aerophysics of Canada Limited

AIRBORNE ELECTROMAGNETIC SURVEY

LARDER LAKE AREA, ONTARIO

FOR

WM. KNOX

1. INTRODUCTION

As authorized by our contract with Mr. Wm. Knox, an airborne electromagnetic survey was carried out over an area of approximately 10 square miles located in Boston and McElroy Townships, District of Timiskaming, Ontario.

The general geology of the district is covered by map No. 1950-3 (Township of McElroy, O.D.M.) which is on a scale of 1" = 1000'. The rock types which occur within the surveyed area include Keewatin volcanics, Timiskaming sediments, and basic intrusives (Haileyburian) as well as Algoman syenites and porphyries.

2. SURVEY PROCEDURE

Approximately 77 line miles were flown on flight lines oriented east-west and spaced at 1/8 mile intervals.

3. RESULTS

The results of the survey have been plotted according to the legend and are shown on the accompanying map No. F1004 which is on a scale of 1" = 1320'. The anomalies have been numbered to correspond with the flight lines on which they were found and have been labelled alphabetically from west to east. Where possible these anomalies have been grouped into zones for the purpose of discussion.

ZONE A

Zone A strikes roughly northwest-southeast and cuts across the boundary of Boston and McElroy Townships in the northwest corner of the surveyed area. The majority of the anomaly peaks lie close to the position of an inferred serpentine-volcanic contact. A strong linear feature evident on the airphotos also appears to be coincident with the electromagnetic indications. Detailed ground electromagnetic surveying and geological investigations should be carried out to establish the cause of this conductive zone.

ZONE B

Zone B has been formed from two peak values which were encountered to the east of Zone A and has been interpreted to have a similar strike direction. Outcrops of greywacke and conglomerate are shown in the vicinity of these two anomalies. Detail investigations are recommended on Zone B.

ZONE C

Zone C consists of three rather broad anomalies which were found in the north part of the grid. Outcrops are few in this vicinity, but the majority of those mapped are shown to be Algoman intrusives or Timiskaming conglomerate interbedded with arkose and slate - the latter, if carbonaceous, could give rise to the anomaly.

Because of the lack of correlation of the airborne results and the paucity of outcrop information in this locality, it is suggested that a reconnaissance electromagnetic survey be carried out to pinpoint the conductors on the ground and if any outcrops are found, they might provide a geological clue as to the cause of the anomalies.

ZONE D

Similar to Zone C, this zone has been formed from a group of rather broad responses which were encountered in an area of extensive overburden. The peaks of these anomalies do not appear to be aligned in regular patterns and the zone probably represents a series of conductors. The comments regarding slates under Zone C may also apply here.

A reconnaissance electromagnetic program in conjunction with a geological examination of all nearby outcrops appears to be the most efficient procedure for assessing the economic importance of this group of anomalies.

Anomalies 1A, 2A, 10A, and 16B are isolated indications which should also be checked by reconnaissance methods.

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Dated: May 7th, 1957.

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AIRBORNE ELECTROMAGNETIC SURVEY

The purpose of an airborne electromagnetic survey is to narrow rapidly the search for conductive sulphide ore bodies in areas where such deposits are likely to occur. Depending on a number of things, including size and attitude, conductive bodies can be located by airborne electromagnetic surveys at depths varying from a few feet to over one hundred feet below the surface.

