Dir Brd	500γ 3	Poor character
3A	35555/80	10/40	160	Dir Brd	350γ 3	Broad
4A	34715/40	20?/50	145	Dir Brd	450γ 3	Multiple?
5A	34100/35	0/50	150	Dir? Brd	100γ 3	Double Quad
6A	33285/305	10/20	165	Dir Brd	300γ X	Weak
8A	41000/40	0/30	150	Dir?	900γ X	Broad-Multiple
9A	40475/4050	0/50	150	Nil	3	
B	40635/55	0/100	135	Dir	600γ 3	
C	40655/70	20/80	135	Dir	650γ 3	
10A	40150/65	0/40	150	S Edge	700γ 3	Broad Quad
B	40135/50	0/20	150	Dir	700γ 3	Weak
11A	39795/810	20/40	150	Dir?	750γ 3	
15A	38090/110	10?/30	150	Dir	500γ X	Weak

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List of Claims located in Wilhelmina and Geary Townships, Porcupine Mining Division, on which airborne electromagnetic survey is to apply as 20 days' assessment credit on each claim:

P-67900 to P-67912 inclusive,

P-69908 to P-69915 inclusive,

P-69918 to P-69925 inclusive,

P-69927, P-77789,

P-77791 to P-77793 inclusive,

and

P-77796.

There are approximately 18 line miles flown over these claims.

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APPENDIX II

A. EQUIPMENT

The electromagnetic unit and the magnetometer are the key instruments in the Canadian Aero Mineral Surveys Limited Otter survey system. The remainder of the equipment consists of a radio-altimeter, a scintillation counter, an accelerometer, a continuous-strip camera, two recorders and a fiducial numbering system.

The EM unit is the low frequency (320 c.p.s.) in-phase/out-of-phase system designed by Mullard Ltd. of England and operated formerly by Riocanex. The transmitting and receiving coils are mounted on the wingtips of the Otter, with a vertical coplanar orientation and a separation of 61 feet. An electronic null device is adjusted so that in the absence of a conductor within the range of the system no signal is recorded. The anomalous signal is divided into two components, the "in-phase" component having the same phase as the transmitted field and the "quadrature" or "out-of-phase" component being at right angles to it. These two measurements are recorded on two channels of the six-channel recorder.

Variations in the total magnetic field of the earth are measured by the Elliott electron-beam tube magnetometer mounted in the aircraft. This instrument was designed by Elliott Brothers (London) Ltd. Anomalies as small as 10-15 gammas can normally be distinguished. The output of the magnetometer is presented as one channel on the six-channel recorder to facilitate correlation with the EM traces. It is also presented at a larger scale and in rectalinear form on a separate recorder, these recordings being used in the preparation of isomagnetic contour maps whenever they are required.

An APN-1 radio altimeter provides a terrain clearance profile on one channel of the six-channel recorder. Because EM response decays rapidly with increasing altitude this altitude information is important in the analysis of the EM data.

A vertical accelerometer mounted in the aircraft provides a record of the air turbulence and of any drastic manoeuvres of the aircraft. The accelerometer trace on the six-channel recorder is often helpful in recognizing spurious blips on the EM traces caused by air turbulence on drastic manoeuvres.

A Nuclear Enterprises Mark VI-A scintillation counter in the aircraft records gamma radiation from the land surface. This record can be used as auxiliary location information since outcrop, overburden-covered areas and swamps are readily distinguishable by their radiation levels.

The entire flight path is photographed by a vertically-mounted Aeropath 35 mm. continuous-strip camera.

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The six-channel recorder is a Brush curvilear unit. It is normally operated at a paper speed of 2 mm. per second. The magnetic data is also recorded on a six-inch Texas Instruments Rectalinear recorder.

Synchronization of the film strip with the two recorders is accomplished by means of an automatic fiducial numbering system which prints simultaneous time markers on all three records at regular time intervals, normally every ten seconds.

