A-814

REPORT ON AN

AIRBORNE MAGNETIC
AND VLF-EM SURVEY

BANNAGAN PROPERTY
HUTTON TOWNSHIP

SUDBURY MINING DIVISION, ONTARIO

for

IMPERIAL METALS CORPORATION

by: *TERRAQUEST LTD.*
Toronto, Canada
January 16,1989

41115SW0136 2.12228 HUTTON

010C

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF MAPS IN JACKET

1. Introduction

This report describes the specifications and results of a geophysical survey carried out for Imperial Metals Corporation of 800-601 West Hastings, Vancouver, B.C., V6B 5A6 by Terraquest Ltd., 240 Adelaide Street West, Toronto, Canada. The field work was performed between December 15th and 18th, 1988 and the data processing, interpretation and reporting from December 19, 1988 to January 16, 1989.

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 in the eastern half of Hutton township, in the Sudbury Mining Division of Ontario about 45 kilometres north of the town of Sudbury and one kilometre north of the hamlet of Milnet. The claims lie along the Vermilion River and can be accessed by the C.N.R. Line, Route 806 which passes to the south and west of the property, and several bush roads within the property.

The latitude and longitude are 46 degrees 51 minutes, and 80 degrees 56 minutes respectively, and the N.T.S. reference is 41I/15.

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

S	985559-985585	(27)
	Total of 27 claims	

3. Geology

Map Reference

1. Map P.399: Hutton Township
Scale 1:15,840
O.D.M. 1967
2. Map P.405: Sudbury Mining Area
Scale 1:63,360
O.D.M. 1967
3. Map 41E: Moose Mountain-Wanapitei Area
Scale 1:47,520
O.D.M. 1932
4. Map 2170: Sudbury Mining Area
Scale 1:63,360
O.D.M. 1969
5. Map 2180: Hutton and Parkin Townships
Scale 1:31,680
O.D.M. 1970
6. Map 2361: Sudbury-Cobal Compilation Series
Scale 1:253,440
O.G.S. 1977
7. Map 1512G: Milnet
Scale 1:63,360
Magnetic Survey, G.S.C. 1965

The oldest rocks within the survey area are Archean in age in the southwestern corner. They are comprised of granitic rocks with mafic metavolcanics around the edges. These metavolcanics host iron, copper, gold, silver, nickel and zinc immediately south of the survey block. The past producing open pit iron mine, Moose Mountain, occurs three kilometres to the west. The remaining rocks within the survey area are Proterozoic in age and in order of decreasing age are comprised of quartzite of the Mississagi Formation, conglomerate of the Bruce Formation, limestone of the Espanola Formation, quartzite of the Serpent Formation and argillite of the Gowanda Formation. Four areas of uranium mineralization have been mapped immediately southwest of Bannagan Lake.

The dominant structures in the area trend to the northwest, the Milnet fault coincides with the Vermilion River valley. Numerous cross faults trend to the northeast and a few to the north-northeast and east-northeast.

