A-676

chmond Street West, Toronto, Canada, M5H 2K1, Telephone (416) 869-0010

REPORT ON AN AIRBORNE MAGNETIC AND VLF-EM SURVEY GOLDEN STAR PROPERTY, MINE CENTRE KENORA MINING DIVISION, ONTARIO

for

P. I. R. P. HOLDINGS INC.

RECEIVED
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TERRAQUEST LTD.
Toronto, Canada

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April 7, 1987

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1. INTRODUCTION

This report describes the specifications and results of a geophysical survey carried out for P.I.R.P. Holdings Inc. of 3-106 Adelaide West, Toronto, Ontario, M5A 1S2 by Terraquest Ltd., 905 - 121 Richmond Street West, Toronto, Canada. The field work was performed on January 31, 1987 and the data processing, interpretation and reporting from February 1 to April 7, 1987.

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 meters 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 in the Bad Vermilion Lake Area (Map G-2665), in the Kenora Mining Division of Ontario about 2 kilometres south of the settlement of Mine Centre. The property lies along the east shore of Bad Vermilion Lake and is readily accessible by roads.

The latitude and longitude are 48 degrees 45 minutes, and 92 degrees 37 minutes respectively, and the N.T.S. reference is 52C/10 and 15.

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

K 824686-824694	(9)
K 629055-629057	(3)
K 659872-659875	(4)
K 349062-640065	(4)
K 202521	(1)
K 44632	(1)
K 3449057-349061	(5)
K 532134-531143	(10)
K 629042	(1)
K 629044	(1)
K 629046	(1)
K 629048	(1)
K 794707-794708	(2)
P. 663	(1)
A.D. 2-3	(2)......total 46 claimas

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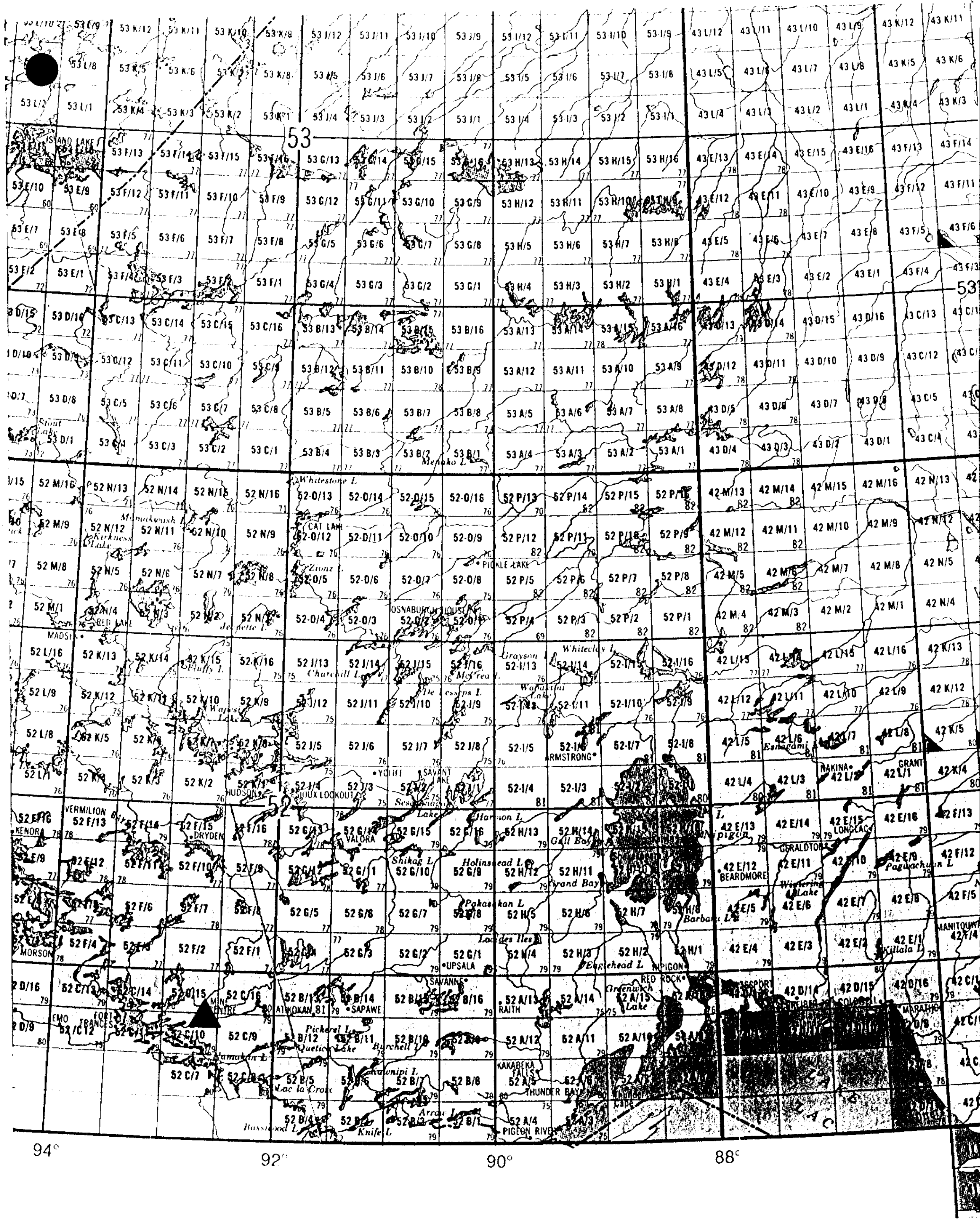

