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REPORT

ON A COMBINED HELICOPTER-BORNE ELECTROMAGNETIC AND MAGNETIC SURVEY MATACHEWAN AND TEMAGAMI AREAS PROVINCE OF ONTARIO NTS 31 M/4, 41 P/15,16, 42 A/1

FOR

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May 3, 1997

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J9733

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1. INTRODUCTION

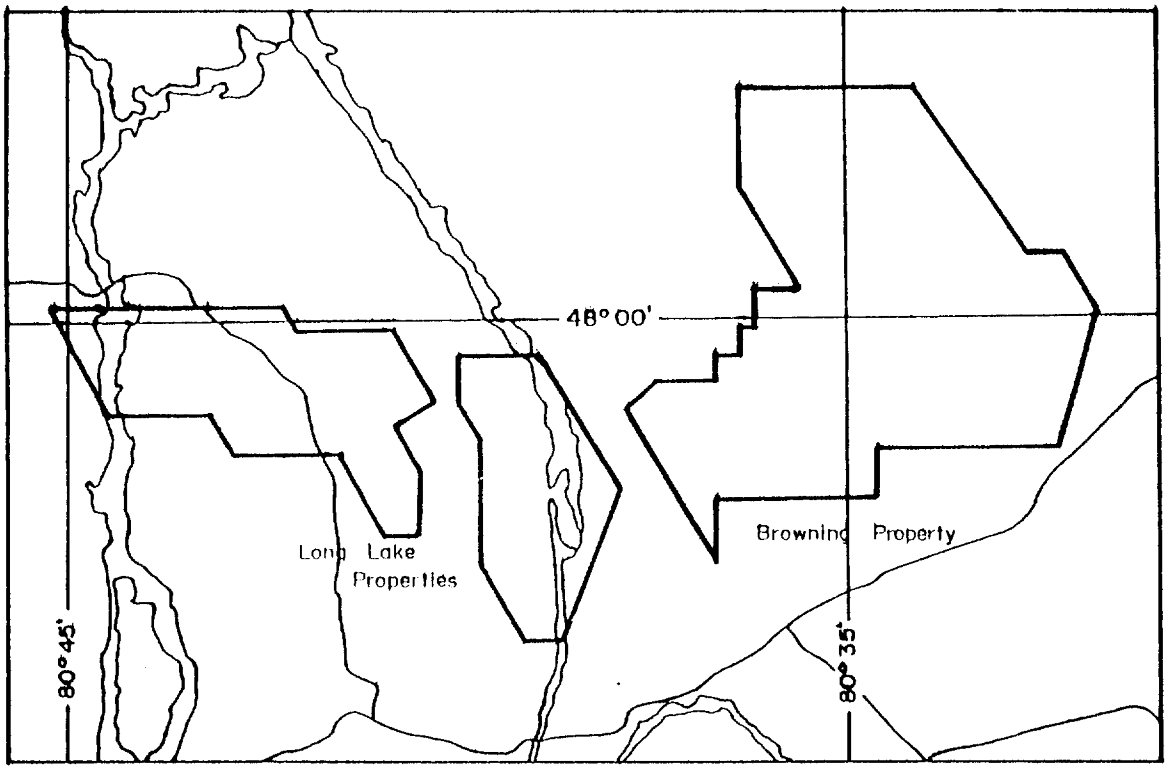
This is a report on an airborne geophysical survey carried out for Norcan Resources Ltd. by Aerodat Inc. under a contract dated March 14, 1997. Principal geophysical sensors included a five frequency electromagnetic system and a high sensitivity cesium vapour magnetometer. Ancillary equipment included a colour video tracking camera, Global Positioning System (GPS) navigation instrumentation, a radar altimeter, a power line monitor and a base station magnetometer.

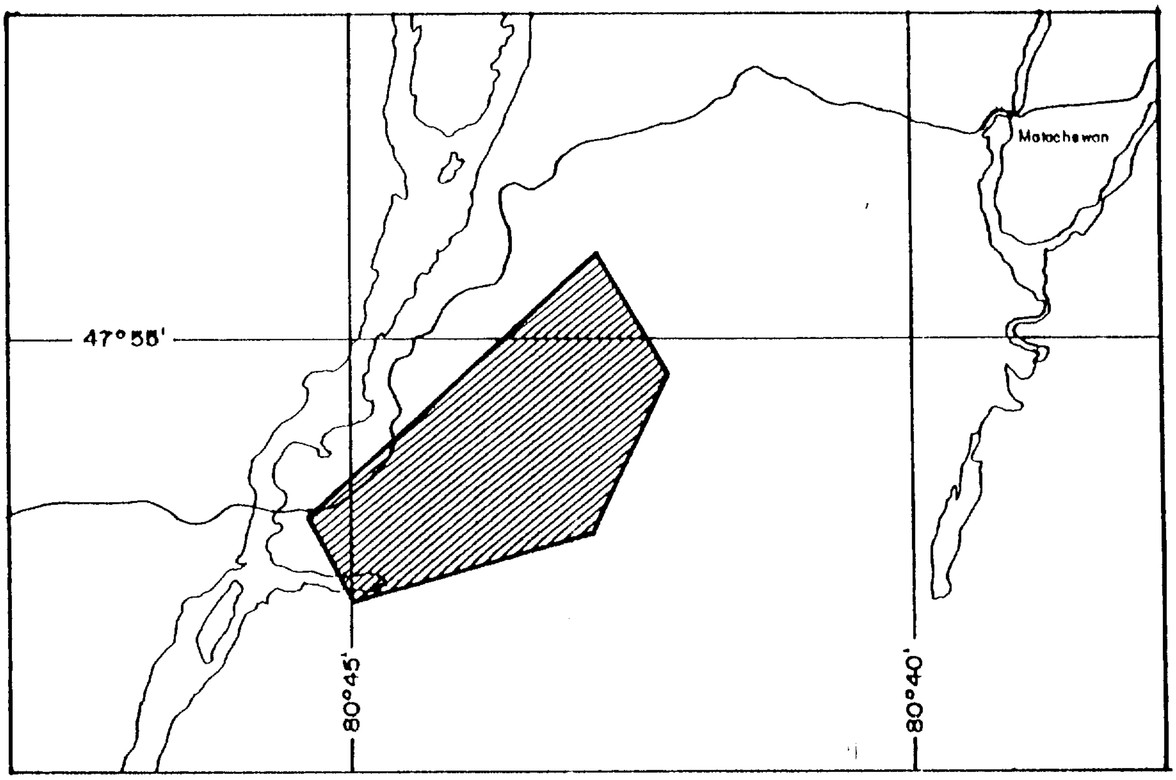
The survey covered five areas totalling about 66 square kilometres located in east-central Ontario. Total survey coverage is approximately 810.3 kilometres including 77.3 kilometres of tie lines. The Aerodat Job Number is J9733.

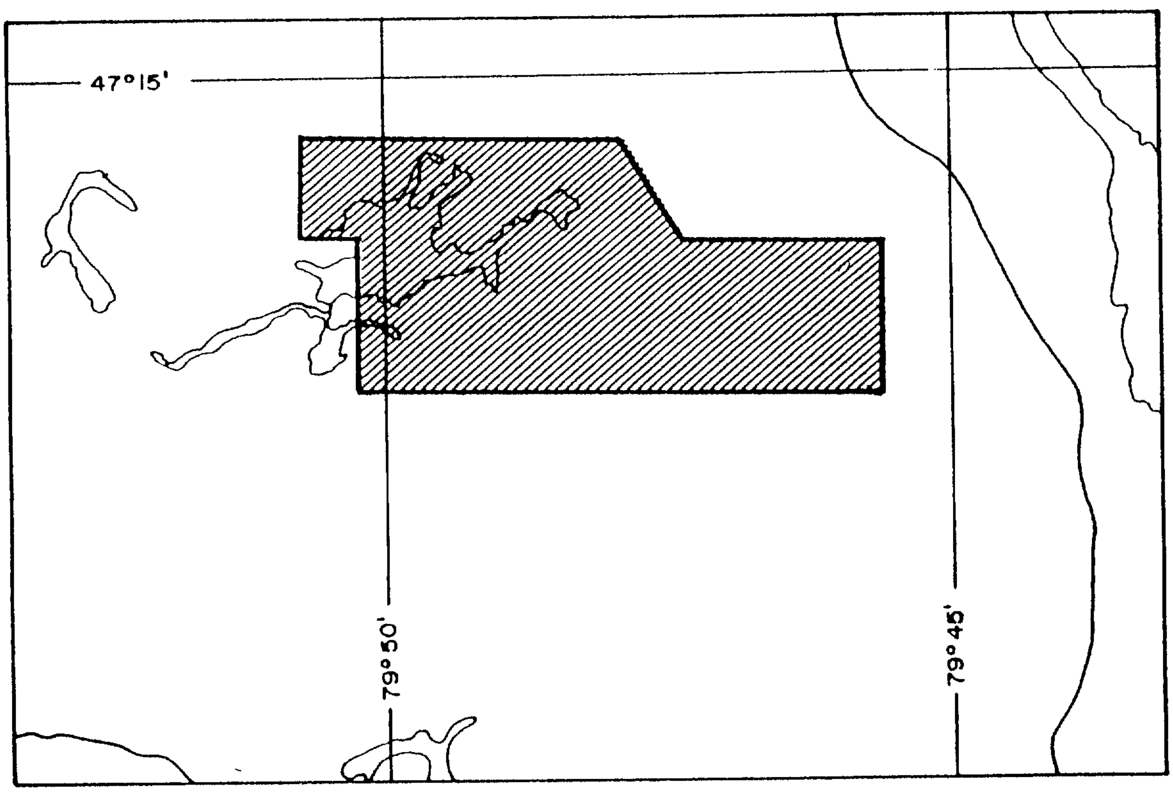
This report describes the survey, the data processing, data presentation and interpretation of the geophysical results. Identified electromagnetic anomalies appear on selected map products as anomaly symbols with interpreted source characteristics. The interpretation map indicates conductive areas of possible interest. It also shows prominent structural features interpreted from the magnetic results. Significant structural, conductive and/or magnetic associations are the basis for the selection of specific geophysical anomalies for further investigation.

2. SURVEY AREA

Four of the survey blocks are centred around the town of Matachewan, about 75 km southeast of Timmins, in Powell, Cairo and Yarrow Townships (NTS 41 P/15, P/16 and 42 A/1). The other area is 100 km north-northwest of North Bay and about 20 km southwest of Cobalt covering Mountain Lake (NTS 31 M/4). Topography is shown on the 1:50,000 scale NTS map sheets. Local relief is moderate to rugged with some deeply incised valleys. Elevations range from about 325 m to over 450 m above mean sea level. The survey areas are shown in the attached index map that includes local topography and latitude - longitude coordinates. This index map also appears on all black line map products. Line direction is north 30° west for the Matachewan properties and north-south for the Temagami property. Line spacing is 100 metres and other survey statistics are tabulated following:


48° 00'
Long Lake
Properties
Browning Property
80° 45'
80° 35'


Matachewan
47°55'
80°45'
80°40'


47°15'
79°50'
79°45'

Property and Area No.[†]	Survey Area km^2	Traverse Lines km	Tie Lines km	Total Line Kilometres
Log Lake #1	10.7	119.5	13.8	133.3
Montreal River #2	8.4	81.7	7.2	88.9
Browning North and South #3	28.1	311.9	32.4	344.3
Yarrow #4	9.0	78.3	8.7	87.0
Temagami #5	10.0	141.6	15.2	156.8
Totals	66.2	733	77.3	810.3

[†] The area number refers to a preliminary survey block designation by Aerodat.

3. AIRCRAFT AND SURVEY EQUIPMENT

3.1 Aircraft

The survey aircraft was an Aerospatiale AS 350D helicopter, piloted by J. Breton, owned and operated by Abitibi Helicopters Ltd. G. Bernetic of Aerodat acted as navigator and equipment operator. Aerodat performed the installation of the geophysical and ancillary equipment. The survey aircraft is flown at a mean terrain clearance of 60 metres (200 feet) and speed of 60 knots.

3.2 Electromagnetic System

The Helicopter ElectroMagnetic system (HEM) is an Aerodat five frequency configuration. Two vertical coaxial coil pairs operate at frequency ranges of 935 Hz and 4,600 Hz and three horizontal coplanar coil pairs at frequency ranges of 865, 4,175 Hz and 32 kHz. The actual frequencies used depend on the particular bird configuration. At the present time Aerodat has ten bird systems. This survey utilized the Raven bird with frequencies of 927 Hz and 4,545 Hz for the coaxial coil pairs and 863 Hz, 4,250 Hz and 32,490 Hz for the coplanar coil pairs. The transmitter-receiver separation is 6.5 metres. Inphase and quadrature signals are measured simultaneously for the five frequencies with a time constant of 0.1 seconds. The HEM bird is towed 30 metres (100 feet) below the helicopter.

3.3 Magnetometer

A Scintrex H8 cesium, optically pumped magnetometer sensor, measures the earth's magnetic field. The sensitivity of this instrument is 0.001 nanoTesla at a sampling rate of 0.2 second. The sensor is towed in a bird 15 metres (50 feet) below the helicopter 45 metres (150 feet) above the ground).

3.4 Ancillary Systems

Base Station Magnetometer

A Gem Systems, Inc. GSM19 magnetometer is set up at the base of operations to record diurnal variations of the earth's magnetic field. Synchronization of the clock of the base station with that of the airborne system is checked each day to insure diurnal corrections will be accurate. Recording resolution is 1 nT with an update rate of four seconds. Magnetic field variation data are plotted on a 3" wide gridded paper chart analog recorder. Each division of the grid (0.25") is equivalent to one minute (chart speed) or five nT (vertical sensitivity). The date, time and current total field magnetic value are automatically recorded every 10 minutes. The data is also saved to digital tape.

Radar Altimeter

A King KRA-10 radar altimeter records terrain clearance. The output from the instrument is a linear function of altitude. The radar altimeter is pre-calibrated by the manufacturer and is checked after installation using an internal calibration procedure.

Tracking Camera

A Panasonic colour video camera records the flight path on VHS video tape. The camera operates in continuous mode. The video tape also shows the flight number, 24 hour clock time (to .01 second), and manual fiducial number.

Global Positioning System (GPS)

Global Positioning Systems utilize at present 25 active satellites orbiting the earth. The orbital period for each satellite is approximately 12 hours with an altitude of approximately 12,600 miles (~ 20,000 km). Each satellite contains a very accurate cesium clock which is synchronized to a common clock by the ground control stations (operated by the U.S. Air Force).

The satellites radiate individually coded radio signals which are received by the user's GPS receiver. Along with timing information, each satellite transmits ephemeris (astronomical almanac or table) information which enables the receiver to compute the satellite's precise spatial position. The receiver decodes the timing signals from the satellites in view (4 or more for a three dimensional fix) and, knowing their respective locations from the ephemeris information, computes a latitude, longitude, and altitude for the user. This position fix process is continuous and can be updated once per second.

Differential GPS is employed to eliminate the problem of selective availability where the US Defence Department corrupts the satellite's timing signal. Differential GPS utilizes a GPS reference receiver which must be established within a few hundred miles from the survey aircraft. The GPS System computes differential corrections as a post-processing operation to achieve accuracies in the 2 to 5 metre range.

A Magnavox 9212 (12 channel) GPS receiver is used in the aircraft. Nortech differential GPS processing software is used to compute the differentially corrected GPS positions on a daily flight basis. The navigational unit in the aircraft supplies continuous information to the pilot and allows multiple way point entry.

The Picodas PNAV 2001 survey navigation system is utilized on the aircraft to provide a left/right indicator for the pilot. The single point GPS positions are logged onto the PICODAS or RMS digital acquisition systems along with the magnetometer data. The single point GPS accuracy is much better than 25 metres. The GPS positions are converted to NAD27 format for inclusion in the technical report and in the digital archive data.

Analog Recorder

An RMS dot matrix recorder displays the data during the survey. Record contents are as follows:

LABEL	PARAMETER	CHART SCALE
MAGF	Total Field Magnetics, Fine	2.5 nT/mm
MAGC	Total Field Magnetics, Coarse	25 nT/mm
L9XI	935 Hz, Coaxial, Inphase	2.5 ppm/mm
L9XQ	935 Hz,Coaxial,Quadrature	2.5 ppm/mm
M4XI	4,600 Hz, Coaxial, Inphase	2.5 ppm/mm
M4XQ	4,600 Hz, Coaxial, Quadrature	2.5 ppm/mm
L8PI	865 Hz, Coplanar, Inphase	10 ppm/mm
L8PQ	865 Hz, Coplanar, Quadrature	10 ppm/mm
M4PI	4,175 Hz, Coplanar, Inphase	10 ppm/mm
M4PQ	4,175 Hz, Coplanar, Quadrature	10 ppm/mm
H3PI	32,000 Hz, Coplanar, Inphase	20 ppm/mm

LABEL	PARAMETER	CHART SCALE
H3PQ	32,000 Hz, Coplanar, Quadrature	20 ppm/mm
BALT	Barometer	50 ft/mm
RALT	Radar Altimeter	10 ft/mm
PWRL	50/60 Hz Power Line Monitor	-

Data is recorded with positive - up, negative - down. The analog zero of the radar altimeter is 5 cm from the top of the analog record. A helicopter terrain clearance of 60 m (200 feet) should therefore be seen some 3 cm from the top of the analog record.

Chart speed is 2 mm/second. The 24-hour clock time is printed every 20 seconds. The total magnetic field value is printed every 30 seconds. The ranges from the radar navigation system are printed every minute.

Vertical lines crossing the record are manual fiducial markers activated by the operator. The start of any survey line is identified by two closely spaced manual fiducials. The end of any survey line is identified by three closely spaced manual fiducials. Manual fiducials are numbered in order. Every tenth manual fiducial is indicated by its number, printed at the bottom of the record.

Calibration sequences are located at the start and end of each flight and at intermediate times where needed.

Digital Recorder

A DGR-33 data system records the digital survey data on magnetic media. Contents and update rates are as follows:

DATA TYPE	RECORDING INTERVAL	RECORDING RESOLUTION
Magnetometer	0.1 second	0.001 nT
HEM, (8 or 10 Channels)	0.1 second	
HEM, coaxial- 935 Hz/4,600 Hz		0.03 ppm
HEM, coplanar- 865 Hz/4,175 Hz		0.06 ppm
HEM, coplanar- 32,000 Hz		0.125 ppm
Position (2 Channels)	0.2 second	0.1 m
Altimeter	0.2 second	0.05 m

DATA TYPE	RECORDING INTERVAL	RECORDING RESOLUTION
Power Line Monitor	0.2 second	
Manual Fiducial		
Clock Time		

4. SURVEY LOGISTICS AND CALIBRATION

4.1 Survey

The survey was completed in the period April 14 to 20, 1997. Principal personnel are listed in Appendix I. A total of 12 survey flights was required to complete the project. Aircraft ground speed is maintained at approximately 60 knots (30 metres per second) and mean terrain clearance of 60 metres consistent with the safety of the aircraft and crew.

4.2 Navigation

A global positioning system (GPS) consisting of a Magnavox MX 9212 operated in differential mode guides aircraft navigation and flight line control. Field processing of the differential GPS data in the field utilizes a PC using software supplied by the manufacturer. One system is installed in the survey helicopter. This involves mounting the receiver antenna on the casing ("bird") containing the magnetometer sensor. A second system acts as the base station.

The published NTS maps provide the Universal Transverse Mercator (UTM) coordinates of the survey area corners. These coordinates program the navigation system. A test flight confirms if area coverage is correct. Thereafter the navigation system guides the pilot along the survey traverse lines marked on the topographic map. The operator also enters manual fiducials over prominent topographic features. Survey lines showing excessive deviation are re-flown.

The operator calibrates the geophysical systems at the start, middle (if required) and end of every survey flight. During calibration the aircraft is flown away from ground effects to record electromagnetic zero levels.

4.3 Calibration and Data Verification

The operator calibrates the geophysical systems including the barometric altimeter at the start, middle (if required) and end of every survey flight. Immediately after takeoff and before landing the altimeter values are compared with the 30 m separation between the helicopter and EM sensor. The geophysical systems are calibrated and monitored as follows:

Electromagnetics

The system is nulled and phased according to Aerodat's standard procedures. Any discrepancies from previous surveys require an external Q coil calibration. The External Calibration Procedure is done at the start of every survey and every week thereafter until the survey has been completed. There are four parts to the External Calibration Procedure. After system has warmed up, they are:

1.) Null each frequency
2.) Phase each frequency
3.) Set the gain for each frequency
4.) Note the response of the internal Cal-coil

The phasing is done with a ferrite bar. The gain calibration is done using a calibration coil which is mounted at a pre-set location off the end of the bird.

The phasing and calibration is checked with the internal Q coil. The internal Q coil is activated prior to and at the end of each flight with the system flying out of ground effect (250 m or higher) to assure correct EM calibration. Analog trace locations are corrected for all channels when the system is out of ground effect. If excessive drift is present on the EM system the preceding procedures are repeated as required.

Magnetics

The airborne magnetic data is monitored in the aircraft by means of a 4th difference of the data which is calculated and presented on the airborne analog recorder. Should the 4th difference exceed the allowable specification, the portion of the flight line thereby affected is reflown.

The fourth difference is defined as:

$$FD_i = X_{i+2} - 4x_{i+1} + 6x_i - 4x_{i-1} + X_{i-2}$$

where X_i is the i^{th} total field sample. The fourth difference in this form has units of nT. High frequency noise should be such that the fourth differences divided by 16 are generally less than ± 0.1 nT The fourth difference is displayed on analog at scales of 0.20 nT/cm.

Altimeters

The radar altimeter test is carried out before and after the survey and if any of the altitude equipment is changed. The radar altimeter reading is determined when flying at barometric altitudes of 60, 120, 180 and 240 meters above the base airstrip. Also, the barometric altimeter is calibrated pre-flight and post-flight using the radar altimeter to determine the drift and this drift is applied to the data in the subsequent data processing.

Video Flight Path Verification

The record from the video camera is monitored continuously in flight. The video tape is reviewed immediately after each flight to ensure that the quality is acceptable. Selective flight path verification is performed as necessary.

Lag Tests

Before survey production commences and when any major survey equipment modification or replacement occurs, a lag test is performed to determine the time difference between the magnetometer reading, the electronic navigation reading and the operation of the positioning equipment. These tests are flown at the survey flight altitude in two (2) directions across a distinct magnetic anomaly and a recognizable feature whose exact location is known.

5. DATA PROCESSING AND PRESENTATION

5.1 Base Map

The base map is taken from a photographic enlargement of the NTS topographic maps. A UTM reference grid (grid lines usually every kilometre) and the survey area boundaries are added. After registration of the flight path to the topographic base map, some topographic detail and the survey boundary are added digitally. This digital image forms the base for the colour and shadow maps.

5.2 Flight Path Map

Global Positioning System

The GPS receiver takes in coded data from satellites in view and there after calculates the range to each satellite. The coded data must therefore include the instantaneous position of the satellite relative to some agreed earth-fixed coordinate system.

A further calculation using ranges to several satellites gives the position of the receiver in that coordinate system (eg. UTM, lat/long.). The elevation of the receiver is given with respect to a model ellipsoidal earth.

Normally the receiver must see four satellites for a full positional determination (three space coordinates and time). If the elevation is known in advance, only three satellites are needed. These are termed 3D and 2D solutions.

The position of the receiver is updated every tenth of a second. The accuracy of any one position determination is described by the Circular Error Probability (CEP). Ninety-five percent of all position determinations will fall within a circle of a certain radius. If the horizontal position accuracy is 25 m CEP, for example, 95% of all trials will fall within a circle of 25 m radius centred on the mean. The system may be degraded for civilian use and the autonomous accuracy is then 100 m CEP. This situation is called selective availability (SA). Much of this error (due principally to satellite position/time errors and atmospheric delays) can be removed using two GPS receivers operating simultaneously. One receiver acting as the base station, is at a known position. The second remote receiver is in the unknown position. Differential corrections determined for the base station may then be applied to the remote station. Differential positions are accurate to five m CEP (for a one second sample). Averaging will reduce this error further.

Flight Path

The flight path is drawn using linear interpolation between x,y positions from the navigation system. These positions are updated every second (or about 3.0 mm at a scale of 1:10,000). Occasional dropouts occur when the optimum number of satellites are not available for the GPS to make accurate positional determinations. Interpolation is used to cover short flight path gaps. The navigator's flight path and/or the flight path recovered from the video tape may be stitched in to cover larger gaps. Such gaps may be recognized by the distinct straight line character of the flight path.

The manual fiducials are shown as a small circle and labelled by fiducial number. The 24-hour clock time is shown as a small square, plotted every 30 seconds. Small tick marks are plotted every two seconds. Larger tick marks are plotted every 10 seconds. The line and flight numbers are given at the start and end of each survey line.

The aircraft position is expressed in geographic latitude and longitude coordinates, using the international WGS84 spheroid for the Matachewan area properties and NAD27 for the Temagami property to match the associated published NTS maps. To convert from WGS84 to NAD 27, subtract 226m from the northing, and subtract 9m from the easting. Any particular survey area located on the globe has a specific reference ellipsoid or projection zone. A further refinement for a better fit to the earth's surface at the survey location is applied by adding or subtracting slight x, y and/or z datum shifts (a few metres to hundreds of metres) to the origin of the ellipsoid. The geographic coordinates are converted to fit this ellipsoid before calculating the UTM coordinates. The UTM coordinates are expressed as UTM eastings (x) and UTM northings (y).

The flight path map is merged with the base map by matching UTM coordinates from the base maps and the flight path record. The match is confirmed by checking the position of prominent topographic features as recorded by manual fiducial marks or as seen on the flight path video record.

5.3 Electromagnetic Survey Data

The electromagnetic data are recorded digitally at a sample rate of 10 per second with a time constant of 0.1 seconds. A two stage digital filtering process rejects major sferic events and reduces system noise. Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events. This is referred to as a "surgical mute" in signal processing terms. The signal to noise ratio is further enhanced by the application of a low pass digital filter. This filter has zero phase shift that prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 0.25 seconds. This low effective time constant gives minimal profile distortion.

Following the filtering process, a base level correction is made using electromagnetic zero levels determined during high altitude calibration sequences. The correction applied is a linear function of time that ensures the corrected amplitude of the various inphase and quadrature components is zero when no conductive or permeable source is present. The filtered and levelled data are the basis for the determination of apparent resistivity (see following section). The inphase and quadrature responses along the flight line are presented in profile form offset along the flight lines. Differentiation of the various profiles is achieved using two colours (coaxial and coplanar) and two line weights (inphase and quadrature). For interpretation purposes the coaxial and coplanar data sets for a similar frequency range are presented together on one map (865/935 and 4,175/4,600).

5.4 Total Field Magnetics

The aeromagnetic data is corrected for diurnal variations by adjustment with the recorded base station magnetic values. No corrections for regional variations are applied. The corrected profile data are interpolated on to a regular grid using an Akima spline technique. The grid provided the basis for threading the presented contours. The minimum contour interval is 5 nT with a grid cell size of 25 m. Magnetic high areas are assigned warm colours (orange/red) while magnetic low areas show as cool colours (blue).

5.5 Calculated Vertical Magnetic Gradient

The vertical magnetic gradient is calculated from the gridded total field magnetic data. The calculation is based on an FFT operator. The results are contoured using a minimum contour interval of 0.1 nT/m. Grid cell sizes are the same as those used in processing the total field data. The high and low amplitude responses are give the same colour representation as the total field contours.

5.6 Colour Relief or Shadow Map of Total Field Magnetics

A useful manipulation of the magnetic data is the production of a colour shadow map. It is an aid in the interpretation and presentation of the magnetic information. The shadow map displays two independent variables simultaneously on the same map. The two variables are the amplitude and the gradient of the quantity measured over the mapping region. At every point or grid cell on the map the hue represents the amplitude of the magnetic value and the lightness/darkness of the hue is varied according to the slope or gradient of the data at the cell location. The gradient is translated into a reflectance parameter with respect to a chosen illumination direction. Subtle magnetic structures having a specific trend are enhanced or attenuated depending on the position and angle to the horizon of the light source relative to the trend. If the light source is orthogonal to the trend there will be maximum shadow relief. Regional discontinuities representing fault structures are easily recognized with shadow enhancement.

5.7 Apparent Resistivity

The apparent resistivity is calculated by assuming a 200 metre thick conductive layer over resistive bedrock. The computer determines the resistivity that would be consistent with the sensor elevation and recorded inphase and quadrature response amplitudes at the selected frequency. The apparent resistivity profile data is re-interpolated onto a regular grid at a 25 metres true scale interval using an Akima spline technique and contoured using logarithmically arranged contour intervals. The minimum contour interval depends on the selected frequency and is in units of log(ohm.m) in logarithmic intervals of 0.1, 0.5, 1.0, 5.0 etc. The colour presentation assigns warmer colours ,(reds) to low resistivity or very conductive responses and cooler colours (blues) to high resistivity or poor conductivity responses.

The highest measurable resistivity is approximately equal to the transmitter frequency. The lower limit on apparent resistivity is rarely reached.

6. DELIVERABLES

The report on the results of the survey is presented in two copies. The report includes folded white print copies of all black line maps. Two copies of the colour and shadow maps are in accompanying map tube(s).

The black line maps show topography, UTM grid coordinates and the survey boundary. The survey data are presented in sets of numbered maps in the following format:

I BLACK LINE MAPS: (Scale 1:10,000)

Map No. Description

1. BASE MAP; screened topographic base map plus survey area boundary, and UTM grid.

2. COMPILATION / INTERPRETATION MAP; with base map, flight path map and HEM anomaly symbols with interpretation .

3. TOTAL FIELD MAGNETIC CONTOURS; with base map, HEM anomaly symbols and flight lines.

4. VERTICAL MAGNETIC GRADIENT CONTOURS; with base map, HEM anomaly symbols and flight lines.

5A. APPARENT RESISTIVITY CONTOURS; apparent resistivity calculated for the coplanar 4,175 Hz data, with base map, HEM anomaly symbols and flight lines.

5B. APPARENT RESISTIVITY CONTOURS; apparent resistivity calculated for the coplanar 32,000 Hz data, with base map, HEM anomaly symbols and flight lines.

II COLOUR MAPS: (Scale 1:10,000)

1. TOTAL FIELD MAGNETICS; with superimposed contours, flight lines and HEM anomaly symbols.

2. VERTICAL MAGNETIC GRADIENT; with superimposed contours, flight lines and HEM anomaly symbols.

3A. HEM OFFSET PROFILES; coplanar 865 Hz and coaxial 935 Hz data with flight lines and HEM anomaly symbols.

3B. HEM OFFSET PROFILES; coplanar 4,175 Hz and coaxial 4,600 Hz data with flight lines and HEM anomaly symbols.

3C. HEM OFFSET PROFILES; coplanar 32,000 Hz data with flight lines and HEM anomaly symbols.

4A. APPARENT RESISTIVITY; calculated for the coplanar 4,175 Hz data with superimposed contours, flight lines and HEM anomaly symbols.

4B. APPARENT RESISTIVITY; calculated for the coplanar 32,000 Hz data with superimposed contours, flight lines and HEM anomaly symbols.

III SHADOW DERIVATIVE: (Scale 1:10,000)

1. TOTAL FIELD MAGNETICS SHADOW MAP; with suitable sun angle

The processed digital data, including both the profile and the gridded data, is on CD ROM'S (ISO 9660). Profile data is written as columnar ASCII records and the gridded data as standard Geosoft PC grids. A full description of the format is included with the package. All gridded data can be displayed on IBM compatible microcomputers using the Aerodat AXIS (Aerodat Extended Imaging System) or RTI (Real Time Imaging) software package. The complete data package includes all analog records, base station magnetometer records, flight path video tape and original map cronaflexes.

7. INTERPRETATION

7.1 Area Geology

For the Matachewan Area, in Powell Township the Log Lake and Montreal River properties are mainly underlain by Archaean age rocks consisting of argillaceous metasediments and intermediate to mafic metavolcanics. In Cairo Township, however, the major rock types underlying the Browning properties are felsic intrusives consisting of quartz syenite and syenite porphyry. The Yarrow property to the south of Powell Township covers granitic and mafic metavolcanic rocks as well as a small portion of overlying Huronian age argillaceous and arenaceous rocks. The Temagami property has a similar geological setting to the Yarrow property.

Both survey areas are known for their base and precious metal mineralization. There are previous past producing gold and silver mines in the Matachewan area and the Temagami-Cobalt area hosts numerous past producing silver and cobalt mines as well as the Temagami copper mine.

7.2 Magnetic Interpretation

The total field magnetic responses reflect major changes in the magnetite content of the underlying rock units. The amplitude of the magnetic responses relative to the regional background help to assist in identifying specific magnetic and nonmagnetic units related to, for example, mafic flows or tuffs, mafic to ultramafic intrusives, felsic intrusives, felsic volcanics and/or sediments etc. Obviously, several geological sources can produce the same magnetic response. These ambiguities can be reduced considerably if basic geological information on the area is available to the geophysical interpreter.

In addition to amplitude variations, magnetic patterns related to the geometry of the particular rock unit also help in determining the probable source of the magnetic response. For instance, long narrow magnetic linears usually reflect mafic tuff/flow horizons or mafic intrusive dyke structures while semi-circular features with complex magnetic amplitudes may be produced by local plug-like intrusive sources such as pegmatites, carbonatites or kimberlites.

The calculated vertical magnetic gradient assists considerably in mapping weaker magnetic linears that are partially masked by nearby higher amplitude magnetic features. The broad zones of higher magnetic amplitude, however, are severely attenuated in the vertical magnetic gradient results. These higher amplitude zones reflect rock units having magnetic susceptibility signatures. For this reason both the total and gradient magnetic data sets must be evaluated.

Theoretically the magnetic gradient zero contour line marks the contacts or limits of large magnetic sources. This applies to wide sources, greater than 50 metres, having simple slab geometries and shallow depth.(See discussion in Appendix II) Thus the gradient map also aids in the more accurate delineation of contacts between differing magnetic rock units.

