010

AIRBORNE ELECTROMAGNETIC AND MAGNETIC SURVEY

WILLROY MINES LIMITED

MOOSE MOUNTAIN AREA

FILE #24A56 NOVEMBER, 1982

Questor Surveys Limited, 6380 Viscount Road, Mississauga, Ontario L4V 1H3

010C

CONTENTS

INTRODUCTION

This report contains those results and interpretation of an airborne electromagnetic (INPUT) and magnetic survey conducted in northwestern Ontario for Willroy Mines Limited of Toronto, on October 6 and 8, 1982. The survey area pertains to mining claims 606293, 626054, 626055, 626056 and 626057. They are located in Hutton Township, approximately 3.6 kilometres east of Milnet. A location map of the survey site is provided within this report. It was taken in part from a N.T.S. topographic map, sheet number 41I, Sudbury.

The survey area has been isolated from a larger survey which had been flown in two separate flight directions, E and N20^{o} and at a line spacing of 200 metres. During the course of the initial survey, a total of 287 line kilometres was flown of which 6.1 kilometres were over the specified survey area.

SURVEY PROCEDURES

A Shorts Skyvan aircraft with Canadian registration, C-GDRG, owned and operated by QUESTOR SURVEYS LIMITED, was used for the survey. This aircraft has been specially modified for geophysical survey use, by the addition of nose and tail booms to support a large transmitter loop which encircles the aircraft.

During the survey, the aircraft maintained a terrain clearance as close to 122 metres as possible, with the E.M. bird at approximately 55 metres above the ground. In areas of substantial topographic relief, the aircraft height exceeds 122 metres for safety reasons. The bird height above the ground is also influenced by the aircraft's air speed, which is maintained at 110 to 120 knots while on survey.

A ground magnetic base station was monitored daily in Sudbury, Ontario, for severe diurnal variations. A variation of greater than 20 gammas over 5 minutes was considered to be a magnetic storm. The base station consisted of a Geometric's 826 Proton Magnetometer with a $\pm$ 1 gamma accuracy.

Flight path recovery is accomplished by the comparison of the 35mm continuous strip film (exposed during flight) with the photo base mosaics. This film is graduated into fiducials which are used in annotating points of similar topographic features. They are accurately plotted using at least one point per major fiducial.

MAP COMPILATION

For navigational and flight path recovery purposes, a photo base mosaic of the initial survey area at a scale of 1:20,000 was used. It was produced at QUESTOR SURVEYS LIMITED from an uncontrolled mosaic which had been constructed from 1977, 1:17,000 N.A.P.L. photographs. The specified survey area was then photographically isolated from this photo base mosaic and reproduced at an appropriate scale of 1:10,000, where upon the electromagnetic results, isomagnetic contours, flight path and interpretation were plotted.

In total there are 2 maps provided in the map pockets of this report. Block A contains those electromagnetic results flown in the east-west flight direction, while, Block B is a composite map of the electromagnetic and magnetic contour data flown in the north-south direction.

GENERAL GEOLOGY OF SURVEY AREA

Available geology (H.D. MEYN, 1970: GEOLOGY OF HUTTON AND PARKIN TOWNSHIP: ODM, Geol. report 80.) shows the survey area to contain predominantly mafic volcanic rocks, which are characterized by flows and tuffs. Felsic volcanic rocks, such as rhyolites are found as minor lenses within the mafic tuffs. These rocks are of Archean age and have been sheared and metamorphosed to a degree that ranges from greenschist to the epidote-amphibolite facies. They have been intruded by granitic rocks of quartz monzonite to granodiorite composition. The granitic rocks mainly underlie the southern part of the survey area.

The survey ares is generally of low topographic relief and is covered with Pleistocene and Recent sedimentary material, most of it being a thin discontinuous veneer of glacial till.

Tectonic folding is quite evident in the metavolcanic rocks as is faulting, so much so that the electromagnetic survey had to be flown in two separate directions to be comprehensive.

Economically, the greenstone belt, in the vicinity of the survey area, is known to contain zones of iron formation. They are distributed in the form of lenticular bodies which pinch and swell. The bodies are interbedded with flows and tuffs of basaltic to rhyolitic composition as well as chert which forms the major gangue constituent of the iron. Iron ore has been mined locally, by National Steel Corporation of Canada, which has since discontinued operations.

INTERPRETATION AND RECOMMENDATIONS

The two isolated intercepts, plotted in Block B, represent selections based on an apparent increase in local conductivity, in a survey area otherwise characterized by inactivity. They are attributable to a local compositional and/or dimensional change in the overburden. Consequently, the anomalies are believed to be insignificant and no further work is recommended.

Magnetically, the survey area is quite intense due to three anomalous zones of higher magnetic relief probably due to discrete bodies of iron formation.

QUESTOR SURVEYS LIMITED

D. Martyn,
Geophysicist.

APPENDIX

EQUIPMENT

The aircraft is equipped with a Mark VI INPUT (R) airborne E.M. system and Sonotek P.M.H. 5010 Proton Magnetometer. Radar altimeters are used for vertical control. The outputs of these instruments together with fiducial timing marks are recorded by means of galvanometer type recorders using light sensitive paper. Thirty-five millimeter continuous strip cameras are used to record the actual flight path.

