2.270

REPORT ON AIRBORNE GEOPHYSICAL SURVEY OR KIRKLAND LAKE-LARDER LAKE AREA, FOR UPPER CANADA MINES LIMITED.

I. INTRODUCTION

During July 15th to July 21st, 1964, Canadian Aero Mineral Surveys Limited flew an airborne geophysical survey for Upper Canada Mines Limited in the Kirkland Lake-Larder Lake area. The survey block includes parts of Arnold, Katrine, Gauthier, and McVittie Townships. Flight lines were spaced at 1/8 mile intervals in a NNE'ly direction. A mean terrain clearance of 150 feet was maintained except in areas of sharp relief.

Canadian Aero Mineral Surveys personnel assigned to the project were:

G. A. Curtis	-	Project Manager
D. Smith	-	Pilot
K. McLeod	-	Navigator
D. Graham	-	Operator
D. J. Sarazin	-	Data Compiler

Details of the geophysical equipment, the survey procedures, and the ddta presentation are provided in Appendices II and III of the report. A list of all EM anomalies by flight line is contained in Appendix I. The EM anomalies are plotted on the plan map at ¼ mile scale, produced from an airphoto laydown. The magnetic data is not compiled.

CANADIAN AERO *Mineral Surveys* LIMITED

Four anomaly trends have been located on the plan map. The characterisitics of the trends are discussed in detail. No priority classification has beam given to the trends. The magnetic coincidence to the EM anomaly and a short strike length indicates a high probability of their being sulphide conductors.

II. GEOLOGY

The geology of the survey block can be divided into three areas. The northern most third of the block contains undifferentiated basic volcanics and interflow sedimentary rocks. The WNW'ly striking intrusive, because of its magnetic characterisitcs, exhibits a more basic characteristic and is likely a basic syenite or lamprophyric type. The magnetic map would indicate a lense of this intrusive, not shown on the Ontario geologic map, 2046, occurs in the basic volcanics near the rhyolite contact from the southwest tip of Beaverhouse Lake, almost to the west boundary of the block.

The midsection of the survey block is mainly rhyolite. The Lake Beaverhouse Mine (Argonaut) is located on a N-S fault at the rhyolite-basic volcanic contact at the southwest tip of Beaverhouse Lake. Two conductors, 1 and 4, occur in the rhyolite at the contact with basic volcanics, but are not directly related to the mine. A weak response is mapped northwest of the mine along an old power line, and may be caused by the power line. However, its proximity to the rhyolite-basic volcanic contact and known mineralization, give the zone some value. A third conductor, 2, is

located along the rhyolite-sedimentary Timiskaming contact.

The southern third of the block contains sediments of the Timiskaming series, locally intruded by Algoman syenite and prophyry. It is from within this sedimentary series and the syenite intrusive, that most of the gold has been produced. Varying amounts of pyrite, pyrrhotite, chalcopyrite, and to a lesser degree, galena, sphalerite and magnetite, are associated with the gold occurences. A conductor is associated with the Upper Canada mine north of Dobie.

Generally, the smaller isolated sulphide showings do not respond to the airborne survey because of their limited size and grade. The two sulphide occurrences in the northwest corner of the survey area are of this nature.

III. EM RESULTS

Four major conductors have been located on the plan map. Their relationship to the general geology is discussed above. Five very weak conductors, (x), occur on or near geologic contacts, and their validity as bedrock conductors is questioned.

As mentioned, there is no priority classification for the four conductors. They all likely represent sulphides. Their economic importance cannot be ascertained from the data alone, but must be judged from further geologic evidence.

Anomaly 1 - Moderate to weak EM response with coincident magnetics. High probability of being pyrrhotite. Similar to Anomaly 4.

Anomaly 2 - Moderate to strong EM response with coincident magnetics at each end of the conductor. Some pyhrrotite likely, with central section non-magnetic sulphides. Very low probability of graphite.

