



32D04SE0003 2.14273 MCVITTIE

010

2.14273

A-908

OPERATIONS REPORT ON A

HIGH SENSITIVITY MAGNETIC
& VLF-EM AIRBORNE SURVEY

LARDER LAKE NORTH

GAUTHIER and McVITTIE
TOWNSHIPS

LARDER LAKE
MINING DIVISION
ONTARIO

RECEIVED

JUL 31 1991

MINING LANDS SECTION

for

SUDBURY CONTACT MINES LTD.
and
MR. R. MCGREGOR

by

TERRAQUEST LTD.
Toronto, Canada

July 15, 1991





32D04SE0003 2.14273 MCVITTIE

010C

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1.0 INTRODUCTION

This report describes the specifications and results of an airborne geophysical survey carried out for SUDBURY CONTACT MINES LTD. in conjunction with MR. ROBERT MCGREGOR c/o W.A. HUBACHECK CONSULTANTS LTD., 603-141 Adelaide Street West, Toronto, Ontario M5H 3L5 by Terraquest Ltd., 240 Adelaide Street West, Toronto, Canada. The field work was carried out from May 11 to 16, 1991 and the data processing, interpretation and reporting from May 20 to July 15, 1991.

2.0 THE PROPERTY

The property consists of four claims, one located in Gauthier Township and three in McVittie Township in the Larder Lake Mining Division of Ontario. Claim number L111211 lies in the southeast quadrant of Gauthier Township immediately west of Misema River and borders the regional power transmission line, approximately 2.5 kilometres north of highway #66.

Claims L1151867-1151869 inclusive lie in the southwest quadrant of McVittie Township, immediately east of Marjorie Lake and north of the railway tracks.

The N.T.S. reference is 32D/4.

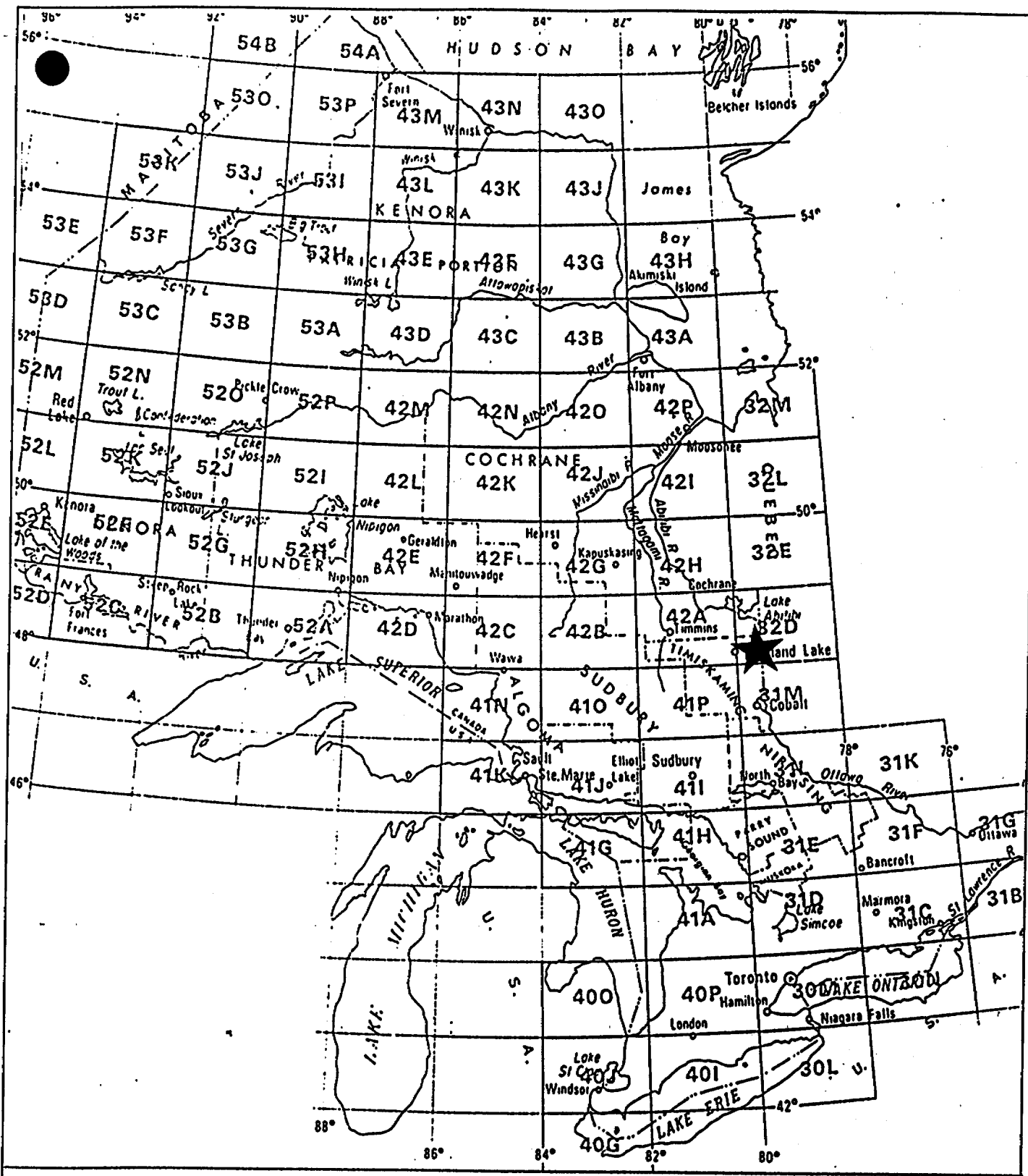
3.0 GEOLOGY

Map References

1. Map 29e: Ben Nevis Gold Area. scale 1:95,040. ODM 1920
2. Map 32e: Kirkland Lake Area. scale 1:31,680. ODM 1923
3. Map 33b: Larder Lake Area. scale 1:47,520. ODM 1924
4. Map 2205: Timmins-Kirkland Lake Geological Compilation Series. scale 1:253,440. ODM 1973
7. Map P.2480: Larder Lake Area, Drift Thickness. scale 1:50,000 OGS 1982
8. Map P.2492: Larder Lake Area, Sand and Gravel Resources. scale 1:50,000, OGS 1982

The three claims are underlain by a east-west trending metasedimentary belt that is generally comprised of conglomerate, greywacke, siltstone, slate, argillite and iron formation. The claim in Gauthier Township is underlain trachyte flows.

The east-west trending Larder Lake Fault is the major structural element and occurs south of the claims. Other faults trend to the northeast and northwest.