(I) BARRINGER/QUESTOR MARK VI INPUT (R) SYSTEM

The Induced Pulse Transient (INPUT) system is particularly well suited to the problems of overburden penetration. Currents are induced into the ground by means of a pulsed primary electromagnetic field which is generated in a transmitting loop around the aircraft. By using half sine wave current pulses and a loop of large turns-area, the high output power needed for deep penetration is achieved.

The induced current in a conductor produces a secondary electromagnetic field which is detected and measured after the termination of each primary pulse. Detection is accomplished by means of a receiving coil towed behind the aircraft on four hundred feet of cable,

and the received signal is processed and recorded by equipment in the aircraft. Since the measurements are in the time domain rather than the frequency domain common to continuous wave systems, interference effects of the primary transmitted field are eliminated. The secondary field is in the form of a decaying voltage transient originating in time at the termination of the transmitted pulse. The amplitude of the transient is, of course, proportional to the amount of current induced into the conductor and, in turn, this current is proportional to the dimensions, the conductivity and the depth beneath the aircraft.

The rate of decay of the transient is inversely proportional to conductivity. By sampling the decay curve at six different time intervals, and recording the amplitude of each sample, an estimate of the relative conductivity can be obtained. By this means, it is possible to discriminate between the effects due to conductive near-surface materials such as swamps and lake bottom silts, and those due to genuine bedrock sources. The transients due to strong conductors such as sulphides exhibit long decay curves and are therefore commonly recorded on all six channels. Sheet-like surface materials, on the other hand, have short decay curves and will normally only show a response in the first two or three channels.

The samples, or gates, are positioned at 334, 498, 744, 1072, 1482 and 1974 micro-seconds after the cessation of the pulse. The widths of the gates are 164, 164, 328, 328, 492, and 492 micro-seconds respectively.

For homogeneous conditions, the transient decay will be exponential and the time constant of decay is equal to the time difference at two successive sampling points divided by the log ratio of the amplitudes at these points.

(II) SONOTEK P.M.H. 5010 PROTON MAGNETOMETER

The magnetometers which measure the total magnetic field have a sensitivity of 1 gamma and a range from 20,000 gammas to 100,000 gammas.

Because of the high intensity field produced by the INPUT transmitter, the magnetometer results are recorded on a time-sharing basis. The magnetometer head is energized while the transmitter is on, but the read-out is obtained during a short period when the transmitter is off. The precession frequency is being recorded and converted to gammas during the 0.2 second interval when there is no power in the transmitter loop.

For this survey, a lag factor has been applied to the data. Magnetic data recorded on the analogue records at fiducial 10.00 for example would be plotted at fiducial 9.95 on the mosaics.

DATA PRESENTATION

The symbols used to designate the anomalies are shown in the legend on each map sheet, and the anomalies on each line are lettered in alphabetical order in the direction of flight. Their locations are plotted with reference to the fiducial numbers on the analog record.

A sample record is included to indicate the method used for correcting the position of the E.M. Bird and to identify the parameters that are recorded.

All the anomaly locations, magnetic correlations, conductivity-thickness values and the amplitudes of channel number 2 are listed on the data sheets accompanying the final maps.

GENERAL INTERPRETATION

The INPUT system will respond to conductive overburden and near-surface horizontal conducting layers in addition to bedrock conductors. Differentiation is based on the rate of transient decay, magnetic correlation and the anomaly shape together with the conductor pattern and topography.

Power lines sometimes produce spurious anomalies but these can be identified by reference to the monitor channel.

