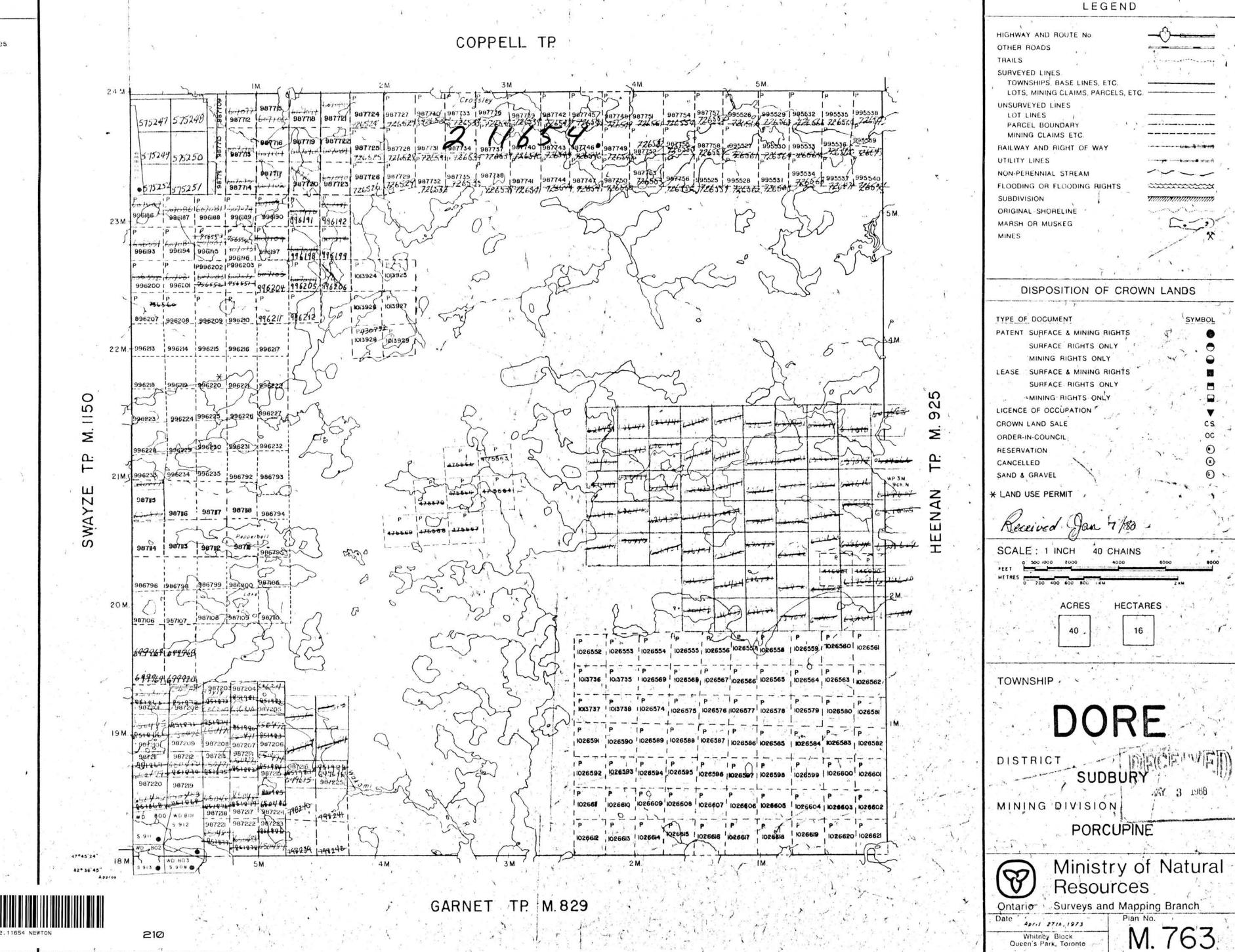
NOTES

400' surface rights reservation along the shores of all lakes and rivers.





