REPORT ON
COMBINED HELICOPTER BORNE
MAGNETIC, ELECTROMAGNETIC AND VLF
SURVEY
PORPHYRY CREEK AREA
HOBLITZELL TWP., NORTH EAST ONTARIO

for
COGEMA CANADA LIMITED
by

AERODAT LIMITED
January 12, 1988

J8793

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(Scale 1:10,000)

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1. INTRODUCTION

This report describes an airborne geophysical survey carried out on behalf of COGEMA Canada Limited by Aerodat Limited. Equipment operated included a three frequency electromagnetic system, a high sensitivity cesium vapour magnetometer, a two frequency VLF-EM system, a video tracking camera, an altimeter and an electronic positioning system. Electromagnetic, magnetic and altimeter data were recorded both in digital and analog form. Positioning data were stored in digital form, encoded on the VHS format video tape and recorded at regular intervals in UTM co-ordinates on the analog trace, as well as being marked on the flight path mosaic by the operator while in flight.

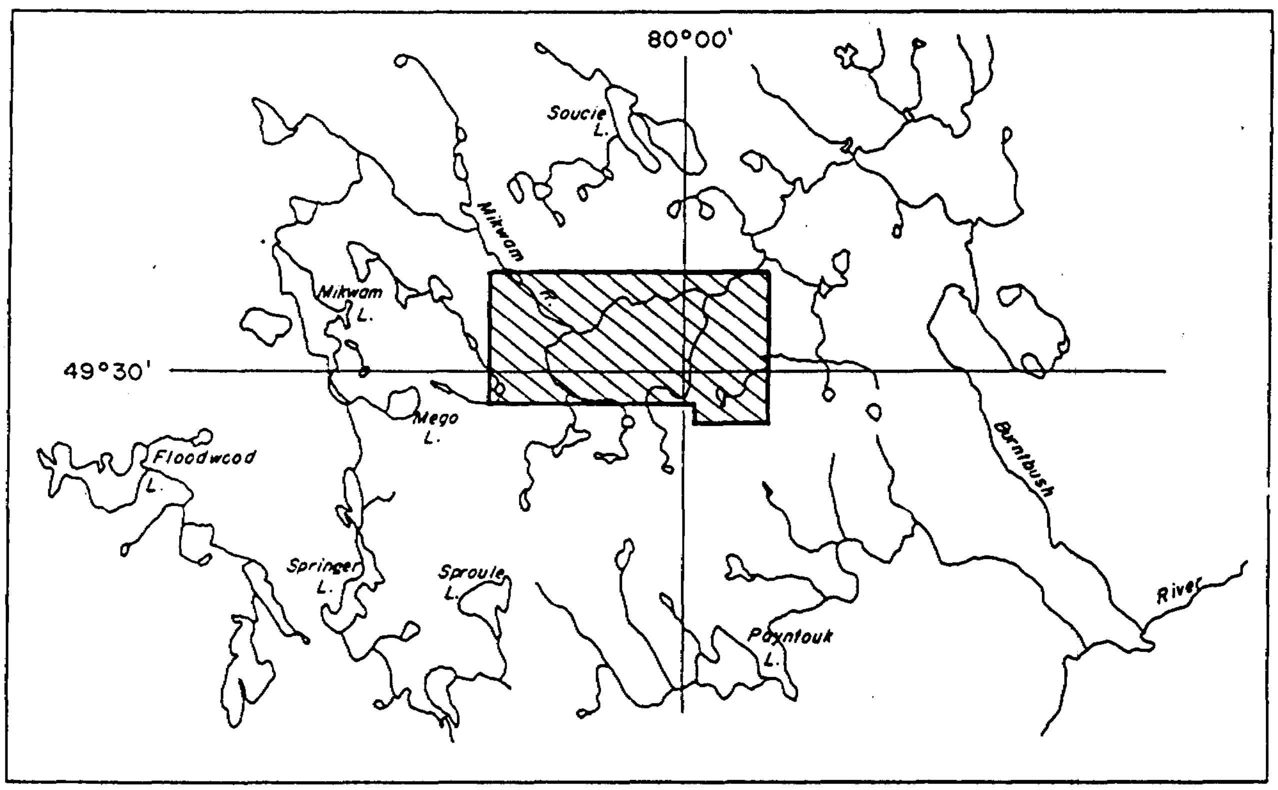
The airborne survey, comprising a block of ground in the Larder Lake Mining Division, Kirkland Lake District of north eastern Ontario and situated about 150 kilometres due north of Kirkland Lake, was flown during the period of November 27 to December 1, 1987. Three flights were required to complete the survey with flight lines oriented at Azimuths of 000-180 degrees and flown at a nominal spacing of 100 metres. Coverage and data quality were considered to be well within the specifications described in the contract.

The purpose of the survey was to record airborne geophysical data over and around ground that is of interest to COGEMA Canada Limited.

A total of 460 kilometres of the recorded data including 27 km of tie-line magnetic data were compiled in map form and are presented as part of this report according to specifications outlined by COGEMA Canada Limited.

2. SURVEY AREA LOCATION

The survey area is depicted on the index map shown below. It is centred at Latitude 49 degrees 31 minutes north, Longitude 80 degrees 02 minutes west, approximately 150 kilometres due north of Kirkland Lake in north eastern Ontario (NTS Reference Map Nos. 32 E/5,12 & 42 H/8,9). The area is accessed by roads and winter trails out of Cochrane, approximately 85 kilometres to the south west or by helicopter out of Kirkland Lake or Timmins.



3. AIRCRAFT AND EQUIPMENT

3.1 Aircraft

An Aerospatiale A-Star 350D helicopter, (C-GFIX), owned and operated by Lakeland Helicopters Limited, was used for the survey. Installation of the geophysical and ancillary equipment was carried out by Aerodat. The survey aircraft was flown at a mean terrain clearance of 60 metres.

3.2 Equipment

3.2.1 Electromagnetic System

The electromagnetic system was an Aerodat three frequency system. Two vertical coaxial coil pairs were operated at 935 Hz and 4.6 kHz and a horizontal coplanar coil pair at 4.2 kHz. The transmitter-receiver separation was 7 metres. Inphase and quadrature signals were measured simultaneously for the three frequencies with a time constant of 0.1 seconds. The electromagnetic bird was towed 30 metres below the helicopter.

3.2.2 VLF-EM System

The VLF-EM System was a Herz Totem 2A. This instrument measures the total field and quadrature components of two selected transmitters, preferably oriented at right angles to one another. The sensor was towed in a bird 12 metres below the helicopter. The transmitters monitored were NAA, Cutler, Maine for the 'Line' station and NLK, Jim Creek, Washington for the 'Ortho' station, broadcasting at 24.0 and 24.8 kHz respectively.

3.2.3 Magnetometer

The magnetometer employed a Scintrex Model VIW - 2321 H8 cesium, optically pumped magnetometer sensor. The sensitivity of this instrument was 0.1 nanoTeslas at a 0.2 second sampling rate. The sensor was towed in a bird 12 metres below the helicopter.

3.2.4 Magnetic Base Station

An IFG proton precession magnetometer was operated at the base of operations to record diurnal variations of the earth's magnetic field. The clock of the base station was synchronized with that of the airborne system to facilitate later correlation.

3.2.5 Radar Altimeter

A Hoffman HRA-100 radar altimeter was used to record terrain clearance. The output from the instrument is a linear function of altitude for maximum accuracy.

3.2.6 Tracking Camera

A Panasonic video flight path recording system was used to record the flight path on standard VHS format video tapes. The system was operated in continuous mode and the flight number, real time and manual fiducial numbers were registered on the picture frame for cross-reference to the analog and digital data.

3.2.7 Analog Recorder

An RMS dot-matrix recorder was used to display the data during the survey. In addition to manual and time fiducials, the following data were recorded:

Channel	Input	Scale
RALT	Altimeter (150 m at top of chart)	3 m/mm
CXI1	935 Hz Coaxial Inphase	2 ppm/mm
CXQ1	935 Hz Coaxial Quadrature	2 ppm/mm

Channel	Input	Scale
CXI2	4.6 kHz Coaxial Inphase	2 ppm/mm
CXQ2	4.6 kHz Coaxial Quadrature	2 ppm/mm
CPI1	4.2 kHz Coplanar Inphase	8 ppm/mm
CPQ1	4.2 kHz Coplanar Quadrature	8 ppm/mm
VLT	VLF-EM Total Field, Line	2.5 %/mm
VLQ	VLF-EM Quadrature, Line	2.5 %/mm
VOT	VLF-EM Total Field, Ortho	2.5 %/mm
VOQ	VLF-EM Quadrature, Ortho	2.5 %/mm
MAGF	Magnetometer, fine	2.5 nT/mm
MAGC	Magnetometer, coarse	25 nT/mm
PWRL	Power line monitor	n/a

3.2.8 Digital Recorder

A DGR 33 recorder in conjunction with a DAC/NAV 2 data system recorded the survey on magnetic tape. Information recorded was as follows:

Equipment	Recording Interval
EM system	0.1 seconds
Magnetometer	0.2 seconds
VLF-EM	0.5 seconds
Altimeter	0.5 seconds
NAV System	1.0 seconds

3.2.9 Radar Positioning System

A Motorola Mini-Ranger (MRS III) radar navigation system was used for both navigation and flight path recovery. Transponders sited at fixed locations were interrogated several times per second and the ranges from these points to the helicopter measured to a high degree of accuracy. A navigational computer triangulates the position of the helicopter and provides the pilot with navigation information. The range/range data were recorded on magnetic tape for subsequent flight path determination.

4. DATA PRESENTATION

4.1 Base Map and Flight Path

A topographic base at a scale of 1:10,000 was prepared from an enlargement of a 1:50,000 topographic map.

The flight path, with a real time scale and navigator's manual fiducials for cross reference to both the analog and digital data, has been photocombined with the base map and is presented on a stable base film.

The flight path was derived from the Mini-Ranger radar positioning system. The distance from the helicopter to two established reference locations was measured several times per second and the position of the helicopter calculated by triangulation. It is estimated that the flight path is generally accurate to about 10 metres with respect to the topographic detail of the base map.

4.2 EM Profiles

The electromagnetic data were recorded digitally at a sample rate of 10/second with a time constant of 0.1 seconds. A two stage digital filtering process was carried out to reject major sferic events and to reduce 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.

The signal to noise ratio was further enhanced by the application of a low pass digital filter. It has zero phase shift which 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 permits maximum profile shape resolution.

Following the filtering process, a base level correction was made. 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 were then presented in profile map form.

The EM data is presented in profile form on maps 2A, and 2B, comprising the 935 and 4600 Hz data, and the 4175 and 4600 Hz data, respectively.