The cross cutting structures, shown on the interpretation map as faults, are based on interruptions and discontinuities in the magnetic trends. Generally, sharp folding of magnetic units will produce a magnetic pattern indistinguishable from a fault break. Thus, if anomaly displacements are small such fault structures, where they mark an anomaly interruption, may actually represent a deformation node rather than faulting.

7.3 Magnetic Survey Results and Conclusions

To facilitate the following discussion of the magnetic results it is suggested the interpretation map be compared with the total field and vertical gradient magnetic colour contour maps either as overlays or side by side.

There are four types of magnetic signatures designated on the interpretation maps. Relatively high amplitude and apparent discrete magnetic centres are enclosed and cross hatched. These anomalies are thought to be possible mafic intrusive source bodies as opposed to the sinuous linear features typical of mafic volcanic units. The higher amplitude horizons are indicated with thick lines while lower amplitude more subtle linears are shown with thinner lines. Long straight linear horizons thought to reflect possible mafic dyke structures are indicated with a dashed-dotted line. The fourth type of magnetic signature are the below background non-magnetic zones which usually map felsic or sedimentary rocks. Local small negative zones can also indicate possible alteration effects. The more significant below background zones are shown with thick dashed lines and depression symbols.

The magnetic background and maximum and minimum amplitudes are variable for each of the survey blocks as tabulated following:

Survey Area	Background (nT)	Minimum (nT)	Maximum (nT)
Log Lake Montreal River	57,600	-380	+2,400
Browning N. S.	58,200	-400	+4,000
Yarrow	57,950	-150	+1,050
Temagami	57,450	-250	+4,850

Comments on each property follow:

Log Lake Property

This property is dominated by north-south linear horizons which, no doubt, map the diabase dykes that are ubiquitous to the area. Of most interest, however, are the high amplitude sinuous horizons and magnetic centres along the south and southeast boundaries of the survey block marked as zones A and B on the interpretation map. These high amplitude features could be mafic volcanics but their complex anomaly patterns and high amplitudes, up to 2,400 nT above background, suggest a mafic to ultramafic intrusive origin. In fact they could reflect the same ultramafic intrusives that host the nickel-copper occurrences and deposits associated with the Shaw Dome complex in the Timmins area to the northwest. In addition, a conductive zone, to be discussed in a following section, is peripheral to the zone A magnetic complex. Both magnetic complexes A and B warrant evaluation.

Montreal River Property

This area, immediately east of the Log Lake property, has similar magnetic attributes. The north-south dyke structures are not as obvious as they are masked by a complex of medium to high amplitude sinuous magnetic horizons covering the south half of the property. The main source of the magnetic activity appears to be off the west part of the property, and southeast of the Log Lake property. If investigation of the magnetic complexes on the Log Lake property proves of interest then further exploration of the higher amplitude sections on this property is justified.

The sharp attenuation of the magnetic responses in the east part of the north half of the area suggests a fault structure is present here as shown on the interpretation map. This fault is probably related to the major Montreal Fault structure cutting through the area.

Browning Properties

These properties contain the highest amplitude responses of the four properties in the Matachewan area. In the southwest and southeast sectors of the area anomalies exceeding 1,500 nT above background are present at locations A and B. The centre of the area is dominated by background to below background magnetic levels. Wide linear below background zones striking north-south and east-northeast are present within this area. The rest of the area is characterized by erratic sinuous and intermittent anomaly trends with an east-northeast striking grain. The magnetic characteristics match the geological description of the area quite well. Summarizing from a report supplied by Norcan: "The property (South Browning) is underlain entirely by the Cairo Stock. The Cairo Stock consists mainly of syenite and shows some evidence of zoning from a quartz bearing central core to mafic syenite margins. Bulk rock chemical data indicate the core is high in silica diminishing to a low in marginal mafic syenite facies produced by assimilation of mafic volcanic host rocks. Rocks west of the Browning Lake Fault are generally less siliceous than those in the eastern part of the intrusion."

It would appear the higher amplitude peripheral magnetic complexes map the mafic facies while the background to below background central area reflects the high silica core. The high amplitude magnetic responses suggest ultramafic intrusive rocks may form part of the margins of the Cairo Stock. The central north-south zone corridor of below background response is probably associated with the Browning Lake Fault. Two other major fault structures, F-1 and F-2, interpreted from the magnetic anomaly patterns, are indicated either side of this fault. Fault F-1 follows the McDonnel Creek. As the Browning Lake fault zone hosts base and precious metal mineralization faults F-1 and F-2 may be also prospective.

Yarrow Property

A series of north-south to north-northeast trending horizons occur in the central part of the survey block. To the east and northeast the anomaly contour patterns broaden considerably and amplitudes diminish gradually. This indicates an increasing depth of burial of the magnetic sources. The overlying non-magnetic Huronian sediments present on the east side of the property are responsible for the anomaly attenuations.

The shallow source magnetic responses are thought to reflect intermediate to mafic metavolcanic flows. However, the high amplitude anomaly complex on the north boundary of the property, at location A, probably marks the edge of a mafic intrusive source off the property to the north.

Temagami Property

The west-northwest striking long linear features probably map mafic dyke structures. The major anomalies of interest are the magnetic centres at A and B. Their respective amplitudes are 4,850 and 1,000 nT above background. The former higher amplitude anomaly A is typical of a ultramafic source response. A cautionary note is suggested, however, as Nipissing diabase rocks, which can be very magnetic, occur to the south and west of the property and may be the source of the higher amplitude responses. Investigation of the anomaly A and B areas is suggested especially the area around the interpreted fault structure bisecting B.

Similar to the Yarrow property, attenuation of the magnetic responses and broadening contour patterns in the east part of the block reflect the presence of the Huronian sediments overlying magnetic Archean rocks.

7.4 Electromagnetic Anomaly Selection/Interpretation

Vertical to Near Vertical Tabular Conductive Sources

Usually two sets of stacked colour coded profile maps of one coaxial and one coplanar inphase and quadrature responses are used to select conductive anomalies of interest. These HEM intercepts are automatically plotted on the various map products listed previously. Selection of HEM anomaly intercepts is based on conductivity as indicated by the inphase to quadrature ratios of the 935 Hz and/or 4,600 Hz coaxial data, anomaly shape, and anomaly profile characteristics relative to coaxial and corresponding coplanar responses. The peak of the coaxial responses is picked for digitizing as that defines the position of any near vertical to dipping tabular source.

These response shapes are illustrated in Appendix II, in the figure entitled "HEM Response Profile Shapes .....". Profile A illustrates the coaxial and coplanar signature of a vertical source while profiles B and C show the effect of dip on the coplanar and coaxial profiles. For a gently dipping source the small up-dip tail of the coplanar profiles B and C is not present and there is just a shift of the coplanar peak down dip from the coaxial peak.

Flat Lying Conductive Sources

Flat lying responses are characterized by identically shaped coaxial and coplanar response profiles. Profile I, Appendix II, illustrates a flat source response. Variations in the conductivity and thickness of flat lying sources produces peaks and valleys in the profile data. Ordinarily the anomaly peaks from flat lying sources are not selected for plotting as HEM intercepts. Their locations have little meaning if the source is flat lying. A much better presentation of conductive flat lying sources is achieved by the resistivity calculations and map plots. Comparison of the resistivity data with geological information can then ascertain if the source of the responses are of possible geological interest.

It is difficult to differentiate between responses associated with the edge effects of flat lying conductors and actual poor conductivity bedrock conductors on the edge of or overlain by flat lying conductors. Extensive flat lying to gently dipping conductors often have an "edge effect" anomaly which is a coaxial peak on the flank of the coplanar responses similar to one side of profile E, G or H, Appendix II. Often only one edge can be seen if the source is dipping. Such edge effect anomalies are often seen marking the perimeter of lakes or swamps containing conductive material.

Poor conductivity bedrock conductors having low dips will also exhibit responses that may be interpreted as surficial overburden conductors. In such cases, where the source of the conductive response appears to be ambiguous, the coaxial peak of the anomaly is still selected for plotting. In some situations the conductive response has line to line continuity and some magnetic association thus providing possible evidence that the response is related to an actual bedrock source.

Flat lying limited width ribbon type conductive responses with some strike length are sometimes also present. These responses are characterized by a "M" shaped coaxial anomaly with a single peaked coplanar anomaly centred in the trough between the two coaxial peaks. This is illustrated in Appendix II in the same figure as previously mentioned (see profile shape E or G). The actual geometry of the source of these ribbon type responses is difficult to determine. They could represent a synclinal structure such as would be produced by combining dipping profiles C and B.

Negative Inphase Responses

In some areas the inphase profile component exhibits a negative anomaly response usually over obvious magnetic areas. This is produced by local concentrations of magnetite and usually occurs when the sensor is flying close to the ground surface. If only magnetite is present there will be no quadrature response associated with the negative inphase response. If conductive material is present, however, such as graphite or sulphides, a positive quadrature response will be evident with the negative inphase response. In this case the anomaly is selected for plotting and evaluation and designated as a magnetic/conductive response.

Depth and Conductivity Calculation

The calculation of the depth to the conductive source and its conductivity is based on the 4,600 Hz data assuming a thin vertical sheet model. The amplitude of the inphase and quadrature responses are used for the calculations which are automatically determined by computer. These data are listed in Appendix III and the depth and conductivity values are shown with each plotted anomaly. Further detailed discussion and illustration of the determination of these values is contained in Appendix II. Note the depth calculation for those conductors having a gently dipping to flat lying profile signature will not be accurate although the conductivity value will have some relative meaning.

The selected HEM intercepts are automatically categorized according to their conductivity and amplitude. The calculation of the conductivity of low amplitude anomalies can be very inaccurate. Therefore, anomalies having amplitudes below a certain level and/or low conductivity value are given a zero rating with the category increasing for increasing conductivity values that are statistically reliable.

7.5 Electromagnetic Survey Results and Conclusions

Slightly conductive flat lying material is contributing to the electromagnetic responses in various degrees throughout the survey block. There is a definite correlation between low resistivity and topographically low areas such as lakes and swampy areas. This usually immediately implies conductive overburden is the main source of the conductive effects. In many cases there are obvious edge effect anomalies as explained in the previous section. These generally occur along the edges of lakes and ponds and are especially noticeable for the Temagami property.

Some of the conductors may be produced by man-made sources such as mine infrastructures, buildings, bridges, culverts, highway guard rails, irrigation pipes, disused power lines, grounded metal fences etc. The location of the anomalies relative to these features or suspected features gives a clue to a possible cultural source for the anomaly. Other anomalies produced by operating power lines are sometimes difficult to recognize without reference to the power line monitor record. The only obvious cultural effect is the power line running through the Yarrow survey block.

Other than the slightly conductive effects of the water covered areas, all the survey areas are generally very resistive indicating a relatively thin veneer of overburden cover. There are not very many bedrock conductor indications and no significant conductive responses are indicated on the Temagami and Browning properties. In the latter case this is to be expected as the Browning properties cover felsic intrusive rocks. Such rocks seldom host conductive material of any significance although considerable disseminated sulphides, without electrical continuity, are often associated with base or precious metal mineralization. Comments on the other properties follow:

Log Lake Property

There are five conductive zones of interest. Conductors 2, 4 and 5 have good conductivity and 2 and 5 either correlate or have a spatial association with magnetic anomalies. Anomalies 1 and 3 have poor conductivity and are questionable responses. It is possible, however, they are mapping shear or contact zones that could be of geological interest and therefore require checking.

Montreal River Property

As this property is presented on the same map sheet as the Log Lake property numbering of conductors continues consecutively from the Log Lake numbering. There are three conductors designated on this property. Numbers 6, 7 and 8 all have magnetic associations and border the Montreal River. The best conductivity responses are exhibited by conductors 6 and 8 and these are considered prime exploration targets.

Yarrow Property

Most of the HEM intercepts on this property are related to conductive surficial material and lake bottom sediments. A good example is on the east side of the area where high amplitude poor conductivity responses are registered over the waters of Mudpack Lake.

The only anomaly of interest is a good conductivity sharp response just west of magnetic anomaly A designated 1 on the interpretation map. It occurs at the north end of line 40270 which extends further north than adjacent lines. This anomaly is close to a road on a small knoll and may be a cultural source anomaly such as a forestry tower. It is readily accessible and may be explained by ground investigation.

8. RECOMMENDATIONS

Selection of geophysical anomalies for further investigation is based on magnetic signature attributes and structural and magnetic associations of the designated conductors as well as their relative conductivity. Prior to any ground follow-up, the following priority categories should be reviewed with respect to the geological target model being sought and known geology and mineralization in the area.

The designated magnetic (letter) and conductive (number) anomalies are prioritized as first or second priority investigation targets. This priority rating is based on the comments and discussion in the main body of this report and are tabulated following:

Property	First Priority	Second Priority
Log Lake	2, 5	A, B, 1, 3, 4
Montreal River	6, 8	7
Browning N. S.	Faults F-1 and F-2	A, B
Yarrow	1	A
Temagami	None	A, B

The magnetic and conductive anomalies recommended for investigation represent a first phase exploration program. Additional work will be contingent on the results of this program. More detailed geological information used in conjunction with geophysics may help to direct further exploration efforts.

Respectfully submitted,

R. W. Woolham, P.Eng.
Consulting Geophysicist

for

AERODAT INC.

J9733

May 3, 1997

APPENDIX I

PERSONNEL

FIELD

Flown	April 14 to 20, 1997
Pilot(s)	J. Breton
Operator(s)	G. Bernetic

OFFICE

Processing	Douglas Oneschuk George McDonald
Report	R. W. Woolham

APPENDIX II

GENERAL INTERPRETIVE CONSIDERATIONS

GENERAL INTERPRETIVE CONSIDERATIONS

Electromagnetic

The Aerodat electromagnetic system utilized two different transmitter-receiver coil geometries. The traditional coaxial coil configuration is operated at widely separated frequencies. The horizontal coplanar coil configuration is similarly operated at different frequencies where at least one pair is approximately aligned with one of the coaxial frequencies.

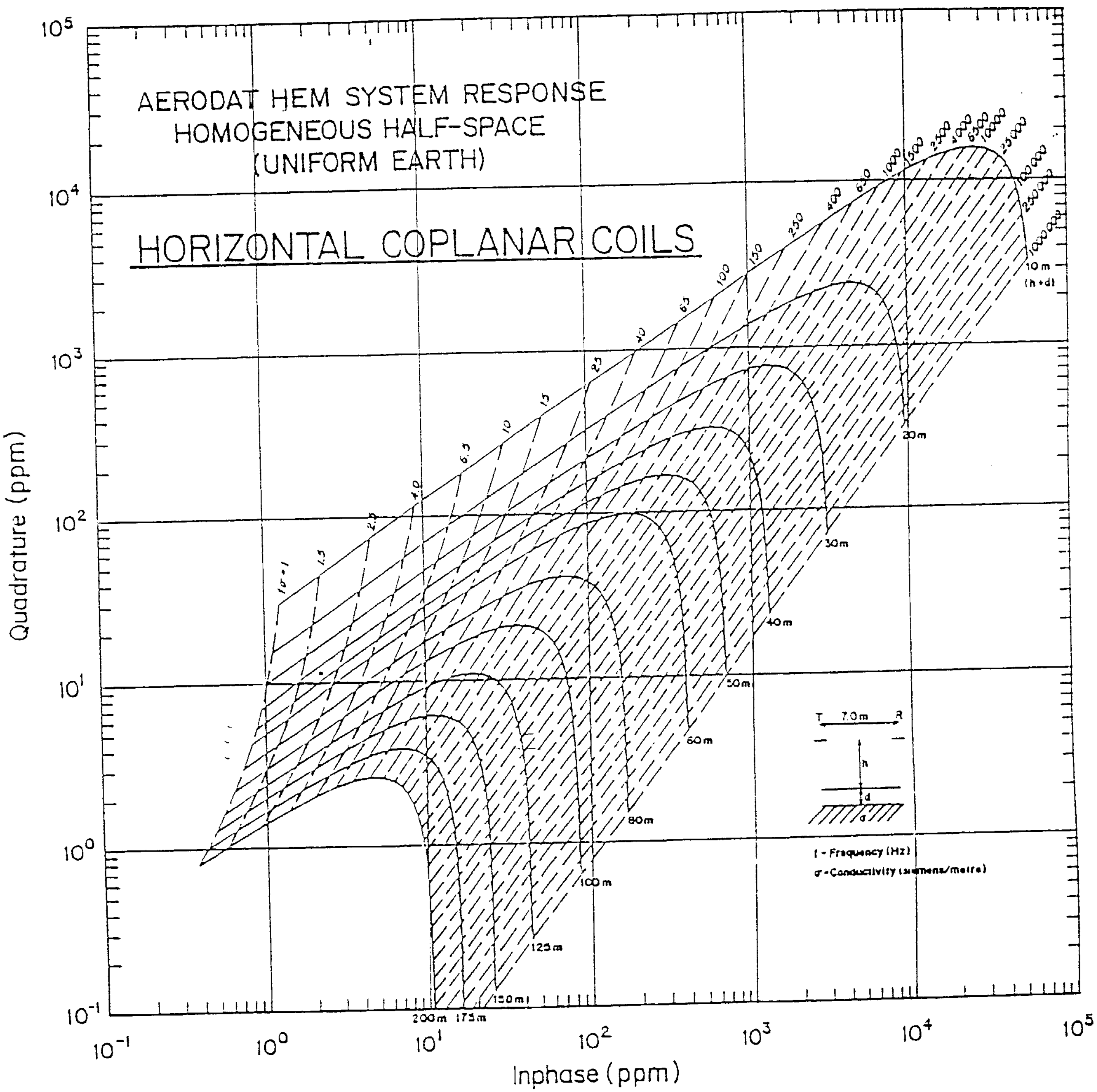
The electromagnetic response measured by the helicopter system is a function of the "electrical" and "geometrical" properties of the conductor. The "electrical" property of a conductor is determined largely by its electrical conductivity, magnetic susceptibility and its size and shape; the "geometrical" property of the response is largely a function of the conductor's shape and orientation with respect to the measuring transmitter and receiver.

Electrical Considerations

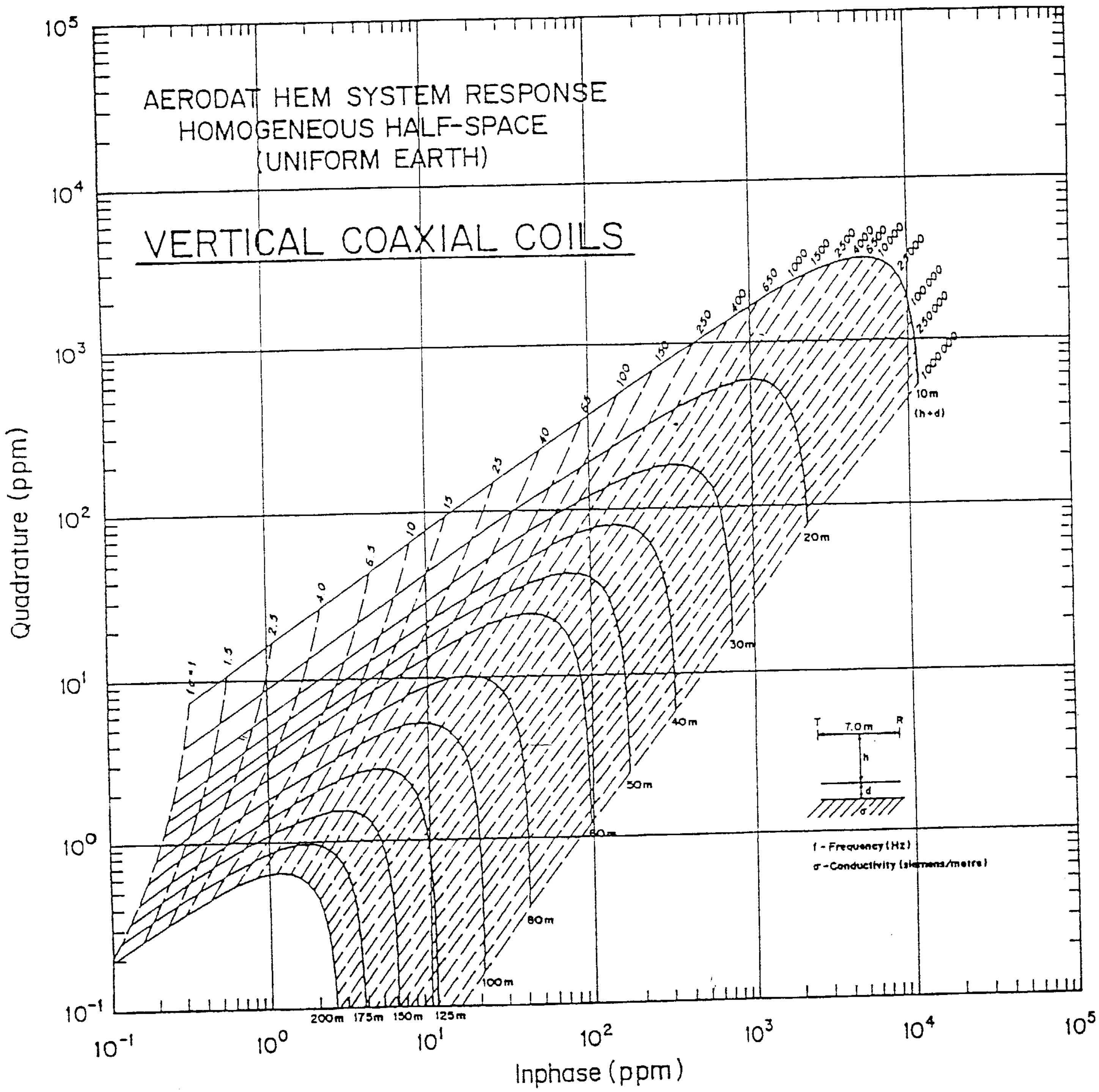
For a given conductive body the measure of its conductivity or conductance is closely related to the measured phase shift between the received and transmitted electromagnetic field. A small phase shift indicates a relatively high conductance, a large phase shift lower conductance. A small phase shift results in a large inphase to quadrature ratio and a large phase shift a low ratio. This relationship is shown quantitatively for a non-magnetic vertical half-plane and half space models on the accompanying phasor diagrams. Other physical models will show the same trend but different quantitative relationships

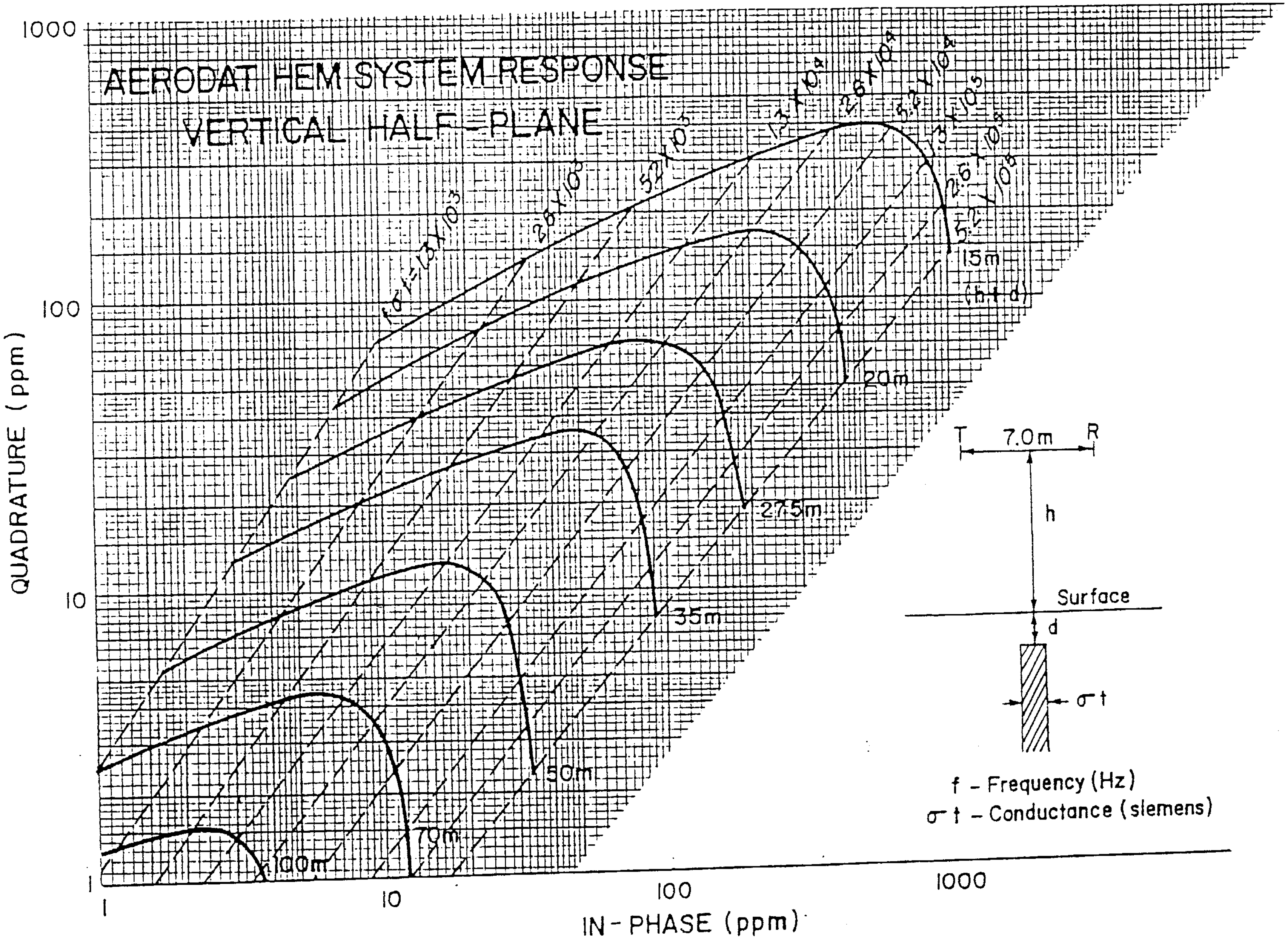
The phasor diagram for the vertical half-plane model, as presented, is for the coaxial coil configuration with the amplitudes in parts per million (ppm) of the primary field as measured at the response peak over the conductor. To assist the interpretation of the survey results the computer is used to identify the apparent conductance and depth at selected anomalies. The results of this calculation are presented in anomaly listings included in the survey report and the conductance and inphase amplitude are presented in symbolized form on the map presentation.

The conductance estimate is most reliable when anomaly amplitudes are large and background resistivities are high. Where the anomaly is of low amplitude and background resistivities are low, the conductance estimates are much less reliable. In such situations, the conductance estimate is often quite low regardless of the true nature of the conductor. This is due to the elevated background response levels in the quadrature channel. In an extreme case, the conductance estimate should be discounted and should not prejudice target selection.



AERODAT HEM SYSTEM RESPONSE
HOMOGENEOUS HALF-SPACE
(UNIFORM EARTH)
HORIZONTAL COPLANAR COILS
Quadrature (ppm)
Inphase (ppm)
10 m (h+d)
20 m
30 m
40 m
50 m
60 m
80 m
100 m
125 m
150 m
175 m
200 m
T 7.0 m R
h
d
σ
f - Frequency (Hz)
σ - Conductivity (siemens/metre)


AERODAT HEM SYSTEM RESPONSE
HOMOGENEOUS HALF-SPACE
(UNIFORM EARTH)
VERTICAL COAXIAL COILS
Quadrature (ppm)
Inphase (ppm)
10m
(h+d)
20m
30m
40m
50m
60m
80m
100m
125m
150m
175m
200m
T
7.0m
R
h
d
σ
f - Frequency (Hz)
σ - Conductivity (siemens/metre)


AERODAT HEM SYSTEM RESPONSE
VERTICAL HALF-PLANE
1000
100
10
1
QUADRATURE (ppm)
1
10
100
1000
IN-PHASE (ppm)
15m
(h+d)
20m
27.5m
35m
50m
70m
100m
T
7.0m
R
h
Surface
d
σ t
f - Frequency (Hz)
σ t - Conductance (siemens)

The conductance and depth vales as presented are correct only as far as the model approximates the real geological situation. The actual geological source may be of limited length, have significant dip, may be strongly magnetic. Its conductivity and thickness may vary with depth and/or strike and adjacent bodies and overburden may have modified the response. In general the conductance estimate is less affected by these limitations than is the depth estimate, but both should be considered as relative rather than absolute guides to the anomaly's properties.

Conductance in mhos is the reciprocal of resistance in ohms and in the case of narrow slab-like bodies is the product of electrical conductivity and thickness.

The higher ranges of conductance, greater than 2-4 mhos, indicate that a significant fraction of the electrical conduction is electronic rather than electrolytic in nature. Materials that conduct electronically are limited to certain metallic sulphides and to graphite. High conductance anomalies, roughly 10 mhos or greater, are generally limited to massive sulphides or graphites.

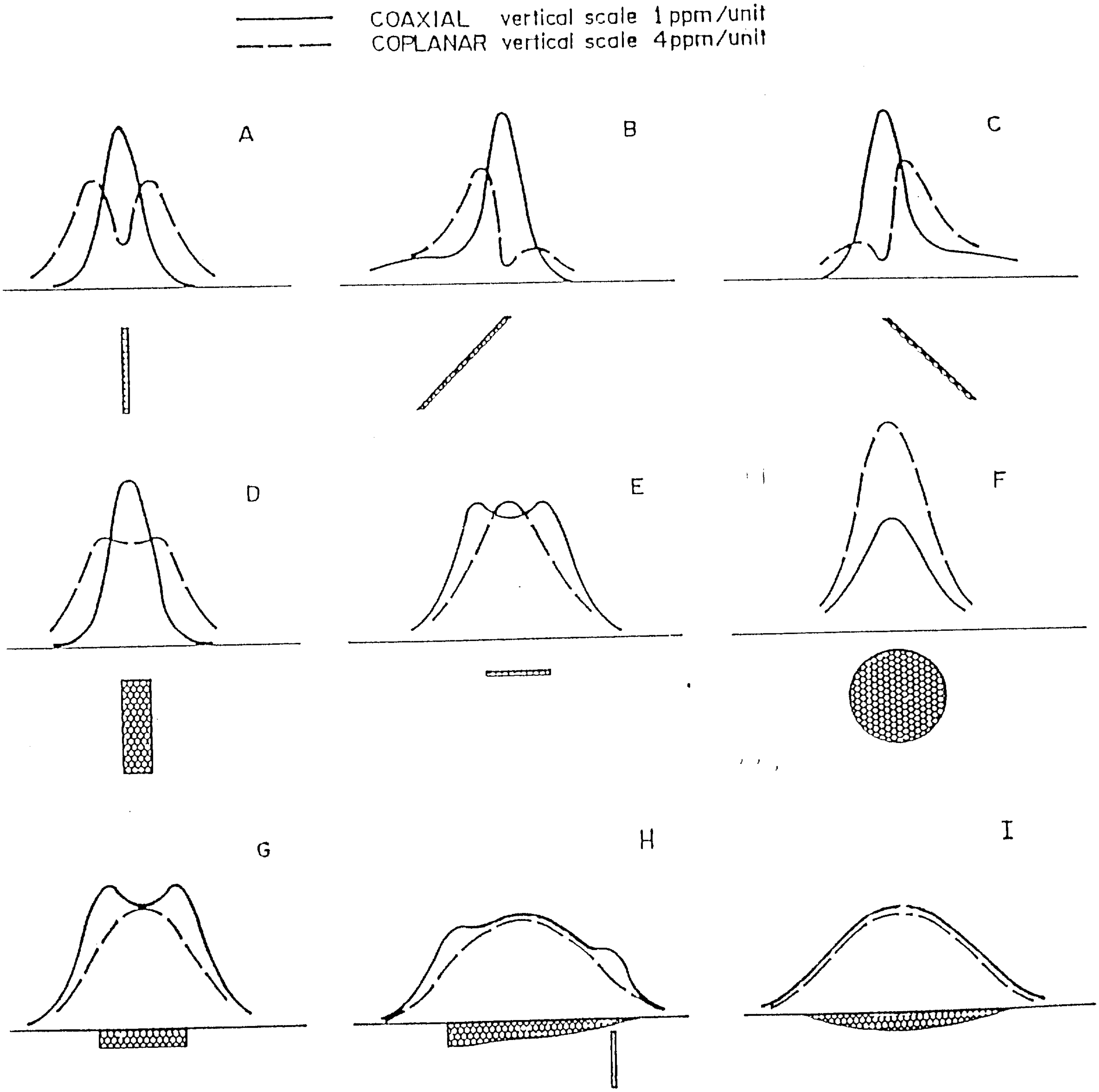
Sulphide minerals, with the exception of such ore minerals as sphalerite, cinnabar and stibnite, are good conductors. Sulphides may occur in a disseminated manner that inhibits electrical conduction through the rock mass. In this case the apparent conductance can seriously underrate the quality of the conductor in geological terms. In a similar sense the relatively non-conducting sulphide minerals noted above may be present in significant concentrations in association with minor conductive sulphides, and the electromagnetic response will only relate to the minor associated mineralization. Indicated conductance is also of little direct significance for the identification of gold mineralization. Although gold is highly conductive, it would not be expected to exist in sufficient quantity to create a recognizable anomaly. Minor accessory sulphide mineralization may however provide a useful indirect indication.

In summary, the estimated conductance of a conductor can provide a relatively positive identification of significant sulphide or graphite mineralization. A moderate to low conductance value does not rule out the possibility of significant economic mineralization.

Geometrical Considerations

Geometrical information about the geologic conductor can often be interpreted from the profile shape of the anomaly. The change in shape is primarily related to the change in inductive coupling among the transmitter, the target, and the receiver. The accompanying figure shows a selection of HEM response profile shapes from nine idealized targets. Response profiles are labelled A through I. These labels are used in the discussion which follows.