FIGURE 1. General Location

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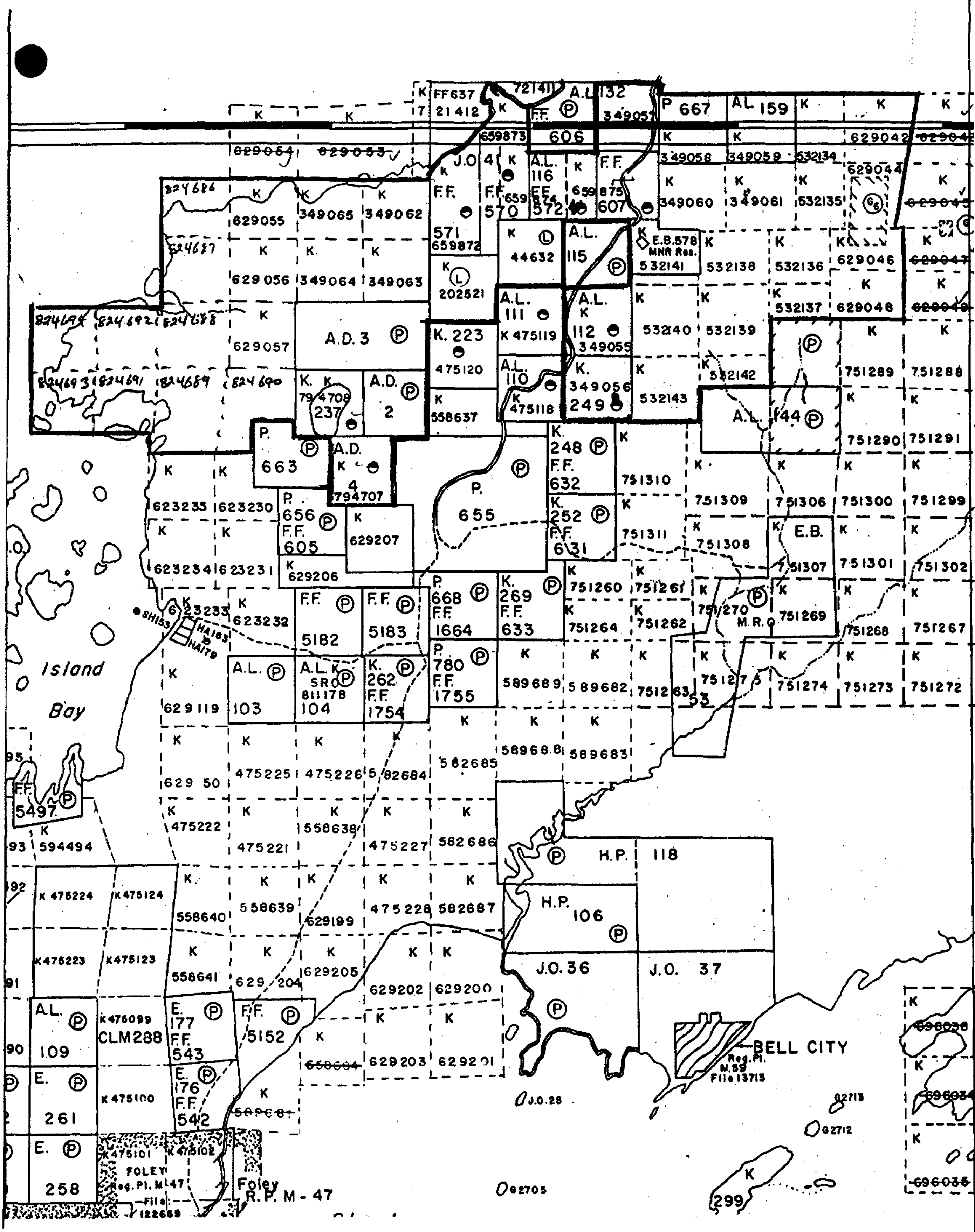

FIGURE 2. Claim Location Map
(exact locations not certified)

3. GEOLOGY

Map References

1. Map P.293: Rainy Lake Sheet. scale 126,720. O.D.M. 1965
2. Map P.2202: Mine Centre Area (Eastern Half). scale 1:15,840. O.G.S. 1980
3. Map 2443: Kenora - Fort Francis, Geological Compilation. scale 1;253,440. O.G.S. 1981
4. Map 334A: Mine Centre Area. scale 1:31,680. G.S.C. 1936
5. Report: A Summary of Explorartion Programs on the Golden Star Mine Property, Mine Centre, Ontario. May 1974 to August 1985. G.F. Ennis, November 1985

The survey area is underlain to the west by anorthosites and related mafic intrusives known as the Bad Vermilion Lake Intrusion, and to the east by clastic sediments, primarily sandstones. These are separated in the centre of the property by felsic metavolcanics and to the north by mafic metavolcanics. A northeast trending tongue of felsic intrusives occurs to the south and is comprised of leucocratic trondhjemite, granodiorite and quartz monzonite.

Numerous shafts have been put down within the survey area including the Golden Star Mine which was a producer during the turn of the century. Many northwest trending, gold bearing type quartz veins occur throughout the felsic intrusives and the metavolcanics. Other mineralization includes sphalerite, chalcopyrite, pyrite, copper and lead.

Fold axes within the sediments trend to the northeast. Major regional faults trend east-west to north of the survey area and northeast to the south of the property.

