LEGEND AREAS WITHDRAWN FROM DISPOSITION M.R.O. - MINING RIGHTS ONLY CONMANDAL HOUSE N S.R.O. - SURFACE RIGHTS ONLY CALVERT TOWNSHIP _ - - - - - - -M.+ S. - MINING AND SURFACE RIGHTS to with the company of the control 756623 1 756624 ------756625 756626 +52066 THAT SHIP MENT MENT 952067 DISPOSITION OF CROWN LANDS ∵_ o c TYPE OF DOCUMENT SYMBOL Control of the contro 756627 and the second section of the second 756628 HE SERVICE TO 756629 l 756630 AMERICE JAMES THALE **┝╒╴╴╴╴╴**┟╴╴╴ ... NOTE WAS A CONTRACT WAS A CHARLES OF BY MAKE AND THE PERSON OF THE PERSON O 756632 | 756631 022368 :025246 1025244 756633 756687 1025253 .025250 756621 756686 COWNSHIP 866606 756683 756684 866607 SCALE 1:20 000 756688 292754 292765 236685 95850 છેલ હાત્વવધૂક MOL 58444 . P 822406 4337 292766 822405 1029062 DONNO P 236687 P 822412 822413 р 916845 | P | 9+6849 0555 822414 1029823 **1029824** 236694 236695 1027057 P (236820 P 236777 916847 1 10 4068 236821 1024036 1024035 236781 236782 789206 236784 P 749970 292051 749962 TOWNSHIP 73:910 CLERGUE 731909 M N.R. ADMINISTRATIVE DISTRICT COCHRANE MINING DIVISION P 749985 984665 984664 984666 984668 PORCUPINE LAND TITLES / REGISTRY DIVISION 984631 984661 984662 984663 984667 527010 COCHRANE 521332 Ministry of 10 5 3 Northern Development Resources and Mines Ontario STOCK TOWNSHIP Barr SEPTEMBER, 1986 Marel 24 987 95 G-3487

MAP SYMBOLOGY EVELYN TWP. Aerial Cableway -----Pipeline Railroad Turniable 924:43 434146 E 988443 Road HIGHWAY, COURTY Approximate Teanship Park Boundary Access (road of doughtfel ===== 5395000mN 5395000mN meintenance or significant driveway) P 650348 452497 -238685375 Bridge ⁹²⁴¹³⁶ =924145 424147 996545 -373:04- Language 393109 383446 Trait, Busk Road 393104 393/05 Building LOT -Rapids Chimney CON 6 CON 6 P 617 234, 617 233 P624630 | P624629 P 617.784 | P 617.735 528372 528373 Cliff, Pit, Pile 393741 1 -617787-Souble line river 28408% 924151 924154 Contours interpolated Reservoir _____ P 525091 P 528369 | P 528366 P 528363 | P 528359 528407 River, Stream, Canal 528387 528386 525-29-B _____ 924159 528394 | 528393 40 HWY 610 a 0:774051 Lirection at flow @ 300.02 528405 | P.528406 1 1 528355 E P 528404 528362 | 528360 P.528347 Culvert 525297 | 525301 Spot Elevation (loke eleveriens) :300.0 Dauble lies river Fence, Hedge, 528346 538445 ¹³528¥44 | 528343 ⁸ 528361 503030 503029 503028 1 528354 3 3779 56 | P. 5157726 Transmission Line Feature Outline 525296 \525299 - ---Flooded Land $\Longrightarrow \Leftarrow$ 528340 503027 | P611491 P 528060 ON 5 P 528061 528348 503031 503028 P. 515767 P. 515768 Utility Poles Marsh or Swamp 🖐 🛨 Wharf , Dock , Pier ----48° 36'---Wooded Area Mine Head Frame 🔞 528342 | 628339 P 528338 P 528337 P528349 528336 611490 371443 Beaver Dar 5 5766 528062 528059 F----BD AREAS WITHDRAWN FROM DISPOSITION 282 P 52840 528334 443342 443343 443331 4 443339 577998 528409 M.R.O. - MINING RIGHTS ONLY 528353 -823 3544 20 S.R.O. - SURFACE RIGHTS ONLY M.+ S. - MINING AND SURFACE RIGHTS 528332 P 528731 443334 443332 443330 P-443338 ^{P.} 52 8 3 3 5 ^P443335 443333 577997 577996 \$4858T 916913 443337 443329 520363 9169/5 P528391 525349 308569 308570 1923997 779166 2 P 525 350 <mark>-628302</mark> - 9 24 0 6 **8** 11 P443328 525351 443336 HWY 308563 528420-539000 mN → 308565 308553 528419. ₹ 5390000 mN 111 611426 611429 3 08551 611428 652549 5 4525KF CON 2 30860471 308602 **8**0 P. 585549 585550 585551 P791630 791629 CON 791628 20204 20202 P 791**631** 546877 1 779812 5386000 mN 5386000 mN 12 CODY TWP.

HIGHWAY AND ROUTE No OTHER ROADS TRAILS -----SURVEYED LINES: TOWNSHIPS, BASE LINES, ETC. LOTS, MINING CLAIMS, PARCELS, ETC UNSURVEYED LINES LOT LINES PARCEL BOUNDARY _____ _____ MINING CLAIMS ETC. +---RAILWAY AND RIGHT OF WAY **~~~ €3** UTILITY LINES NON-PERENNIAL STREAM FLOODING OR FLOODING RIGHTS SUBDIVISION OR COMPOSITE PLAN RESERVATIONS ORIGINAL SHORELINE MARSH OR MUSKEG MINES TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT SYMBOL
PATENT, SURFACE & MINING RIGHTS
" , SURFACE RIGHTS ONLY \varTheta
", MINING RIGHTS ONLY O
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 MAY 6, 1913, VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP 380, SEC. 63, SUBSEC 1.

SCALE 1:20 000 GRID ZONE: 17

NOTES

FLOODING RIGHTS ON THE FFEDERICK HOUSE RIVER TO 903' CONTOUR RESERVED TO H.E.P.C.



TOWNSHIP

MATHESON

M.N.R. ADMINISTRATIVE DISTRICT

TIMMINS MINING DIVISION PORCUPINE

LAND TITLES / REGISTRY DIVISION COCHRANE



Ministry of

Management Resources Branch

COMPILATION REVISED

AREAS WITHDRAWN FROM DISPOSITION M.R.O. - MINING RIGHTS ONLY S.R.O. - SURFACE RIGHTS ONLY M.+ S. - MINING AND SURFACE RIGHTS LITTLE TOWNSHIP NRW 41/85 Nerandeau ; 3 Lake Clearwater FREDERICK HOUSE LAKE PROVINCIAL NATURE RESERVE 684490 684466 -684489 684488 | 6B4464 684484 684483 852063 852059 TOWNSHIP _____ 684482 684481 8520!8 852064 684448 684447 |-<u>-</u>----| GOW 684433 684437 955805 684430 684431 684432 649938 649826 649823 683529 649822 P 649829 684424 683523 649841 649840 0 33007

HIGHWAY AND ROUTE No OTHER ROADS TRAILS SURVEYED LINES TOWNSHIPS, BASE LINES, ETC. LOTS, MINING CLAIMS, PARCELS, ETC. UNSURVEYED LINES LOT LINES PARCEL BOUNDARY MINING CLAIMS ETC RAILMAY AND RIGHT OF WAY UTILITY LINES NOM PERENNIAL STREAM FLG. ING OR FLOCOING RIGHTS T SUBDIVISION OR COMPOSITE PLAN RESERVATIONS CRIGINAL SHOPE, NO MARSH OR MUSKEG WINES TRAVERSE MONUMENT DISPOSITION OF CROWN LAMPS TYPE OF DOCUMENT SURFACE RIGHTS ONLY. " MINING RIGHTS ONLY ____ LEASE, SURFACE & MINING RIGHTS ... " MINING PIGHTS ONLY.... LICENCE OF OCCUPATION ORDER-IN-COUNCIL RESERVATION CANCELLED SAND & GRAVEL ⑤ NOTE MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6, 1913 VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.D. 1970 CHAP 380, SEC. 63, SUBSEC 1. 10 0 10 20 30 40 50 50 70 DUNDONALD SCALE 1:20 000 OWNSHIP TOWNSHIP EVELYN M.N.R. ADMINISTRATIVE DISTRICT TIMMINS MINING DIVISION PORCUPINE LAND TITLES / REGISTRY DIVISION COCHRANE Ontario Bate OCTOBER/7986

LEGEND

+---

Marine Committee Com

SYMBOL

JUN 9 1987

Ministry of

and Mines

Northern Development

LEGEND HIGHWAY AND ROUTE No. PROSSER TOWNSHIP OTHER ROADS TRAILS SURVEYED LINES TOWNSHIPS, BASE LINES, ETC LOTS MINING CLAIMS, PARCELS, ETC -UNSURVEYED LINES: LOT LINES PARCEL BOUNDARY MINING CLAIMS ETC RANDAY AND RIGHT OF WAY UTIL THILINES 57688 | 57687 NON PERENWIAL STREAM FLO ING OR FLOCKING RIGHTS ,------SUBJUST NOTA COMPOSITE PLAN RESERVATIONS 55984 55985 ORIGINAL SHORELINE 1030765 1030769 1030767 5 54 182 5 54181 MARSH OR MUSICEG -; -MINES TRAVERSE MONUMENT 55967 1030768 1030770 1030766 DISPOSITION OF CROWN LANDS 597306 TYPE OF DOCUMENT PATENT SURFACE & MINING RIGHTS " SURFACE RIGHTS ONLY ______ 1P 1 568458 MINING RIGHTS ONLY _____ 1 P 1 568459 LEASE SURFACE & MINING RIGHTS..... SURFACE RIGHTS ONLY..... MINING RIGHTS ONLY 916912 | 916911 595995 ORDER IN COUNCIL _. RESERVATION ... CANCELLED SAND & GRAVEL 1 595989 P 568450 55813 568451 595990 🗸 NOTE MINING RICHTS IN PARCELS PATENTED PRIOR TO MAY 6 1913 VESTED IN ORIGINAL PATENTEE BY THE PUBLIC ANDS ACT. RS.C. 1970. CHAP. 380. SEC. 63, SUBSECT P55815~_____ 55815 P 568453 568452 1 P 568454 568455 30 C 1C 20 30 40 50 60 70 1V 0 LP_55816 P 55/617 | B33452± O **∀** 597 323 | 595046 952480 952479 SHI SCALE 1:20 000 S5859 1 55805 833 449 833/451 55858 597324 597 325 1. 5 1/2 LOT 9, CON 3, LOT 9, CON 2 & 952478 95247" 95248 726423 SI/2, SI/2, LOT 6, CON 3 - Withdrawn from stoking-11 #1 _____ SR & M.R. P71085 71086 OT KIDD 1 P 71092 878501 P878502 P 756531 915974 915977> 915974 915977 TOWNSHIP 9+5978 1029214 M.N.R. ADMINISTRATIVE DISTRICT TIMMINS MTC 3H- 4 Bouchard MINING DIVISION 946480 1-946479 946478 1/946477 PORCUPINE LAND TITLES / REGISTRY DIVISION P932586 | P93258 P 915984-946473 1946474 COCHRANE 946475 1946476 12 -8 10 9 3 Ontario Natural Resources MURPHY 7 OWNSHIP