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A-784

REPORT ON AN

DORE AND HEENAN TOWNSHIPS

PORCUPINE MINING DIVISION, ONTARIO

for

MR. A. HOPKINS

by: **TERRAQUEST LTD.** Toronto, Canada September 21, 1988

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TABLE OF CONTENTS

P	a	g	e
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1.	INTRODUCTION	1
2.	THE PROPERTY	1
3.	GEOLOGY	1
4.	SURVEY SPECIFICATIONS	1
	4.1 Instruments	1
	4.2 Lines and Data	. 2
	4.3 Tolerances	2
	4.4 Photomosaics	2
5.	DATA PROCESSING	2
6.	INTERPRETATION	3
	6.1 General Approach	3
	6.2 Interpretation	3
7.	SUMMARY	4

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-784-1 ~ Total Magnetic Field No. A-784-2~ Vertical Magnetic Gradient No. A-784-3 ~ VLF-EM Survey No. A-784-4 ~ Interpretation Ø10C

. Introduction

This report describes the specifications and results of a geophysical survey carried out for Mr. A. Hopkins of 810 Duplex Ave., Toronto, Ontario, M4R 1W7 by Terraquest Ltd., 240 Adelaide Street West, Toronto, Canada. The field work was performed from June 30 to July 2, 1988 and the data processing, interpretation and reporting from July 3 to September 21, 1988.

The purpose of a survey of this type is two-fold. First 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 Property

The property is located along the northern edges of Dore and Heenan townships, in the Porcupine Mining Division of Ontario about 110 kilometres southwest of the town of Timmins and 60 kilometres east of the town of Chapleau. The survey area is made up of a three-claim-deep block that stretches across most of Dore and half of Heenan townships and can be accessed by bush roads from the west.

The average latitude and longitude are 47 degrees 50 minutes, and 82 degrees 30 minutes respectively, and the N.T.S. reference are 410/15 and /16.

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

Dore Township (Report of Work W8806-50049)

Р	987709-987758 ³	(50)
	995525-995540 √	(16)

Heenan Township

(Report of Work W8808-50048)

P 995541-995582 (42) Total of 108 claims

3. Geology

Map References

1.	Map 43B:	Swayze Gold Area Scale 1:63,360 O.D.M. 1934.
2.	Map 2067:	Heenan, Marianne & Northern Part of Genoa Townships Scale 1:31,680 O.D.M. 1965.
3.	Map 2070:	Swayze and Dore Townships Scale 1:31,680 O.D.M. 1965.
4.	Map 2352:	Chapleau Scale 1:250,000 O.D.M. 1976.

The survey area is underlain by a belt of east to northeast trending metavolcanics. Mafic metavolcanics ranging from pillowed basalts to massive dioritic and gabbroic rocks occupy the eastern half of the survey area. Felsic metavolcanics, minor clastic metasediments and rare diorite occupy the western half of the survey area. A wedge of mafic metavolcanics crosses the western boundary and hosts several important gold showings to the west. Several regional faults trend to the northwest.

4. Survey Specifications

4.1 Instruments

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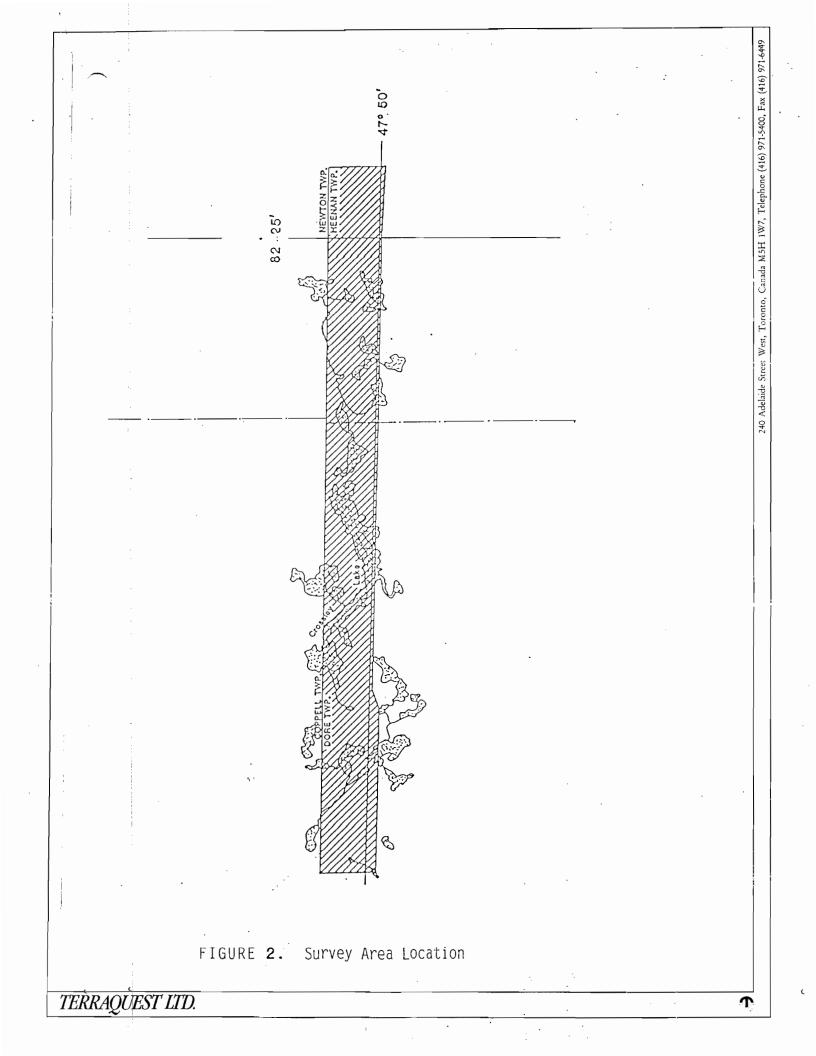
The survey was carried out using a Cessna 206 aircraft, registration C-GGLS, which carries a magnetometer and a VLF electromagnetic detector.