HEM RESPONSE PROFILE SHAPE AS AN INDICATOR OF CONDUCTOR GEOMETRY



In the case of a thin, steeply dipping, sheet-like conductor, the coaxial coil pair will yield a near symmetric peak over the conductor. On the other hand, the coplanar coil pair will pass through a null couple relationship and yield a minimum over the conductor, flanked by positive side lobes (Profile A). As the dip of the conductor decrease from vertical, the coaxial anomaly shape changes only slightly, but in the case of the coplanar coil pair the side lobe on the down dip side strengthens relative to that on the up dip side (Profiles B and C).

As the thickness of the conductor increases, induced current flow across the thickness of the conductor becomes relatively significant and complete null coupling with the coplanar coils is no longer possible (Profile D). As a result, the apparent minimum of the coplanar response over the conductor diminishes with increasing thickness, and in the limiting case of a fully 3 dimensional body or a horizontal layer or half-space, the minimum disappears completely.

A horizontal conducting layer such as a horizontal thin sheet or overburden will produce a response in the coaxial and coplanar coils that is a function of altitude (and conductivity if not uniform). The profile shape will be similar in both coil configurations with an amplitude ratio (coplanar:coaxial) of about 4:1* (Profiles E and G).

In the case of a spherical conductor, the induced currents are confined to the volume of the sphere, but not relatively restricted to any arbitrary plane as in the case of a sheet-like form. The response of the coplanar coil pair directly over the sphere may be up to 8* times greater than that of the coaxial pair (Profile F).

In summary, a steeply dipping, sheet-like conductor will display a decrease in the coplanar response coincident with the peak of the coaxial response. The relative strength of this coplanar null is related inversely to the thickness of the conductor. A pronounced null indicates a relatively thin conductor. The dip of such a conductor can be inferred from the relative amplitudes of the side-lobes.

Massive conductors that could be approximated by a conducting sphere will display a simple single peak profile form on both coaxial and coplanar coils, with a ratio between the coplanar to coaxial response amplitudes as high as 8*.

Overburden anomalies often produce broad poorly defined anomaly profiles (Profile I). In most cases, the response of the coplanar coils closely follows that of the coaxial coils with a relative amplitude ration of 4*.

Occasionally, if the edge of an overburden zone is sharply defined with some significant depth extent, an edge effect will occur in the coaxial coils. In the case of a horizontal conductive ring or ribbon, the coaxial response will consist of two peaks, one over each edge; whereas the coplanar coil will yield a single peak (Profile H).

* It should be noted at this point that Aerodat's definition of the measured ppm unit is related to the primary field sensed in the receiving coil without normalization to the maximum coupled (coaxial configuration). If such normalization were applied to the Aerodat units, the amplitude of the coplanar coil pair would be halved.

Magnetics

The Total Field Magnetic Map shows contours of the total magnetic field, uncorrected for regional variation. Whether an EM anomaly with a magnetic correlation is more likely to be caused by a sulphide deposit than one without depends on the type of mineralization. An apparent coincidence between an EM and a magnetic anomaly may be caused by a conductor which is also magnetic, or by a conductor which lies in close proximity to a magnetic body. The majority of conductors which are also magnetic are sulphides containing pyrrhotite and/or magnetite. Conductive and magnetic bodies in close association can be, and often are, graphite and magnetite. It is often very difficult to distinguish between these cases. If the conductor is also magnetic, it will usually produce an EM anomaly whose general pattern resembles that of the magnetics. Depending on the magnetic permeability of the conducting body, the amplitude of the inphase EM anomaly will be weakened, and if the conductivity is also weak, the inphase EM anomaly may even be reversed in sign.

The interpretation of contoured aeromagnetic data is a subject on its own involving an array of methods and attitudes. The interpretation of source characteristics for example from total field results is often based on some numerical modelling scheme. The vertical gradient data is more legible in some aspects however and useful inferences about source characteristics can often be read off the contoured VG map.

The zero contour lines in contoured VG data are often sited as a good approximation to the outline of the top of the magnetic source. This only applies to wide (relative to depth of burial) near vertical sources at high magnetic latitudes. It will give an incorrect interpretation in most other cases.

Theoretical profiles of total field and vertical gradient anomalies from tabular sources at a variety of magnetic inclinations are shown in the attached figure. Sources are 10, 50 and 200 m wide. The source-sensor separation is 50 m. The thin line is the total field profile. The thick line is the vertical gradient profile.

The following comments about source geometry apply to contoured vertical gradient data for magnetic inclinations of 70 to 80°.

Outline

Where the VG anomaly has a single sharp peak, the source may be a thin near-vertical tabular source. It may be represented as a magnetic axis or as a tabular source of measurable width - the choice is one of geological preference.

Where the VG anomaly has a broad, flat or inclined top, the source may be a thick tabular source. It may be represented as a thick body where the width is taken from the zero contour lines if the body dips to magnetic north. If the source appears to be dipping to the south (i.e. the VG anomaly is asymmetric), the zero contours are less reliable indicators of outline. The southern most zero contour line should be ignored and the outline taken from the northern zero contour line and the extent of the anomaly peak width.

Dip

A symmetrical vertical gradient response is produced by a body dipping to magnetic north. An asymmetrical response is produced by a body which is vertical or dipping to the south. For southern dips, the southern most zero contour line may be several hundred meters south of the source.

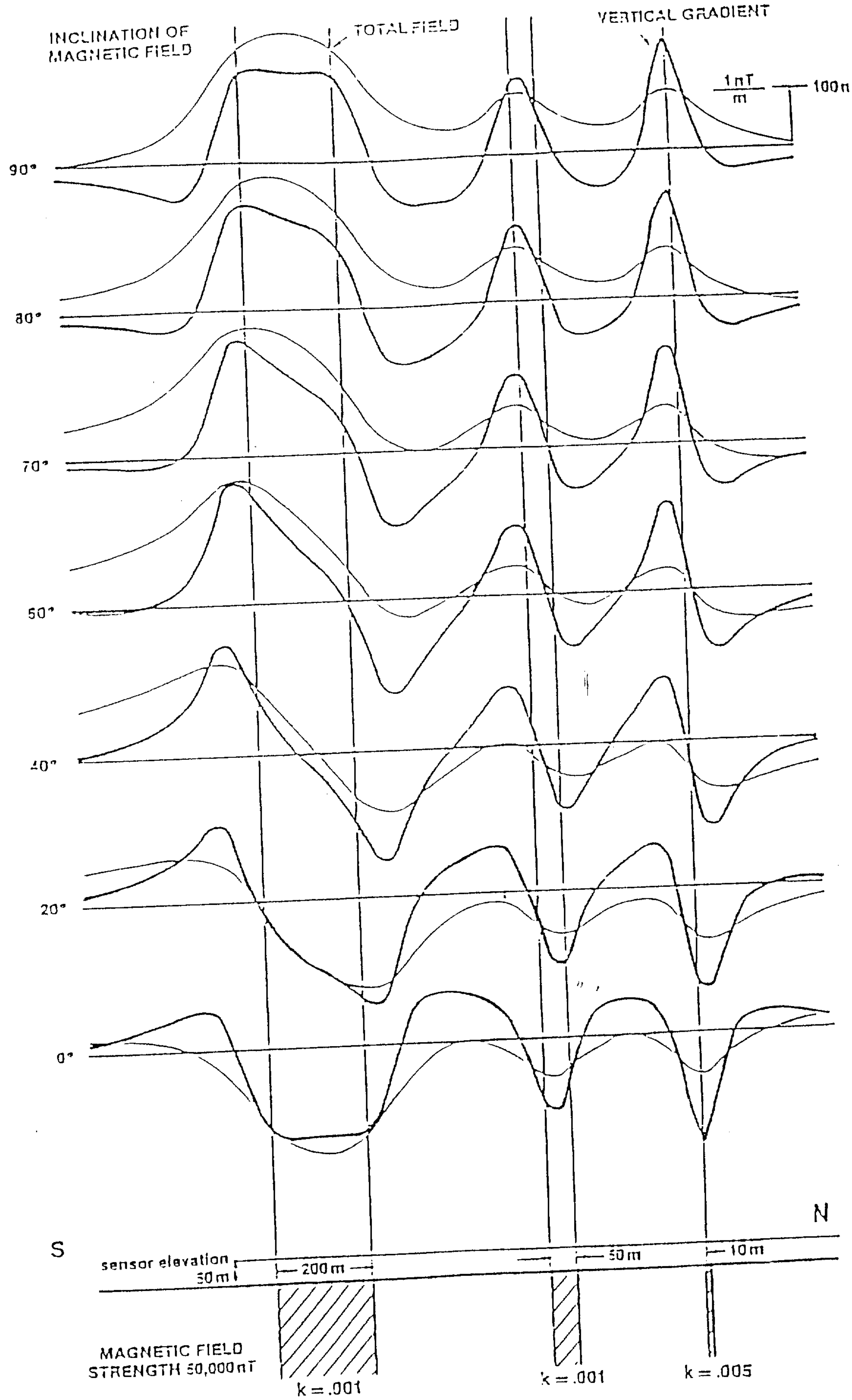
Depth of Burial

The source-sensor separation is about equal to half of the distance between the zero contour lines for thin near-vertical sources. The estimated depth of burial for such sources is this separation minus 50 m. If a variety of VG anomaly widths are seen in an area, use the narrowest width seen to estimate local depths.

VLF Electromagnetics

The VLF-EM method employs the radiation from powerful military radio transmitters as the primary signals. The magnetic field associated with the primary field is locally horizontal and normal to a line pointing at the transmitter.

The Herz Totem uses three coils in the X, Y, Z configuration to measure the total field and vertical quadrature component from two VLF stations. These stations are designated Line and Ortho. The line station is ideally in a direction from the survey area at right angles to the flight line direction. Conductors normal to the flight line direction point at the line station and are therefore optimally coupled to VLF magnetic fields and in the best situation to gather secondary VLF currents. The ortho station is ideally 90 degrees in azimuth from the line station.



INCLINATION OF MAGNETIC FIELD
TOTAL FIELD
VERTICAL GRADIENT
1nT/m
100nT
90°
80°
70°
50°
40°
20°
0°
S
N
sensor elevation 50m
200m
50m
10m
MAGNETIC FIELD STRENGTH 50,000nT
k = .001
k = .001
k = .005

The relatively high frequency of VLF (15-25) kHz provides high response factors for bodies of low conductance. Relatively "disconnected" sulphide ores have been found to produce measurable VLF signals. For the same reason, poor conductors such as sheared contacts, breccia zones, narrow faults, alteration zones and porous flow tops normally produce VLF anomalies. The method can therefore be used effectively for geological mapping. The only relative disadvantage of the method lies in its sensitivity to conductive overburden. In conductive ground to depth of exploration is severely limited.

The effect of strike direction is important in the sense of the relation of the conductor axis relative to the energizing electromagnetic field. A conductor aligned along a radius drawn from a transmitting station will be in a maximum coupled orientation and thereby produce a stronger response than a similar conductor at a different strike angle. Theoretically, it would be possible for a conductor, oriented tangentially to the transmitter to produce no signal. The most obvious effect of the strike angle consideration is that conductors favourably oriented with respect to the transmitter location and also near perpendicular to the flight direction are most clearly rendered and usually dominate the map presentation.

The total field anomaly is an indicator of the existence and position of a conductor. The response will be a maximum over the conductor, without any special filtering, and strongly favour the upper edge of the conductor even in the case of a relatively shallow dip.

Conversely a negative total field anomaly is often seen over local resistivity highs. This is because the VLF field produces electrical currents which flow towards (or away from) the transmitter. These currents are gathered into a conductor and are taken from resistive bodies. The VLF system sees the currents gathered into the conductor as a total field high. It sees the relative absence of secondary currents in the resistor as a total field low.

As noted, VLF anomaly trends show a strong bias towards the VLF transmitter. Structure which is normal to this direction may have no associated VLF anomaly but may be seen as a break or interruption in VLF anomalies. If these structures are of particular interest, maps of the ortho station data may be worthwhile.

Conductive overburden will obscure VLF responses from bedrock sources and may produce low amplitude, broad anomalies which reflect variations in the resistivity of thickness of the overburden.

Extreme topographic relief will produce VLF anomalies which may bear no relationship to variations in electrical conductivity. Deep gullies which are too narrow to have been surveyed at a uniform sensor height often show up as VLF total field lows. Sharp ridges show up as total field highs.

The vertical quadrature component over steeply dipping sheet-like conductor will be a cross-over type response with the cross-over closely associated with the upper edge of the conductor.

The response is a cross-over type due to the fact that it is the vertical rather than total field quadrature component that is measured. The response shape is due largely to geometrical rather than conductivity considerations and the distance between the maximum and minimum on either side of the cross-over is related to target depth. For a given target geometry, the larger this distance the greater the depth.

The vertical quadrature component is rarely presented. Experience has shown the total field to be more sensitive to bedrock conductors and less affected by variations in conductive overburden.

Apparent Resistivity/Conductivity Maps

Overburden and different types of bedrock may be modelled as a large area horizontal conductor of fixed thickness. A phasor diagram may be constructed, in the same fashion as for the vertical sheet, to convert the measured HEM in-phase and quadrature response to a depth and conductivity value for a horizontal layer. Traditionally if the thickness is large, an infinite half-space, the associated conductivity value is referred to as "apparent conductivity". We have generalized the use of the word "apparent" to include any model where the thickness of the layer is a fixed as opposed to a variable parameter. The units of apparent resistivity are ohm-m and those of apparent conductivity are the inverse mhos/m or siemen/m. If the chosen model layer thickness is close to the true thickness of the conductor then the apparent conductivity will closely conform to the true value; however, if the thickness is inappropriate the apparent value may be considerably different from the true value.

The benefit of the apparent conductivity mapping is that it, provides a simple robust method of converting the HEM in-phase and quadrature response to apparent change in ground conductivity.

A phasor diagram for several apparent resistivity models is presented. The general forms for the various thicknesses is very similar and also closely resembles the diagram for the vertical sheet. The diagrams also show the curves for apparent depth. As with the conductivity value the depth value is meaningful if the model thickness closely resembles the true conductive layer thickness. If the HEM response from a thin conducting layer is applied to a thick layer model the apparent conductivity and depth will be less than the true conductivity and depth.

APPENDIX III

ANOMALY LISTINGS

J9733

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS		
3	20270	A/	0	5.2	15.0	0.1	5	31	526926.1	5314500.0
3	20270	B/	0	6.9	13.1	0.3	9	33	527289.8	5313850.0
3	20260	A/	0	7.4	13.8	0.3	1	41	527198.9	5313847.0
3	20260	B/	0	2.8	9.2	0.1	3	38	526857.8	5314433.5
3	20260	C/	0	3.1	9.7	0.1	7	34	526824.4	5314491.5
3	20250	A/	0	20.5	29.5	0.8	1	32	527081.2	5313851.5
3	20240	A/	0	15.1	26.4	0.5	4	29	527049.1	5313690.5
3	20240	B/	1	37.9	53.0	1.0	0	29	526971.1	5313819.5
3	20240	C/	1	36.2	48.0	1.1	0	30	526934.3	5313878.5
3	20240	D/	0	4.9	10.1	0.2	8	38	526828.8	5314060.0
3	20240	E/	1	21.2	26.1	1.0	4	32	526791.9	5314144.0
3	20230	A/	2	43.9	31.2	2.7	0	36	526866.5	5313767.5
3	20230	B/	1	18.5	16.2	1.5	9	36	527073.4	5313411.5
3	20220	A/	3	62.6	35.1	4.1	0	42	527014.3	5313381.5
3	20220	B/	4	61.3	18.7	9.0	0	46	526971.9	5313459.5
3	20220	C/	3	59.5	21.3	7.2	0	41	526946.8	5313504.0
3	20210	A/	0	1.1	8.2	0.0	1	32	525534.2	5315794.5
3	20210	B/	4	100.9	34.1	9.1	0	33	526909.6	5313375.5
3	20210	C/	3	99.5	40.1	7.2	0	35	526934.4	5313335.5
3	20200	A/	0	10.9	12.2	0.9	16	32	526800.0	5313338.5
3	20190	A/	0	8.1	37.6	0.1	0	29	526616.7	5313520.5
3	20190	B/	0	10.1	36.7	0.1	0	31	526676.4	5313411.0
3	20180	A/	0	2.9	13.5	0.0	0	41	526631.7	5313281.0
3	20180	B/	0	9.6	13.4	0.6	15	30	526584.4	5313362.0
3	20160	A/	0	0.1	11.1	0.0	0	39	526921.9	5312242.0
3	20110	A/	0	1.4	22.3	0.0	0	33	526423.4	5312154.5
4	20020	A/	0	-0.4	4.0	0.0	0	40	526062.7	5311020.5
4	20020	B/	0	-0.6	4.5	0.0	0	40	526027.4	5311067.0
2	10400	A/	0	5.6	15.1	0.1	1	36	524428.9	5313698.5
2	10390	A/	0	7.0	15.6	0.2	0	39	524335.7	5313618.5

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS		
2	10390	B/	0	5.0	87.3	0.0	0	26	523916.8	5314401.0
2	10380	A/	0	0.3	33.1	0.0	0	32	523443.1	5314954.0
2	10370	A/	0	6.0	59.3	0.0	0	34	523811.7	5314160.5
2	10320	A/	0	1.4	34.2	0.0	0	38	523801.1	5313220.5
2	10300	A/	0	6.0	43.1	0.0	0	33	523687.5	5312993.0
2	10290	A/	0	12.4	86.3	0.0	0	29	522628.5	5314647.0
2	10290	B/	0	13.0	89.6	0.0	0	29	522591.6	5314718.5
2	10240	A/	0	0.8	10.4	0.0	0	37	520913.3	5316618.0
2	10230	A/	0	-2.5	6.2	0.0	0	38	521195.1	5315862.0
2	10230	B/	0	-1.6	8.7	0.0	0	38	520817.3	5316569.5
2	10220	A/	0	-1.0	5.4	0.0	0	42	521122.3	5315833.5
2	10210	A/	1	15.2	12.3	1.5	6	43	521840.8	5314298.5
2	10210	B/	0	0.5	14.5	0.0	0	30	521049.0	5315769.5
2	10200	A/	0	0.6	22.3	0.0	0	36	520931.7	5315738.0
2	10200	B/	3	42.6	14.7	6.9	5	36	521776.8	5314273.5
2	10190	A/	3	51.5	21.2	5.8	5	32	521658.3	5314235.0
2	10190	B/	2	47.9	26.9	3.8	0	38	521628.5	5314297.5
2	10180	A/	0	2.2	9.2	0.0	0	43	521238.0	5314799.5
2	10180	B/	3	30.3	12.5	4.9	8	38	521590.1	5314209.5
3	10170	A/	1	7.2	6.1	1.1	4	59	521474.8	5314189.0
3	10170	B/	1	9.2	8.8	1.0	18	37	521068.4	5314895.5
3	10170	C/	1	12.1	11.2	1.2	5	45	521038.5	5314951.0
3	10150	A/	0	-0.2	11.8	0.0	0	35	520413.3	5315606.0
3	10140	A/	0	1.0	20.1	0.0	0	34	519777.8	5316512.5
3	10140	B/	0	-0.9	5.4	0.0	0	40	520354.6	5315556.5
3	10140	C/	0	0.2	5.0	0.0	0	42	520399.6	5315485.0
3	10120	A/	0	1.1	27.5	0.0	0	24	519539.4	5316488.5
3	10120	B/	1	5.7	3.9	1.3	38	35	520420.9	5314968.0
3	10110	A/	1	11.2	8.6	1.5	20	35	520346.9	5315004.5

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3	10100	A/	0	1.8	12.7	0.0	0	31	519370.4	5316482.0
3	10100	B/	0	1.5	11.7	0.0	0	33	519392.9	5316442.5
3	10100	C/	0	0.6	4.8	0.0	0	41	519513.1	5316221.5
3	10100	D/	2	27.7	17.5	2.7	5	38	520197.6	5315026.0
3	10100	E/	0	4.5	12.8	0.1	0	43	520317.3	5314780.0
3	10090	A/	1	20.1	19.8	1.3	6	35	520078.9	5315049.5
3	10090	B/	0	1.5	8.9	0.0	0	38	519486.2	5316082.0
3	10090	C/	0	1.0	13.9	0.0	0	31	519281.7	5316426.5
3	10080	A/	0	1.0	23.0	0.0	0	29	519407.5	5315980.0
3	10080	B/	0	0.4	1.2	0.0	53	30	519532.9	5315763.0
3	10080	C/	0	4.6	11.0	0.2	0	44	519856.8	5315191.5
3	10080	D/	4	56.6	13.3	12.4	4	35	520052.7	5314839.5
3	10080	E/	3	61.6	21.4	7.6	5	31	520082.5	5314793.0
3	10080	F/	2	33.5	18.6	3.4	8	33	520134.7	5314707.0
3	10070	A/	5	54.9	10.8	15.5	3	37	519947.7	5314818.5
3	10070	B/	4	80.5	19.1	13.6	0	34	519911.8	5314882.5
3	10070	C/	4	77.1	19.6	12.2	0	35	519891.2	5314930.0
3	10070	D/	1	12.8	12.7	1.1	9	39	519783.1	5315168.0
3	10070	E/	0	-0.5	0.9	0.0	0	31	519523.3	5315588.5
3	10060	A/	0	-0.6	10.7	0.0	0	38	518886.0	5316495.0
3	10060	B/	0	0.0	0.9	0.0	0	27	519522.7	5315442.0
3	10060	C/	1	12.9	8.5	1.9	17	38	519706.4	5315119.5
3	10060	D/	2	26.5	14.4	3.2	1	45	519802.3	5314960.0
3	10060	E/	3	13.3	5.0	4.2	23	38	519876.8	5314819.0
3	10050	A/	1	8.7	6.4	1.4	30	31	519719.8	5314926.0
3	10050	B/	2	9.6	5.3	2.2	24	41	519651.0	5315047.0
3	10050	C/	0	-1.2	2.0	0.0	0	33	519525.6	5315253.5
3	10050	D/	0	0.4	12.0	0.0	0	38	518847.6	5316481.0
3	10040	A/	0	0.6	9.0	0.0	0	40	518772.2	5316322.0
3	10020	A/	0	0.4	5.2	0.0	0	38	518496.2	5316389.5
3	10020	B/	0	1.0	6.5	0.0	0	46	518554.6	5316282.0
4	30730	A/	0	-1.8	20.3	0.0	0	31	534960.1	5316550.0
4	30730	B/	0	1.1	14.0	0.0	0	48	534726.8	5316984.5
4	30720	A/	0	0.1	12.5	0.0	0	44	534698.6	5316838.0
4	30720	B/	0	-2.0	23.0	0.0	0	33	534884.0	5316521.0

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4	30710	A/	0	-3.3	18.7	0.0	0	33	534793.4	5316479.5
4	30710	B/	0	2.6	17.3	0.0	0	47	534667.9	5316679.0
4	30710	C/	0	-1.8	8.3	0.0	0	33	534596.4	5316797.5
4	30700	A/	0	-3.5	12.5	0.0	0	35	534906.7	5315954.0
4	30690	A/	0	-3.3	18.6	0.0	0	34	534845.4	5315903.0
4	30690	B/	0	-1.9	15.5	0.0	0	38	534463.8	5316538.5
4	30680	A/	0	-0.2	9.8	0.0	0	34	533273.0	5318434.5
4	30680	B/	0	1.9	31.0	0.0	0	24	533432.5	5318117.5
4	30680	C/	0	-2.3	22.4	0.0	0	33	534540.1	5316172.5
4	30670	A/	0	-2.9	21.0	0.0	0	33	534426.0	5316201.5
4	30670	B/	0	-1.2	11.3	0.0	0	38	533183.2	5318383.5
4	30660	A/	0	-4.7	7.4	0.0	0	35	534740.6	5315453.5
4	30651	A/	0	-2.9	19.0	0.0	0	28	533236.5	5317825.0
4	30651	B/	0	-1.1	9.3	0.0	0	46	533031.0	5318174.5
4	30640	A/	0	-3.6	13.2	0.0	0	40	532920.6	5318133.0
4	30640	B/	0	-8.1	5.8	0.0	0	35	534163.0	5316050.5
4	30640	C/	0	-7.7	8.7	0.0	0	33	534275.6	5315848.0
4	30640	D/	0	-9.3	14.5	0.0	0	29	534560.0	5315346.5
5	30630	A/	0	-5.0	8.2	0.0	0	41	534484.9	5315339.0
5	30630	B/	0	-3.8	8.3	0.0	0	40	534408.5	5315475.5
5	30630	C/	0	-6.2	6.3	0.0	0	37	534368.1	5315542.0
5	30630	D/	0	-8.2	5.7	0.0	0	37	534294.5	5315662.5
5	30620	A/	0	-3.8	8.8	0.0	0	37	534364.7	5315290.5
5	30610	A/	0	-2.6	5.4	0.0	0	38	534251.3	5315277.0
5	30600	A/	0	-2.9	5.5	0.0	0	38	534172.3	5315223.0
5	30590	A/	0	-3.1	4.5	0.0	0	35	533236.3	5316639.5
5	30590	B/	0	-1.3	7.2	0.0	0	47	532418.3	5318056.0
5	30590	C/	0	-1.1	4.7	0.0	0	43	532367.1	5318140.0
5	30580	A/	0	-2.8	5.6	0.0	0	45	532315.4	5318094.0
5	30580	B/	0	-2.7	6.3	0.0	0	41	532357.3	5318013.5
5	30580	C/	0	-3.2	5.7	0.0	0	39	533160.1	5316630.0

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5	30580	D/	0	-7.7	7.3	0.0	0	33	533839.4	5315445.0
5	30560	A/	0	-4.5	4.8	0.0	0	41	531337.3	5319446.5
6	30531	A/	0	-2.4	7.5	0.0	0	38	533532.0	5314943.0
6	30520	A/	0	-1.1	9.4	0.0	0	39	533450.2	5314882.5
6	30520	B/	0	-2.8	10.1	0.0	0	35	533376.4	5315010.0
6	30520	C/	0	-4.7	6.7	0.0	0	34	533220.9	5315275.5
6	30520	D/	0	-1.9	6.6	0.0	0	29	531771.3	5317845.5
6	30510	A/	0	-2.6	6.4	0.0	0	41	531725.3	5317760.5
6	30510	B/	0	-3.3	14.3	0.0	0	37	533371.4	5314870.0
6	30500	A/	0	-3.1	7.4	0.0	0	36	533290.3	5314769.5
6	30500	B/	0	-2.9	5.1	0.0	0	34	533252.8	5314835.0
6	30500	C/	0	-3.0	10.2	0.0	0	40	532639.0	5315863.0
6	30500	D/	0	-1.6	9.9	0.0	0	37	531742.4	5317392.0
6	30490	A/	0	-3.8	10.9	0.0	0	36	531655.4	5317355.5
6	30490	B/	0	-2.6	10.4	0.0	0	45	532589.9	5315791.5
6	30490	C/	0	-2.3	9.4	0.0	0	45	532616.4	5315751.5
6	30490	D/	0	-3.7	4.6	0.0	0	40	533220.9	5314667.5
6	30470	A/	0	-5.5	5.9	0.0	0	38	531259.0	5317740.5
6	30460	A/	0	-4.5	7.4	0.0	0	40	531097.5	5317776.0
6	30460	B/	0	-3.6	24.6	0.0	0	33	530602.3	5318670.0
6	30450	A/	0	-0.8	15.2	0.0	0	37	530604.3	5318425.0
6	30440	A/	0	-0.1	4.0	0.0	0	32	531788.2	5316146.5
6	30440	B/	0	1.5	15.4	0.0	0	42	531648.3	5316405.5
6	30440	C/	0	-1.0	6.1	0.0	0	47	530613.1	5318241.0
6	30440	D/	0	-0.8	5.2	0.0	0	47	530566.1	5318320.0
6	30430	A/	0	-0.3	17.7	0.0	0	34	530831.9	5317601.5
6	30430	B/	0	-1.8	6.5	0.0	0	36	530873.3	5317518.5
6	30430	C/	0	-1.1	14.4	0.0	0	38	531594.8	5316313.5
6	30430	D/	0	-6.8	7.8	0.0	0	36	532353.4	5314989.5
6	30420	A/	0	-0.4	7.7	0.0	0	46	531476.3	5316282.0
6	30410	A/	0	-2.7	8.1	0.0	0	40	530714.2	5317442.0
6	30410	B/	0	-2.9	7.6	0.0	0	35	530933.4	5317046.5

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6	30410	C/	0	0.4	40.1	0.0	0	31	531679.4	5315754.5
6	30410	D/	0	-4.2	6.9	0.0	0	37	531911.7	5315295.0
6	30400	A/	0	-3.1	8.3	0.0	0	39	532110.8	5314800.5
6	30400	B/	0	-0.5	9.9	0.0	0	43	531589.9	5315734.5
6	30400	C/	0	-4.0	15.6	0.0	0	34	531498.1	5315874.5
6	30400	D/	0	-0.8	16.4	0.0	0	31	531435.9	5315988.0
6	30400	E/	0	-2.9	10.5	0.0	0	37	531345.3	5316169.0
6	30400	F/	0	-5.2	9.5	0.0	0	38	530853.3	5316977.5
6	30400	G/	0	-1.5	19.2	0.0	0	32	530626.3	5317371.5
6	30391	A/	0	-2.7	5.1	0.0	0	37	531515.8	5315625.5
6	30380	A/	0	-5.3	7.4	0.0	0	39	530322.3	5317563.0
7	30350	A/	0	-2.3	14.3	0.0	0	34	530798.4	5316130.5
7	30340	A/	0	-2.0	9.9	0.0	0	40	530717.9	5316063.0
7	30330	A/	0	-5.7	17.4	0.0	0	32	531405.5	5314641.0
7	30330	B/	0	-9.2	7.7	0.0	0	33	531114.8	5315134.5
7	30310	A/	0	-4.5	7.7	0.0	0	33	530894.6	5315088.5
7	30300	A/	0	-1.8	4.8	0.0	0	47	530221.3	5316069.5
7	30290	A/	0	-4.0	8.6	0.0	0	39	531170.8	5314259.0
7	30290	B/	0	-2.6	5.2	0.0	0	40	530186.6	5316023.0
7	30280	A/	0	-2.0	23.1	0.0	0	32	531033.1	5314266.0
7	30280	B/	0	-4.5	23.7	0.0	0	31	531195.8	5313991.0
7	30280	C/	0	-4.1	26.7	0.0	0	31	531229.4	5313933.5
7	30280	D/	0	0.2	27.2	0.0	0	36	531280.0	5313845.5
7	30270	A/	0	-0.7	40.9	0.0	0	30	531120.4	5313917.5
7	30260	A/	0	-1.0	33.9	0.0	0	32	531132.8	5313743.0
7	30260	B/	0	-3.8	17.9	0.0	0	32	531199.0	5313623.5
8	30230	A/	0	-2.8	6.4	0.0	0	29	529543.1	5315888.0
8	30200	A/	0	-0.5	4.8	0.0	0	34	529683.3	5314979.5
8	30130	A/	0	-0.4	10.2	0.0	0	30	529550.0	5313858.5
8	30100	A/	0	2.9	8.1	0.1	10	35	529500.4	5313385.0

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8	30020	A/	0	-1.8	8.8	0.0	0	33	528383.0	5313652.5
8	30020	B/	0	2.0	12.9	0.0	0	31	528858.3	5312836.0
8	30010	A/	0	-1.2	11.1	0.0	0	28	528799.4	5312736.5
8	30010	B/	0	-1.9	5.9	0.0	0	32	528726.8	5312880.0
1	40010	A/	0	2.3	14.2	0.0	0	44	521962.9	5307219.0
1	40010	B/	0	9.4	54.2	0.0	0	34	522039.3	5307069.0
1	40010	C/	0	1.0	35.6	0.0	0	29	522139.9	5306881.0
1	40010	D/	0	0.4	26.4	0.0	0	31	522233.6	5306716.5
1	40020	A/	0	26.2	111.4	0.2	0	31	522191.2	5306505.5
1	40020	B/	0	25.2	115.0	0.2	0	30	522166.1	5306553.5
1	40020	C/	0	27.6	120.0	0.2	0	29	522112.2	5306648.0
1	40020	D/	0	49.6	143.0	0.4	0	29	521983.7	5306841.0
1	40020	E/	0	3.7	34.9	0.0	0	34	521875.5	5307001.0
1	40020	F/	0	1.6	16.0	0.0	0	42	521809.4	5307116.0
1	40030	A/	0	0.4	12.0	0.0	0	42	521760.4	5307035.0
1	40030	B/	0	0.0	13.3	0.0	0	40	521824.1	5306946.5
1	40030	C/	0	37.5	130.4	0.3	0	31	521982.2	5306683.0
1	40030	D/	0	29.4	99.1	0.3	0	32	522022.4	5306613.0
1	40030	E/	0	10.5	69.3	0.0	0	31	522096.3	5306476.5
1	40040	A/	0	0.8	13.7	0.0	0	33	522100.8	5306332.5
1	40040	B/	0	2.8	25.5	0.0	0	32	521929.4	5306617.0
1	40040	C/	0	4.1	38.4	0.0	0	32	521887.6	5306690.5
1	40040	D/	0	0.2	7.8	0.0	0	37	521717.6	5306972.0
1	40050	A/	0	-0.7	7.3	0.0	0	34	521673.7	5306933.0
1	40050	B/	0	-1.5	7.0	0.0	0	37	521807.6	5306676.0
1	40060	A/	0	0.3	9.5	0.0	0	43	521538.8	5306913.5
1	40070	A/	0	0.1	6.2	0.0	0	63	521397.5	5306899.5
1	40080	A/	0	1.8	7.8	0.0	0	51	521225.8	5306889.0
1	40090	A/	0	0.6	5.2	0.0	0	67	521093.0	5306904.5
1	40130	A/	0	2.4	6.6	0.1	0	56	520681.9	5306900.0
1	40140	A/	0	0.6	5.2	0.0	0	56	520600.4	5306879.0
1	40200	A/	0	-2.5	4.2	0.0	0	45	520768.8	5305337.0

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.