AREAS WITHDRAWN FROM DISPOSITION

M.+ S. - MINING AND SURFACE RIGHTS

M.R.O. - MINING RIGHTS ONLY S.R.O. - SURFACE RIGHTS ONLY

checked to 20,80 EF

Northern Development and Mines

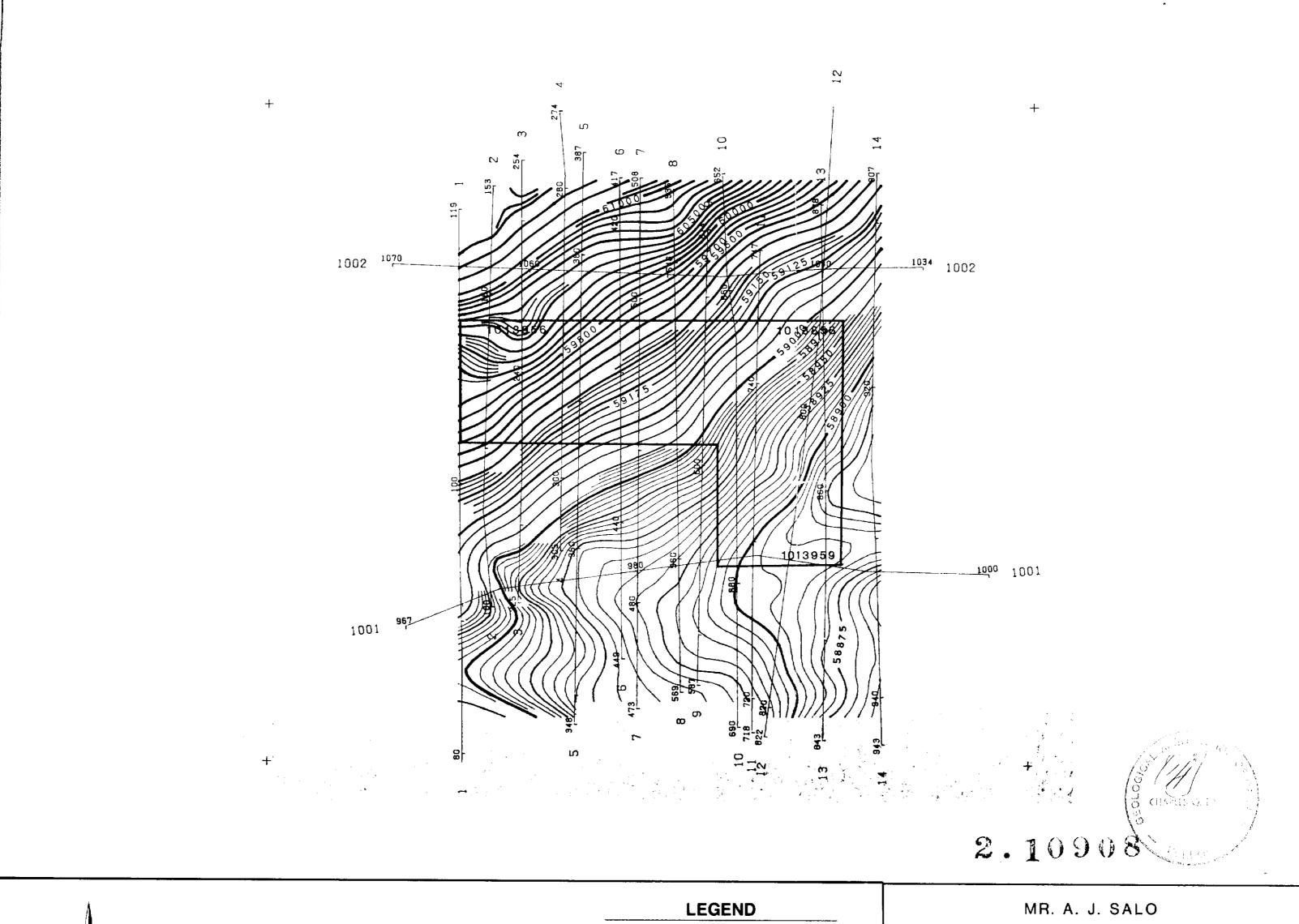
Ministry of

Same the below with

SYMBOL

Date SEPTEMBER 1986

G-3989





Terrain Clearance 100 meters Line Spacing 100 meters

TOTAL MAGNETIC FIELD 500 gammas 100 gammas 25 gammas 5 gammas

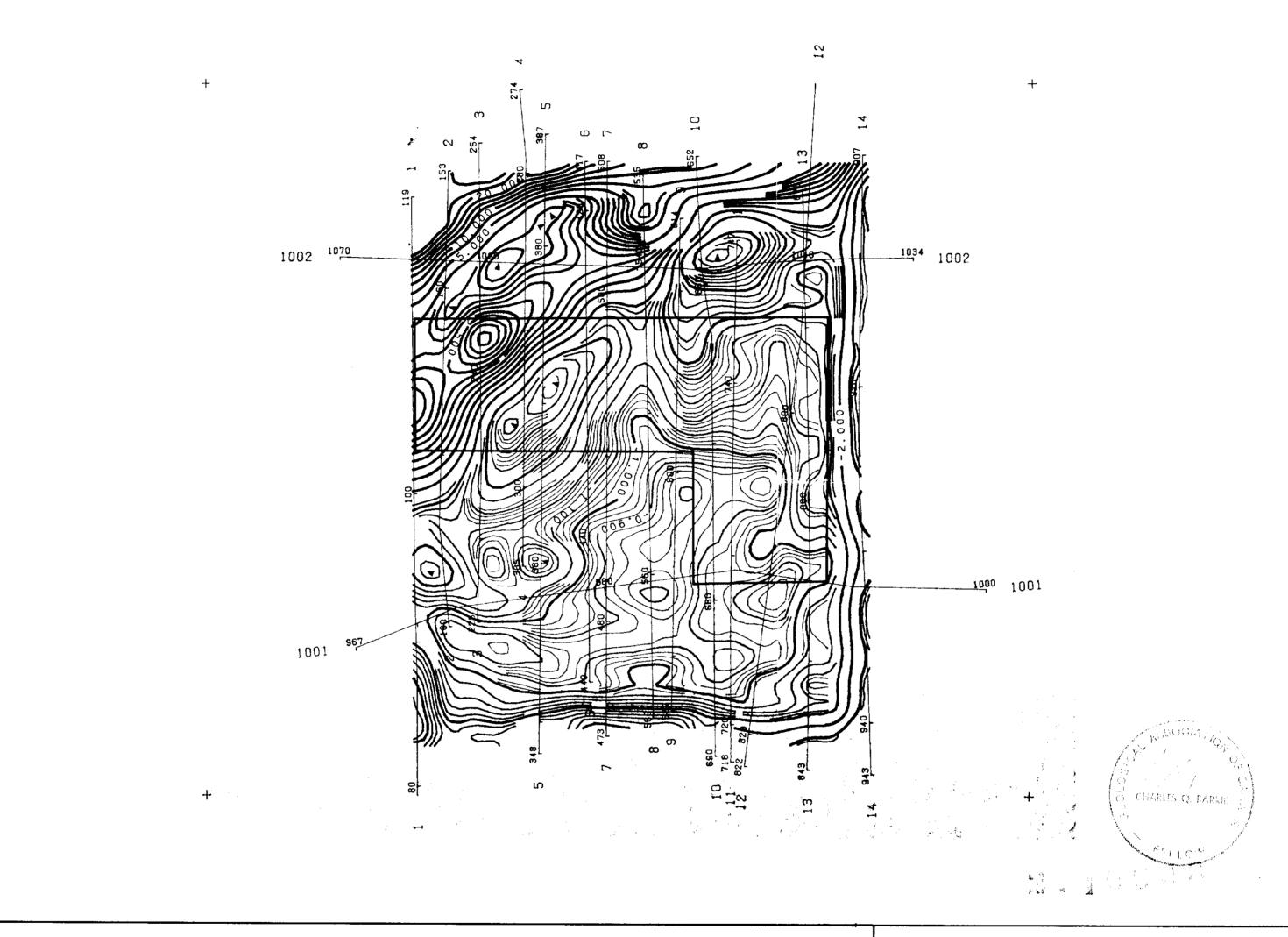
AIRBORNE MAGNETIC SURVEY **TOTAL MAGNETIC FIELD**

CLERGUE TOWNSHIP, ONTARIO

N.T.S. NO. 42A/10 DRAWING NO. A-739.1-1 SCALE: 1:10,000 DATE: February 1988

TERRAQUEST LTD.
**ORONTO. CANADA







LEGEND

Terrain Clearance Line Spacing 100 meters

VERTICAL MAGNETIC GRADIENT 2.500 gammas/meter .500 gammas/meter .100 gammas/meter .025 gammas/meter

MR. A. J. SALO

AIRBORNE MAGNETIC SURVEY

VERTICAL MAGNETIC GRADIENT Calculated From Total Field

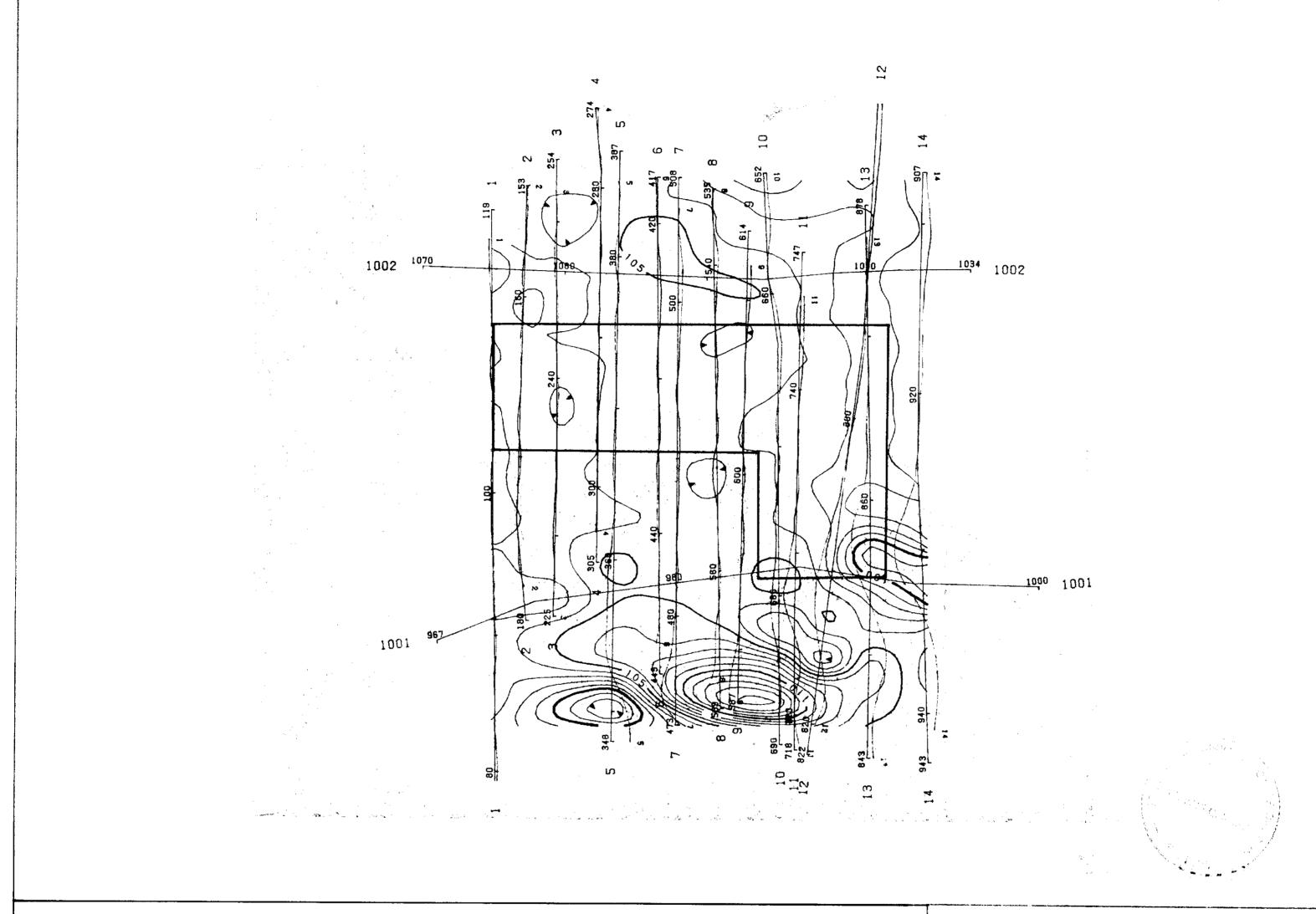
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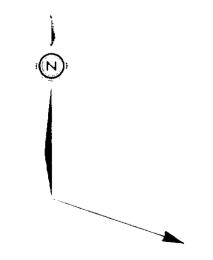
N.T.S. NO 42A/10 DRAWING NO. A-739.1-2 SCALE 1:10,000 February 1988

TERRAQUEST LTD.