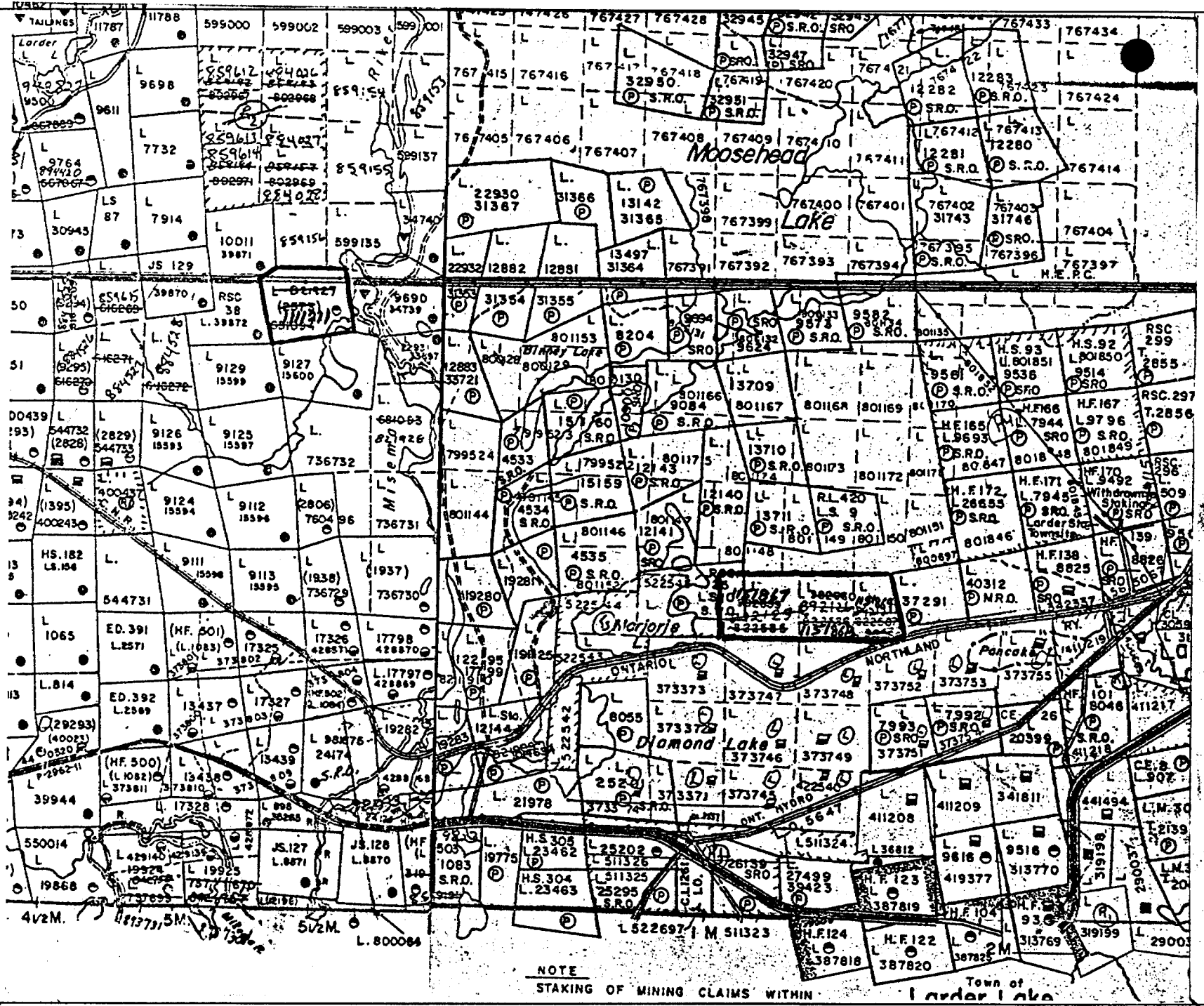


Federal National Topographic System (N.T.S.) Maps

FIGURE 1. Location Map

(exact claim locations not certified)

FIGURE 2. SURVEY AREA



4.0 SURVEY SPECIFICATIONS

4.1 Aircraft and Instruments

The survey was carried out using a Cessna 206 aircraft, registration C-GGLS, which carries a magnetometer and a VLF electromagnetic detector.

The magnetometer sensor is a high sensitivity, optically pumped cesium vapour magnetometer mounted in an extension boom attached to the tail of the aircraft. It's specifications are as follows:

Working range: 20,000-100,000 gammas
 Sensitivity: 0.005 gammas
 Sampling rate: 0.1 seconds
 Model: BIW 2321H8
 Manufacturer: Scintrex, Concord Ontario.

The magnetometer processor is a PMAG 3000 and the data acquisition system is a PDAS 1000, both manufactured by Picodas Group Inc.

The VLF-EM sensor is mounted in the port wingtip. It uses three orthogonal detector coils to measure (a) the total field strength of the time-varying EM field and (b) the phase between the vertical coil and both the "along line" coil (LINE) and the "cross-line" coil (ORTHO). The LINE coil is tuned to a transmitter station that is ideally positioned at right angles to the flight lines, while the ORTHO coil transmitter should be in line with the flight lines. It's specifications are:

Accuracy: 1%
 Reading Interval: 0.1 second
 Model: TOTEM 2A
 Manufacturer: Herz Industries, Toronto, Canada

Other instruments are:

- * King KRA-10A radar altimeter
- * PDAS-1000 data processor with 40 mByte cassette tape and 3 1/2" disk recorder manufactured by Picodas Group Inc.
- * Trimble TRANS GPS satellite and Loran-C navigation
- * Video tape flight path confirmation, 1/10th second fiducial intervals and with electronic attitude compensation

4.2 Lines and Data

Claim group coverage.....10 kilometres
 Line direction.....090 degrees azimuth
 Line interval.....100 metres
 Tie line interval..... 2 kilometres
 Terrain clearance.....100 metres
 Average ground speed....193 kilometres/hour
 Data point interval:
 Magnetic.....5.5 metres
 VLF-EM.....5.5 metres
 Channel 1 (LINE).....NSS Annapolis, 21.4 kHz
 Channel 2 (ORTHO).....NAA Cutler, 24.0 kHz

4.3 Tolerances

Line spacing: Any gaps wider than twice the line spacing and longer than 10 times the line spacing were filled in by a new line.
 Terrain clearance: Portions of line which were flown above 125 metres for more than one kilometre were reflown if safety considerations were acceptable.
 Diurnal magnetic variation: Less than ten gammas deviation from a smooth background over a period of two minutes or less as seen on the base station analogue record.
 Manoeuvre noise: nil

4.4 Navigation and Recovery

The satellite navigation system was used to ferry to the survey site and to survey along each line using UTM coordinates. The accuracy is variable depending on the number and condition of the satellites, however it is less than twenty five metres and typically in the ten to fifteen metre range. Post processing accuracy is in the range of plus or minus three metres.

For assisting the navigation of the aircraft and the recovery of the flight path, semi-controlled mosaics of aerial photographs were made from existing air photos. Each photograph forming the mosaic was adjusted to conform to the NTS map system before the mosaic was assembled. These mosaics are also used as a base for the data and interpretation maps and thereby allow detailed ground locations for follow-up investigations and further mapping.

In addition, flight path recovery was also carried out in the field using a video tape viewer to observe the flight path as