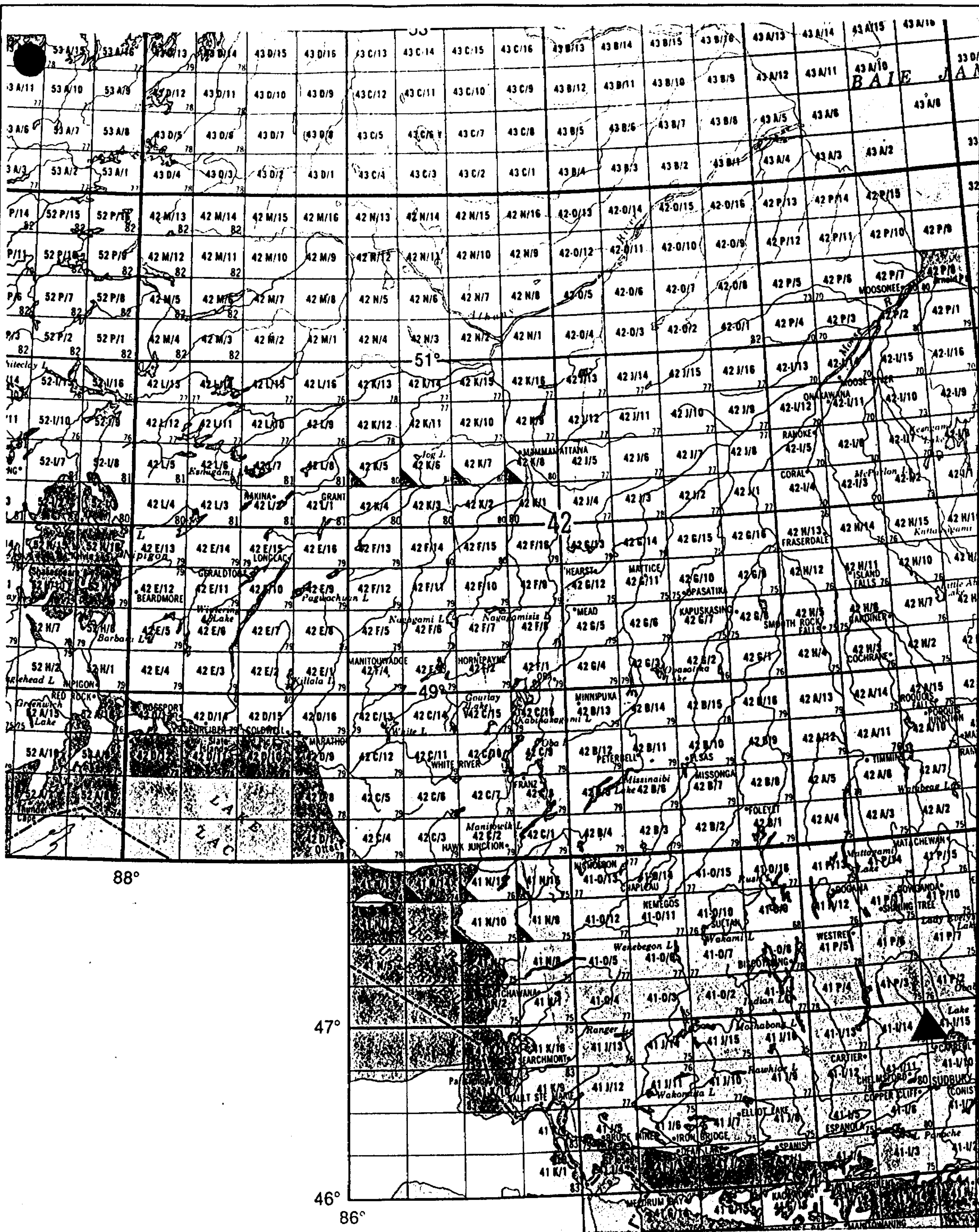

FIGURE 1. General Location

Suite 905, 121 Richmond Street West, Toronto, Canada, M5H 2K1, Telephone (416) 869-0010