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

Working range:	20,000-100,000 gammas
Sensitivity:	0.001 gammas
Sampling rate:	0.2 seconds
Model:	BIW 2321H8
Manufacturer:	Scintrex, Concord Ontario.

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

The signal to noise ratio of the magnetic response is improved by a real time compensation technique provided by Picodas Limited. The sources of compensated noise are permanent, induced and petty current effects of the airframe and the heading effects. The system uses three fluxgate magnetometers to measure the aircraft attitude with respect for the earth magnetic field vector. A mathematical model is used to solve this interference effect.

The VLF-EM unit 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: 1/2 second Model: TOTEM 2A Manufacturer: Herz Industries, Toronto, Canada

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

Other instruments are:

- King KRA-10A radar altimeter
- UDAS-100 data processor with Digidata nine track tape recorder, manufatured by Urtec Ltd., Markham, Ontario.
- Geocam video camera and recorder for flight path recovery, manufactured by Geotech Ltd., Markham, Ontario.

4.2 Lines and Data

Line spacing:	100 metres
Line direction:	360 degrees
Terrain clearance:	100 m
Average ground speed:	193 km/hr 🕠
Data point interval:	
Magnetic:	11 metres
VLF-EM:	11 metres

Tie Line interval: 2 km

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

Note: Cutler transmitter was not operational during the survey of Lines 127-142 inclusive, therefore responses from the Seattle transmitter were recorded.

Line km over total 280 line km survey area:

Line km over claim 216 line km groups:

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 km 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 Photomosaics

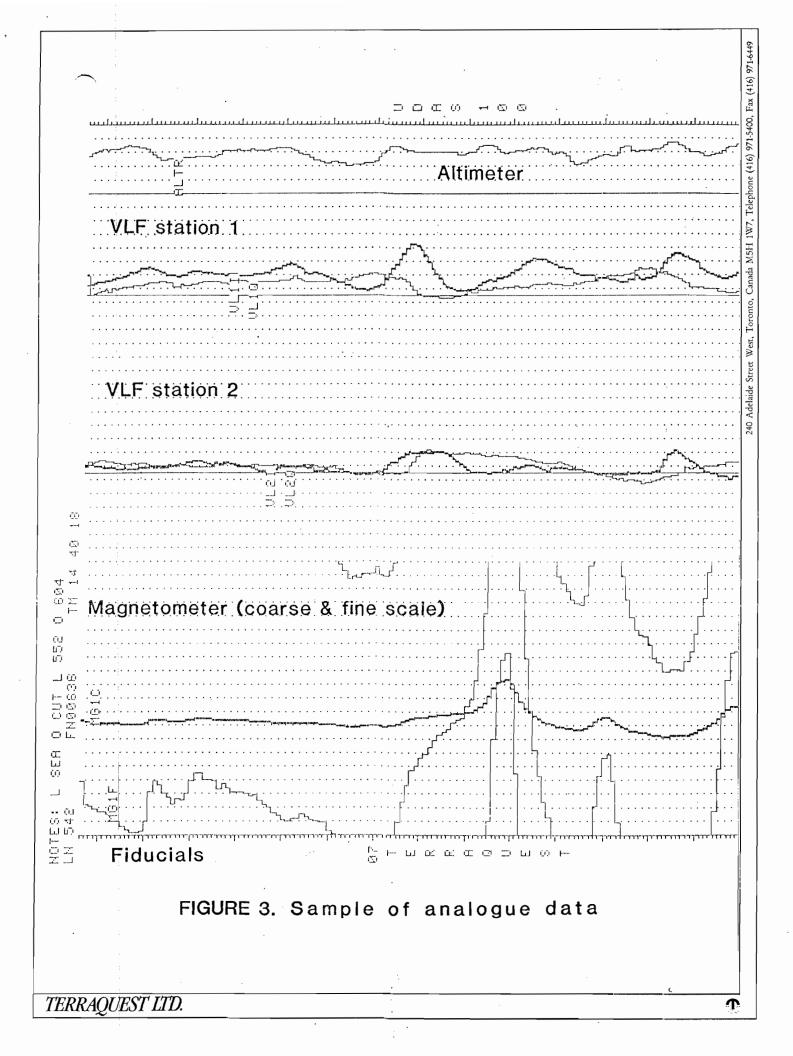
For navigating the aircraft and recovering the flight path, semi-controled mosaics of aerial photographs were made from existing air photos. Each photograph forming the mosaic was adjusted to conform to the NTS map system before the mosaic was assembled.

