I. INTRODUCTION.

Between September 30th and October 9th, 1968, an airborne geophysical survey comprising in-phase and out-of-phase electromagnetometer, was carried out by Lockwood Survey Corporation Limited for Sutherland and Associates of 99 claims, in one block, totalling 102.37 line miles.

The airborne survey over the claim block was within 16 miles radius of Gowganda. The survey was within the Township of Van Hise; District of Timiskaming, Larder Lake Mining District.

Traverse lines were spaced at 1/16th mile, on an east-west bearing. Appropriate tie-lines were flown.

The mean terrain clearance for the E.M. and magnetometer bird was 100 feet.

Photographs of the terrain below the aircraft were exposed at intervals of 1.5 secs. throughout the survey on 35 mm film. This photography was used to establish the actual flight path of the aircraft whilst on survey.

The areas have been collated on map sheets, at a scale of 1 inch to 1,320 feet, with planimetry traced from uncontrolled mosaics.

The survey was undertaken by the following personnel:

J.M. Barthelemew, Pilot.

J. Masse, Engineer.

H. Sandau, Navigator, Operator.

P. Bell, Data Reduction.

The aircraft used for the survey was a Hiller 1100, registration CF - AHB.

II. INSTRUMENT SPECIFICATIONS.

II.1 ELECTROMAGNETIC SYSTEM:

Manufacturer:	Lockwood Survey Corporation Limited (formerly Hunting Survey Corporation Limited).
Type:	In-phase/Out-of-phase System.
Serial No:	Unit 3.
Frequency:	4000 cycle per second.
Power Source:	28 volts.
Coil Size:	18 inches.
Coil Separation:	30 feet - vertical, co-axial.
Power Output:	10 watt.
Sensitivity:	400 parts per million (0.04%).
Calibration:	100 parts per million step.
Noise Level:	$\pm$ 6 parts per million.
Recorder:	Century.
Chart Speed:	3 inches per minute.

II.2 MAGNETOMETER SYSTEM:

Manufacturer:	Gulf Research & Development Corporation.
Type:	Mark III Fluxgate.
Unit No:	6.
Power Source:	28 volt.
Sensitivity:	1200 gamma.
Step:	1000 gamma.
Noise envelope:	4 gamma.
Recorder:	Gulf.
Chart Speed:	3 inches per minute.

II.3 ELEVATION CONTROL:

Type:	Bonzer Altimeter.
Serial No:	TRN-70.
Power Source:	28 volt.
Calibration Range:	80-2, 500 feet, non-linear.
Power Output:	1 watt.
Operating Frequency:	1600 mega cycle.
Chart Speed:	3 inches per minute

II.4 CAMERA:

Manufacturer:	Canadian Applied Research.
Model:	MK8.
Serial No:	8106.
Exposure interval:	1.5 second.
Film Size:	35 mm.
Shutter:	Focal Plane.

III. SURVEY PROCEDURE.

All instrument calibrations were checked and adjusted immediately before and/or after take-off, and checked for normal function, e.g., pen alignment, automatic stepping, standardization and degree of noise. Assuming all systems were functioning satisfactorily, the flight would proceed following predetermined flight lines marked on uncontrolled mosaics at a scale of 1 inch to 1,320 feet, at the predetermined separation.

The helicopted followed a systematic predetermined pattern of flight lines and tie-lines at an average elevation of 200 feet.

The position of the helicopter was recorded by a vertically mounted camera; there was no significant lag between any instrument and the recorded position. Every time the camera fired, a reference mark was printed on all records and numbered to correspond with the film frame number.

The magnetometer and electromagnetic system detector heads were in the bird, the controls and recorder being mounted in the helicopter with the camera and radio altimeter.

IV. DATA REDUCTION AND PRESENTATION.

The flight produces positioning film, duly processed, magnetometer, electromagnetic and radio altimeter continuous records with appropriate frame numbers and field annotations, plus an operator's Daily Flight Report.