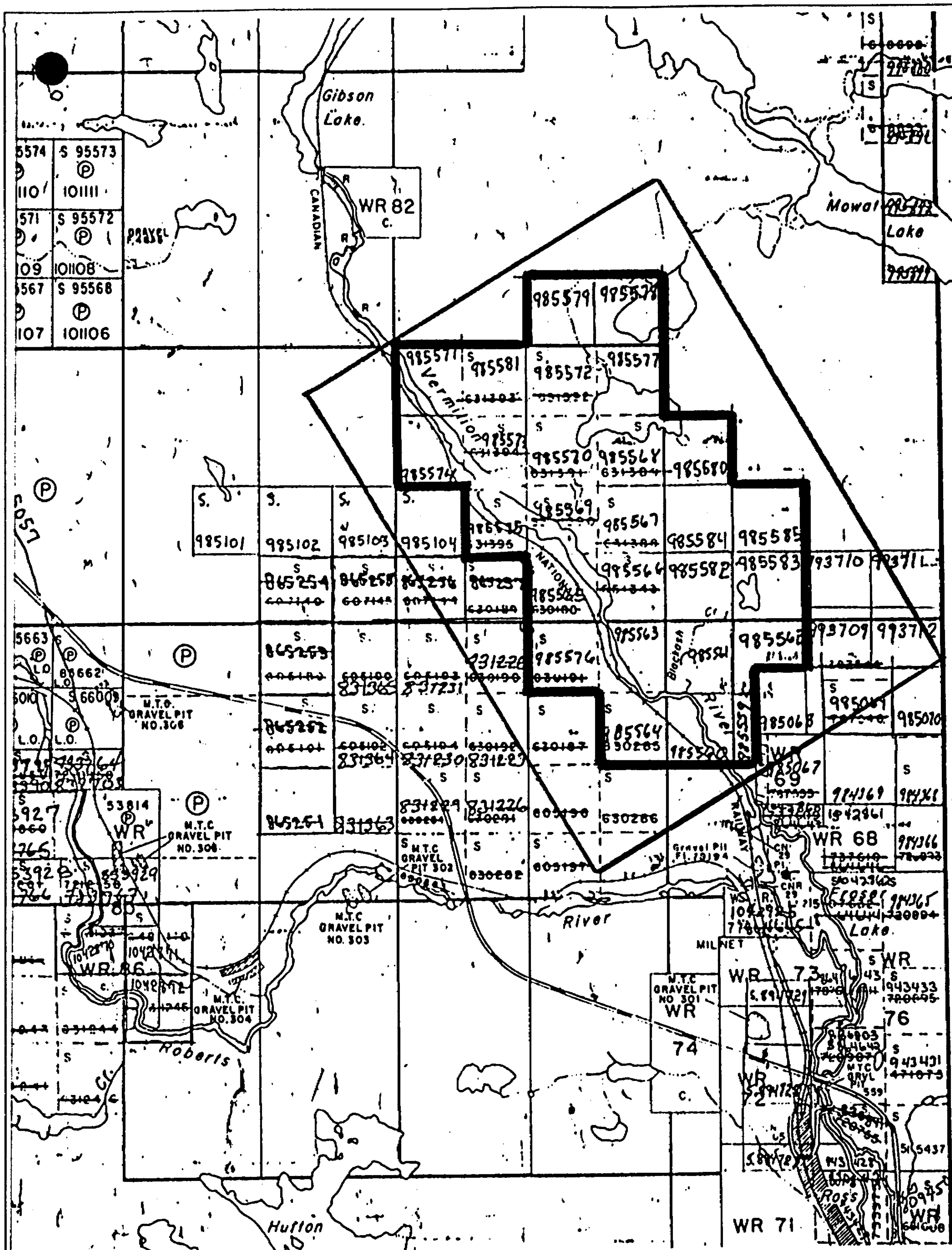

Figure 2 Claim Location Map

(exact locations not certified)

240 Adelaide Street West, Toronto, Canada M5H 1W7, Telephone (416) 971-5400, Fax (416) 971-6449

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:

Model:	GSM-9BA
Manufacturer:	GEM Systems Inc 105 Scarsdale Road Don Mills, Ontario
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 5,000 gammas/m

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 (Channel 1) that is ideally positioned at right angles to the flight lines, while the ORTHO coil transmitter (Channel 2) should be in line with the flight lines. It's specifications are:

Model:	TOTEM 2A
Manufacturer:	Herz Industries, Toronto, Canada
Accuracy:	1%
Reading interval:	0.5 second

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

Line spacing:	100 metres
Line direction:	050 degrees
Terrain clearance:	100 m
Average ground speed:	156 km/hr
Data point interval:	
Magnetic:	27 metres
VLF-EM:	27 metres
Tie Line interval:	2 km
Channel 1 (LINE):	NAA Cutler, 24.0 kHz
Channel 2 (ORTHO):	NSS Annapolis, 21.4 kHz
Line km over total survey area including overrun:	126 line km
Line km over claim groups:	
Magnetic survey totals:	54 line km
VLF-EM survey totals:	54 line km

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 twenty gammas deviation from a smooth background over a period of two minutes or less as seen on the base station analogue record.

Manoeuvre noise: Approximately +/- 5 gammas.