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS		
1	40210	A/	0	-1.5	3.6	0.0	0	47	520631.7	5305391.0
1	40220	A/	0	-2.3	4.3	0.0	0	40	520477.4	5305420.5
1	40220	B/	0	-1.7	5.5	0.0	0	38	520094.8	5306115.0
1	40240	A/	0	-2.3	6.9	0.0	0	44	520228.6	5305481.0
1	40240	B/	0	-0.1	9.3	0.0	0	39	520186.3	5305557.5
1	40250	A/	0	-2.8	5.5	0.0	0	45	520085.5	5305559.0
1	40250	B/	0	-0.7	5.8	0.0	0	46	520149.5	5305453.0
1	40260	A/	0	-2.4	5.0	0.0	0	41	520066.3	5305443.5
1	40260	B/	0	-1.7	5.7	0.0	0	43	519987.1	5305584.0
1	40270	A/	3	45.3	17.4	6.1	4	36	519367.1	5306502.0
1	40280	A/	0	-1.7	13.2	0.0	0	33	520257.3	5304663.5
1	40290	A/	0	-1.4	9.5	0.0	0	31	520184.7	5304651.0
1	40290	B/	0	-2.5	9.9	0.0	0	32	520236.1	5304564.0
1	40310	A/	0	-3.7	3.1	0.0	0	40	519799.4	5304795.5
1	40320	A/	0	-5.4	3.9	0.0	0	37	519639.6	5304915.5
1	40340	A/	0	-2.6	4.1	0.0	0	43	519368.8	5304991.5
1	40360	A/	0	-3.7	2.8	0.0	0	41	519130.9	5304991.0

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS		
10	50020	A/	0	0.0	5.8	0.0	0	37	587456.1	5232015.5
10	50020	B/	0	-0.9	7.6	0.0	0	36	587454.2	5232141.0
10	50020	C/	0	0.5	6.5	0.0	0	35	587448.4	5232535.5
10	50030	A/	0	0.4	12.4	0.0	0	32	587545.1	5232552.0
10	50030	B/	0	-0.4	4.2	0.0	0	39	587538.3	5232078.5
10	50050	A/	0	0.2	15.6	0.0	0	27	587728.1	5232551.5
10	50060	A/	0	-0.3	7.9	0.0	0	33	587856.7	5232574.5
10	50060	B/	0	-0.8	8.7	0.0	0	29	587849.1	5232691.5
10	50070	A/	0	-0.7	7.8	0.0	0	26	587932.9	5232571.0
10	50080	A/	0	0.0	7.9	0.0	0	31	588044.2	5230921.0
10	50080	B/	0	-1.0	6.2	0.0	0	35	588053.2	5231788.5
10	50080	C/	0	-0.9	6.4	0.0	0	31	588053.3	5231937.0
10	50090	A/	0	-0.7	7.4	0.0	0	30	588138.1	5232742.5
10	50090	B/	0	-1.1	9.5	0.0	0	29	588154.6	5231808.5
10	50090	C/	0	1.2	8.0	0.0	2	32	588162.8	5230948.5
10	50090	D/	0	-0.1	3.5	0.0	0	43	588159.1	5230573.5
10	50100	A/	0	-0.1	3.0	0.0	0	44	588246.9	5230574.5
10	50100	B/	0	-0.5	7.5	0.0	0	33	588246.0	5230946.0
10	50100	C/	0	0.0	6.6	0.0	0	34	588239.6	5231837.0
10	50110	A/	0	-0.1	8.0	0.0	0	27	588327.4	5232656.0
10	50110	B/	0	0.3	8.2	0.0	0	32	588357.8	5231455.0
10	50120	A/	0	1.5	6.7	0.0	11	31	588452.6	5230888.0
10	50120	B/	0	1.7	6.1	0.0	13	32	588446.7	5231109.5
10	50120	C/	0	-1.2	9.1	0.0	0	32	588451.0	5231454.0
10	50130	A/	0	-3.2	9.1	0.0	0	27	588547.4	5231415.5
10	50130	B/	0	0.8	6.3	0.0	3	32	588548.9	5231129.0
10	50130	C/	0	1.1	5.4	0.0	7	37	588543.6	5230930.5
10	50140	A/	0	-0.1	10.1	0.0	0	27	588642.6	5231158.0
10	50140	B/	0	-2.5	10.8	0.0	0	27	588643.9	5231421.0
10	50150	A/	0	-3.6	8.7	0.0	0	31	588745.3	5231402.5
10	50160	A/	0	0.7	10.4	0.0	0	29	588834.3	5231161.0

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS		
10	50160	B/	0	-4.7	10.1	0.0	0	25	588834.1	5231408.5
10	50170	A/	0	0.2	4.8	0.0	0	35	588928.5	5232428.0
10	50170	B/	0	-0.8	6.1	0.0	0	31	588948.6	5232041.0
10	50170	C/	0	1.3	6.0	0.0	7	35	588938.3	5231162.0
10	50180	A/	0	0.0	7.7	0.0	0	32	589038.9	5231184.5
10	50190	A/	0	-1.5	7.8	0.0	0	32	589146.5	5231344.5
10	50190	B/	0	-0.6	4.4	0.0	0	38	589140.3	5231173.5
11	50200	A/	0	-0.2	2.5	0.0	0	33	589239.6	5232221.5
11	50200	B/	0	0.2	5.3	0.0	0	39	589242.4	5231223.5
11	50210	A/	0	0.2	7.2	0.0	0	33	589343.1	5231273.5
11	50220	A/	0	0.5	3.8	0.0	7	35	589434.7	5232273.0
11	50220	B/	0	0.3	3.0	0.0	9	35	589433.9	5232159.0
11	50230	A/	0	-0.3	4.4	0.0	0	38	589538.1	5229853.5
11	50230	B/	0	2.7	12.5	0.0	0	33	589530.8	5232168.5
11	50230	C/	0	2.2	17.4	0.0	0	30	589524.8	5232271.0
11	50240	A/	0	0.2	2.4	0.0	9	33	589641.7	5232773.5
11	50240	B/	0	4.8	24.4	0.0	0	29	589654.2	5232259.0
11	50240	C/	0	2.3	12.7	0.0	0	32	589642.8	5232156.0
11	50250	A/	0	-0.9	6.4	0.0	0	29	589742.6	5232290.5
11	50250	B/	0	-1.5	6.5	0.0	0	28	589724.8	5232523.5
11	50260	A/	0	-0.6	10.3	0.0	0	27	589839.9	5232541.5
11	50260	B/	0	-1.0	6.1	0.0	0	31	589824.1	5232368.0
11	50280	A/	0	1.0	3.6	0.0	16	40	590033.6	5231917.5
11	50290	A/	0	0.6	8.4	0.0	0	31	590154.6	5231862.5
11	50290	B/	0	-0.4	9.8	0.0	0	29	590150.6	5231971.0
11	50300	A/	0	0.0	5.7	0.0	0	40	590258.5	5232017.5
11	50300	B/	0	-0.4	9.0	0.0	0	35	590238.1	5231841.0
11	50310	A/	0	-1.5	7.8	0.0	0	27	590339.1	5231883.5
11	50310	B/	0	-0.1	6.3	0.0	0	30	590341.8	5232007.0
11	50340	A/	0	-0.5	2.0	0.0	0	36	590643.4	5231471.0

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.

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FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS		
11	50350	A/	0	-1.0	2.1	0.0	0	34	590730.6	5231499.5
11	50380	A/	0	-3.4	2.8	0.0	0	39	591049.9	5231410.0
11	50390	A/	0	-2.1	2.5	0.0	0	41	591137.5	5231353.5
11	50400	A/	0	-1.4	3.6	0.0	0	31	591243.2	5231327.5
11	50410	A/	0	0.0	8.4	0.0	0	27	591332.9	5229921.0
11	50410	B/	0	-0.1	5.5	0.0	0	28	591336.7	5230052.0
11	50410	C/	0	0.1	5.9	0.0	0	30	591338.1	5231077.0
11	50410	D/	0	-1.2	5.4	0.0	0	30	591333.9	5231205.5
11	50410	E/	0	-0.5	2.6	0.0	0	33	591332.2	5231329.5
11	50410	F/	0	-2.7	3.9	0.0	0	35	591335.7	5231503.0
11	50420	A/	0	-1.1	1.8	0.0	0	39	591438.4	5231631.5
11	50420	B/	0	-3.3	5.4	0.0	0	36	591430.1	5231359.0
11	50420	C/	0	-0.9	4.6	0.0	0	35	591453.8	5231055.5
11	50420	D/	0	-1.5	6.3	0.0	0	31	591428.8	5229835.0
11	50440	A/	0	-2.4	4.9	0.0	0	34	591646.7	5231368.0
11	50480	A/	0	-1.6	2.8	0.0	0	42	592030.4	5231140.0
11	50490	A/	0	-1.4	3.9	0.0	0	28	592122.3	5231145.5
11	50500	A/	0	-1.0	4.2	0.0	0	43	592253.3	5231165.5
11	50510	A/	0	-0.6	6.4	0.0	0	36	592350.0	5231093.5
11	50520	A/	0	-0.6	10.0	0.0	0	37	592431.9	5231174.5
11	50520	B/	0	-0.6	11.3	0.0	0	33	592431.4	5231058.0
12	50610	A/	0	0.2	4.8	0.0	0	33	593343.8	5230939.0

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.

APPENDIX IV

CERTIFICATE OF QUALIFICATION

I, Roderick W. Woolham of the town of Pickering, Province of Ontario, do hereby certify that:-

1. I am a geophysicist and reside at 1463 Fieldlight Blvd., Pickering, Ontario, L1V 2S3

2. I graduated from the University of Toronto in 1961 with a degree of Bachelor of Applied Science, Engineering Physics, Geophysics Option. I have been practising my profession since graduation.

3. I am a member in good standing of the following organizations: Professional Engineers Ontario (Mining Branch); Society of Exploration Geophysicists; South African Geophysical Association; Prospectors and Developers Association of Canada.

4. I have not received, nor do I expect to receive, any interest, directly or indirectly, in the properties or securities of Norcan Resources Ltd. or any affiliate.

5. The statements contained in this report and the conclusions reached are based upon evaluation and review of maps and information supplied by Aerodat.

6. I consent to the use of this report in submissions for assessment credits or similar regulatory requirements.

R. W. Woolham, P.Eng.

Pickering, Ontario

J9733

May 3, 1997

Ontario | Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use) W9780.00482

Assessment Files Research Imaging

Personal informa... and 66(3) of the Mining Act. Under section 8 of the Mining Act, the in... ...nt work and correspond with the mining land holder. Questions about ... of Northern Development and Mines, 6th Floor, 933 Ramsey Lak...

42A02SE0050 2.17354 ALMA

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2.17354

Instructions: - For work performed on Crown Lands before recording a claim, use form 0240.
- Please type or print in ink.

"Browning North Property"

1. Recorded holder(s) (Attach a list if necessary)

Name	Client Number
NORCAN Resources Ltd.	301193
Address	Telephone Number
#1500-789 West Pender St	(604) 681-3343
Vancouver, B.C. V6C 1H2	Fax Number (604) 681-3347
Name	Client Number
Address	Telephone Number
	Fax Number

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

[X] Geotechnical: prospecting, surveys, assays and work under section 18 (regs)
[ ] Physical: drilling, stripping, trenching and associated assays
[ ] Rehabilitation

Work Type: Airborne Mag & EM Survey + Project Management

Survey: April 14-20/97

Dates Work Performed From 15 12 96 (Day Month Year) To 07 05 97 (Day Month Year)

Global Positioning System Data (if available): see Report

Township/Area: Alma Twp

M or G-Plan Number: M-202

Office Use	
Commodity	
Total $ Value of Work Claimed	$12,451.00
NTS Reference	
Mining Division	[illegible]
Resident Geologist District	[illegible]

Please remember to:
- obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

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MAY 23 1997
MINING LANDS BRANCH

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name	Telephone Number
Aerodat Inc.	(905) 671-2446
Address	Fax Number
6300 Northwest Drive Mississauga Ontario, L4V 1J7	(905) 671-8160
Name	Telephone Number
Blackstone Dev. Inc.	(705) 679-5500
Address	Fax Number
50 Silver St. P.O. Box 699 Cobalt Ont P0J 1C0	(705) 679-5519

4. Certification by Recorded Holder or Agent

I, Gino Chitaroni (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent: [signature]

Date: May 16 1997

Agent's Address: c/o Blackstone Dev Inc. 50 Silver St. Cobalt Ont P0J 1C0

Telephone Number: (705) 679-5500

Fax Number: (705) 679-5519

14 107

5. **Work to be recorded and distributed.** Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	**Number of Claim Units.** For other mining land, list hectares.	**Value of work performed** on this claim or other mining land.	**Value of work applied** to this claim.	**Value of work assigned** to other mining claims.	**Bank.** Value of work to be distributed at a future date.
eg	TB 7827	16 ha	$26, 825	N/A	$24,000	$2,825
eg	1234567	12	0	$24,000	0	0
eg	1234568	2	$ 8, 892	$ 4,000	0	$4,892
1	1223279	9	$ 3864	$ 3,864	$ 0	$ 0
2	1223370	12	5,152	5,152	0	0
3	1223278	4	1,717	1,717	0	0
4	1223369	4	1,718	1,718	0	0
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15	4 Claims	29 units				
		Column Totals	$ 12,451	$ 12,451	$ 0	$ 0

4 claims 29 units

2.17354

I, Gino Chitaroni (Print Full Name), do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing: [signature]

Date: May 16, 1997

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MAY 23 1997
MINING LANDS BRANCH

6. **Instructions for cutting back credits that are not approved.**

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☒ 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- ☐ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Received Stamp	Deemed Approved Date: Aug 14/97	Date Notification Sent
	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature)	

Ontario — Ministry of Northern Development and Mines

Statement of Costs for Assessment Credit

Personal information collected on this form is obtained under the authority of subsection 6(1) of the Assessment Work Regulation 6/96. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

Browning North Property
Cairo Twp

Work Type	Units of Work (Depending on the type of work, list the number of hours/days worked, metres of drilling, kilometres of grid line, number of samples, etc.)	Cost Per Unit of work	Total Cost
Airborne EM/Mag			$4,810.00
Project Geologist + Field Operations			6,641.00
		2.17354	

Associated Costs (e.g. supplies, mobilization and demobilization).

mob/demob Airborne	1,000.00

Transportation Costs

Included under Project Geologist

Food and Lodging Costs

Included under Project Geologist

Total Value of Assessment Work $12,451.00

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

Calculations of Filing Discounts:

1. Work filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work.
2. If work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total Value of Assessment Work. If this situation applies to your claims, use the calculation below:

TOTAL VALUE OF ASSESSMENT WORK × 0.50 = Total $ value of worked claim

Note:
- Work older than 5 years is not eligible for credit.
- A recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for verification and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all or part of the assessment work submitted.

Certification verifying costs:

I, Gino Chitaroni (please print full name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as Agent for WORCAN (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature: [signature]

Date: May 16 1997

Ontario | Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use): W9780.00483
Assessment Files Research Imaging

Instructions: - For work performed on Crown Lands before recording a claim, use form 0240.
- Please type or print in ink.

"Browning South Property"

1. Recorded holder(s) (Attach a list if necessary)

Name: NORCAN RESOURCES LTD.	Client Number: 301193
Address: #1500 - 789 WEST PENDER ST.	Telephone Number: (604) 681-3343
VANCOUVER, B.C. V6C 1H2	Fax Number: (604) 681-3347
Name:	Client Number:
Address:	Telephone Number:
	Fax Number:

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

[X] Geotechnical: prospecting, surveys, assays and work under section 18 (regs)
[ ] Physical: drilling, stripping, trenching and associated assays
[ ] Rehabilitation

	Office Use	
Work Type: AIRBORNE MAG & EM SURVEY + Project Management (survey: Apr. 14-20/97)	Commodity	
	Total $ Value of Work Claimed	~~$ 22,569.50~~ ISC
Dates Work Performed From 15 12 96 (Day Month Year) To 15 ~~07~~ 05 97 (Day Month Year)	NTS Reference	$27,255 ISC.
Global Positioning System Data (if available): — SEE REPORT	Township/Area: Cairo Twp; M or G-Plan Number: G-3209	Mining Division
		Resident Geologist District

Please remember to: - obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name: HERODIAT INC	Telephone Number: (905) 671-2446
Address: 6300 NORTHWEST DRIVE, MISSISSAUGA	Fax Number: (905) 671-8160
ONTARIO, L4V 1J7	Telephone Number:
Address:	Fax Number:
Name: BLACKSTONE DEVELOPMENT INC	Telephone Number: (705) 679-5500
Address: 50 SILVER ST. P.O. Box ~~291~~ 699	Fax Number: (705) 679-5519
COBALT, ONT. P0J 1C0	

4. Certification by Recorded Holder or Agent ~~June 30 1997~~

I, GINO CHITARONI (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent: [signature]	Date: May 16, 1997
Agent's Address: c/o BLACKSTONE DEV. INC 50 SILVER ST. COBALT, ONT P0J 1C0	Telephone Number: (705) 679-5500
	Fax Number: (705) 679-5519

5. Work to be recorded and distributed. Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

R1

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land.	Value of work applied to this claim.	Value of work assigned to other mining claims.	Bank. Value of work to be distributed at a future date.	
eg	TB 7827	16 ha	$26, 825	N/A	$24,000	$2,825	
eg	1234567	12	0	$24,000	0	0	
eg	1234568	2	$ 8, 892	$ 4,000	0	$4,892	
1	1223290	16	~~13,569~~ 13,374	6,687	Ø	Ø	688
2	1223209	2	446 53	835	Ø	Ø	86
3	1223208	8	1,784 212	3,343	Ø	Ø	344
4	1223292	7	1,561 186	2,925	Ø	Ø	301
5	1223291	2	446 53	835	Ø	Ø	86
6	1223294	3	669 79	1,253	Ø	Ø	129
7	1223293	3	669 79	1,253	Ø	Ø	129
8	1223296	4	892 106	1,671	Ø	Ø	172
9	1223295	9	~~2,007~~ 239	3,767	Ø	Ø	387
10	1221959	1	~~223~~ 26	Ø	223	Ø	43
11	1221960	4	892 ~~[illegible]~~ 104	Ø	892	Ø	172
12	1217893	2	~~446~~ 53	Ø	446	Ø	86
13	1217895	8	~~1,784~~ 212	Ø	1,784	Ø	344
14	1230635	1	~~223~~ 26	Ø	223	Ø	43
15	1230633	1	~~223~~ 26	Ø		Ø	43
	Column Totals		18,886	~~22,569~~ 22,569	3,791	Ø	3053

Subtotal

I, Gino Chitaroni (Print Full Name), do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing: [signature] | Date: May 16 1997

June 30, 1997

6. Instructions for cutting back credits that are not approved.

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☒ ~~2. Credits are to be cut back starting with the claims listed last, working backwards; or~~
- ☒ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only		
Received Stamp: 97 JUN 30 PM 3 06	Deemed Approved Date	Date Notification Sent
	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature): [signature]	

5. Work to be recorded and distributed. Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

P.2

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land.	Value of work applied to this claim.	Value of work assigned to other mining claims.	Bank. Value of work to be distributed at a future date.
eg	TB 7827	16 ha	$26, 825	N/A	$24,000	$2,825
eg	1234567	12	0	$24,000	0	0
eg	1234568	2	$ 8, 892	$ 4,000	0	$4,892
1	1217887	2	~~446~~ 532	Ø	~~446~~ 532	Ø
2	1221820	2	~~446~~ 532	Ø	~~446~~ 532	Ø
3	1221767	2	~~446~~ 532	Ø	~~446~~ 532	Ø
4	1213837	1	~~223~~ 266	Ø	~~223~~ 266	Ø
5	1206379	1	~~223~~ 266	Ø	~~223~~ 266	Ø
6	1221819	6	~~1,338~~ 1,696	Ø	~~1,338~~ 1,596	~~Ø~~ 100
7	1221817	9	~~2,007~~ 2,394	Ø	~~2,007~~ 2,394	Ø
8	1221964	7	~~1,607~~ 1,965	Ø	~~1,607~~ 1,618	~~Ø~~ 347
9	1212004	2	186	1,000	0	0
10						
11						
12						
13						
14	24 claims	103 units				
15			$27255	$23,569	$11,527	$3,500
		Column Totals	~~22,569~~	~~22,569~~	~~10,627~~	~~Ø~~

I, Gino Chitaroni (Print Full Name), do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing	Date
[signature]	Ma. 11. 1997
[signature]	June 30, 1997

6. Instructions for cutting back credits that are not approved.

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☒ 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- ☒ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Received Stamp	Deemed Approved Date	Date Notification Sent
	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature)	

CHK

Ontario | Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use): W9780.00484

Assessment Files Research Imaging

Personal information collected on this form is obtained under the authority of subsections 65(2) and 66(3) of the Mining Act. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

2.17354 Log Lake Property

Cairo Twp

Instructions: - For work performed on Crown Lands before **recording** a claim, use form 0240.
- Please type or print in ink.

1. Recorded holder(s) (Attach a list if necessary)

Name: NORCAN Resources Ltd	Client Number: 301193
Address: #1500-789 West Pender St, Vancouver, B.C. V6C 1H2	Telephone Number: (604) 681-3343
	Fax Number: (604) 681-3347
Name:	Client Number:
Address:	Telephone Number:
	Fax Number:

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

[X] Geotechnical: prospecting, surveys, assays and work under section 18 (regs)
[ ] Physical: drilling, stripping, trenching and associated assays
[ ] Rehabilitation

		Office Use	
Work Type: Survey April 14-20, 1997 Airborne Mag & EM Survey + Project Management		Commodity	
		Total $ Value of Work Claimed	$9,664.00
Dates Work Performed From 15 12 96 (Day Month Year) To 07 05 97 (Day Month Year)		NTS Reference	
Global Positioning System Data (if available): see Report	Township/Area: Cairo Twp	Mining Division	Larder Lake
	M or G-Plan Number: G-3209	Resident Geologist District	K. Lake

Please remember to:
- obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name: Aerodat Inc	Telephone Number: (905) 671-2446
Address: 6300 Northwest Drive, Mississauga Ont L4V	Fax Number: (905) 671-8160
	Telephone Number:
	Fax Number:
Name: Blackstone Dev. Inc	Telephone Number: (705) 679-5500
Address: 50 Silver St P.O Box 699 Cobalt, Ont P0J 1C0	Fax Number: (705) 679-5519

4. Certification by Recorded Holder or Agent

I, Gino Chitaroni (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent: [signature]	Date: May 16 1997
Agent's Address: c/o Blackstone Dev. Inc 50 Silver St. Cobalt, Ont. P0J 1C0	Telephone Number: (705) 679-5500
	Fax Number: (705) 679-5519

W7183.40707

5. **Work to be recorded and distributed.** Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

Log Lake Property Powell Twp

2.17354

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land.	Value of work applied to this claim.	Value of work assigned to other mining claims.	Bank. Value of work to be distributed at a future date.
eg	TB 7827	16 ha	$26, 825	N/A	$24,000	$2,825
eg	1234567	12	0	$24,000	0	0
eg	1234568	2	$ 8, 892	$ 4,000	0	$4,892
1	1212001	1	$ 193	$ 193	$ 0	$ 0
2	1212002	1	193	193	0	0
3	1212003	1	193	193	0	0
4	1223272	8	1,544	1,544	0	0
5	1223273	1	193	193	0	0
6	1223274	1	193	193	0	0
7	1223277	6	1,158	1,158	0	0
8	1223280	8	1,544	1,544	0	0
9	1223282	7	1,351	1,351	0	0
10	1223289	6	1,158	1,158	0	0
11	1223299	2	386	386	0	0
12	1223300	1	193.00	193	0	0
13	1223301	4	786.00	786	0	0
14	1223302	1	193	193	0	0
15	1223365	2	386	386	0	0
	15 Claims	50 units Column Totals	$ 9,664.00	$ 9,664.00	$ 0	$ 0

I, Gino Chitaroni (Print Full Name), do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing	Date
[signature]	May 16, 1997

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

6. **Instructions for cutting back credits that are not approved.**

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☐ 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- ☒ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Received Stamp	Deemed Approved Date	Date Notification Sent
[stamp]	Aug 14/98	
	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature)	
	[signature]	

Ontario Ministry of Northern Development and Mines

Statement of Costs for Assessment Credit

Transaction Number (office use) W9780.00484

"Log Lake" Powell Twp

Personal information collected on this form is obtained under the authority of subsection 6(1) of the Assessment Work Regulation 6/96. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

2.17354

Work Type	Units of Work Depending on the type of work, list the number of hours/days worked, metres of drilling, kilometres of grid line, number of samples, etc.	Cost Per Unit of work	Total Cost
Airborne Mag/EM			$8,664.50
Associated Costs (e.g. supplies, mobilization and demobilization).			1,000.00
	mob/demob		
Transportation Costs			
Food and Lodging Costs			
		Total Value of Assessment Work	$9,664.50

Assessment Applied = 9,664.00

Calculations of Filing Discounts:

1. Work filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work.
2. If work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total Value of Assessment Work. If this situation applies to your claims, use the calculation below:

TOTAL VALUE OF ASSESSMENT WORK ______ × 0.50 = ______ Total $ value of worked claimed

RECEIVED MAY 23 1997 MINING LANDS BRANCH

Note:
- Work older than 5 years is not eligible for credit.
- A recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for verification and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all or part of the assessment work submitted.

Certification verifying costs:

I, Gino Chitaroni (please print full name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as Agent for NORCAN (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature [signature] Date May 16 1997

0212 (02/96)

Ontario — Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use): W9780.00486

Assessment Files Research Imaging

Personal information collected on this form is obtained under the authority of subsections 65(2) and 66(3) of the Mining Act. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

2.17354

"Yarrow Twp Property"

Instructions: - For work performed on Crown Lands before **recording** a claim, use form 0240.
- Please type or print in ink.

1. Recorded holder(s) (Attach a list if necessary)

Name: NORCAN RESOURCES LTD.	Client Number: 301193
Address: #1500 - 789 WEST PENDER ST. VANCOUVER, BC V6C 1H2	Telephone Number: (604) 681-3343
	Fax Number: (604) 681-3347
Name:	Client Number:
Address:	Telephone Number:
	Fax Number:

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

[X] Geotechnical: prospecting, surveys, assays and work under section 18 (regs) [ ] Physical: drilling, stripping, trenching and associated assays [ ] Rehabilitation

Work Type: AIRBORNE MAG & EM SURVEY + Project Management	**Office Use**
	Commodity:
	Total $ Value of Work Claimed: $12,451.00
Dates Work Performed From: 15 12 96 (Day Month Year) To: 07 05 97 (Day Month Year)	NTS Reference:
Global Positioning System Data (if available): SEE REPORT — Township/Area: Yarrow Twp. — M or G-Plan Number: M-260	Mining Division: Larder Lake
	Resident Geologist District: K. Lake

Please remember to:
- obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name: AERODAT INC	Telephone Number: (905) 671-2446
Address: 6300 NORTHWEST DRIVE MISSISSAUGA, ONT. L4V 1J7	Fax Number: (905) 671-8160
Name:	Telephone Number:
Address:	Fax Number:
Name: BLACKSTONE DEV INC	Telephone Number: (705) 679-5500
Address: 50 SILVER ST. P.O. Box 699 COBALT, ONT., P0J 1C0	Fax Number: (705) 679-5519

RECEIVED MAY 23 1997 MINING LANDS BRANCH

4. Certification by Recorded Holder or Agent

I, GINO CHITARONI (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent: [signature]	Date: May 16, 1997

Agent's Address	Telephone Number	Fax Number
c/o BLACKSTONE DEV INC 50 SILVER ST. COBALT, ONT P0J 1C0	(705) 679-5500	(705) 679-5519

5 Work to be recorded and distributed. Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

Yarrow Twp Property

2.17854

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land.	Value of work applied to this claim.	Value of work assigned to other mining claims.	Bank. Value of work to be distributed at a future date.
eg	TB 7827	16 ha	$26, 825	N/A	$24,000	$2,825
eg	1234567	12	0	$24,000	0	0
eg	1234568	2	$ 8, 892	$ 4,000	0	$4,892
1	1223363	3	1,245	1,245	0	0
2	1223364	9	3,735	3,735	0	0
3	1223368	9	3,735	3,735	0	0
4	1223367	6	2,490	2,490	0	0
5	1223362	2	830	830	0	0
6	1223357	1	416	416	0	0
7						
8						
9						
10						
11						
12						
13						
14						
15	6 claims	30 units				
		Column Totals	$ 12,451	$ 12,451	$ 0	$ 0

6 claims 30 units

I, Gino Chitaroni (Print Full Name), do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing

Date ~~Sept 16~~ May 16 1997

6. **Instructions for cutting back credits that are not approved.**

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☒ 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- ☐ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

RECEIVED
MAY 2 3 1997
MINING LANDS BRANCH

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Received Stamp	Deemed Approved Date Aug 14/97	Date Notification Sent
	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature)	

Ontario

Ministry of Northern Development and Mines

Statement of Costs for Assessment Credit

Yarrow Twp

Personal information collected on this form is obtained under the authority of subsection 6(1) of the Assessment Work Regulation 6/96. Under section 8 of the Mining Act, the information is a public record. This Information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

Work Type	Units of Work Depending on the type of work, list the number of hours/days worked, metres of drilling, kilometres of grid line, number of samples, etc.	Cost Per Unit of work	Total Cost
Airborne EM + Mag			$ 5,665.00
Project Geologist			2,500.00
Administration			694.32

2.17354

Associated Costs (e.g. supplies, mobilization and demobilization). mob/demob airborne			1,000.00
Transportation Costs			
Food and Lodging Costs			2,592.0[illegible]
Total Value of Assessment Work			$ 12,451.41

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

Calculations of Filing Discounts:

1. Work filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work.
2. If work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total Value of Assessment Work. If this situation applies to your claims, use the calculation below:

TOTAL VALUE OF ASSESSMENT WORK × 0.50 = Total $ value of worked claimed

Note:
- Work older than 5 years is not eligible for credit.
- A recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for verification and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all or part of the assessment work submitted.

Certification verifying costs:

I, Gino Chitaroni (please print full name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as Agent for NORCAN (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature: [signature] Date: May 16, 1997

0212 (02/96)

Ontario | Ministry of Northern Development and Mines

Declaration of Assessment Work Performed on Mining Land

Mining Act, Subsection 65(2) and 66(3), R.S.O. 1990

Transaction Number (office use): W9780.00486

Assessment Files Research Imaging

Personal information collected on this form is obtained under the authority of subsections 65(2) and 66(3) of the Mining Act. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

2.17354

Powell & Cairo Twps.

"Montreal River Property"

Instructions: - For work performed on Crown Lands before **recording** a claim, use form 0240.
- Please type or print in ink.

1. Recorded holder(s) (Attach a list if necessary)

Name: NORCAN RESOURCES LTD	Client Number: 301193
Address: #1500 – 789 WEST PENDER ST.	Telephone Number: (604) 681-3343
VANCOUVER, B.C V6C 1H2	Fax Number: (604) 681-3347
Name:	Client Number:
Address:	Telephone Number:
	Fax Number:

2. Type of work performed: Check (✓) and report on only ONE of the following groups for this declaration.

- [X] Geotechnical: prospecting, surveys, assays and work under section 18 (regs)
- [ ] Physical: drilling, stripping, trenching and associated assays
- [ ] Rehabilitation

	Office Use	
Work Type: Survey: April 14-20, 1997 AIRBORNE MAG & EM SURVEY + Project Management and Assays	Commodity	
	Total $ Value of Work Claimed	~~$9,604.00~~ 8,916.00
Dates Work Performed: From 15 12 96 (Day Month Year) To 07 05 97 (Day Month Year)	NTS Reference	
Global Positioning System Data (if available): SEE REPORT; Township/Area: Powell Twp. + Cairo Twp.; M or G-Plan Number: G-3218 + G-3208	Mining Division	Larder Lake
	Resident Geologist District	K. Lake

Please remember to: - obtain a work permit from the Ministry of Natural Resources as required;
- provide proper notice to surface rights holders before starting work;
- complete and attach a Statement of Costs, form 0212;
- provide a map showing contiguous mining lands that are linked for assigning work;
- include two copies of your technical report.

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

3. Person or companies who prepared the technical report (Attach a list if necessary)

Name: AERODAT INC	Telephone Number: (905) 671-2446
Address: 6300 NORTHWEST DRIVE	Fax Number: (905) 671-8160
~~Name~~ MISSISSAUGA, ONT., L4V 1J7	Telephone Number:
~~Address~~	Fax Number:
Name: BLACKSTONE DEV INC	Telephone Number: (705) 679-5500
Address: 50 SILVER ST P.O. BOX 699, COBALT, ONT. P0J 1C0	Fax Number: (705) 679-5519

Swastika Labs, Swastika Ontario P.O. Box 10 P0K 1T0 ph (705) 642-3244

4. Certification by Recorded Holder or Agent

I, GINO CHITARONI (Print Name), do hereby certify that I have personal knowledge of the facts set forth in this Declaration of Assessment Work having caused the work to be performed or witnessed the same during or after its completion and, to the best of my knowledge, the annexed report is true.

Signature of Recorded Holder or Agent: [signature]	Date: May 16, 1997
Agent's Address: c/o BLACKSTONE DEV INC 50 SILVER ST. COBALT, ONT. P0J 1C0	Telephone Number: (705) 679-5500
	Fax Number: (705) 679-5519

5. **Work to be recorded and distributed.** Work can only be assigned to claims that are contiguous (adjoining) to the mining land where work was performed, at the time work was performed. A map showing the contiguous link must accompany this form.