B. DESCRIPTION OF RECORDS

Rectalinear Magnetic Record

With the chart oriented so that fiducial numbers increase from right to left, upward deflections on the chart indicate increases in the total magnetic field of the earth. At the normal setting (300 scale) the smallest division on the chart is approximately equivalent to 12 gammas. When the record "steps" a change of approximately 400 gammas is indicated. Two other scales are available to accommodate areas of large magnetic relief. On the "600" scale 1 small division is 40 gammas and a step is equivalent to 1200 gammas. On the "1200" scale 1 division is 120 gammas and a step is 3600 gammas. All changes of scale are noted on the tape by the operator.

The fiducial marks are normally spaced at 10-second intervals, a spacing which is equivalent to approximately 1500 feet on the ground. The exact horizontal scale of the tape can be established by measuring the fiducial spacing on the map.

Brush Six-Channel Record

With the chart oriented so that fiducial numbers increase from right to left the tracings from the bottom to the top of the chart are as follows:

1) Fiducial markers - same comments as above.

2) Magnetometer - positive upward. At the normal setting (300 scale) 1 mm. is approximately equivalent to 15 gammas and a step is approximately 400 gammas. At the "600" and "1200" scales 1 mm. is 50 gammas and 150 gammas respectively and the steps are 1200 gammas and 3600 gammas.

   It should be noted that this trace is a differential record with a time constant of some 4 seconds. The net result of this is to wipe out long term variations but to leave short term changes relatively unaltered. This magnetometer record is therefore used primarily to check for possible relationships between EM anomalies and sharp magnetic features.

3) EM In-Phase - positive upward. 1 mm. represents approximately 20 parts per million, referred to the primary field at the receiving coil. The scale is linear until approximately 600 p.p.m. is reached, after which compression occurs to a level of 1200 p.p.m., beyond which the value is "off-scale."

4) EM Quadrature - positive upward. Same scale as In-Phase.

5) Altimeter - increasing altitude upward. Centre line position approximately 150 feet. Scale below 150 feet approximately 5 feet per mm. Scale above 150 feet approximately 7 feet per mm.

6) Accelerometer - an acceleration of 1/3"G" is equivalent to a 5 mm. deflection from the central point.

7) Scintillometer - positive upward. 5 mm. represents a change of approximately 0.06 mr./hr.

C. SURVEY AND MAP COMPILATION PROCEDURES

Uncontrolled airphoto mosaics usually serve as base maps for flying the survey and for compilation of the geophysical data. The most common scale is 1/4 mile per inch.

The flight lines are oriented perpendicular to the assumed longest dimension of massive sulphide occurrences anticipated in the survey area. Occasionally two or more line directions have to be used to accommodate changes of geological strike within the area. Line spacings normally range between 1/8 mile and 1/4 mile.

The navigator is provided with "flight strips" of the area to be surveyed. These flight strips are a copy of the airphoto mosaic, with the intended flight lines inked and numbered. Navigation along the parallel flight lines is accomplished by visual means based on the physical detail observed on the photos. The aircraft is flown at a terrain clearance of 150 feet or, in rough terrain, at the lowest safe altitude.

Flight path is recovered in the field by comparison of the 35 mm. strip film with the airphoto mosaics. Identifiable points are marked on the mosaics and designated by numbers determined from the fiducial numbering system on the film. These recovered flight lines provide the positional basis for plotting the geophysical data. The EM anomalies are listed and graded in the field and are often plotted on the field mosaics to permit immediate acquisition of ground.

In our Ottawa office transparent overlays of the mosaics are prepared, upon which are drafted the recovered

fiducial points, the interpolated flight line positions, the key planimetric features as traced from the mosaics, and the significant geophysical data. The geophysical data are subjected to a careful analysis by a geophysicist who prepares an interpretation report including recommendations for further work.

D. DATA PRESENTATION

The data presentation procedure which we employ for the Otter geophysical system is a combination of an anomaly listing and a plan map plot of graded EM anomalies. The anomaly listing provides the significant details concerning each anomaly and the map gives a "bird's eye view" of the conductors detected.