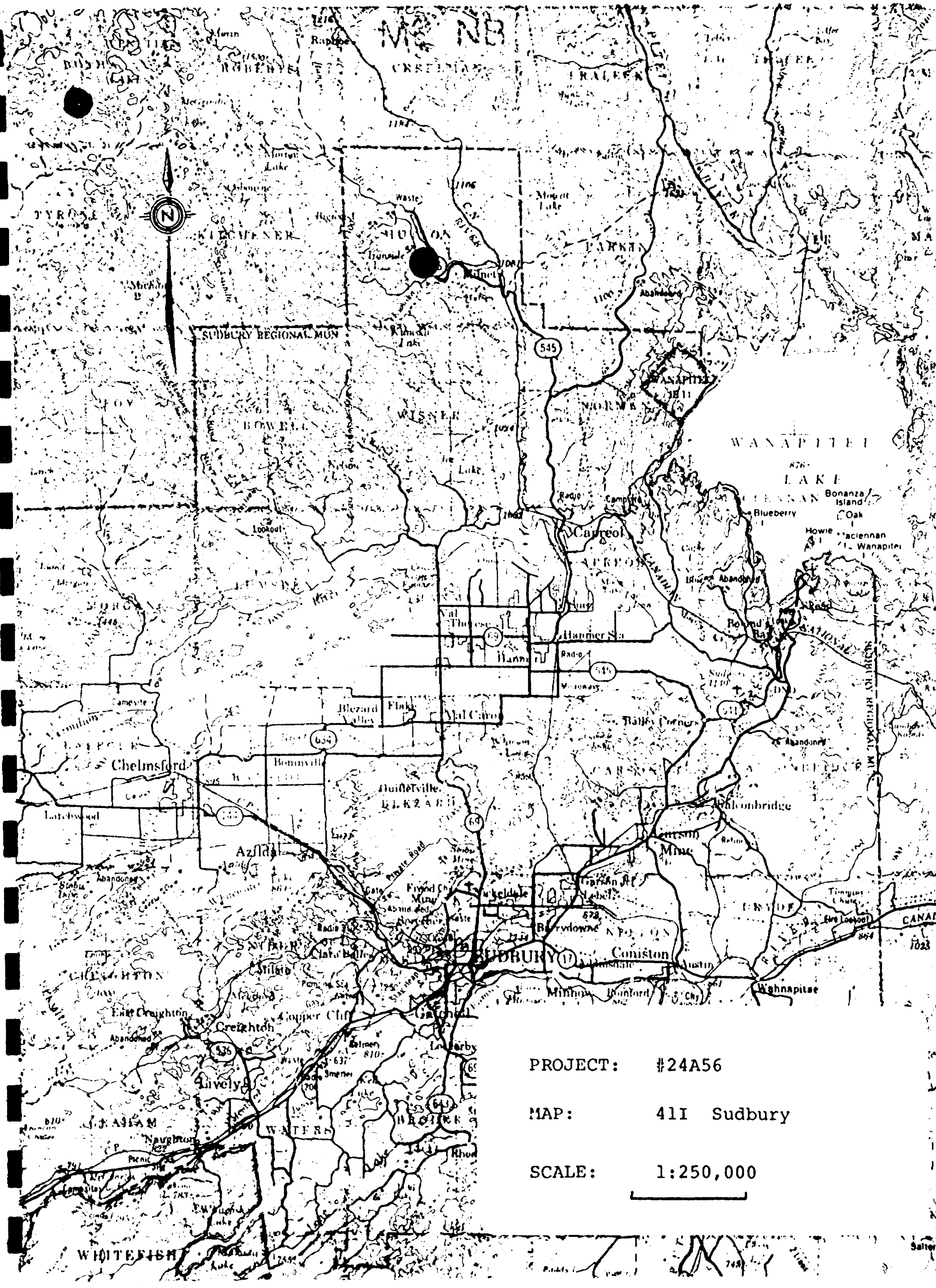
Railroad and pipeline responses are recognized by studying the film strips.

Graphite or carbonaceous material exhibits a wide range of conductivity. When long conductors without magnetic correlation are located on or parallel to known faults or photographic linears, graphite is most likely the cause.

Contact zones can often be predicted when anomaly trends coincide with the lines of maximum gradient along a flanking magnetic anomaly. It is unfortunate that graphite can also occur as relatively short conductors and produce attractive looking anomalies. With no other information than the airborne results, these must be examined on the ground.

Serpentinized peridotites often produce anomalies with a character that is fairly easy to recognize. The conductivity which is probably caused in part by magnetite, is fairly low so that the anomalies often have fairly large response on channel #1; they decay rapidly, and they have strong magnetic correlation. INPUT E.M. anomalies over massive magnetites show a relationship to the total Fe content. Below 25 - 30%, very little or no response at all is obtained, but as the percentage increases the anomalies become quite strong with a characteristic rate of decay which is usually greater than that produced by massive sulphides.

Commercial sulphide ore bodies are rare, and those that respond to airborne survey methods usually have medium to high conductivity. Limited lateral dimensions are to be expected and many have magnetic correlation caused by magnetite or pyrrhotite. Provided that the ore bodies do not occur within formational conductive zones as mentioned above, the anomalies caused by them will usually be recognized on an E. M. map as priority targets.



PROJECT: #24A56

MAP: 41I Sudbury

SCALE: 1:250,000

FINAL ANOMALY	ANOMALY FIDUCIAL	CHS	CH1.AMP	CH2.AMP	SIEMENS	MAGNETIC FIDUCIAL	VALUE	ALT
20060A	106.374	2	60	30	NC	106.25	218	553
20070D	104.666	2	60	30	NC	-	-	428

$

Questor Surveys Limited

NAME : DANIEL MARTYN

OCCUPATION : Geophysicist

EDUCATION : University of Toronto, B.Sc., Degree in Geophysicis, 1977.

EXPERIENCE :

Summer 1975 — Northway Survey Corporation Ltd., as Assistant Technician. Assembling and dismantling of survey equipment aboard aircraft.

Summer 1976 — Amax Exploration Ltd., - Geophysicist. Carried out detailed ground spectrometer survey in Sudbury area, as well as ground VLF and magnetometer surveys in Northwestern Quebec. Also assisted in investigation of INPUT anomalies and geological mapping.

Summer 1977 — Rayrock Mines Ltd., - Field Geophysicist. Carried out spectrometer and radon gas detection surveys in search of uranium in NWT.

1977-78 — Joined Geoprobe Ltd., as Geophysicist and Crew Chief, performing ground electromagnetic surveys in North America. Responsible for interpretation and quality of the data while in the field.

1978-80 — Joined Chemical Projects Ltd. (Helium Surveys Ltd.), as a Geophysicist/Geochemist. Carried out all field surveys as Crew Chief. In-house was responsible for report writing, map preparation and interpretation. Assisted in publications and R & D work.

