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REPORT ON  
AIRBORNE GEOPHYSICAL SURVEY  
OF THE  
PRICE, FRIPP, AND THORNLOW TOWNSHIPS AREA  
FOR  
ACME GAS AND OIL CO. LTD.

63. 2118

I. INTRODUCTION

This report pertains to the combined airborne EM and magnetometer survey flown on behalf of Acme Gas and Oil Company Limited in the Price, Fripp, and Thornloe Townships area of Ontario. The flying was accomplished between September 3rd and September 7th, 1966 by the Canadian Aero Mineral Surveys Limited geophysically equipped Otter aircraft (registration CF-IGM) based at South Porcupine.

The survey was flown at a mean terrain clearance of 150' with flight lines spaced at 1/8 mile intervals. Lines 1-17 were oriented north-south and the remainder N65°E. The geophysical data acquired totalled 112 line miles.

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

G. A. Curtis	-	Project Manager
K. Dempster	-	Pilot and Navigator
T. Korpatt	-	Pilot and Navigator
T. Peacock	-	Operator
D. Sarazin	-	Data Compiler
G. Granger	-	Draftsman
P. Tallyhoe	-	Data Chief
R. W. Stemp	-	Geophysicist.

The EM data and all magnetic anomalies coincident with conductors are plotted on a plan map at the scale of 1" =  $\frac{1}{2}$  mile which accompanies this report. The magnetic results are also presented in "redball" form for anomalies 100g or greater in amplitude. An airphoto laydown provided the base for this map.

## II. DISCUSSION OF RESULTS

All of the conductors outlined by the airborne survey are closely associated with bands of iron formation which are indicated on the Ontario Department of Mines geological map No. 2046 (1963). The source of these conductors is believed to be massive sulphides interbedded with the iron formation. Pyrite is a common occurrence under these conditions but we cannot rule out the possibility of other commercial sulphides or graphite.

Conductors 1, 2, 3, 4, and 7 are the strongest and should be checked out initially in the ground followup work. If they prove interesting, the remaining weaker zones should also be looked at.

Respectfully submitted,



OTTAWA, Ontario,  
November 2, 1966.

R. W. Stemp, P.Eng.,  
Geophysicist.

## APPENDIX I

PROJECT NO. 6113 - PRICE, FRIPP & THORNLOE TWPS.

<u>Anomaly</u>	<u>Fiducials</u>	<u>In-Phase Quad</u>	<u>Altitude</u>	<u>Magnetics</u>	<u>Rate</u>	<u>Comments</u>
6 A	8815/9	0/30	150	Dir. 6400g+	2	Mag off scale
7 A	9112/4	40/80	160	Dir. 4000g	3	
7 AA	1145/8	0/20	150	Dir. 6400g+	3	Weak, mag off scale
8 A	9178/81	120/70	165	Dir. 8000g	2A	Sharp IP, double?
8 B	9221/3	70/40	185	N. edge 500g	3	
9 A	9289/92	80/20	165	S. edge 2850g	3	Double?
9 B	9240/3	0/40	155	S. edge 450g	3	
9 C	9237/40	440/160	150	N. edge 450g	2B	
10 A	9337/40	260/40	155	Dir. 2075g	2A	
10 B	9383/8	240/100	160	Assoc. 400g	2B	Double
11 AA	9476/8	0/30	145	S. Flank 3650g	3	Weak
11 AB	9474/6	400/100	150	Dir. 3650g	2A	
11 AC	9421/4	100/300	145	Dir. 200g	1A	
11 AD	9416/9	130/50	145	nil	3	
11 A	9537/40	80/40	150	N. edge 3100g	3	
11 B	9583/6	260/230	150	Dir? 450g	2A	
11 C	9587/90	170/40	150	N. side 350g	2B	
12 A	9673/6	360/160	145	Dir. 3850g	2A	
12 B	9671/3	70/20	145	N. side 3850g	3	
12 C	9620/3	900/260	140	Dir. 100g	1A	Double
12 D	9613/6	650/340	145	nil	1B	Poss. some dir mag