Montreal River Property

2.17354

	Mining Claim Number. Or if work was done on other eligible mining land, show in this column the location number indicated on the claim map.	Number of Claim Units. For other mining land, list hectares.	Value of work performed on this claim or other mining land.	Value of work applied to this claim.	Value of work assigned to other mining claims.	Bank. Value of work to be distributed at a future date.
eg	TB 7827	16 ha	$26, 825	N/A	$24,000	$2,825
eg	1234567	12	0	$24,000	0	0
eg	1234568	2	$ 8, 892	$ 4,000	0	$4,892
1	1223373	4	$ 1,120	$ 400.00	$ 720	$ Ø
2	1223374	4	1,120	400.00	720	Ø
3	1223371	1	280	116.00	164	Ø
4	1223359	7	1,960	3,000.00	Ø	Ø
5	1223360	3	857	2,000.00	Ø	Ø
6	1223361	7	1,960	3,000.00	Ø	Ø
7	G-9000	12.7 ha	812	Ø	812	Ø
8	650 (MR 9915)					
9	G-9000	12.9 ha	812	Ø	812	Ø
10	652					
11	(MR 8107)					
12	Note G-9000 650 (MR 9915)					
13	+ G-9000 652 (MR 8107)					
14		Hawley Lake Claims				
15						
	8 claims	36 units Column Totals	$ 8,916.00	$ 8,916.00	$ 3,228	$ Ø

I, [illegible] (Print Full Name), do hereby certify that the above work credits are eligible under subsection 7 (1) of the Assessment Work Regulation 6/96 for assignment to contiguous claims or for application to the claim where the work was done.

Signature of Recorded Holder or Agent Authorized in Writing [signature] Date May 16/1997

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

6. **Instructions for cutting back credits that are not approved.**

Some of the credits claimed in this declaration may be cut back. Please check (✓) in the boxes below to show how you wish to prioritize the deletion of credits:

- ☐ 1. Credits are to be cut back from the Bank first, followed by option 2 or 3 or 4 as indicated.
- ☐ 2. Credits are to be cut back starting with the claims listed last, working backwards; or
- ☒ 3. Credits are to be cut back equally over all claims listed in this declaration; or
- ☐ 4. Credits are to be cut back as prioritized on the attached appendix or as follows (describe):

Note: If you have not indicated how your credits are to be deleted, credits will be cut back from the Bank first, followed by option number 2 if necessary.

For Office Use Only

Received Stamp	Deemed Approved Date Aug 14/97	Date Notification Sent
	Date Approved	Total Value of Credit Approved
	Approved for Recording by Mining Recorder (Signature)	

Ontario — Ministry of Northern Development and Mines

Statement of Costs for Assessment Credit

Transaction Number (office use)

Montreal River Prop

Personal information collected on this form is obtained under the authority of subsection 6(1) of the Assessment Work Regulation 6/96. Under section 8 of the Mining Act, the information is a public record. This information will be used to review the assessment work and correspond with the mining land holder. Questions about this collection should be directed to the Chief Mining Recorder, Ministry of Northern Development and Mines, 6th Floor, 933 Ramsey Lake Road, Sudbury, Ontario, P3E 6B5.

Cairo / Powell Twps

2.17354

Work Type	Units of Work Depending on the type of work, list the number of hours/days worked, metres of drilling, kilometres of grid line, number of samples, etc.	Cost Per Unit of work	Total Cost
Airborne EM & Mag			$5,778.50
Field Administration			513.38
Assays	21 Gold Samples		1,624.27
	56 " "		
	55 " "		
* Note: Goes with previously submitted Diamond Drilling!			
Associated Costs (e.g. supplies, mobilization and demobilization).			1,000.00
mob/demob			
Transportation Costs			
Food and Lodging Costs			

Total Value of Assessment Work $8,916.15

Assessment Applied = $8,916.00

Calculations of Filing Discounts:

1. Work filed within two years of performance is claimed at 100% of the above Total Value of Assessment Work.
2. If work is filed after two years and up to five years after performance, it can only be claimed at 50% of the Total Value of Assessment Work. If this situation applies to your claims, use the calculation below:

TOTAL VALUE OF ASSESSMENT WORK × 0.50 = Total $ value of worked claimed

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

Note:
- Work older than 5 years is not eligible for credit.
- A recorded holder may be required to verify expenditures claimed in this statement of costs within 45 days of a request for verification and/or correction/clarification. If verification and/or correction/clarification is not made, the Minister may reject all or part of the assessment work submitted.

Certification verifying costs:

I, Gino Chitaroni (please print full name), do hereby certify, that the amounts shown are as accurate as may reasonably be determined and the costs were incurred while conducting assessment work on the lands indicated on the accompanying Declaration of Work form as Agent for NORCAN (recorded holder, agent, or state company position with signing authority) I am authorized to make this certification.

Signature: [signature] Date: May 16/97

0212 (02/96)

Ministry of
Northern Development
and Mines

Ministère du
Développement du Nord
et des Mines

Ontario

Geoscience Assessment Office
933 Ramsey Lake Road
6th Floor
Sudbury, Ontario
P3E 6B5

Telephone: (888) 415-9846
Fax: (705) 670-5863

September 24, 1997

NORCAN RESOURCES LTD.
SUITE 1500
789 WEST PENDER STREET
VANCOUVER, B.C.
V6C-1H2

Dear Sir or Madam:

Submission Number: 2.17354

Subject: Transaction Number(s):

	Status
W9780.00482	Deemed Approval
W9780.00483	Deemed Approval
W9780.00484	Deemed Approval
W9780.00485	Deemed Approval
W9780.00486	Deemed Approval

We have reviewed your Assessment Work submission with the above noted Transaction Number(s). The attached summary page(s) indicate the results of the review. WE RECOMMEND YOU READ THIS SUMMARY FOR THE DETAILS PERTAINING TO YOUR ASSESSMENT WORK.

If the status for a transaction is a 45 Day Notice, the summary will outline the reasons for the notice, and any steps you can take to remedy deficiencies. The 90-day deemed approval provision, subsection 6(7) of the Assessment Work Regulation, will no longer be in effect for assessment work which has received a 45 Day Notice.

Please note any revisions must be submitted in DUPLICATE to the Geoscience Assessment Office, by the response date on the summary.

If you have any questions regarding this correspondence, please contact Lucille Jerome by e-mail at jerome_l@torv05.ndm.gov.on.ca or by telephone at (705) 670-5858.

Yours sincerely,

ORIGINAL SIGNED BY
Blair Kite
Supervisor, Geoscience Assessment Office
Mining Lands Section

Correspondence ID: 11355
Copy for: Assessment Library

Work Report Assessment Results

Submission Number: 2.17354

Date Correspondence Sent: September 24, 1997 **Assessor:** Lucille Jerome

General Comment:

The airborne geophysics surveys were deficient in several areas such as specifying the total distance flown over the entire survey and the distance flown over the mining land in respect of which the assessment work is to be credited. No map or plan were supplied identifying the claim disposition in reference to the area traversed.

This submission has been deemed approved, however, future submissions may be cut-back because of work performed on lands for which you have no interest. Because of the lack of information in this submission, no cut-back will be done this time.

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9780.00482	1223279	ALMA	Deemed Approval	August 14, 1997

Section:

15 Airborne Geophy AMAG

15 Airborne Geophy AEM

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9780.00483	1223290	CAIRO	Deemed Approval	August 14, 1997

Section:

15 Airborne Geophy AEM

15 Airborne Geophy AMAG

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9780.00484	1212001	CAIRO	Deemed Approval	August 14, 1997

Section:

Correspondence ID: 11355

Work Report Assessment Results

Submission Number: 2.17354

15 Airborne Geophy AEM
15 Airborne Geophy AMAG

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9780.00485	1223363	YARROW	Deemed Approval	August 14, 1997

Section:
15 Airborne Geophy AEM
15 Airborne Geophy AMAG

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9780.00486	1223373	POWELL, CAIRO	Deemed Approval	August 14, 1997

Section:
15 Airborne Geophy AEM
15 Airborne Geophy AMAG

Correspondence to:
Resident Geologist
Kirkland Lake, ON

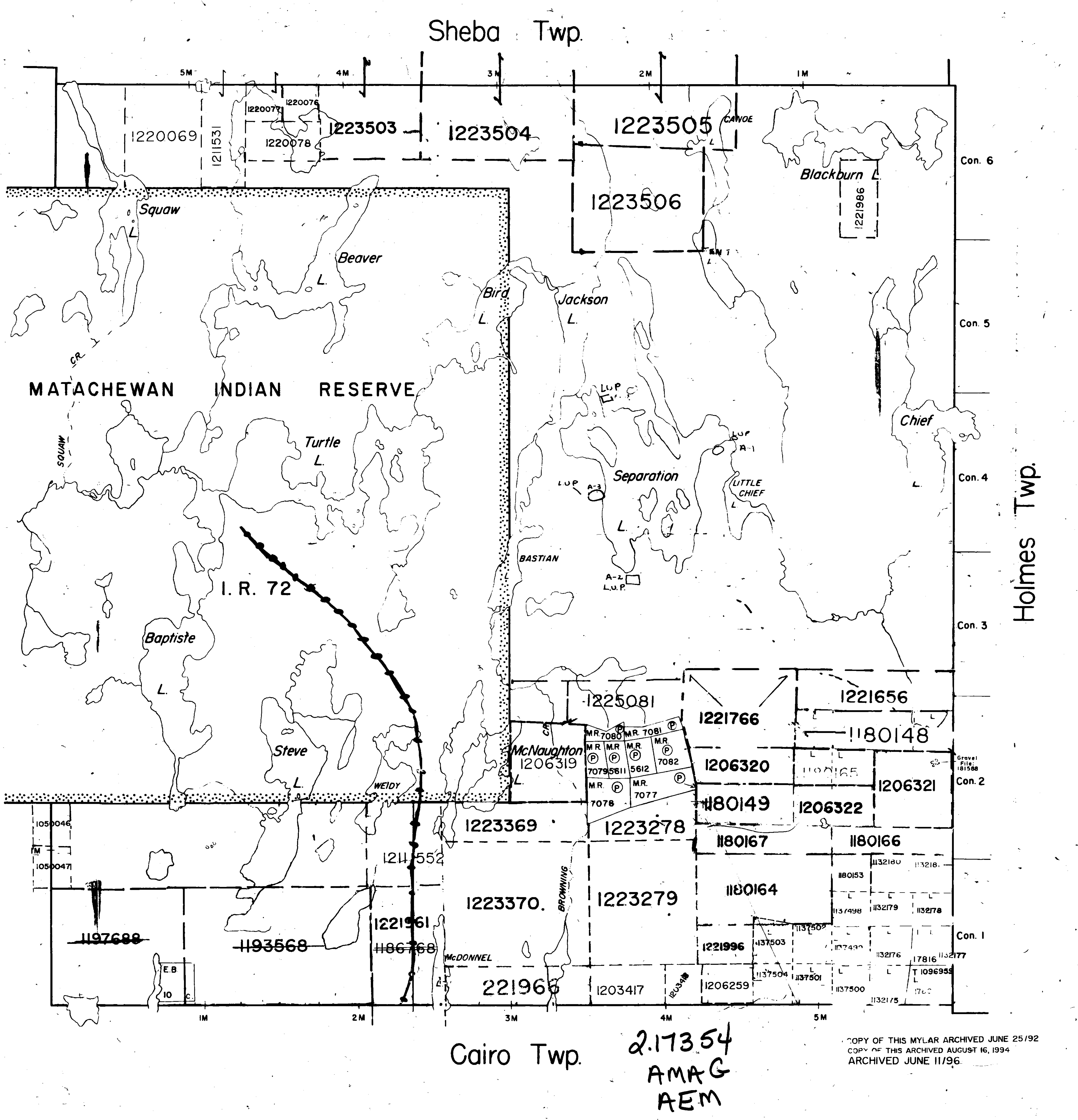
Assessment Files Library
Sudbury, ON

Recorded Holder(s) and/or Agent(s):
Gino Chitaroni
COBALT, ONTARIO

NORCAN RESOURCES LTD.
VANCOUVER, B.C.

Correspondence ID: 11355

2.17354



COPY OF THIS MYLAR ARCHIVED JUNE 25/92
COPY OF THIS ARCHIVED AUGUST 16, 1994
ARCHIVED JUNE 11/96

THE TOWNSHIP OF ALMA

DISTRICT OF TIMISKAMING

LARDER LAKE 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

Matachewan Indian Reserve shown thus:-

400' Surface rights reservation around all lakes and rivers.

THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

PLAN NO.- M-202

ONTARIO #3

MINISTRY OF NATURAL RESOURCES

SURVEYS AND MAPPING BRANCH

200

42A02SE0050 2.17354 ALMA

2.17354

REFERENCES

AREAS WITHDRAWN FROM DISPOSITION

M.R.O. – MINING RIGHTS ONLY
S.R.O. – SURFACE RIGHTS ONLY
M.+ S. – MINING AND SURFACE RIGHTS

Description	Order No.	Date	Disposition	File
~~Ⓡ – SEC. 36, REO – 1980~~	~~NRW 65/83~~	~~NOV. 18, 1983~~	~~M+S~~	

(R1) MINING & SURFACE RIGHTS REOPENED TO PROSPECTING, SALE OR LEASE. ORDER O-L-10/95, PREVIOUSLY WITHDRAWN UNDER ORDER W 65/83.

(R2) Mining and Surface Rights Withdrawn Order No. W-L-17/95 Dated March30, 1995. Previously withdrawn under Order NWR 65/83.

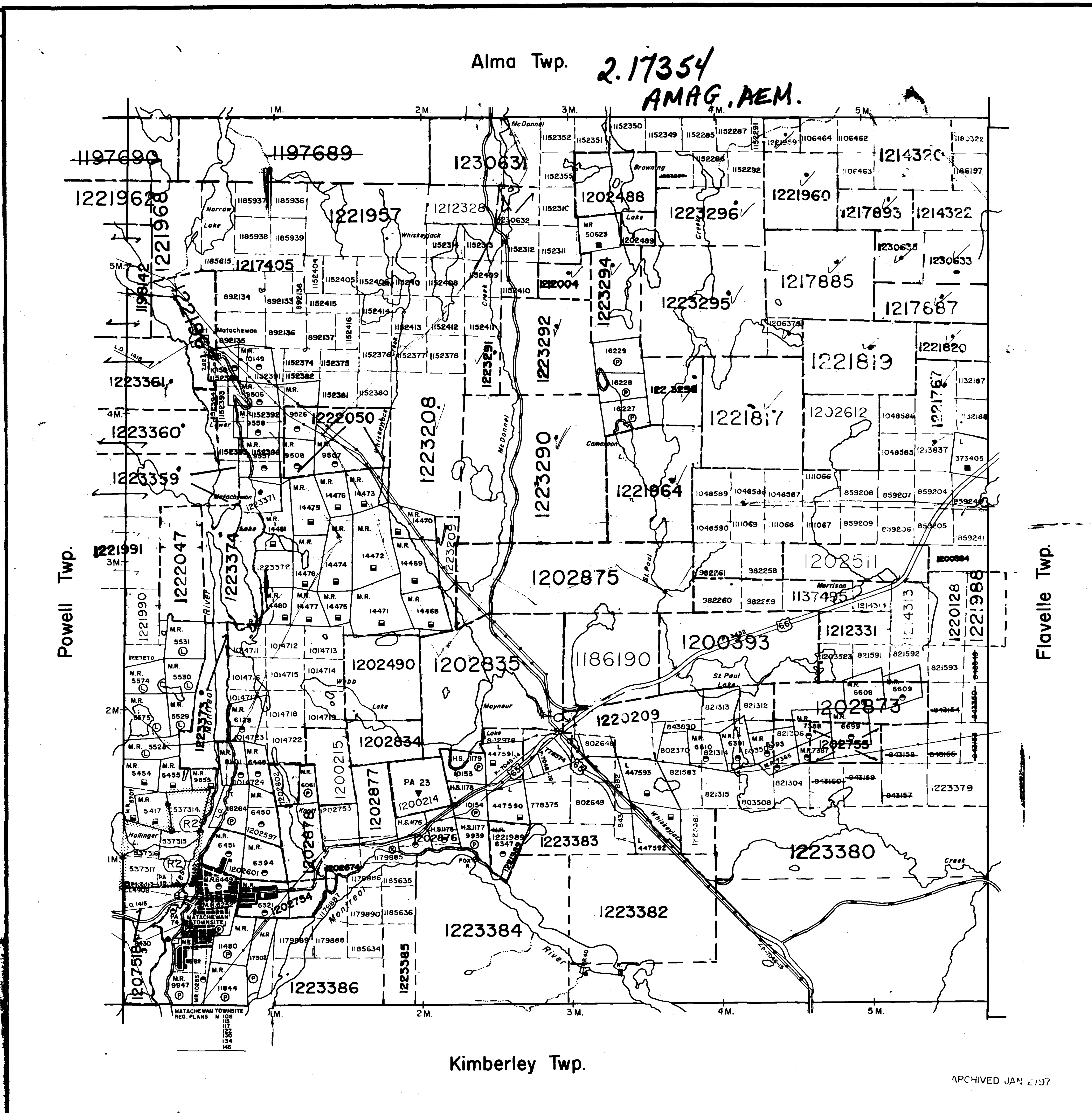
THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

NOTES

LUP – LAND USE PERMIT

NOTICE OF FORESTRY ACTIVITY

THIS TOWNSHIP / AREA FALLS WITHIN THE PLONSKI FOREST MANAGEMENT UNIT AND MAY BE SUBJECT TO FORESTRY OPERATIONS. THE MNR UNIT FORESTER FOR THIS AREA CAN BE CONTACTED AT: P.O. BOX 129
SWASTIKA, ONT.
P0K 1T0
705-642-3222



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 OR COMPOSITE PLAN
- RESERVATIONS
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES
- TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	Ⓟ or ●
" , SURFACE RIGHTS ONLY	◓
" , MINING RIGHTS ONLY	◒
LEASE, SURFACE & MINING RIGHTS	Ⓛ or ■
" , SURFACE RIGHTS ONLY	⬒
" , MINING RIGHTS ONLY	⬓
LICENCE OF OCCUPATION	L.O. or ▼
ORDER-IN-COUNCIL	OC
RESERVATION	Ⓡ
CANCELLED	⊗
SAND & GRAVEL	Ⓢ

NOTE: MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6, 1913, VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP. 380, SEC. 63, SUBSEC. 1.

SCALE: 1 INCH = 40 CHAINS

FEET 0 1000 2000 4000 6000 8000
METRES 0 200 1000 (1 KM) 2000 (2 KM)

TOWNSHIP

CAIRO

M.N.R. ADMINISTRATIVE DISTRICT

KIRKLAND LAKE

MINING DIVISION

LARDER LAKE

LAND TITLES / REGISTRY DIVISION

TIMISKAMING

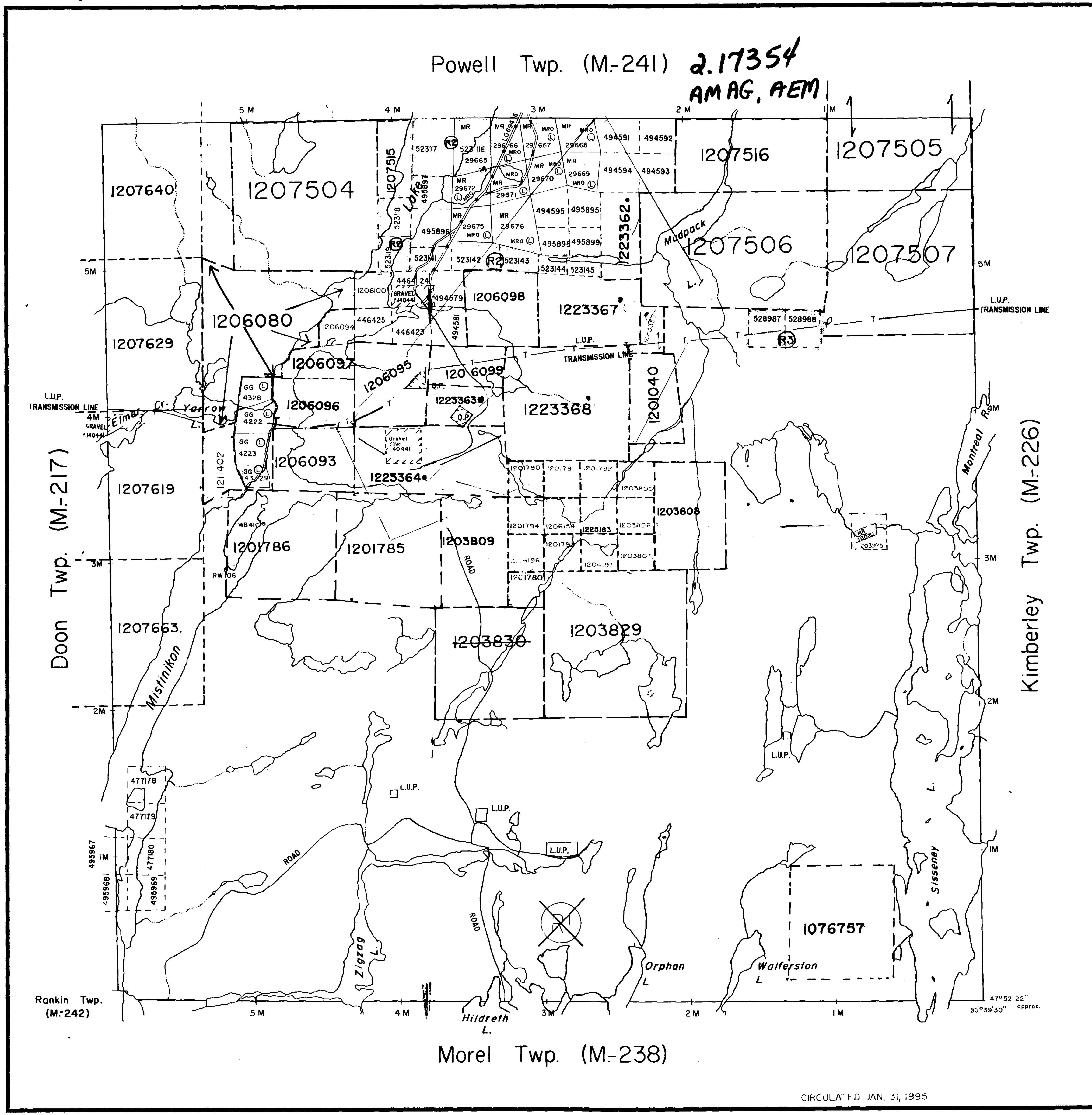
Ontario — Ministry of Natural Resources — Ministry of Northern Development and Mines

Date: JULY 1986

Number: G-3209

210

CIRCULATED JANUARY 17 1995



THE TOWNSHIP
OF

YARROW

DISTRICT OF
TIMISKAMING

LARDER LAKE
MINING DIVISION

SCALE: 1-INCH 40 CHAINS

LEGEND

PATENTED LAND	● or Ⓟ
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
PATENTED S.R.O.	

NOTES

400' Surface Rights Reservation along the Shores of all Lakes and Rivers.

L.O. 7601 Covers Flooding Rights in this Township to below Contour 870' for Ont. Hydro. File 12290 v.2.

~~(R1) MINING & SURFACE RIGHTS WITHDRAWN FROM PROSPECTING SALE OR LEASE SECTION 36, MINING ACT R.S.O. 1980. ORDER NO. NRW 65/83 DATED NOV. 16, 1983~~

(R2) MINING AND SURFACE RIGHTS WITHDRAWN ORDER NO. W-L-21/95 DATED MARCH30,1995

(R1) MINING & SURFACE RIGHTS REOPENED TO PROSPECTING, SALE OR LEASE. ORDER O-L-10/95. PREVIOUSLY WITHDRAWN UNDER ORDER #W 65/83.

(R3) MINING AND SURFACE RIGHTS WITHDRAWN ORDER NO. W-L-22/95 DATED MARCH30,1995. PREVIOUSLY WITHDRAWN UNDER ORDER #NRW 65/83.

NOTICE OF FORESTRY ACTIVITY
THIS TOWNSHIP / AREA FALLS WITHIN THE ELK LAKE MANAGEMENT UNIT AND MAY BE SUBJECT TO FORESTRY OPERATIONS. THE MNR UNIT FORESTER FOR THIS AREA CAN BE CONTACTED AT BOX 129 SWASTIKA ONT. POK 1T0 705-642-3222

PLAN NO. M.260

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH

INFORMATION THAT ...RS ON THIS MAP ...BEEN COMPILED ...VARIOUS SOURCES. ...ACCURACY IS NOT ...ANTEED. THOSE ...G TO STAKE MIN... ...AIMS SHOULD CON... ...WITH THE MINING ...DER, MINISTRY OF ...HERN DEVELOP... ...AND MINES FOR AD... ...IAL INFORMATION ...IE STATUS OF THE ...SHOWN HEREON

ARCHIVED APRIL 23/97

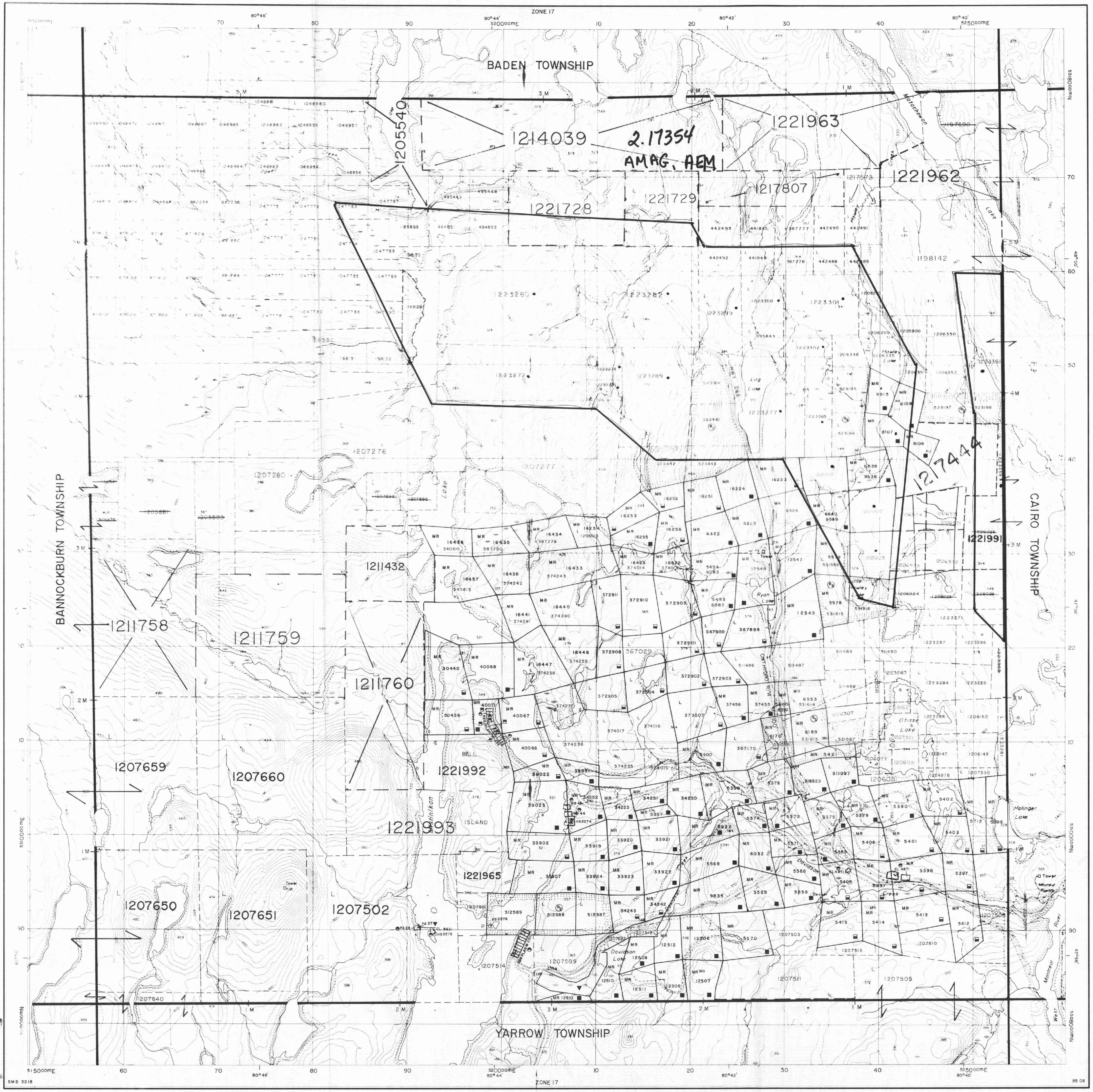
2.17354

220

42A02SE0050 2.17354 ALMA

YARROW TWP.

M.260



Ministry of Natural Resources
Ministry of Northern Development and Mines
Ontario

230

INDEX TO LAND DISPOSITION

PLAN
G-3218

TOWNSHIP
POWELL

M.N.R. ADMINISTRATIVE DISTRICT
KIRKLAND LAKE

MINING DIVISION
LARDER LAKE

LAND TITLES/REGISTRY DIVISION
TIMISKAMING

Scale 1:20 000

Contour Interval 10 Metres

AREAS WITHDRAWN FROM DISPOSITION

MRO - Mining Rights Only
SRO - Surface Rights Only
M + S - Mining and Surface Rights

Description	Order No.	Date	Disposition	File
R1	W-L-18/95	MAR. 30/95	M + S	
R2	W-L-19/95	MAR. 30/95	M + S	
R3	W-L-20/95	MAR. 30/95	M + S	

2.17354

RECEIVED
MAY 23 1997
MINING LANDS BRANCH

SYMBOLS

Boundary
Township, Meridian, Baseline
Road allowance; surveyed
shoreline
Lot/Concession; surveyed
unsurveyed
Parcel; surveyed
unsurveyed
Right-of-way; road
railway
utility
Reservation
Cliff, Pit, Pile
Contour
Interpolated
Approximate
Depression
Control point (horizontal)
Flooded land
Mine head frame
Pipeline (above ground)
Railway; single track
double track
abandoned
Road, highway, county, township
access
trail, bush
Shoreline (original)
Transmission line
Wooded area

NOTES

L.O. 7601 COVERS FLOODING RIGHTS IN THIS TOWNSHIP TO CONTOUR 870 TO ONTARIO HYDRO. FILE: 12290 VOL. 2

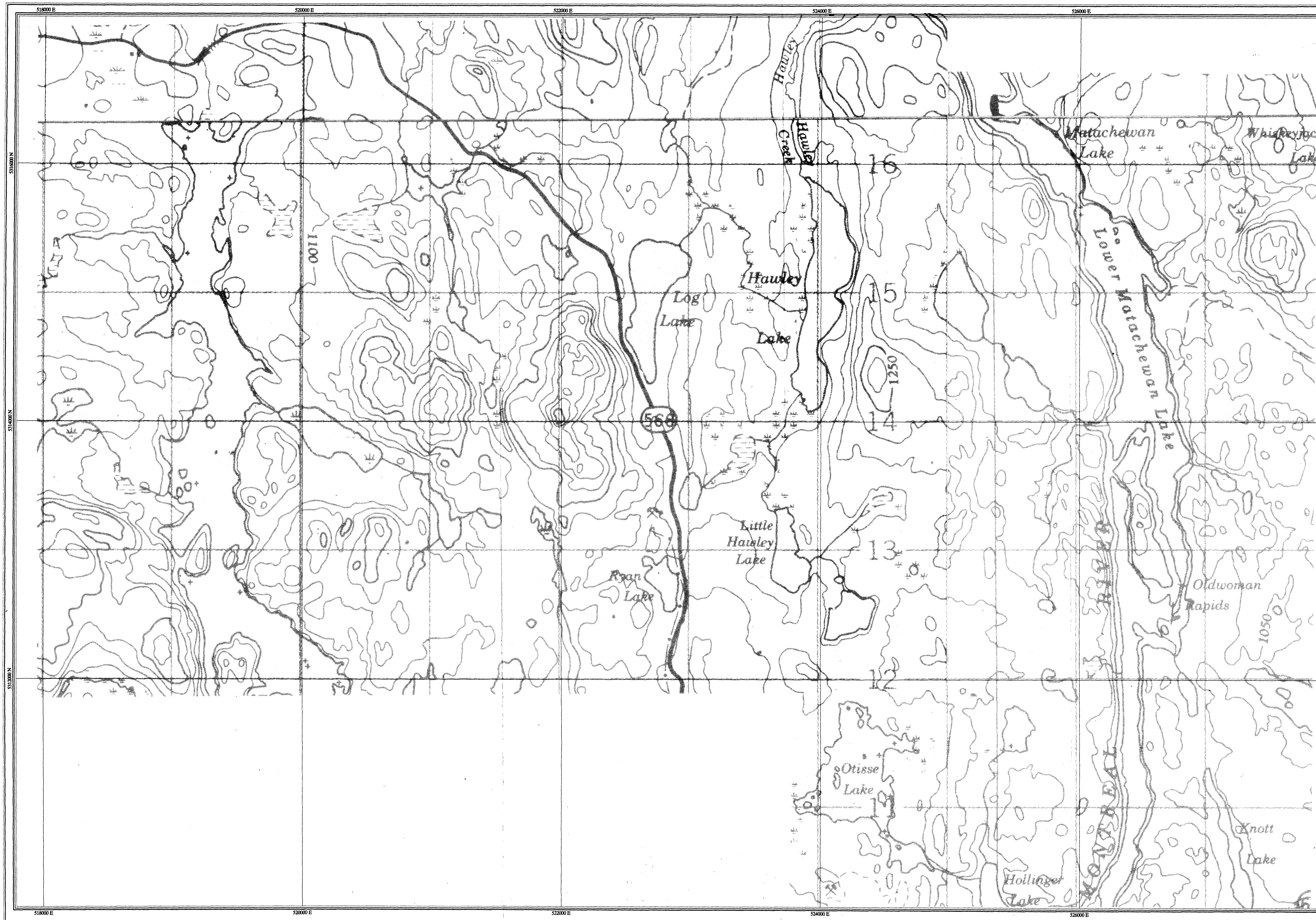
DISPOSITION OF CROWN LANDS

Patent
Surface & Mining Rights
Surface Rights Only
Mining Rights Only
Lease
Surface & Mining Rights
Surface Rights Only
Mining Rights Only
Licence of Occupation
Order-in-Council
Cancelled
Reservation
Sand & Gravel

CIRCULATED DEC 14, 1995 KP

Map base and land disposition drafting by Surveys and Mapping Branch, Ministry of Natural Resources.