TORON TO CANADA







VLF Transmitter
NAA Cutler, 24.0 kHz
Azimuth 108

Terrain Clearance 100 meters Line Spacing 100 meters TOTAL FIELD STRENGTH (Contours) 5% 1% QUADRATURE (Profiles) Normal Slope Reverse Slope +10% -10%

MR. A. J. SALO

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

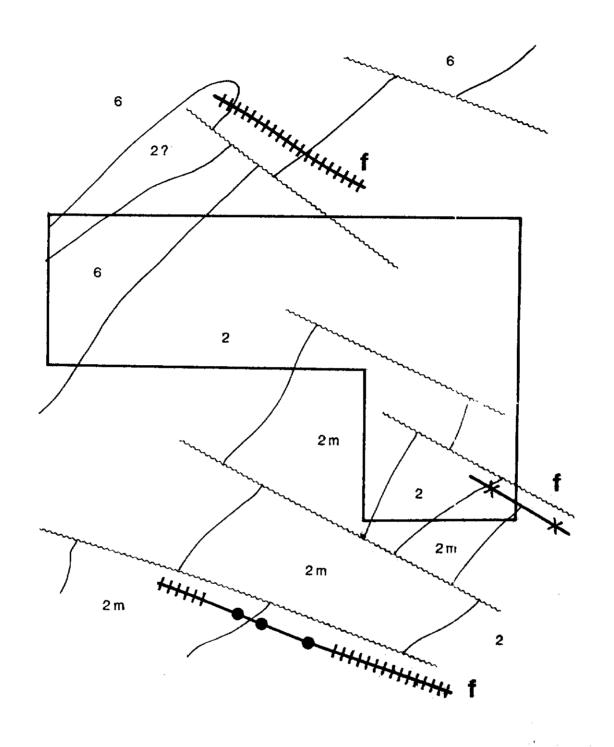
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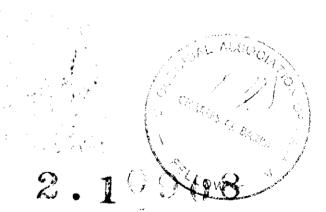
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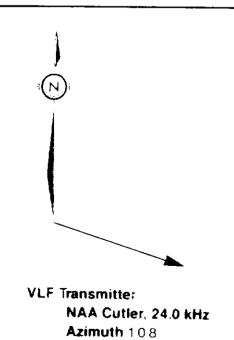
SCALE 1:10,000 DATE February 1988