The track of the helicopter is recovered on the photographic mosaics by examination of the film; prominent features, i.e., roads, lake-shore, etc., are used for the transposition.

The intersections of tie and flight lines are accurately determined on film and transferred to the records. The frame numbers of the individual plotted points relocated on the mosaic are identified on each record.

The flight line network is divided into conveniently sized circuits and from one intersection as reference, the magnetic closure error around each circuit is determined and distributed uniformly around each circuit such that the correction applied to the magnetic baseline results in a uniform datum of all these magnetometer records throughout the area; this is the datum used for contouring. If the flight lines are very short a single control or tie-line is used to apply a constant datum to all lines assuming zero drift.

The electromagnetic record is baselined with respect to the

local background level.

The data for each survey are individually transferred to separate intercept tapes; the data transferred consist of the plotted fiducial point and the intercept of the predetermined contour interval with the trace, and the position and values of high and lows.

The intercepted data are transferred to the flight line plot by linearly interpolating between plotted fiducial points. The transferred data are then contoured, and subsequently fair drawn.

V. PERSONNEL.

Pilot:	J.M. Bathelemew, Autair Limited, MONTREAL.
Engineer:	J. Masse, Autair Limited, MONTREAL.
Operator:	H. Sandau, Lockwood Survey Corporation Limited, 1450, O'Connor Drive, TORONTO 16.
Data Technician:	P. Bell, Lockwood Survey Corporation Limited, 1450, O'Connor Drive, TORONTO 16.
Geophysicist:	J.W. Prior, M.Sc., F.G.S., Huntec Limited, 1450, O'Connor Drive, TORONTO 16.

VI. THE ELECTROMAGNETIC SURVEY.

II.1 THE ELECTROMAGNETIC SYSTEM:

The helicopter-borne E.M. system used for this survey was developed by Hunting Survey Corporation and was described by Dr. N.R. Paterson in "Helicopter E.M. Test, Mobrun Ore Body, Noranda", in Canadian Mining Journal, November, 1961. The system measures the in-phase and out-of-phase components of the secondary electromagnetic field, in terms of the primary field at the receiver. Receiving and transmitting coils are held vertical and co-axial in a towed "bird", a distance of 30 feet apart and 100 feet below the helicopter. The sensitivity of the measuring system is such that the minimum recognizable in-phase anomaly is about 8 parts per million. Noise on the in-phase profile should be less than 5 parts per million. The frequency of the alternating electromagnetic field is 4000 cycles per second.

The system so designed is sensitive to large bodies at a depth of up to 250 feet below the "bird". Anomalies in the range 8 to 100 parts per million are commonly obtained over sulphide bodies when this equipment is operated at a "bird" height of 100 feet. The anomaly amplitude decreases with increasing depth (and increasing height) at a roughly 3.8 power. Consequently, an anomaly of 8 parts

per million could be caused by a large body buried 150 feet below ground or a very small body at surface. The ambiguity is to some extent resolved by studying the shape of the anomaly.

VI.2 EFFECT OF MAGNETIC BODIES ON ELECTROMAGNETIC RESPONSE:

The survey area is characterized by high magnetic relief; therefore, in assessing the significance of any particular anomaly it is essential to note the correlation with strong magnetic relief, as well as geological structural correlation.

The effect of a strong magnetic field on the electromagnetic response is to degrade, to a variable extent, the in-phase component only; the out-of-phase component is unaffected. Therefore, anomalies in areas of low magnetic relief cannot have been degraded, whereas anomalies in areas of high magnetic relief may have had their in-phase response degraded, resulting in an apparently low ratio, hence, low apparent conductivity. The extreme case is where the magnetic field due to the causative body is considerably stronger than the secondary field being measured at the receiving coil, resulting in a negative in-phase anomaly.

VI.3 PRESENTATION OF DATA:

The electromagnetic data is presented as contours of the

anomaly in the in-phase component relative to the local background level at an interval of 20 p.p.m. of the primary field and with ratios of in-phase to out-of-phase components at the peaks of the anomalies.

