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REPORT ON COMBINED HELICOPTER-BORNE MAGNETIC AND ELECTROMAGNETIC SURVEY KIRKLAND LAKE, ONTARIO

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Laborate Laboration and the at

for MONOPROS LIMITED by AERODAT LIMITED DECEMBER 1982

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LIST OF MAPS

(Scale: 1:15,000)

Maps

- 1 Total Field Magnetic Map
- 2 Airborne Electromagnetic Survey Profiles with Interpretation.

1. INTRODUCTION

An airborne geophysical survey was carried out on behalf of Monopros Limited by Aerodat Limited. Equipment operated included a 3 frequency electromagnetic system and a magnetometer. The survey, located near Kirkland Lake Ontario was flown on December 11 and 12, 1982 and a total of 533 line kilometers of data was collected. This report relates to a portion of the survey, consisting of 41 line kilometers over a group of claims held by Monopros. The claims are indicated and numbered on the maps accompanying this report.

2. AIRCRAFT EQUIPMENT AND PERSONNEL

2.1 Aircraft

The helicopter used for the survey was an Aerospatial Astar 350 D owned and operated by North Star Helicopter of Timmins, Ontario. Installation of the geophysical and ancillary equipment was carried out by Aerodat at Timmins. The helicopter was operated at a mean terrain clearance of 60 meters.

2.2 Equipment

2.2.1 Electromagnetic System

The electromagnetic system was an Aerodat/ Geonics/Geotech 3 frequency system. Two vertical coaxial coil pairs were operated at 955 and 4550 Hz and a horizontal coplanar coil pair at 4250 Hz. The transmitter-receiver separation was 7 meters. In-phase and quadrature signals were measured simultaneously for the 3 frequencies with a time-constant of 0.1 seconds. The EM bird was towed 30 meters below the helicopter.

2.2.2 Magnetometer

The magnetometer was a Geometrics G-803 proton precession type. The sensitivity of the instrument was 1 gamma at a 0.5 second sample rate. The sensor was towed in a bird 15 meters below the helicopter.

2.2.3 Magnetic Base Station

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

2.2.4 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.

2.2.5 Tracking Camera

A Geocam tracking camera was used to record flight path on 35 mm film. The camera was operated in strip mode and the fiducial numbers for cross reference to the analog and digital

data were imprinted on the margin of the film.

2.2.6 Radar Positioning System

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

2.2.7 Analog Recorders

A RMS 16-channel dot-matrix recorder was used to display the data during the survey. The chart speed was 2 mm/sec. and in addition to manual and time fiducials the following data was recorded:

RMS Dot-matrix

Channel	Input	Scale
00	Altimeter	10 ft/mm (top=1000 ft.)
05	EM Coplanar (in-phase 4250 Hz.)	4 ppm/mm
06	EM Coplanar (quadrature 4250 Hz.)	4 ppm/mm
07	EM Coaxial (in-phase 4550 Hz.)	2 ppm/mm
08	EM Coaxial (guadrature 4550 Hz.)	2 ppm/mm
09	EM Coaxial (in-phase 955 Hz.)	2 ppm/mm
10	EM Coaxial (quadrature 955 Hz.)	2 ppm/mm
11	Magnetometer	5 gammas/mm
12	Magnetometer	2 gammas/mm

2.2.8 Digital Recorder

A Perle DAC/NAV data system recorded the survey data on cassette magnetic tape. Information recorded was as follows:

Equipment	Interval
EM	0.1 sec.
Magnetometer	0.5 sec.
Altimeter	1.0 sec.
Fiducial (time)	1.0 sec.
Fiducial (manual)	0.2 sec.

2.3 Personnel

Personnel directly involved with the survey operation were as follows:

Pilot: Bert Simon

Equipment Operator/Technician: P. Moisan

3. DATA PRESENTATION

3.1 Flight Plan and Base Map

The flight lines were flown in a $5^{\circ}/185^{\circ}$ direction at a mean spacing of 150 meters.

A photomosaic was constructed using available aerial photography. It was used during the course of the survey for visual navigation and preliminary flight path recovery.