TRACE 1: RAD Full Scale: 180.000 ft *

TRACE 2: VI-I Full Scale: 200.000 %

TRACE 3: VI-Q Full Scale: 200.000 % *

TRACE 4: V2-I Full Scale: 200.000 %

TRACE 5: V2-Q Full Scale: 200.000 % *

TRACE 7: MAG1 Full Scale: 875.000 nT

TRACE 9: MAG2 Full Scale: 875.000 nT

TRACE19: MAG1 Full Scale: 8.750 nT /m T-GR1

Line : 750.0N Time: 14:14: 5.0 Start Fid: 420 File: S9091014.B13

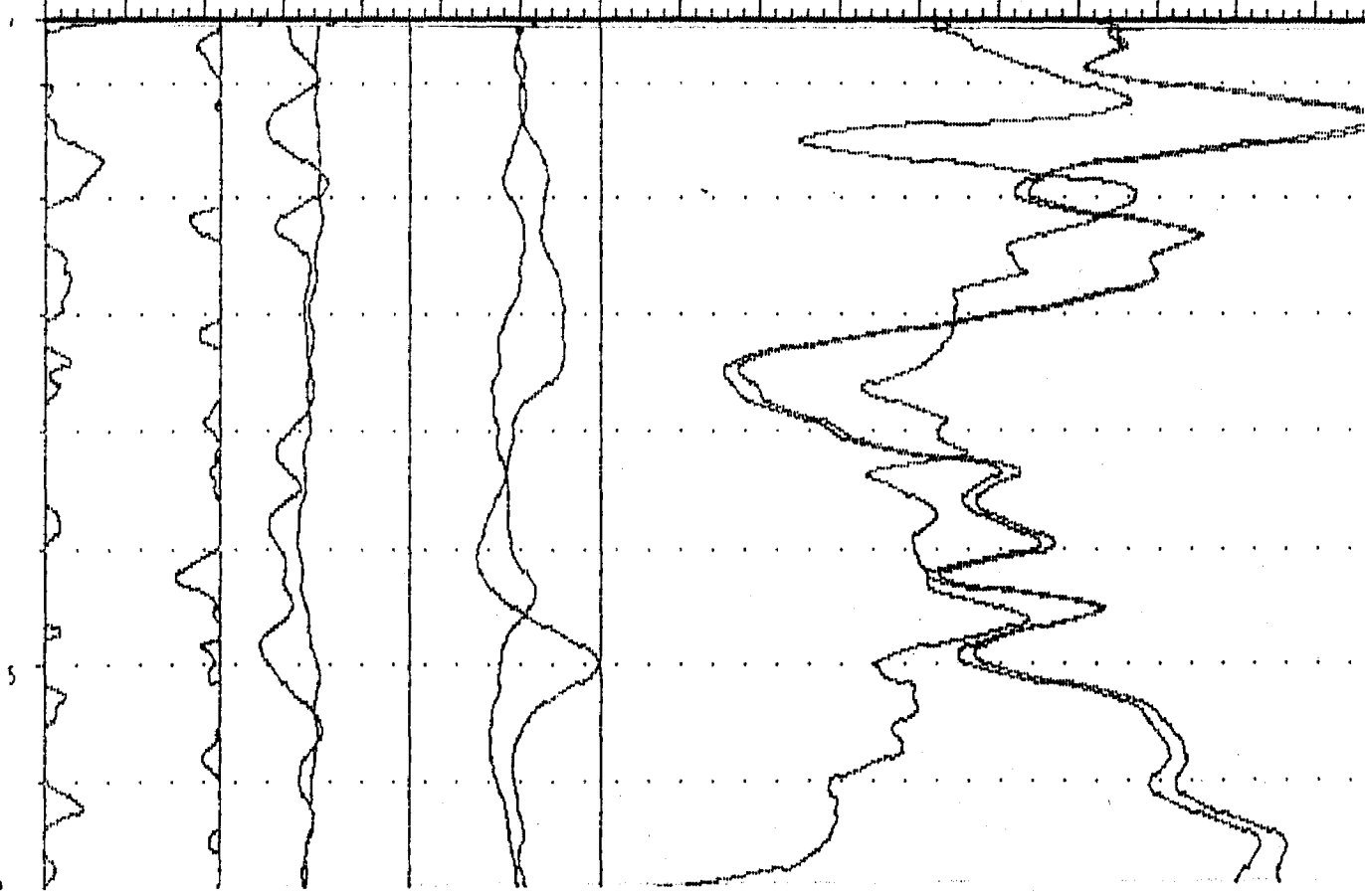


FIGURE 3. SAMPLE OF ANALOG DATA

recorded by the Geocam video camera system. The flight path recovery was completed daily to enable reflights to be selected where needed for the following day and to provide correlation between the satellite navigation/recovery data and the photomosaic base maps.

5.0 DATA PROCESSING

The magnetic data was levelled in the standard manner by tying survey lines to the control lines. The IGRF has not been removed. The total field was contoured by computer using a program provided by Dataplotting Services Inc. To do this the final levelled data set is gridded at a grid cell spacing of 1/10th of an inch at map scale.

The vertical magnetic gradient is computed from the gridded and contoured total field data using a method of transforming the data set into the frequency domain, applying a transfer function to calculate the gradient, and then transforming back into the spatial domain. The method is described by a number of authors including Grant, 1972 and Spector, 1968. The computer program for this purpose is provided by Paterson, Grant and Watson Ltd. of Toronto.

The VLF data was treated automatically so as to normalize the non conductive background areas to 100 (total field strength) and zero (quadrature). The algorithms to do this were developed by Terraquest and will be provided to anyone interested by application to the company.

All of these data processing calculations and map contouring were carried out by Dataplotting Services Inc. of Toronto.

The VLF-EM station for this survey for the line channel was NSS Annapolis located at an azimuth of 164.3 degrees from the survey area. However, despite filtering the signal to noise ratio was too low for the data set to be useful. This may have been due in part to an overriding effect from the stronger conductors trending to the east-southeast. Good VLF-EM responses were obtained from channel 2 monitoring NAA Cutler at an azimuth of 107.7 degrees to the survey area. The resolution of conductors that are parallel or sub-parallel to the flight lines is significantly lower than those oriented at high angles.

- Grant, F.S. and Spector A., 1970:Statistical Models for Interpreting Aeromagnetic Data; Geophysics, Vol 35
Grant, F.S., 1972:Review of Data Processing and Interpretation Methods in Gravity and Magnetics; Geophysics Vol 37-4
Spector, A., 1968:Spectral Analysis of Aeromagnetic maps; unpublished thesis; University of Toronto.

6.0 INTERPRETATION

The magnetic and VLF-EM data are shown in contoured format on maps at a scale of 1:10,000 in the back pocket.

The total magnetic field has a relief of approximately 150 gammas from 58,250 to 58,400 gammas in the vicinity of the Gauthier Township claim and from 57,925 to 58,075 gammas over the McVittie claims. The vertical magnetic gradient shows improved resolution and can be used to delineate the stratigraphy and structure.

The metasedimentary rocks in McVittie Township generally correlate with weak magnetic responses. Subtle magnetic horizons within the metasedimentary belt are probably caused by weak iron formation, disseminated pyrrhotite, or thin intercalations of metavolcanic material.

The alkalic metavolcanics, primarily trachyte in Gauthier Township correlate with moderate to strong magnetic values. Magnetic horizons possess a stratigraphic habit and are probably related to varying composition within the alkalic metavolcanics.

Displacements or truncations of magnetic horizons have been used to interpret faults or shear zones. Most of these structures trend to the northeast and northwest.

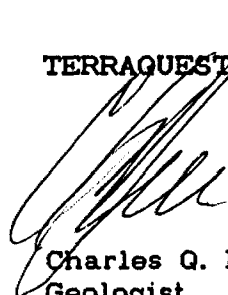
The VLF-EM responses are weak and are probably related to conductive overburden and structural sources.

7.0 SUMMARY

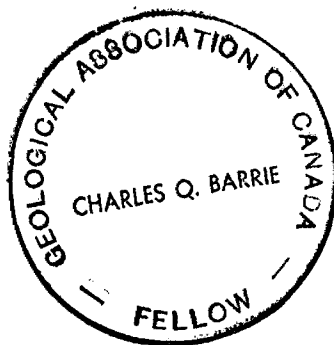
An airborne combined magnetic and VLF-EM survey has been carried out at 100 metre line intervals with data reading stations at 5.5 metres along the flight lines. All data is produced on maps at a scale of 1:10,000.

The magnetic data has been used to modify and update the existing geology and has shown some new contacts within the trachyte and metasedimentary rocks.

TERRAQUEST LTD.



Charles Q. Barrie, M.Sc.
Geologist



APPENDIX I

PERSONNEL

Field: Operator.....Michel Roy
Pilot.....Ken Towers
Completion Date....May 16, 1991

Office: Manager/Interpretation.....Charles G. Barrie, M.Sc.
Processing.....Dataplotting Services Inc.



APPENDIX II

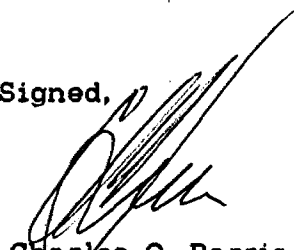
CERTIFICATE OF QUALIFICATION

I, Charles G. Barrie, certify that :

1. I am registered as a Fellow with the Geological Association of Canada and work as a Professional Geologist.
2. I hold an honours B.Sc. degree in Geology from McMaster University, obtained in 1977.
3. I hold an M.Sc. degree in Geology from Dalhousie University, obtained in 1980.
4. I am a member of the Prospectors and Developers Association of Canada.
5. I have been working continuously as a geologist in the mineral industry for eleven years.
6. I am employed by and am an owner of Terraquest Ltd., specializing in high sensitivity airborne geophysical surveys.
7. The accompanying report has been prepared from airborne data collected by Terraquest Ltd. exclusively for SUDBURY CONTACT MINES LTD. Reference material included geological maps published by the provincial government. I have not visited the property.
8. I have no interest in the property described nor the immediate area of the claims.

Toronto, Ontario
July 15, 1991

Signed,



Charles G. Barrie, M.Sc.
Vice President, TERRAQUEST LTD.