4. SURVEY SPECIFICATIONS

4.1 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 is a high sensitivity airborne proton (Overhäuser) type with the sensor element mounted in a towed bird at a distance of 14 metres below and 24 metres behind the aircraft. It's specifications are as follows:

Resolution:	0.01 gamma
Accuracy:	0.03 gamma for 2 readings per second
Cycle time:	0.5 second

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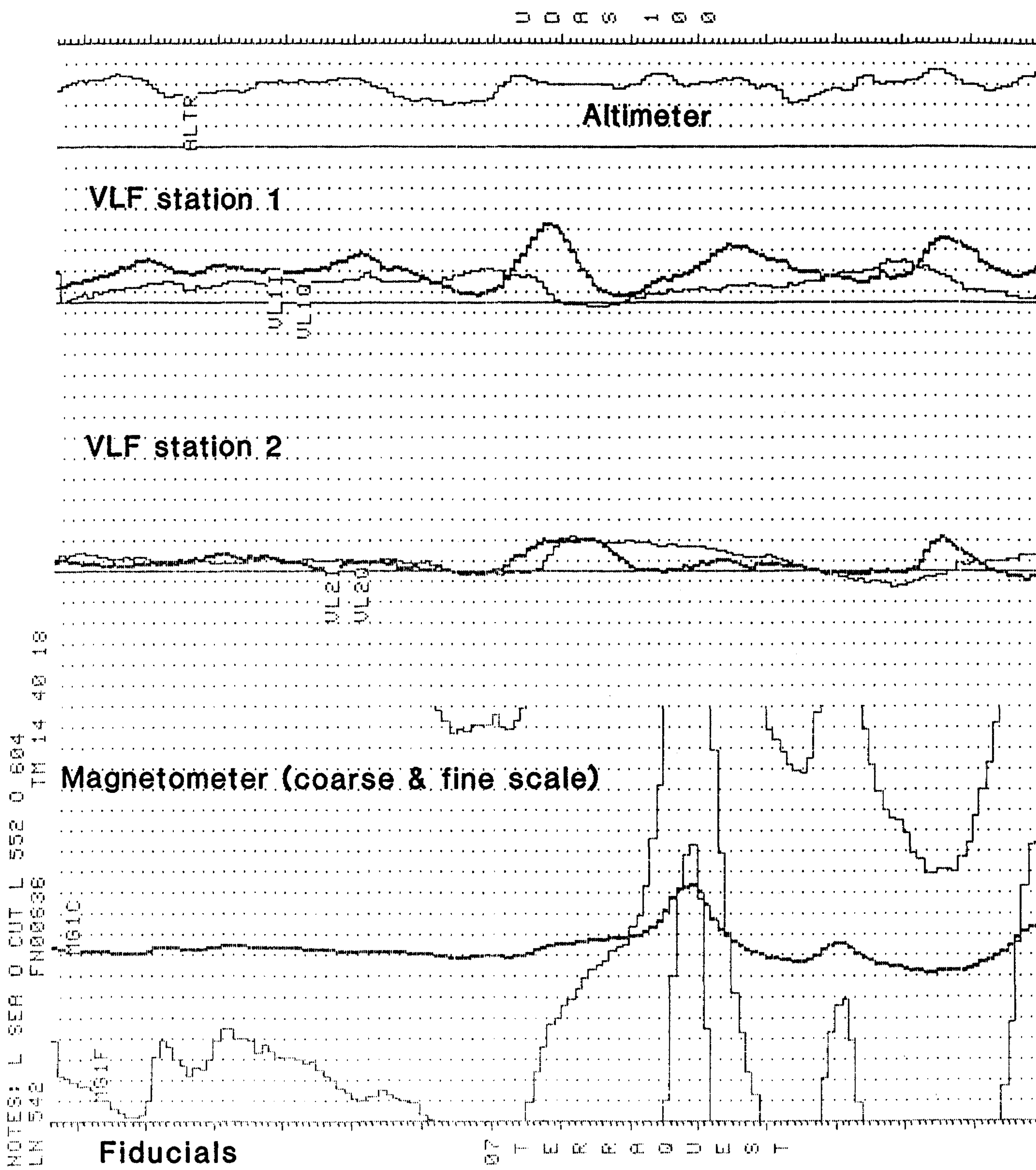

FIGURE 3. Sample of analogue data

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Range:	20000-100000 gammas
Gradient tolerance:	Up to 5000 gammas per meter
Model:	GSM-11
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
- UDAS-100 data processor with Digidata nine track tape recorder, manufactured 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

a) Line spacing:	100 metres	
b) Line direction:	360 degrees	
c) Terrain clearance:	100 metres	
d) Average ground speed:	193 km/hr.	
e) Data point interval:	Magnetic:	11 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: 75
j) Line km over claim groups: 55

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

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acceptable.
c) 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.
d) Manoeuvre noise: nil

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 37-4
Spector, A., 1968: Spectral Analysis of Aeromagnetic maps; unpublished thesis; University of Toronto, 1968.

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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. A first pass interpretation is also provided. The following notes are intended to supplement the maps.

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FIGURE 4

TERRAQUEST CLASSIFICATION OF VLF-EM CONDUCTOR AXES

SYMBOL	CORRELATION	ASSOCIATION: Possible Origins
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

3 - Mineralogic origins include sulphides, graphite, and in fault zones, gouge

4 - Electrolytic origins imply conductivity related to porosity or high moisture content

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The total magnetic field has a relief of approximately 600 gammas and shows the general trend of the lithologies. The vertical magnetic gradient data provides significantly improved resolution and has been used to delineate the structure and stratigraphy.