The recorded MRS III radar positioning data was used to derive the final flight track position, with an accuracy in the order of 10 meters. An enlargement of the published 1:50,000 topographic map, which is planimetrically compatible with the radar positions, was adopted as the final base map. The aerial photography displayed some distortion and was therefore incompatible with the radar positioning method.

3.2 Electromagnetic

The Aerodat 3 frequency system utilizes 2 different transmitter/receiver coil geometries. The traditional

coaxial coil configuration is operated at 2 frequencies, 955 and 4550 Hz and a second horizontal coplanar coil configuration is operated at 4250 Hz.

A given conductive source within the detection range of the system will couple differently with the coaxial as opposed to coplanar coil pairs. As a result the characteristic shape of the anomaly may differ significantly between geometries.

In the case of a thin steeply dipping dyke-like feature, the coaxial coil pair yield a symmetric peak directly over the conductor whereas the coplanar coil pair yield a minimum flanked by positive side lobes.

As the dip of the conductor decreases the coaxial anomaly shape changes 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. This asymmetry characteristic may be used for estimating dip.

As the thickness of the conductor increases the coaxial response shape changes slightly. However, in the case of the coplanar coils the minimum response directly over the conductor diminishes in amplitude relative to the positive side lobes and in the limiting case of a sphere or horizontal sheet-like conductor the

minimum will disappear completely.

In general the coaxial coil pairs operated at two frequencies provide a conductive response range sufficiently broad to ensure a good response from geologic conductors. The coplanar coil pair provides additional information well suited to the interpretation of the structure of the conductive anomaly.

The Airborne Electromagnetic Survey Profile Map shows a phasor diagram in the legend for the coaxial coil pair at 4550 Hz. The apparent conductance is determined by applying the inphase and quadrature anomaly amplitudes of the coaxial coil configuration to the phasor diagram for the vertical half-plane model. The relationship of apparent conductance to true conductance, which in the case of narrow, slab-like bodies is the product of the electrical conductivity and average thickness, depends upon how closely the body approximates the sheet-like form, and upon how nearly at right angles its strike direction is to the flight line of the aircraft.

Conductance in mhos is the reciprocal of resistance in ohms and is a geologic parameter because it is characteristic of the conductor alone. It is generally independent of frequency and flying height (or depth of burial) and relatively independent of conductor

strike length and dip. The inphase amplitude is a function of both flying height and dip, and is more strongly affected by conductor size than is conductance.

Apparent depths to the conductors can also be determined from the phasor diagram. Although the phasor curves are often able to distinguish between conditions of comparatively thick and thin overburden, the depth estimates are not generally reliable.

Some of the more common reasons for this area:

- (i) the conductivity of the body may change with depth
- (ii) the conductor plunges
- (iii) the dip is substantially less than vertical
- (iv) interference from conductive overburden or host rock has distorted the anomalies
- (v) the body has too short a strike lengthto give a good half-plane response

Any of the conditions enumerated above may affect the anomaly amplitudes. Some will cause roughly proportionate changes in both phases, so that the depth estimates tend to be more seriously affected than the conductance estimates.

3.3 Magnetics

The Total Field Magnetic Map shows contours of the total magnetic field, uncorrected for regional variation.

A correction for diurnal variation was made by direct subtraction of the recorded magnetic base station variation. 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.

4. INTERPRETATION AND RECOMMENDATIONS

An analysis of the electromagnetic profile data did not indicate any anomalies that were clearly characteristic of bedrock conductors. Several tentative bedrock conductor axes have been indicated on the electromagnetic profile map; however it is suspected that these conductors may simply relate to lateral variations in overburden thickness or conductivity. If they are of bedrock origin their conductance is very low, typical of that expected from electrolytic conduction in faults and shears. At best only very minor disseminated conductive sulphide or graphite mineralization would be expected.

The magnetic contour map indicates several isolated anomalies of higher magnetization. The conductor axis A appears to be associated with one of these units, a factor that adds credence to the conductor being of bedrock as opposed to overburden origin.

On the basis of the airborne geophysical data alone follow-up investigation for base metal sulphide type deposits is not warranted. Should the area be considered geologically favourable for gold mineralization, conductor axis A may warrant ground followup investigation.