4.3 Airborne Electromagnetic Survey Interpretation Map

An interpretation map was prepared showing flight lines, fiducials, peak locations of anomalies and conductivity thickness range along with the Inphase amplitudes. These values were computed from the 4.6 kHz coaxial response. The data have been photocombined with the topographic base (on map 3b) and flight path and are presented on a suitable stable base film.

4.4 Total Field Magnetic Contours

The aeromagnetic data were corrected for diurnal variations by adjustment with the digitally recorded base station magnetic values. No correction for regional variation was applied. The corrected profile data were interpolated onto a regular grid at a 25 metre true scale interval using a cubic spline technique. The grid provided the basis for threading the presented contours at a 5 nanoTesla interval.

The aeromagnetic data have been presented with the flight path on a suitable stable base film, photocombined with the topographic base (map 4B), and as contours only (map 4C).

4.5 Vertical Magnetic Gradient Contours

The vertical magnetic gradient was calculated from the gridded total field magnetic data. Contoured at a 0.5 nT/m interval, the gradient data were presented on a suitable stable base film photocombined with the topographic base together with flight path (map 5B), and as contours only (map 5C).

4.6 VLF-EM Total Field

The VLF-EM signals from NAA, Cutler, Maine for the 'Line' station, broadcasting at 24.0 kHz, were compiled in map form, with flight lines, and presented on a suitable stable base film photocombined with the topographic base map (map 6B). The contours alone are presented on map 6C.

4.7 VLF-EM Profiles

The VLF-EM quadrature profiles for the 'Line' station were presented with flight lines and fiducial markers on a suitable stable base film.

4.8 Apparent Resistivity Contours

The electromagnetic information was processed to yield a map of the apparent resistivity of the ground.

The approach taken in computing apparent resistivity was to assume a model of a 200 metre thick conductive layer (i.e., effectively a half space) over a resistive bedrock. The computer then generated, from nomograms for this model, the resistivity that would be consistent with the bird elevation and recorded amplitude for the coaxial frequency pair.

The apparent resistivity profile data were interpolated onto a regular grid at a 20 metres true scale interval using a cubic spline technique.

The contoured apparent resistivity data were presented on a suitable stable base film photocombined with the topographic base together with the flight path.

5. INTERPRETATION

5.1 Geology

The 1:253,440 Geologic Compilation Series Map No. 2161 (Coral Rapids - Cochrane Sheet) shows the area to be underlain largely by an east-west trending sequence of metasedimentary and metavolcanic rocks, in the northwestern part of the Abitibi Archean Greenstone Belt, that continues well into northwestern Quebec. Due to extensive overburden cover, the geology is based on a limited number of outcrops and a geophysical interpretation of the regional airborne magnetics.

The belt appears to be a continuation of the same stratigraphic system that hosts the Casa Berardi gold deposits roughly 50 kilometres to the east (and slightly north) of the survey area. The compilation map shows granitic rocks along the north edge with metasediments (amphibolites) comprising the remainder of the northern half of the block. Felsic to intermediate metavolcanics followed by a more mafic sequence comprise the rocks of the southern half. Iron formation was mapped within the felsic series (i.e., tuffs and dacites) about 18 kilometres to the east in Noseworthy Township. Although north-south trending diabase are indicated in the vicinity of the survey area, no such features and no other structural elements are shown inside the area itself.

No other geologic data were supplied to Aerodat by COGEMA Canada Limited and no other published geologic data was available to the writer. The 1:250,000 aeromagnetic compilation provided by COGEMA is taken from the published Federal-Provincial maps. Also, types of targets sought have not been discussed or identified by Cogema although it is generally assumed that the primary interest is in gold mineralization. The writer was involved with an extensive exploration program in this area during the period 1966 to 1968. Massive sulphides were the principal exploration target.

5.2 Magnetics

The magnetic data from the high sensitivity cesium magnetometer provided virtually a continuous magnetic reading when recording at two-tenth second intervals. The system is also noise free for all practical purposes.

The sensitivity of 0.1 nT allows for the mapping of very small inflections in the magnetic field, resulting in a contour map that is comparable in quality to ground data. Both the fine and coarse magnetic traces were recorded on the magnetic charts. The regional magnetic map - from the 1:250,000 compilation of the Ontario and Quebec provincial coverage - supplied by COGEMA, confirms that the area of the survey lies along a continuation of the metavolcanic/iron formation belt of rocks that host the Casa Berardi gold deposits. The area of the survey actually lies within what appears to be a gap in the magnetic trends at a point where it seems to have been severely disturbed by either structural or intrusive activity.

The Total Field magnetic map underscores this 'so-called' gap in the magnetic trend and provides a fairly simple explanation for it by way of the magnetic interpretation. A large, oval shaped area to the west of Line 820, with fairly sharply defined (magnetic) boundaries along the eastern and southern edges, occupies most of the central portion of the survey. The northern edge may extend off the area and the western edge is rather poorly defined although some attempt at delineating it in the north west corner is shown on the Interpretation map. Internal to this area, the magnetics are relatively featureless and any trends noted have been attributed to faulting, whereas around the perimeter, the magnetic trends are quite varied and fairly well resolved.

The strong north-south pattern in the northeastern corner of the survey appears to be iron formation that has been rotated out of its normal east-west trend. The anomalous values of almost 6,000 nanoTeslas (nT) above a background of roughly 58,600 nT is commensurate with values to be expected from the iron formations of this region. Highest magnetic values for the survey were recorded over this feature (Lines 840 and 890).

An east-west to east northeasterly trend extends along the south boundary of the area. Magnetic values range up to about 600 nT maximum above the background levels (Line 850). Several small, scattered anomalies of no apparent trend occur toward the north west corner. Peak values are of the order of 1,000 nT over background (Line 100), quite high for bodies of such limited dimensions.

Narrow north-south trends, characteristic of diabase dikes, occur in the areas of Lines 80 and 870. A third diabase, trending north northwesterly, may extend from the south end of Line 860. Numerous lineaments, from magnetic lows, can be traced throughout the central part of the survey. These northwesterly and east northeasterly - not the only, but the predominant directions - trends have been interpreted as faults.

Finally, attention is drawn to the small, nearly circular anomalies throughout the central area, similar in size and shape to the anomalies in the north west corner. These are all thought to be from small mafic plugs.

The writer is of the opinion that the large, central area represents a fairly young intrusive of acidic to intermediate composition (e.g., quartz porphyry to diorite) with most of the faulting being contemporaneous with the intrusion. If in fact the intrusive body extends off the south west corner of the area, it would suggest that the diabase dikes were a later event.

5.3 Electromagnetics

The electromagnetic data was first checked by a line-by-line examination of the analog records. Record quality was good to very good with little or no sferic interference and only minor instrument (system) noise on the 935 Hz coaxial trace. This was readily removed from the traces by an appropriate smoothing filter. Geologic noise, in the form of surficial conductors, is present on the higher frequency responses and to a minor extent, on the low frequency quadrature response.

Anomalies were picked off the analog traces of the low and high frequency coaxial responses and then validated on the coplanar profile data. These selections were then checked with a proprietary computerized selection program which can be adjusted for ambient and instrumental noise. The data were then edited and re-plotted on a copy of the of the profile map. This procedure ensured that every anomalous response spotted on the analog data was plotted on the final map and allowed for the rejection - or inclusion if warranted - of obvious surficial conductors.

Each conductor or group of conductors was evaluated on the bases of magnetic (and lithologic, where applicable) correlations apparent on the analog data and man made or surficial features not obvious on the analog charts.

RESULTS: Fairly strong surficial responses were recorded over most of the survey area with several bedrock ridges and troughs (i.e., resistivity highs and lows) spotted throughout the area. This abrupt variation in overburden thickness can and has produced edge effects that could very readily be interpreted as bedrock conductors. Conversely, these variations represent changes in bedrock topography that may reflect underlying structure or stratigraphy. Very few anomalies were registered on the 935 Hz inphase channel, indicating a general lack of high conductance zones. The negative inphase response is characteristic of the EM response over magnetic bodies.

CONDUCTOR I - (Lines 190 to 380): This single conductive band of low to moderate conductance falls on the north flank of a magnetic high that extends along the southern edge of the survey. The strongest response, on Line 350, coincides with a small (i.e., one line) magnetic peak. Dip is consistently to the north. This zone is classed as a priority target.

CONDUCTORS II, IIa - (Lines 20 to 50): Conductors II and IIa represent two short, north dipping zones in the south western corner of the survey. Conductance is low with only Line 20 showing any 935 Hz inphase response. The more northerly of the two, zone II, lies along the north contact of a short magnetic anomaly of moderate (i.e., 350+nT) amplitude. Inphase response may have been distorted by magnetic inversion.

CONDUCTORS III, IIIa - (Lines 890 to 930): Conductor III is a single band of low to moderate (Line 910) conductance that coincides with a weak, east-west trending magnetic zone. It occurs in the vicinity of one of the inferred northwesterly faults. The conductor dips shallowly to the north. Zone IIIa is a weak, possible bedrock conductor that is coincident with an east-west magnetic trend roughly 200 metres to the north of III.

The above three conductive zones represent the only definite bedrock conductors that have been identified within the survey area. The remaining conductors that have been numbered on the Interpretation map are all classed as probable bedrock EM conductors. Anomalies V, VI, VIII, IX, and XI are all associated with magnetic anomalies, either along a north-south diabase dike (V and VI) or coincident with the small plug-like features (VIII, IX and XI). Anomalies IV, VII and

X correlate either with the magnetic stratigraphy (IV and X) or the inferred structures (VII and Xa). A few show apparent north dip (i.e., anomalies V, VI, VII and IX) where the coplanar peak is to the north of the 4.6 kHx coaxial peak. Anomaly XI shows minor quadrature response over the negative inphase response. This "mafic plug" may be south dipping.

Conductors I through IV, VII and X are believed to be either stratigraphically or structurally controlled whereas the others all relate to some form of apparent intrusive activity. A few other 'possible' bedrock conductors. largely based on their quadrature response, have been marked on the Interpretation map.

5.4 Apparent Resistivity

The Apparent Resistivity map gives a good representation of surficial resistivities throughout the surveyed area. As such, it can provide a fairly good picture of bedrock topography from an overburden thickness map. The latter could be useful in the planning of an overburden drilling program for geochemical sampling.

5.5 VLF-EM TOTAL FIELD

The predominant west northwesterly (positive) trends are considered to be a reflection of the direction to the VLF transmitter station. This condition arises from a non uniform but highly conductive overburden and a highly resistive bedrock. It is doubtful that any of the trends represent structure (e.g., shearing).