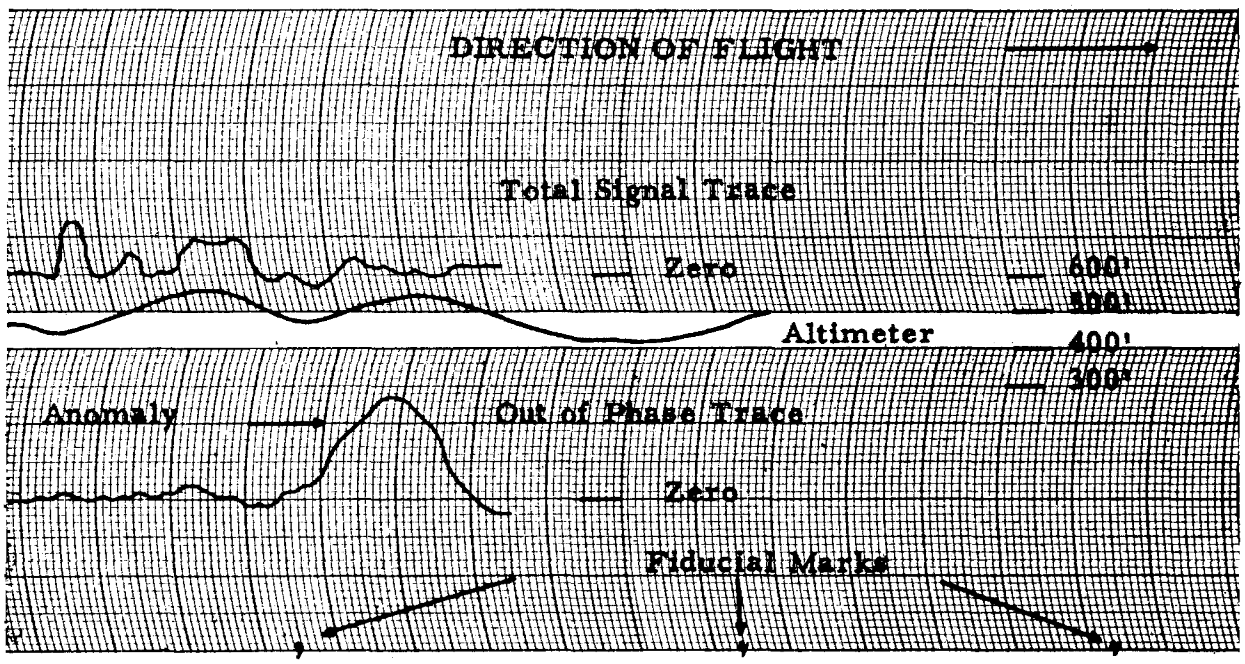
The principles underlying electromagnetic induction methods, whether used in airborne equipment or on ground work, are identical. Briefly an alternating current generator produces an alternating field which is radiated by a coil of wire. This primary field links with any conductive body within its range to produce a secondary field, and this secondary field is picked up by a receiving coil, amplified and recorded as an anomalous reading. If no conductive body occurs within the limits mentioned above, then there is no secondary field produced and no anomalous indication.

The system used by Aerophysics of Canada Limited is a single frequency out-of-phase method, with a coil orientation and low operating frequency which gives it good depth of exploration as well as excellent discrimination against surficial overburden. The equipment consists of an alternating current generator connected to a primary transmitting coil, all mounted in an aircraft. The pickup or receiving coil is towed behind and below the aircraft in a specially constructed "bomb", and the received signals are transmitted up the tow cable. These signals are continuously recorded on a paper tape along with the elevation of the aircraft and are synchronized with a continuous strip photograph made of the flight path.

Electromagnetic anomalies result from sulphide mineralization, graphitic formations, and some fault zones. Disseminated sulphide mineralization, consisting entirely of discrete particles is not a conductor at the frequencies used for airborne geophysical exploration. The airborne anomalies obtained from a survey should be evaluated in the light of all geological and physiographical data before embarking on field investigations. Under certain circumstances, some anomalies can be eliminated by the above procedure. The remaining anomalies should be checked by ground surveys in order to establish their exact locations.

EXPLANATION OF AEM RECORDS

An illustrative section of a record is shown below. The direction of flight is always from left to right. The paper speed is about ~~2.5~~ 1.5 inches per mile, but this will vary with the wind and direction of flight.



The bottom trace is a record of the Out-of-Phase component. Its zero position is in the centre of the chart. Anomalous peaks are always positive, i. e. , they rise above the zero position. Negative peaks have no direct significance. Peaks marked S are calibration markers.

The top trace records the Total Signal, and is of secondary importance only.

The middle trace is the Altimeter trace and continuously records the height of the aircraft above ground.

NOTE: The Altimeter pen records ten millimeters to the right of the other two pens. Hence one should compare a given point on the Total Signal trace or Out-of-Phase trace with a point 10 millimeters to the right on the Altimeter trace.

The fiducial marks on the bottom of the record occur regularly at 30 second intervals, and, in addition, as required by the operator to mark topographic features as an aid to data reduction. These marks occur simultaneously on the record and photographic strip.

PRESENTATION OF DATA

The aircraft flight path is plotted on a base map from the continuous photographic strip. The corresponding record is correlated with the strip photograph by means of the fiducial marks.

An Out-of-Phase anomaly is shown on the map as an oblong block on the flight line with a large dot marking the approximate location of its maximum amplitude. The length of the block represents the approximate extent of the anomaly on the ground as recorded by the equipment. If the anomaly is indefinite the block is dotted; an indefinite maximum amplitude is shown as an open circle.

NOTE: The extent and location of the anomalies cannot be recorded to better than $\pm$ 300 feet.