1980 - Present — Joined Questor Surveys Limited as Staff Geophysicist, INPUT Division.

COUNTIRES WORKED IN : Canada, U.S.A.

41I14SE0010 0036 HUTTON

900

1162-125.

TILL S-608293

Ontario Ministry of Natural Resources

Report of Work
(Geophysical, Geological, Geochemical and Expenditures)

2.5205

The Mining Act

Instructions: – Please type or print
– If number of mining claims traversed exceeds space on this form, attach a list.
Note: – Only days credits calculated in the "Expenditures" section may be entered in the "Expend. Days Cr." columns.
– Do not use shaded areas below.

Type of Survey(s)	Township or Area
AIRBORNE ELECTROMAGNETIC & MAGNETIC	HUTTON TWP. (M.944)
Claim Holder(s)	**Prospector's Licence No.**
MOOSE MOUNTAIN CONSOLIDATED LTD.	T-1254
Address	
Thorne Riddell & Co. P.O. Box 156 144 Pine St. Sudbury ONT c/o TILLEY, CARSON & FINLAY, 44 KING ST. W., TORONTO, ONTARIO	
Survey Company	**Date of Survey (from & to)** Day / Mo. / Yr. — Day / Mo. / Yr.	**Total Miles of line Cut**
QUESTOR SURVEYS LIMITED	6 10 82 — 8 10 82	
Name and Address of Author (of Geo-Technical report)	
MR. DANIEL MARTYN, 6380 VISCOUNT ROAD, MISSISSAUGA, ONTARIO L4V 1H3	2.5205

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	· Electromagnetic	
	· Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	· Radiometric	
	· Other	
	Geological	
	Geochemical	
Man Days		**Days per Claim**
Complete reverse side and enter total(s) here	Geophysical	
	· Electromagnetic	
	· Magnetometer	
	· Radiometric	
	· Other	
	Geological	
	Geochemical	
Airborne Credits		**Days per Claim**
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	30
	Magnetometer	16
	Radiometric	

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.
S.	608293	
	626054	
	626055	
	626056	
	626057	

Mining Claim Prefix	Mining Claim Number	Expend. Days Cr.

RECEIVED
NOV 29 1982
MINING LANDS SECTION

Total number of mining claims covered by this report of work: 5

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.

Date	Recorded Holder or Agent (Signature)
NOV. 18th/82	

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
230	Nov 26/82	
	Date Approved as Recorded: 83.05.13	Director

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		
DR. R.B. LORTIE, 185-146 FRONT ST. W., TORONTO, ONTARIO M5J 2L7		
	Date Certified: NOV. 18th/82	Certified by (Signature): R.B. Lortie

1362 (81/9)