The strongest magnetic responses correlate with the mafic metavolcanics (Unit 1) to the north. The interpreted widths of these units are prone to exaggeration due to the overwhelming nature of strong magnetic fields. This interpretation shows the mafic metavolcanics to extend southwards to the felsic intrusive contact. This is not shown by the geological maps but is consistent with the diamond drill hole information.

The moderate to high magnetic responses to the southeast are tentatively identified as mafic metavolcanics, most likely at depth beneath the sandstones. Alternatively they may represent mafic intrusives.

The anorthosites and mafic intrusives (Unit 4) to the west correlate with intermediate magnetic responses. The more magnetic areas (Unit 4m) are probably related to different magnetic phases. For example, north of Bad Vermilion Lake the gabbro is quite magnetic, containing up to 5% magnetite.

The felsic metavolcanics (Unit 3) and the sandstones (Unit 9) correlate with lower magnetic responses. The lowest responses are associated with the outline of the felsic intrusives (Unit 5) to the south centre of the property.

The area is structurally complex. Magnetically interpreted faults trend to the northwest, north, northeast and east. There is an interpretational bias against the detection of the northeast trending faults due to the fact that they parallel the magnetic trends.

The VLF-EM responses are strong with excellent definition. Many conductor axes are associated with structural features. This type of conductivity may be (a) mineralogic such as graphite, gouge or sulphides, or (b) ionic such as porosity along the fault or shear zone or clay in an overlying topographic depression. Faults identified by magnetic or VLF-EM methods may provide primary structural control for epithermal mineralization.

Several conductor axes show a stratigraphic association in that they are coincident with or parallel to the magnetic stratigraphy. These possess potential for bedrock stratabound sources such as graphite or sulphides and should be followed up on the ground by EM or IP methods.

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7. SUMMARY

An airborne combined magnetic and VLF-EM mapping survey has been carried out at 100 metre line intervals with magnetic 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. Numerous VLF-EM conductor axes were found of which most possess a structural association and several have potential sulphide origins and have been recommended for additional investigation.

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Charles Q. Barrie, M.Sc.
Geologist

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Ministry of Northern Development and Mines
Ontario

Report of Work

(Geophysical, Geological, Geochemical and Expenditures)

52C10NE0051 2.10067 BAD VERMILION LAKE

900

W99-87

Type of Survey(s): Airborne Mag & VLF-EM

Township or Area: G.2665 Bad Vermillion Lake Area

Claim Holder(s): P.I.R.P. Holdings Inc.

Prospector's Licence No.:

Address: 3-106 Adelaide West, Toronto, Ontario M5A 1S2

Survey Company: Terraquest Ltd.

Date of Survey (from & to): 31 01 87 | 31 01 87 (Day | Mo. | Yr.)

Total Miles of line Cut:

Name and Address of Author (of Geo Technical report): Charles Q. Barrie, 905-121 Richmond St. W., Toronto, Ontario M5H 2K1

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting) For each additional survey: using the same grid: Enter 20 days (for each)	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- 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	40
	Magnetometer	40
	Radiometric	

* REDUCED TO MAXIMUM

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Expend. Days Cr.
K	824686	
	824687	
	824688	
	824689	
	824690	
	824691	
	824692	
	824693	
	824694	
	629055	*
	629056	*
	629057	*

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KENORA MINING DIV. RECEIVED MAY 25 1987 AM 7 8 9 10 11 12 1 2 3 4 5 6 PM

RECEIVED MAY 2? 1987 MINING LANDS SECTION

629053

Total number of mining claims covered by this report of work: 12

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.

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
795	May 25/87	McLemay (acting)
	Date Approved as Recorded: 1987.07.24	Branch Director

Date: May 19, 1987 | Recorded Holder or Agent (Signature)