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.

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e 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.

6. 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. In some cases, a change in the orientation of the conductor appears to affect the sense of the phase response.

Areas showing a smooth VLF-EM 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 at a scale of 1:10,000 in the back pocket. An interpretation map is also provided. The following notes are intended to supplement these maps.

The total magnetic field has a relief of approximately 1,400 gammas; the strongest responses have been observed along the western and eastern sides. Most of the magnetic trends are consistent with the geological maps except for several narrow northwest trending magnetic anomalies in Dore township. The vertical magnetic gradient improves the resolution of the magnetic trends, particularly the more subtle magnetic responses, and has been used to delineate the stratigraphy and structure.

The mafic to intermediate metavolcanics correlate with weak to moderate magnetic responses (Unit 1) and very strong magnetic responses (Unit 1m). The strongest responses correlate with the wedge of an-

TER		FIGURE 4	
RAQU		TERRAQUEST CLASSIFICATION OF	
TERRAQUEST LTD	SYMBOL	CORRELATION	ASSOCIATION: Possible Origins
TD.	a , A	Coincident with magnetic stratigraphy	Bedrock magnetic horizons: stratabound mineralogic origin or shear zone
	b , B	Parallel to magnetic stratigraphy	Bedrock non-magnetic horizons: stratabound mineralogic origin or shear zone
	C , C	No correlation with magnetic stratigraphy	Association not known: possible small scale stratabound mineralogic origin, fault or shear zone, overburden
	d, D	Coincident with magnetic dyke	Dyke or possible fault: mineralogic or electrolytic
	f,F	Coincident with topographic lineament or parallel to fault system	Fault zone: mineralogic or electrolytic
	ob , OB	Contours of total field response conform to topographic depression	Most likely overburden: clayey sediments, swampy mud
	cul , CUL	Coincident with cultural sources	Electrical, pipe or railway lines
	NOTES		

- 1 Upper case symbols denote a relatively strong total field strength
- 2 Underlined symbols denote a relatively strong quadrature response

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- 3 Mineralogic origins include sulphides, graphite, and in fault zones, gouge
- 4 Electrolytic origins imply conductivity related to porosity or high moisture content

itic rocks that cross the western boundary. It is speculated that in this locality the strongest responses may be related to an increase in pyrrhotite or magnetite within specific metavolcanic horizons. Note that the closest gold showing does not appear to be related to the magnetic horizons, but rather is situated between to 1m units. The shaft located a little further to the west correlates well with the centre of the entire magnetic trend, but it is difficult to ascertain whether or not it is associated the magnetic rocks or to relatively non-magnetic rocks that have been overwhelmed and dominated by the entire magnetic trend. The detailed magnetic interpretation suggests that this metavolcanic trend extends at least 6 claims along the southern edge of the property. At this point the metavolcanics appear to curve to the northeast accompanied by a decrease in the total magnetic field, and eventually leave across the north central part of the property.

The mafic to intermediate metavolcanics on the east part of the property correlate with a wider range of magnetic values. This is probably a function of the composition of the metavolcanics, ranging from andesites and basalts through to massive gabbroic and dioritic metavolcanics. The diorite (Unit 6) on the western half of the survey area correlates with moderately strong magnetic responses.

The narrow northwest trending magnetic units are probably derived from diabase dykes (Unit 7). These units are parallel to cross-cutting structures.

Most of the magnetically interpreted faults trend to the northwest showing considerable displacement of the metavolcanic horizons and are parallel to the diabase dykes. Several northeast trending faults or shear zones are interpreted to cut the diabase dykes and may occur throughout the entire survey area. East-west trending structures would be difficult to identify as they would be parallel to the general magnetic trends.