Ministry of Natural Resources
Ontario

Geotechnical Report Approval

File 2.5205

Jan 28/83

Mining Lands Comments

☑ To: Geophysics MR Barlow

Comments

☐ Approved ☐ Wish to see again with corrections | Date Feb 28/83 | Signature

☐ To: Geology · Expenditures

Comments

☐ Approved ☐ Wish to see again with corrections | Date | Signature

☐ To: Geochemistry

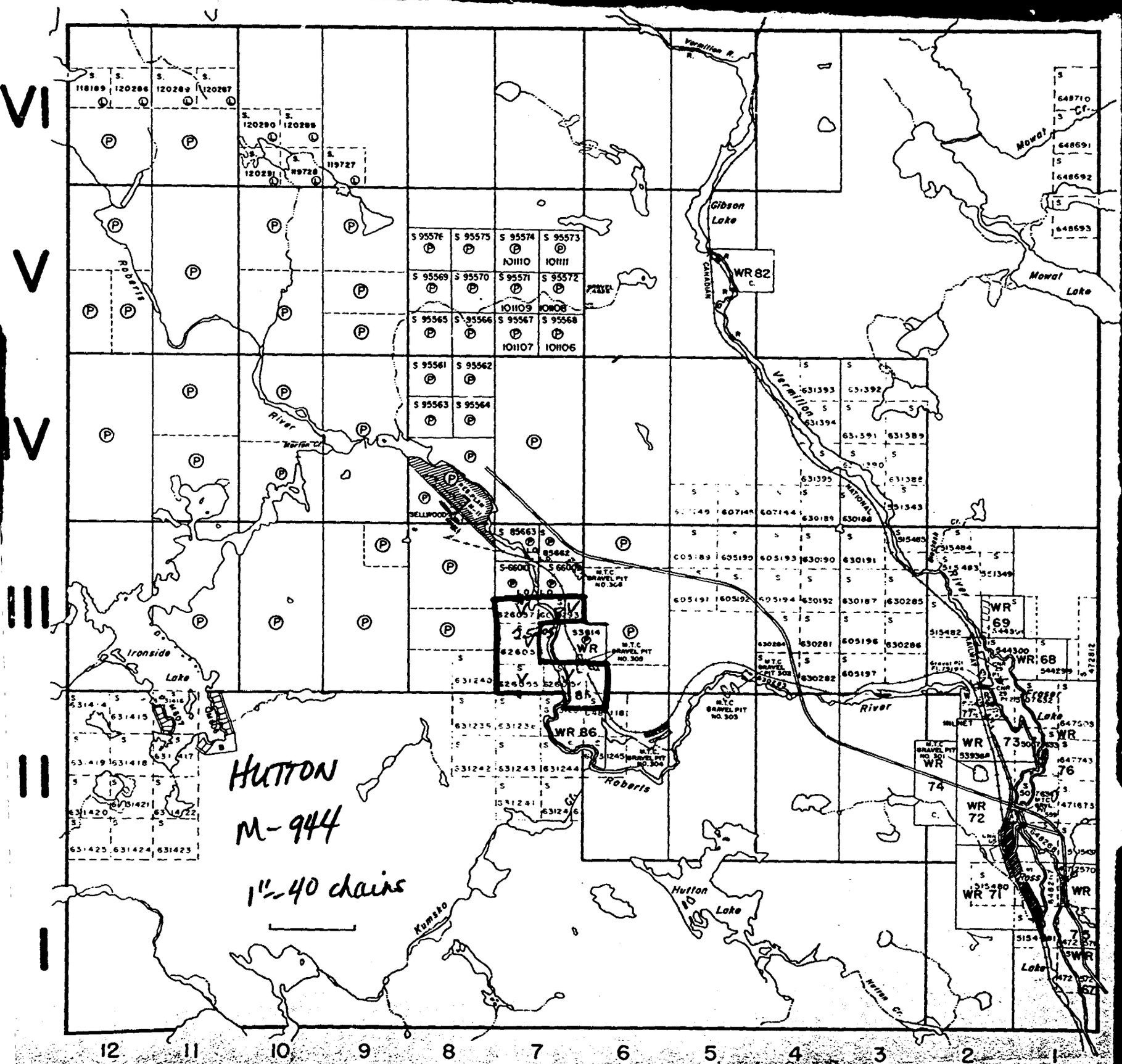
Comments

L D.

☐ Approved ☐ Wish to see again with corrections | Date | Signature

☐ To: Mining Lands Section, Room 6462, Whitney Block. (Tel: 5-1380)

1593 (81/10)


HUTTON
M-944
1" = 40 chains
Vermilion R.
Gibson Lake
Mowat
Mowat Lake
Roberts
Vermilion River
Ironside Lake
Hutton Lake
Kumsko
WR 82
WR 86
WR 69
WR 68
WR 73
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WR 75
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Ontario

Ministry of Natural Resources

File _____

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.

Type of Survey(s) Airborne Electromagnetic and Magnetic

Township or Area Hutton Two.

Claim Holder(s) Moose Mountain Consolidated Ltd.
44 King St. W., Toronto, Ont.

Survey Company QUESTOR SURVEYS LIMITED

Author of Report Daniel Martyn

Address of Author 6380 Viscount Road

Covering Dates of Survey October 6 and 8, 1982
(linecutting to office)

Total Miles of Line Cut _____

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 16 Electromagnetic 30 Radiometric _____
(enter days per claim)

DATE: Nov 10th, 1982 SIGNATURE: D Martyn
Author of Report or Agent

Res. Geol. _____ Qualifications enclosed

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
S	608293
	626054
	626055
	626056
	626057

If space insufficient, attach list

TOTAL CLAIMS 5

837 (5/79)

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) ELECTROMAGNETIC (INPUT) & AEROMAGNETIC

Instrument(s) BARRINGER/QUESTOR MARK VI INPUT AND SONOTEK P.M.H. 5010 PROTON MAGNETOMETER
(specify for each type of survey)

Accuracy 60 PPM /. ± 1 gamma
(specify for each type of survey)

Aircraft used Shorts Skyvan, Canadian Registration C-GDRG

Sensor altitude EM = 55 metres & Magnetic = 122 metres

Navigation and flight path recovery method Photobase mosaic at a scale of 1:20,000 was used for navigation and film strip recovery

Aircraft altitude 122 metres Line Spacing 200 metres

Miles flown over total area 287 kilometres Over claims only 6.1 kilometres

LONG LAC MINERAL EXPLORATION LIMITED
SUITE 485, 146 FRONT STREET WEST
TORONTO,ONTARIO M5J 2L7
(416) 598-2538

November 19th, 1982

F.W. Matthews
Supervisor -- Projects Section
Room 6450
Whitney Block
Queen's Park
TORONTO, Ontario

Dear Mr. Matthews:

Please find enclosed two (2) copies of the Airborne Electromagnetic and Magnetic Survey Report done by Questor Surveys on five mining claims in Hutton Township for our Moose Mountain Project.

A "Report of Work" form has been filed with Mr. V.C. Miller in Sudbury, as required by government regulations.

I hope that this is satisfactory. Should you have any questions with regard to the above mentioned reports, please contact me at the address listed above.

Yours very truly,

LONG LAC MINERAL EXPLORATION LTD.

R.B. Lortie, Ph.D.
Project Geologist

RBL/cmm
Encl. (2)

1982 12 09 2.5205

Mining Recorder
Ministry of Natural Resources
199 Larch Street
Sudbury, Ontario
P3E 5P9

Dear Sir:

We have received reports and maps for an Airborne (Electromagnetic and Magnetometer) Survey submitted on Mining Claims S 608293 et al in the Township of Hutton.

