AIRBORNE GEOPHYSICAL SURVEY OF THE TURNBULL TOWNSHIP AREA (EAST-WEST) NORTHERN ONTARIO FOR B. W. LANG

INTRODUCTION

During the period of July 29th and 30th, 1963, Canadian Aero Mineral Surveys Limited conducted an Airborne Geophysical survey for B. W. Lang over a small area in Turnbull Township, in the Cochrane District of Northern Ontario. The survey was performed with C.A.M.S. geophysically-equipped Otter aircraft utilizing the Rio In-Phase, Out-of-Phase Electromagnetic System, with Elliott Magnetometer, and a Nuclear Enterprises Scintillometer. This equipment is further described in Appendix II of this report.

61 miles (as listed on the data sheets from Can. Aero)

A total of some 36 line miles of survey was completed with lines spaced at one-eighth mile intervals. A previous survey covered most of this area, with lines in a north-east, south-west direction. Lines in this survey were flown east-west. References are made in this report to results from both surveys.

Electromagnetic anomalies have been plotted on a base map of scale 1" = 1320'. These anomalies are listed in Appendix I to this report and description of anomaly selection and grading is included in Appendix III of this report.

1308

CANADIAN AERO *Mineral Surveys* LIMITED

PERSONNEL:

The personnel employed on this survey were as follows:

Pilot:	Mr. K. Atkins, Ottawa, Ontario.
Navigator:	Mr. K. McLeod, Toronto, Ontario.
Mechanic:	Mr. R. Sarsfield, Ottawa, Ontario.
Operator:	Mr. G. Curtis, Ottawa, Ontario.
Data Reduction:	Mr. D. Graham, Ottawa, Ontario.
Drafting:	Mr. P. Tallyhoe, Ottawa, Ontario.
Geophysicists:	Mr. D. M. Wagg, Toronto, Ontario.
	Mr. A. R. Ratthew, Ottawa, Ontario.

GEOLOGY:

Geology of the area, as indicated on Preliminary Geological Map No. P141-Timmins Sheet, shows primarily gabbro and diorite with acidic intrusives on the east side of the area. Some basic volcanic rocks are also noted.

ELECTROMAGNETIC RESULTS

The following conductors show some continuity, or reasonable intensity anomalies:

Conductor #1 - Anomalies 1A, 3A, 4A and 5A.

This zone, which lies outside of the former survey area, shows very weak out-of-phase anomalies with little or no magnetic correlation. There is some evidence that the zone, which appears to strike north-south, may be sporadically continuous southward from the indicated zone. This anomaly may reflect a weak shear, or a linear topographic effect, and could be checked on the ground.

Conductor #2 - Anomalies 3B and 4B.

This zone also shows very weak out-of-phase anomalies with no magnetic correlation. The zone would appear too weak to warrant further attention at this time.

1305

Conductor #3 - Anomalies 6A and 7A.

This zone correlates two anomalies on the previous survey, coinciding with a small lake. Again they show weak quadrature with no magnetics, and may be due to lake bottom effect. They could however be checked on a low priority basis.

Conductor #4 - Anomaly 12A.

This weak in-phase anomaly, showing no magnetic correlation, is included primarily because of its possible relationship with Conductor #5. Ground work on this anomaly alone is not warranted unless Conductor #5 should prove of interest.

Conductor #5 - Anomalies 13B and 15A.

These weak anomalies show some correlation with anomalies 22A and 22B on the previous survey. They show no magnetic correlation, but should be ground-checked due to their apparent fair conductivity.

Conductor #6 - Anomaly 17A.

This anomaly, although very weak, shows fair magnetic correlation, and also correlates Conductor #1 on the previous survey. This area should be ground checked.

Other single-line anomalies do not appear worth ground checking, with the possible exception of Anomaly 6B, which shows a 50-gamma magnetic peak. It should also be noted that Conductor #2 from the previous survey shows a possible intercept on Line 17 of this survey, although considered too weak to class as a separate anomaly.

1308

SUMMARY

Six very weak conducting zones have been indicated. Ground followup should rely heavily on local geologic conditions, as well as indications from the previous survey of this area.