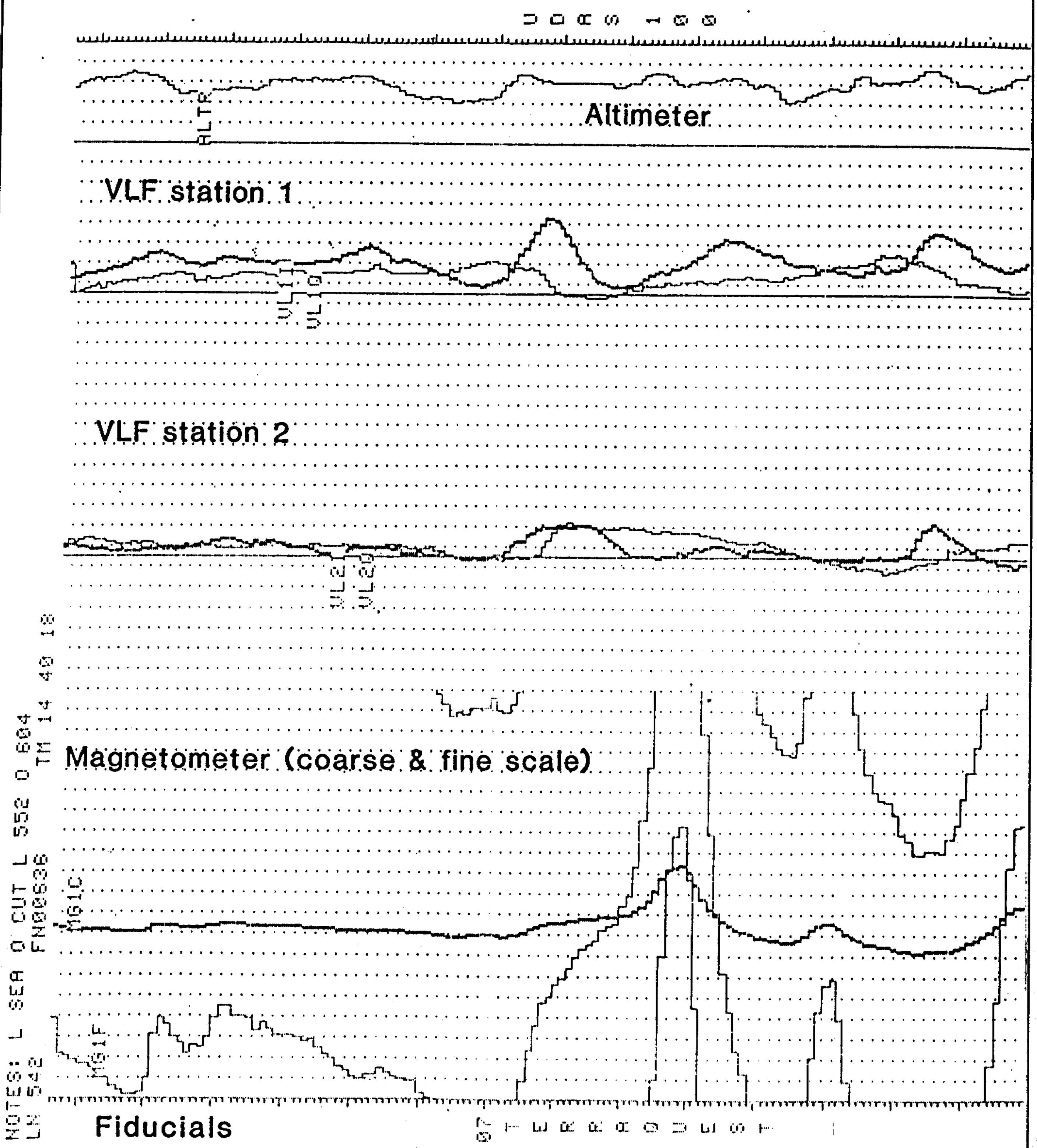

FIGURE 3. Sample of analogue data

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4.4 Photomosaics

For navigating the aircraft and recovering 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.

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.

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 feaures 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 1,250 gammas and is dominated by strong responses beyond the survey area to the northeast except for a narrow anomaly that extends along the river valley from the southeast. The vertical gradient format identifies several subtle anomalies that trend variably to the northwest.

The source of the strong anomaly to the northeast occurs along the edge of the survey area and appears to be related to mafic intrusives at depth. The nature and orientation of this anomaly can be observed on the government magnetic map (Map 1512G).