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

Yours very truly,

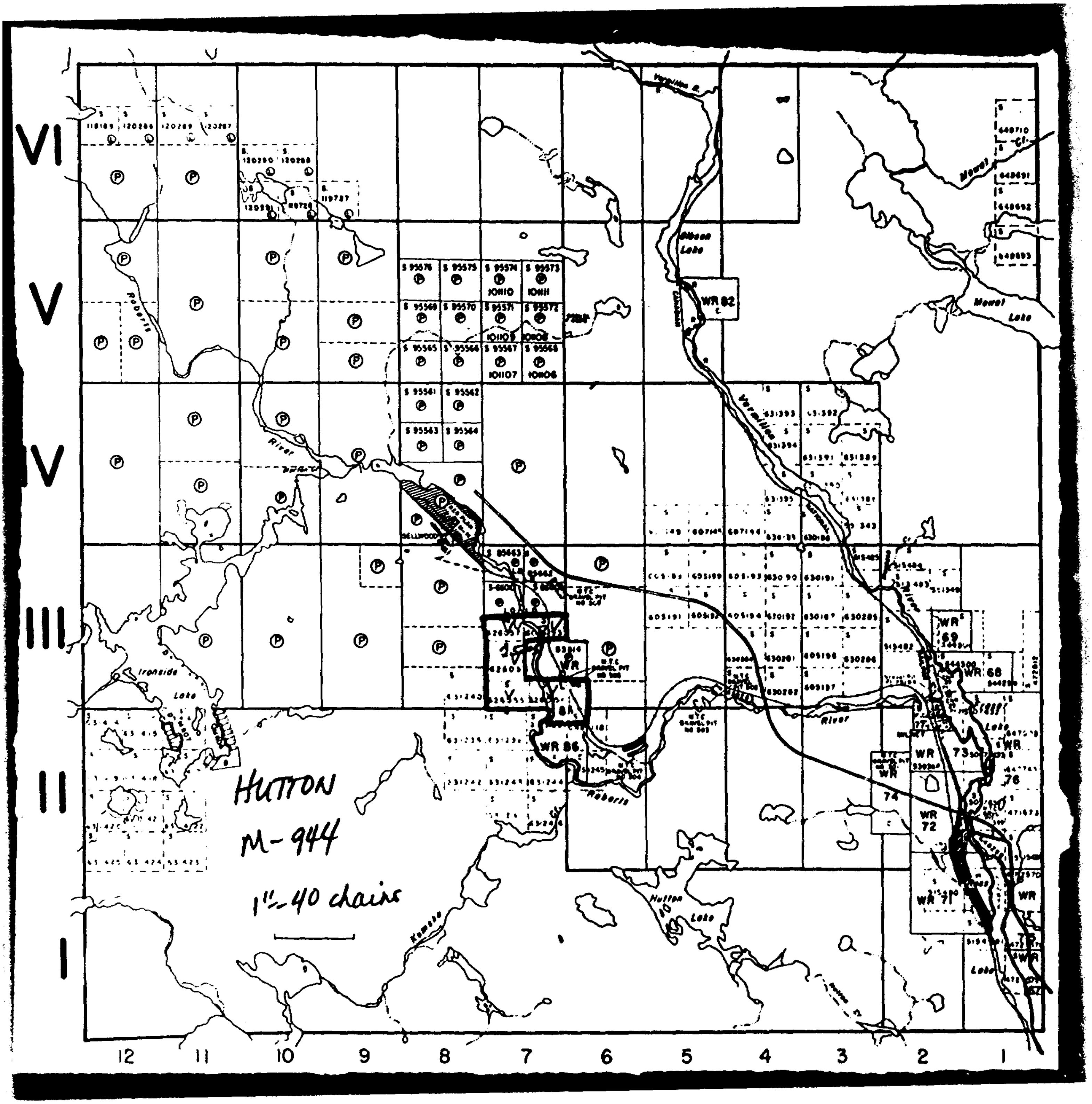
E.F. Anderson
Director
Land Management Branch

Whitney Block, Room 6450
Queen's Park
Toronto, Ontario
M7A 1W3
Phone: 416/965-1380

DW:sc

cc: Moose Mountain Consolidated Limited
Toronto, Ontario

cc: Questor Surveys
Mississauga, Ontario
Attn: Mr. Daniel Martyn.