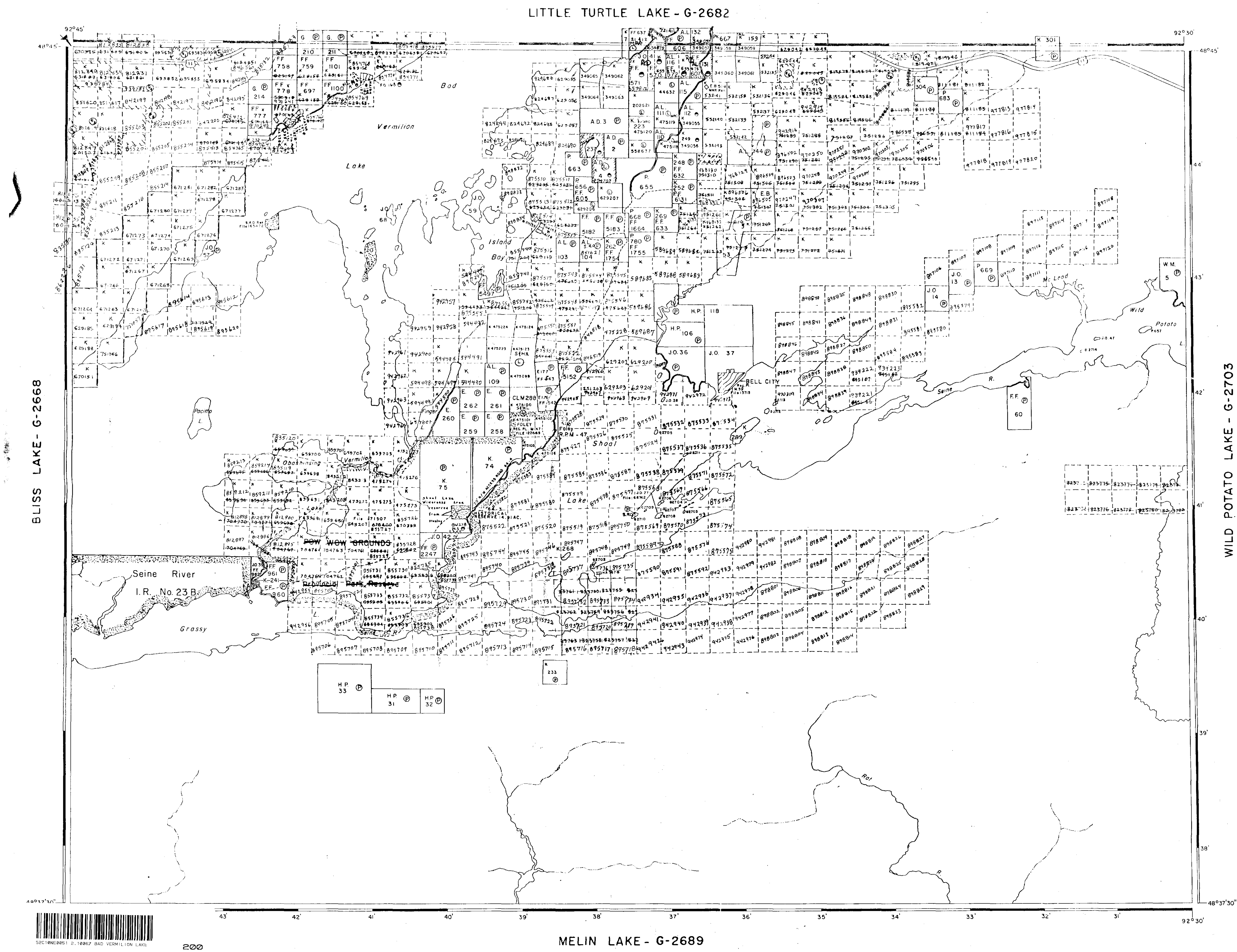
Certification Verifying Report of Work

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: G.F. Ennis M.E. P.Eng. APT 302 263 Russell Hill Rd Toronto Ont

Date Certified: May 19, 1987

Certified by (Signature)



KENORA MINING DIV.
RECEIVED
JUN 3 1987

Effective as liner

LEGEND

PATENTED LAND	Ⓟ
CROWN LAND SALE	C.S.
LEASES	Ⓛ
LOCATED LAND	Lo.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KING'S HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	
CANCELLED	C.
PATENTED S.R.O.	

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
R①	W-21/85	Nov.19/85	S+MR	
R②	W-20/85	Nov19/85	S+MR	

Sand & Gravel

G1	M.T.C. Pit No 1212
G2	" " " 1213
G3	" " " 1214
G4	M.T.C. Gravel Pit 1016
G5	Gravel File 170703
G6	" " 23758
G7	" " 170756
G8	Gravel Pit No 988
G9	M.N.R. Gravel Reserve No. 239
Ⓖ	QUARRY PERMIT

SCALE: 1 INCH - 40 CHAINS

FEET 0 1000 2000 4000 6000 8000
METRES 0 200 1000 (1 KM) 2000 (2 KM)

AREA **BAD VERMILION LAKE**

M.N.R. ADMINISTRATIVE DISTRICT
FORT FRANCES
MINING DIVISION
KENORA
LAND TITLES / REGISTRY DIVISION
RAINY RIVER

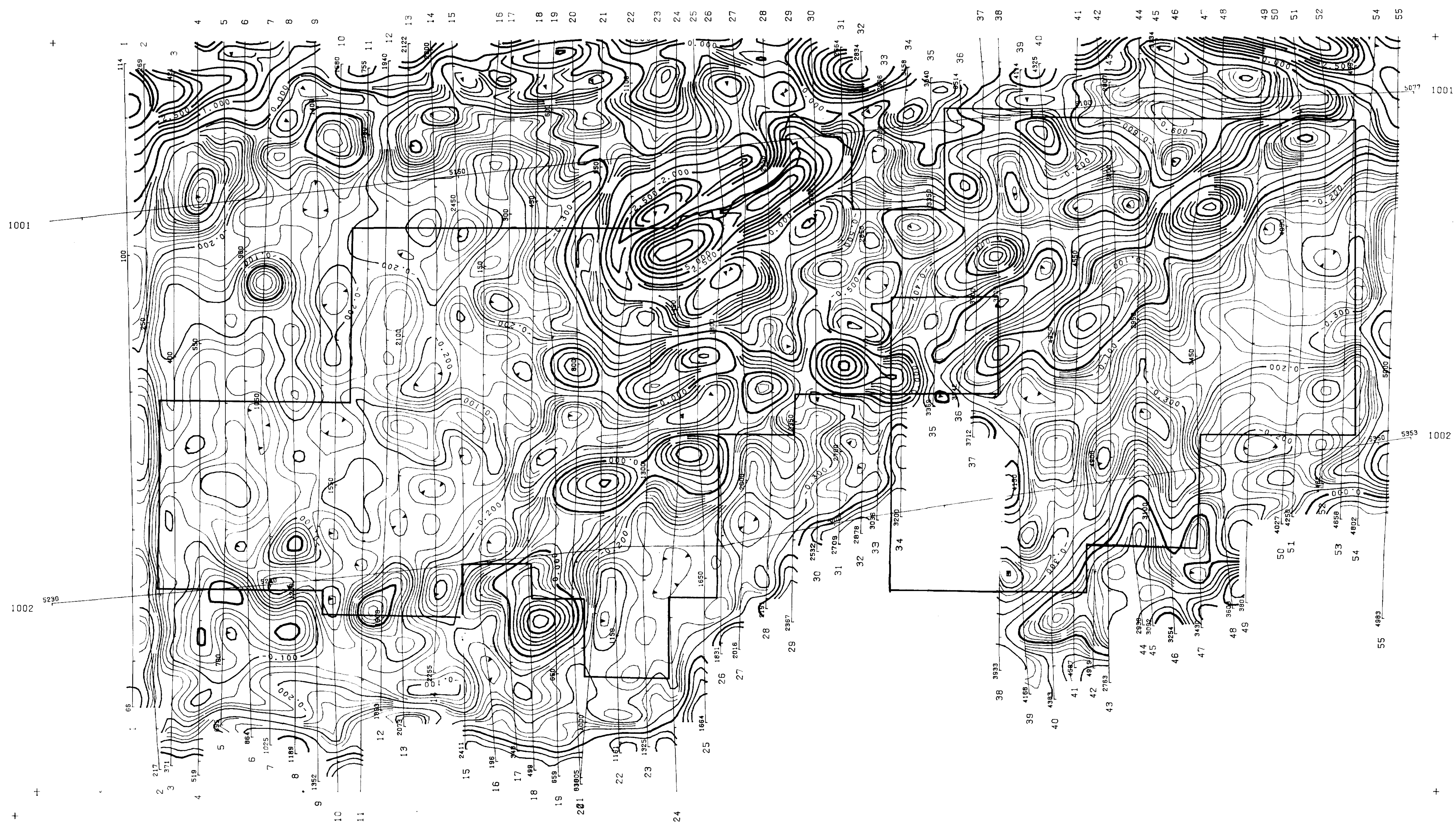
Ontario — Ministry of Natural Resources — Land Management Branch