5.6 Conclusions

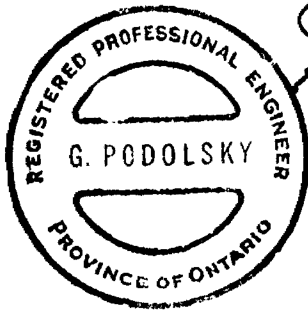
Although the survey detected only a few of what could be classed as bedrock conductors and despite the fact that it tends to negate the presence of any substantial iron formation within the area of primary interest, the survey does present some interesting possibilities with respect to the potential for gold mineralization.

The Casa Berardi model - whatever that is conceded to be - may not necessarily apply here but the writer is compelled to point out the striking analogy between the data in the vicinity of Line 850 and that around the Dona Lake deposit (Dome Mines, Pickle Lake area) where a high grade gold deposit exists within iron formation in proximity to a near parallel diabase dike. Furthermore, the writer considers the northwesterly structures to be of significance in the Casa Berardi area. This may apply even in toward the core of the central 'intrusive', particularly in association with the 'mafic plugs'.

5.7 Recommendations

On the bases of the results of this airborne survey, additional geophysical work is recommended over the area. Ground Em surveys using horizontal loop equipment (e.g., Max Min II) with relatively short dipole spreads and high frequencies should be employed over zones I and II and, if the land situation permits, III, V, VI, VII and X. Zones IV, VII, VIII, X and XI may require induced polarization to map low conductance from disseminated mineralization and possible overburden effects.

The magnetic data, particularly any possible structural interpretation from these data, should be compiled with available geology. The Vertical Magnetic Gradient map is recommended as an initial rendition of a pseudolithologic map.



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January 4, 1988

J8793

APPENDIX I

GENERAL INTERPRETIVE CONSIDERATIONS

Electromagnetic

The Aerodat three frequency system utilizes two different transmitter-receiver coil geometries. The traditional coaxial coil configuration is operated at two widely separated frequencies and the horizontal coplanar coil pair is operated at a frequency 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 model on the accompanying phasor diagram. 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 table form in Appendix II and the conductance and inphase amplitude are presented in symbolized form on the map presentation.

The conductance and depth values 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.

Most overburden will have an indicated conductance of less than 2 mhos; however, more conductive clays may have an apparent conductance of say 2 to 4 mhos. Also in the low conductance range will be electrolytic conductors in faults and shears.

The higher ranges of conductance, greater than 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 sulphide or graphite bearing rocks.

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 consideration in association with minor conductive sulphides, and the electromagnetic response 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, but minor accessory sulphide mineralization could 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; however, 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.

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. As the dip of the conductor decreased 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.

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. 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 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*.

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.

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. In most cases, the response of the coplanar coils closely follows that of the coaxial coils with a relative amplitude ratio 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.

* 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.

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 elliptically polarized in the vicinity of electrical conductors. The Herz Totem uses three coils in the X, Y, Z configuration to measure the total field and vertical quadrature component of the polarization ellipse.

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 measureable 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 the 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 response is an indicator of the existence and position of a conductivity anomaly. 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.

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 amplitude of the quadrature response, as opposed to shape is function of target conductance and depth as well as the conductivity of the overburden and host rock. As the primary field travels down to the conductor through conductive material it is both attenuated and phase shifted in a negative sense. The secondary field produced by this altered field at the target also has an associated phase shift. This phase shift is positive and is larger for relatively poor conductors. This secondary field is attenuated and phase shifted in a negative sense during return travel to the surface. The net effect of these 3 phase shifts determine the phase of the secondary field sensed at the receiver.

A relatively poor conductor in resistive ground will yield a net positive phase shift. A relatively good conductor in more conductive ground will yield a net negative phase shift. A combination is possible whereby the net phase shift is zero and the response is purely in-phase with no quadrature component.

A net positive phase shift combined with the geometrical crossover shape will lead to a positive quadrature response on the side of approach and a negative on the side of departure. A net negative phase shift would produce the reverse. A further sign reversal occurs with a 180 degree change in instrument orientation as occurs on reciprocal line headings. During digital processing of the quadrature data for map presentation this is corrected for by normalizing the sign to one of the flight line headings.

APPENDIX II

ANOMALY LIST

J8793

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
1	10	C	0	1.1	28.4	0.0	0	41
1	20	A	0	2.5	23.4	0.0	0	42
1	20	B	0	12.4	37.1	0.2	0	40
1	30	A	0	6.5	41.7	0.0	0	40
1	40	A	0	-2.3	43.5	0.0	0	40
1	40	B	0	5.8	36.2	0.0	0	41
1	40	C	0	7.0	31.7	0.1	0	42
1	50	A	0	0.9	59.8	0.0	0	37
1	50	B	0	2.5	41.0	0.0	0	42
1	70	A	0	2.3	37.6	0.0	0	42
1	70	B	0	0.1	34.8	0.0	0	42
1	70	C	0	0.9	113.5	0.0	0	35
1	70	D	0	-1.4	24.8	0.0	0	53
1	80	A	0	4.3	38.0	0.0	0	33
1	80	B	0	5.2	30.0	0.0	0	42
1	90	A	0	2.4	26.6	0.0	0	42
1	90	B	0	-1.5	29.9	0.0	0	53
1	90	C	0	19.2	33.6	0.6	0	49
1	90	D	0	26.5	39.6	0.8	0	54
1	100	A	1	57.1	59.0	1.8	0	37
1	100	B	0	15.0	43.6	0.2	0	34
1	120	A	0	5.1	44.9	0.0	0	45
1	120	B	0	3.4	36.2	0.0	0	44
1	130	A	0	5.2	48.2	0.0	0	45
1	150	A	0	2.8	46.0	0.0	0	44
1	150	B	0	3.1	30.3	0.0	0	43
1	160	A	0	3.1	18.6	0.0	0	37
1	160	B	0	7.6	19.9	0.2	0	40
1	170	A	0	1.9	29.1	0.0	0	37
1	170	B	0	9.2	25.9	0.2	0	38
1	180	A	0	6.1	22.1	0.1	0	44

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.

J8793

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
1	190	A	0	12.9	34.0	0.3	0	39
1	200	A	0	18.6	37.6	0.5	0	40
1	210	A	0	22.3	43.2	0.5	0	36
1	220	A	0	0.3	35.6	0.0	0	29
1	220	B	0	27.1	52.5	0.6	0	41
1	230	A	1	40.0	44.6	1.4	0	45
1	230	B	0	10.3	29.8	0.2	0	45
1	230	C	0	1.3	37.6	0.0	0	41
1	240	A	0	33.9	50.5	0.9	0	41
1	250	A	1	31.1	40.1	1.1	0	41
1	260	A	0	-6.5	75.2	0.0	0	34
1	260	B	0	15.7	34.3	0.4	0	41
1	270	A	0	4.0	27.2	0.0	0	39
1	270	B	0	2.2	17.8	0.0	0	46
1	270	C	0	-0.4	36.6	0.0	0	41
1	280	A	0	2.7	20.5	0.0	0	42
1	290	A	0	2.4	21.4	0.0	0	40
1	300	A	0	1.4	25.1	0.0	0	45
1	300	B	0	4.2	19.2	0.0	0	45
1	300	C	0	8.8	20.3	0.3	0	44
1	310	A	0	23.8	41.1	0.6	0	44
1	310	B	0	4.6	28.2	0.0	0	37
1	320	A	0	19.6	31.8	0.6	0	41
1	330	A	0	24.2	34.0	0.9	0	42
1	330	B	0	8.2	36.9	0.1	0	34
1	340	A	1	31.8	26.5	1.9	0	50
1	340	B	1	25.4	30.6	1.1	0	48
1	350	A	2	63.6	46.9	2.8	0	39

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.

J8793

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
1	360	A	0	12.9	26.6	0.4	0	45
2	370	A	0	8.0	25.6	0.1	0	48
2	380	A	0	3.3	15.4	0.0	0	43
2	430	A	0	7.1	37.2	0.0	0	42
2	470	A	0	13.4	42.8	0.2	0	43
2	480	A	0	0.1	48.0	0.0	0	40
2	530	A	0	10.4	73.3	0.0	0	39
2	540	A	0	8.6	77.1	0.0	0	39
2	580	A	0	3.0	68.1	0.0	0	41
2	590	A	0	5.4	51.8	0.0	0	46
2	590	B	0	5.9	50.2	0.0	0	49
2	600	A	0	4.0	80.6	0.0	0	37
2	600	B	0	5.3	77.6	0.0	0	39
2	640	A	0	4.2	65.0	0.0	0	41
2	650	A	0	6.1	48.8	0.0	0	47
2	660	A	0	5.2	58.5	0.0	0	41
2	670	A	0	7.0	45.8	0.0	0	48
2	680	A	0	8.0	53.6	0.0	0	42
2	690	A	0	8.4	45.9	0.0	0	45
2	700	A	0	9.6	57.8	0.0	0	42
2	720	A	0	6.6	27.4	0.1	0	45
2	730	A	0	6.5	26.3	0.1	0	53
3	840	A	0	-3.1	26.7	0.0	0	41
3	890	A	0	10.8	54.9	0.1	0	41

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.

J8793

FLIGHT	LINE	ANOMALY	CATEGORY	AMPLITUDE (PPM) INPHASE	QUAD.	CONDUCTOR CTP MHOS	DEPTH MTRS	BIRD HEIGHT MTRS
3	890	B	0	6.0	55.2	0.0	0	41
3	900	A	0	4.4	39.8	0.0	0	44
3	900	B	0	16.4	60.0	0.2	0	42
3	910	A	1	45.6	58.9	1.2	0	41
3	910	B	0	7.2	49.4	0.0	0	42
3	920	A	0	11.2	48.6	0.1	0	46
3	920	B	0	14.4	41.8	0.2	0	43
3	930	A	0	15.4	32.2	0.4	0	41

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 III
CERTIFICATE OF QUALIFICATIONS

I, GEORGE PODOLSKY, certify that:

1. I am registered as a Professional Engineer in the Province of Ontario and work as a Professional Geophysicist.

2. I reside at 172 Dunwoody Drive in the town of Oakville, Halton County, Ontario.

3. I hold a B. Sc. in Engineering Physics from Queen's University, having graduated in 1954.

4. I have been continuously engaged in both professional and managerial roles in the minerals industry in Canada and abroad for the past thirty two years.

5. I have been an active member of the Society of Exploration Geophysicists since 1960 and hold memberships on other professional societies involved in the minerals extraction and exploration industry.

6. The accompanying report was prepared from material supplied by COGEMA Canada Limited and from a review of the proprietary airborne geophysical survey flown by Aerodat Ltd. for COGEMA Canada Limited. I have not visited the specific property but did work in the immediate area during the period 1966 to 1968.