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<u>Anomaly</u>	<u>Fiducials</u>	<u>In-Phase Quad</u>	<u>Altitude</u>	<u>Magnetics</u>	<u>Rate</u>	<u>Comments</u>
13 AA	1342/4	50/240	145	N.edge 2850g	2B	
13 AB	1289/91	150/340	135	S.edge 150g	2B	
13 AC	1283/6	260/550	150	nil	2B	
13 BA	1379/82	260/250	145	Dir. 4150g	2A	
13 BB	1432/5	1100/540	125	nil	1B	
13 BC	1438/41	650/600	125	N.Flank 150g	2B	Double
13 A	9705/10	240/140	150	N.edge 2925g	2B	Triple
13 B	9758/61	1100/200	150	S.edge 50g	1B	
13 C	9764/7	560/240	150	N.edge 50g	1B	Double
14 A	9865/8	350/560	140	Dir. 4000g	2A	
14 B	9861/5	1000/200	145	Dir. side peak 200g	1A	Double?
14 C	9804/7	300/80	150	nil	2B	
14 D	9797/800	500/520	155	N.Flank 100g	1B	
15 A	9878/83	600/420	160	N.edge 1000g	1B	Multiple
15 B	9939/42	500/300	150	S.edge 250g	1B	
15 C	9944/7	420/260	150	S.Flank 200g	2B	Double
16 A	9993/5	1300/340	145	N.Flank 2350g	1B	Sharp
16 B	9987/90	60/50	160	Dir. 1150g	3	

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<u>Anomaly</u>	<u>Fiducials</u>	<u>In-Phase Quad</u>	<u>Altitude</u>	<u>Magnetics</u>	<u>Rate</u>	<u>Comments</u>
17 A	155/9	60/40	160	N. Flank 700g	3	Broad
17 B	217/20	80/100	155	S. edge 400g	3	
17 C	222/6	730/40	155	Dir? 100g	3	Broad
18 A	249/52	170/120	165	Dir. 1600g	2A	
19 A	370/3	800/300	160	Dir. 5400g	1A	
26 A	2037/9	-/100	120	Dir. 12,100g	3	
26 B	2040/2	-/70	125	Dir. 6475g	3	
27 A	2165/8	-/40	120	Dir. 6975g	3	Weak
28 A	2220/5	607/20	100	Dir. 10,900g	x	Double, low alt.
32 A	2688/92	-/20	150	Dir. 2600g	3	Weak
32 AA	1351/4	0/20	150	Dir. 3100g	3	Weak
33 A	2915/8	-/20	165	Dir. 4000g	3	Weak
35 A	3088/90	-/300	145	Dir. 6100g	2A	Sharp
36 A	3152/5	-/110	155	Dir. 5300g	3	
39 A	3509/12	0/40	170	N. edge 4300g	3	

ACME GAS & OIL CO., LIMITED

Summary of Claims for which this Report is in support of an  
Application for a Geophysical Certificate

Price Township:

P-91752 to P-91754 inclusive,

P-91770 to P-91787 inclusive,

P-91820 to P-91828 inclusive.

There are approximately 15 line miles  
flown over these claims.

## 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 rectilinear 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 infor-



mation 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.

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

Rectilinear 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 (250 scale) the smallest division on the chart is approximately equivalent to 10 gammas. When the record "steps" a change of approximately 400 gammas is indicated. Three other scales are available to accommodate areas of large magnetic relief. On the "500" scale 1 small division is 20 gammas and a step is equivalent to 800 gammas. On the "1250" scale 1 division is 50 gammas and a step is 2000 gammas, and on the "2500" scale 1 division is 100 gammas and a step is 4000 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 (250 scale) 1 mm. is approximately equivalent to 12.5 gammas and a step is approximately 400 gammas. At the "500", "1250", and "2500" scales 1 mm. is 25 gammas, 62.5 gammas, and 125 gammas respectively and the steps are 800, 2000, and 4000 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: "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.