Respectfully submitted,

A. R. Rattew,
Prof. Eng., (Ontario).

1308

PROJECT 3026-16

Anomaly	Fiducials	In-Phase Quad	Altitude	Magnetics	Rate	Comments
1 A	9730/6	-/30	90	Dir? 20g	3	Low altitude-Broad
3 A	9934/8	-/40	110	Nil	3	
B	9896/900	-/20	120	Nil	x	
C	9841/6	40/-	120	Nil	x	Possible mag effect.
4 A	9960/64	-/30	120	Nil	x	
B	9988/92	-/20	125	Nil	x	
5 A	0130/36	-/30	120	Nil	x	Broad, very weak.
6 A	0211/17	-/30	120	Nil	x	Broad
B	0226/30	20/30	120	Dir 50g	x	Possible correlation.
7 A	0304/09	10/20	110	Possible slight	x	Very weak, poor correlation.
11A	0867/9	30/20	120	Nil	x	Narrow, very weak.
12A	0984/90	30/-	110	Nil	x	Broad - very weak.
13A	1169/72	20?/20	115	Nil	x	
B	1220/23	20/10	110	E. Edge 100g	x	Very weak.
15A	1503/10	30/-	130	Nil	x	Double - very weak.
17A	1752/56	20/10	140	Dir. 80g	3	Very weak.

APPENDIX II

DESCRIPTION OF OTTER AIRBORNE GEOPHYSICAL SYSTEM.

SURVEY BASIS

The basis of surveys with this equipment is electromagnetic and magnetic results obtained from units installed in a deHavilland Otter aircraft. In addition results are available on a Scintillation record which gives a rough indication of overburden conditions traversed in addition to its normal function.

Traverses of a survey area are made at an appropriate elevation (usually 100' to 200' above terrain,) on parallel lines spaced from one-quarter to one-eighth mile apart, and crossing the implied regional strike at right angles. Continuous photographic record is made of the ground passing below the aircraft, and this is correlated by time markers with the geophysical equipment records.

In the electromagnetic unit a low frequency (320 cycles per second) field is produced by a 'transmitter' mounted on the starboard wingtip, and the resultant field is measured at the 'receive' coil on the port wingtip. Separation of these coils is 61 feet. An electronic null device is adjusted so that in the absence of a conductor within range of the system, no signal is recorded. The presence of a conductor distorts the received field, producing an anomalous signal which is recorded. The anomalous signal is divided into two components, one which has the same phase as the transmitted field, termed the 'in-phase' component, and the other whose phase is at right angles to the transmitted field, termed the 'quadrature' component. These are recorded on two channels of a six channel recorder, and the ratio of the in-phase to the quadrature components gives a measure of the conductivity of the disturbing body. Intensity of response depends on proximity to the body, conductivity of the body, and to its geometric configuration. In general, a body which bears dimensions and conductivity to be of interest will produce an anomalous signal larger than the background noise if the aircraft is within 300' to 400' of it.

The magnetometer installed in the aircraft measures short term variations in the total intensity of the earth's magnetic field. These short term variations are recorded simultaneously on the six channel recorder with the e.m. results. In addition, all variations in this total field are recorded on a Rectalinear recorder for possible subsequent magnetic contouring when required.

A radio altimeter within the aircraft measures and records continuously the height of the aircraft above ground. This information is subsequently used to relate geophysical anomalies at varying altitudes.

The scintillation counter results are also recorded on the six channel recorder. These results are frequently useful in estimating conditions of overburden thickness, where other means may not be available. It may also be useful in dividing broad geologic divisions within a survey area.

An indication of the air turbulence is also recorded on the six channel record, and spurious anomalies which may be due to an aircraft 'bump' may be eliminated.

Appendix II - continued

The Aeropath camera continuously records the ground passing below the aircraft, and numbered fiducials are impressed on this same film at intervals usually of 10 seconds. These same fiducials are recorded on the six channel recorder and the rectalinear recorder, thus correlating all recorded information with accurate ground positions.

RECORDER TRACKS

In studying results from the six channel recorder, the following are the scales, reading from bottom to top of the chart, with increasing fiducial numbers to your left:

1) Fiducial marks are noted, with a time separation of 1500 feet approximately. Numbering from right to left, this being the 'forward' direction of flight.

2) Magnetometer; Each 5 mm. represents approximately 80 gammas. When the units 'steps' - approximately 320 gammas change is indicated. This applies to the 300-0-300 scale which is normal unless otherwise noted. Ten steps are available, beyond which, unless the range is advanced, the unit goes 'off scale'. It should be noted that this record 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. Thus the magnetometer record in this case is useful largely for 'correlating' magnetic features associated with the electromagnetic results.

3) In-Phase e.m. - Each 5 mm. represents approximately 100 parts per million referred to the primary field at the receive coil. Noise level should not exceed 50 parts per million, although records are still considered useable until the noise level reaches 100 p.p.m. Intensity is linear until 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) Quadrature e.m. - Exactly the same scale values and comments apply to this trace as to the in-phase above.