Mining Act

Report of Work
(Geophysical, Geological and Geochemical Surveys)

| | | |
|---|---|--|
| Type of Survey(s) Airborne Geophysical | Mining Division Larder Lake | Township or Area Gauthier & McVittie Townshi |
| Recorded Holder(s) Skead Holdings Ltd. | Prospector's Licence No. T-1956 | |
| Address c/o P.O. Box 1110, SAULT STE. MARIE, Ont. P6A 5N7 | | Telephone No. 949-5928 |
| Survey Company Terraquest Ltd. | | |
| Name and Address of Author (of Geo-Technical Report) Terraquest Charles Barry, 2nd Floor, 240 Adelaide St. W. Toronto | | Date of Survey (from & to) 01.05.91 31.5.91 |

2.14273

Credits Requested per Each Claim in Columns at right

Mining Claims Traversed (List in numerical sequence)

| 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: | - Other | |
| Enter 20 days (for each) | Geological | |
| | Geochemical | |
| Man Days Complete reverse side and enter total(s) here | Geophysical | Days per Claim |
| | - Electromagnetic | |
| | - Magnetometer | |
| | - Other | |
| | Geological | |
| | Geochemical | |
| Airborne Credits Note: Special provisions credits do not apply to Airborne Surveys. | Electromagnetic | 40 |
| | Magnetometer | 40 |
| | Other | |
| Total miles flown over claim(s) | 4 | |
| Date May 31/91 | Recorded Holder or Agent (Signature) <i>[Signature]</i> | |

| Mining Claim | | Mining Claim | | Mining Claim | |
|---|-------------|-----------------|--------|--------------|--------|
| Prefix | Number | Prefix | Number | Prefix | Number |
| L | 1111211 | * | | | |
| | 1151867 | | | | |
| | 1151868 | | | | |
| | 1151869 | | | | |
| | | | | | |
| * | 10 days AEm | Maximum allowed | | | |
| | 10 day AMag | allowed | | | |
| | | | | | |
| MINING LANDS SECTION | | | | | |
| Total number of mining claims covered by this report of work. | | | | | |
| 4 | | | | | |

Certification Verifying Report of Work

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

Name and Address of Person Certifying
R.A. MacGregor, 28 Ford St., Sault Ste. Marie, Ontario P6A 4N4

Telephone No. **705-949-5928**

Date **May 31, 1991** Certified By (Signature) *[Signature]*

For Office Use Only

| | | |
|---------------------------------------|--|--|
| Total Days Cr. Recorded 260 | Date Recorded May 31/91 | Mining Recorder <i>[Signature]</i> |
| | Date Approved as Recorded Oct 1/91 | Provincial Manager, Mining Lands <i>[Signature]</i> |

Received Stamp

31 PM 31 PM 3 53

REFERENCES

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

TOWNSHIP E staking restricted S. 20' 20' 10' 10'

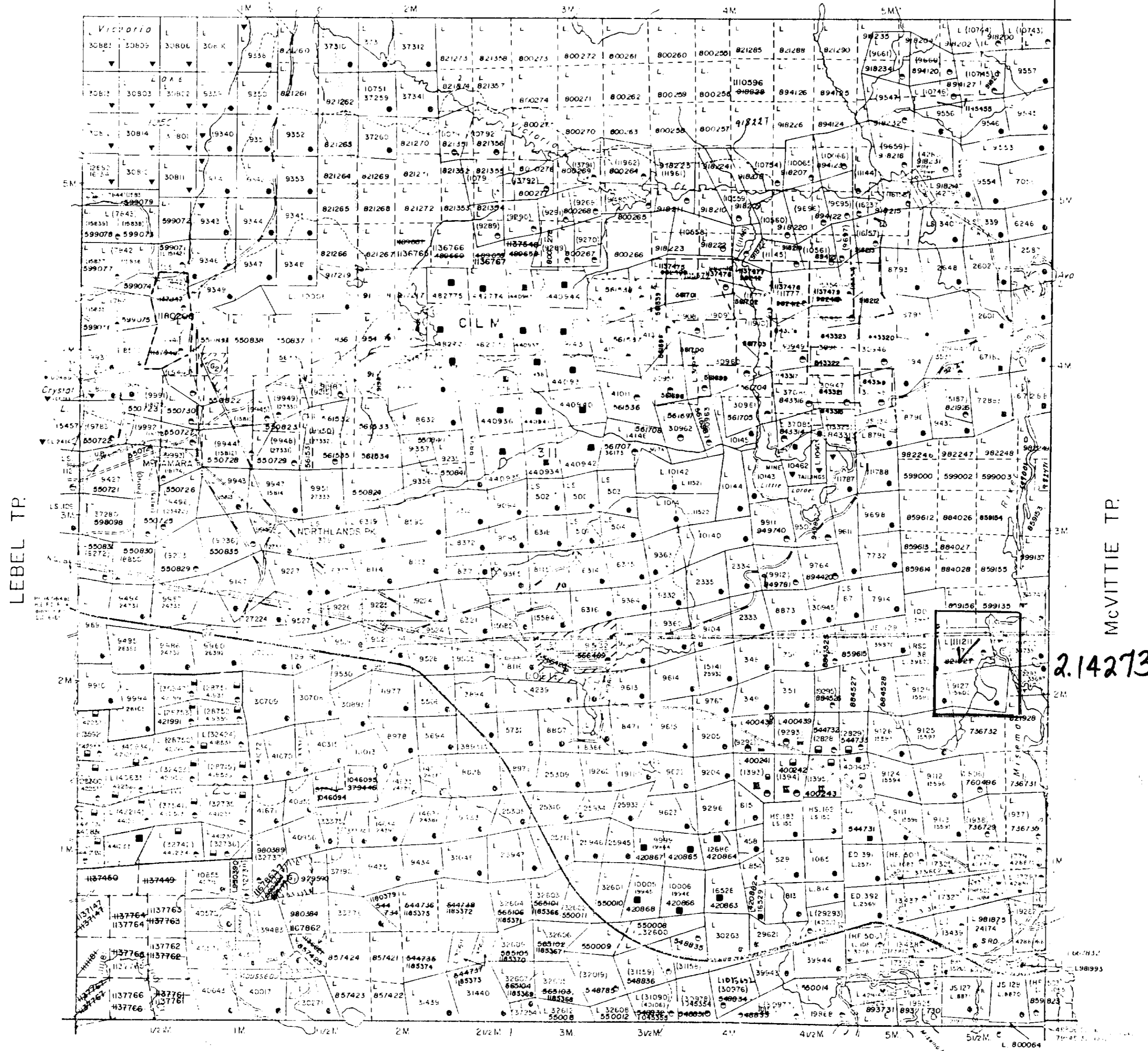
BARRICK POWER LINE
(Application pending under Public Lands Act)

SAND and GRAVEL

- ① M.T.C. PIT No. 1666 FILE 101421
- ② M.T.C. PIT 3F-27

THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

ARNOLD TP.



LEGEND

- HIGHWAY AND ROUTE NO.
- OTHER ROADS
- TRAILS
- SURVEYED LINES
- TOWNSHIP BOUNDARIES, ETC.
- LOTS, MINING CLAIMS, PARCELS, ETC.
- UNSURVEYED LINES
- LOT LINES
- PARCEL BOUNDARY
- MINING CLAIMS, ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINE
- NON-PERMANENT STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION OR COMPACT PLAN
- FEDERATION
- ORIGINAL SURVEYING
- 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 MARCH 1912, AND LOTS IN ORIGINAL PATENTS BY THE PUBLIC LANDS ACT, R.S.O. 1910 CHAP. 161, SEC. 63, SURVIVE.

SCALE 1 INCH = 40 CHAINS

TOWNSHIP
GAUTHIER
M.M.R. ADMINISTRATIVE DISTRICT
KIRKLAND LAKE
MINING DIVISION
LARDER LAKE
LAND TITLES / REGISTRY DIVISION
TIMISKAMING

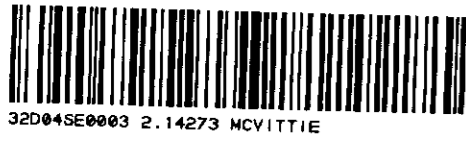
Ministry of Land
Natural Resources
Management Branch
Ontario