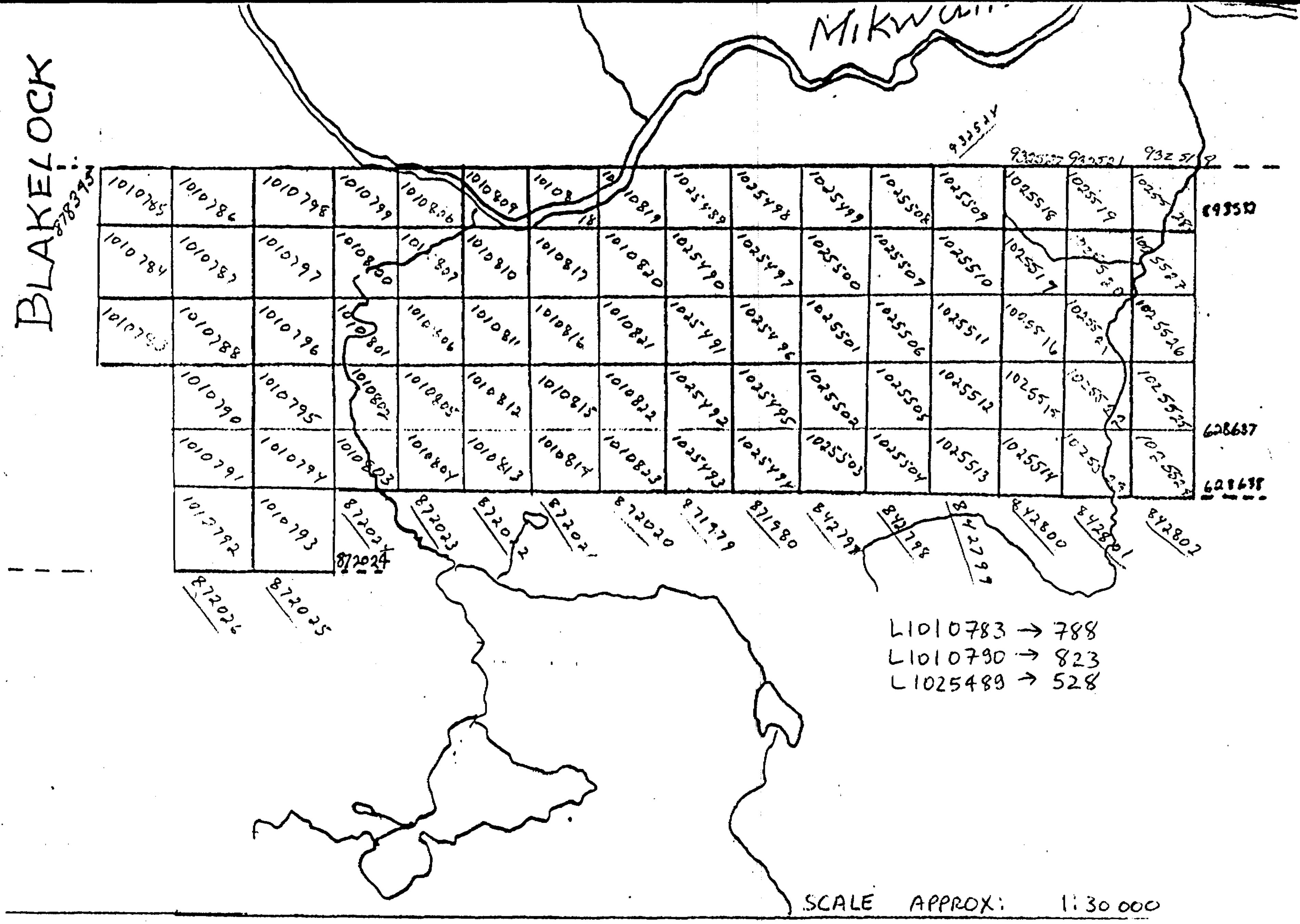
7. I have no interest, direct or indirect, in the property described nor do I hold securities in COGEMA Canada Limited.

8. I hereby consent to the use of this report in a Statement of Material Facts of the Company and for the preparation of a prospectus for submission to the Ontario Securities Commission and/or other regulatory authorities.

Signed,

George Podolsky, P. Eng.
GEOPOD ASSOCIATES INC.

Oakville, Ontario
January 4, 1988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628638
L1010783 → 788
L1010790 → 823
L1025489 → 528
SCALE APPROX: 1:30 000

Ministry of Northern Development and Mines
Ontario

Report of Work

(Geophysical, Geological, Geochemical and Expenditures)

W8808.178

Mining Lands Management

42H09SE0005 2.11104 HOBLITZELL 900

Type of Survey(s): AIRBORNE GEOPHYSICAL	HOBLITZELL and BLAKELOCK
Claim Holder(s): COGEMA CANADA LIMITED	Prospector's Licence No.: T-4677
Address: 2000 Mansfield St., Suite 400, Montréal, Qué. H3A 2Z1	
Survey Company: AERODAT LIMITED	Date of Survey (from & to): 27 / 11 / 87 – 01 / 12 / 87 (Day / Mo. / Yr.) — Total Miles of line Cut: X
Name and Address of Author (of Geo-Technical report): George Podolsky, 172 Dunwoody Drive, Oakville, Ont.	

Credits Requested per Each Claim in Columns at right

Special Provisions	Geophysical	Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	- Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Radiometric	
	- Other	
	Geological	
	Geochemical	

Man Days	Geophysical	Days per Claim
Complete reverse side and enter total(s) here	- Electromagnetic	
	- Magnetometer	
	- Radiometric	
	- Other	
	Geological	
	Geochemical	

Airborne Credits		Days per Claim
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	40
	Magnetometer	40
	Radiometric	

RECEIVED MAY 11 1988 MINING LANDS SECTION

RECEIVED LARDER LAKE MINING DIVISION APR 29 1988 9.40am

Expenditures (excludes power stripping)

Type of Work Performed

Performed on Claim(s)

Calculation of Expenditure Days Credits

Total Expenditures $ ÷ 15 = Total Days Credits

Instructions
Total Days Credits may be apportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.	Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.
	see attached list				

RECORDED APR 29 1988 Receipt #

ONTARIO GEOLOGICAL SURVEY ASSESSMENT FILES OFFICE MAY 19 1988 RECEIVED

Total number of mining claims covered by this report of work: 80

For Office Use Only		
Total Days Cr. Recorded: 6400 LP.	Date Recorded: April 29/88	Mining Recorder: M. G. Wurman
	Date Approved as Recorded: 17 May 88 RM	Branch Director:

Date	Recorded Holder or Agent (Signature)
April 26, 1988	Denis Lessage

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

Name and Postal Address of Person Certifying: John Learn, 2350 Melrose Ave., N.D.G., Montréal, Qué. H4A 2R8

Date Certified	Certified by (Signature)
April 26, 1988	John Learn

1362 (85/12)

LIST OF CLAIMS TRAVERSED

L1010783
L1010784
L1010785
L1010786
L1010787
L1010788
L1010790
L1010791
L1010792
L1010793
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L1025527
L1025528

(total 80 claims)

Ministry of Northern Development and Mines
Ontario

Geophysical-Geological-Geochemical Technical Data Statement

File ____________

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) AIRBORNE GEOPHYSICAL
Township ~~or Area~~ HOBLITZELL and BLAKELOCK
Claim Holder(s) COGEMA CANADA LIMITED

Survey Company AERODAT LIMITED
Author of Report George Podolsky
Address of Author 172 Dunwoody Drive, Oakville, Ont.
Covering Dates of Survey Nov. 27 - Dec. 1, 1987
(linecutting to office)
Total Miles of Line Cut X

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	
–Magnetometer	
–Radiometric	
–Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer 40 Electromagnetic 40 Radiometric ____
(enter days per claim)

DATE: April 26, 1988 SIGNATURE: Denis Lesage
Author of Report or Agent

Res. Geol. ____________ Qualifications on this file

Previous Surveys

File No.	Type	Date	Claim Holder

OFFICE USE ONLY

MINING CLAIMS TRAVERSED
List numerically

see attached list
(prefix) (number)

If space insufficient, attach list

TOTAL CLAIMS 80

837 (85/12)

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS – If more than one survey, specify data for each type of survey

Number of Stations ____________________ Number of Readings ____________________
Station interval ____________________ Line spacing ____________________
Profile scale ____________________
Contour interval ____________________

MAGNETIC

Instrument ____________________
Accuracy – Scale constant ____________________
Diurnal correction method ____________________
Base Station check-in interval (hours) ____________________
Base Station location and value ____________________

ELECTROMAGNETIC

Instrument ____________________
Coil configuration ____________________
Coil separation ____________________
Accuracy ____________________
Method: ☐ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line
Frequency ____________________
(specify V.L.F. station)
Parameters measured ____________________

GRAVITY

Instrument ____________________
Scale constant ____________________
Corrections made ____________________
Base station value and location ____________________
Elevation accuracy ____________________

INDUCED POLARIZATION RESISTIVITY

Instrument ____________________
Method ☐ Time Domain ☐ Frequency Domain
Parameters – On time ____________________ Frequency ____________________
– Off time ____________________ Range ____________________
– Delay time ____________________
– Integration time ____________________
Power ____________________
Electrode array ____________________
Electrode spacing ____________________
Type of electrode ____________________

LIST OF CLAIMS TRAVERSED

L1010783	L1025489
L1010784	L1025490
L1010785	L1025491
L1010786	L1025492
L1010787	L1025493
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L1010818	L1025524
L1010819	L1025525
L1010820	L1025526
L1010821	L1025527
L1010822	L1025528
L1010823	

(total 80 claims)

AIRBORNE SURVEYS

Type of surveys	:	1) Frequency domain EM
		2) Magnetics
		3) VLF-EM
Instruments	:	1) Aerodat 3 frequency EM
		- 2 coaxial pairs
		- 1 coplanar pair
		2) Scintrex Model VIW-2321
		H8 cesium magnetometer
		3) Herz Totem 2A VLF-EM unit
Accuracy	:	1) Typically less than 2 ppm
		2) 0.1 nT at 0.2 sec sample rate
		3) N/A

SELF POTENTIAL

Instrument ______ Range ______

Survey Method ______

Corrections made ______

RADIOMETRIC

Instrument ______

Values measured ______

Energy windows (levels) ______

Height of instrument ______ Background Count ______

Size of detector ______

Overburden ______
(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey ______

Instrument ______

Accuracy ______

Parameters measured ______

Additional information (for understanding results) ______

AIRBORNE SURVEYS

Type of survey(s))
Instrument(s)) see attached list
(specify for each type of survey)
Accuracy)
(specify for each type of survey)

Aircraft used Aerospatiale AS 350D

Sensor altitude Frequency EM at 30 m, Magnetics at 48 m, VLF at 48 m

Navigation and flight path recovery method Motorola Mini-Ranger (MRS III) radar navigation system (airphoto backup for navigation)