5) Altimeter trace: The center of this trace represents approx. 150' above ground; the bottom, approx. 100', and the top approx. 300'. Response on this trace is non-linear.

6) Accelerometer trace; One-third "G" force is indicated by 5 mm. deflection from the central point. Bumps of greater than one-half "G" can cause spurious responses on the e.m. charts.

7) Scintillation trace; 5 mm. represents an increase of 0.06 mr/hr.

The Rectalinear record charts produce absolute magnetic field results with scale of 300-0-300 covering the full paper width.

APPENDIX III

SURVEY PROCEDURES AND RESULTS

PROCEDURE

Having laid out a proposed survey on a photomosaic at the required scale, the aircraft is navigated along the proposed flight lines at altitudes of 100' to 250' depending on topography. This is designed so that detection of bodies of interest to a depth of not less than 150' below surface should be accomplished. Actual flight paths are tracked from the recording camera, to the photo-mosaic, and thence to the base map, which is plotted directly from the mosaic. The control fiducials are plotted directly on the base map as well as the photo-mosaic.

Anomalies are numbered according to the line on which they fall, and a sequence letter; lettering from South to North, or from East to West. They are assigned fiducial numbers from the charts, and transferred to the base map by means of proportional devices. The overall grade of the anomaly is indicated by the manner in which it is plotted, as indicated on the base map. Where a magnetic contour map, or red-ball magnetic map has not been specified, the intensity of directly correlating magnetics is indicated opposite the appropriate anomaly.

ANOMALY RATINGS

With due regard to the confusion which would arise from too large a number of grade symbols appearing on the base map, we recognize 6 grades of anomalies. The following factors are utilized in arriving at an anomaly rating;

A) Magnitude of the in-phase component of the e.m. response, related to a given altitude.

B) Ratio of in-phase to quadrature responses.

C) Shape, magnitude, and degree of magnetic correlation, if any.

D) Character and shape of e.m. curves, with due regard to altitude and ambient noise level.

Anomaly listings are compiled and included as Appendix I of this report. Ultimate rating is a reflection of the above factors, with the immediate objective being the localizing of ground anomalous zones of sufficient interest to warrant further investigation on the ground.

ANOMALY LISTING

The anomaly listing (Appendix I) shows all the pertinent data concerning each anomaly recorded during the survey. From left to right the columns indicate:

1) The anomaly appelation; the line number, followed by a letter, where the sequence is from South to North, or East to West.

Appendix III - continued

2) The fiducial limits of the anomaly. These are taken for all intents as the full base-width of the e.m. response. Dula, or double anomalies are grouped within one set of limits where the interpreter feels that their characteristics are similar, or where two zones lie within approximately 300 feet of each other. In this connection, resolution is such that conductive zones separated by only 100' should be distinguishable.

3) Electromagnetic (component) responses are recorded, in-phase first, followed by the quadrature. Response intensity is taken from the assigned base of the anomaly in each case.

4) Altitude above ground is recorded to the nearest 5 feet.

5) Magnetic phenomena associated with e.m. anomalies is noted. A consistent pattern is used here, whereby the indication of direct correlation followed by magnetic intensity, is just that. Curve shapes must coincide, as well as peak positions. An indication of the e.m. position relative to a magnetic feature which does not correlate directly is shown. Direction is indicated, and relative distance is indicated according to the words 'edge', 'flank', or 'side', and also the intensity of the magnetic disturbance involved.

6) Comments are given applying to an anomaly where conditions are not what might be called standard. In the case of multiple anomalies, the number of peaks are indicated. When the anomaly is broad, but does not reflect a wide zone, an indication of depth to disturbing body may be made. Possibilities of spurious anomalies are noted (these are confined to atmospherics and turbulence effects). When the interpreter finds a rating near a boundary, a comment may be made as to 'strong' or 'weak' - referring to the rating category in which the anomaly has been placed. Topographic features, or manmade disturbances will also be noted in this column. Indications of body dip or odd strike will be noted where applicable.

GENERAL

It is manifestly impossible to place all pertinent information on the base map, and although a boiling down of information is included, the base map should always be examined in conjunction with the anomaly listing for full appreciation of the assessment of the results made by the interpreter.

The purpose of a survey of this type is not to outline orebodies from the air, but to economically pin point those targets on the ground which warrant further expenditure as good bets in the exploration for orebodies.