> Respectfully submitted, AERODAT LIMITED

PROFESSIONAL L. Scott Hoggs B. R. L. S. HOCG R.

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February 23, 1983

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Enter 40 days. (This includes line cutting)	- Magnetometer			666161	V		714047 1	
For each additional survey:	- Radiometric			666162	V		714048	-
using the same grid:	- Other							+
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Complete reverse side and enter total(s) here	- Electromagnetic		•	666167			714053 🖌	
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Geotechnical Report Approval

File 2.5921

Mining Lands Comments

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To: Geophysics	Mr. R. Barlow								
Comments									
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Ministry of Natural Resources

File___2.5921

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GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

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.

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OFFICE USE ONLY

GEOPHYSICAL TECHNICAL DATA

G	ROUND SURVEYS – If more than one survey, s	pecify data for each ty	pe of survey	•			
N	umber of Stations	Number o	f Readings	•			
	tation interval		-				
	rofile scale	-	-				
	ontour interval						
-		· · · · · · · · · · · · · · · · · · ·					
7 3	Instrument		······································				
MAGNETIC	Accuracy – Scale constant						
CNI	Diurnal correction method	***					
MA	Base Station check-in interval (hours)						
	Base Station location and value						
<u>0</u>	Instrument						
EL	Coil configuration						
AG	Coil separation	*** **					
MO	Accuracy						
ELECTROMAGNETIC	Method:	Shoot back	🗔 In line	🗆 Parallel line			
LEC	Frequency	(specify VI F station)					
Ш	Parameters measured						
	Instrument						
	Scale constant						
X	Corrections made						
GRAVIT							
S	Base station value and location		·				
		·····					
	Elevation accuracy						
	Instrument						
	Method 🔲 Time Domain	🗔 Fr	equency Domain				
	Parameters – On time	Fr	equency				
Z	- Off time	Ra	ange	· · · · · · · · · · · · · · · · · · ·			
RESISTIVITY	— Delay time						
IST	— Integration time						
RES	Power						
-4	Electrode array						
	Electrode spacing						
	Type of electrode			<u></u>			

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SELF POTENTIAL

Instrument	Range
,	
PADIOMETRIC	· · · · · · · · · · · · · · · · · · ·
RADIOMETRIC	
Instrument	
	Background Count
•	
Overburden	
(type, depth	include outcrop map)
OTHERS (SEISMIC, DRILL WELL LOGGING ETC.	.)
Type of survey	
Instrument	·
Accuracy	······································
Parameters measured	
Additional information (for understanding results)	
AIDDODNE CUDVEVS	
AIRBORNE SURVEYS Type of survey(s) AIRBORNE MAGNETIC AND	ELECTROMAGNETIC
Type of survey(s)	ESSION/ARRODAT, GEONICS, GEOTECH 3 FREQUENCY SYSTEM
mstrument(s)	each type of survey)
(specify for Aircraft used <u>AEROSPATIAL ASTAR 350 D HELI</u>	each type of survey) COPTER
Sensor altitude MAGNETIC 45 METRES / ELECTRO	MAGNETIC 30 METRES
Navigation and flight path recovery method <u>MOTORO</u>	LA MINI-RANGER (MRS III) RADAR NAVIGATION SYSTEM
Aircraft altitude60 METRES	Line Spacing 150 METRES
Miles flown over total area 533 Km. 333.1 MIL	

GEOCHEMICAL SURVEY - PROCEDURE RECORD

Numbers of claims from which samples taken_____

	·				
Total Number of Samples Type of Sample (Nature of Material)	Values expressed in: per cent				
Average Sample Weight Method of Collection	p. p. v. 🗅				
Soil Horizon Sampled					
Horizon Development					
Sample Depth					
Terrain	•				
	Reagents Used				
Drainage Development					
Estimated Range of Overburden Thickness					
	Extraction Method				
	Analytical Method				
	Reagents Used				
SAMPLE PREPARATION	Commercial Laboratory (tests)				
(Includes drying, screening, crushing, ashing)	Name of Laboratory				
Mesh size of fraction used for analysis	Extraction Method				
	Analytical Method				
	Reagents Used				
General	General				
· · · · · · · · · · · · · · · · · · ·					

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MINING CLAIMS TRAVERSED (Cont'd)

1983 10 26

Mr. George J. Koleszar Mining Recorder Ministry of Natural Resources 4 Government Road East P.O. Box 984 Kirkland Lake, Ontario P2N 1A2

Dear Sir:

We have received reports and maps for an Airborne Geophysical (Electromagnetic and Magnetómeter) survey on mining claims L 666160 et al in the Township of Morrisette.