The disposition of land, location of lot fabric and parcel boundaries on this index was compiled for administrative purposes only.



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

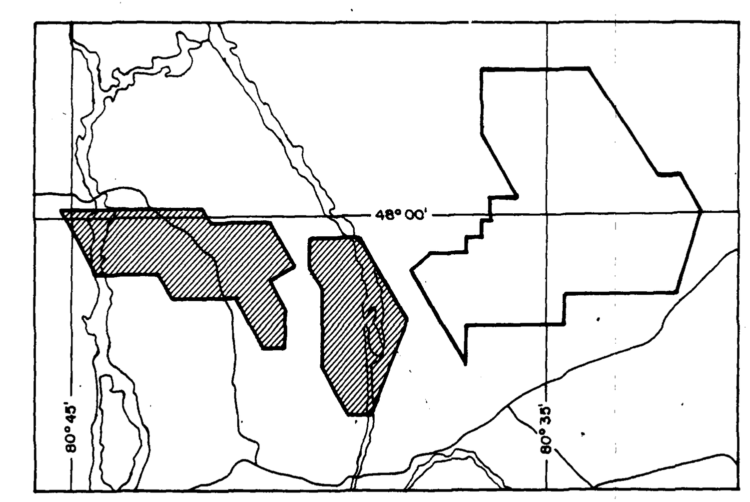
Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

PLANIMETERY

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)



NORCAN RESOURCES LTD.

BASE MAP 2.17354

LOG LAKE PROPERTY

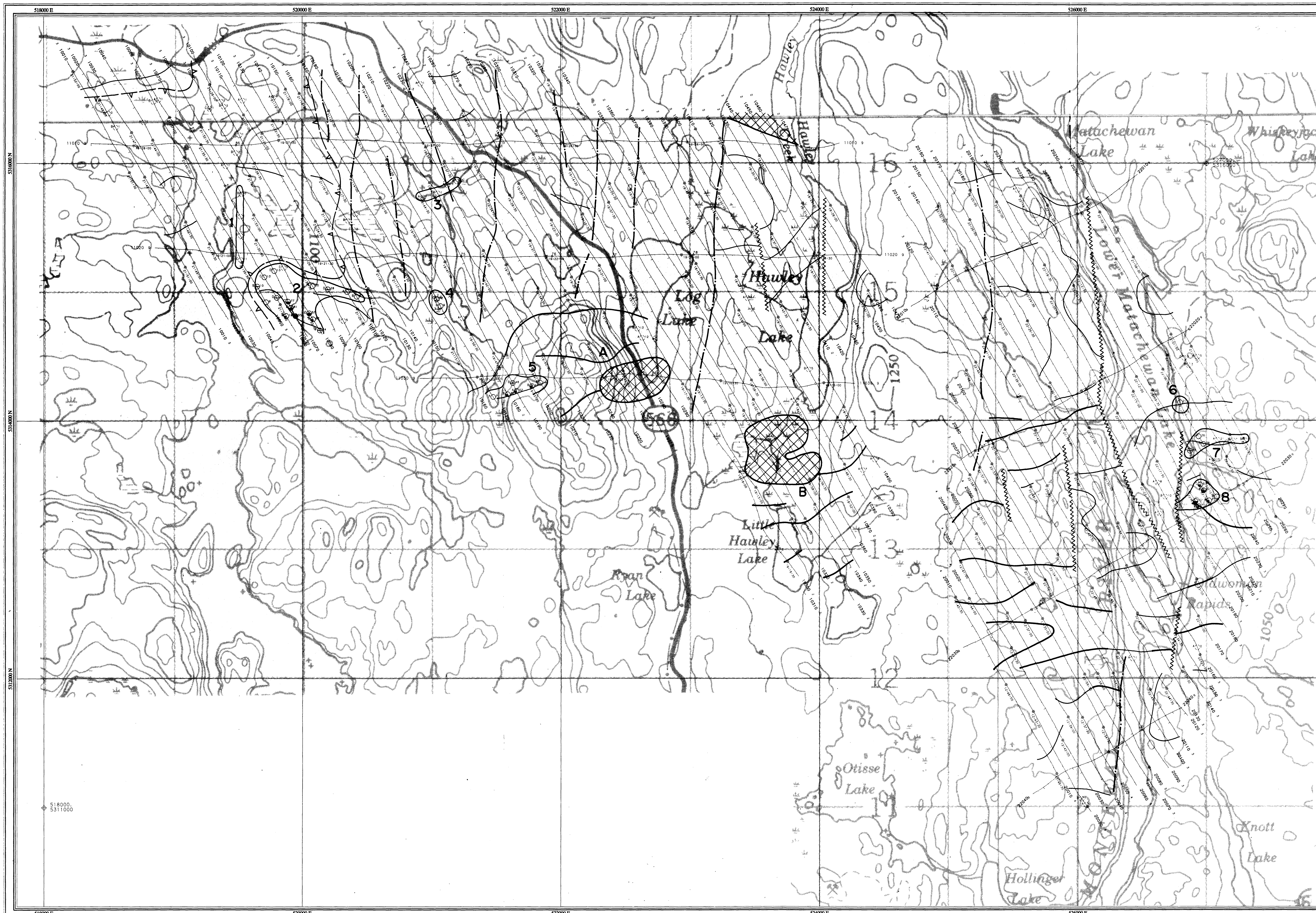
Matachewan, Ontario

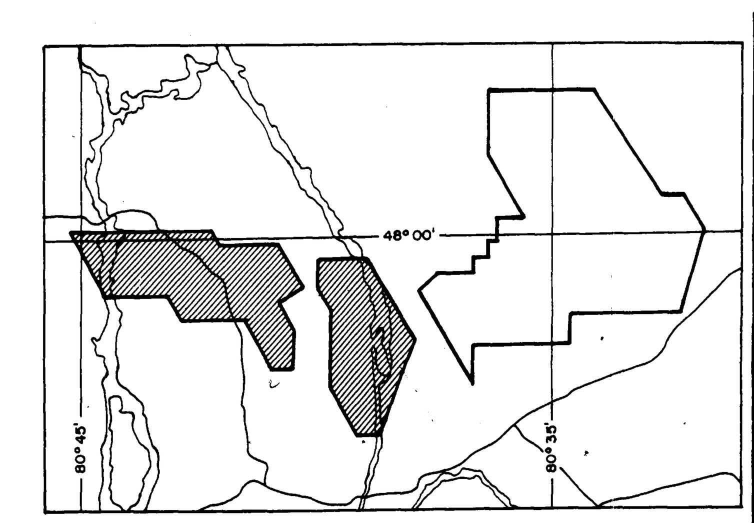
SCALE 1:10 000

250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-1 (Sheet 1)





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True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum, UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos

LEGEND

- High amplitude magnetic zone, possible mafic intrusive
- High amplitude magnetic trend, probable mafic volcanic unit
- Linear horizon, probable mafic dyke
- Other magnetic trend
- Non-magnetic below background zone, felsic or sedimentary rocks
- Conductive zone
- Fault/contact structure interpreted from magnetics
- B Anomalous magnetic response designated for investigation
- 3 Anomalous conductive response designated for investigation

NORCAN RESOURCES LTD.

INTERPRETATION

2.17354

LOG LAKE PROPERTY

Matachewan, Ontario

SCALE 1:10 000

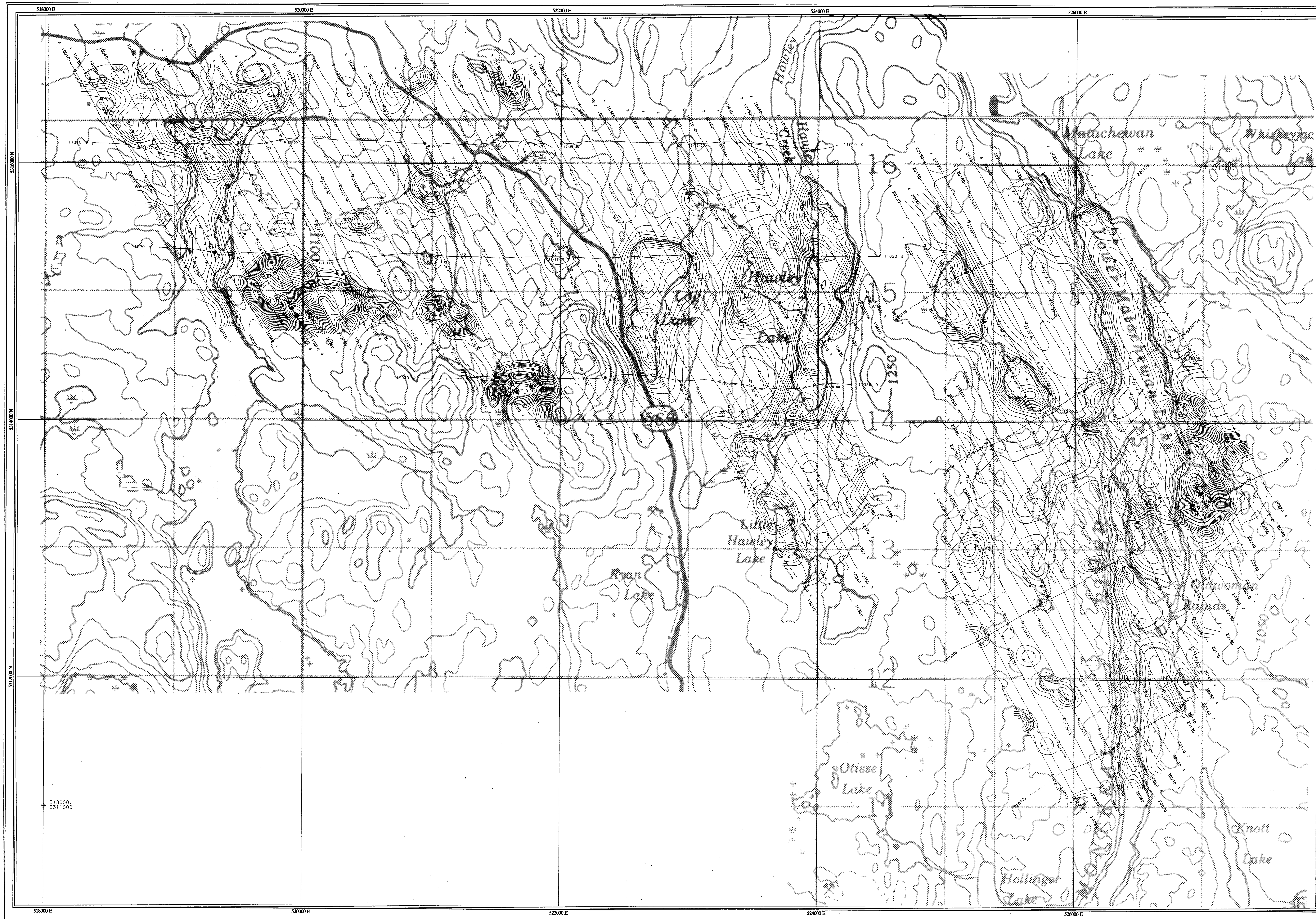
250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown: April, 1997

Map Ref: 41P/15, 42A/2

Project Ref: J9733-2 (Sheet 1)



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum, UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 4175 Hz coplanar EM response, assuming a resistive half-space (200 m) model. Average sensor elevation was 36.7 m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

- 0.1 log(ohm·m)
- 0.5 log(ohm·m)
- 2.0 log(ohm·m)

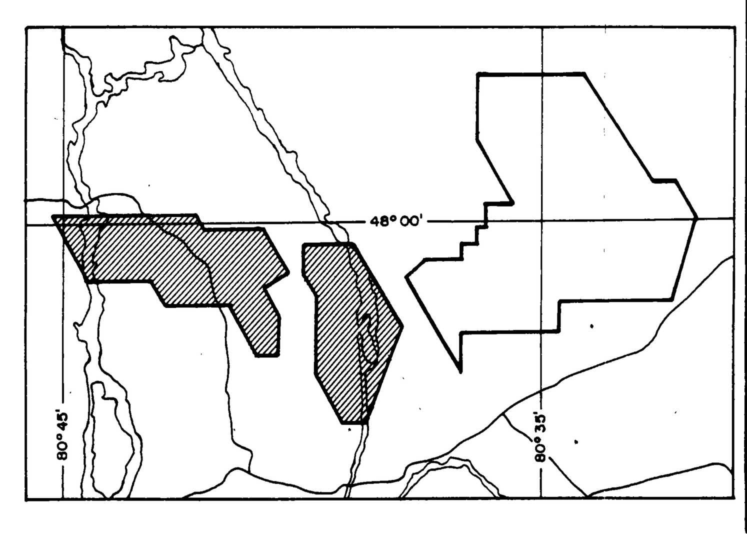
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



NORCAN RESOURCES LTD.

APPARENT RESISTIVITY
4175 Hz COPLANAR

LOG LAKE PROPERTY
Matachewan, Ontario

2.17354

SCALE 1:10 000

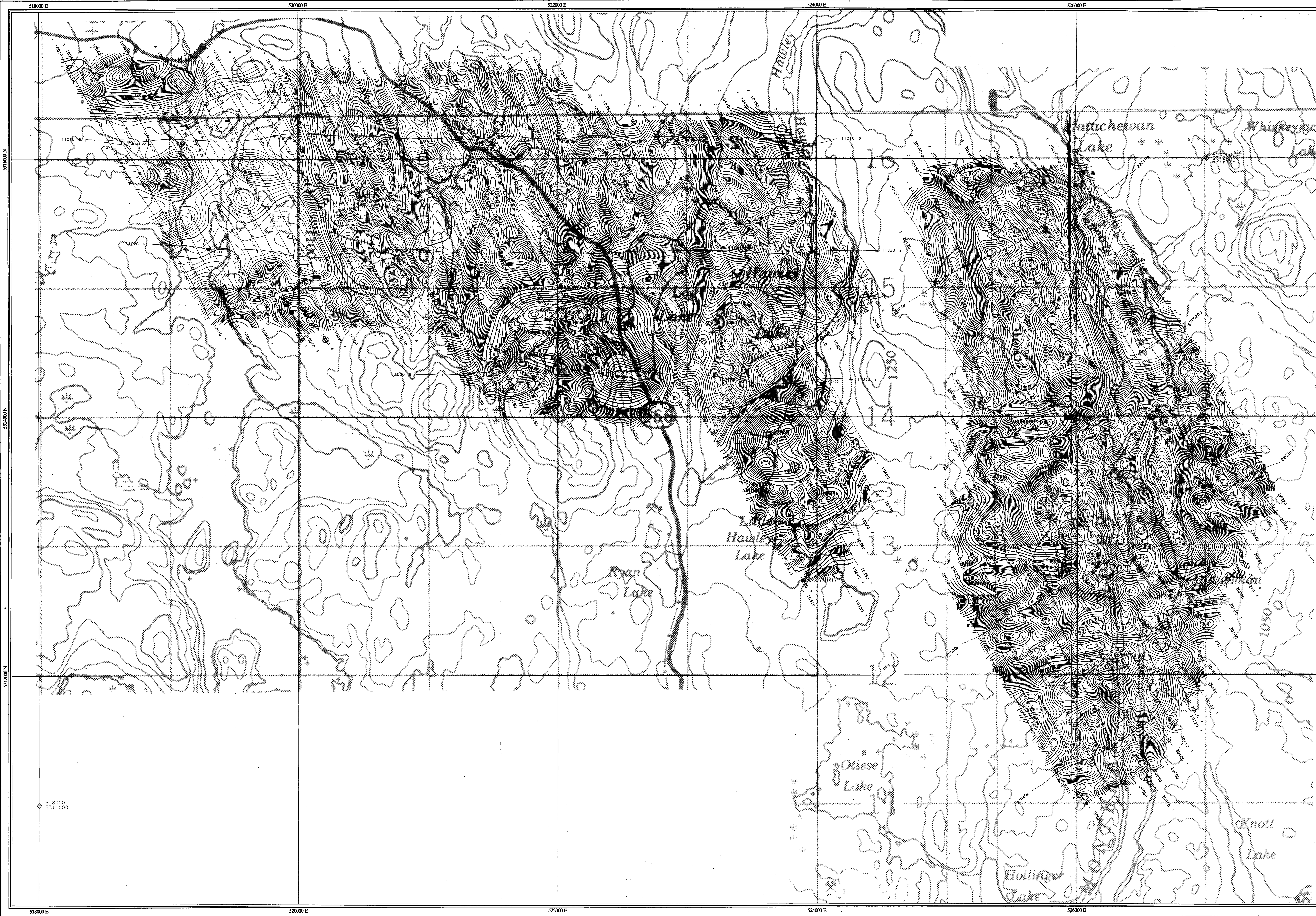
250 0 100 200 500 1000 metres

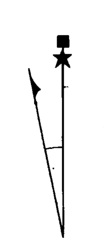
AERODAT INC.

Date Flown: April, 1997

Map Ref: 41P/15, 42A/2

Project Ref: J9733-5B (Sheet 1)





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum, UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

TOTAL FIELD MAGNETICS

Total field magnetic intensity contour data, measured by a cesium high sensitivity magnetometer at an average sensor elevation of 51.7 m, and corrected for diurnal variation.

Map contours are in nanoTeslas, and are multiples of those listed below:

- 5 nT
- 20 nT
- 100 nT
- 500 nT
- 2000 nT

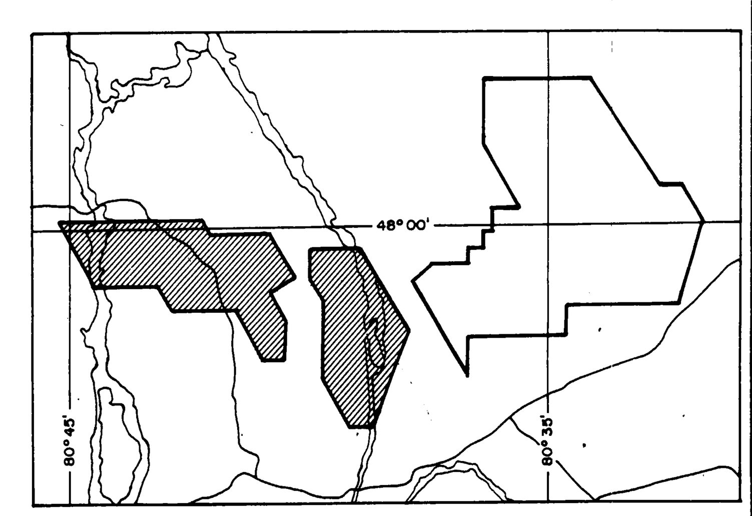
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



NORCAN RESOURCES LTD.

TOTAL FIELD MAGNETICS

LOG LAKE PROPERTY

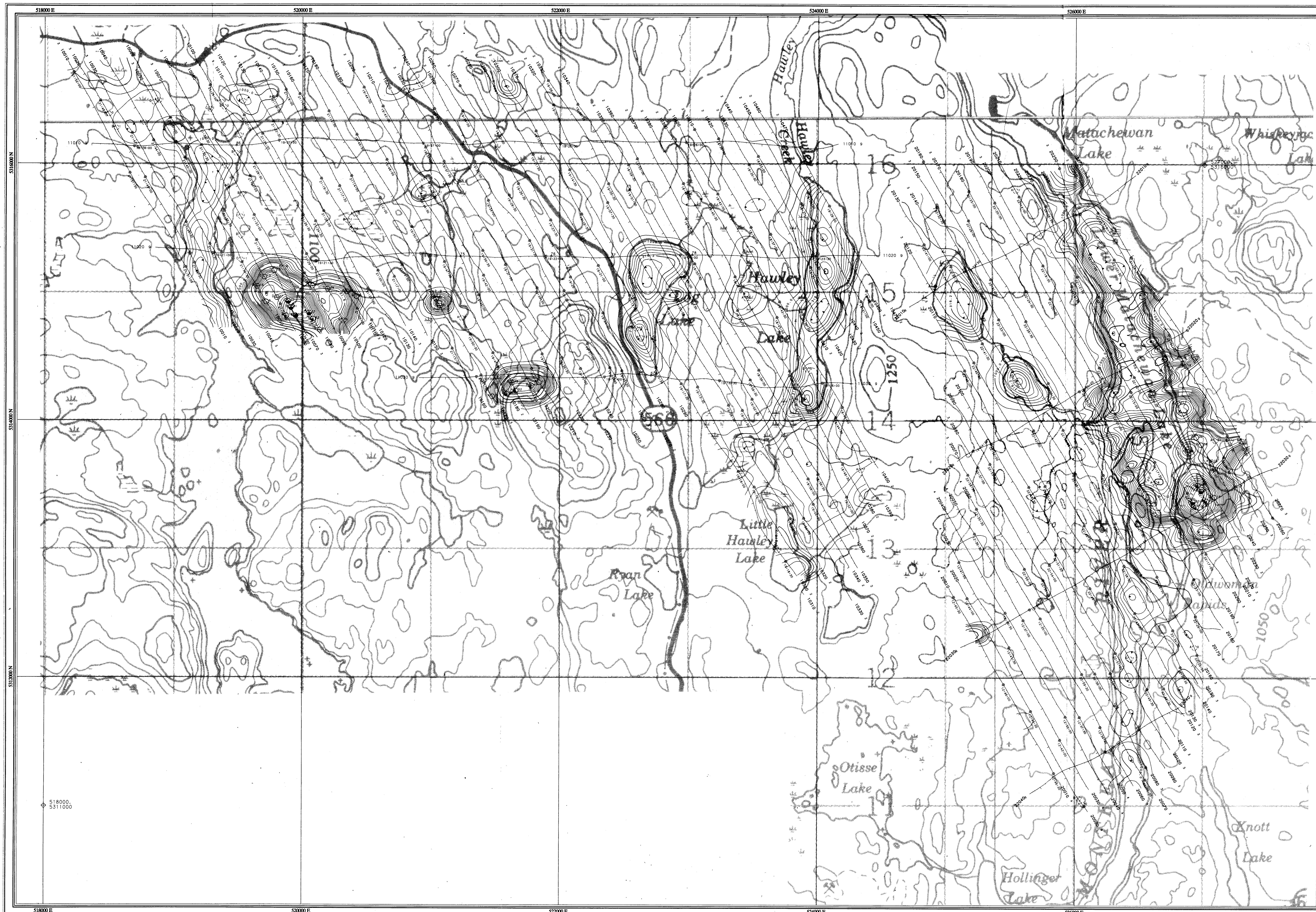
Matachewan, Ontario 2.17354

SCALE 1:10 000

250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-3 (Sheet 1)



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 860 Hz coplanar EM response, assuming a resistive half-space (200 m) model. Average sensor elevation was 36.7 m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

- 0.1 log(ohm·m)
- 0.5 log(ohm·m)
- 2.0 log(ohm·m)

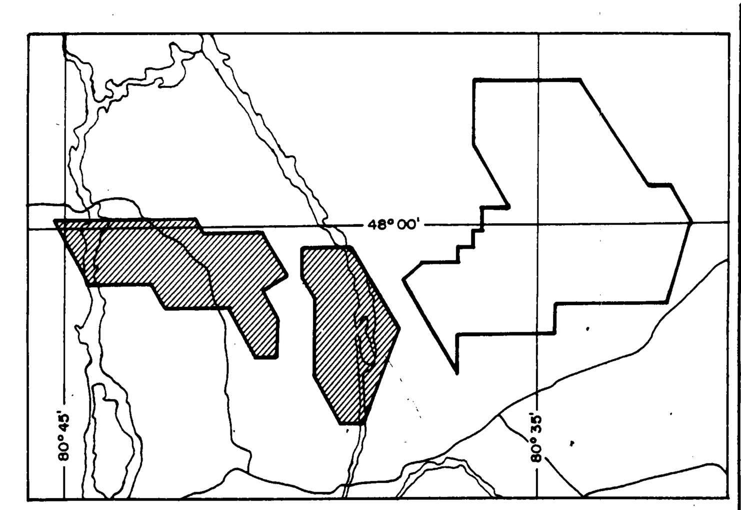
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



NORCAN RESOURCES LTD.

APPARENT RESISTIVITY

860 Hz COPLANAR 2.17354

LOG LAKE PROPERTY

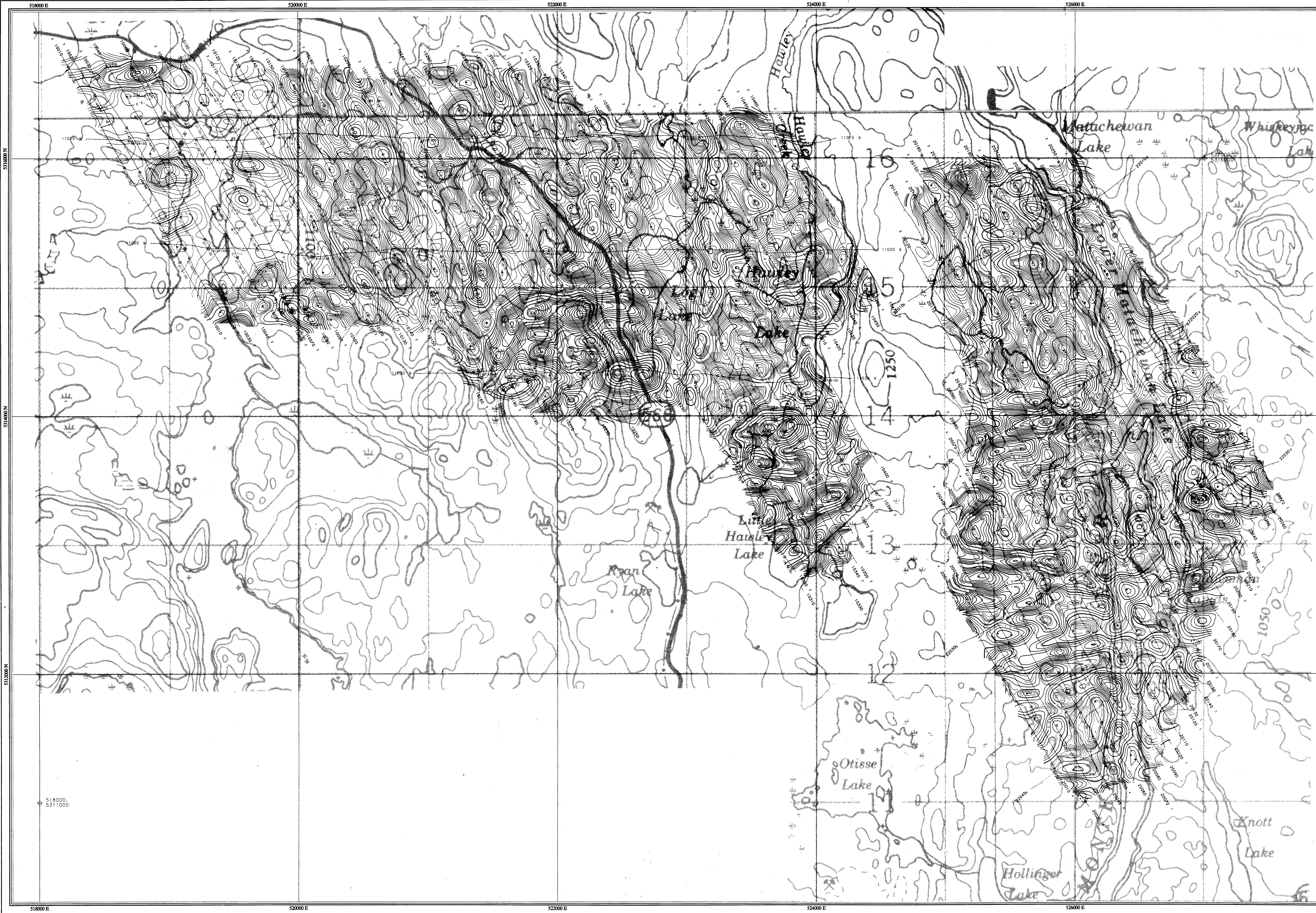
Matachewan, Ontario

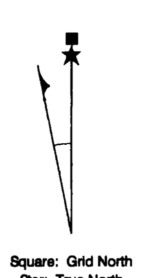
SCALE 1:10 000

250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-5A (Sheet 1)





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum, UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

VERTICAL GRADIENT

Vertical magnetic gradient contour data, calculated from the gridded total field magnetics data by an FFT algorithm.

Map contours are in nanoTeslas/metre, and are multiples of those listed below:

- 0.1 nT/m
- 0.5 nT/m
- 2 nT/m
- 10 nT/m
- 50 nT/m

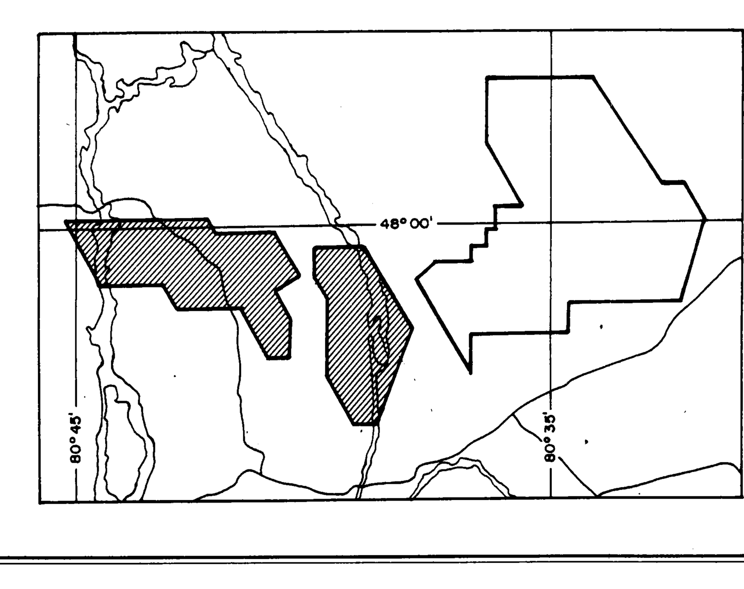
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- A 2 — 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



NORCAN RESOURCES LTD.

VERTICAL MAGNETIC GRADIENT

2.17354

LOG LAKE PROPERTY

Matachewan, Ontario

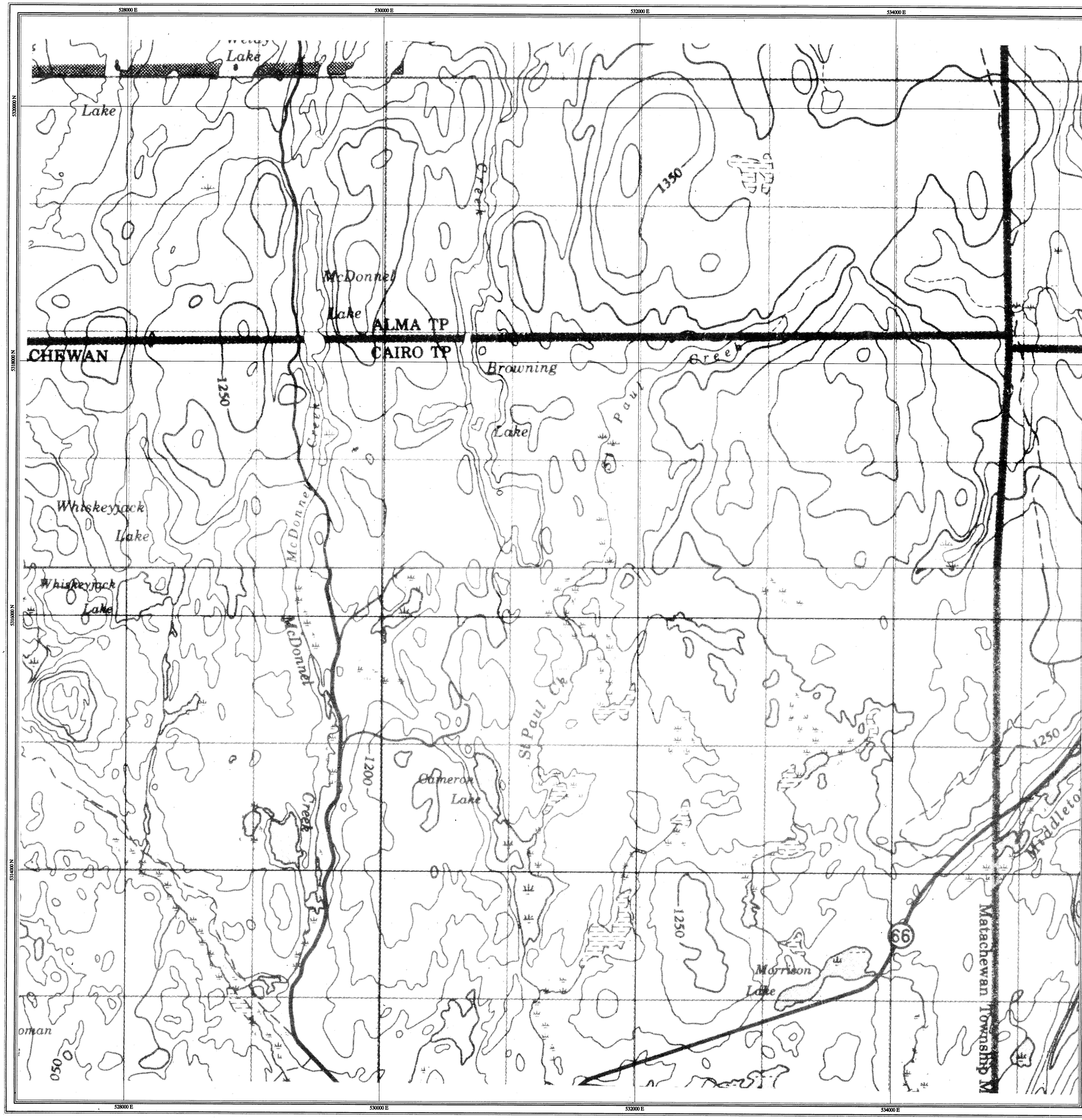
SCALE 1:10 000

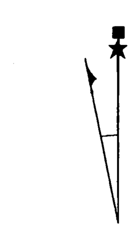
250 0 100 200 500 1000 metres

aerodat
AERODAT INC.