TERRAQUEST LTD. TORONTO CANADA









LITHOLOGY

6 Peridotite, Pyroxenite

2m Magnetic Unit Within 2

2 Andesitic & Rhyolitic Metavolcanics

LEGEND

Terrain Clearance 100 meters Line Spacing 100 meters

INTERPRETATION

Contact Fault **Property Boundary**

VLF-EM Conductor Axes

normal quadrature reverse quadrature total field only

See text for classification of VLF-EM conductor axes

MR. A. J. SALO

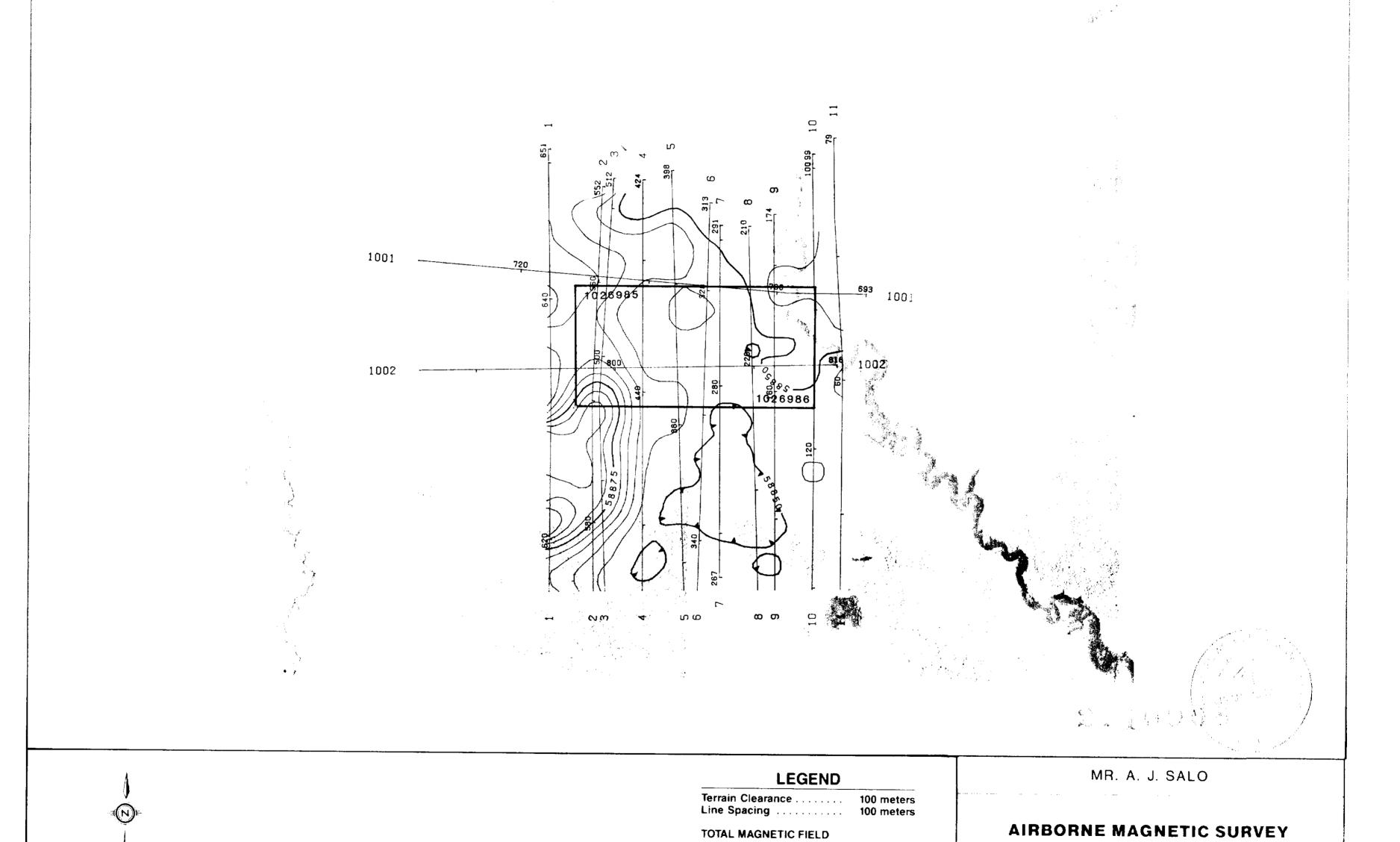
INTERPRETATION

CLERGUE TOWNSHIP, ONTARIO

N.T.S. NO. 42A/10 DRAWING NO. A-739.1-4 SCALE: 1:10,000 February 1988 DATE

TERRAQUEST LTD.
TORONTO, CANADA





500 gammas 100 gammas 25 gammas 5 gammas

TOTAL MAGNETIC FIELD

WARK TOWNSHIP, ONTARIO

TERRAQUEST LTD. T

DRAWING NO A-739.2-1

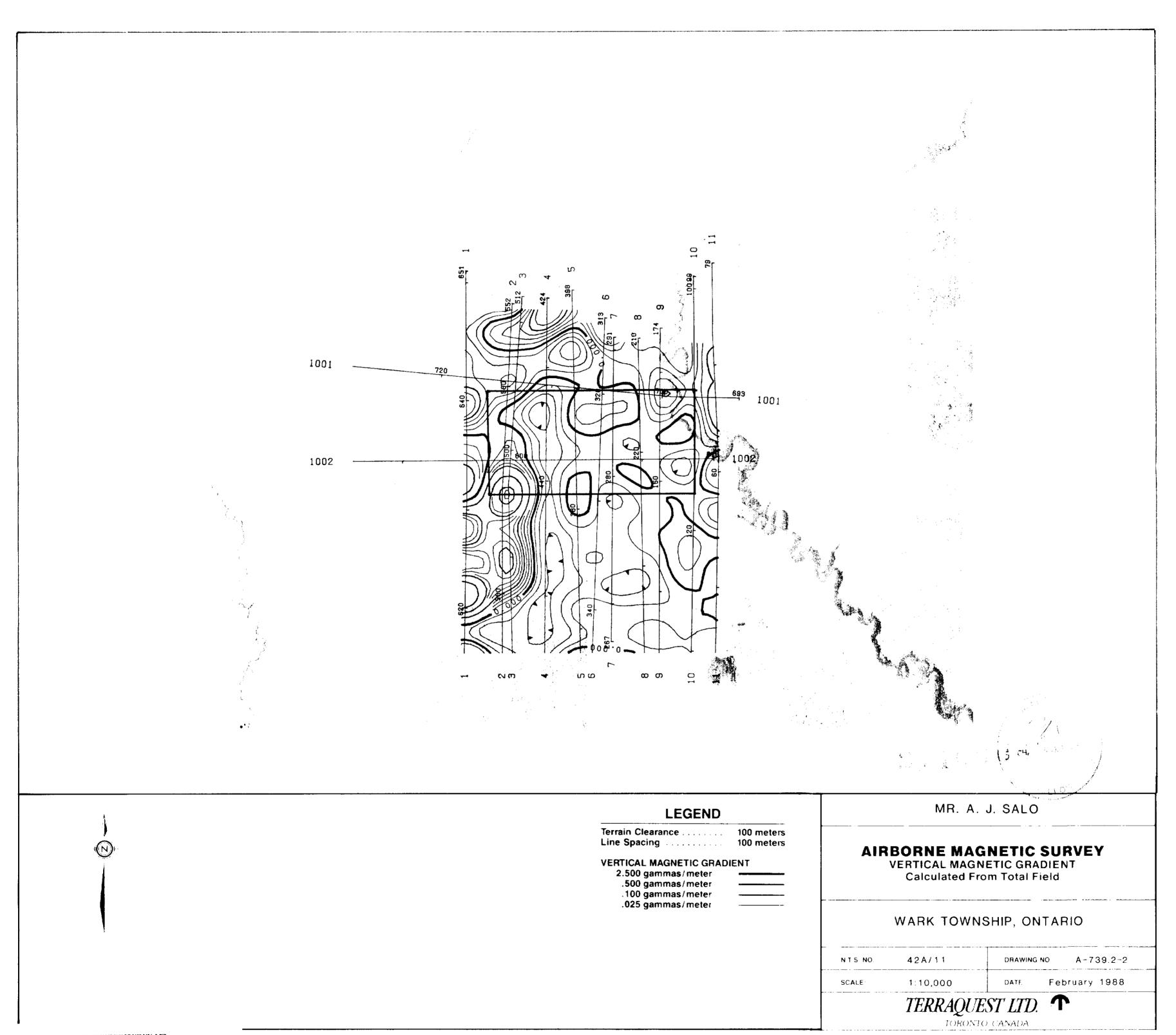
DATE February 1988

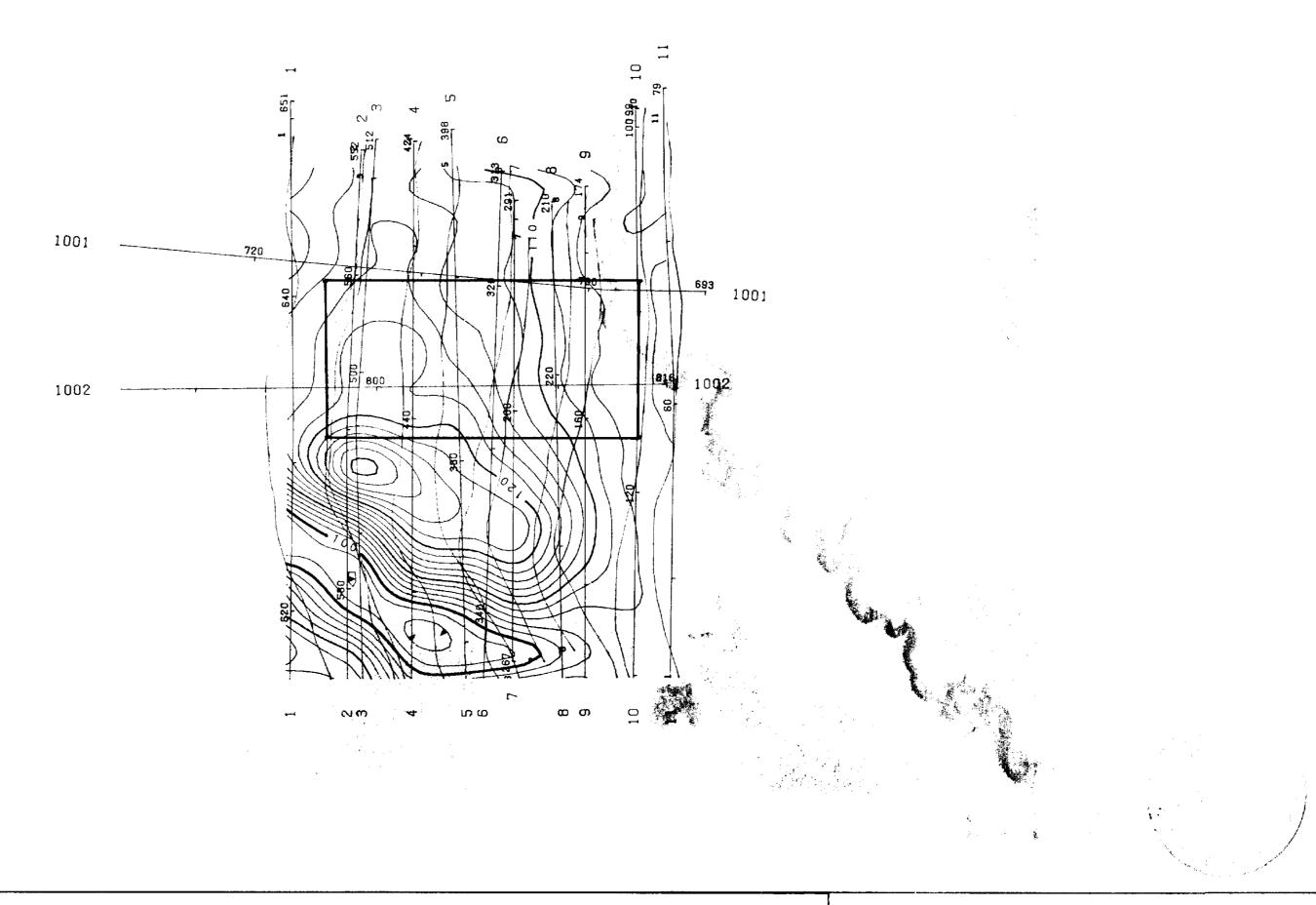
42A/11

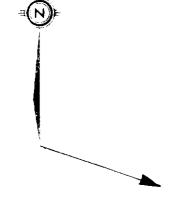
1:10,000

SCALE

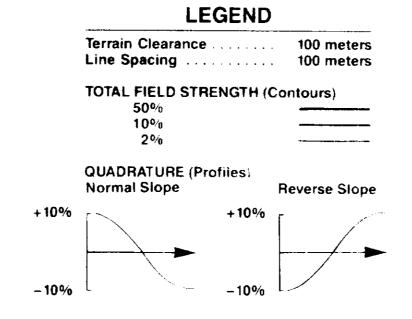








VLF Transmitter NAA Cutier, 24.0 kHz Azimuth 108



MR. A. J. SALO

AIRBORNE VLF-EM SURVEY CONTOURS OF TOTAL FIELD STRENGTH

PROFILES OF QUADRATURE

WARK TOWNSHIP, ONTARIO

42A/11 N.T.S. NO

A-739.2-3

1:10.000 SCALE

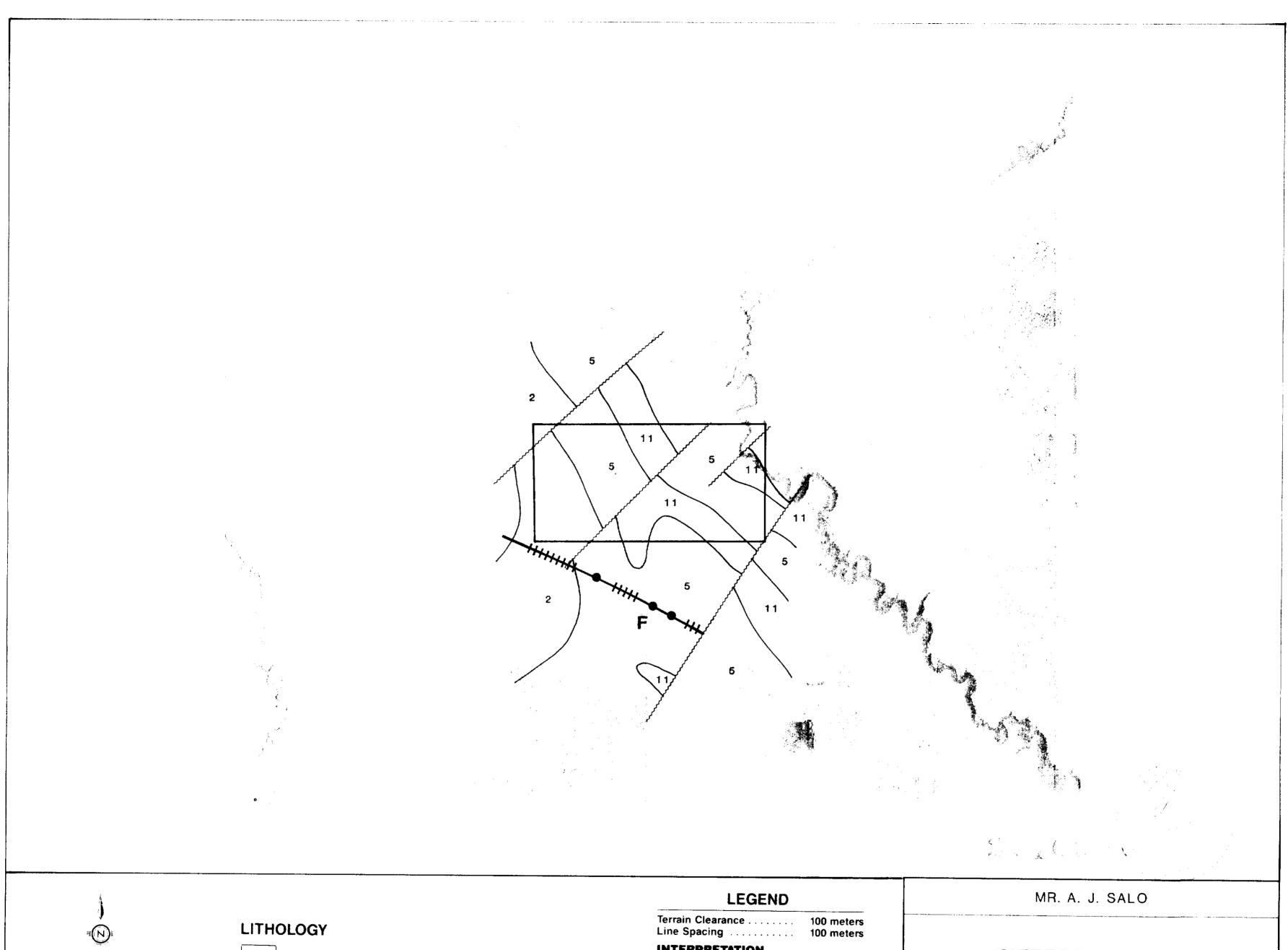
DATE February 1988

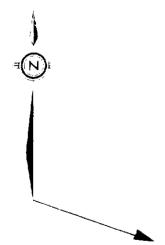
TERRAQUEST LTD.

TORONTO CANADA









VLF Transmitter NAA Cutler, 24.0 kHz Azimuth 108

11 Diabase Dyke

5 Greywacke

2 Rhyolite

INTERPRETATION

Contact Fault

Property Boundary

VLF-EM Conductor Axes

normal quadrature reverse quadrature total field only

See text for classification of VLF-EM conductor axes

INTERPRETATION

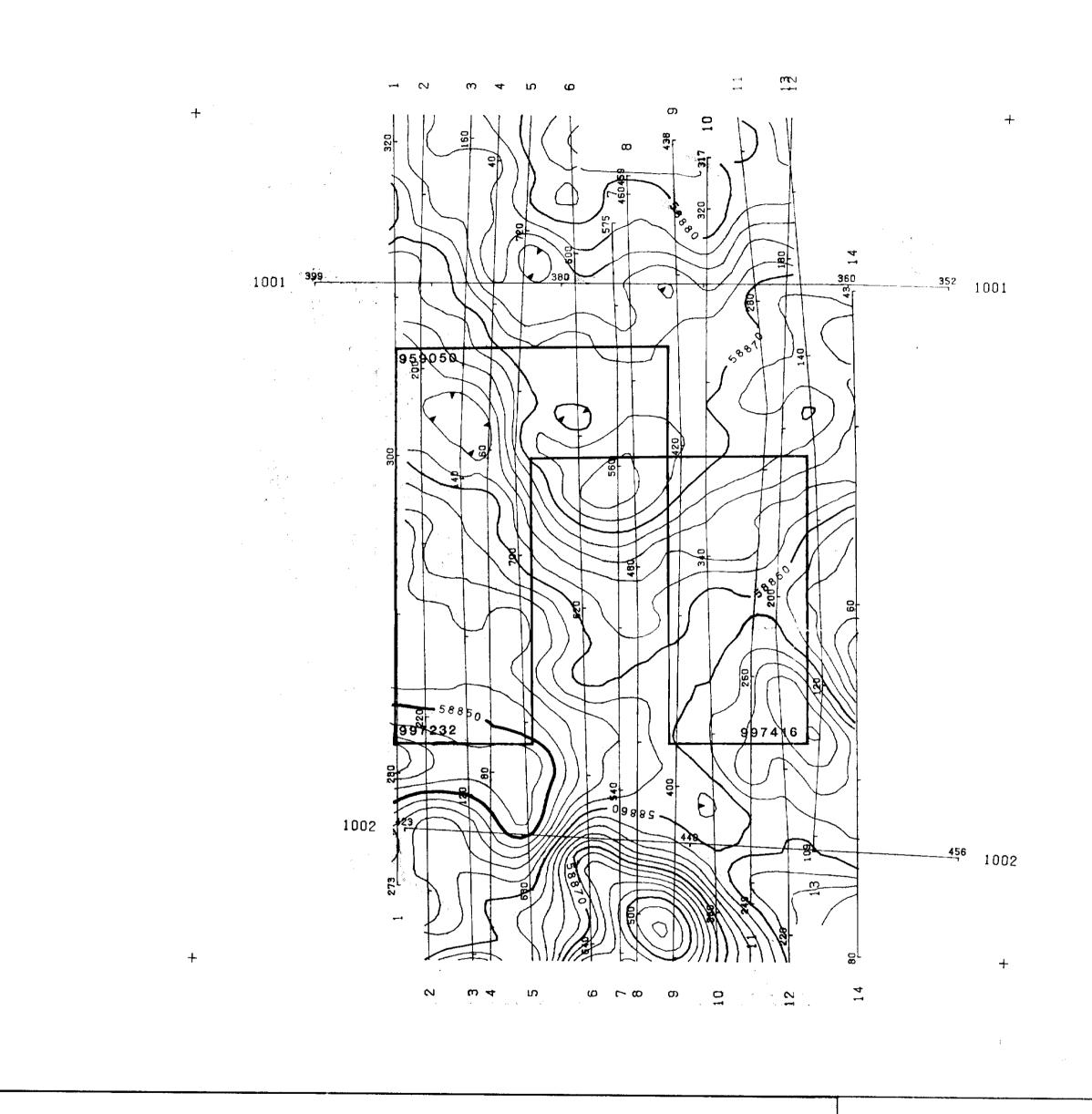
WARK TOWNSHIP, ONTARIO

N.T.S. NO.

42A/11 DRAWING NO. A-739.2-4 SCALE: 1:10,000 February 1988

> TERRAQUEST LTD. TORONTO, CANADA







LEGEND

Terrain Clearance 100 meters Line Spacing 100 meters

TOTAL MAGNETIC FIELD

50 gammas 10 gammas 2 gammas MR. A. J. SALO

AIRBORNE MAGNETIC SURVEY TOTAL MAGNETIC FIELD

MATHESON, EVELYN TOWNSHIPS ONTARIO

N.T.S. NO. 42A/11

DRAWING NO A-739.3-1

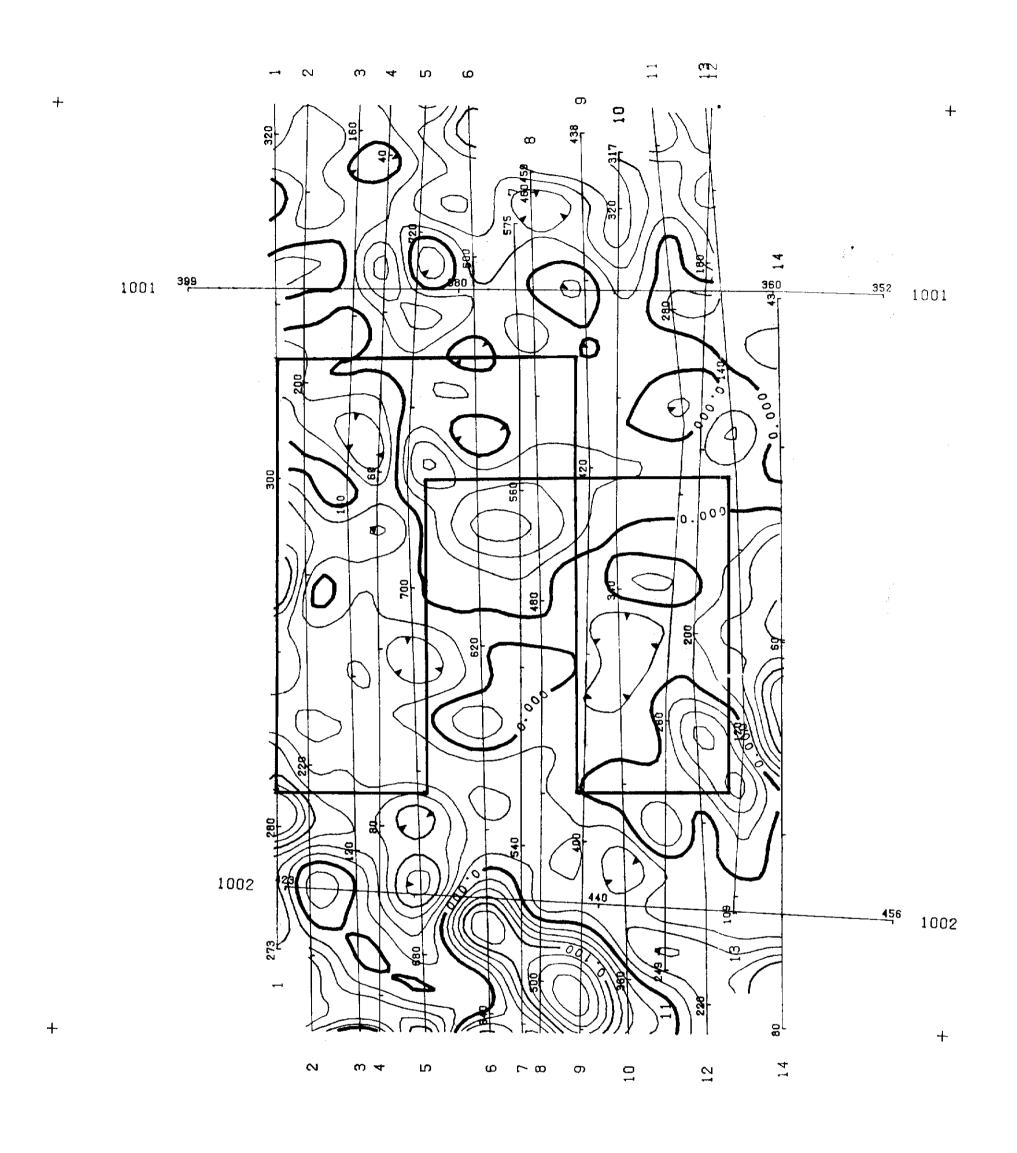
SCALE

1:10,000

DATE February 1988

TERRAQUEST LTD.