This material will be examined and assessed and a statement of assessment work credits will be issued.

We do not have a copy of the report of work which is normally filed with you prior to the submission of this technical data. Please forward a copy as soon as possible.

Yours very truly,

E.F. Anderson Director Land Management Branch

Whitney Block, Room 6643 Queen's Park Toronto, Ontario M7A 1W3 Phone:(416)965-1380

D. Kinvig:mc

cc: Donald Boucher 20 Victoria Street Toronto, Ontario M5C 2N8 2.5921

MONOPROS LIMITED

September 6th, 1983

I, Donald Boucher, certify that I completed a Bachelor of Science degree (geology and physics major) at Brock University, St. Catherines, Ontario, in 1979.

I also certify that I worked for Hudson Bay Mining and Smelting Box 28 Toronto Dominion Centre Toronto, Ontario M5K 1B8

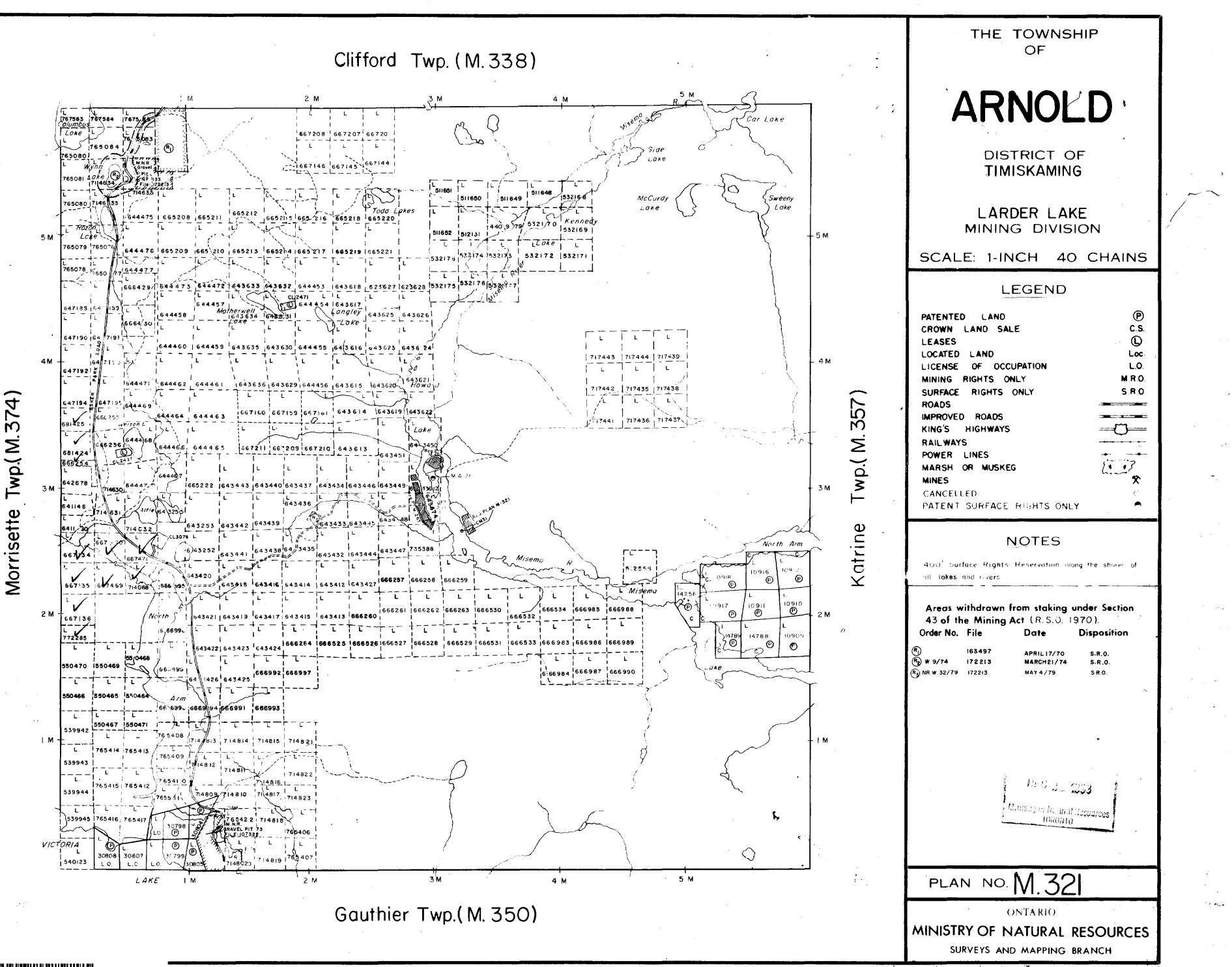
from May 1979 to May 1983 as an exploration geologist in base and precious metal exploration.