VI.4 COMMENTS ON ELECTROMAGNETIC DATA.

The lakes, rivers and swampy areas, as mapped, are related to and probably cause the majority of the electromagnetic anomalies; outside of this category there are no anomalies of significant amplitude, the anomalies generally being of the amplitude up to 30 parts per million. These latter anomalies form no particular trend and appear to bear no relationship to the geology as presented in the Preliminary Geological Map No. P.159, Elk Lake - New Liskeard Sheet of the Ontario Department of Mines.

VII. THE MAGNETIC SURVEY.

VII.1 THE AIRBORNE MAGNETOMETER:

The instrument used for this survey was the Gulf MK III Fluxgate Magnetometer which measures the strength of the earth's total magnetic field in the direction of maximum force. The instrument was housed in the centre section of the towed bird, the controls and recorder being housed in the helicopter.

The instrument was used with full scale deflection of 1200 gamma with a noise level of $\pm$4 gamma.

VII.2 PRESENTATION OF DATA:

The magnetic data is presented as contours of the total magnetic field at a basic interval of 20 gamma with multiple intervals where the gradient warrants.

The diurnal variation was removed by the standard procedure of closing the loop and distributing the misclosure.

The contour map has been reduced for convenience to an arbitrary datum of 5000 gamma; the 5000 gamma reading on the map represents a true reading of about 59,000 gamma.

VII.3 MAGNETIC CONSTANTS:

The relevant magnetic constants for the area are:

Total field strength:	0.595 oersted: 59,500 gamma
Declination:	10° West
Inclination:	77° North

VII.4 COMMENTS ON MAGNETIC DATA.

The magnetic relief throughout the sheet area is fairly strong and conforms in a general way with the mapped geology; the near surface activity is associated with the Keweenawan diabase. This activity continues along the trend of the diabase suggesting that the diabase is at no great depth, alternatively the anomalies in the north could be caused by the volcanic sequence, the magnetic character of which prevails to the north and east of the diabase. To the west of the diabase there is very little magnetic expression from shallow depths indicating that the magnetic horizons, diabase and volcanics, are either not present or downfaulted to considerable depth. A few isolated sources are observed to the west of the diabase.

VIII. RECOMMENDATIONS.

The interpretation of the survey embodied in this report is essentially a rapid geophysical appraisal of the survey area; as such it can incorporate only as much geological information as the interpreter has available. It should be judicously used, therefore, as a guideline by geologists thoroughly familiar with the area and who are in a better position to have a "feel" for the geological significance of any particular feature.

The electromagnetic system used for this survey detects electrically continuous conductors, especially massive sulphides, at relatively shallow depths; therefore, any anomalous situation of further interest should be accurately located on the ground by a comparable E.M. system. From the map of the electromagnetic response, therefore, it must be concluded that there are no conductors in the area which fulfill the conditions of continuity and massiveness; this is not to say that there may not be disseminated sulphides present in the area.

Under these circumstances it is felt that no positive recommendation can be made, but that further action on the property should result from recommendations by a geologist or geophysicist

familiar at first hand with the ground.

HUNTEC LIMITED,

J.W. Prior

J.W. Prior, M.Sc., F.G.S.,
Geophysicist.

Roger K. Watson B.A.Sc. P.Eng
Consulting Geophysicist

ADDENDUM

NUMBER OF MINING CLAIMS TRAVERSED BY SURVEY

Van Hise Township MR	SSM 49400 to SSM 49411 incl	12	claims
	SSM 49422 to SSM 49443 incl	22	"
	SSM 49456 to SSM 49464 incl	9	"
	SSM 49506 - SSM 49507	2	"
	SSM 49914	1	"
	SSM 49975 to SSM 49984 incl	10	"
	SSM 49986 to SSM 50004 incl.	19	"
	SSM 50014 to SSM 50029 incl	16	"
	SSM 50319 to SSM 50323 incl	5	"
		96	claims

Total Mileage flown 155.6

Milage flown over claim groups 102.0

$\frac{102 \times 40 \times 2}{96} = 85$

MAX. 80 days?