DATE: FEBRUARY, 1988
FEBRUARY 8, 1988
Number: G-3211

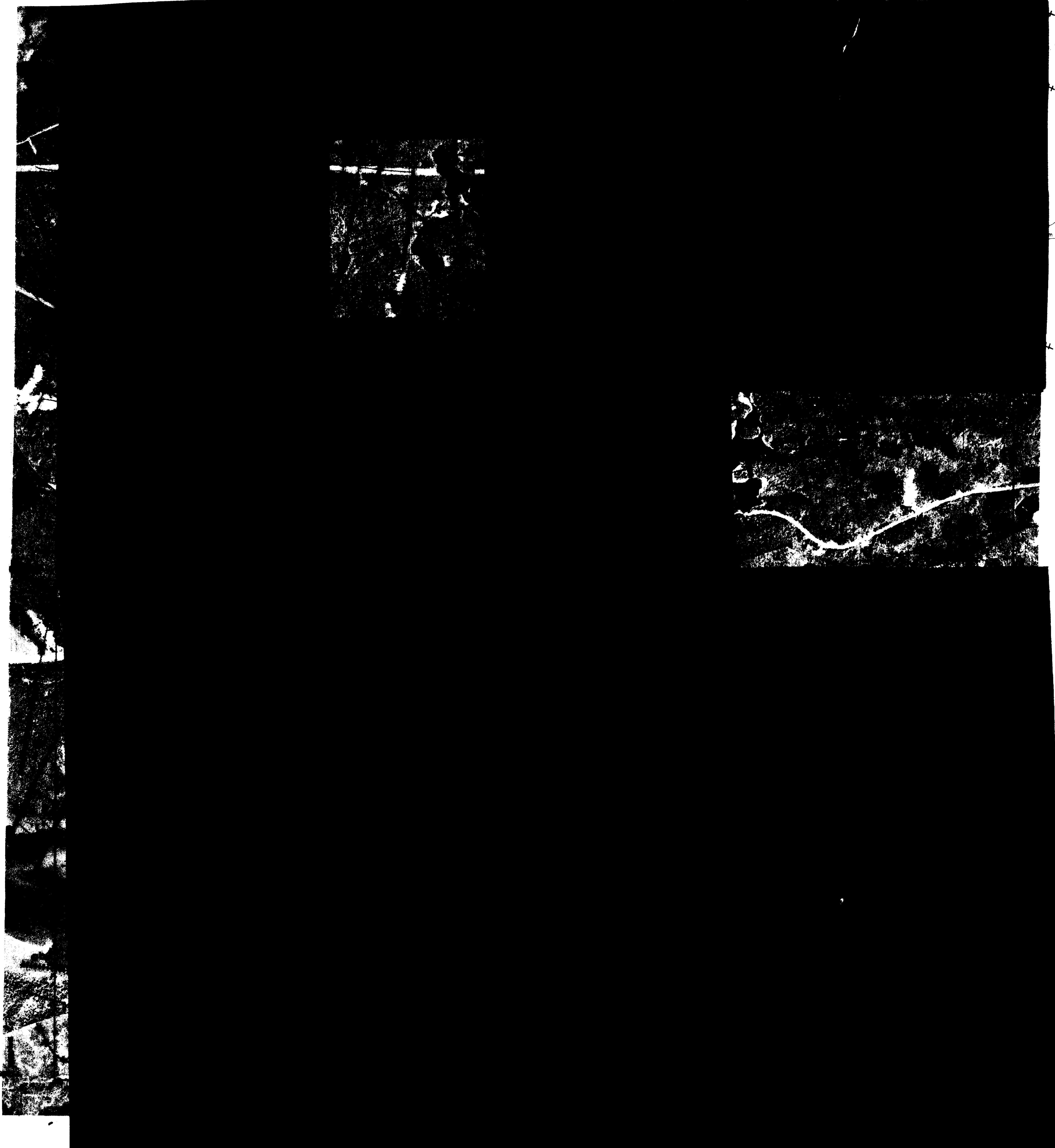
McELROY TP.

TOWNSHIP SUBJECT TO

DATE OF ISSUE



3204SE003 2.14273 MCVITTIE



VLF Transmitter
 NAA Cutler, 24.0 kHz
 Azimuth 107.7

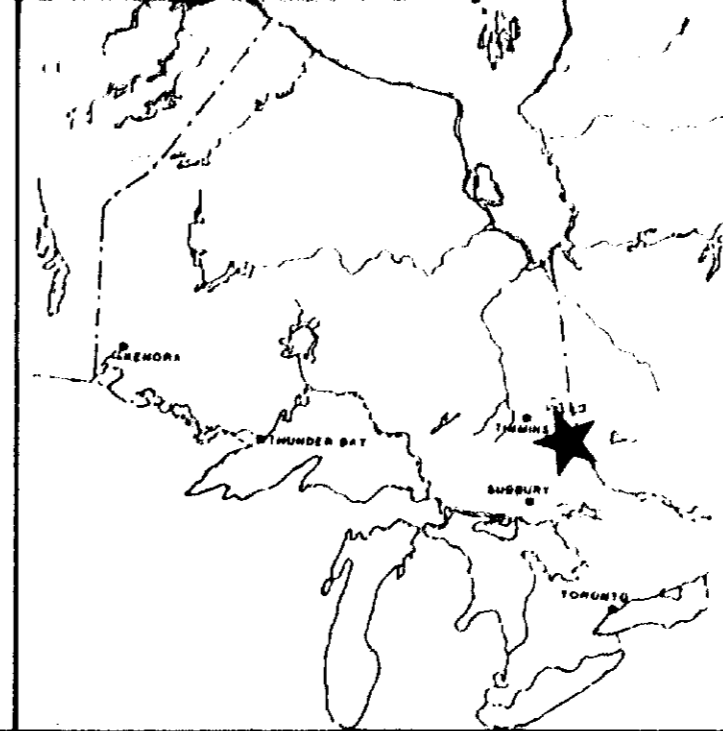
LITHOLOGY

- | | |
|----------------------------|--|
| 11 Dyke | 4M Strongly Magnetic Unit within 4. |
| 10 Quartz Porphyry | 4m Magnetic Unit within 4. |
| 9 Syenite, Monzonite | 4 Alkalic Metavolcanics |
| 8 Gabbro, Diorite | 1c Mafic Metavolcanics |
| 9M Iron Formation | 1b Intermediate Pyroclastics |
| 6m Magnetic Unit within 6. | 1a Intermediate Flows |
| 6 Metasediments | 1 Mafic and Intermediate Metavolcanics |

LEGEND

- Terrain Clearance 100 metres
 Line Spacing 100 metres
 Property Boundary
- INTERPRETATION**
- Contact
 Fault
- VLF-EM Conductor Axes**
- Normal Quadrature
 Reverse Quadrature
 Total Field Only
 Quadrature Only

See text for classification of VLF-EM conductor axes



SUDBURY CONTACT MINES LTD.

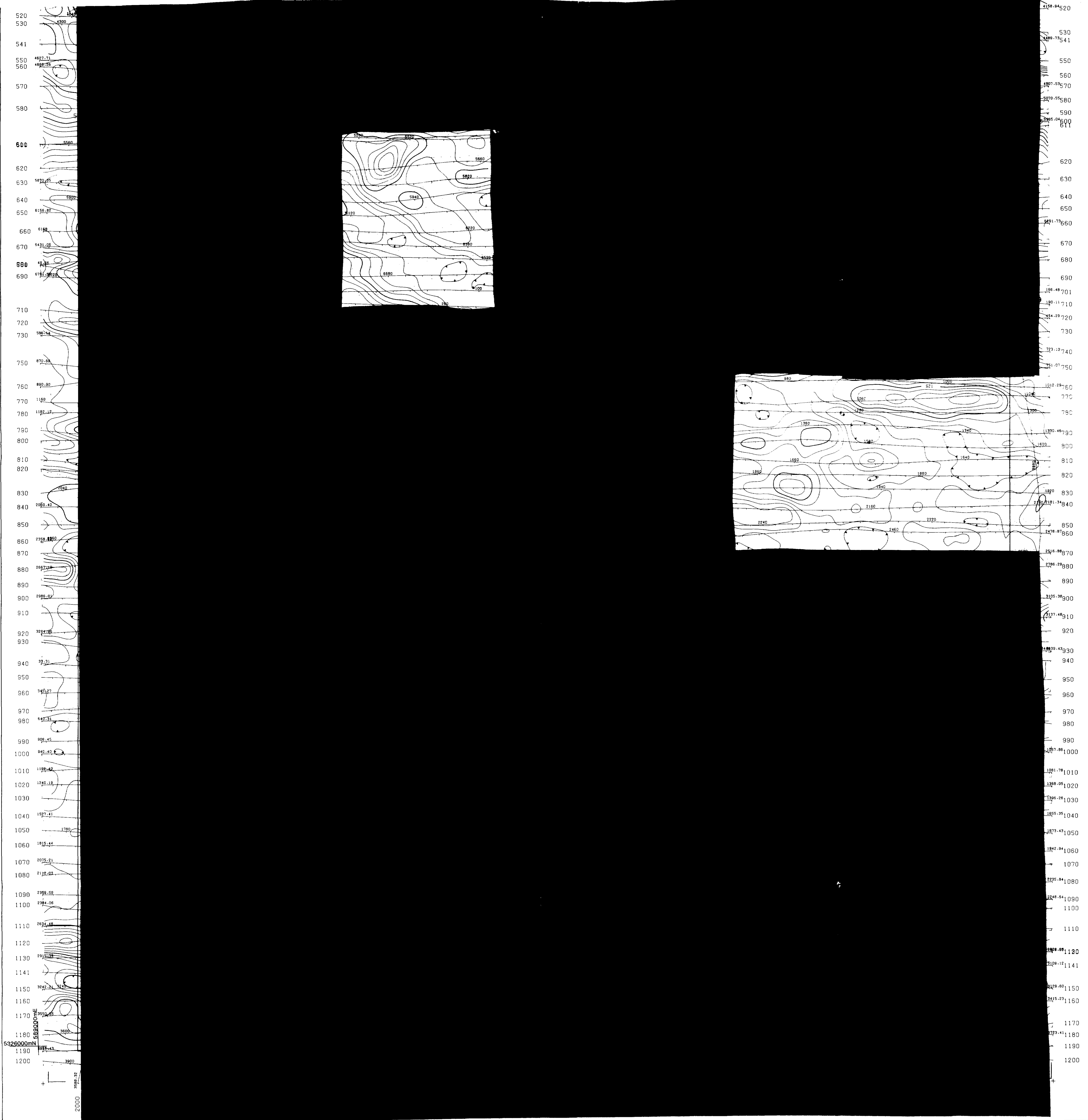
RECEIVED INTERPRETATION
 JUL 31 1991 2-14978