The VLF-EM survey has identified numerous weak to very strong conductor axes, some displaying prominent quadrature profiles. Most of the lakes and rivers correlate with conductive zones suggesting that conductive overburden is confined to topographic depressions. Those conductor axes that cross magnetic stratigraphy and do not bear an obvious relationship with topography have been interpreted to be derived from structural sources, either faults or shear zones. This type of conductivity may be related to: (a) minerals such as sulphides, graphite or gouge along the structure, or (b) an ionic effect created by water or porosity within the structure or to conductive overburden along the top of the structure. Many of these corroborate the magnetically interpreted faults to the northwest and northeast while others suggest the possibility of regional east-west structures.

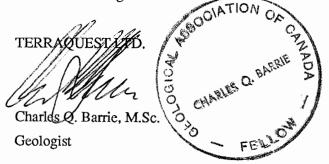
Those conductor axes that are parallel to or coincide with magnetic stratigraphy bear potential for bedrock stratabound origins such as graphite or sulphides. These should be followed up on the ground using EM or IP methods. Note that the conductor axes to the west associated with the mafic metavolcanics are characterized by very strong quadrature profiles which may be indicative of considerable depth extent.

7. Summary

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An airborne combined magnetic and VLF-EM survey has been carried out at 100 metre line intervals with data reading stations at 11 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 a number of new contacts and faults. The VLF-EM survey has identified numerous VLF-EM conductor axes that have been interpreted to be derived variously from overburden, structure and stratigraphic sources, the latter of which have been recommended for additional investigation.



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For first survey:	Geophysical	Ciaim	Prefix	Number	Expend. Days Cr.	Prefix Number	Expend, Days Cr.
Enter 40 days. (This	- Electromegnetic		PS	20835	mining	P 98772	5
includes line cutting)			57	52.47	*	993777	16
For each additional survey: using the same grid:			57	5249	*	9877	27
Enter 20 days (for each)	2 Stn 1988		<u>57</u>	5249	*	98777	28
. MANDIG	Geniogical		57	5250	*	98777	a
	Geochemical		57	5251	*	<u>9877</u>	30
Man Days		Claim	57	5252	*	9877:	31
	Electromagnetic		99	27709		9877	32
	• Megnetometer		99	010		98773	53
	- Radiometric		92	ורד		98773	54
JUL 1 1 1988	- Other		99	37712		9877	35
	Geplogical		96	37713		9977	36
	Geochemical		वर्	57714		9877	37
Airporne Credits		ays per Claim	বিধ	577155		9877	20
Note: Special provisions	Electromegnetic	10	9	37716		98773	59
credits do not apply to Airborne Surveys.	Megnezometer	$\overline{10}$	94			98770	40
	Radiometric		99	37718		98.776	11
Expenditures (excludes pow	er stripping)		99			99370	42
Type or work Performed	THIN HANGING DATE		99	37720		98770	4°5
Performed on Claim(s)	MEREIVIE	TIT.	90	27721		98:170	44
	The second	-U/ }		37722		98:274	15
Celculation of Expenditure Day	LIT		90	7723		98.774	16
Total Expenditures	Toti Days Cr		99	57724		98774	17
S		*	MAXIMUM	ALLOW	ABLE	SEE attacked St Total number of mining	<u>ee</u>
Instructions		1	CREDIT A	LREADY	obtainel	claims covered by this report of work.	12
Totel Days Credits may be sportioned at the claim holder's choice. Enter number of days credits per claim selected in columns at right.							
neorded July 1 188				Mining Recorder	HA		
Dates Turing 1983 Recorded Holder of Agent (Signature) 52				TH ADDTOTOT	a Recorded	Brench Director	
Certification Verliving Report of Work							
I hereby cartify 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.							
Russen Imple 240 ADELAKOE STW TOLOWTO M5411W7							
Kussen IMEIE			P	L Certified		Cartifictiby (Signature)	
1362 (85/12)			K	lucy 61	188	Kur/mu	