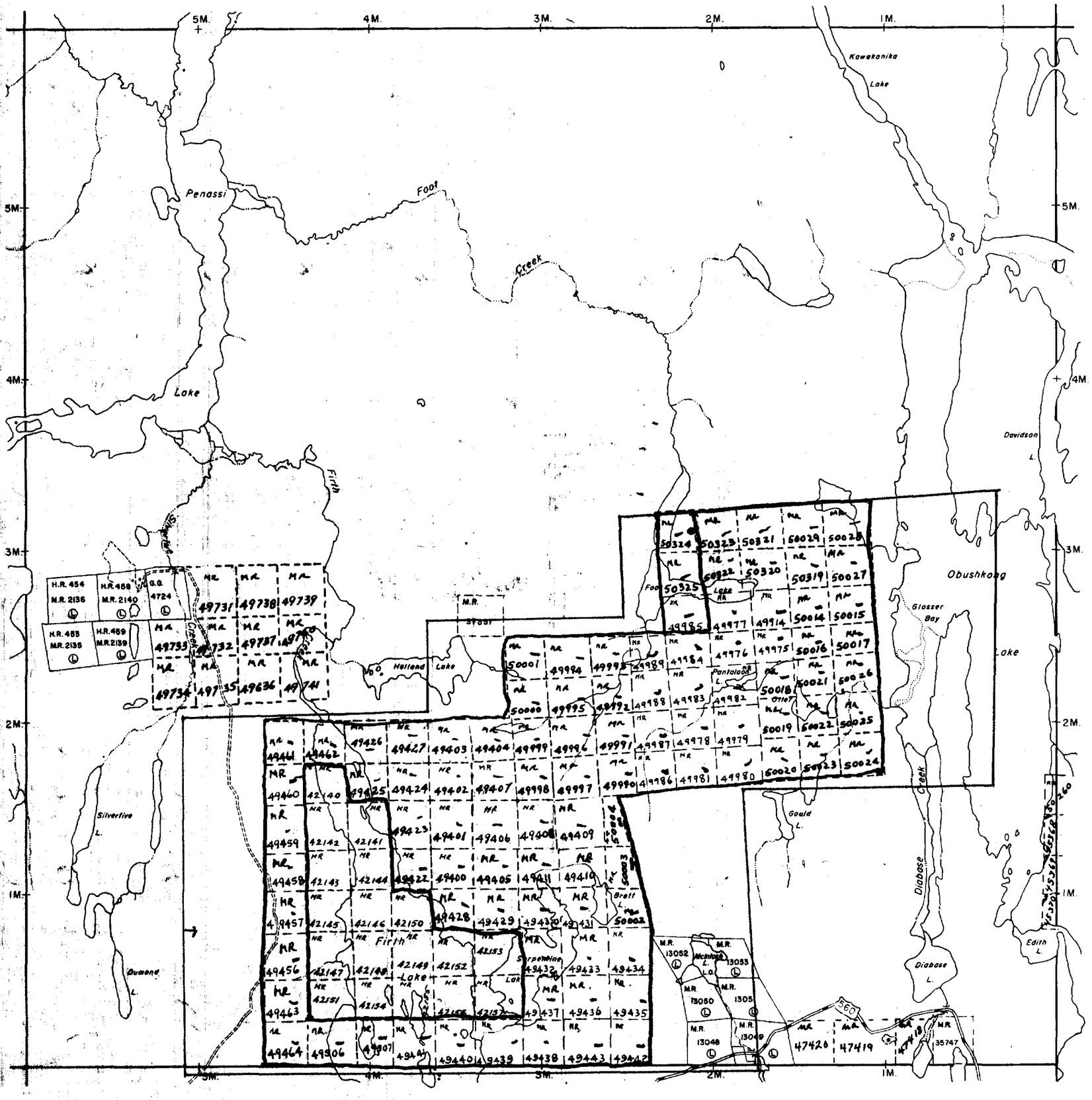
Approved

Rankin Twp. - M.242

Knight Twp. - M.228

Haultain Twp. - M.222

Milner Twp. - M.236



THE TOWNSHIP OF

VAN HISE

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 22 1969
ONTARIO DEPT. OF MINES