The narrow anomaly that extends northwestwards from Fraser Lake has a relief of approximately 250 gammas. It appears to be an extension of the iron formation located along strike to the south of the survey area. The interpreted width is probably exaggerated due to the overwhelming effect commonly associated with strong susceptibilities. The two short anomalies of similar magnitude which occur along strike to the northwest may also be related to iron formation, possibly at depth.

Most of the smaller, broken up anomalies to the southwest correlate with the amphibolitic, mafic intrusive rocks (Unit 4). The subtle anomaly on the east end of Bannagan Lake trends to the north-northeast and is interpreted to originate from similar intrusives.

The mafic metavolcanics (Unit 1) correlate with moderate strength responses. These are best identified where they occur in contrast with the magnetically quiet Proterozoic sediments. The easternmost edge of the metavolcanic unit is characterized by slightly stronger responses (Unit 1m) which may be related to either iron formation, pyrrhotite or more mafic compositions.

The remaining lithologies correlate with weak magnetic responses and cannot be readily discriminated on the total magnetic field map. This is primarily due to the fact that the strong anomaly to the northeast overwhelms and dominates these subtle responses. For example the Gowganda Formation (Unit 9) correlates with the strongest responses on the map area, but are not interpreted to be the source of the magnetism. Similarly, the Bruce Formation conglomerates (Unit 6) correlate with weak responses to the west of Vermilion River and moderate responses north of Bannagan Lake, the difference being a function of the regional gradient across the property.

The subtle anomalies detected on the vertical gradient map correlate with parts of the Bruce Formation (Unit 6m) and parts of the Serpent Formation (Unit 8m). These may be related to minor concentrations of magnetic minerals such as magnetite or pyrrhotite within the Proterozoic sediments. Note that many of these trends are consistent with the bedding of the mapped lithologies. Alternatively, some of these responses may be related to the underlying mafic metavolcanic rocks (Unit 1).

Further processing of the vertical magnetic gradient using the shadowgraph technique is generally consistent with the overall interpretation. In several instances the shadowgraph has identified very subtle expressions that were not present on the vertical derivative plots. These are parallel to and therefore consistent with the overall lithological trends. Note that the shadowgraph is based on a sun declination of 030 degrees and therefore creates a detection bias in favour of northwest trending bodies.

The structural interpretation is highly subjective due to the fact that: a) many of the anomalies are short and truncated, b) there are numerous assumed faults as shown on the mapped geology, and c) many of the anomalies may be derived from sources at depth beneath the Proterozoic sediments. Supporting evidence has been taken from air photo lineaments both within and beyond the survey area. This structural interpretation is not consistent with most of the assumed faults shown on the geological map. The Milnet Fault is not readily identifiable by magnetic mapping as it is parallel to the magnetic units.

Most of the magnetically interpreted faults trend to the east to east-southeast. It is suspected that these offset the Milnet Fault in at least two places. Minor faults or shear zones trend to the north to north-

TERRAQUEST LTD.

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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northeast similar to those shown on the geological map.

The VLF-EM survey has identified several strong conductor axes that trend to the east-southeast displaying an obvious detection bias in favour of the transmitter azimuth (Cutler, 098 degrees). The contours of the total field strength of most of these conductive zones conform to topographic depressions suggesting that the primary source is from conductive overburden.

The narrow conductive zones that coincide with either topographic depressions or magnetically interpreted faults are interpreted to possess structural origins, either faults or shear zones. This type of conductivity may be related to mineral origins such as sulphides, graphite or gouge along the structure, or b) an ionic effect created by water or porosity within the structure or along the upper weathered and leached edge.

The strongest conductive zone appears to be related primarily to the railroad tracks along the south side of the river valley, however there may be minor contributions from the Milnet Fault zone or the overburden within the valley.

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. Several VLF-EM conductor axes have been identified and have been interpreted to be derived from overburden and structural sources.

TERRAQUEST LTD.

Charles Q. Barrie, M.Sc.

Geologist

GEOLOGICAL ASSOCIATION OF CANADA
CHARLES Q. BARRIE
FELLOW

W8907.00021

Ministry of Northern Development and Mines
Ontario

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

Mining Act

DOCUMENT W8907-

2.12228

41I15SW0136 2.12228 HUTTON

900

Type of Survey(s)	Township or Area
Airborne Magnetic and VLF Survey	Hutton Twp. - Sudbury M.D.