Anomaly 3 - Strong multiple conductor at the Upper Canada mines north of Dobie. Multiplicity in part a response from surface buildings, power lines, etc. The conducting zone is associated with a magnetic high north of Dobie. Ground reconnaisance would be required to separate the surface interference from the bedrock conductor.

Anomaly 4 - Moderate to weak EM response with coincident magnetics. Characteristics identiaal to Anomaly 1, and a similar cause suspected.

REFERENCES :- Ontario Department of Mines

(a) Map 2046
Timmins-Kirkland Lake Sheet
1" = 4 Miles

(b) Vol. XXX, Part II, 1921,
Ontario Gold Deposits
by P. E. Hopkins

REFERENCES :- Ontario Department of Mines

(c) Vol. XXXVII, Part II, 1928,
Kirkland Lake Gold Area
by E. W. Todd

(d) GEOLOGICAL SURVEY OF CANADA
Aeromagnetic Map 47 G
Sheet 32 D/6
Larder Lake.

Respectfully submitted,

W. G. Wieduwilt,
Geophysicist.

OTTAWA, Ontario,
September 23, 1964.

PROJECT No. 4033 - GAUTHIER TOWNSHIP AREA

Anomaly	Fiducials	In-Phase Quad	Altitude	Magnetics	Rate	Comments
6 A	8562/5	30/90	150	Dir. 20g	3	
6 B	8525/9	40/20	160	Dir. 25g	3	Broad mag
7 A	8666/70	120/160	175	nil	2B	
7 B	8692/5	20/220	175	Broad 50g	3	Possible double on N. side
8 A	8961/5	220/80	165	nil	2B	Double
8 B	8931/4	0/100	155	Dir. 10g	3	
9 A	9072/6	0/20	175	10g	x	Weak EM, possibl weak mag, possible overburden
16 A	621/4	20/30	135	10g	x	On S.flank 500g mag, possible culture
16 B	627/32	(?)300/60	130-170	Dir.double 250g	2A	IP mag effect, multiple zone both sides of peak
17 A	0974/9	(-)/50	140	EM at N. edge 600	3	IP mag effect weak EM on N. contact 600g
42 A	58/61	10/40	140	nil	3	
42 B	01/3	0/20	110	Dir. 80g	x	Possible surface conductor
43 A	240/3	0/40	145	Dir. 40g	3	Apparent S. dip to mag

APPENDIX I

PROJECT No. 4033 - GAUTHIER TOWNSHIP AREA

Anomaly	Fiducials	In-Phase Quad	Altitude	Magnetics	Rate	Comments
45 A	640/4	(-)/40	150	Dir. 25g	3	Apparent S. dip to mag
46 A	778/81	90/80	160	N.Flank 350g	x	Possibly turbulence
46 B	0336/9	(-)/30	155	Dir. 35g	3	

APPENDIX II

DESCRIPTION OF OTTER AIRBORNE GEOPHYSICAL SYSTEM

SURVEY BASIS

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

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

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

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

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

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

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

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

RECORDER TRACKS

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

1) Fiducial marks are noted, with a time separation of 10 seconds, which is equivalent to a distance separation of approximately 1500 feet. The numbering is from right to left, this being the 'forward' direction of flight.

2) Magnetometer - Each 5 mm. represents approximately 80 gammas. When the unit "steps", approximately 400 gammas change is indicated. This applies to the 300-0-300 scale which is normal unless otherwise noted. Ten steps are available, beyond which, unless the range is advanced, the unit goes "of scale." It should be noted that this record is a differential record, with a time constant of some 4 seconds. The net result of this is to wipe out long term variations, but to leave short term changes relatively unaltered. Thus the magnetometer record in this case is useful largely for "correlating" magnetic features associated with the electromagnetic results.