Date Flown: April, 1997	
Map Ref: 41P/15, 42A/2	
Project Ref: J9733-4	(Sheet 1)

300





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

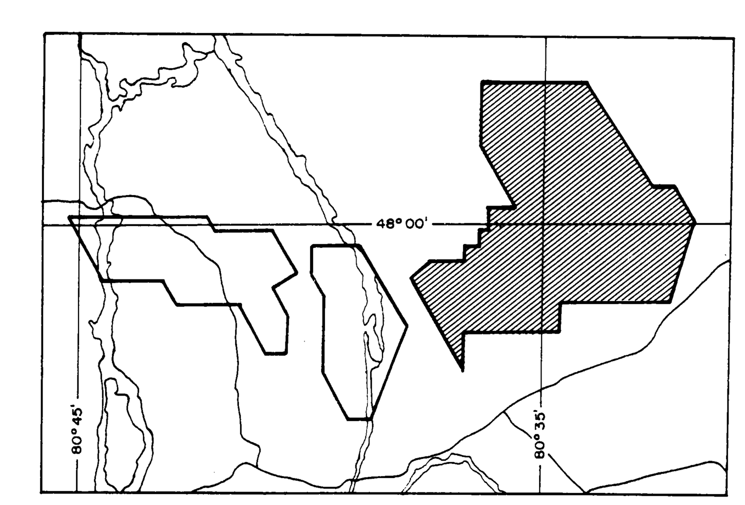
Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

PLANIMETERY

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)



NORCAN RESOURCES LTD.

BASE MAP

BROWNING PROPERTY

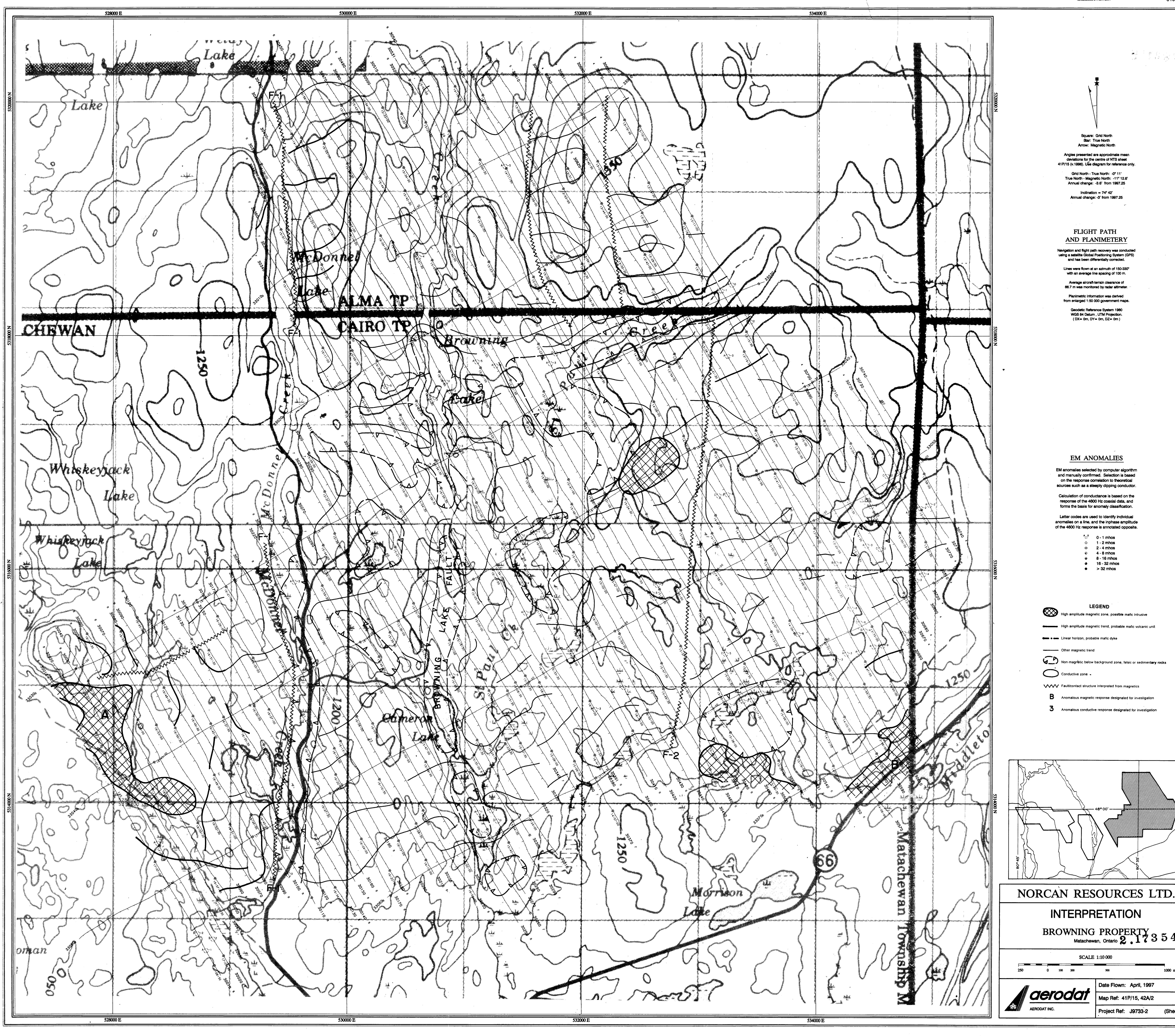
Matachewan, Ontario 2.17354

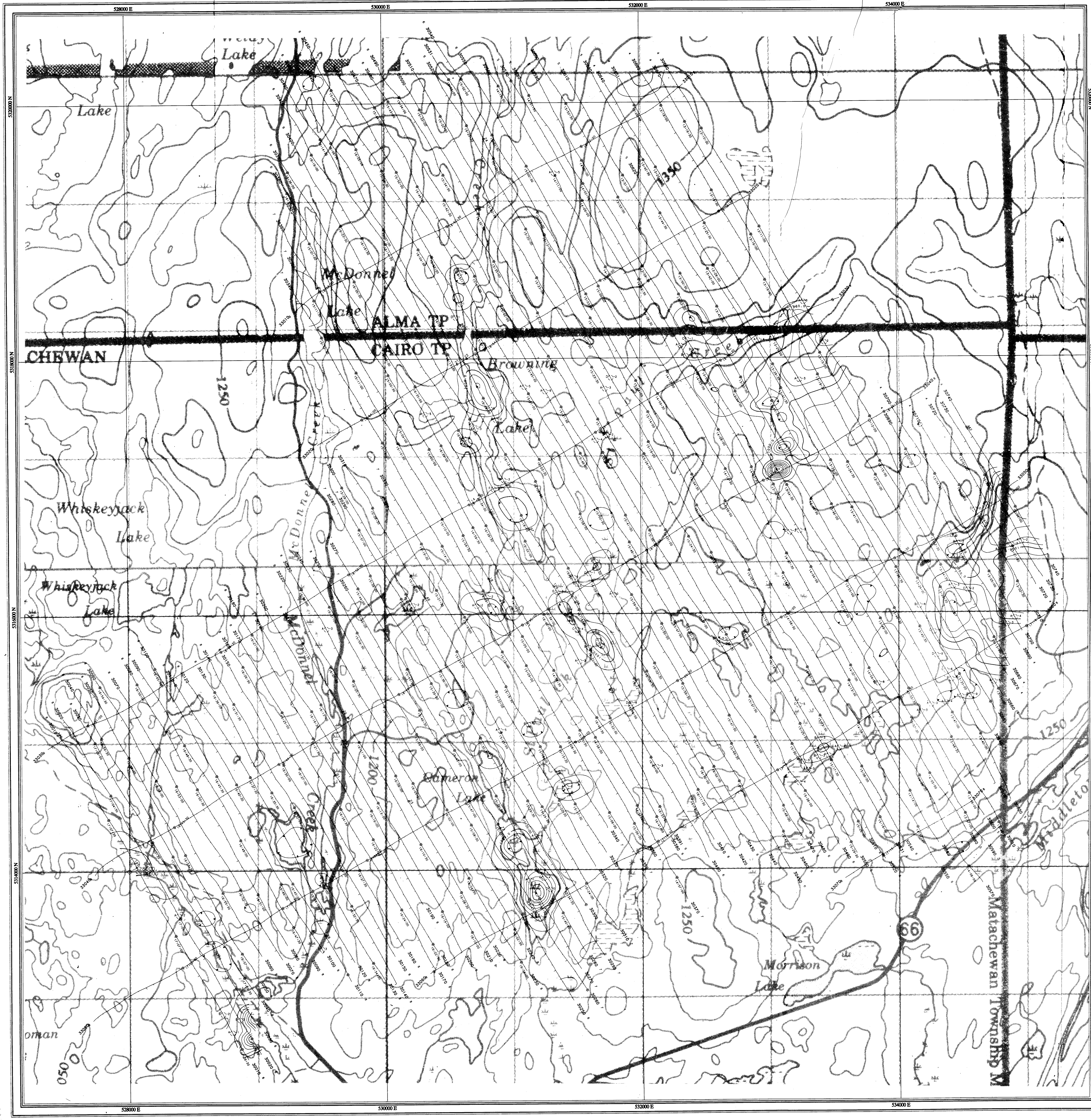
SCALE 1:10 000

250 0 100 200 500 1000 metres

aerodat
AERODAT INC.

Date Flown:	April, 1997
Map Ref:	41P/15, 42A/2
Project Ref:	J9733-1 (Sheet 2)


528000 E
530000 E
532000 E
534000 E
5320000 N
5318000 N
5316000 N
5314000 N
Lake
McDonnel Lake
ALMA TP
CAIRO TP
CHEWAN
Browning Lake
Whiskeyjack Lake
McDonnel Creek
BROWNING LAKE FAULT
Cameron Lake
Morrison Lake
Matachewan Township
Middleton
66
1250
1200
F-1
F-2
A
B
Square: Grid North
Star: True North
Arrow: Magnetic North
Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.
Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25
Inclination = 74° 42'
Annual change: -3' from 1997.25
FLIGHT PATH AND PLANIMETERY
Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.
Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.
Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.
Planimetric information was derived from enlarged 1:50 000 government maps.
Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)
EM ANOMALIES
EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.
Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.
Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.
0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos
LEGEND
High amplitude magnetic zone, possible mafic intrusive
High amplitude magnetic trend, probable mafic volcanic unit
Linear horizon, probable mafic dyke
Other magnetic trend
Non-magnetic below background zone, felsic or sedimentary rocks
Conductive zone
Fault/contact structure interpreted from magnetics
B Anomalous magnetic response designated for investigation
3 Anomalous conductive response designated for investigation
48° 00'
80° 45'
80° 35'
NORCAN RESOURCES LTD.
INTERPRETATION
BROWNING PROPERTY
Matachewan, Ontario
2.17354
SCALE 1:10 000
250 0 100 200 500 1000 metres
aerodat
AERODAT INC.
Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-2 (Sheet 2)



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 860 Hz coplanar EM response, assuming a resistive half-space (200 m) model. Average sensor elevation was 36.7 m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

0.1 log(ohm·m)
0.5 log(ohm·m)
2.0 log(ohm·m)

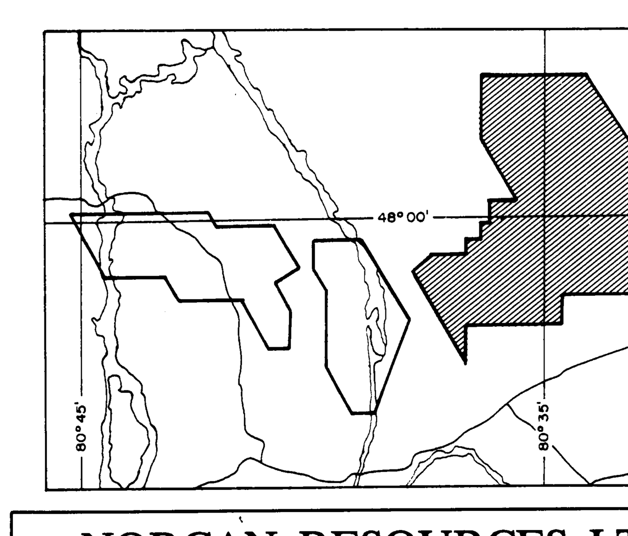
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos



NORCAN RESOURCES LTD.

APPARENT RESISTIVITY
860 Hz COPLANAR

BROWNING PROPERTY
Matachewan, Ontario

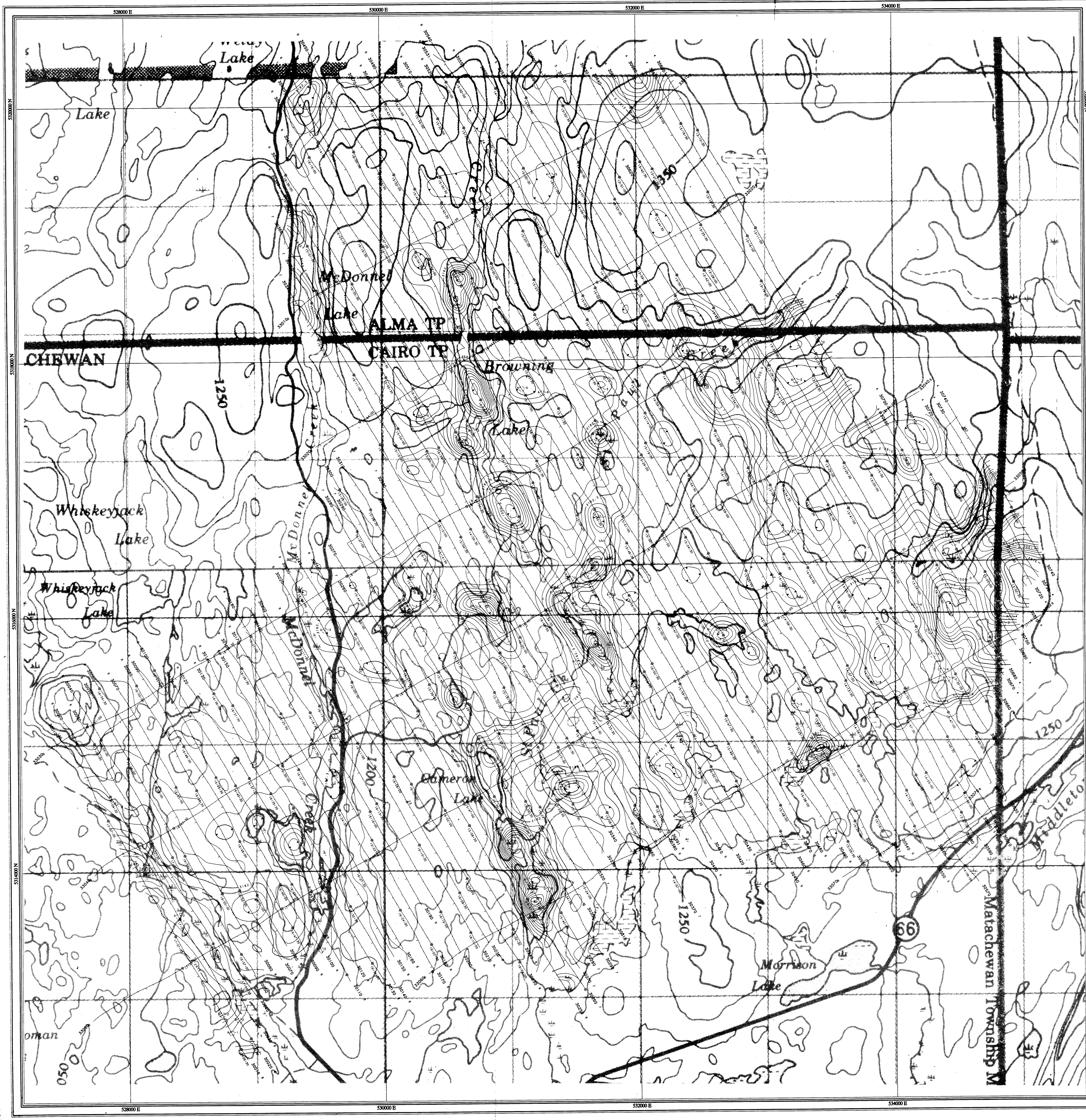
2.17354

SCALE 1:10 000

250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-5A (Sheet 2)



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum, UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 4175 Hz coplanar EM response, assuming a resistive half-space (200 m) model. Average sensor elevation was 36.7 m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

0.1 log(ohm·m)
0.5 log(ohm·m)
2.0 log(ohm·m)

EM ANOMALIES

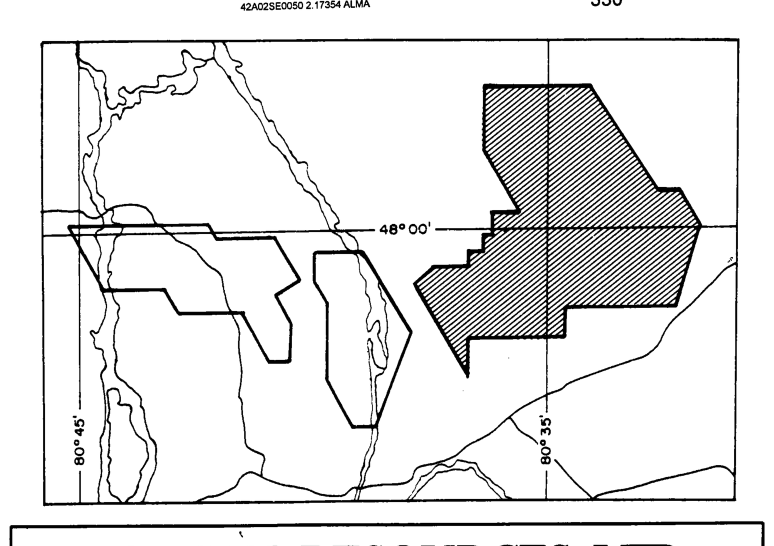
EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos

330



NORCAN RESOURCES LTD.

APPARENT RESISTIVITY
4175 Hz COPLANAR

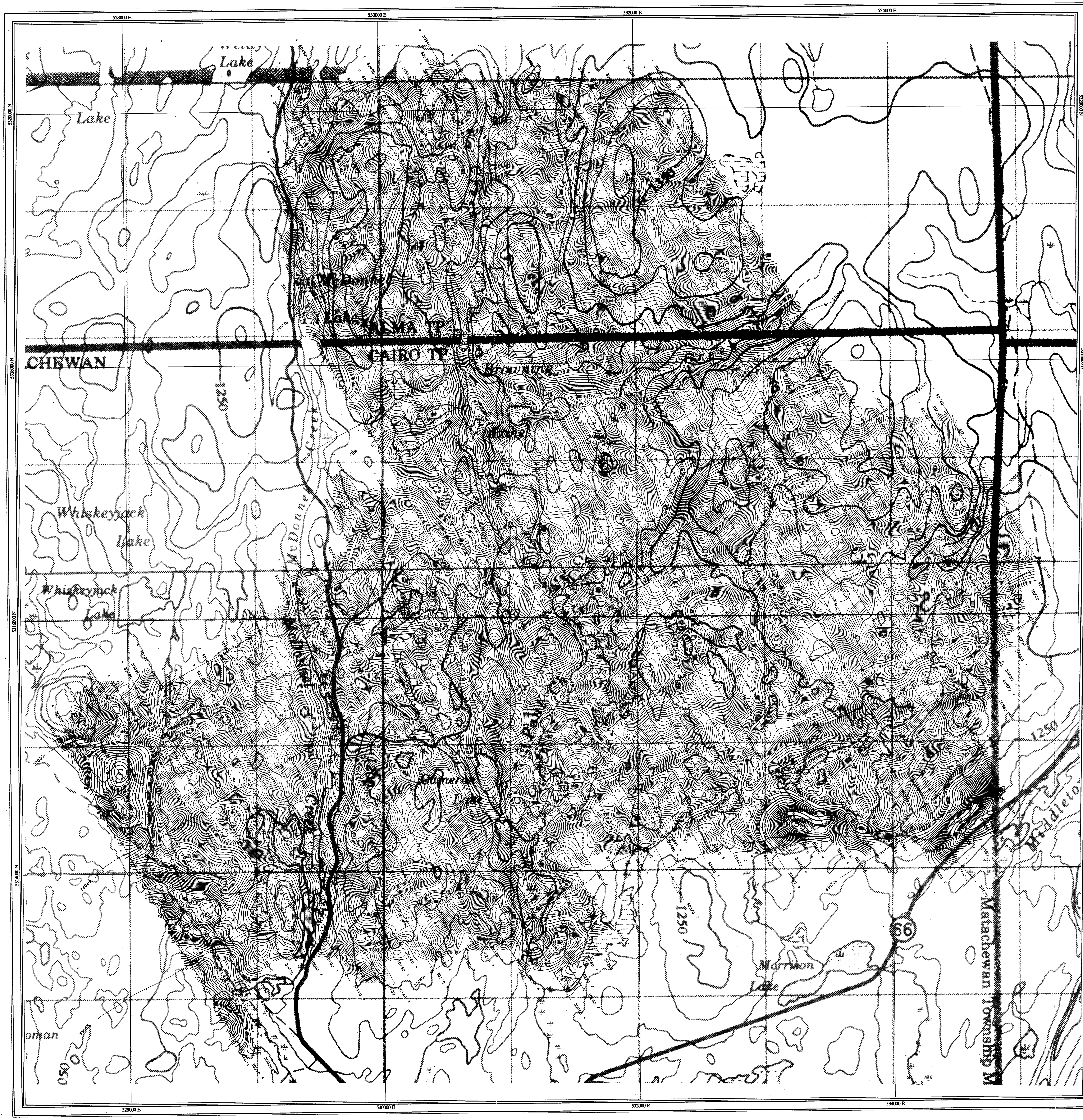
BROWNING PROPERTY
Matachewan, Ontario 2.17354

SCALE 1:10 000

250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-5B (Sheet 2)



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum, UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

TOTAL FIELD MAGNETICS

Total field magnetic intensity contour data, measured by a cesium high sensitivity magnetometer at an average sensor elevation of 51.7 m, and corrected for diurnal variation.

Map contours are in nanoTeslas, and are multiples of those listed below:

- 5 nT
- 20 nT
- 100 nT
- 500 nT
- 2000 nT

EM ANOMALIES

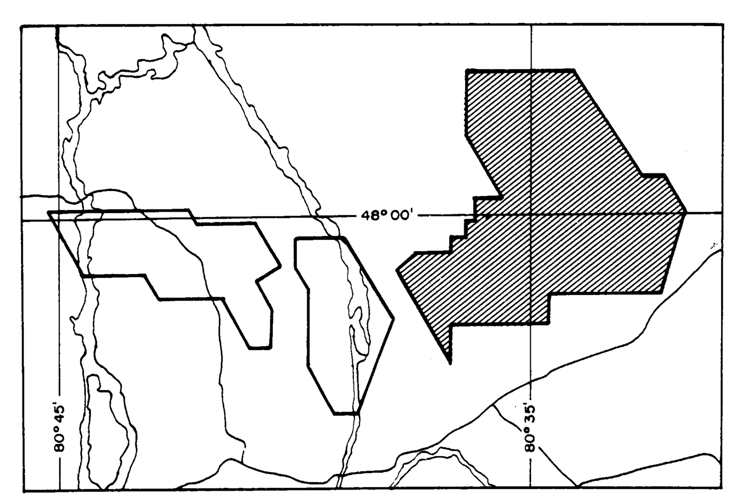
EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos

340



NORCAN RESOURCES LTD.

TOTAL FIELD MAGNETICS

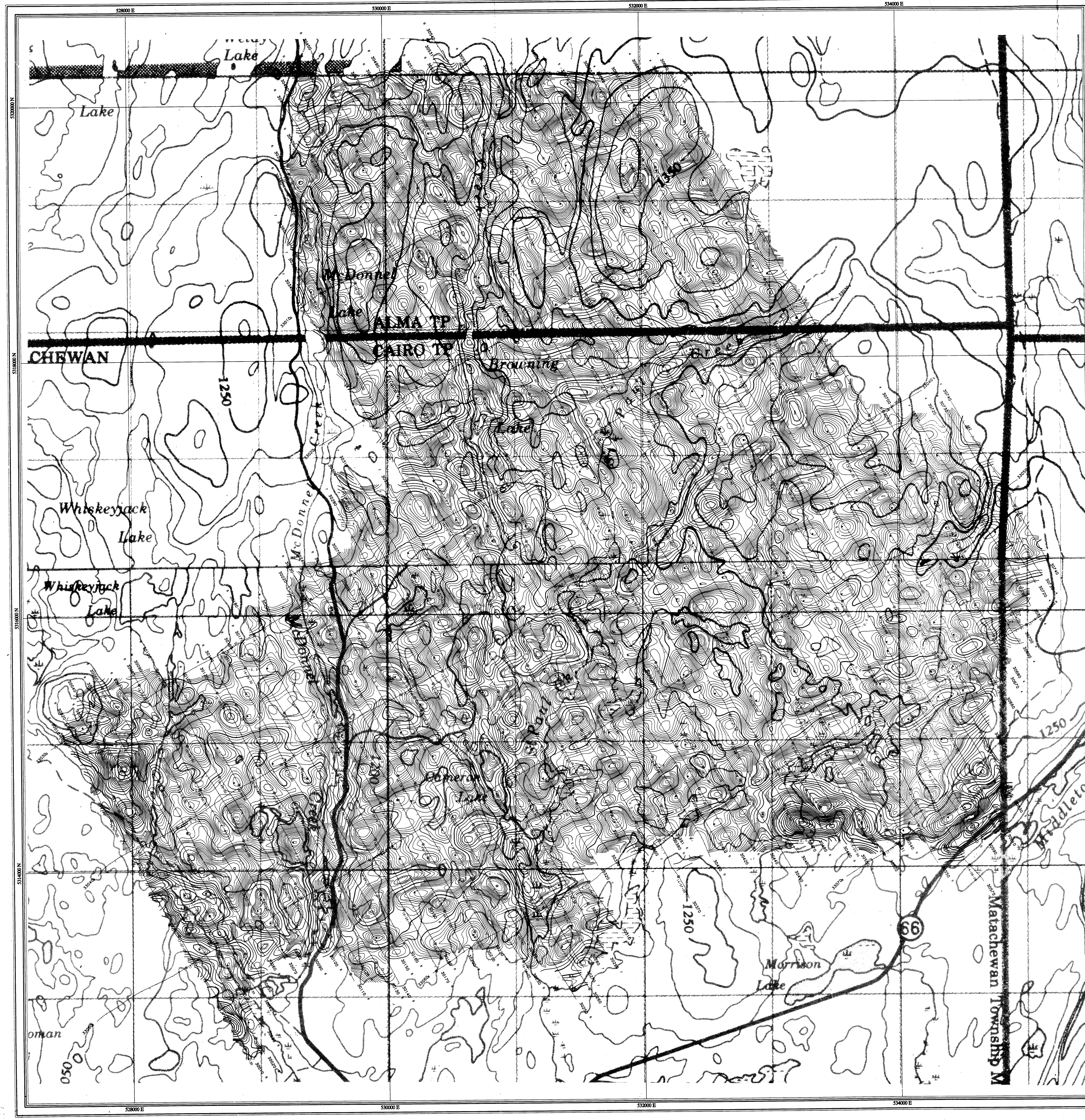
BROWNING PROPERTY
Matachewan, Ontario 2.17354

SCALE 1:10 000

250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown:	April, 1997
Map Ref:	41P/15, 42A/2
Project Ref:	J9733-3 (Sheet 2)



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum, UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

VERTICAL GRADIENT

Vertical magnetic gradient contour data, calculated from the gridded total field magnetics data by an FFT algorithm.

Map contours are in nanoTeslas/metre, and are multiples of those listed below:

0.1 nT/m
0.5 nT/m
2 nT/m
10 nT/m
50 nT/m

EM ANOMALIES

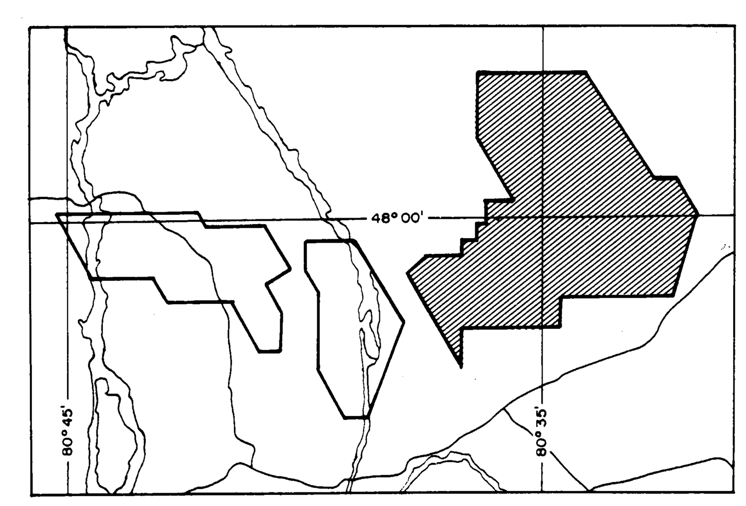
EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos

350



NORCAN RESOURCES LTD.

VERTICAL MAGNETIC GRADIENT

BROWNING PROPERTY

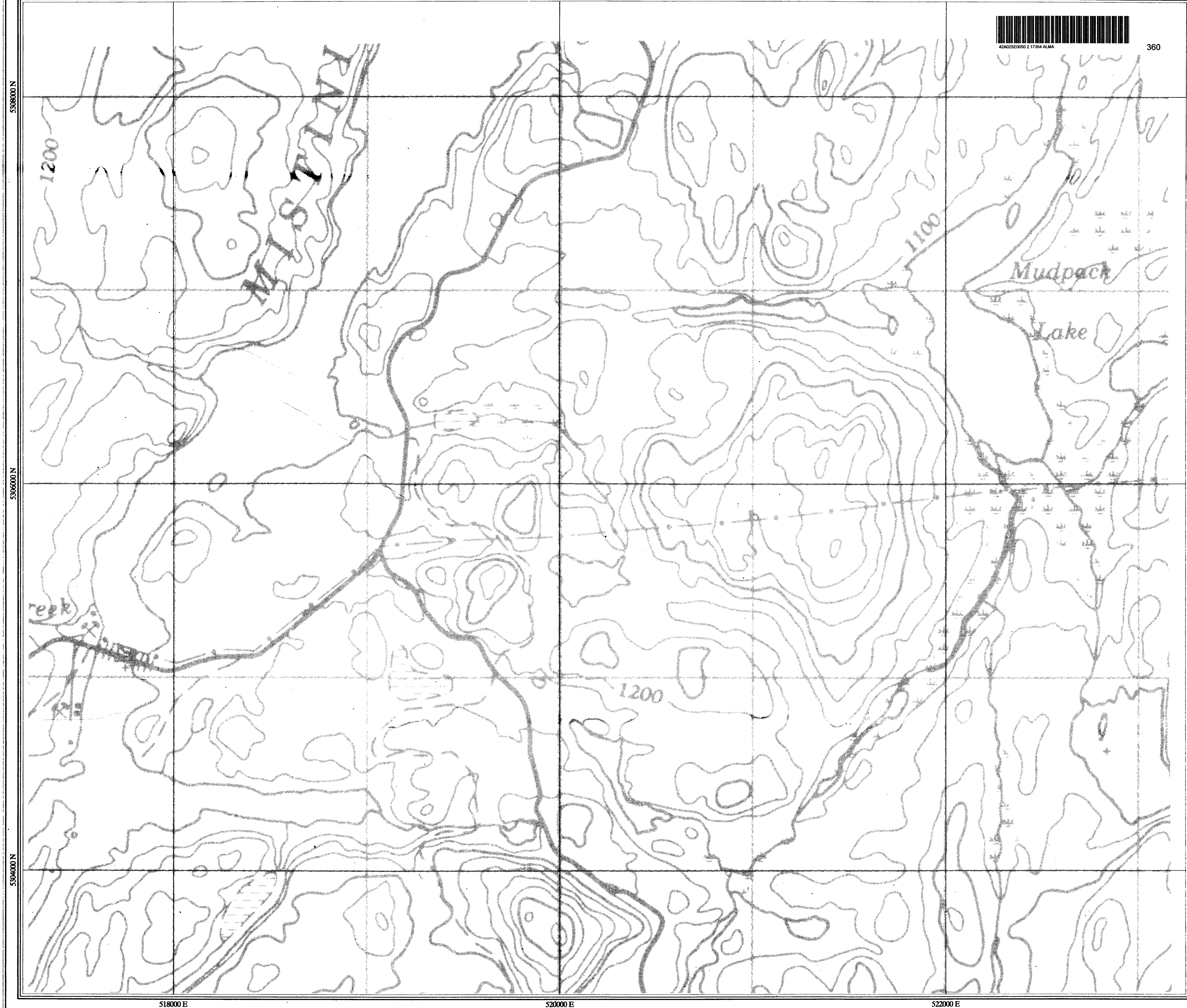
Matachewan, Ontario 2.17354

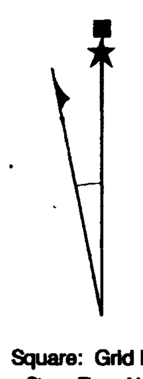
SCALE 1:10 000

250 0 100 200 500 1000 metres

aerodat
AERODAT INC.