For purposes of listing and to facilitate reference in the report each EM anomaly is assigned a "name," which is made up of the number of the line upon which the anomaly occurs plus a letter. For example, on line 257 anomalies would be named 257A, 257B, 257C, etc., from south to north or from west to east. The letter which appears beside each EM anomaly on the map is therefore part of its name. These names also appear on the Brush records and in the anomaly list.

The anomaly list contains the fiducial numbers at the edges of the EM anomaly, the in-phase and quadrature amplitudes in p.p.m., the altitude at which the anomaly was detected, the positional relationship of the EM anomaly to magnetic anomalies (if any), a rating, and comments concerning any other pertinent characteristics of the anomaly.

The nomenclature used in the "magnetics" column of the anomaly list requires some explanation. The main terms used are side, flank, edge and direct. These refer to the position of the EM peak relative to the axis of the magnetic feature. "Direct" depicts coincident peaks and similar widths; "edge" is slightly offset; "flank" is somewhere along the flank of the magnetic anomaly; "side" is down near the base. "N. Flank 800g" means that the EM anomaly occurs along the northern flank of a magnetic feature of 800 gammas total amplitude. When one peak of a multiple EM anomaly coincides with a magnetic high the specific peak may be designated. For example, if the southern peak of a double EM anomaly coincided with a 250 gamma magnetic anomaly the nomenclature would be "Dir. S. 250g".

The rating assigned to each EM anomaly in the listing determines the symbol which represents the anomaly on the map. Six categories of anomalies are defined: 1A, 1B, 2A, 2B, 3, and X. The numbers "1", "2" and "3" are primarily a measure of in-phase amplitude corrected for altitude variation: "1" is for very large anomalies, "2" for intermediate, and "3" for relatively weak response. This rating is sometimes affected by the shape, by the in-phase to quadrature ratio, or by the location of the anomaly. The letters "A" and "B" merely refer to the magnetics:

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"A" indicates a directly coincident magnetic anomaly, and "B" indicates the lack thereof. The "X" rating is reserved for questionable anomalies. The legend on the map shows the symbol used for each of these ratings. In general, the more the rectangle is filled in, the stronger the anomaly.

In the case of directly coincident magnetic anomalies, the amplitude of the magnetic feature is shown on the EM map. It is stencilled beneath the symbol which portrays the EM anomaly.

During the final interpretation stage, EM anomalies are correlated from line to line wherever possible and the conductive zones are outlined. All definite conductors are numbered on the map and discussed in the report.

DATE OF ISSUE
OCT 19 1964
ONTARIO DEPT. OF MINES

WILHELMINA

PORCUPINE MINING DIVISION

DISTRICT OF COCHRANE

Scale - 40 Chains - 1 Inch

NOTE

400' Surface Rights Reservation around all Lakes and Rivers.

- APPLICATION FOR AIRBORNE GEOPHYSICAL CERTIFICATE
- MESPI MINES PROPERTY
- AREA FLOWN (APPROX.)

KIRKLAND

MOBERLY

OKE

AITKEN

North Ast.

24M. 23M. 22M. 21M. 20M. 19M.

29M. 28M. 27M. 26M. 25M. 24M.

29.13 76.70 74.06

5M. 4M. 3M. 2M. 1M.

White River

Caribou Creek

Wilhelmina Creek

DATE OF ISSUE
OCT 19 1964
ONTARIO DEPT. OF MINES

GEARY

PORCUPINE MINING DIVISION

DISTRICT OF COCHRANE

Scale - 40 Chains - 1 Inch

KINGSMILL

MAHAFFY

NORTH AST.

18.27 18M. 17M. 16M. 15M. 14M. 13M. 12M.

82.18 80.28 80.16 80.02 79.66 79.64 79.43

5M. 4M. 3M. 2M. 1M.