Aircraft altitude 60 m Line Spacing 100 m

Miles flown over total area 287.5 Over claims only 83.75

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken ______________________

____

____

Total Number of Samples ______________________

Type of Sample ______________________
(Nature of Material)

Average Sample Weight ______________________

Method of Collection ______________________

____

Soil Horizon Sampled ______________________

Horizon Development ______________________

Sample Depth ______________________

Terrain ______________________

____

Drainage Development ______________________

Estimated Range of Overburden Thickness ______________________

____

____

SAMPLE PREPARATION

(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis ______________________

____

____

____

General ______________________

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ANALYTICAL METHODS

Values expressed in: per cent ☐ p. p. m. ☐ p. p. b. ☐

Cu, Pb, Zn, Ni, Co, Ag, Mo, As,-(circle)

Others ______________________

Field Analysis (______________________ tests)

Extraction Method ______________________

Analytical Method ______________________

Reagents Used ______________________

Field Laboratory Analysis

No. (______________________ tests)

Extraction Method ______________________

Analytical Method ______________________

Reagents Used ______________________

Commercial Laboratory (______________________ tests)

Name of Laboratory ______________________

Extraction Method ______________________

Analytical Method ______________________

Reagents Used ______________________

General ______________________

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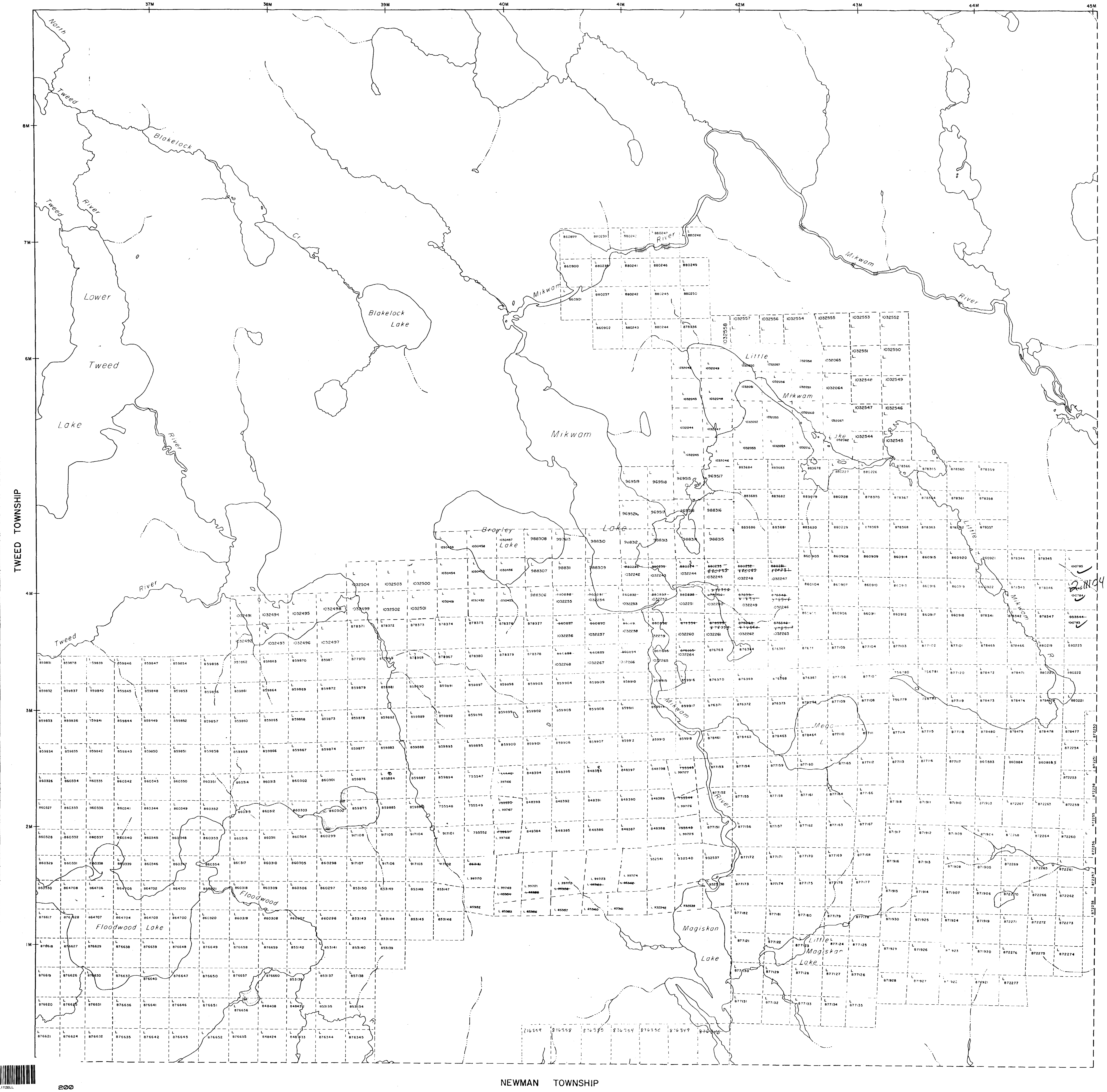
AREAS WITHDRAWN FROM DISPOSITION

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

Description	Order No.	Date	Disposition	File



200

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	●
" SURFACE RIGHTS ONLY	◐
" MINING RIGHTS ONLY	◑
LEASE, SURFACE & MINING RIGHTS	■
" SURFACE RIGHTS ONLY	◧
" MINING RIGHTS ONLY	◨
LICENCE OF OCCUPATION	▼
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.

500 Metres 0 1000 Metres

SCALE 1:20 000

NOTICE OF FORESTRY ACTIVITY

THIS TOWNSHIP / AREA FALLS WITHIN THE IROQUOIS FALLS MANAGEMENT UNIT AND MAY BE SUBJECT TO FORESTRY OPERATIONS. THE MNR UNIT FORESTER FOR THIS AREA CAN BE CONTACTED AT: P.O. BOX 730
2 THIRD AVE.
COCHRANE, ONT.
POL 1C0
705-272-4365

DATE OF ISSUE
APR 25 1988
LARDER LAKE
MINING RECORDER'S OFFICE

TOWNSHIP

BLAKELOCK

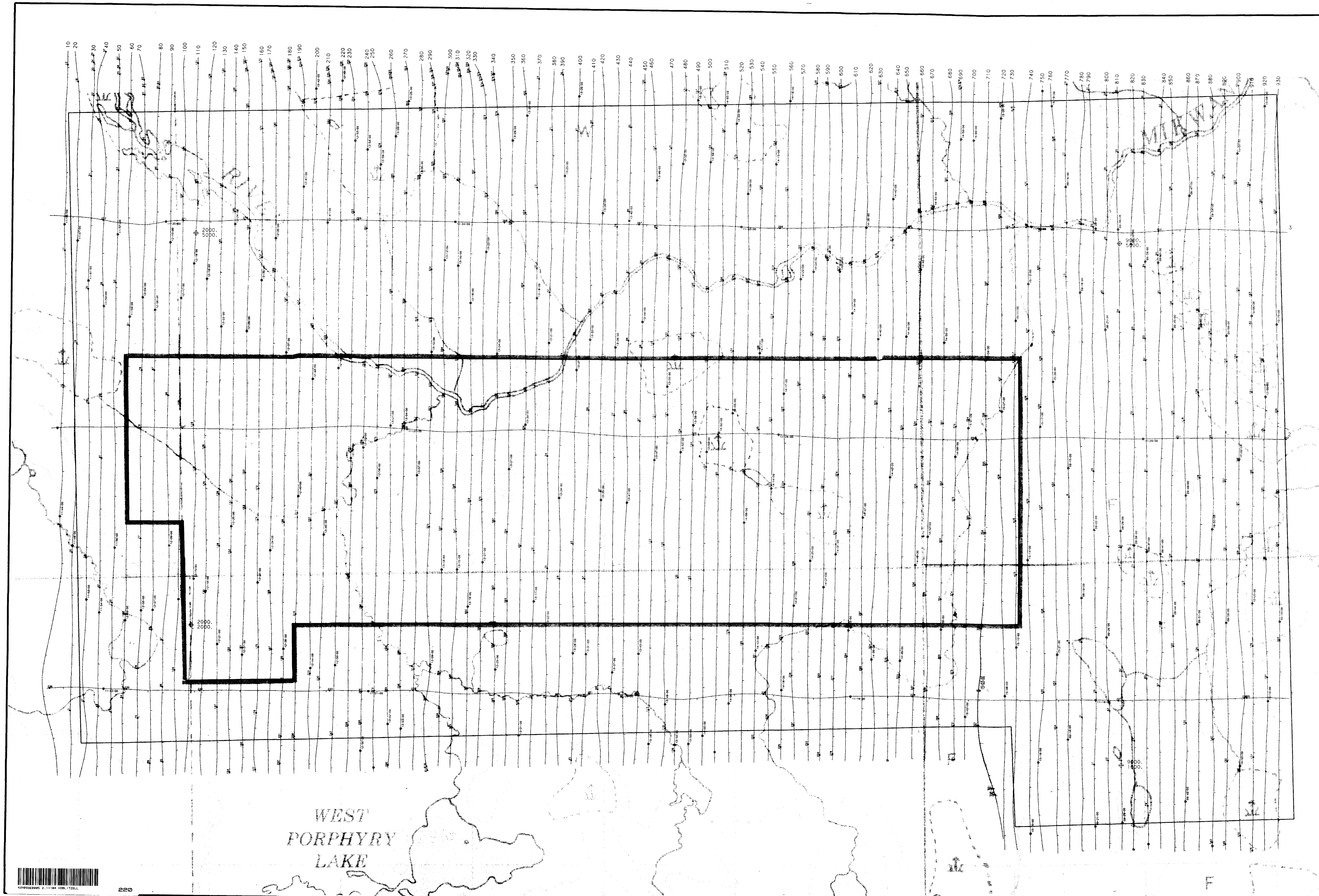
2.11104

M.N.R. ADMINISTRATIVE DISTRICT
COCHRANE
MINING DIVISION
LARDER LAKE
LAND TITLES / REGISTRY DIVISION
COCHRANE

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

Date OCTOBER/1986 | Number G-3474

LEGEND
DISPOSITION OF CROWN LANDS
SCALE 1:20 000
DATE OF ISSUE
APR 14 1988
TOWNSHIP
HOBLITZELL
M.N.R. ADMINISTRATIVE DISTRICT
COCHRANE
MINING DIVISION
LARDER LAKE
LAND TITLES / REGISTRY DIVISION
COCHRANE
Ministry of Natural Resources
Ontario
Date OCTOBER 1986
Number G-3513
NOSEWORTHY TOWNSHIP
TOMLINSON TOWNSHIP
BLAKELOCK TOWNSHIP
Burntbush
Mikwam
Mikwam River
East Soucie Lake
Soucie Lake
Soucie Cr
Soucie Creek
Porphyry L
West Porphyry L
Little Porphyry L
AREAS WITHDRAWN FROM DISPOSITION