Claim Holder(s)	Prospector's Licence No.
Imperial Metals Corporation	T4978

Address: Suite 800, 601 West Hastings Street, Vancouver, B.C. Canada

Survey Company	Date of Survey (from & to)	Total Miles of line Cut
	15 Day, 12 Mo., 88 Yr. – 18 Day, 12 Mo., 88 Yr.	

Name and Address of Author (of Geo-Technical report):

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	- Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Radiometric	
	- Other	
	Geological	
	Geochemical	
Man Days	Geophysical	Days per Claim
Complete reverse side and enter total(s) here	- 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	

RECEIVED
MAR 1 1989
MINING LANDS SECTION

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Expend. Days Cr.
S	985 559	80
[redacted]	985 560	80
[redacted]	985 561	80
[redacted]	985 562	80
[redacted]	985 563	80
[redacted]	985 564	80
[redacted]	985 565	80
[redacted]	985 566	80
[redacted]	985 567	80
[redacted]	985 568	80
[redacted]	985 569	80
[redacted]	985 570	80
[redacted]	985 571	80
[redacted]	985 572	80
[redacted]	985 573	80
[redacted]	985 574	80
[redacted]	985 575	80
[redacted]	985 576	80
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[redacted]	985 578	80
[redacted]	985 579	80
[redacted]	985 580	80
[redacted]	985 581	80
S	985 582	80
[redacted]	985 583	80
[redacted]	985 584	80
[redacted]	985 585	80

SUDBURY MINING DIV.
RECEIVED
FEB 20 1989
A.M. P.M.
7 8 9 10 11 12 1 2 3 4 5 6
2:50

ONT. GEOLOGICAL SURVEY
ASSESSMENT FILES
OFFICE
MAR 10 1989

Total number of mining claims covered by this report of work: 27

Expenditures (excludes power stripping)

Type of Work Performed:

Performed on Claim(s):

Calculation of Expenditure Days Credits

Total Expenditures				Total Days Credits
$	÷	15	=	

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
2160	Feb 23/89	
	Date Approved as Recorded	Branch Director
	2 Mar 89	

Date	Recorded Holder or Agent (Signature)
February 3, 1989	

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

Ministry of Northern Development and Mines

Ontario

Geophysical-Geological-Geochemical Technical Data Statement

File ______

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) Airborne Magnetic and VLF-EM Survey

Township or Area Hutton Twp. Sudbury M.D.

Claim Holder(s) Imperial Metals Corporation

Survey Company Terraquest Ltd.

Author of Report Charles Q. Barrie

Address of Author 240 Adelaide Street, W. Toronto

Covering Dates of Survey Dec 15 - 18, 1988
(linecutting to office)

Total Miles of Line Cut ______

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
—Electromagnetic	
—Magnetometer	
—Radiometric	
—Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer 40 Electromagnetic 40 Radiometric ______
(enter days per claim)

DATE: Feb 3, 1989 SIGNATURE: [signature]
Author of Report or Agent

Res. Geol. ______ Qualifications 2.8365

Previous Surveys

File No.	Type	Date	Claim Holder

OFFICE USE ONLY

MINING CLAIMS TRAVERSED
List numerically

(prefix)	(number)
S 985 559	S 985 580
S 985 560	S 985 581
S 985 561	S 985 582
S 985 562	S 985 583
S 985 563	S 985 584
S 985 564	S 985 585
S 985 565	
S 985 566	
S 985 567	
S 985 568	
S 985 569	
S 985 570	
S 985 571	
S 985 572	
S 985 573	
S 985 574	
S 985 575	
S 985 576	
S 985 577	
S 985 578	
S 985 579	

If space insufficient, attach list

TOTAL CLAIMS 27

837 (85/12)

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS – If more than one survey, specify data for each type of survey

Number of Stations ______________________ Number of Readings ______________________
Station interval ______________________ Line spacing ______________________
Profile scale ______________________
Contour interval ______________________

MAGNETIC

Instrument ______________________
Accuracy – Scale constant ______________________
Diurnal correction method ______________________
Base Station check-in interval (hours) ______________________
Base Station location and value ______________________