VI
V
IV
III
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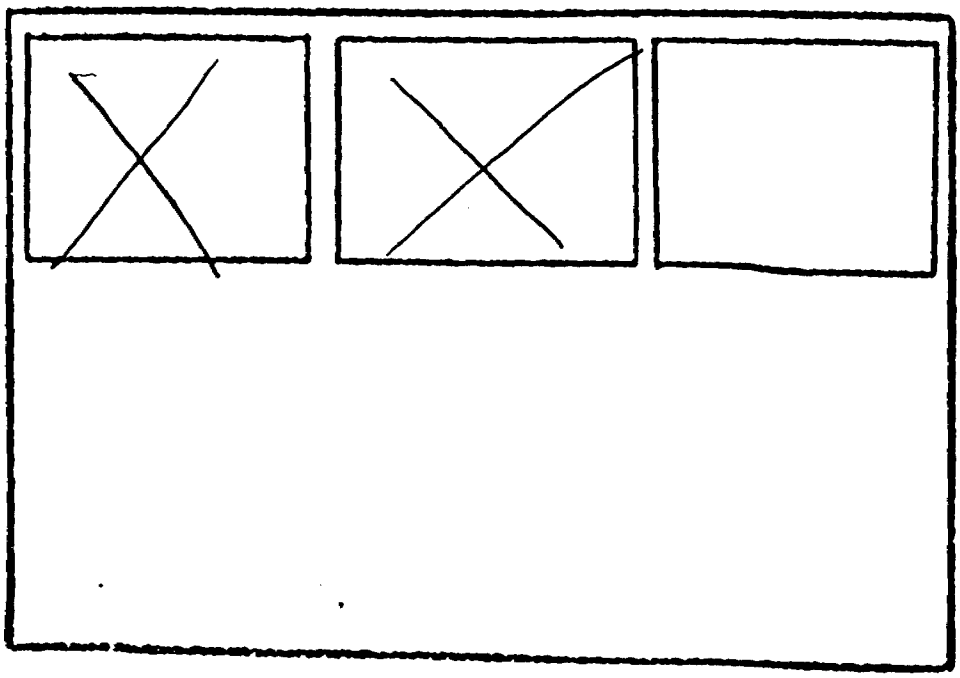
HUTTON
M-944
1"-40 chains
Vermilion R.
Vermilion
River
Roberts
Ironside
Lake
Hutton
Lake
Kamsko
Mowat
Lake
WR 82
WR 86
WR 69
WR 68
WR 73
WR 72
WR 71
WR 74
WR 76

SEE ACCOMPANYING MAP(S) IDENTIFIED AS

HUTTON - 0036 #1

#2

LOCATED IN THE MAP CHANNEL IN THE FOLLOWING SEQUENCE (X)



INTERPRETATION

- Conductor Axis, with reference number (good definition)
- Conductor Axis, with reference number (poor definition)
- Vertical Conductor
- 60° Conductor Dip (magnitude and direction known)
- Conductor Dip (direction known)
- Selected Zone, with reference number
- Surficial Conductivity
- Fault Zone
- [200] Conductor Depth, below surface m

INPUT

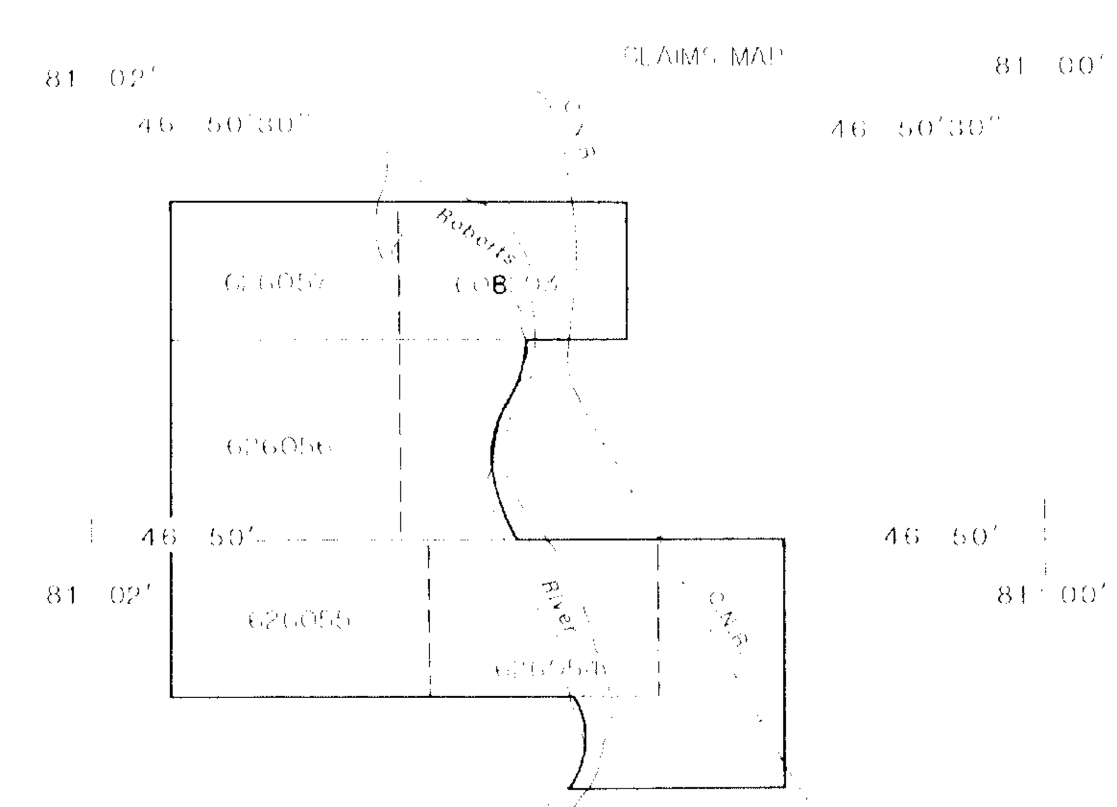
- 1 Channel Anomaly
- 2 Channel Anomaly
- 3 Channel Anomaly
- 4 Channel Anomaly
- 5 Channel Anomaly
- 6 Channel Anomaly