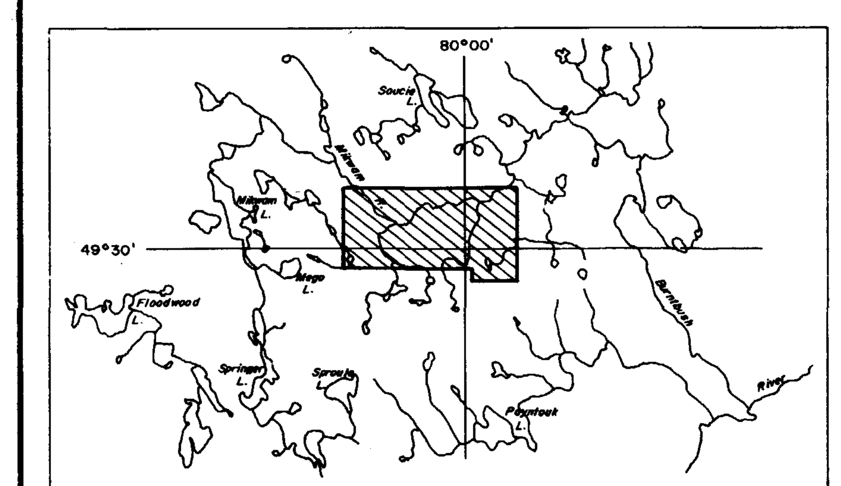


Flight Path

Navigation and recovery using Motorola Mini-Ranger (MRS III) radar navigation system

Average terrain clearance 60m
Line spacing = 100m

Porphyry Creek claims boundary approximate



COGEMA CANADA LTD.

FLIGHT PATH

2.11104

PORPHYRY CREEK AREA

ONTARIO

SCALE 1:10,000

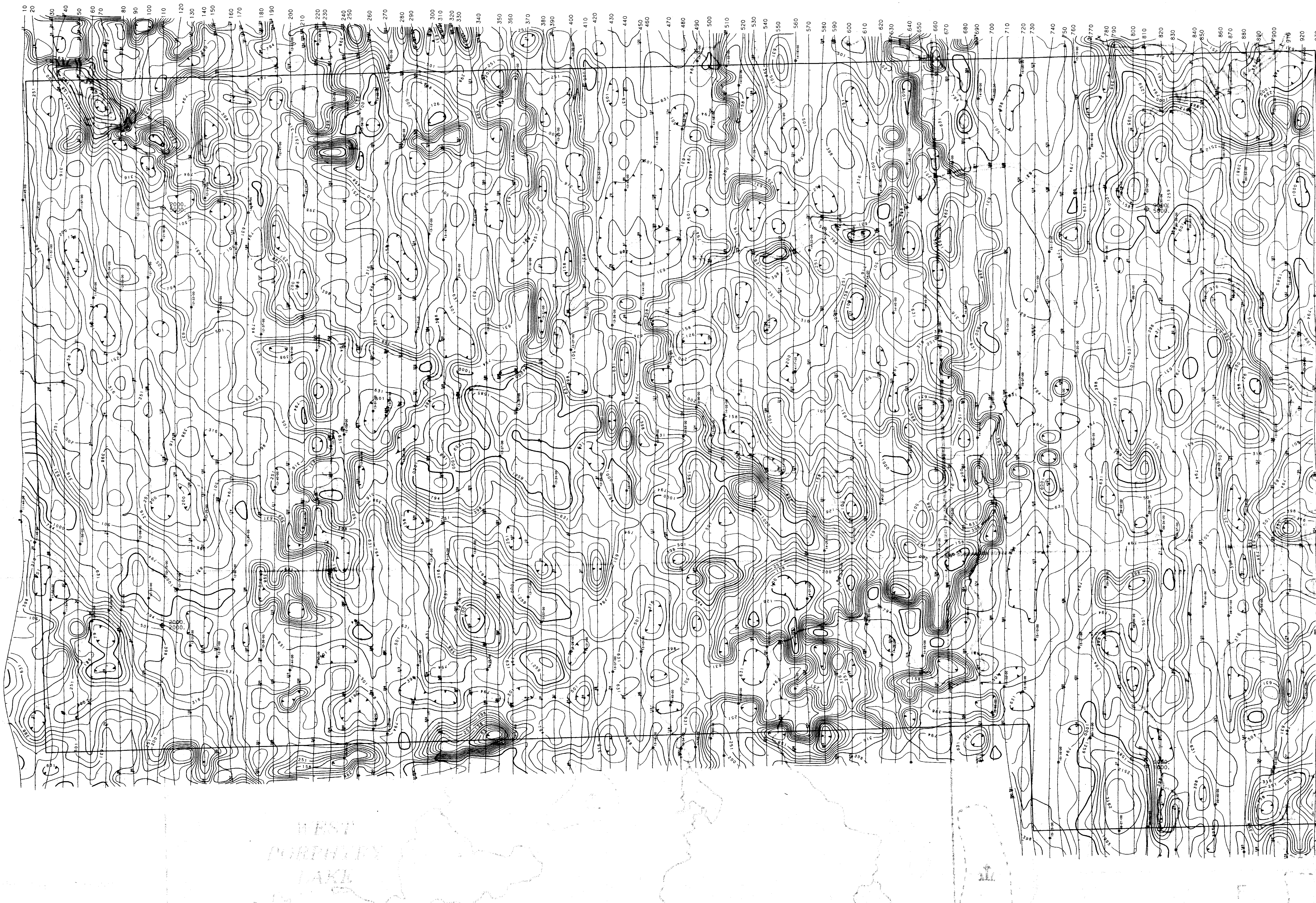
AERODAT LIMITED

DATE:	NOV 87
NTS No:	42H,32E
MAP No:	1

J8793

87-CND-52-01

220



Apparent Resistivity

Contours - logarithmic interval 0.1 ohm-m

Calculated from 4600 Hz coaxial EM response assuming a 200 m conductive layer

Sensor elevation 30m

10^NO OHM-M

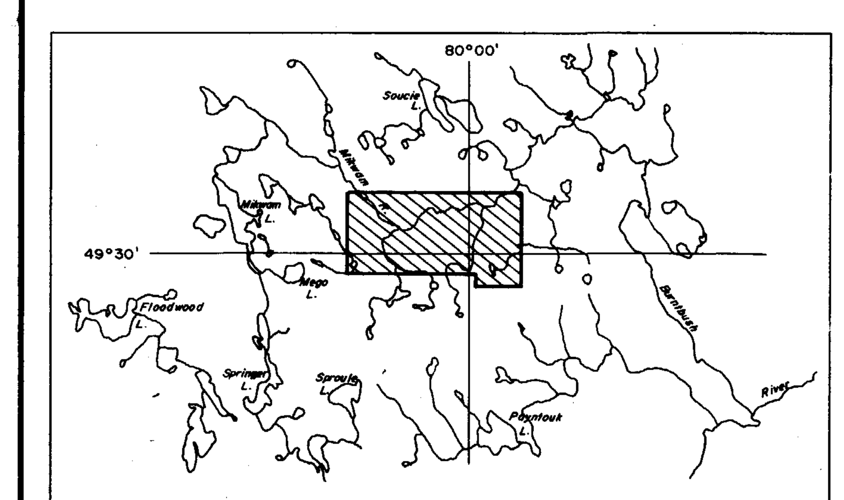
10^NN OHM-M

Flight Path

Navigation and recovery using Motorola Mini-Ranger (MRS III) radar navigation system

Average terrain clearance 60m

Line spacing - 100m



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APPARENT RESISTIVITY

CONTOURS 2.11104

PORPHYRY CREEK AREA

ONTARIO

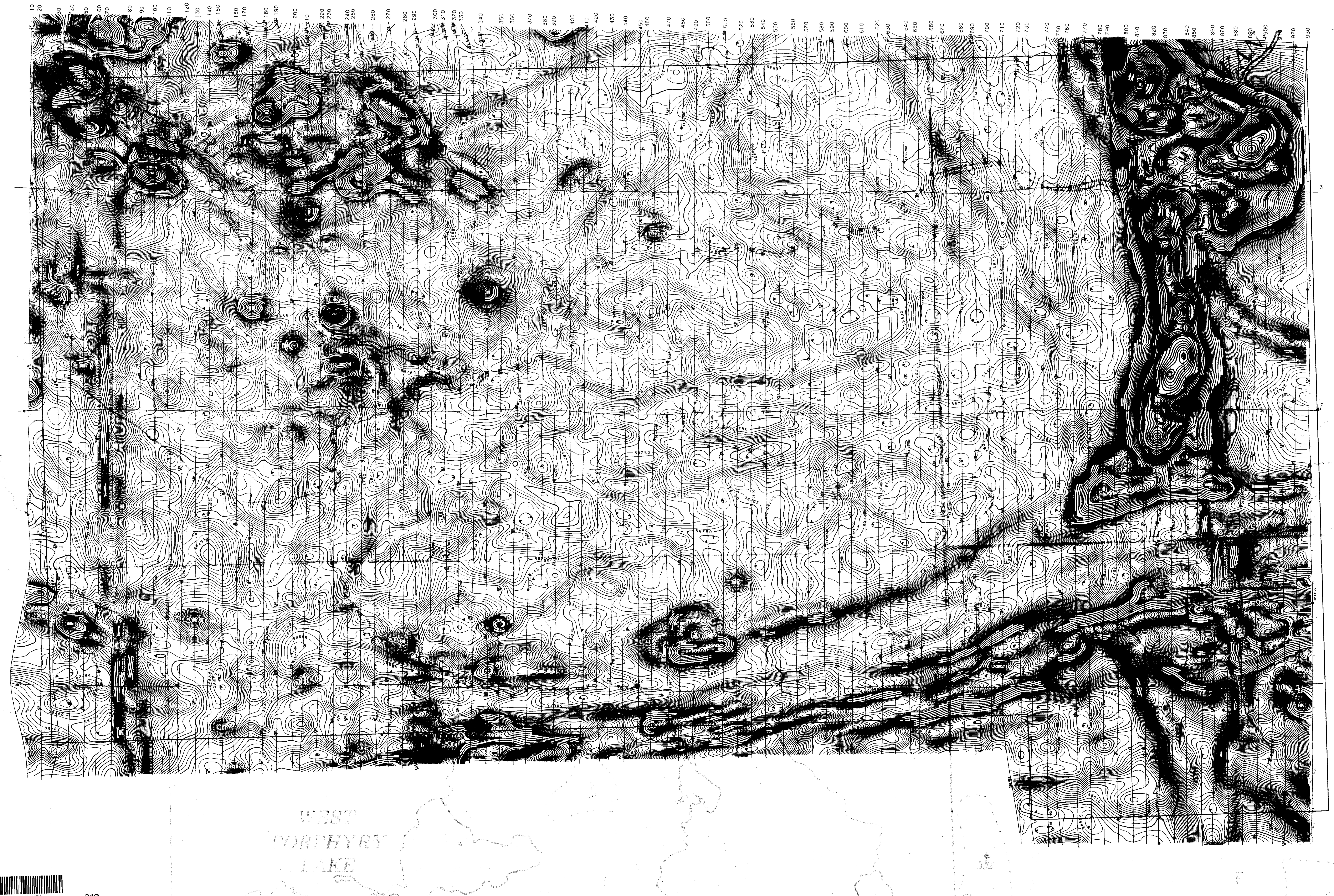
SCALE 1:10,000

AERODAT LIMITED

DATE:	NOV 87
NTS No:	42H, 32E
MAP No:	8B J8793

87-CND-52-01

230



N

Magnetics

Total Field Magnetic Intensity
(in nanoTeslas)