LEGEND

Terrain Clearance 100 meters Line Spacing 100 meters

VERTICAL MAGNETIC GRADIENT

2.500 gammas/meter .500 gammas/meter .100 gammas/meter .025 gammas/meter

MR. A. J. SALO

AIRBORNE MAGNETIC SURVEY

VERTICAL MAGNETIC GRADIENT Calculated From Total Field

MATHESON, EVELYN TOWNSHIPS ONTARIO

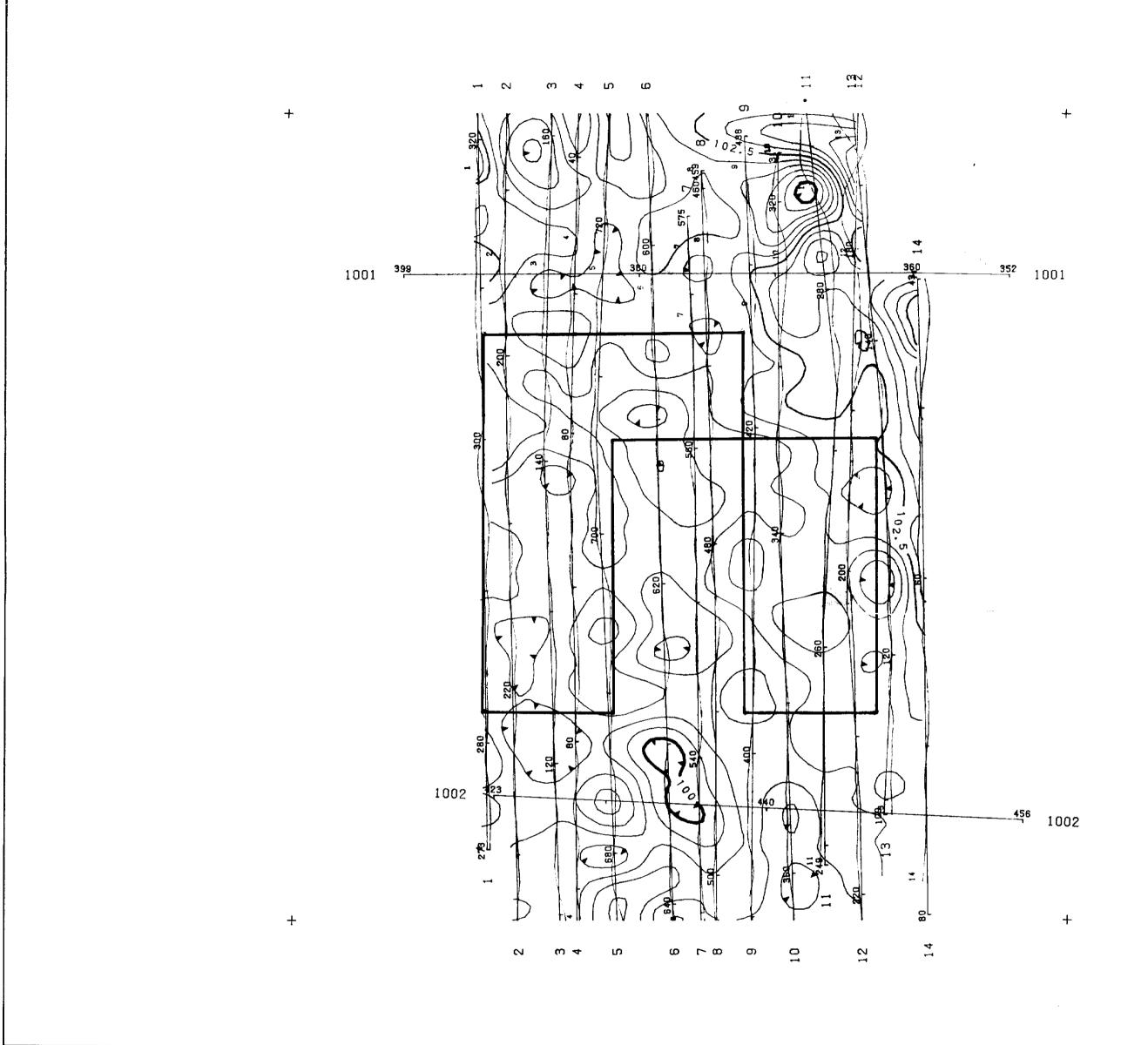
N ! 5 NO.

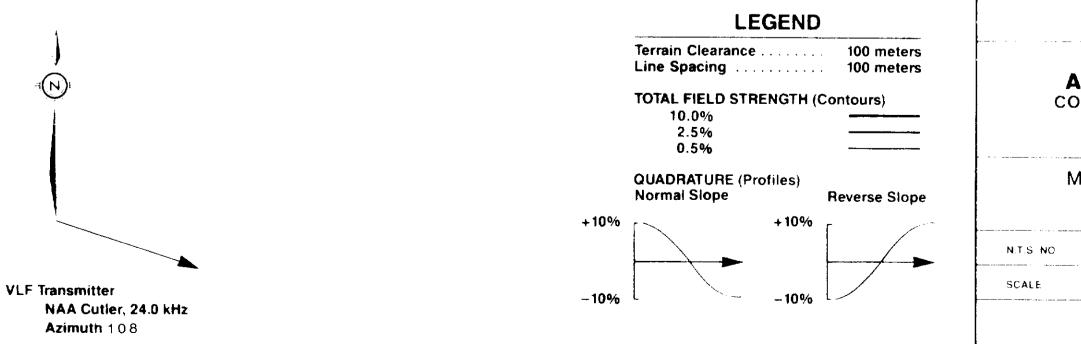
42A/11

DRAWING NO. A-739,3~2 SCALE 1:10,000 February 1988

TERRAQUEST LTD.
IORONTO, CANADA







MR. A. J. SALO

AIRBORNE VLF-EM SURVEY

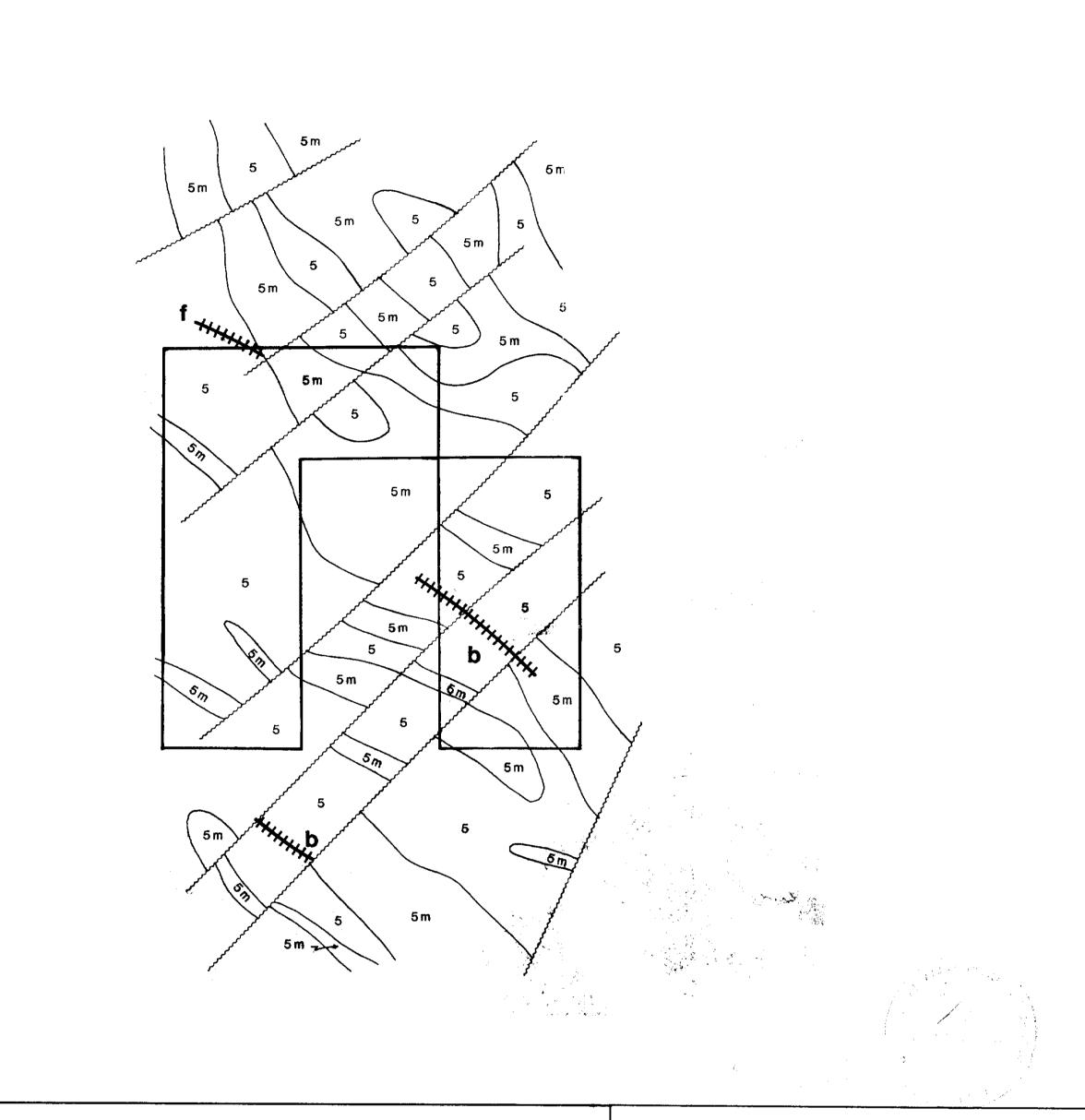
CONTOURS OF TOTAL FIELD STRENGTH PROFILES OF QUADRATURE

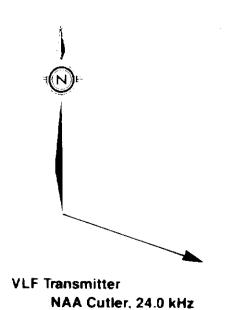
MATHESON, EVELYN TOWNSHIPS ONTARIO

N.T.S NO	42A/11	DRAWING NO A-739.3-3
SCALE	1:10,000	DATE February 1988
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TERRAQUEST LID. * 1 TORONTO CANADA