I am presently employed by

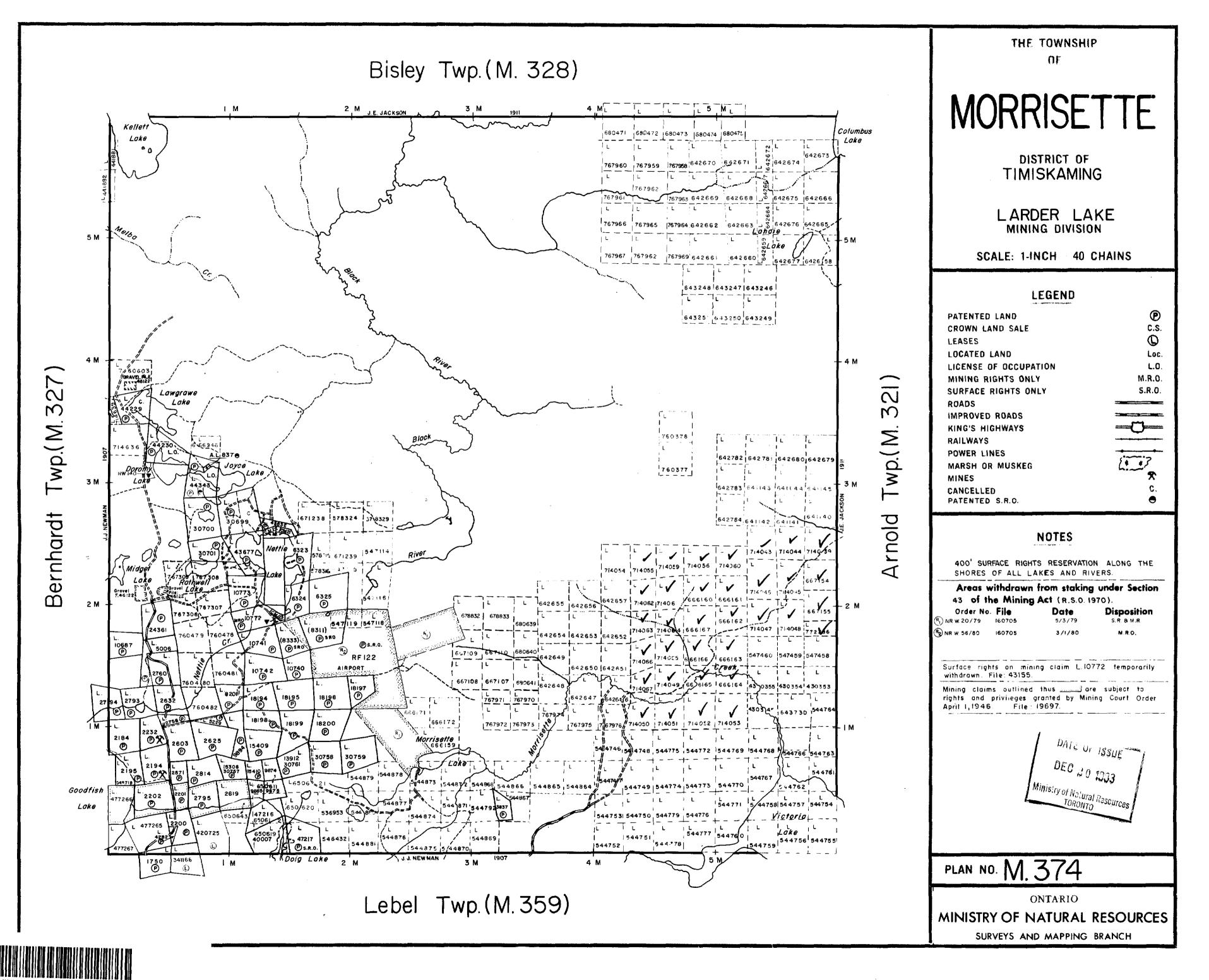
Monopros Limited 20 Victoria Street Toronto, Ontario M5C 2N8