Cesium high sensitivity magnetometer
Sensor elevation - 45m

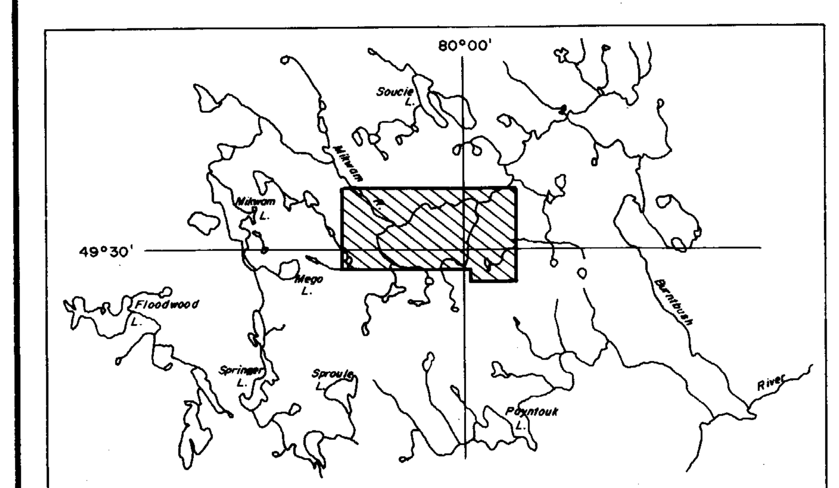
CONTOUR INTERVAL

500 nT
100 nT
25 nT
5 nT

Flight Path

Navigation and recovery using
Motorola Mini-Ranger (MRS III)
radar navigation system

Average terrain clearance 60m
Line spacing = 100m



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TOTAL FIELD MAGNETICS

CONTOURS **2.11104**

PORPHYRY CREEK AREA

ONTARIO

SCALE 1:10,000

0 330 660 1320 1/2 MILE

0 100 200 500 1 KILOMETRE

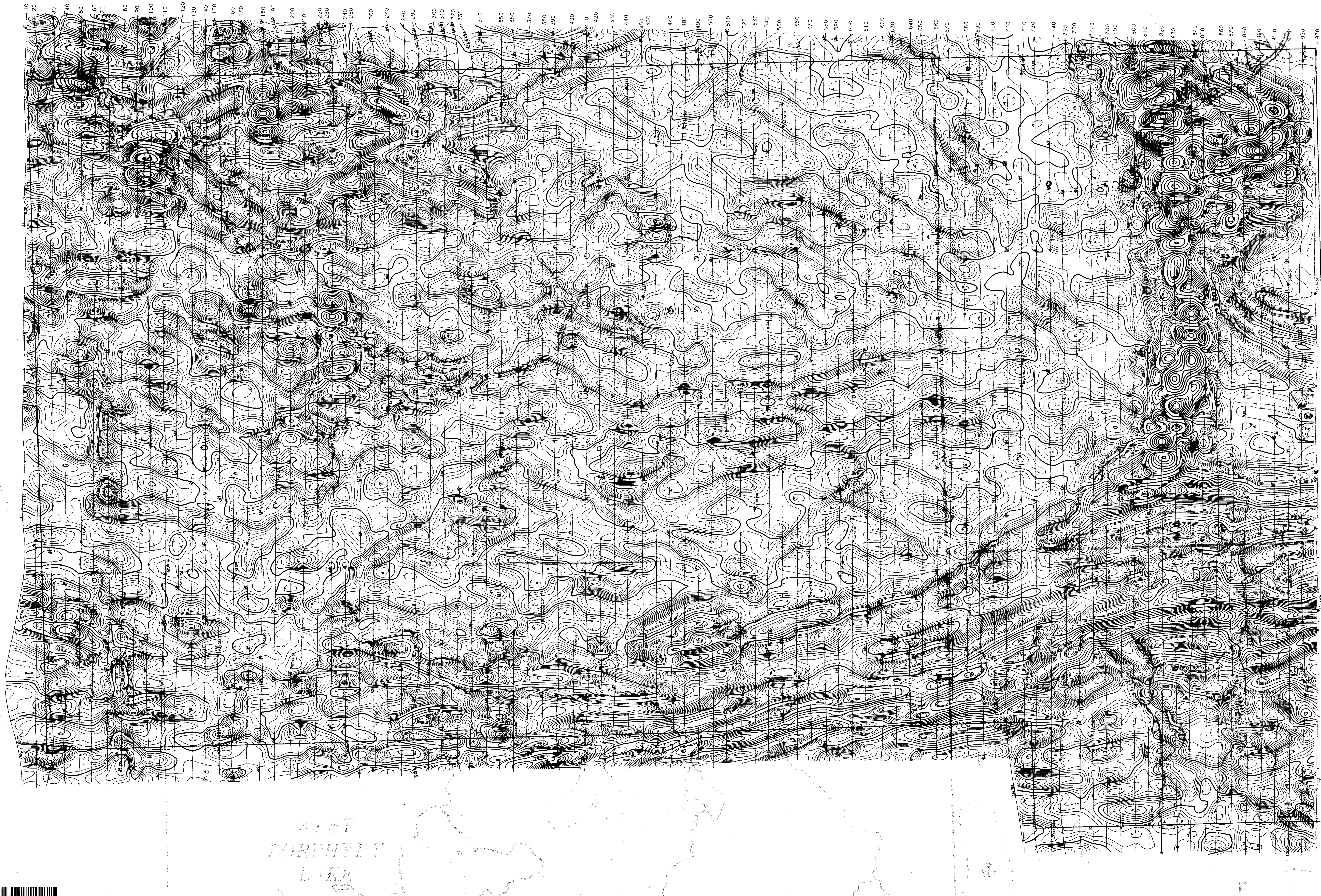
AERODAT LIMITED

DATE: NOV 87

NTS No: 42H,32E

MAP No: 4B J8793

87-CND-52-01



Vertical Gradient

Vertical Magnetic Gradient (in nanoTeslas per meter) calculated from the total field magnetics.

Cesium high sensitivity magnetometer
Sensor elevation 45m

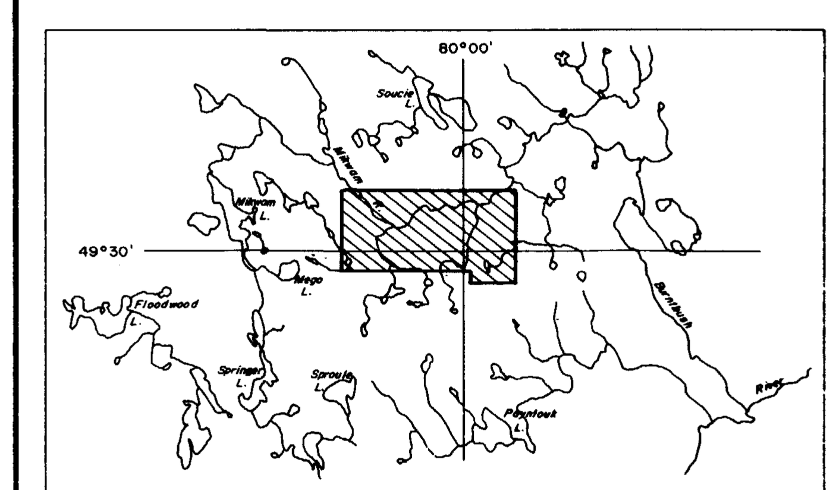
CONTOUR INTERVAL:

25 nT/m
5 nT/m
1 nT/m

Flight Path

Navigation and recovery using Motorola Mini-Ranger (MRS III) radar navigation system