White River

Caribou Creek

Wilhelmina Creek

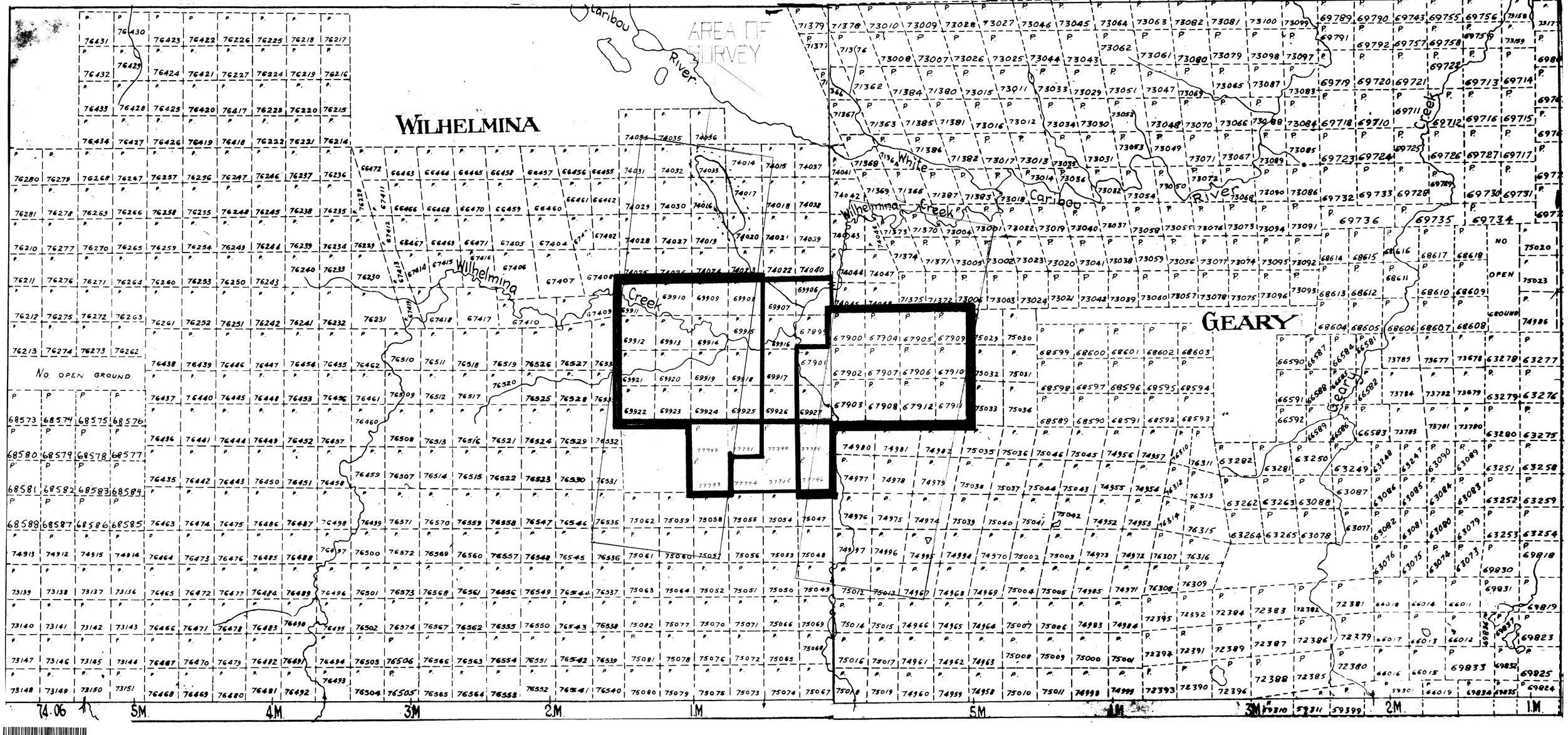
Geary Creek

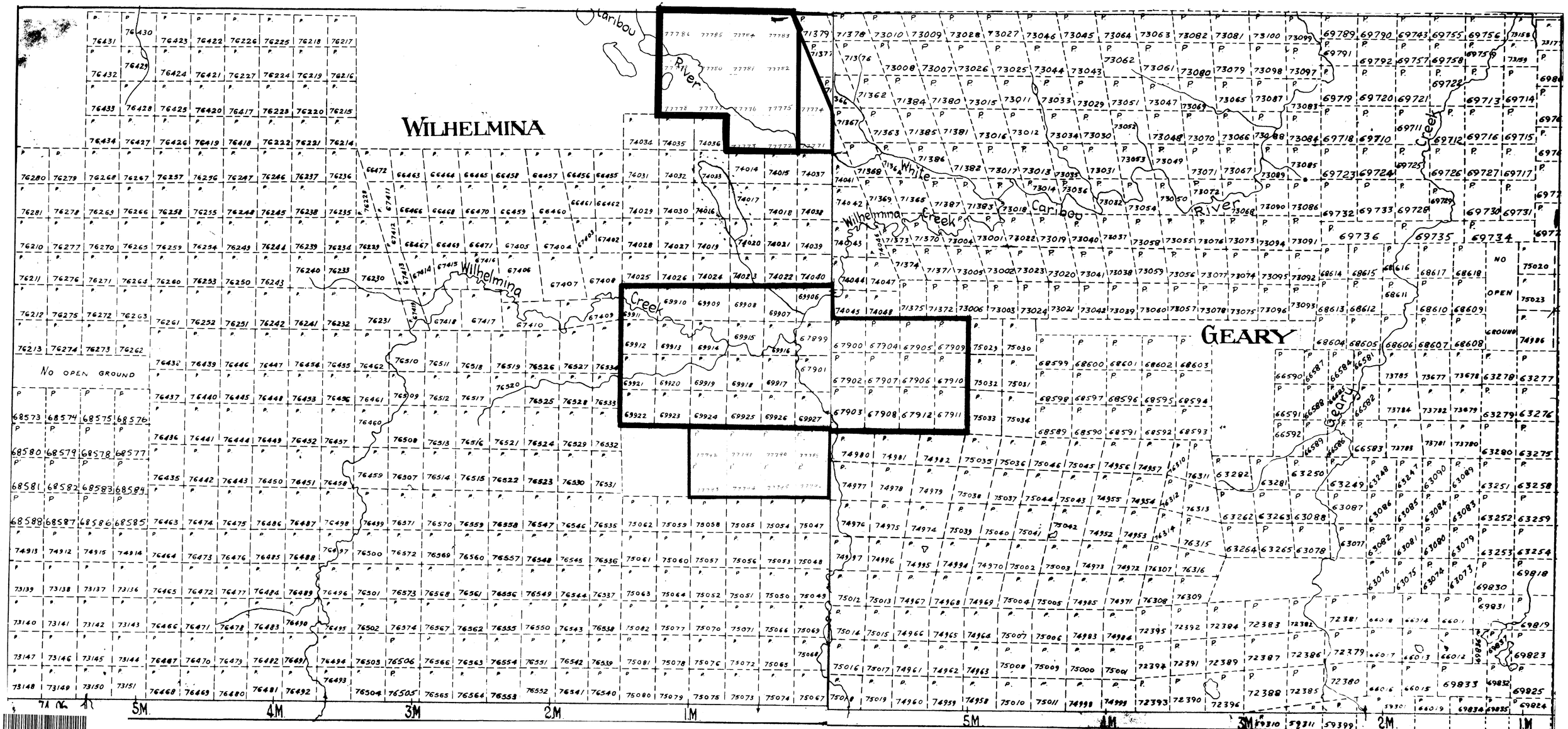
Thorburn

LEGEND

...LAND
...SALE

...surface rights reservation around all lakes and rivers.


AREA OF SURVEY
Caribou River
WILHELMINA
Wilhelmina Creek
White Caribou River
GEARY
Geary Creek
NO OPEN GROUND
74.06
5M.
4M.
3M.
2M.
1M.