MINING LANDS LARDER LAKE NORTH
 ONTARIO

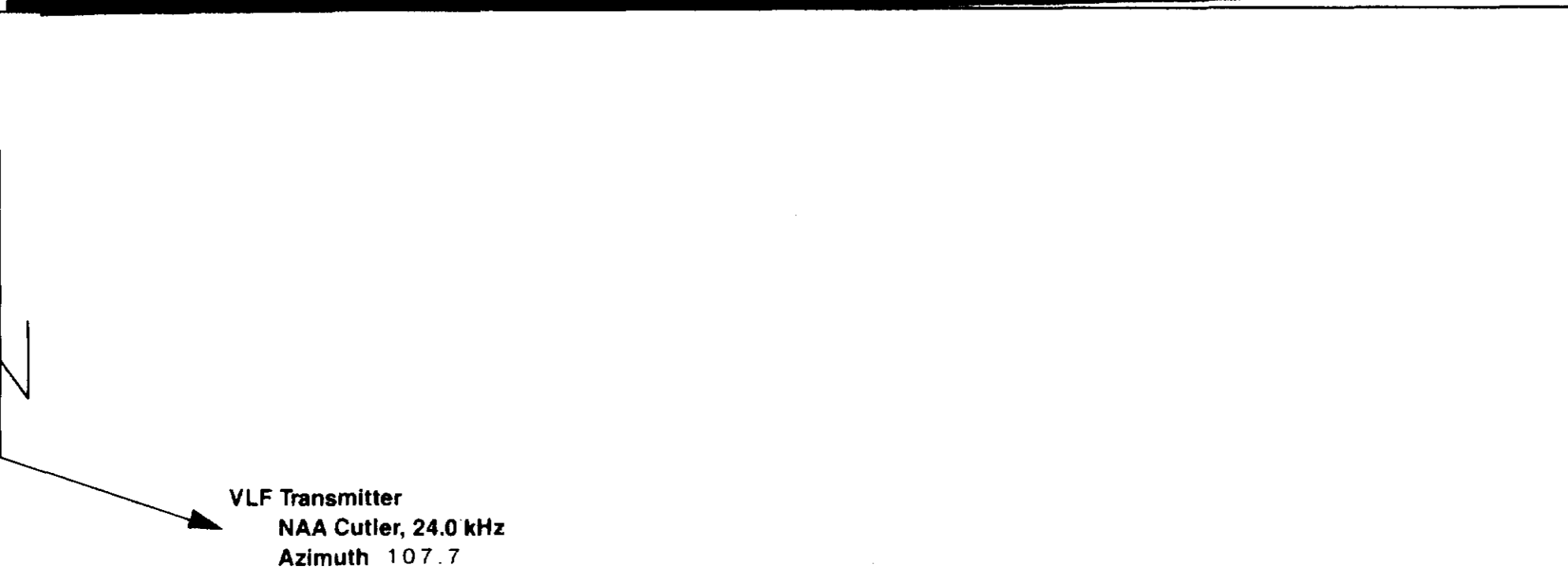
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|------------|----------|-------------|----------|
| N.T.S. NO. | 320/4 | DRAWING NO. | A-908-4 |
| SCALE | 1:10,000 | DATE | May 1991 |

TERRAQUEST LTD.
 TORONTO, CANADA





5326000M
 583000ME
 0002



LEGEND

Survey Altitude 100 metres MTC
 Line Spacing 100 metres
 Survey Boundary

TOTAL FIELD STRENGTH (Contours)
 100%
 25%
 5%

QUADRATURE (Profiles along Flight Lines)
 Normal Slope Reverse Slope

+20% +20%
 -20% -20%

SUDBURY CONTACT MINES LTD.