Average terrain clearance 60m
Line spacing = 100m



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CALCULATED VERTICAL MAGNETIC GRADIENT
CONTOURS **2.11104**

PORPHYRY CREEK AREA
ONTARIO

SCALE 1:10,000

0 330 660 1320 1/2 MILE

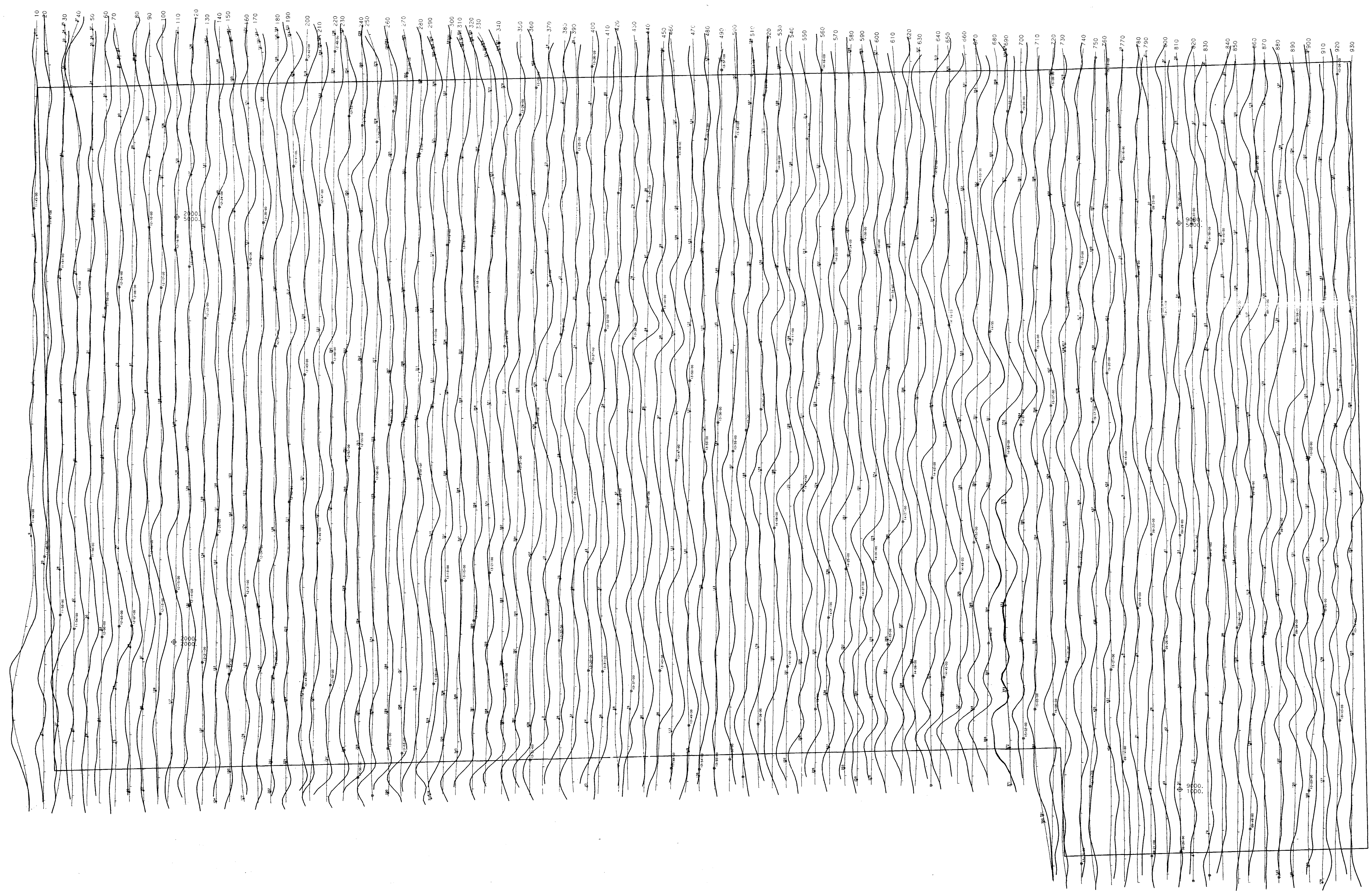
0 100 200 500 1 KILOMETRE

AERODAT LIMITED

DATE:	NOV 87
NTS No:	42H, 32E
MAP No:	5b J8793

87-CND-52-01

250



N

VLF-EM Profiles

Station: NAA (Cutler, Maine) 24.0 kHz
Lines 10 to 470 and 490 to 930
Station: NLK (Seattle, Wash) 24.8 kHz
Line 480
Quaderature 10 percent/cm

Sensor elevation..........45m

Flight Path

Navigation and recovery using
Motorola Mini-Ranger (MRS III)
radar navigation system

Average terrain clearance 60m
Line spacing - 100m

COGEMA CANADA LTD.

VLF-EM QUADERATURE PROFILES
CONTOURS 2.11104

PORPHYRY CREEK AREA

ONTARIO

SCALE 1:10,000

0 330 660 1320 1/2 MILE

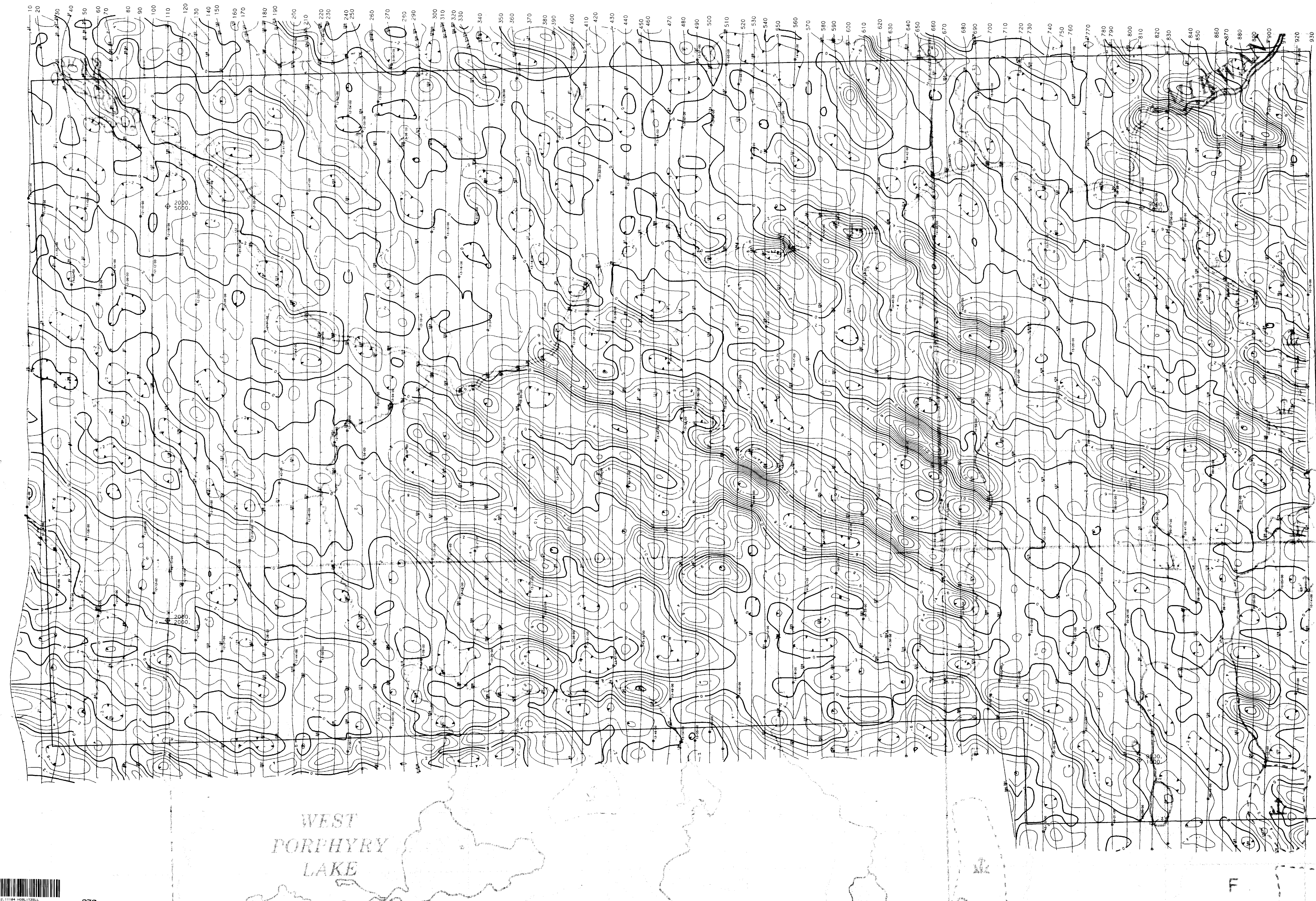
0 100 200 500 1 KILOMETRE

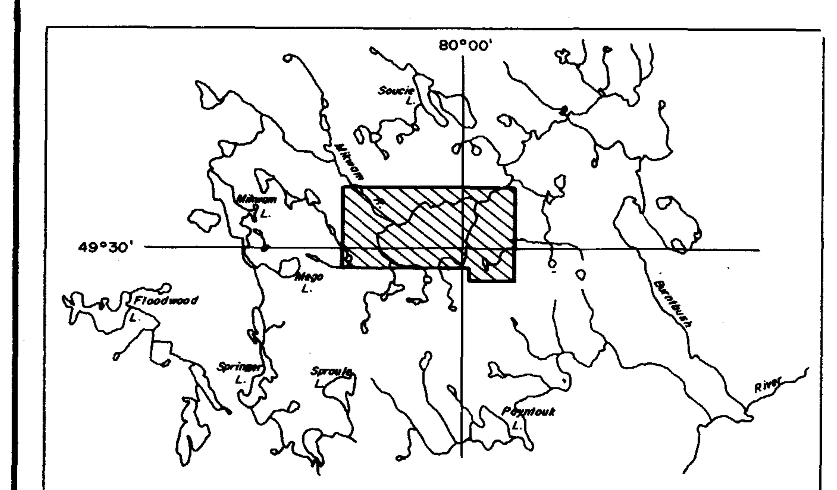
AERODAT LIMITED	DATE: NOV 87	
	NTS No: 42H,32E	
	MAP No: 7	J8793

87-CND-52-01

260

42H09SE0005 2.11104 HOBLITZELL





VLF-EM

VLF-EM Total Field Intensity in percent

Station: NAA (Cutler, Maine) 24.0 kHz
NLK (Seattle, Wash) 24.8 kHz (Line 480)
Sensor elevation 45m

CONTOUR INTERVAL

50%
10%
2%

Flight Path

Navigation and recovery using Motorola Mini-Ranger (MRS III) radar navigation system

Average terrain clearance 60m
Line spacing = 100m

COGEMA CANADA LTD.

VLF-EM TOTAL FIELD
CONTOURS 2.11104

PORPHYRY CREEK AREA
ONTARIO

SCALE 1:10,000

0 330 660 1320 1/2 MILE
0 100 200 500 1 KILOMETRE

AERODAT LIMITED

DATE:	NOV 87
NTS No:	42H, 32E
MAP No:	6B J8793

87-CND-52-01

270

42H09SE0095 2.11104 HOBLITZELL


N
AERODAT HEM SYSTEM RESPONSE
VERTICAL HALF - PLANE
QUADRATURE (ppm)
IN - PHASE (ppm)
Surface
f - Frequency (Hz)
σ t - Conductance (siemens)
Flight Path
Navigation and recovery using Motorola Mini-Ranger (MRS III) radar navigation system
Average terrain clearance 60m
Line spacing = 100m
EM Anomalies
Conductivity Thickness (mhos)
0 - 1
1 - 2
2 - 4
4 - 8
8 - 15
15 - 30
> 30
EM Anomaly A, 4600 Hz inphase amplitude 7 ppm. Bird height 42 m. Depth to conductor 0 m. Conductivity thickness 1-2 mhos (see code).
INTERPRETATION LEGEND
Interpreted bedrock conductor axis
Fault (inferred)
Mafic plug
Diabase dike
Contact (inferred)
80°00'
49°30'
COGEMA CANADA LTD.
INTERPRETATION
2.11104
PORPHYRY CREEK AREA
ONTARIO
SCALE 1:10,000
1/2 MILE
1 KILOMETRE
DATE: NOV 87
NTS No: 42H, 32E
MAP No: 3B
J8793
AERODAT LIMITED
87-CND-52-01
WEST PORPHYRY LAKE
280