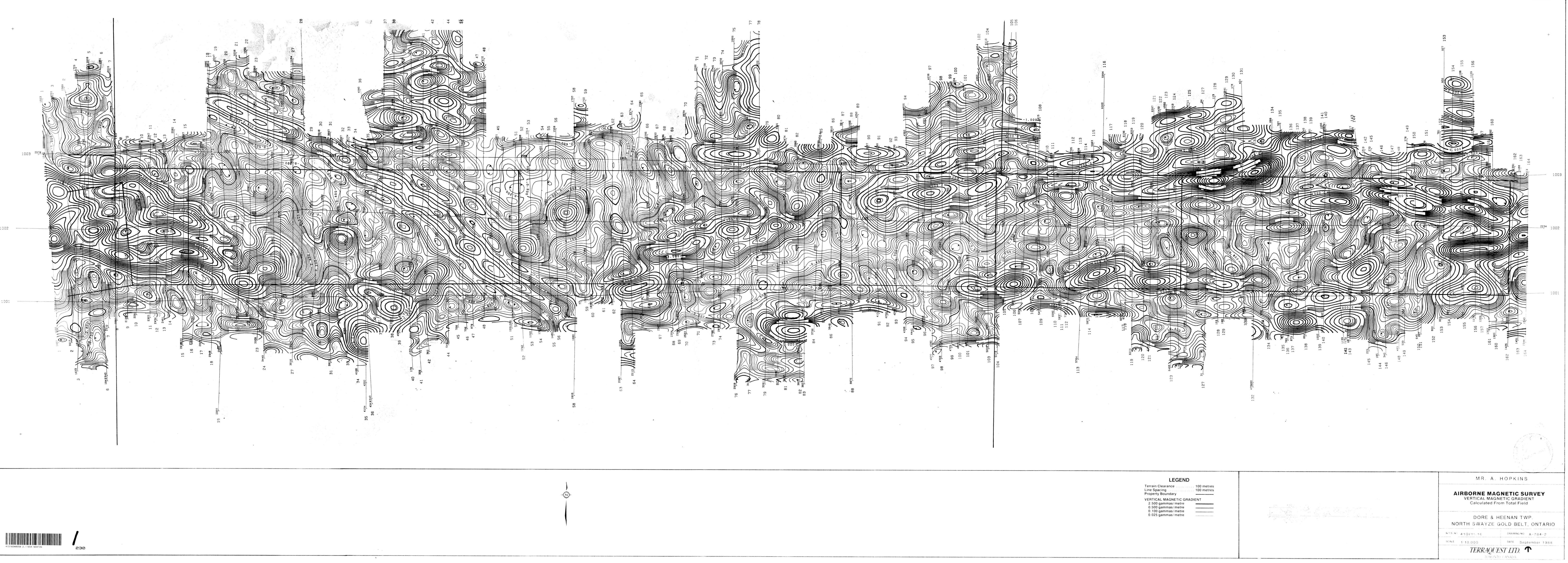
1300	(82/44)
1302	(85/12)