Date MARCH, 1984

Number G-2665

M-2474

52C10NE0051 2.10067 BAD VERMILION LAKE



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

P.I.R.P. HOLDINGS INC

AIRBORNE MAGNETIC SURVEY

VERTICAL MAGNETIC GRADIENT
Calculated From Total Field

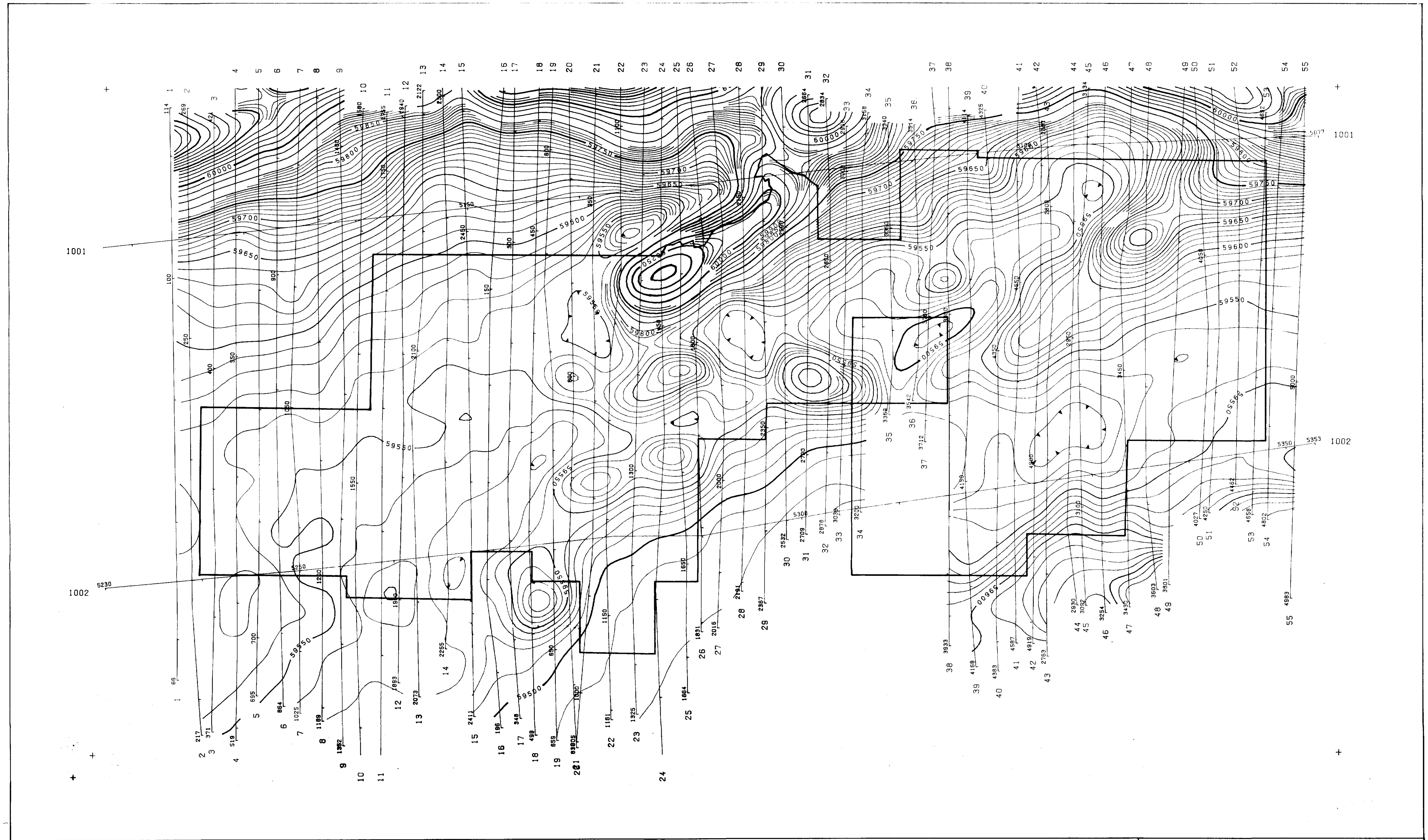
GOLDEN STAR MINE PROPERTY

N.T.S. NO. 52C/10.15
DRAWING NO. A-676-2
SCALE 1:10,000
DATE April 1987

TERRAQUEST LTD.
TORONTO CANADA

52C10NW0051 2.10067 BAD VERMILION LAKE

210



LEGEND

Terrain Clearance .... 100 meters
Line Spacing .... 100 meters

TOTAL MAGNETIC FIELD
1000 gammas
250 gammas
50 gammas
10 gammas