AIRBORNE VLF-EM SURVEY
 CONTOURS OF TOTAL FIELD STRENGTH
 PROFILES OF QUADRATURE

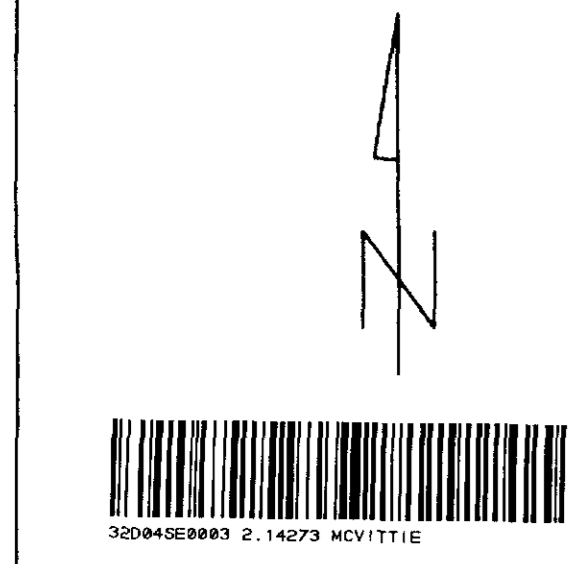
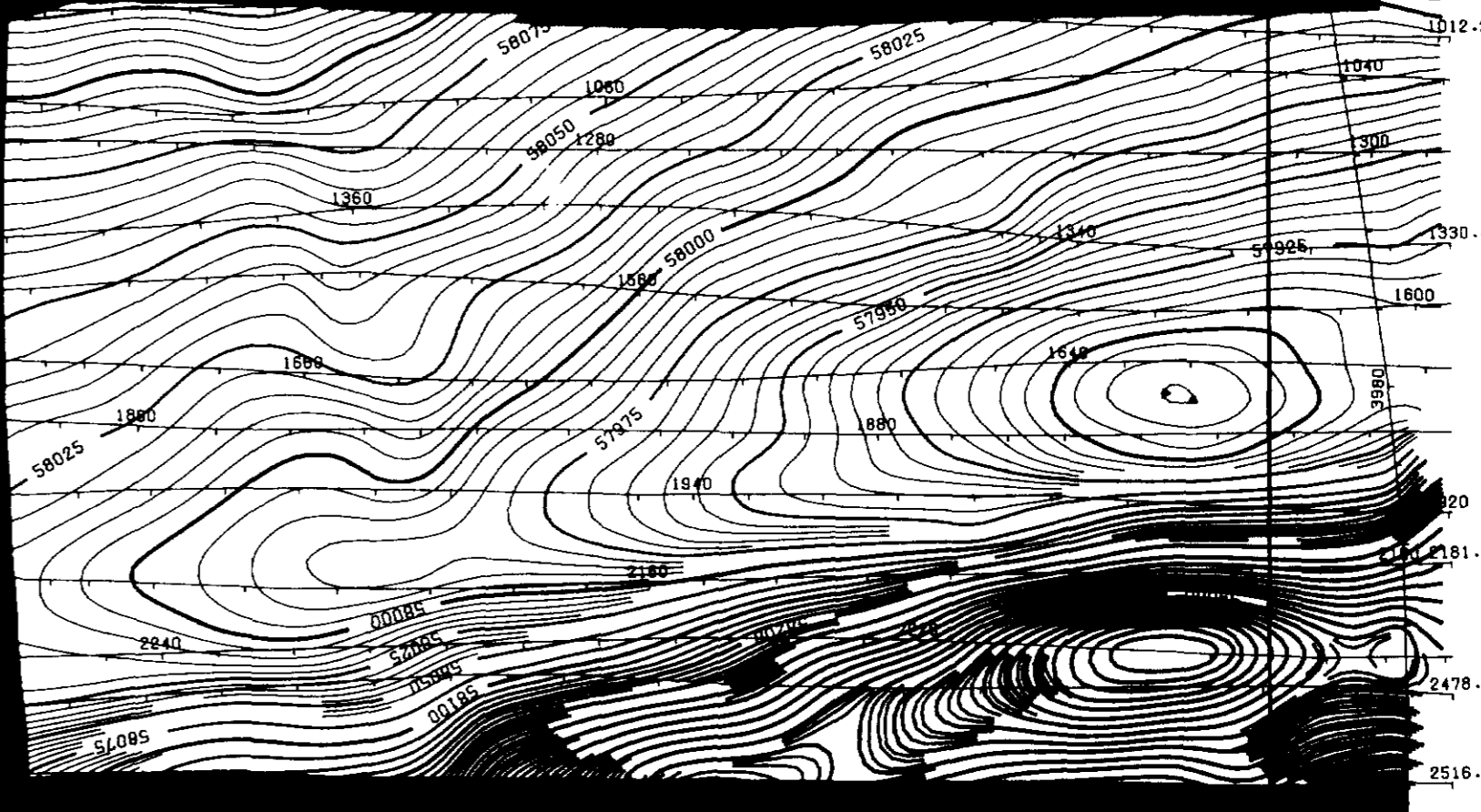
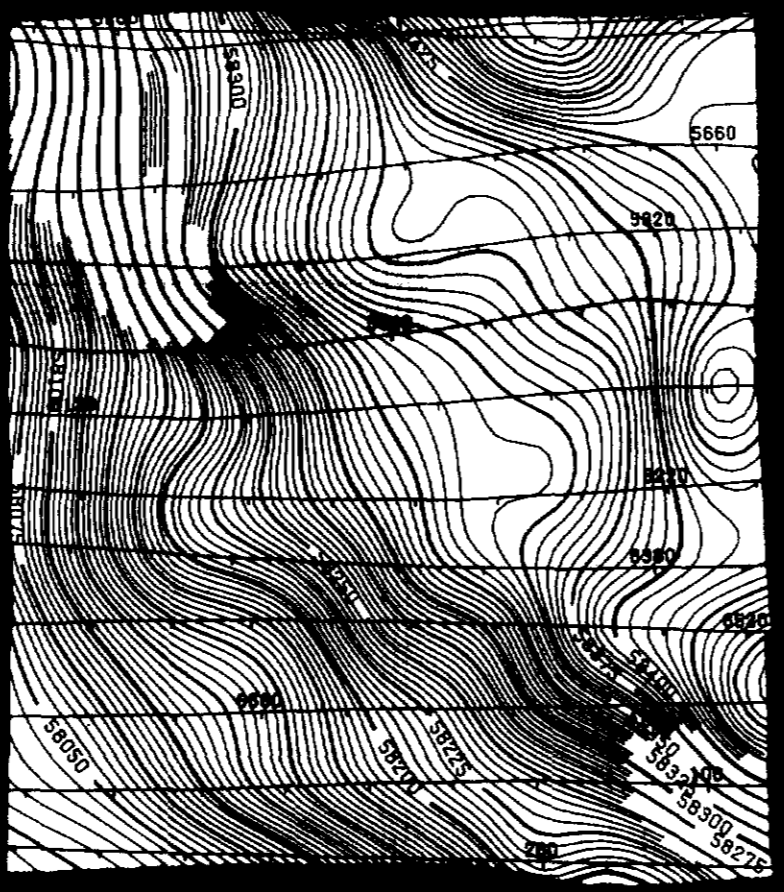
RECEIVED LARDER LAKE NORTH
 JUL 31 1991 ONTARIO

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| SCALE: 1 : 10,000 | DATE: May 1991 |