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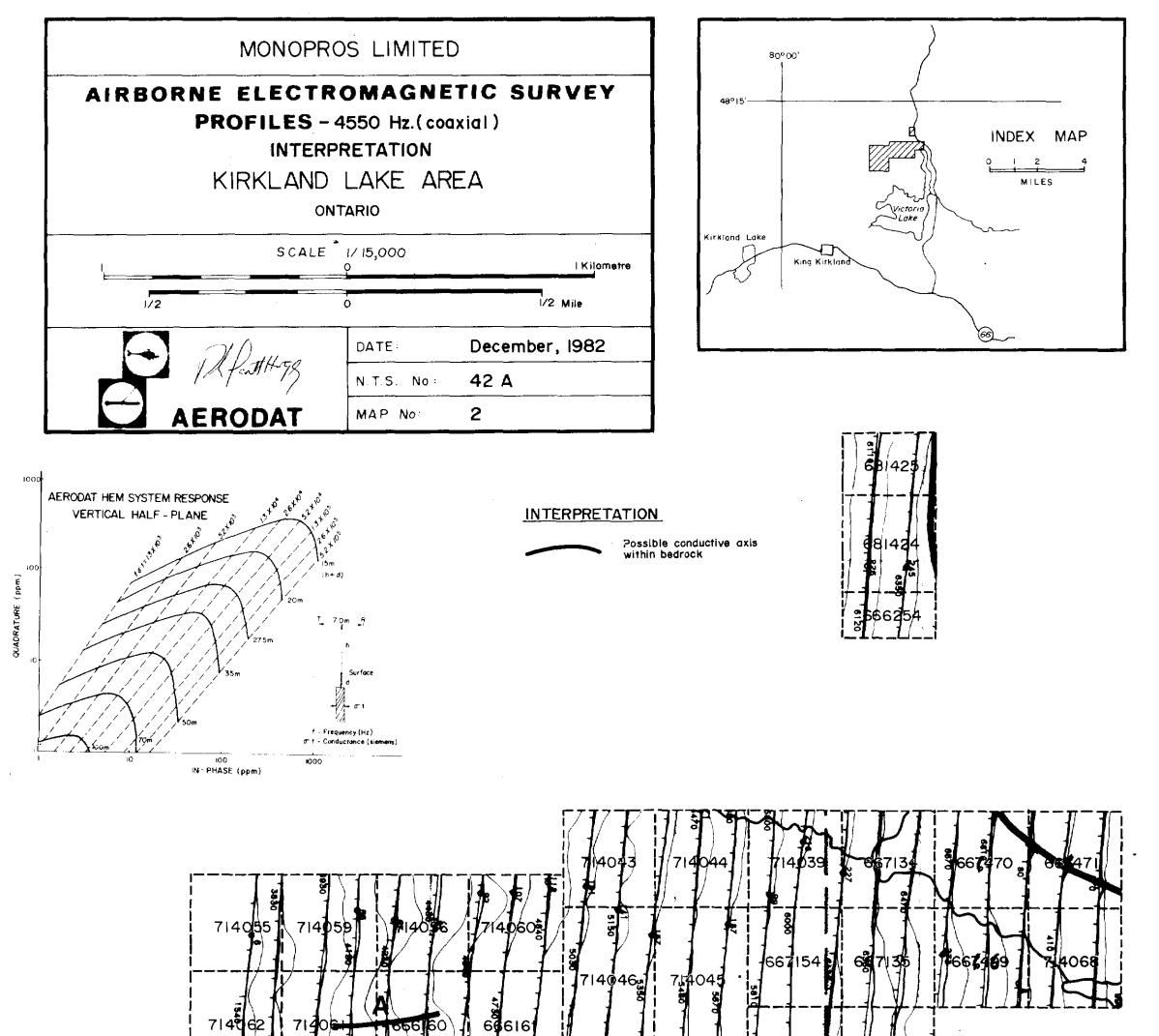
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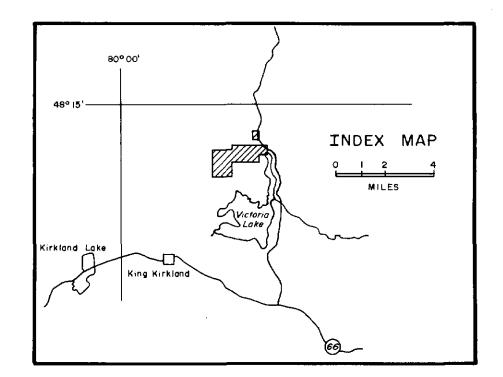