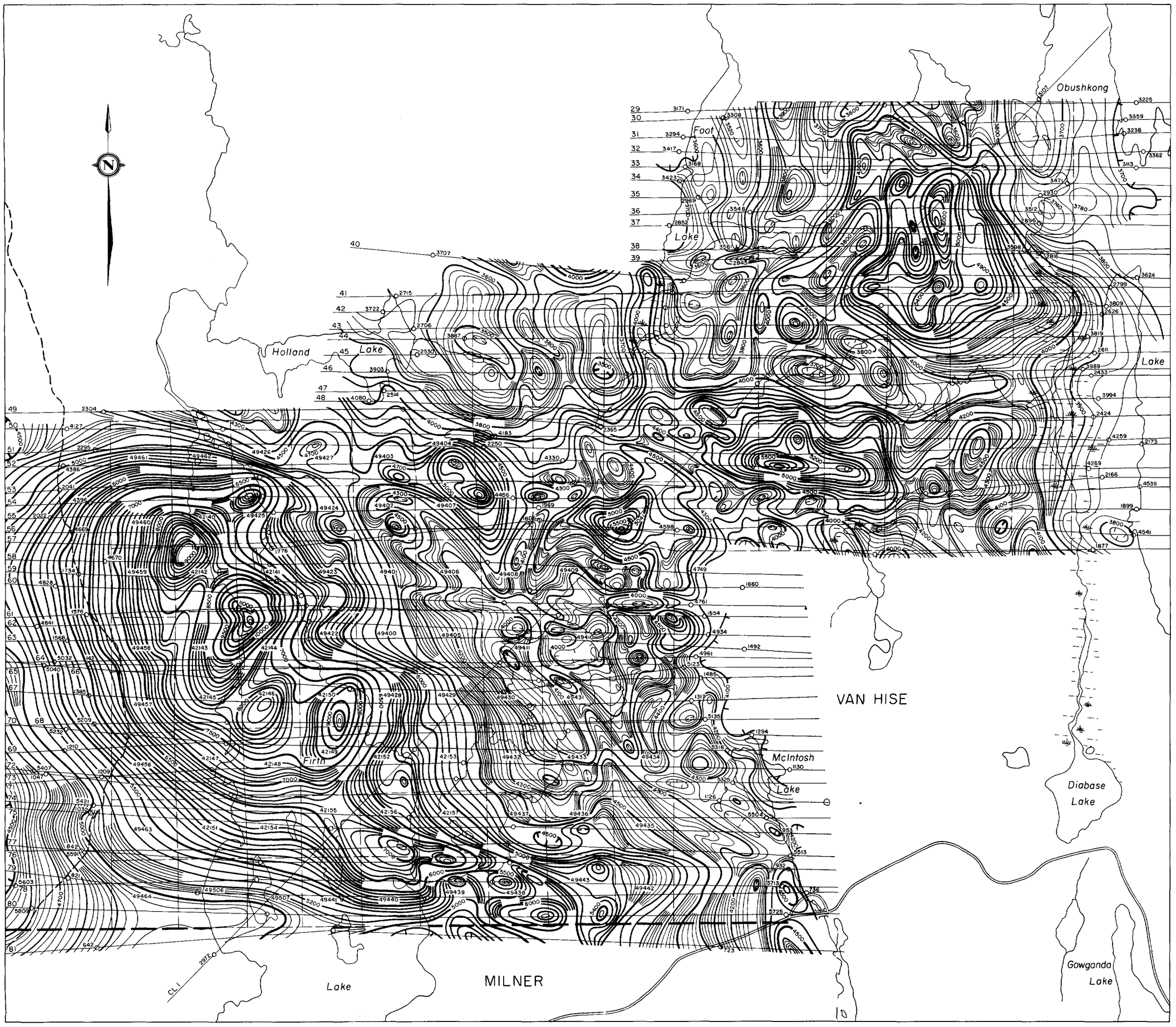
ONT. DEPT. OF MINES
MINING LANDS BR.
THIS MAP FOR CHECKING PURPOSES ONLY – MUST NOT BE SOLD.