LITHOLOGY

5m Magnetic Unit Within 5

5 (

Greywacke

LEGEND

Terrain Clearance 100 meters Line Spacing 100 meters

INTERPRETATION

Contact Fault

Property Boundary

VLF-EM Conductor Axes

**

normal quadrature reverse quadrature total field only

See text for classification of VLF-EM conductor axes

MR. A. J. SALO

INTERPRETATION

MATHESON, EVELYN TOWNSHIPS ONTARIO

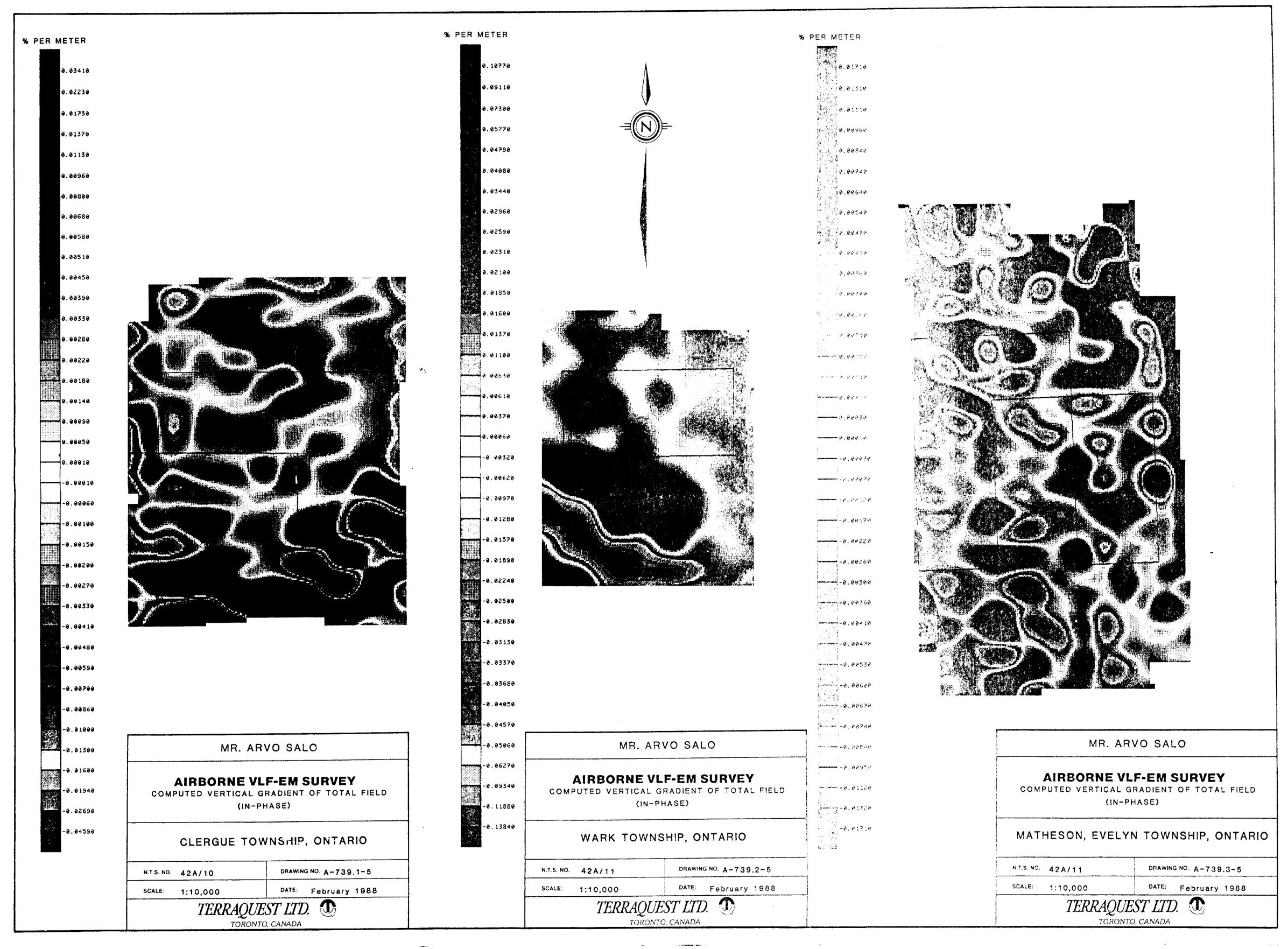
N.T.S. NO. 42A/11 DRAWING NO. A-739.3-4

SCALE: 1:10,000 DATE: February 1988

TERRAQUEST LTD. TO TORONTO, CANADA



Azimuth 108





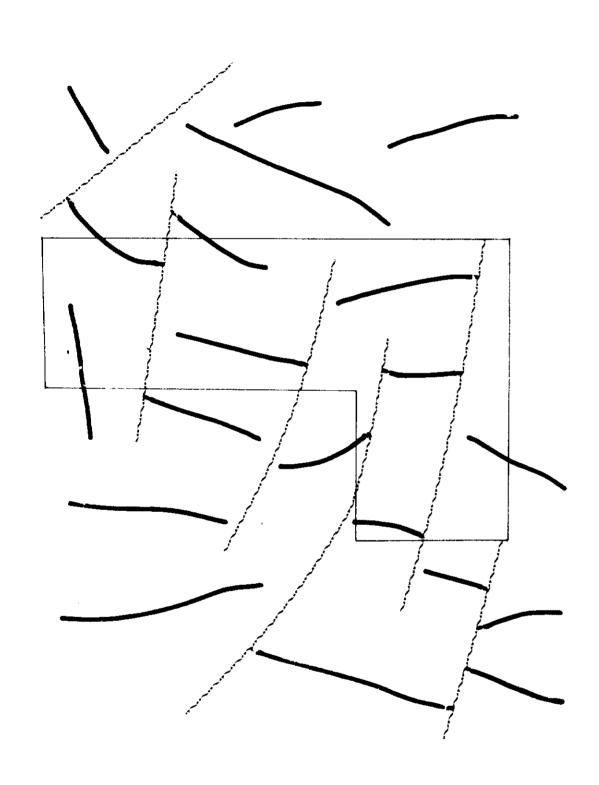
LEGEND

Terrain Clearance 100 meters Line Spacing 100 meters

INTERPRETATION

ENHANCED CONDUCTOR AXIS

FAULTS INTERPRETED FROM DISPLACEMENTS AND TRUNCATION OF CONDUCTOR AXIS



MR. ARVO SALO

AIRBORNE VLF-EM SURVEY COMPUTED VERTICAL GRADIENT OF TOTAL FIELD

INTERPRETATION

CLERGUE TOWNSHIP, ONTARIO

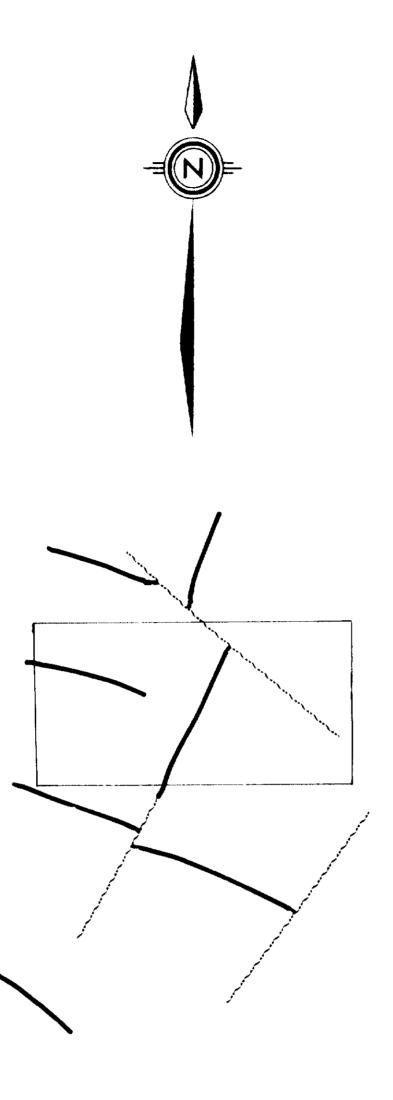
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DRAWING NO. A-739.1-5

0,000

DATE: February 1988

TERRAQUEST LTD. TORONTO, CANADA



MR. ARVO SALO

AIRBORNE VLF-EM SURVEY COMPUTED VERTICAL GRADIENT OF TOTAL FIELD

INTERPRETATION

WARK TOWNSHIP, ONTARIO

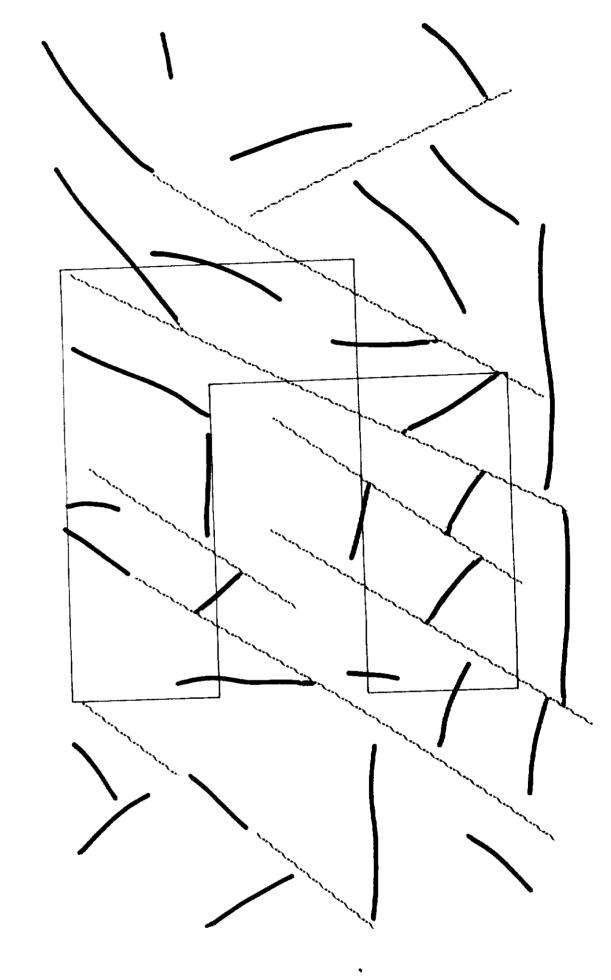
N.T.S. NO. 42A/11

DRAWING NO. A-739.2-5

SCALE: 1:10,000

DATE: February 1988

TERRAQUEST LTD. TORONTO, CANADA



MR. ARVO SALO

AIRBORNE VLF-EM SURVEY COMPUTED VERTICAL GRADIENT OF TOTAL FIELD

INTERPRETATION

MATHESON, EVELYN TOWNSHIP, ONTARIO

N.T.S. NO. 42A/11

SCALE: 1:10,000

DRAWING NO. A-739.3-5

DATE: February 1988 TERRAQUEST LTD. TORONTO, CANADA





2A11NE8828 2.10908 CLERGUE

010

REPORT ON AN

AIRBORNE MAGNETIC AND VLF-EM SURVEY

CLERGUE TOWNSHIP
WARK TOWNSHIP
MATHESON AND EVELYN TOWNSHIPS

PORCUPINE MINING DIVISION, ONTARIO

2.10908

for

MR. A.J. SALO

by

RECEIVED

MAR 1 1 1988

TERRAQUEST LTD. Toronto, Canada

MINING LANDS SECTION

February 24, 1988

A-739

RECEIVED

1988

MINING LANDS SECTION

REPORT ON AN

AIRBORNE MAGNETIC AND VLF-EM SURVEY

CLERGUE TOWNSHIP
WARK TOWNSHIP
MATHESON AND EVELYN TOWNSHIPS

PORCUPINE MINING DIVISION, ONTARIO

for

MR. A.J. SALO

by

TERRAQUEST LTD. Toronto, Canada

February 24, 1988



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	4.1 Instruments 4.2 Lines and Data 4.3 Tolerances 4.4 Photomosaics	3 4 4 4
5.	DATA PROCESSING	5
6.	INTERPRETATION	6
	6.1 General Approach 6.2 Interpretation	6
7.	SUMMARY	9

LIST OF FIGURES

Figure 1 - General Location Map

Figure 2 - Survey Area Map

Figure 3 - Sample Record

Figure 4 - Terraquest Classification of VLF-EM Conductor Axes

LIST OF MAPS IN JACKET

No. A-739-1, Total Magnetic Field

No. A-739-2, Vertical Magnetic Gradient

No. A-739-3, VLF-EM Survey

No. A-739-4, Interpretation

Note: There are three survey areas, therefore there are three of the above listed maps.

1. INTRODUCTION

This report describes the specifications and results of a geophysical survey carried out for Mr. A.J. Salo of General Delivery, Prince George, B.C., V2L 4R8 by Terraquest Ltd., 240 Adelaide Street West, Toronto, Canada. The field work was performed on February 2, 1988 and the data processing, interpretation and reporting from February 3 to February 24, 1988.

The purpose of a survey of this type is two-fold. One is to prospect directly for anomalously conductive and magnetic areas in the earth's crust which may be caused by, or at least related to, mineral deposits. A second is to use the magnetic and conductivity patterns derived from the survey results to assist in mapping geology, and to indicate the presence of faults, shear zones, folding, alteration zones and other structures potentially favourable to the presence of gold and base-metal concentration. To achieve this purpose the survey area was systematically traversed by an aircraft carrying geophysical instruments along parallel flight lines spaced at even intervals, 100 metres above the terrain surface, and aligned so as to intersect the regional geology in a way to provide the optimum contour patterns of geophysical data.

2. THE PROPERTIES

CLERGUE TOWNSHIP

The property is located in the southwest corner of Clergue township, in the Porcupine Mining Division of Ontario about 44 kilometres northeast of the town of Timmins. The property can be accessed by bush roads to the west leading from Highway 67.

The latitude and longitude are 48 degrees 38 minutes, and 80 degrees 48 minutes respectively, and the N.T.S. reference is 42A/10.

The claim numbers are shown in figure 2 and listed below:

P.1013956-1013959 (4).