P.I.R.P. HOLDINGS INC.

AIRBORNE MAGNETIC SURVEY
TOTAL MAGNETIC FIELD

GOLDEN STAR MINE PROPERTY

N.T.S. NO. 52C/10,15	DRAWING NO. A-676-1
SCALE 1:10,000	DATE April 1987

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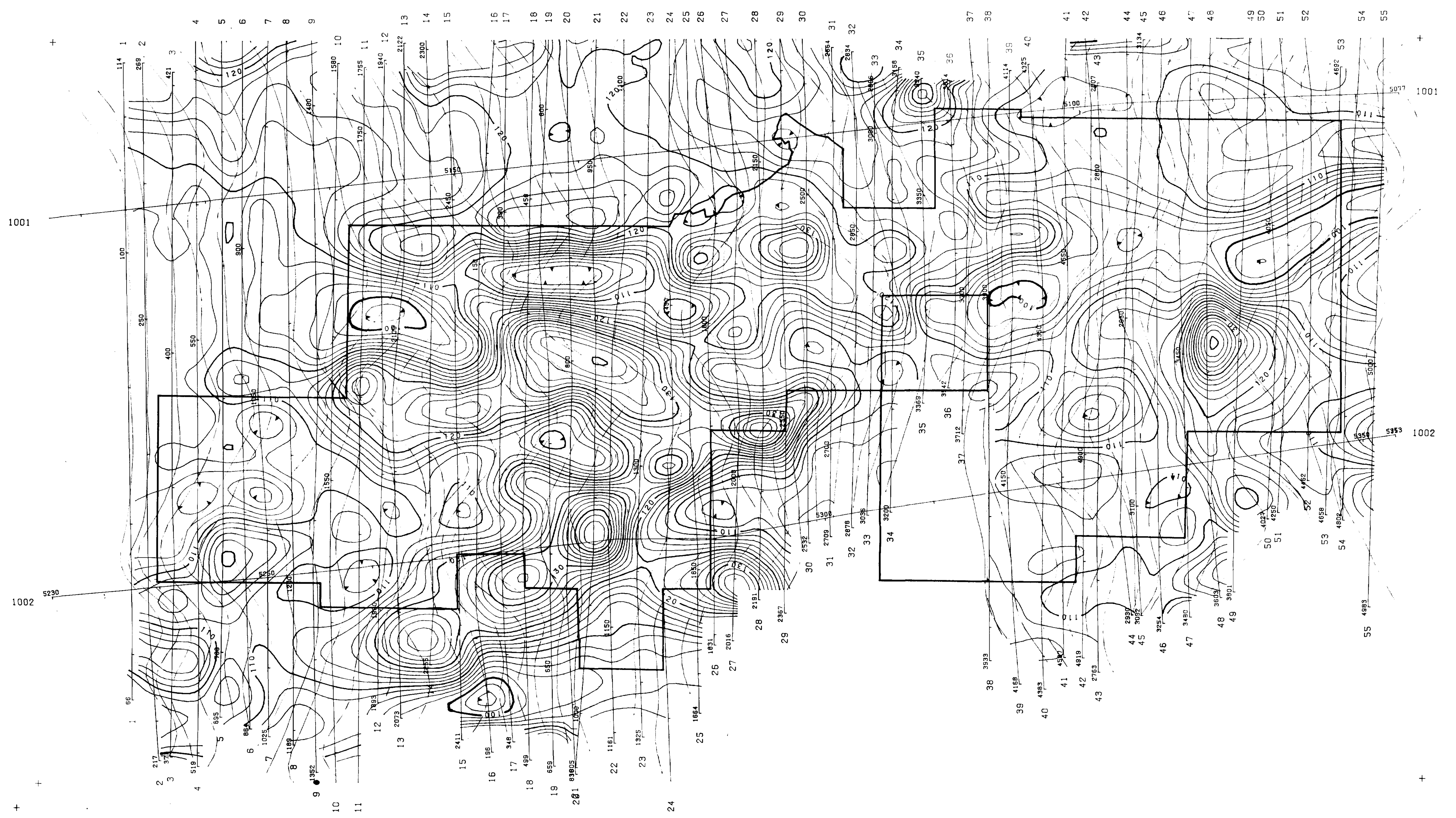
TORONTO CANADA



LEGEND

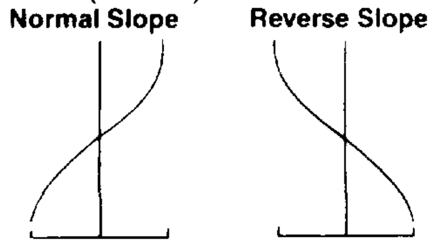
Terrain Clearance	100 meters
Line Spacing	100 meters

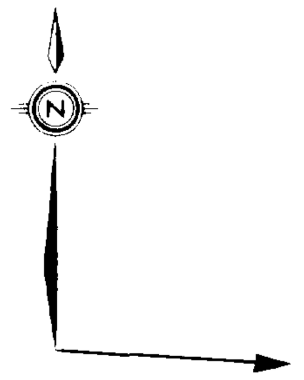
TOTAL FIELD STRENGTH (Contours)

50%
10%
2%

QUADRATURE (Profiles)

Normal Slope — Reverse Slope





VLF Transmitter
NAA Cutler, 24.0 kHz
Azimuth 094

P.I.R.P. HOLDINGS INC.