PLAN NO. M.254

DEPARTMENT OF MINES
– ONTARIO –

SUTHERLAND AND ASSOCIATES

AIRBORNE GEOPHYSICAL SURVEY



CONTOUR INTERVAL ..... 20 GAMMA
MEAN FLIGHT LINE SPACING ..... 330 FEET
MEAN TERRAIN CLEARANCE ..... 200 FEET
500 GAMMA CONTOUR .....
100 GAMMA CONTOUR .....
20 GAMMA CONTOUR .....
MAGNETIC LOW .....
FIDUCIAL POINTS 36900
FLIGHT LINES .....

VAN HISE TOWNSHIP, ONTARIO
VAN HISE GROUP
MAGNETOMETRIC MAP

SCALE

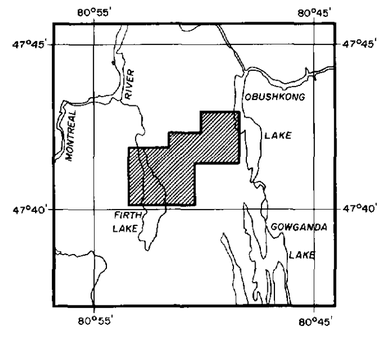
1000 FEET 0 1000 2000 3000 4000 5000 FEET

1 Inch to 1320 Feet

Flown and Compiled
by
LOCKWOOD SURVEY CORPORATION LIMITED
Toronto, Canada
1968

REGISTERED PROFESSIONAL ENGINEER
R. K. WATSON
PROVINCE OF ONTARIO

Roger K. Watson P.Eng.