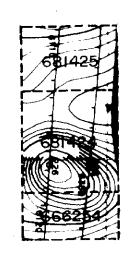


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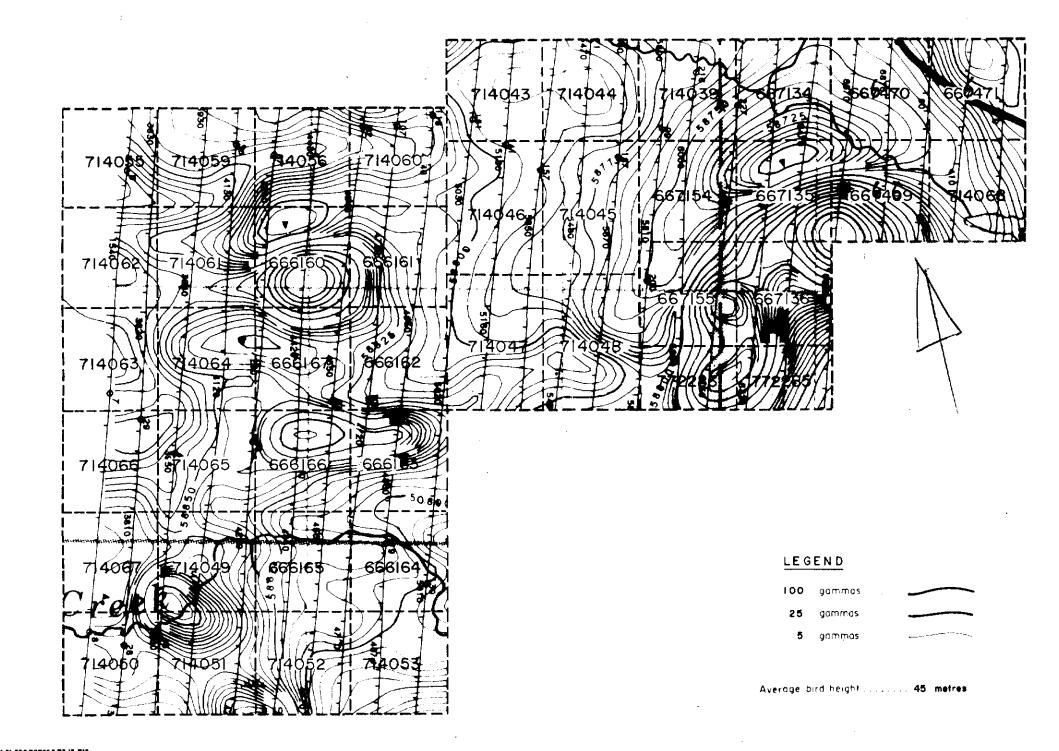


MONOPROS LIMITED						
TOTAL FIELD MAGNETIC MAP						
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