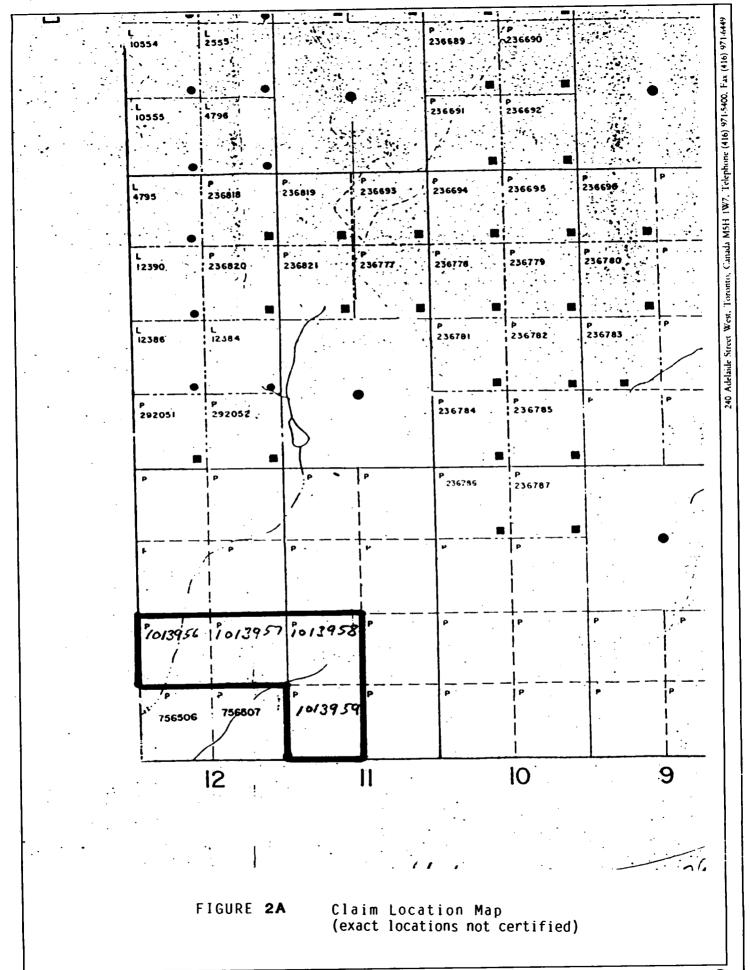
(4) Total of 4 claims

WARK TOWNSHIP PROPERTY

The property is located in the southeast quadrant of Wark township in the Porcupine Mining Division of Ontario about 18 kilometres northeast of the town of Timmins. The property lies on the southwest side of the North Porcupine River and can be accessed by bush roads from the southwest which connect to Highway 655.

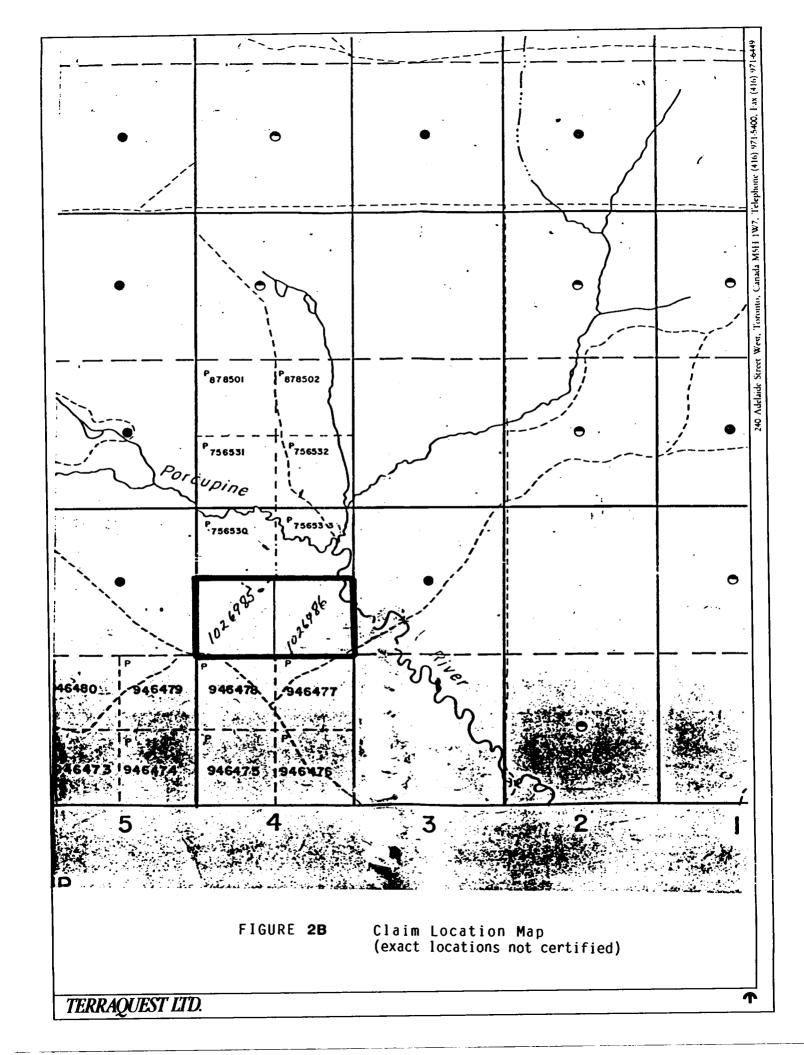
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FIGURE 1. General Location



TERRAQUEST LTD.

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The latitude and longitude are 48 degrees 38 minutes, and 81 degrees 15 minutes respectively, and the N.T.S. reference is 42A/11.

The claim numbers are shown in figure 2 and listed below:

P.1026985-1026986

(2) Total of 2 claims

MATHESON AND EVELYN TOWNSHIPS PROPERTY

This property is located in the north centre of Matheson township and the south centre of Evelyn township in the Porcupine Mining Division of Ontario about 28 kilometres northeast of the town of Timmins. The property is approximately one half a kilometre west of a major road which connects to Highway 610 at the settlement of Dugwal.

The latitue and longitude are 48 degrees 38 minutes, and 81 degrees 02 minutes respectively, and the N.T.S. reference is 42A/ll.

The claim numbers are shown in figure 2 and listed below:

P	59050	(1)
-	595101	(1)
	997231-997232	(2)
	997415-997416	(2) Total of 6 claims

3. GEOLOGY

Map References

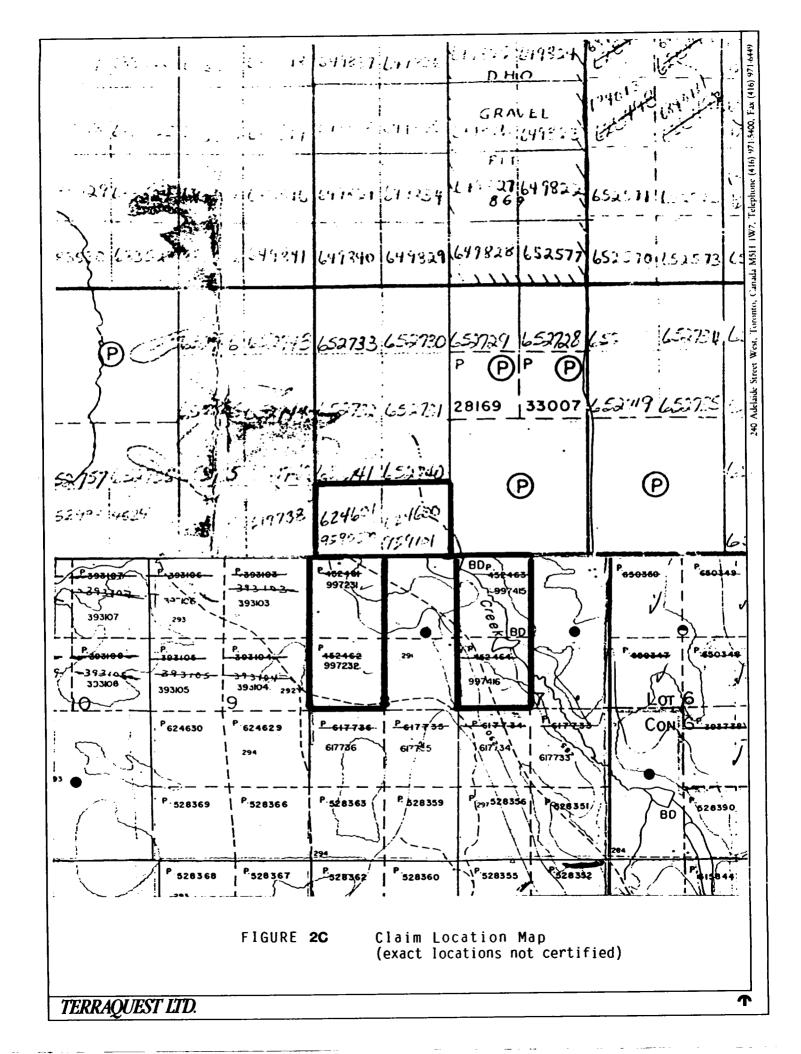
- 1. Map 48N: Big Water Lake Area. scale 1:63,360. O.D.M. 1939.
- 2. Map P.308: Clergue Township. scale 1:15,840. O.D.M. 1965.
- 3. Map 2205: Timmins-Kirkland Lake, Geological Compilation Series. scale 1:253,440. O.D.M. 1973.

CLERGUE TOWNSHIP PROPERTY (A-739.1)

No outcrops have been mapped within the survey area. By extrapolation from drilled hole data to the northeast the area is thought to be underlain by andesitic and rhyolitic metavolcanics trending to the northeast. A peridotite-pyroxenite mafic intrusive occurs to the northwest and hosts asbestos mineralization. Regionally faults trend to the east, northeast and north-northwest.

WARK TOWNSHIP PROPERTY (A-739.2)

The geological maps do not show any outcrops within the survey area. Regional mapping suggests that the property is underlain predominantly by northeast trending greywacke and minor rhyolite.



Gabbroic intrusives are common throughout the area. Regional structures trend to the northeast, north-northeast and northwest. Diabase dykes trend to the north-northwest.

MATHESON AND EVELYN TOWNSHIPS PROPERTY (A-739.3)

There are no outcrops indicated on the geological maps within this survey area. Regional geology indicates east trending greywackes and slate. The property lies on the centre of an east trending syncline. Locally faults trend to the northwest and diabase dykes trend to the north.

4. SURVEY SPECIFICATIONS

4.1 Instruments

The survey was carried out using a Cessna 182 aircraft, registration C-FAKK, which carries a magnetometer and a VLF electromagnetic detector.

The magnetometer is a proton precession type based on the Overhauser effect. The Overhauser effect allows for polarization of a proton rich liquid of the sensor by adding a "free radical" to it and irradiating it by RF magnetic field. Strong precession signals are generated with modest RF power. The sensor element is mounted in an extension of the right wing tip. It's specifications are as follows:

Resolution: 0.5 gamma
Accuracy: 0.5 gamma
Cycle time: 0.5 second

Range: 20,000 - 100,000 gammas in 23 overlapping steps

Gradient tolerance: Up to 5000 gammas per metre

Model: GSM-9BA

Manufacturer: GEM Systems Inc., 105 Scarsdale Rd.,

Don Mills, Ontario, M3B 2R5

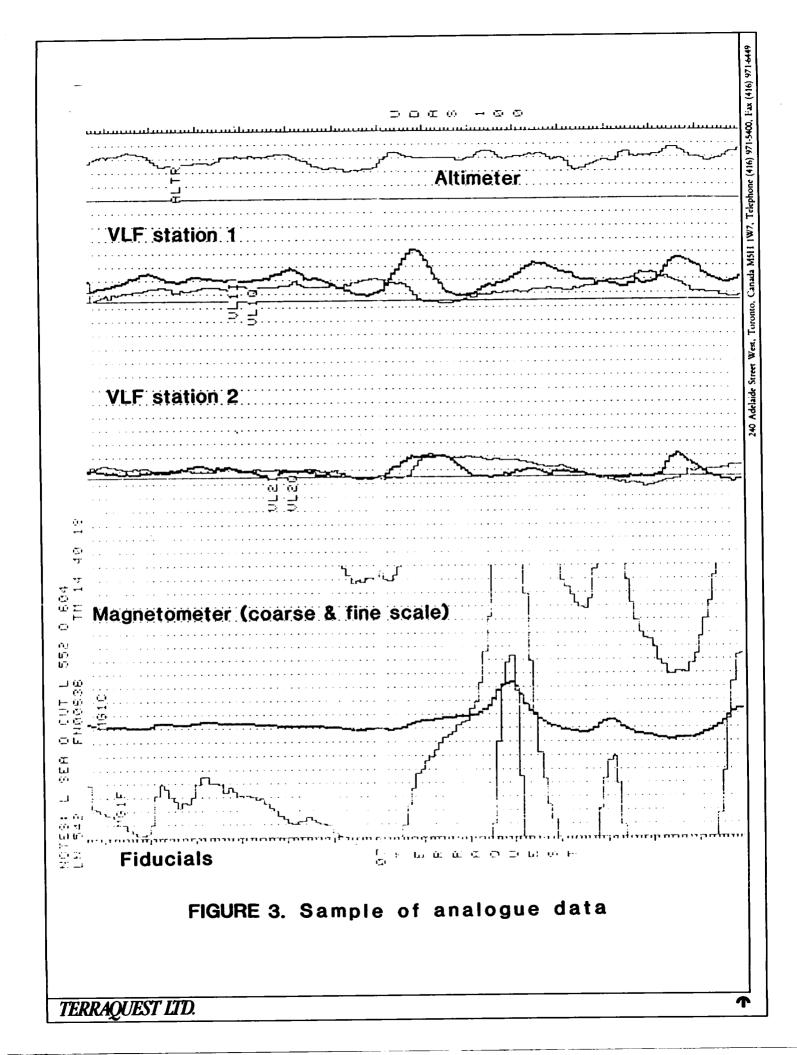
The VLF-EM unit uses three orthoganol detector coils to measure (a) the total field strength of the time-varying EM field and (b) the phase relationship between the vertical coil and both the "along line" coil (LINE) and the "cross-line" coil (ORTHO). The LINE coil is tuned to a transmitter station that 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: 1/2 second Model: TOTEM 2A

Manufacturer: Herz Industries, Toronto

The VLF sensor is mounted in the left wing tip extension.