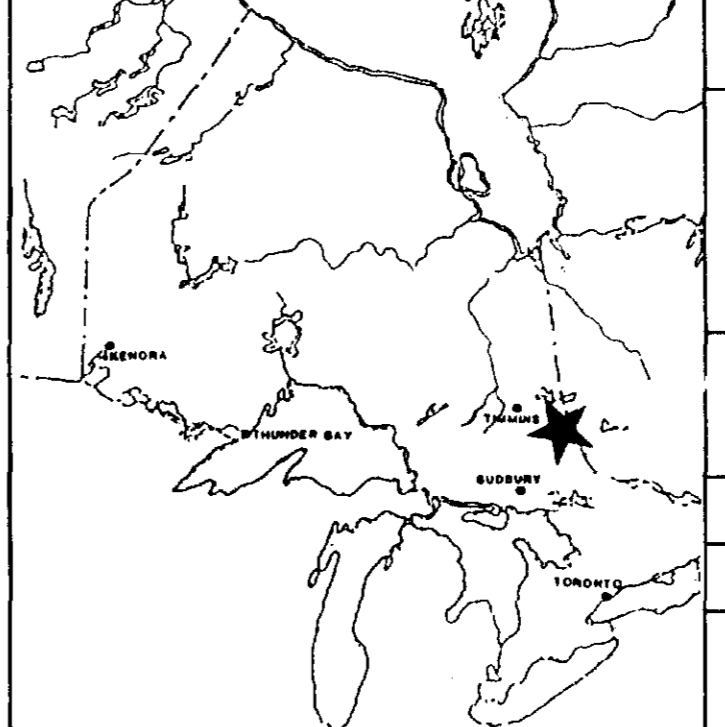
TERRAQUEST LTD.
 TORONTO, CANADA

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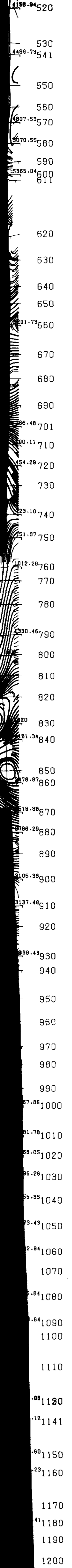
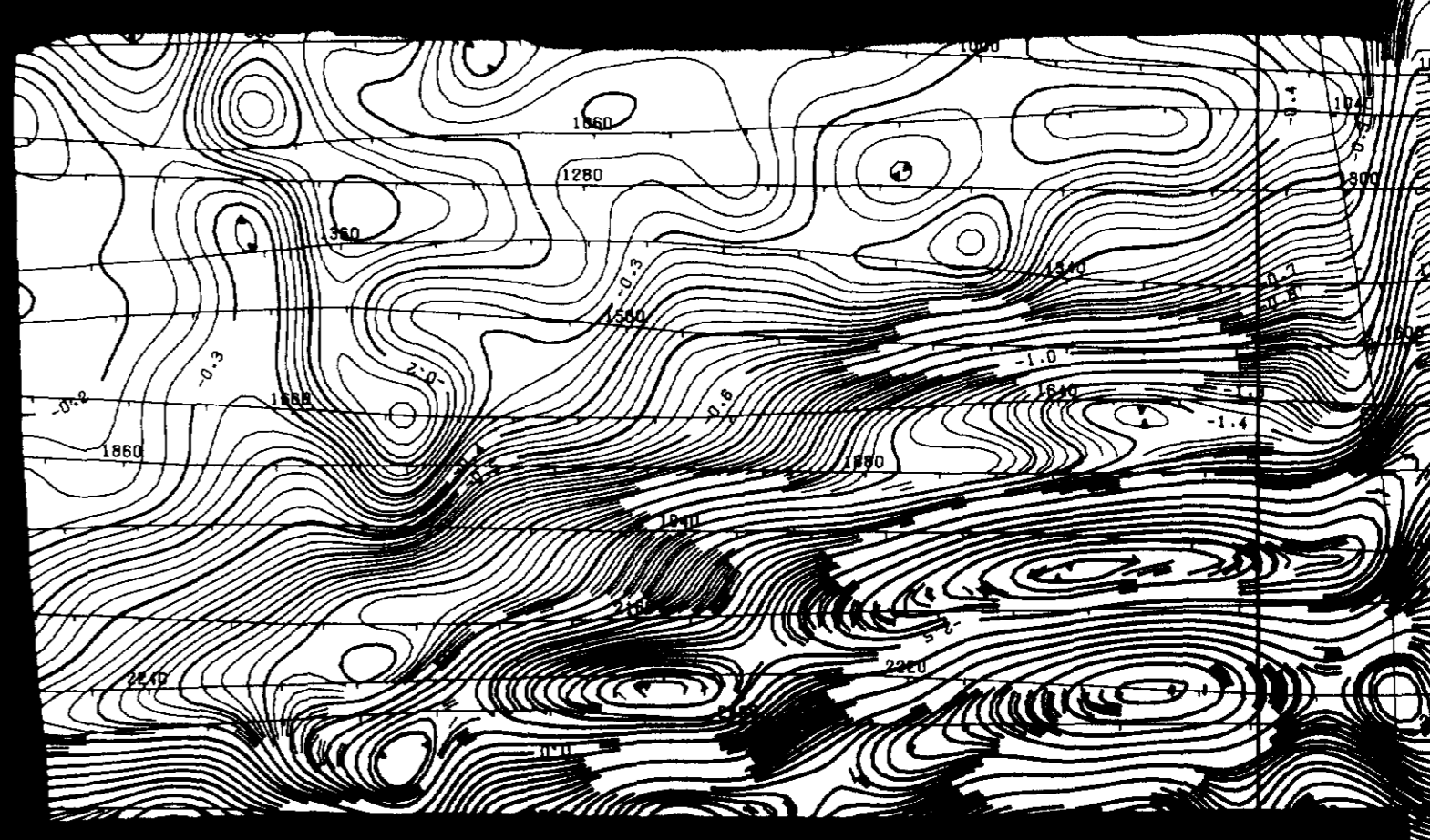
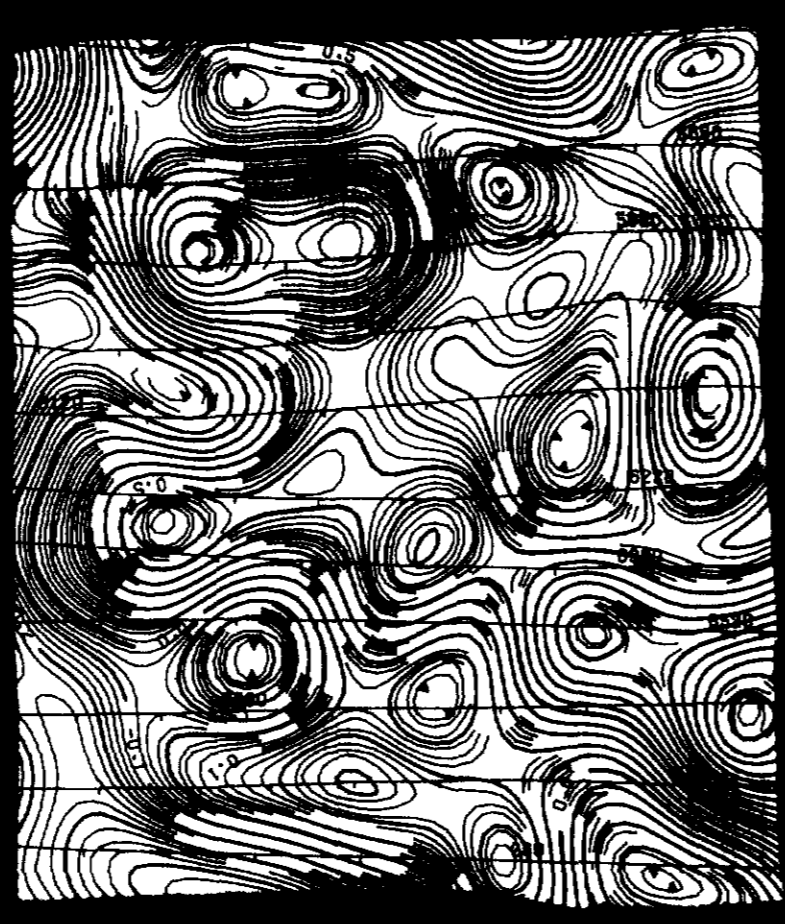
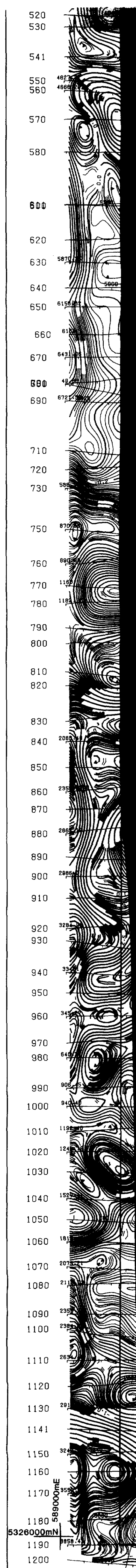
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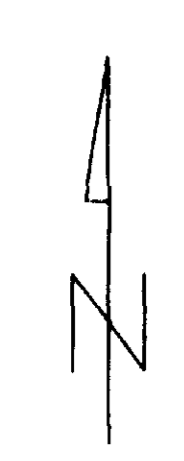
LEGEND
 Survey Altitude 100 metres MTC
 Line Spacing 100 metres
 Survey Boundary
 TOTAL MAGNETIC FIELD
 500 gammas
 100 gammas
 25 gammas
 5 gammas



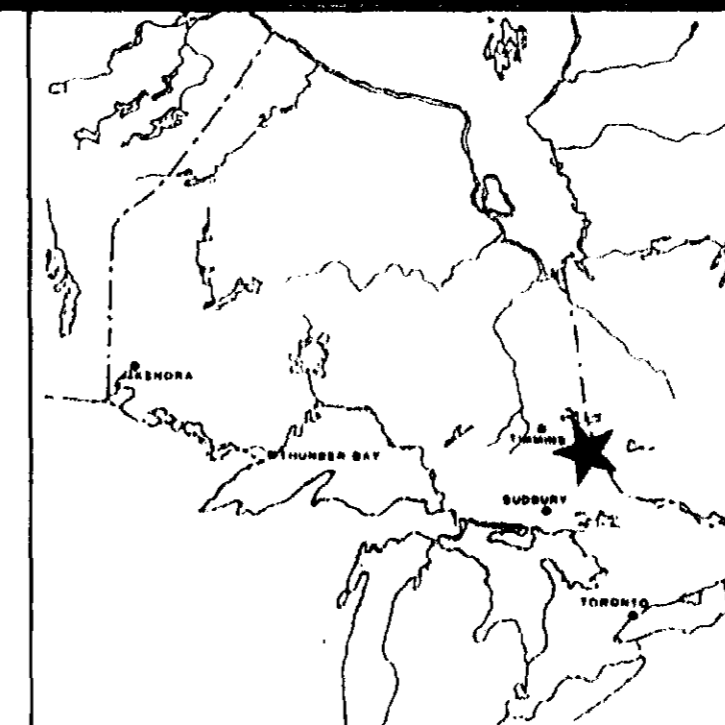
SUDBURY CONTACT MINES LTD.
 AIRBORNE MAGNETIC SURVEY
 TOTAL MAGNETIC FIELD
 2-1480
 RECEIVED
 LARDER LAKE NORTH
 JUL 31 1991 ONTARIO
 MINING LANDS SECTION DRAWING NO. A-908-1
 SCALE: 1 : 10,000 DATE: May 1991
TERRAQUEST LTD.
 TORONTO, CANADA



2000



LEGEND
 Survey Altitude 100 metres: MTC
 Line Spacing 100 metres
 Survey Boundary
 VERTICAL MAGNETIC GRADIENT
 2.500 gammas/metre
 0.500 gammas/metre
 0.100 gammas/metre
 0.025 gammas/metre



SUDBURY CONTACT MINES LTD.
 AIRBORNE MAGNETIC SURVEY
 VERTICAL MAGNETIC GRADIENT
 Calculated From Total Field
RECEIVED
 JUL 31 1991 LARDER LAKE NORTH
 ONTARIO
 MINING LANDS SECTION
 N.T.S. NO. 320/4 DRAWING NO. A-908-2
 SCALE: 1 : 10,000 DATE: May 1991
TERRAQUEST LTD.
 TORONTO, CANADA