Appendix II - cont'd

3) In-phase e.m. - Each 5 mm. represents approximately 100 parts per million referred to the primary field at the receive coil. Noise level should not exceed 50 parts per million, although records are still considered useable until the noise level reaches 100 p.p.m. Intensity is linear until 600 p.p.m. is reached, after which compression occurs to a level of 1200 p.p.m., beyond which the value is 'off-scale'.

4) Quadrature e.m. - Exactly the same scale values and comments apply to this trace as to the in-phase above.

5) Altimeter trace - The center of this trace represents approximately 150' above ground; the bottom, approximately 50', and the top approximately 300'. Response on this trace is approximately linear.

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

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

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

APPENDIX III

SURVEY PROCEDURES AND RESULTS

PROCEDURE

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

Anomalies are numbered according to the line on which they fall, and a sequence letter; lettering from South to North, or from East to West. They are assigned fiducial numbers from the charts, and transferred to the base map by means of proportional devices. The overall grade of the anomaly is indicated by the manner in which it is plotted, as indicated on the base map. The intensity of directly correlating magnetics is indicated opposite the appropriate anomaly.

ANOMALY RATINGS

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

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

B) Ratio of in-phase to quadrature responses.

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

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

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

Appendix III - continued

ANOMALY LISTING

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

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

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

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

4) Altitude above ground is recorded to the nearest 10 feet.

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

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

Appendix III - continued

GENERAL

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

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

W7008-195058

MINING CLAIM

George S. Potter, K 1461 1019508 August 7th, 1970.

88 Queen Street, Kirkland Lake, Ontario. July 25th, 1970 9.00 am

OFFICE USE ONLY

ASSESSMENT WORK CREDIT ASSIGNED

Gauthier Township Pt. Mining Rights Only

(File L 265426)

DATE	DAYS WORK		RECEIPT
Dec.30,1970		Transfer of all interest to Upper Canada Mines Limited. A 26186. (L 264378)	1-333
Mar.1/71		Airborne Geophysical Certificate dated February 22nd, 1971. Prescribed times (under Section 84, Subsection 2) for performing the first and subsequent periods of work are advanced one year. (L 264378)	
Apr.21/72	20	days work Geochemical (L 265436)	

18 1972

Ben Nevis Twp.(M. 325)

Arnold Twp.(M.321)

Ossian Twp.(M.378)

McVittie Twp.(M.370)

THF TOWNSHIP
OF

"KATRINE"

Claim Map

DISTRICT OF
TIMISKAMING

LARDER LAKE
MINING DIVISION

SCALE: 1-INCH 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C S
LEASES	(L)
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	L