ELECTROMAGNETIC

Instrument ______________________
Coil configuration ______________________
Coil separation ______________________
Accuracy ______________________
Method: ☐ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line
Frequency ______________________ (specify V.L.F. station)
Parameters measured ______________________

GRAVITY

Instrument ______________________
Scale constant ______________________
Corrections made ______________________
Base station value and location ______________________
Elevation accuracy ______________________

INDUCED POLARIZATION RESISTIVITY

Instrument ______________________
Method ☐ Time Domain ☐ Frequency Domain
Parameters – On time ______________________ Frequency ______________________
– Off time ______________________ Range ______________________
– Delay time ______________________
– Integration time ______________________
Power ______________________
Electrode array ______________________
Electrode spacing ______________________
Type of electrode ______________________

SELF POTENTIAL

Instrument ______ Range ______

Survey Method ______

______

Corrections made ______

______

RADIOMETRIC

Instrument ______

Values measured ______

Energy windows (levels) ______

Height of instrument ______ Background Count ______

Size of detector ______

Overburden ______

(type, depth – include outcrop map)

OTHERS (SEISMIC, DRILL WELL LOGGING ETC.)

Type of survey ______

Instrument ______

Accuracy ______

Parameters measured ______

______

Additional information (for understanding results) ______

______

______

AIRBORNE SURVEYS

Type of survey(s) Airborne Magnetic and VLF-EM Survey

Instrument(s) Magnetic - GEM Systems Inc. GSM - 9BA, VLF EM Hertz Ind. Totem 2A

(specify for each type of survey)

Accuracy Magnetic - 0.5 gamma VLF-EM - 1%

(specify for each type of survey)

Aircraft used Cessna 182

Sensor altitude 100 m

Navigation and flight path recovery method Semi controlled photo mosaics; Geocam video camera

______

Aircraft altitude 100 m Line Spacing 100 m

Miles flown over total area 126 Over claims only 54

GEOCHEMICAL SURVEY – PROCEDURE RECORD

Numbers of claims from which samples taken ______

______

______

Total Number of Samples ______

Type of Sample ______
(Nature of Material)

Average Sample Weight ______

Method of Collection ______

______

Soil Horizon Sampled ______

Horizon Development ______

Sample Depth ______

Terrain ______

______

Drainage Development ______

Estimated Range of Overburden Thickness ______

______

______

SAMPLE PREPARATION

(Includes drying, screening, crushing, ashing)

Mesh size of fraction used for analysis ______

______

______

______

General ______

______

______

______

______

______

______

______

______

______

ANALYTICAL METHODS

Values expressed in: per cent ☐ p. p. m. ☐ p. p. b. ☐

Cu, Pb, Zn, Ni, Co, Ag, Mo, As,-(circle)

Others ______

Field Analysis (______ tests)

Extraction Method ______

Analytical Method ______

Reagents Used ______

Field Laboratory Analysis

No. (______ tests)

Extraction Method ______

Analytical Method ______

Reagents Used ______

Commercial Laboratory (______ tests)