For easy map reference anomalies have the same number as the line on which they occur, with letter suffixes where more than one anomaly occurs on a given flight line.

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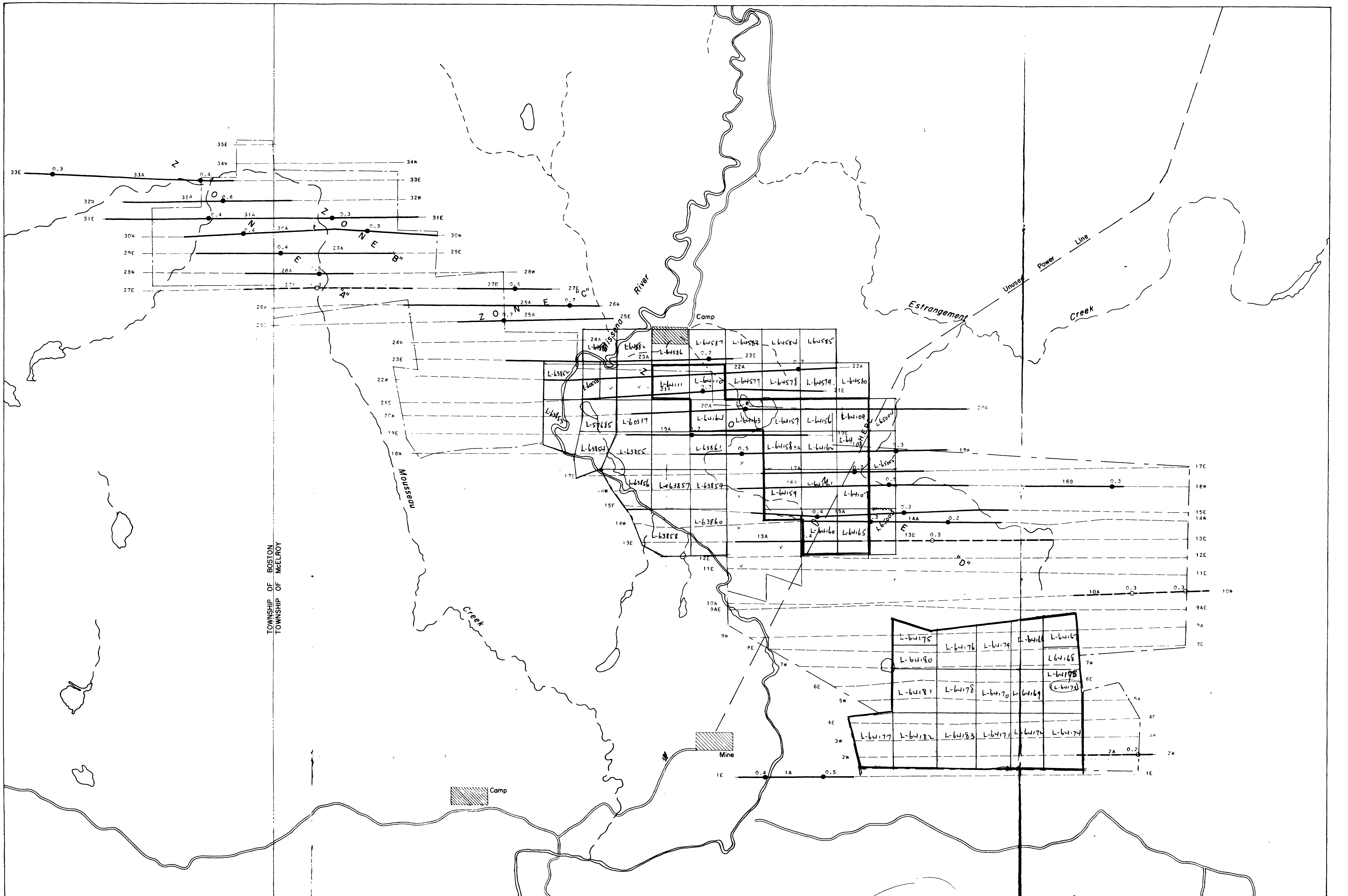

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Mrs R. E. Allerston Timmins Ont

LEGEND

- SECONDARY ROAD
- BUSH ROAD OR TRAIL
- PROPERTY BOUNDARY APPROXIMATE

McELROY CLAIMS

McELROY TOWNSHIP DISTRICT of TEMISKAMING

SCALE
1" = 1320'

Attention Mr. Ralph E. Allerston Timmins

- LENGTH AND PEAK OF ANOMALY
- LENGTH AND PEAK OF WEAK INDICATION

200

DWG. NO. F-1004