THE TOWNSHIP OF  
OF

# PRICE

DISTRICT OF  
TIMISKAMING

PORCUPINE  
MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

### LEGEND

PATENTED LAND	⊙
CROWN LAND SALE	C.S.
LEASES	⊖
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

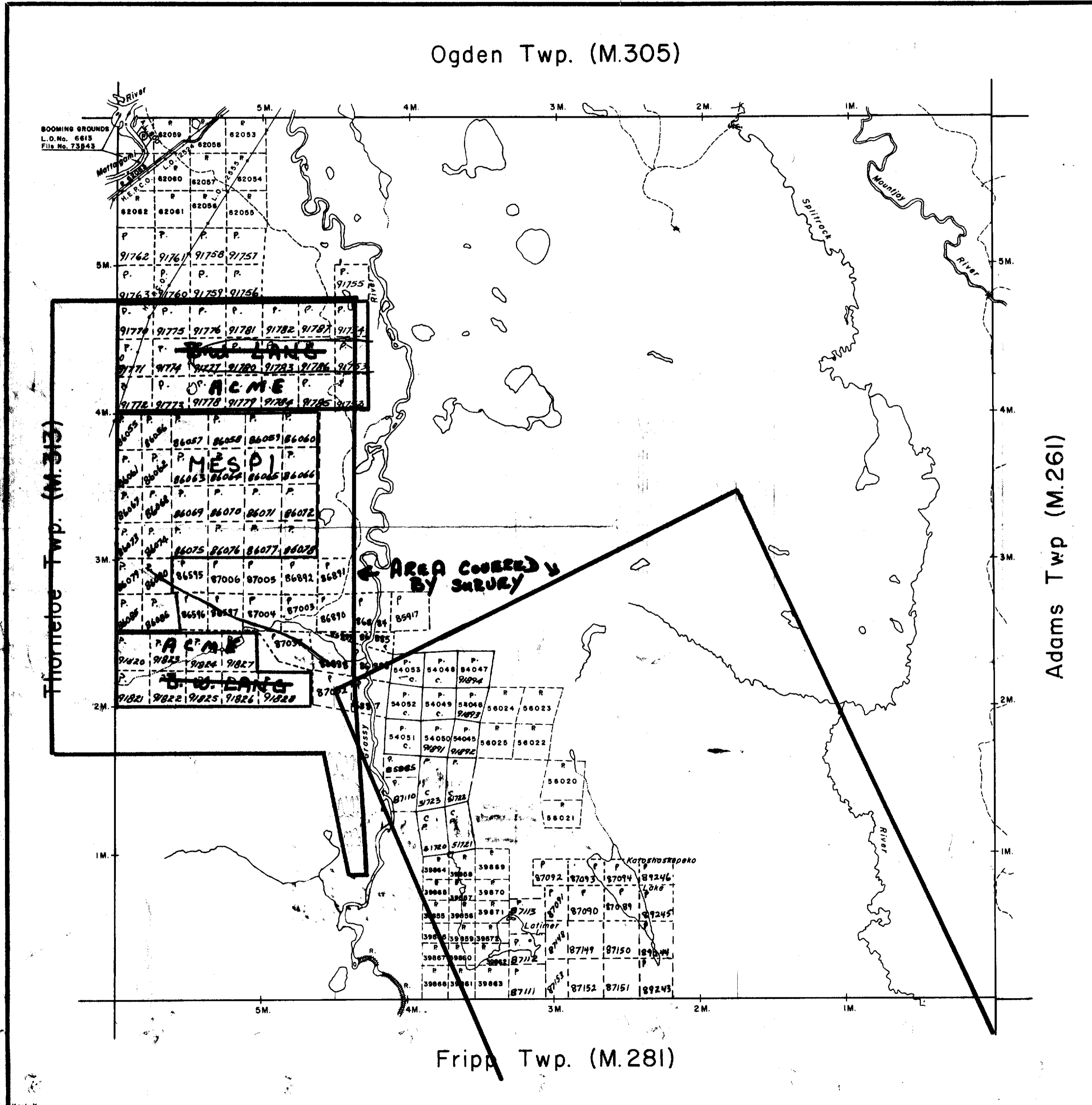
400' Surface Rights Reservation around  
all lakes and rivers.

DATE OF ISSUE  
MAR 3 1967  
ONTARIO DEPT. OF MINES

PLAN NO. **M-307**

DEPARTMENT OF MINES  
— ONTARIO —

## Ogden Twp. (M.305)



## Fripp Twp. (M.281)

Karl K.





63.2118

# AIRBORNE ELECTROMAGNETIC SURVEY PRICE & FRIPP TWP'S. AREA, ONTARIO

FOR  
ACME GAS & OIL CO. LTD.