Magnetic Correlation

DESCRIPTIVE NOTES

INTERPRETATION REFERENCES

CLAIMS MAP



AIRBORNE MK VI INPUT SURVEY

WILLROY MINES (1982) LIMITED

MOOSE MOUNTAIN

Province of ONTARIO

FILE NO.	SHEET NO.	DATE	DRAWN BY
24A56A	1 of 1	October, 82	Questor Surveys Limited

Questor Surveys Limited

Mississauga Ontario Canada

HUTTON-0036 #1

41I14SE0010 0036 HUTTON

200

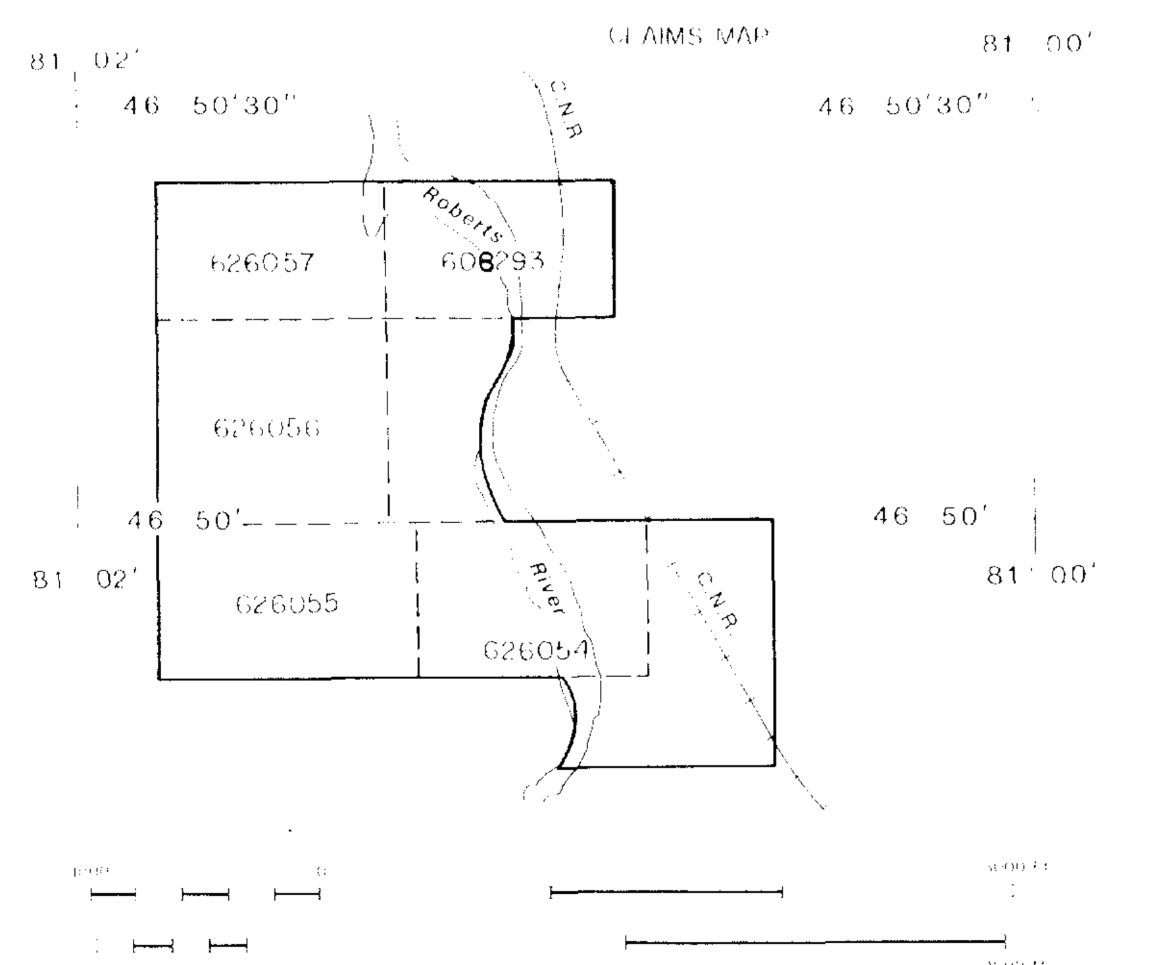
INTERPRETATION

MAGNETIC CONTOURS

INPUT

DESCRIPTIVE NOTES

INTERPRETATION REFERENCES



AIRBORNE MK VI INPUT SURVEY
TOTAL MAGNETIC INTENSITY SURVEY

WILLROY MINES (1982) LIMITED

MOOSE MOUNTAIN

Province of ONTARIO

FILE NO.	SHEET NO.	DATE	DRAWN BY
24A56B	1 of	October, 82	Questor Surveys Limited

Questor Surveys Limited
Mississauga, Ontario Canada

HUTTON-0036 #2

210