WILHELMINA
GEARY
Caribou River
White River
Wilhelmina Creek
Geary Creek
NO OPEN GROUND
5M.
4M.
3M.
2M.
1M.

63.1347

MESPI MINES LIMITED
AIRBORNE GEOPHYSICAL SURVEY

WILHELMINA and GEARY TOWNSHIPS

CONTOUR INTERVAL ..... 20 GAMMA
MEAN FLIGHT LINE SPACING ..... 660 FEET
MEAN TERRAIN CLEARANCE ..... 450 FEET
500 GAMMA CONTOUR .....
100 GAMMA CONTOUR .....
20 GAMMA CONTOUR .....
MAGNETIC LOW .....
FIDUCIAL POINTS 36900
FLIGHT LINES .....

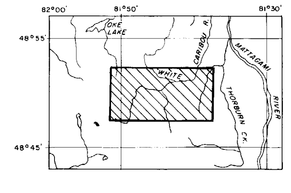
TIMMINS AREA, ONTARIO
MAGNETOMETRIC MAP

SCALE

1000 0 1000 2000 3000 4000 5000 FEET

1 inch to 1320 Feet

Flown and Compiled by
HUNTING SURVEY CORPORATION LIMITED
TORONTO, CANADA
1964



63.1347

Sept 9, 1964

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KIRKLAND

KINGSMILL

WILHELMINA

GEARY

ROAD

WHITE CARIBOU LAKE

WHITE CARIBOU RIVER

WILHELMINA RIVER

ROAD

AREA BOUNDARY

AREA BOUNDARY

T-1 T-5 T-7

MAGNETIC LEGEND

S — SHARP
VS — VERY SHARP
B — BROAD
VB — VERY BROAD
F — FLAT
M — MULTIPLE
200 — SYMBOL

42A13SE0038 63.1347 GEARY

240

LEGEND

1 A ANOMALY
1 B ANOMALY
2 A ANOMALY
2 B ANOMALY
3 ANOMALY
X type ANOMALY

MEAN TERRAIN CLEARANCE . . . 150 FEET
FLIGHT LINE SPACING . . . . . 1/8 MILE
RIVERS AND LAKES . . . . .
HORIZONTAL CONTROL . . . . . BASED ON PHOTO LAYDOWN

AIRBORNE ELECTROMAGNETIC SURVEY

WILHELMINA TOWNSHIP AREA

ONTARIO

B.W.LANG

SCALE: 1 INCH = 1/4 MILE (approx.)

(APPROX.)

63.1347

CANADIAN AERO Mineral Surveys LTD.
OTTAWA & TORONTO, ONTARIO

C.A.M.S.5044

KIRKLAND

KINGSMILL

WILHELMINA

GEARY

MOBERLY

THORBURN

WHITE CARIBOU LAKE

WHITE CARIBOW RIVER

WILHELMINA RIVER

AREA BOUNDARY

AREA BOUNDARY

T-1 T-5 T-7

T-8 T-10 T-15

MAGNETIC LEGEND

S — SHARP
VS — VERY SHARP
B — BROAD
VB — VERY BROAD
F — FLAT
M — MULTIPLE
200 — SYMBOL

42A13SE0038 63.1347 GEARY

250

LEGEND

1 A ANOMALY
1 B ANOMALY
2 A ANOMALY
2 B ANOMALY
3 ANOMALY
X type ANOMALY

MEAN TERRAIN CLEARANCE....150 FEET
FLIGHT LINE SPACING.....1/8 MILE
RIVERS AND LAKES.....
HORIZONTAL CONTROL.....BASED ON PHOTO LAYDOWN

AIRBORNE ELECTROMAGNETIC SURVEY

WILHELMINA & GEARY TWPS. AREA

ONTARIO

MESPI MINES LIMITED

SCALE: 1 INCH = 1/4 MILE (approx.)

63.1347

(APPROX.)

CANADIAN AERO Mineral Surveys LTD.
OTTAWA & TORONTO, ONTARIO

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