Date Flown:	April, 1997
Map Ref:	41P/15, 42A/2
Project Ref:	J9733-4 (Sheet 2)





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

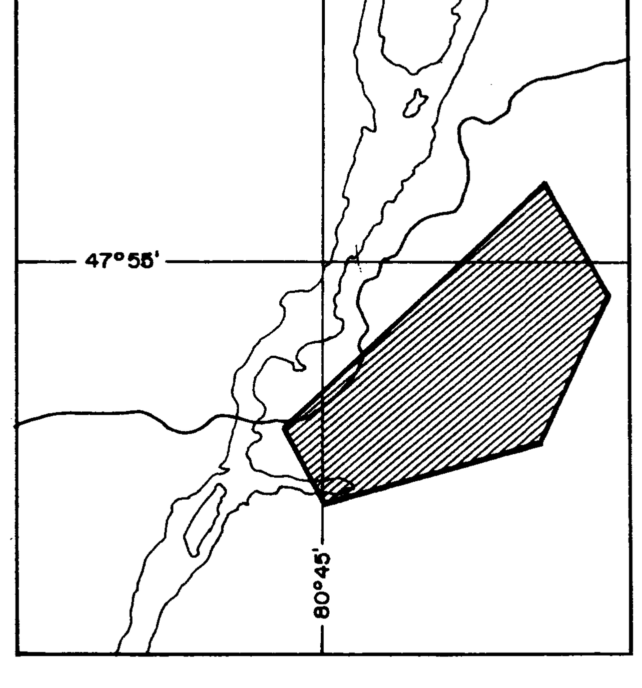
Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

PLANIMETERY

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)



NORCAN RESOURCES LTD.

BASE MAP 2.17354

YARROW PROPERTY

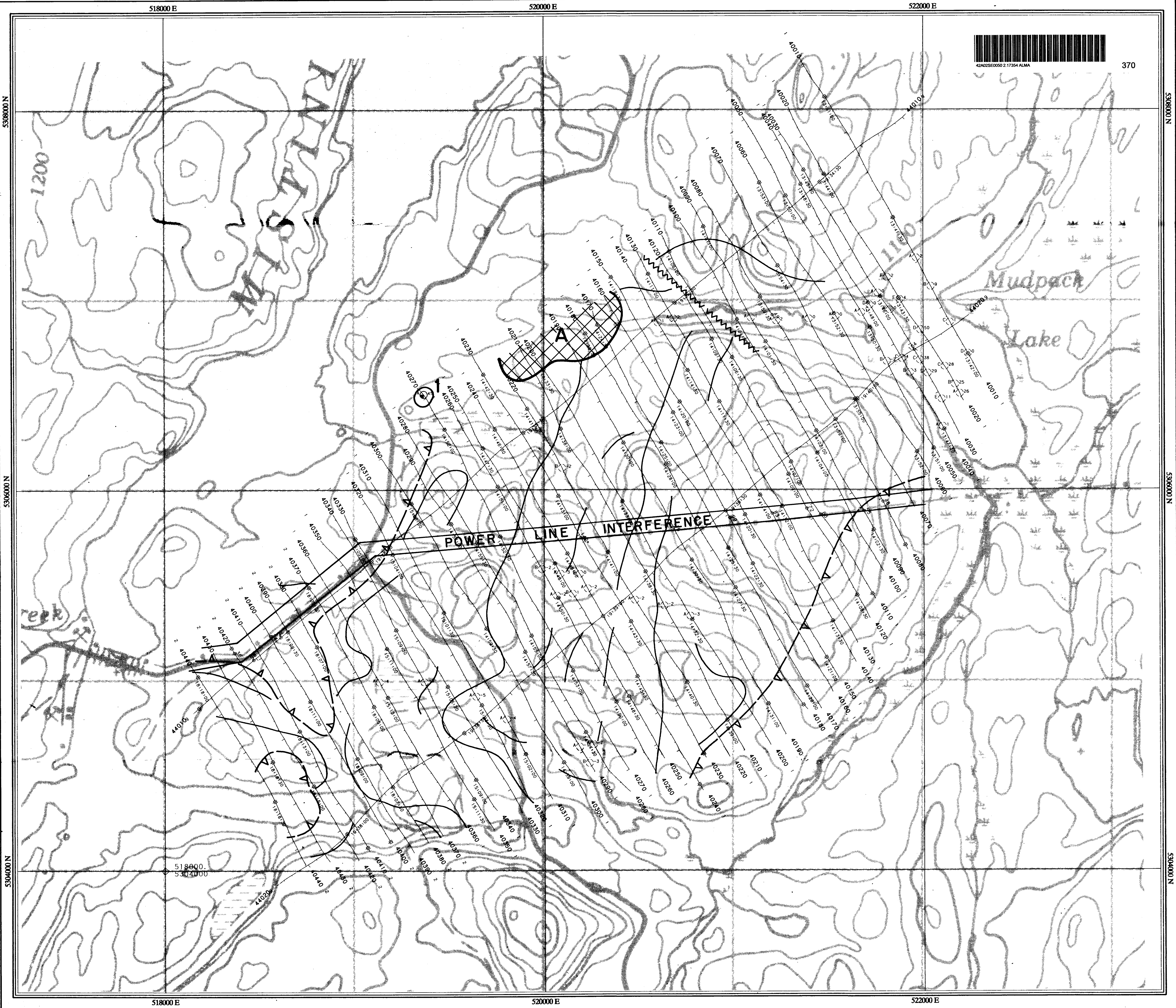
Matachewan, Ontario

SCALE 1:10 000

250 0 100 200 500 1000 metres

aerodat
AERODAT INC.

Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-1 (Sheet 3)



Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

LEGEND

- High amplitude magnetic zone, possible mafic intrusive
- High amplitude magnetic trend, probable mafic volcanic unit
- Linear horizon, probable mafic dyke
- Other magnetic trend
- Non-magnetic below background zone, felsic or sedimentary rocks
- Conductive zone
- Fault/contact structure interpreted from magnetics
- B Anomalous magnetic response designated for investigation
- 3 Anomalous conductive response designated for investigation

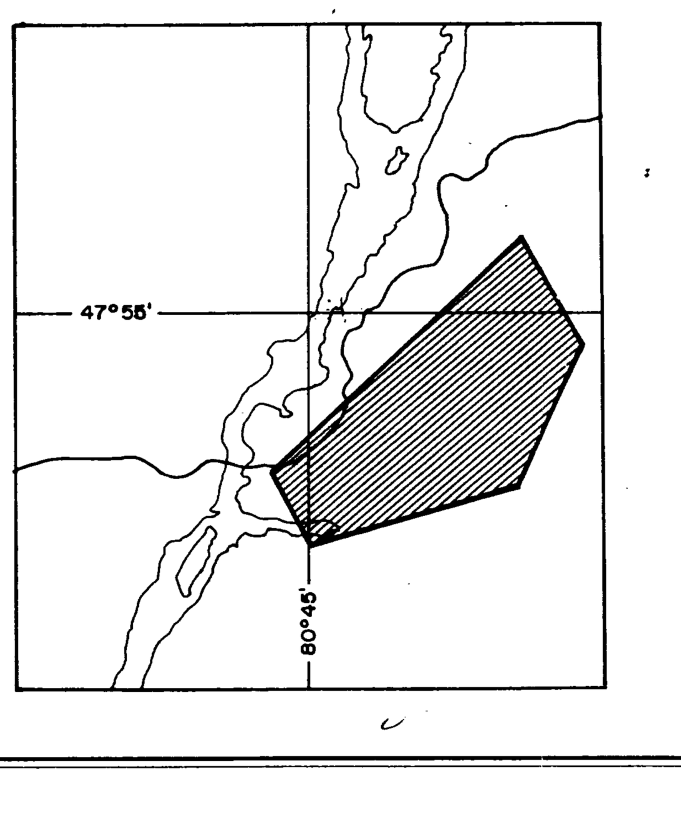
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos



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INTERPRETATION

2.17354

YARROW PROPERTY

Matachewan, Ontario

SCALE 1:10 000

250 0 100 200 500 1000 metres

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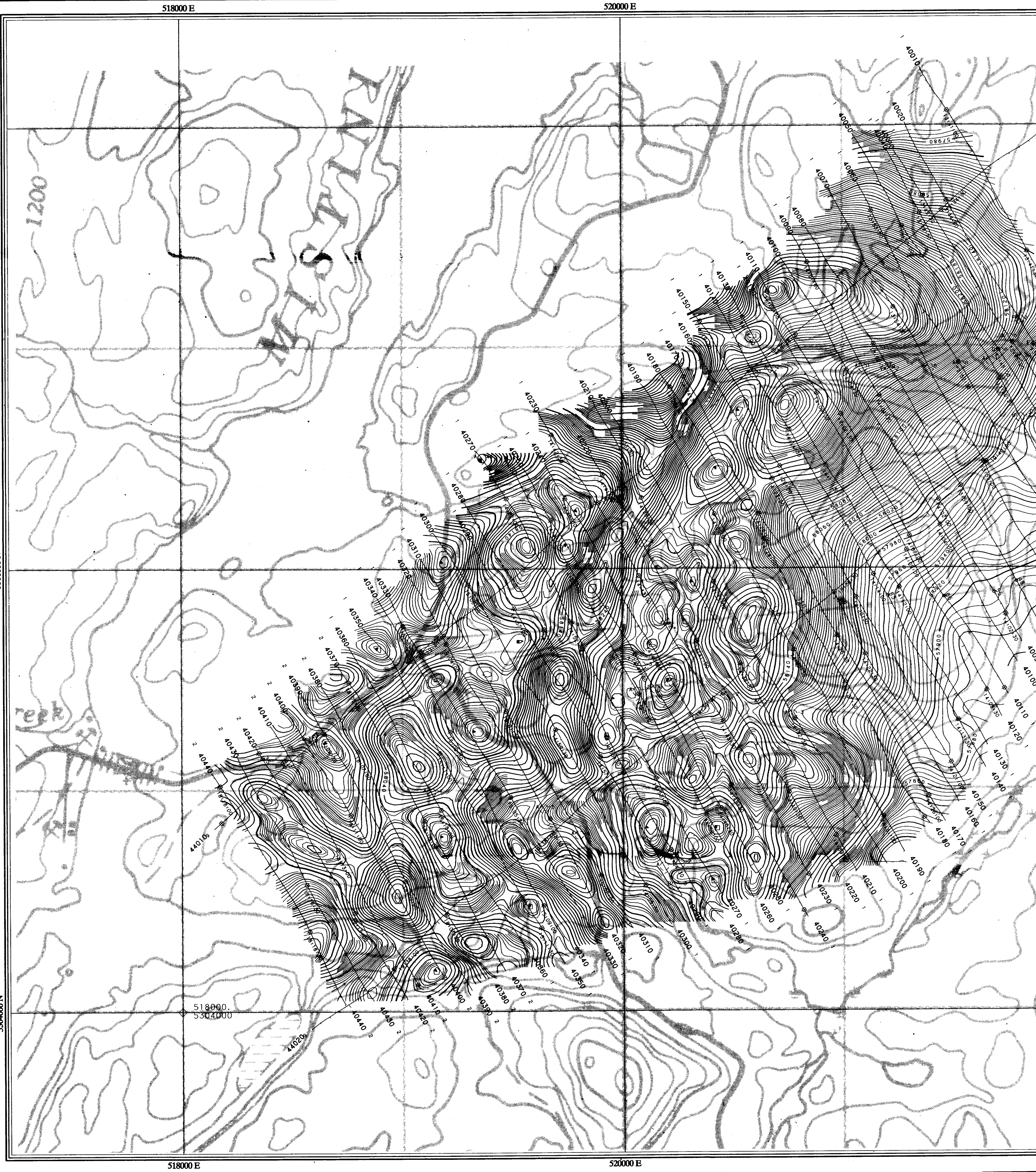
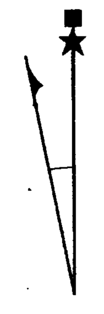
Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-2 (Sheet 3)





Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

TOTAL FIELD MAGNETICS

Total field magnetic intensity contour data, measured by a cesium high sensitivity magnetometer at an average sensor elevation of 51.7 m, and corrected for diurnal variation.

Map contours are in nanoTeslas, and are multiples of those listed below:

5 nT
20 nT
100 nT
500 nT
2000 nT

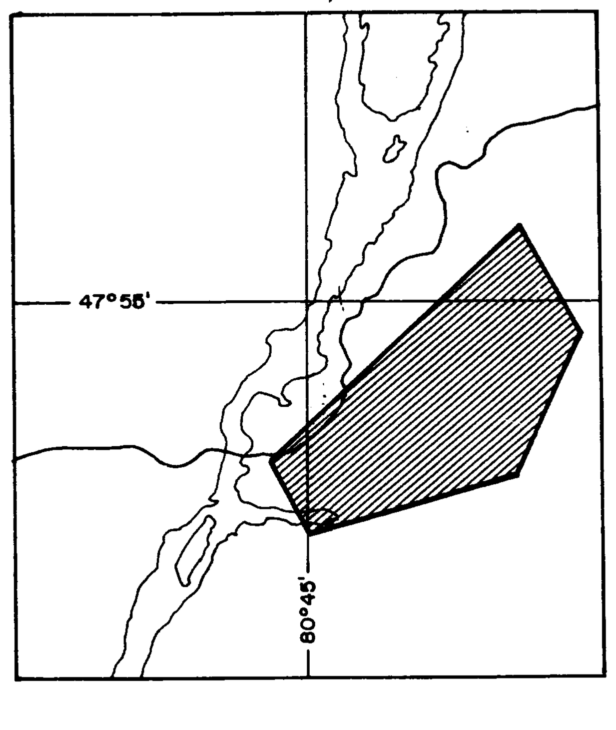
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

A 2
0 - 1 mhos
1 - 2 mhos
2 - 4 mhos
4 - 8 mhos
8 - 16 mhos
16 - 32 mhos
> 32 mhos



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TOTAL FIELD MAGNETICS

YARROW PROPERTY

2.17354

Matachewan, Ontario

SCALE 1:10 000

250 0 100 200 500 1000 metres

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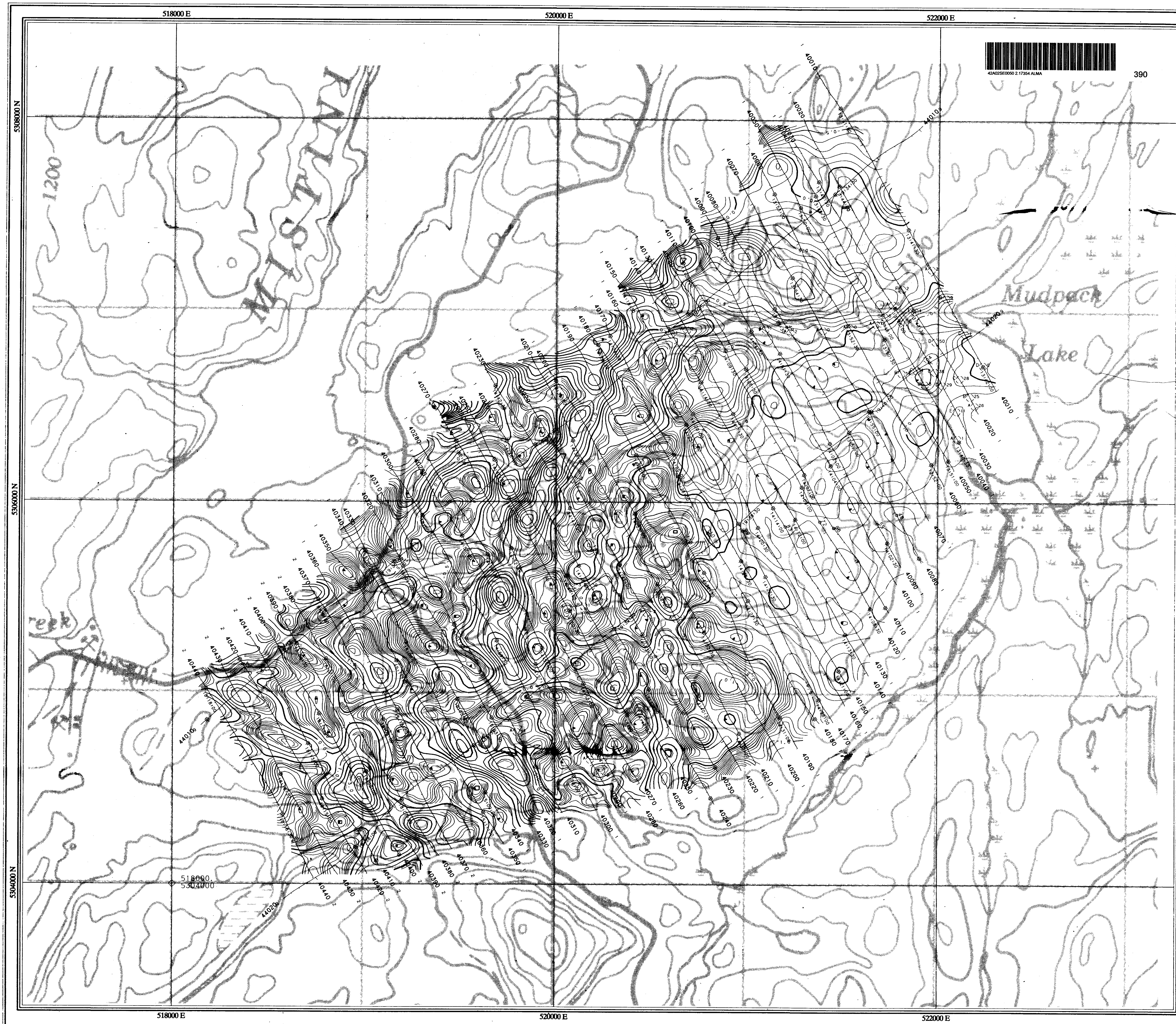
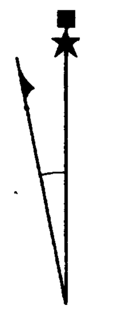
Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-3 (Sheet 3)





Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

VERTICAL GRADIENT

Vertical magnetic gradient contour data, calculated from the gridded total field magnetics data by an FFT algorithm.

Map contours are in nanoTeslas/metre, and are multiples of those listed below:

- 0.1 nT/m
- 0.5 nT/m
- 2 nT/m
- 10 nT/m
- 50 nT/m

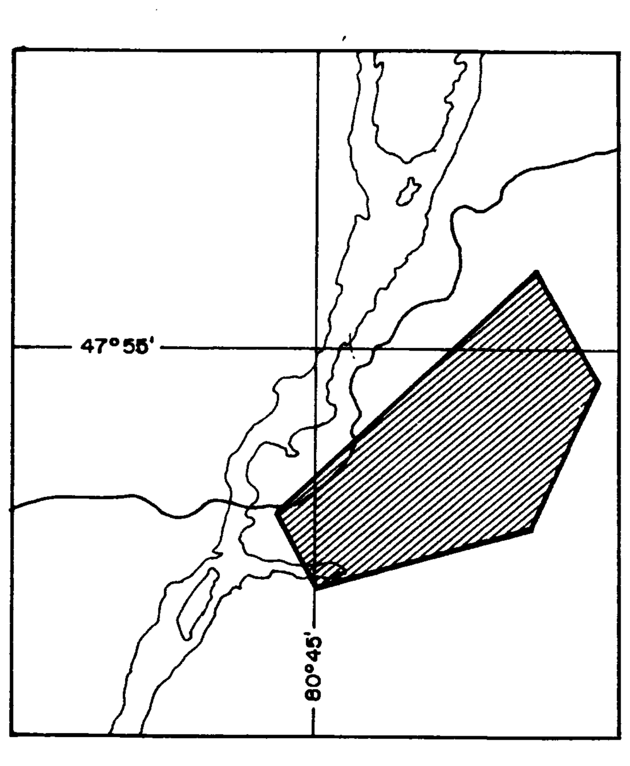
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



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VERTICAL MAGNETIC GRADIENT

YARROW PROPERTY

2.17354

Matachewan, Ontario

SCALE 1:10 000

250 0 100 200 500 1000 metres

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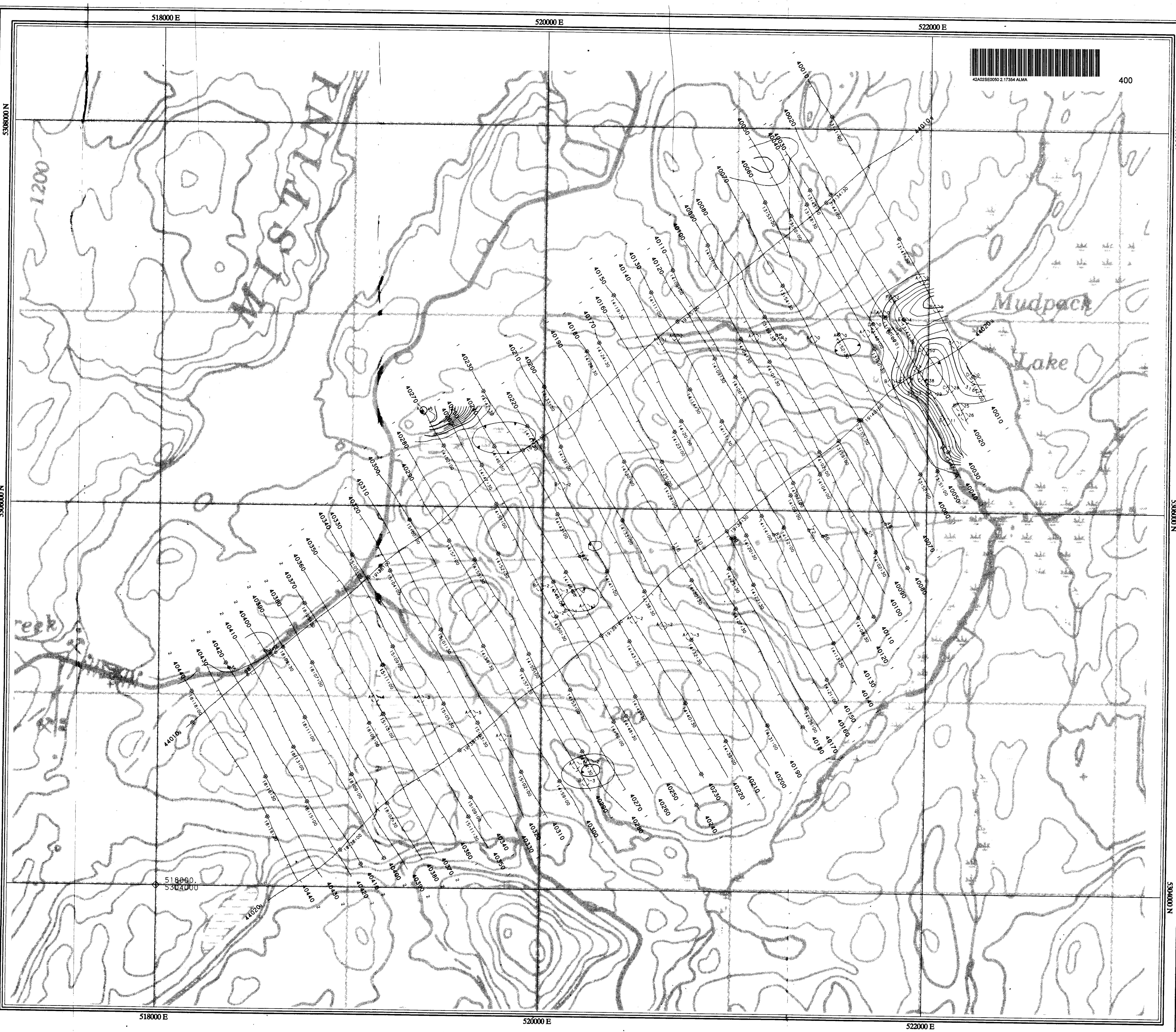
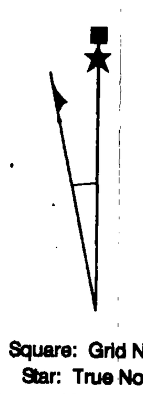
Date Flown:	April, 1997
Map Ref:	41P/15, 42A/2
Project Ref:	J9733-4 (Sheet 3)





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 860 Hz coplanar EM response, assuming a resistive half-space (200 m) model. Average sensor elevation was 36.7 m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

0.1 log(ohm·m)
0.5 log(ohm·m)
2.0 log(ohm·m)

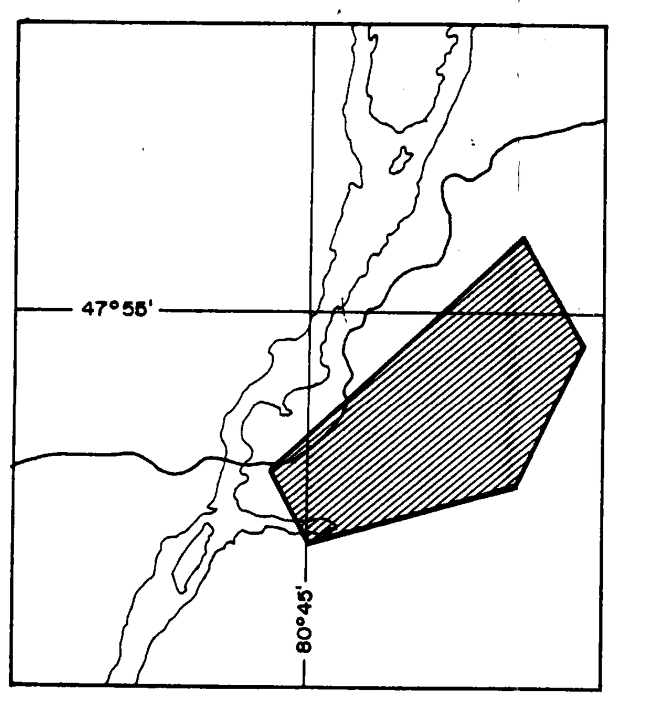
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

- 0 - 1 mhos
- 1 - 2 mhos
- 2 - 4 mhos
- 4 - 8 mhos
- 8 - 16 mhos
- 16 - 32 mhos
- > 32 mhos



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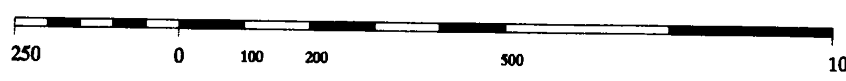
APPARENT RESISTIVITY
860 Hz COPLANAR 2.17354

YARROW PROPERTY
Matachewan, Ontario

SCALE 1:10 000



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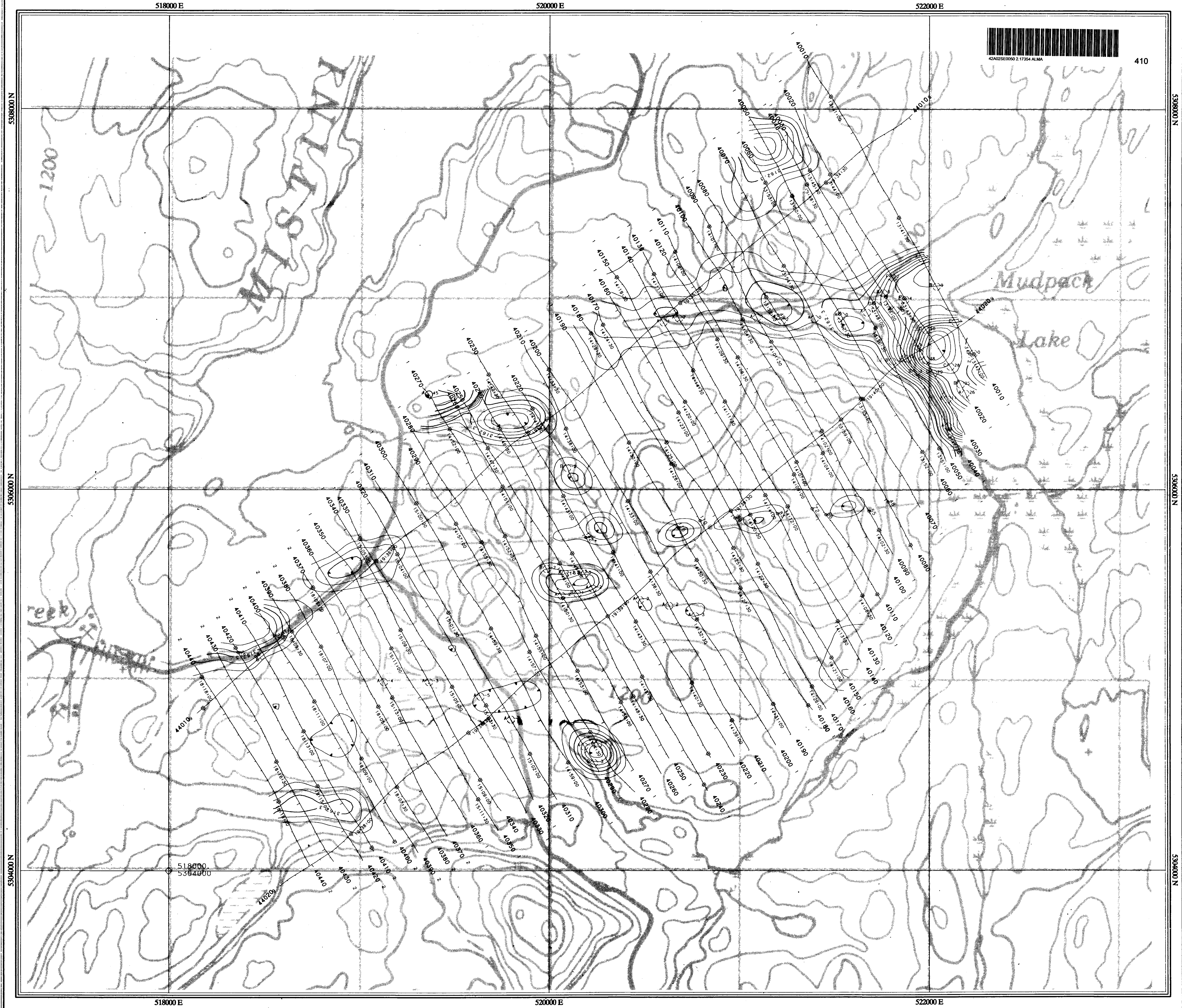
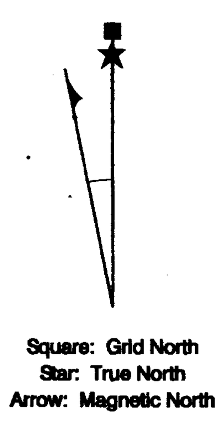
Date Flown: April, 1997
Map Ref: 41P/15, 42A/2
Project Ref: J9733-5A (Sheet 3)





Square: Grid North
Star: True North
Arrow: Magnetic North

Angles presented are approximate mean deviations for the centre of NTS sheet 41P/15 (v.1996). Use diagram for reference only.

Grid North - True North: -0° 11'
True North - Magnetic North: -11° 12.6'
Annual change: -3.6' from 1997.25

Inclination = 74° 42'
Annual change: -3' from 1997.25

FLIGHT PATH AND PLANIMETERY

Navigation and flight path recovery was conducted using a satellite Global Positioning System (GPS) and has been differentially corrected.

Lines were flown at an azimuth of 150-330° with an average line spacing of 100 m.

Average aircraft-terrain clearance of 66.7 m was monitored by radar altimeter.

Planimetric information was derived from enlarged 1:50 000 government maps.

Geodetic Reference System 1980
WGS 84 Datum , UTM Projection.
(DX= 0m, DY= 0m, DZ= 0m)

APPARENT RESISTIVITY

Apparent resistivity calculated from the measured 4175 Hz coplanar EM response, assuming a resistive half-space (200 m) model. Average sensor elevation was 36.7 m.

Map contours are in ohm·m, at logarithmic intervals, in multiples of those listed below:

- 0.1 log(ohm·m)
- 0.5 log(ohm·m)
- 2.0 log(ohm·m)

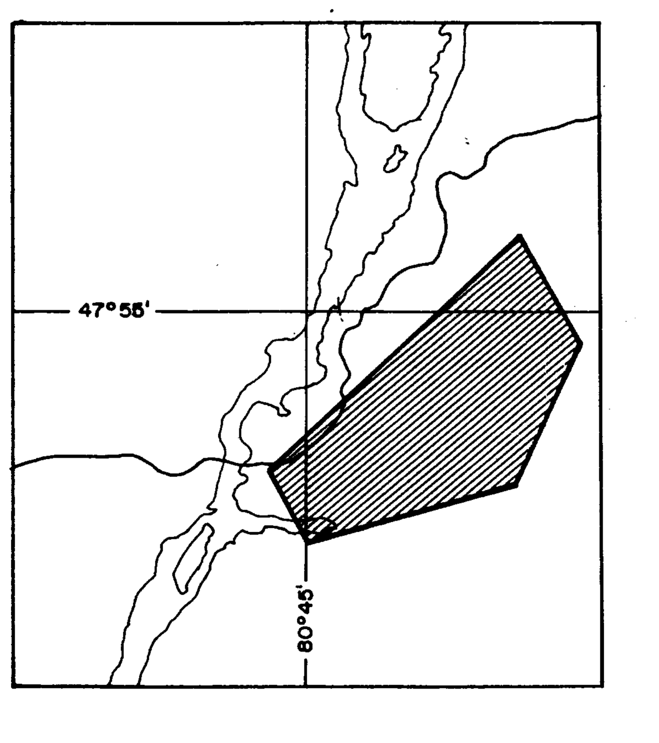
EM ANOMALIES

EM anomalies selected by computer algorithm and manually confirmed. Selection is based on the response correlation to theoretical sources such as a steeply dipping conductor.

Calculation of conductance is based on the response of the 4600 Hz coaxial data, and forms the basis for anomaly classification.

Letter codes are used to identify individual anomalies on a line, and the inphase amplitude of the 4600 Hz response is annotated opposite.

A ○ 2	0 - 1 mhos
○	1 - 2 mhos
⊖	2 - 4 mhos
◒	4 - 8 mhos
◓	8 - 16 mhos
◕	16 - 32 mhos
●	> 32 mhos



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APPARENT RESISTIVITY

4175 Hz COPLANAR

YARROW PROPERTY

2.17354

Matachewan, Ontario

SCALE 1:10 000

250 0 100 200 500 1000 metres

AERODAT INC.

Date Flown:	April, 1997
Map Ref:	41P/15, 42A/2
Project Ref:	J9733-5B (Sheet 3)