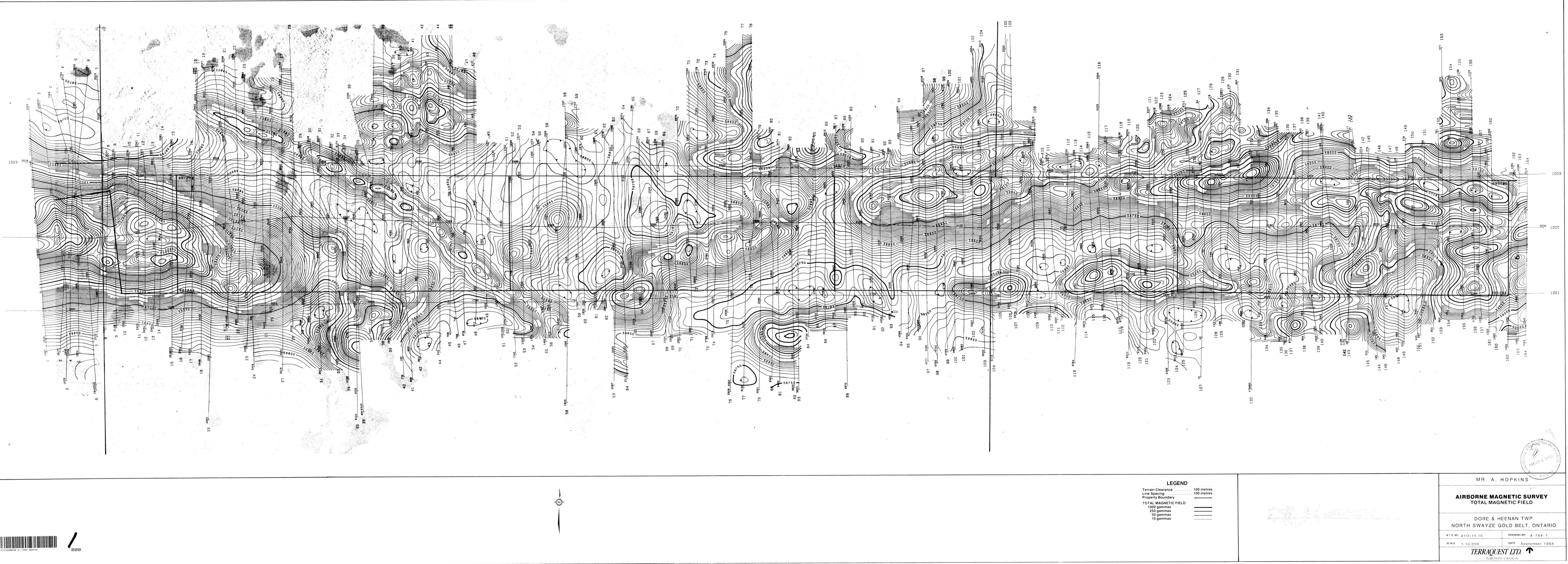
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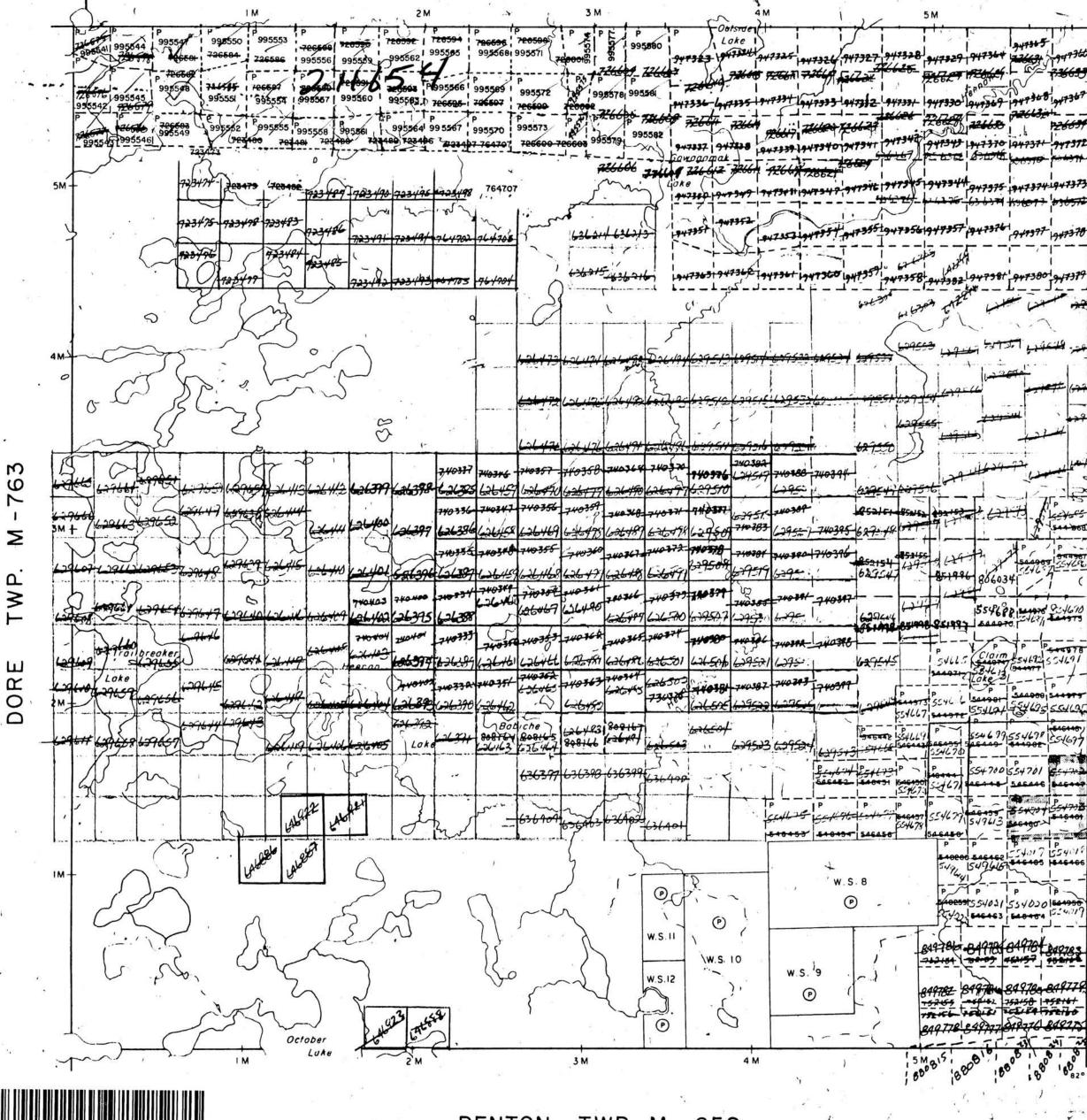
* XEROX TELECOPIER 495-1;29- 9-88;12:05PM 7052648723) ; SENT BY: MND&M M.R. -TIMMINS ; 9-29-88 12:07PM ; 7052648723→ 4169216926;# 3 987748 Q 987750 987750 987751 987752 987752 987753 ۹ 981755 987756 987756 987757 987757 987758 995525 P 995526 995528 995529 995530 995531 995532 995535 99535 995536 995538 995539 JUL 11 1000