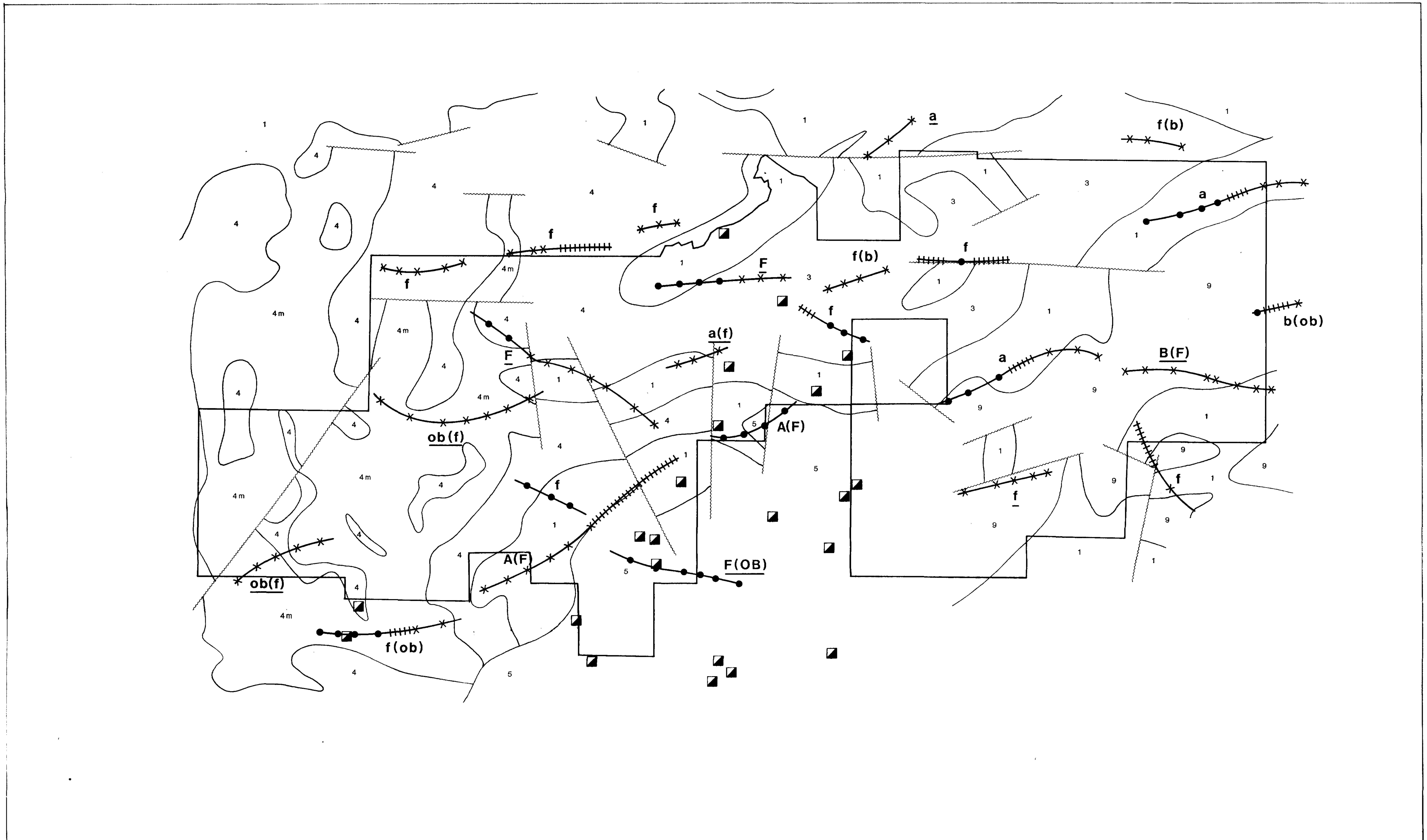
AIRBORNE VLF-EM SURVEY

CONTOURS OF TOTAL FIELD STRENGTH
PROFILES OF QUADRATURE

GOLDEN STAR MINE PROPERTY

N.T.S. NO. 52C/10,15	DRAWING NO. A-676-3
SCALE 1:10,000	DATE April 1987

TERRAQUEST LTD.
TORONTO, CANADA



VLF Transmitter
NAA Cutler, 24.0 kHz
Azimuth 094

LITHOLOGY

9	Sandstone
5	Felsic Intrusives
4m	Magnetic unit within 4.
4	Anorthosites, Mafic Intrusives
3	Felsic Metavolcanics
1	Mafic Metavolcanics

LEGEND

Terrain Clearance .... 100 meters
Line Spacing .... 100 meters

Shaft

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

P.I.R.P. HOLDINGS INC.

INTERPRETATION

GOLDEN STAR MINE PROPERTY

N.T.S. NO. 52C/10.15 | DRAWING NO. A-676-4

SCALE 1:10,000 | DATE April 1987

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240