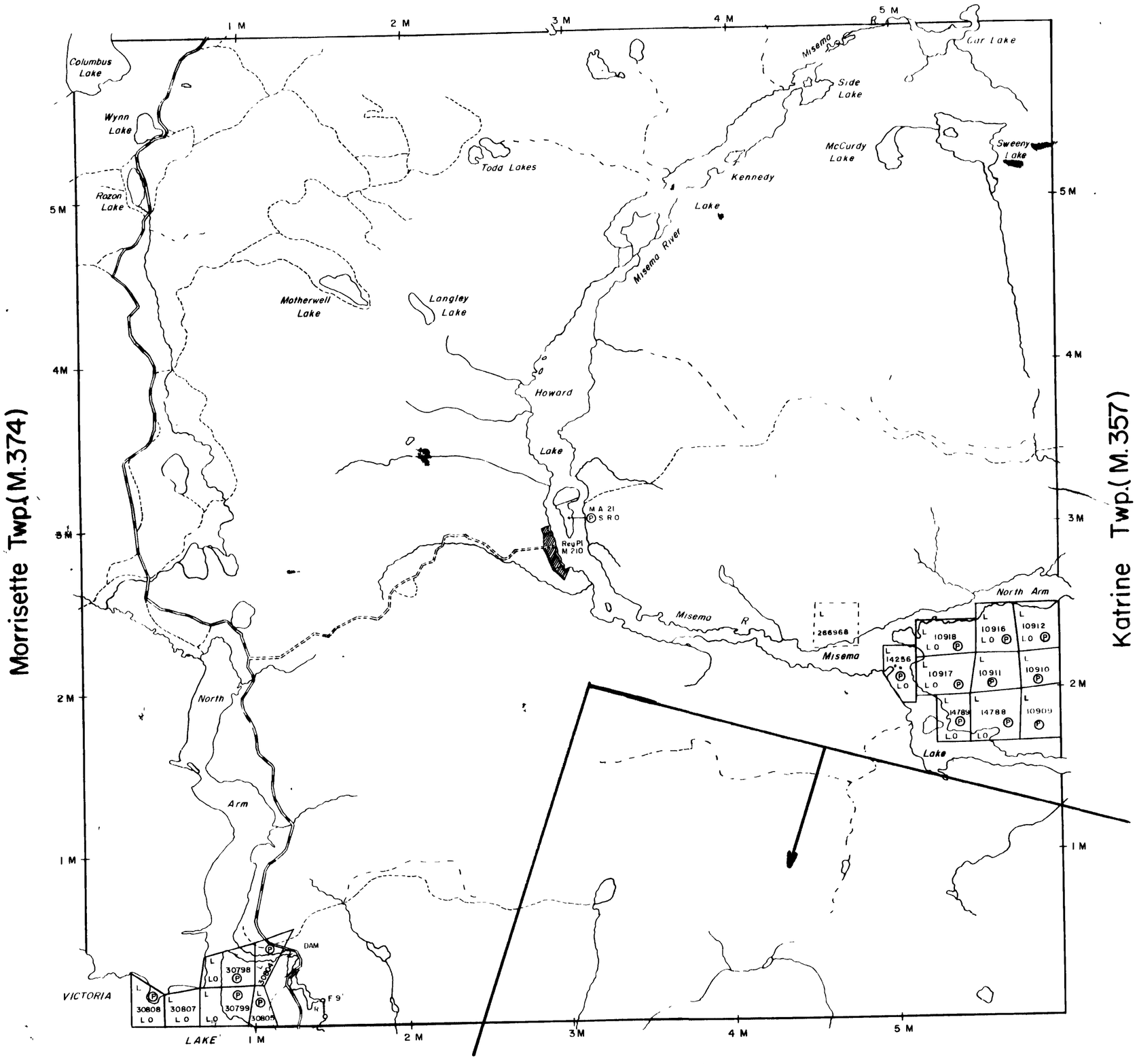
NOTES

400' SURFACE RIGHTS RESERVATION AROUND ALL LAKES AND RIVERS

PLAN NO. M. 357

ONTARIO
DEPARTMENT OF MINES
AND NORTHERN AFFAIRS

Clifford Twp. (M.338)



THE TOWNSHIP OF

"Claim Map" ARNOLD

DISTRICT OF TIMISKAMING

LARDER LAKE MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

LEGEND

PATENTED LAND	P
CROWN LAND SALE	C.S.
LEASES	L
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

400' Surface Rights Reservation Around All Lakes And Rivers

PLAN NO. M.321

ONTARIO DEPARTMENT OF MINES AND NORTHERN AFFAIRS

Arnold Twp. – M.321

EAST ASTRONOMIC

Lebel Twp. – M.359

McVittie Twp. – M.370

McElroy Twp. – M.366

THE TOWNSHIP
OF
"Claim Map"
GAUTHIER

DISTRICT OF
TIMISKAMING

LARDER LAKE
MINING DIVISION

SCALE 1 INCH = 40 CHAINS

LEGEND

PATENTED LAND	P
CROWN LAND SALE	C S
LEASES	L
LOCATED LAND	L O C
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

400' Surface Rights Reservation around all lakes and rivers

DATE OF ISSUE
JAN 22 1971
DEPT. OF MINES
AND NORTHERN AFFAIRS

PLAN NO M.350

ONTARIO
DEPARTMENT OF MINES
AND NORTHERN AFFAIRS

Katrine Twp. (M. 357)

MUNICIPALITY OF LARDER LAKE — IMPROVEMENT DISTRICT OF MC GARRY

Gauthier Twp. (M. 350)

McGarry Twp. (M. 369)

Hearst Twp. (M. 354)

Gem Lake

Beaverhouse Lake 950

Sourdough L.