Other instruments are:

- . King KRA-10A radar altimeter
- . PDAS-1100 data acquisition system with two 3.5" floppy disk drives manufactured by Picodas Group Inc., Richmond Hill, Ontario.
- . Geocam video camera and recorder for flight path recovery, manufactured by Geotech Ltd., Markham, Ontario.
- . PBAS-9000 portable field base station with a 3.5" floppy disk drive and an analog print out manufactured by Picodas Group Inc., Richmond Hill, Ontario, coupled with a GSM-8 proton magnetometer manufactured by Gem Systems Inc., Toronto, Ontario.

4.2 Lines and Data

a)	Line spacing:	100	metres
b)	Line direction:	000	degrees
c)	Terrain clearance:	100	metres
d)	Average ground speed:	156	km/hr.

e) Data point interval:

Magnetic: 27 metres VLF-EM: 27 metres

f) Tie Line interval: 2 kilometres

g) Channel 1 (LINE): NAA Cutler, 24.0 kHz h) Channel 2 (ORTHO): NSS Annapolis. 21.4 kHz

i) Line km over total survey area including overrun: 40 line km

j) Line km over claim groups: Clergue Township Property... 8 line km Wark Township Property.... 4 line km Matheson, Evelyn Property...12 line km

4.3 Tolerances

- a) 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.
- b) Terrain clearance: Portions of line which were flown above 125 metres for more than one km were reflown if safety considerations were acceptable.
- c) Diurnal magnetic variation: Less than twenty gammas deviation from a smooth background over a period of two minutes or less as seen on the base station analogue record.
- d) Manoeuvre noise: Approximately +/-5 gammas.

4.4 Photomosaics

For navigating the aircraft and recovering the flight path, mosaics of aerial photographs were made from existing air photos.

5. DATA PROCESSING

Flight path recovery was carried out in the field using a video tape viewer to observe the flight path as 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.

The magnetic data was levelled in the standard manner by tying survey lines to the tie 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 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 dataprocessing calculations and map contouring were carried out by Dataplotting Services Inc. of Toronto.

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

INTERPRETATION

6.1 General Approach

To satisfy the purpose of the survey as stated in the introduction, the interpretation procedure was carried out on both the magnetic and VLF data. On a local scale the magnetic gradient contour patterns were used to outline geological units which have different magnetic intensity and patterns or "signatures". Where possible these are related to existing geology to provide a geological identity to the units. On a regional scale the total field contour patterns were used in the same way.

Faults and shear zones are interpreted mainly from lateral displacements of otherwise linear magnetic anomalies but also from long narrow "lows". The direction of regional faulting in the general area is taken into account when selecting faults. Folding is usually seen as curved regional patterns. Alteration zones can show up as anomalously quiet areas, often adjacent to strong, circular anomalies that represent intrusives. Magnetic anomalies that are caused by iron deposits of ore quality are usually obvious owing to their high amplitude, often in tens of thousands of gammas.

VLF anomalies are categorized according to whether the phase response is normal, reverse, or no phase at all. The significance of the differing phase responses is not completely understood although in general reverse phase indicates either overburden as the source or a conductor with considerable depth extent, or both. Normal phase response is theoretically caused by surface conductors with limited depth extent.

Areas showing a smooth response somewhat above background (ie. 110 or so) are likely caused by overburden which is thick enough and conductive enough to saturate at these frequencies. In this case no response from bedrock is seen.

The VLF-EM conductor axes have been identified and evaluated according to the Terraquest classification system (Figure 4). This system correlates the nature and orientation of the conductor axes with stratigraphic, structural and topographic features to obtain an association from which one or more origins may be selected. Alternate associations are indicated in parentheses.

6.2 Interpretation

The magnetic and VLF-EM data are shown in contoured format on maps in the back pocket. An interpretation map is also provided. The following notes are intended to supplement these maps.

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TERRAQUEST CLASSIFICATION OF VLF-EM CONDUCTOR AXES

FIGURE 4 CLASSIFICATION OF VLF-EM CONDUCTOR AXES	ASSOCIATION: Possible Origins	Bedrock magnetic horizons: stratabound mineralogic origin or shear zone	Bedrock non-magnetic horizons: stratabound mineralogic origin or shear zone	Association not known: possible small scale stratabound mineralogic origin, fault or she zone, overburden	Dyke or possible fault: mineralogic or electrolytic	Fault zone: mineralogic or electrolytic	Most likely overburden: clayey sediments, swampy mud	Electrical, pipe or railway lines	
FIGURE 4 TERRAQUEST CLASSIFICATION 0	CORRELATION	Coincident with magnetic stratigraphy	Parallel to magnetic stratigraphy	No correlation with magnetic stratigraphy	Coincident with magnetic dyke	Coincident with topographic lineament or parallel to fault system	Contours of total field response conform to topographic depression	Coincident with cultural sources	
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NOTES

- 1 Upper case symbols denote a relatively strong total field strength
 - 2 Underlined symbols denote a relatively strong quadrature response
- 3 Mineralogic origins include sulphides, graphite, and in fault zones, gouge
- Electrolytic origins imply conductivity related to porosity or high moisture content

CLERGUE TOWNSHIP PROPERTY (A-739.1)

The total magnetic field over the Clergue township property has a relief of approximately 1,125 gammas and shows a strong magnetic anomaly trending to the northeast in the northwest corner of the survey area. This anomaly appears to dominate and overwhelm the responses from the rest of the survey area. The vertical magnetic gradient improves the resolution of the strong anomaly and enhances a weak magnetic trend to the south.

The strong anomalies to the northwest correlate well with the peridotite-pyroxenite intrusives (Unit 6). The remaining responses are interpreted to be derived from the andesitic and rhyolitic rocks (Unit 2). Horizons with a slight increase in magnetic activity (Unit 2m) are probably related to the andesitic or more mafic compositions.

Several northwest trending faults have been interpreted from displacements in the magnetic data. These possess the same orientation as a geologically mapped fault approximately two kilometres to the east of the survey area.

The VLF-EM survey shows very flat and uniform responses, probably a function of masking or saturation by wide spread conductive overburden. Three very weak to moderate strength conductor axes have been identified, all of them are associated with magnetically interpreted faults.

WARK TOWNSHIP PROPERTY (A-739.2)

The total magnetic field has a relief of approximately 40 gammas and shows a magnetic anomaly along the western edge of the survey and several weak anomalies trending to the northwest across the centre of the property. The vertical magnetic gradient data show greater continuity within the weaker magnetic anomalies.

The strongest anomaly to the west which is only approximately 30 gammas in relief, is interpreted to be derived from the rhyolitic metavolcanics (Unit 2). The quiet magnetic background is associated with the greywacke (Unit 5). The weak northwest trending anomalies cross-cut the regional trend and therefore are interpreted as diabase dykes (Unit 11).

Several northeast trending faults have been interpreted from disruptions in the east magnetic trends. Any faults trending to the northwest would be difficult to detect as they would parallel the diabasic magnetic units.

The VLF-EM survey shows relatively flat and uniform responses, probably due to masking by conductive overburden. One moderately strong conductor axis south of the property trends to the northwest and is interpreted to be associated with structural sources.

MATHESON AND EVELYN TOWNSHIPS PROPERTY (A-739.3)

The total magnetic field has a relief of approximately 37 gammas, the higher responses are located to the north and south of the property. Very weak magnetic units trend to the northwest across the property. The vertical magnetic gradient data shows improved resolution of all the anomalies.

The low magnetic relief across the survey area is consistent with the regionally mapped greywacke (Unit 5). The weak magnetic trends (Unit 5m) are probably related to minor metavolcanic intercalations or possibly to increased concentrations of magnetic minerals such as pyrrhotite or magnetite.

Numerous northeast trending faults have been interpreted from the magnetic data, showing considerable displacement. Northwest trending faults would be difficult to detect by magnetic techniques.

The VLF-EM survey shows very weak and flat responses, probably related to extensive conductive overburden. There are no significant conductor axes indicated by this survey. Three very weak and poorly defined conductor axes are shown tentatively on the interpretation map. They may be associated either with structural or stratigraphic origins. These should be verified on the ground using EM or IP methods.

7. SUMMARY

An airborne combined magnetic and VLF-EM survey has been done on the property at line intervals of 100 metres. The total field and vertical gradient magnetic data, VLF-EM data and interpretation maps are produced at a scale of 1:10,000.

The magnetic data has been used to modify and update the existing geology and has shown a number of new contacts and faults. A number of VLF-EM conductor axes were found of which most are associated with structural origins.

CHAPLES O. ?

TERRAQUEST LTD.

Charles Q. Barrie, M.Sc

Geologist

For &

AN ADDENDUM TO REPORT A-739 AIRBORNE VLF/EM SURVEY

COMPUTED VERTICAL GRADIENT OF TOTAL FIELD (IN-PHASE)

CLERGUE TOWNSHIP, WARK TOWNSHIP, MATHESON AND EVELYN TOWNSHIP

PORCUPINE MINING DIVISION, ONTARIO

RECEIVED

JUN 1988

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for

MR. A.J. SALO

by

TERRAQUEST LTD. Toronto, Canada

March 28, 1988

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A-739.2-5	Colour Plot of Computed Vertical Gradient of Total Field, Wark Township
A-739.3-5	Colour Plot of Computed Vertical Gradient of Total Field, Matheson/Evelyn Townships
A-739.1-6	Interpretation of Enhanced VLF/EM Data, Clergue Township
A-739.2-6	Interpretation of Enhanced VLF/EM Data, Wark Township
A-739.3-6	Interpretation of Enhanced VLF/EM Data, Matheson and Evelyn Townships

INTRODUCTION

INTERPRETATION

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2.

INTRODUCTION

The calculated vertical gradient of the total field VLF/EM data is an innovative application and is created by applying the same process as is used on the magnetic data. The calculation removes broad regional anomalies and leaves the short wavelength part of anomalies. Some advantages of treating the data this way are:

- 1) Improved resolution between strong conductors that on the unprocessed VLF/EM data appear as a large conductive area.
- 2) Enhancement of subtle conductor axes, revealing conductors that were too weak to be seen on the unprocessed data.
- 3) Reduces the necessity of the VLF/EM conductor to have optimum coupling with the transmitter.
- 4) The increase in the number of conductors improves the detection of faults and other displacement "structures".

The enhanced data is shown on colour plots, one for each property. An interpretation of each area is provided on drafting mylar and can be superimposed on the interpretation maps from the original report (A-739).

INTERPRETATION

In general, the vertical gradient enhancement of the VLF over all three properties shows a considerable increase in the number of conductor axes. It should be noted that the unprocessed VLF/EM data maps show very little relief in conductivity and therefore it is difficult to ascertain whether the enhancements are a mathematical artifact or a bonafide enhancement of weak conductors within the bedrock or overburden. Furthermore, the interpretation maps are highly subjective, several variations are possible.

The data over the Clergue Township property shows numerous southeast trending conductor axes, parallel to the magnetically interpreted faults. Displacement of these trends suggests the presence of several north to northeast trending faults.

The enhancement of the VLF/EM data from Wark Township property shows several southeast trending faults. These are parallel to both the magnetic units and the topographic features. It is suspected that they are related to structural sources. Several northeast trending structures have also been interpreted.

The calculated vertical gradient of the total field VLF from the Matheson and Evelyn Townships property shows numerous conductor axes with a wide variety of orientations. Note that the original unprocessed VLF data map shows very weak responses that do not correlate very well with the magnetic data. It is suspected that most of these responses are related to a combination of overburden and bedrock sources and hence are very difficult to interpret. Most of the responses are so short that it is difficult to obtain a definitive orientation. This interpretation shows a variety of orientations with numerous faults trending to the northwest.

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For each additional survey: * using the same grid:	- Radiometric		* * * * * * * * * * * * * * * * * * * *			<u> </u>	 -	-
Enter 20 days (for each)	Geological							
į į	Geochemical							
Man Days	Geophysical	Days per Claim						
Complete revelope and enter total(s) here	VElectromagnetic							
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Instructions Total Days Credits may be apportioned at the claim holder's						claims cover report of wo		
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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 con-

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or witnessed same during angior after its completion and the annexed report is true.

Lime and Postal Address of Person Certifying

claims covered by this report of work. Total Days Credits may be apportioned at the claim holder's For Office Use Only choice. Enter number of days credits per claim selected Total Days Cr. Date Recorded in columns at right. Recorded Date_ ocor (Signajure -EB Certification Verifying Report of Work I bereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the sooi or systnessed same during ang/or after its completion and the annexed report is true. tame and Postal Address of Person Certifying RARDIE . - (