BY  
CANADIAN AERO  
*Mineral Surveys* LTD.  
OTTAWA & TORONTO, ONTARIO



(APPROX.)

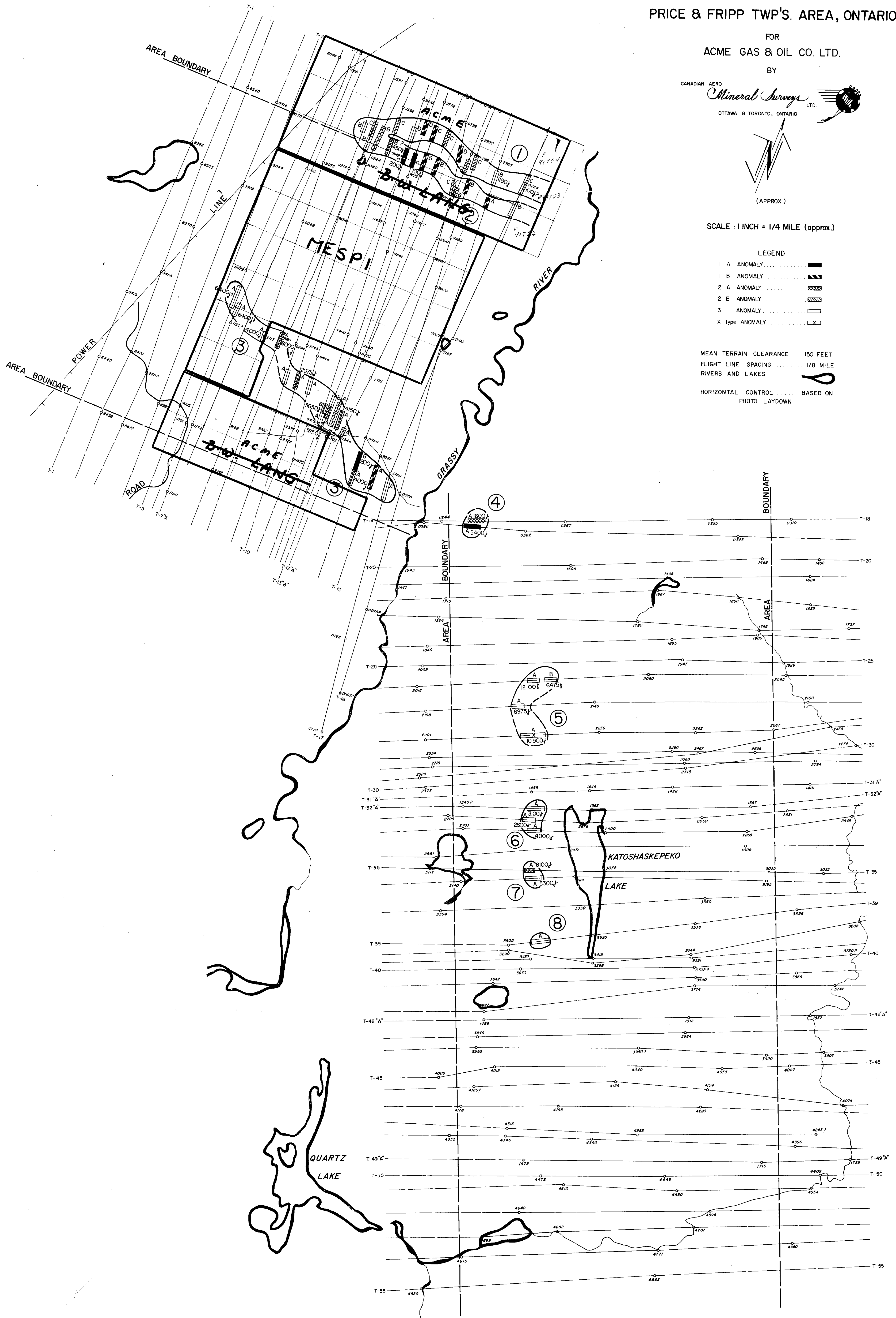
SCALE: 1 INCH = 1/4 MILE (approx.)

### 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



R. W. [Signature]