C.A.M.S. SURVEY
TURNBULL TWP
AREA
(EAST - WEST)

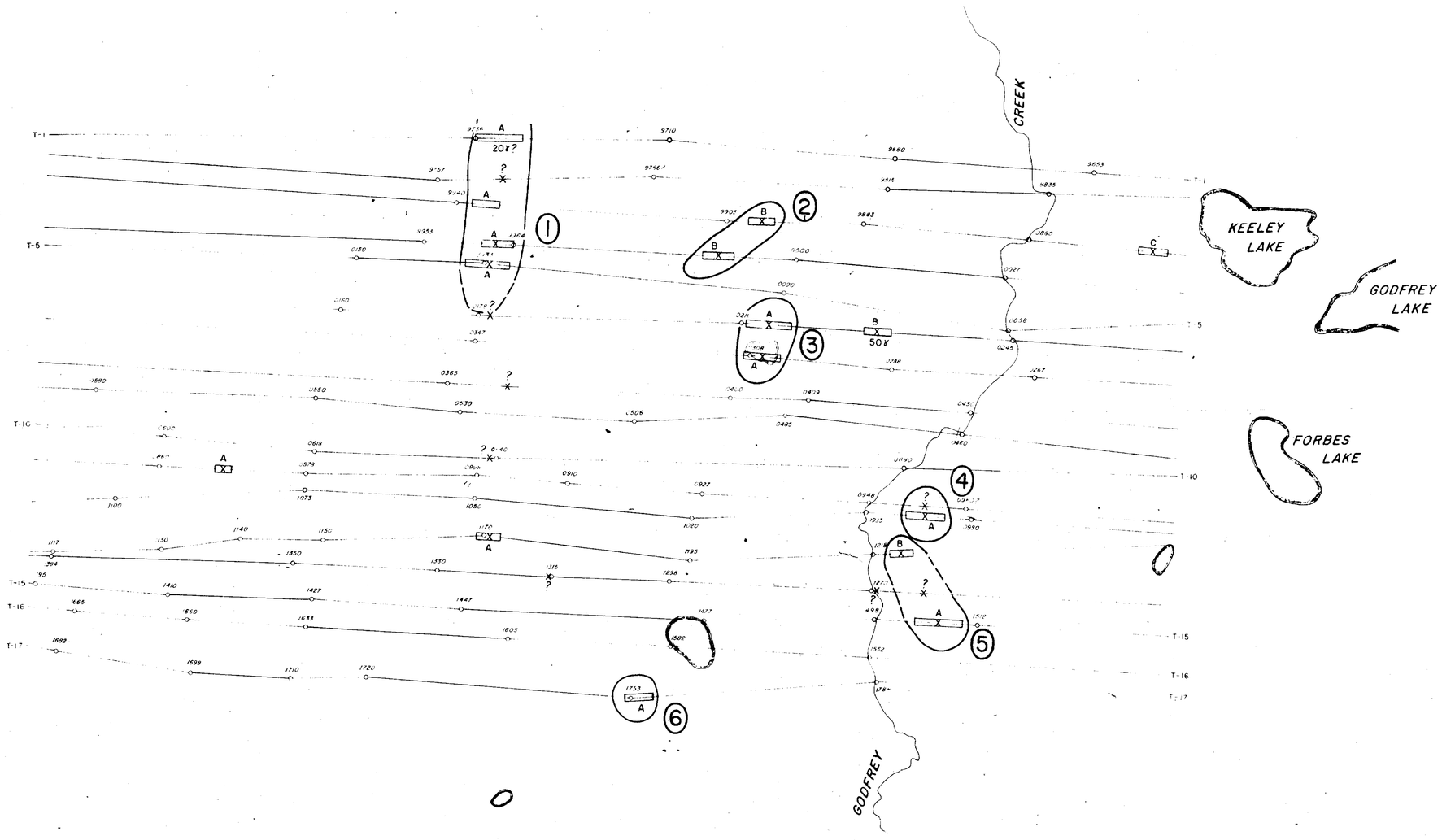
TURNBULL

Christmas

17M 16M 15M 14M 13M

5M 4M 3M 2M 1M

NO OPEN GROUND



210

LEGEND

- 1 A ANOMALY
- 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

TURNBULL TWP. AREA. E.W.

ONTARIO

B. W. LANG

SCALE : 1 INCH TO 1320 FEET

NORTH (approx.)

CANADIAN AERO Mineral Surveys LTD.
TORONTO, ONTARIO

CAMS - 3026

(2½X2) 5

63.1308

63.1308

Christmas

Godfrey

DEPT OF NATURAL RESOURCES
WITHDRAWN FROM STAKING
SEC 34(D) OF THE MG.ACT
FILE 169081

808189