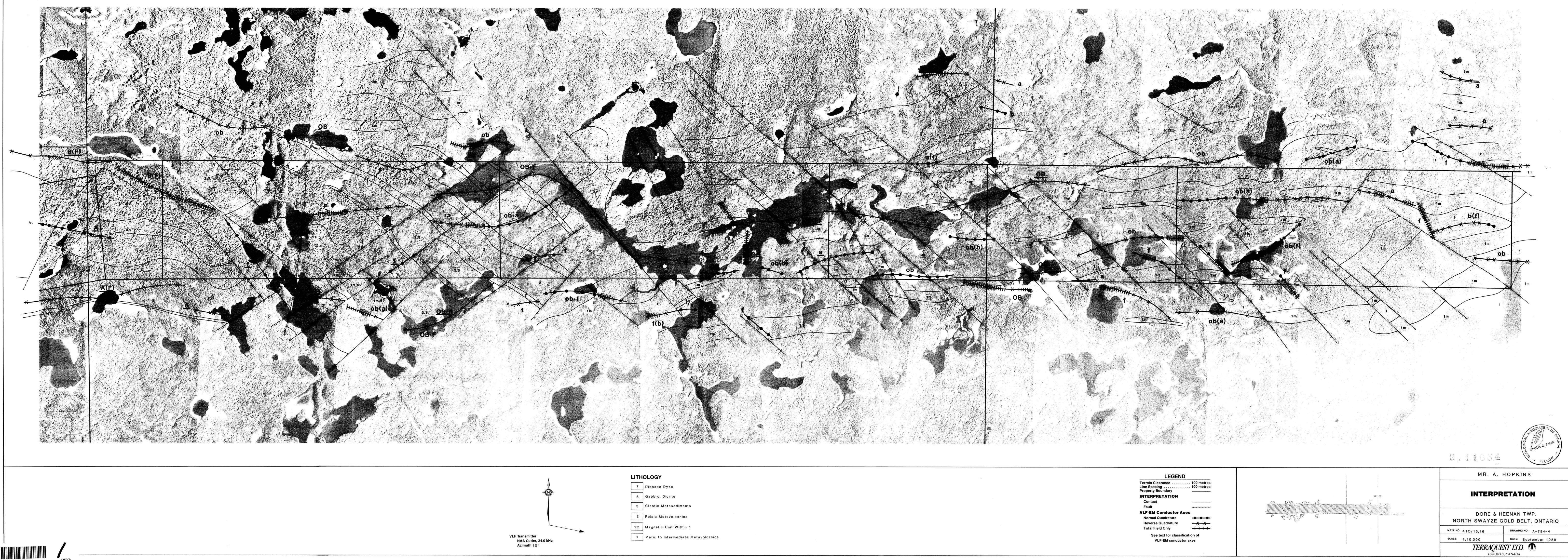
NEWTON TWP.



200

BENTON TWP. M-659

THE TOWNSHIP HEENA FI// , DISTRICT, OF (r) SUDBURY PORCUPINE MINING DIVISION SCALE: 1-INCH 40 CHAINS. LEGEND PATENTED LAND C.S CROWN LAND SALE Q LEASES LOCATED LAND h LOC. L.0, LICENSE OF OCCUPATION M.R.O. MINING RIGHTS ONLY SURFACE RIGHTS ONLY S.R.O. ROADS IMPROVED 'ROADS m KING'S HIGHWAYS 5 RAILWAYS ω POWER LINES 1 MARSH OR MUSKEG Σ́ MINES CANCELLED ۵. ≥ NOTES Z 400' Surface rights reservation around the shores of all lakes and rivers. 0 The Mining and Surface Rights of the former Mining Claims P-554702, P-554703, P-554704 are withdrawn from staking by ORDER NRW 5/87 Ľ, A 554194 -54695 55419 Σ 54679,55469R 54700 554701 554021 534020100 2422 BAGA63 BABABA 15- 40 849786 84978 84978 84978 84978 752450 175214/ · · · · · Kee. Feb 11/8 Appros 0 | \ 82° 20' 45" 925 PLAN NO. _ ONTARIO MINISTRY OF NATURAL RESOURCES SURVEYS AND MAPPING BRANCH 1 1



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