Coate L.

Spectacle Lakes

Moosehead Lake

Binney Lake

Diamond Lake

Fork L.

Gold Lake

Lemieux L.

Grosby Lake

Beaver Lake

Monocle L.

Malone Lake

Larder Lake

Pancake L.

Pancake Cr.

Northland Pancake L.

Leroy Bay

Pearl Beach

Northeast Arm

Northwest Bay

LARDER LAKE

Town of Larder Lake

Sta.

HEPC LO 2386 & LO 1596

HEPC LO 5647

HEPC LO 6165

ONT NORTHL RY

Bear Lake

Blackwell Lake

Bear L.

Enright Pt

Res to Dep of L & F File 164586

THE TOWNSHIP OF "Claim Map" McVITTIE

DISTRICT OF TIMISKAMING

LARDER LAKE MINING DIVISION

SCALE: 1-INCH 40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	C.S
LEASES	(L)
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

400 SURFACE RIGHTS RESERVATION AROUND ALL LAKES AND RIVERS

DATE OF ISSUE
JAN 1 1972
ONTARIO DEPT OF MINES AND NORTHERN AFF

PLAN NO. M.370

ONTARIO DEPARTMENT OF MINES AND NORTHERN AFFAIRS

32D04NE0068 2.270 KATRINE

265435	265430	265426	265757	265756	267209	267208	267207	267206	267205	267204	267203	267200	267202
265434	265431	265427	264380	265755	265754	265747	265746	265739	265138	265131	265727		
265433	265432	265428	264379	264381	265753	265748	265745	265140	265137	265732	265728	265722	
267365	267364	265429	264378	264382	265752	265749	265744	265141	265136	265733	265729	265725	
267214	267213	267212	267211	267210	265751	265752	265743	265142	265735	265734	265730		

TWP

N

UPPER BEAVER MINES LIMITED

ALTIE TWP

265875 265879 FROM PLAN 394

265876 265878 265879 265880 265881 267072

265877 101364 101365 101366 267070 267071

267069 267068

267061 267062 267065 267066

267057 267060 267063 267064

267058 267059

SCALE
1" = 1000'
23-12-70

ARNOLD

KATRINE

MISEMA LAKE

GOLD L.

AREA BOUNDARY

GEM L.

BEAVERHOUSE LAKE

SOURDOUGH LAKE

1970 STAKED MER

263835

101364

101365

101336

COATE L.

SPECTACLE L.

MOOSEHEAD L.

VICTORIA CREEK

ROAD

LITTLE LARDER LAKE

AREA of Gabrielle Survey (1970) Previously Submitted (1962)

MISEMA RIVER

POWER LINE

BINNEY LAKE

DOBIE

GAUTHIER

McVITTIE

LEGEND

1A ANOMALY

1B ANOMALY

2A ANOMALY

2B ANOMALY

3 ANOMALY

X Type ANOMALY

MEAN TERRAIN CLEARANCE 150 FEET

FLIGHT LINE SPACING ..... 1/8 MILE

RIVERS AND LAKES .....

HORIZONTAL CONTROL .....BASED ON PHOTO LAYDOWN

AIRBORNE ELECTROMAGNETIC SURVEY

GAUTHIER TWP. AREA

ONTARIO

UPPER CANADA MINES LTD.

SCALE 1 INCH = 1/4 MILE (approx)

(APPROX.)

AERO Mineral Surveys LTD

OTTAWA & TORONTO, ONTARIO

250

Original

2.270