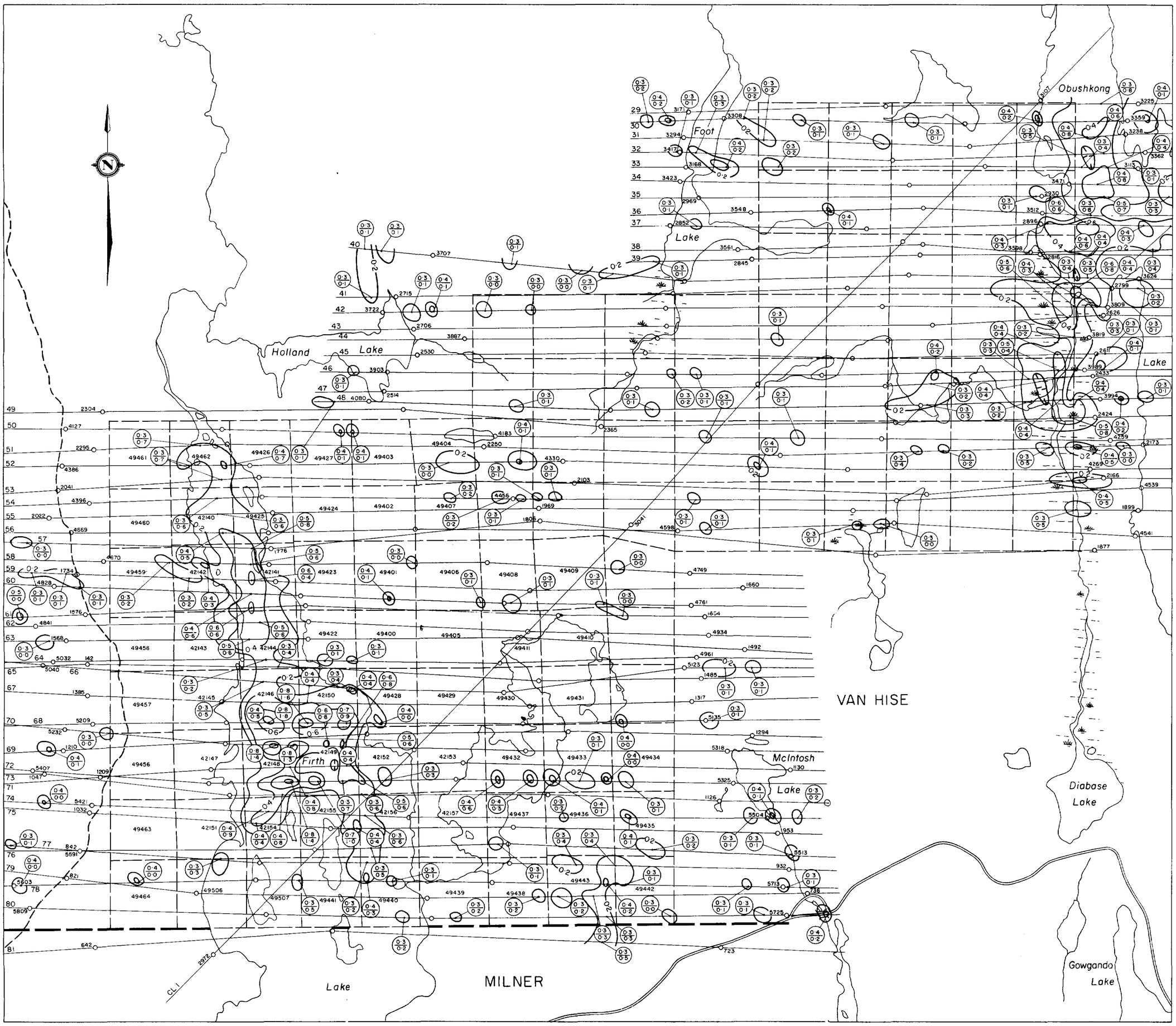


210

63.2398

SUTHERLAND AND ASSOCIATES

AIRBORNE GEOPHYSICAL SURVEY



MEAN FLIGHT LINE SPACING ..... 330 FEET

MEAN GROUND CLEARANCE ..... 200 FEET

FLIGHT LINES .....

FIDUCIAL POINTS 3690

ELECTROMAGNETIC CONTOURS 1.0°-2.0°-3.0° ETC. .....

0.2°-0.4°-0.6° ETC. .....

THE CONTOURS REPRESENT THE ELECTROMAGNETIC RESPONSE OF THE IN PHASE COMPONENT OF THE SECONDARY FIELD IN UNITS OF 100 PARTS PER MILLION.

(0.2/0.4) REPRESENTS $\frac{\text{IN PHASE COMPONENT}}{\text{OUT OF PHASE COMPONENT}}$ OF SECONDARY FIELD

VAN HISE TOWNSHIP, ONTARIO

VAN HISE GROUP

ELECTROMAGNETIC MAP

SCALE

1000 FEET 0 1000 2000 3000 4000 5000 FEET

1 Inch to 1320 Feet

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by
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1968

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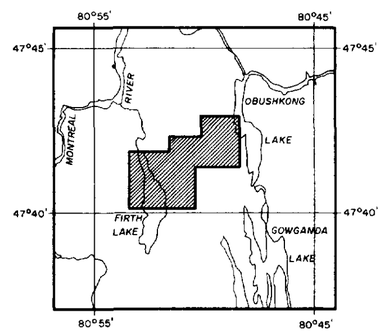

102 units over claim group

63.2398