Name of Laboratory ______

Extraction Method ______

Analytical Method ______

Reagents Used ______

General ______

______

______

______

______

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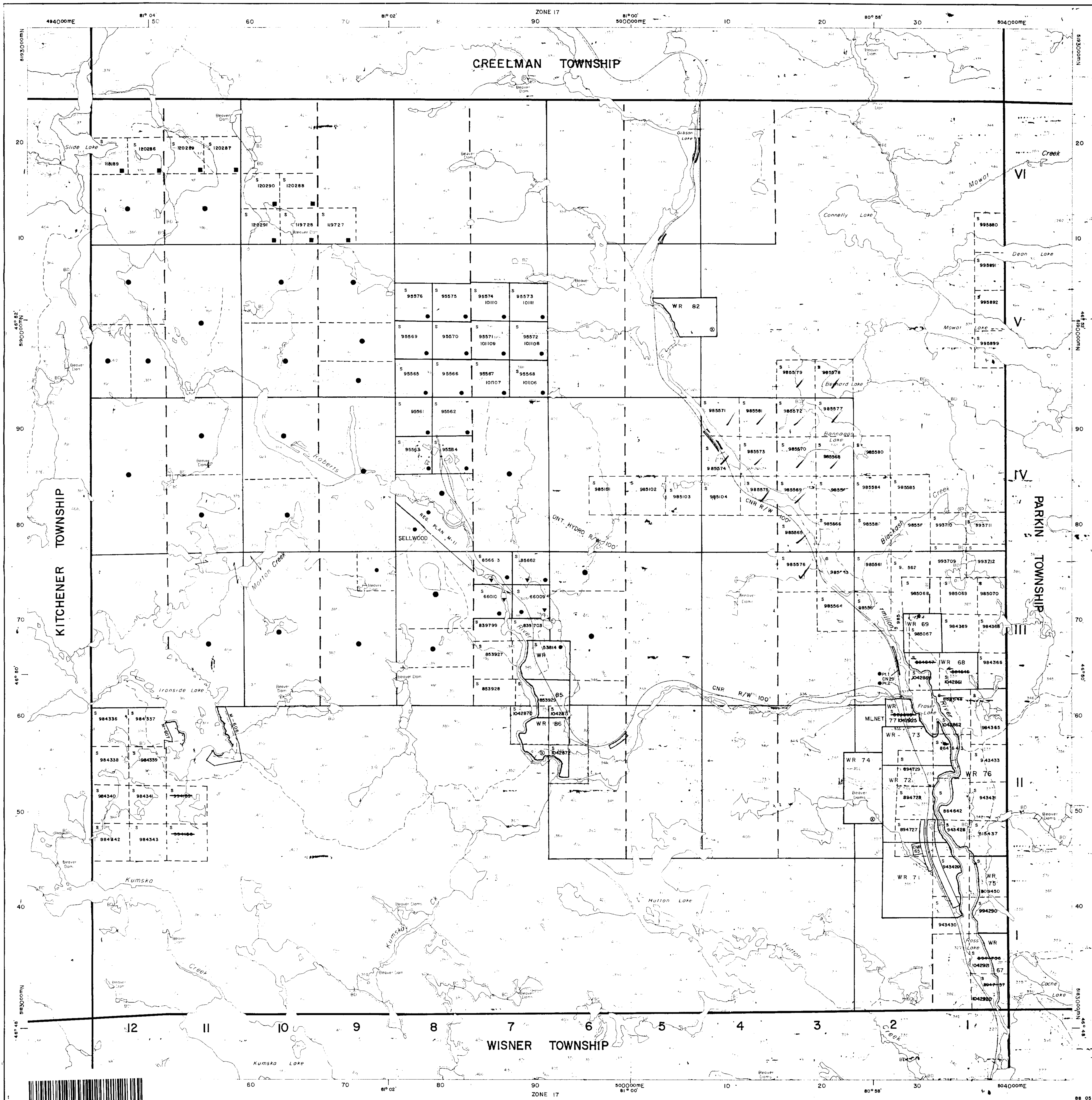

Ministry of Natural Resources — Ministry of Northern Development and Mines

Ontario

IN SERVICE FEBRUARY 10, 1989

INDEX TO LAND DISPOSITION

PLAN

G-4066

TOWNSHIP

HUTTON

M.N.R. ADMINISTRATIVE DISTRICT

SUDBURY

MINING DIVISION

SUDBURY

LAND TITLES/REGISTRY DIVISION

SUDBURY

Scale 1:20 000

Metres 1000 0 1000 2000 Metres

Feet 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 Feet

Contour Interval 10 Metres

AREAS WITHDRAWN FROM DISPOSITION

MRO - Mining Rights Only

SRO - Surface Rights Only

M + S - Mining and Surface Rights

Description	Order No.	Date	Disposition	File

SYMBOLS

Boundary
- Township, Meridian, Baseline
- Road allowance; surveyed
- shoreline
- Lot/Concession; surveyed
- unsurveyed
- Parcel; surveyed
- unsurveyed
- Right-of-way; road
- railway
- utility
- Reservation

Cliff, Pit, Pile

Contour
- Interpolated
- Approximate
- Depression

Control point (horizontal)

Flooded land

Mine head frame

Pipeline (above ground)

Railway; single track
- double track
- abandoned

Road; highway, county, township
- access
- trail, bush

Shoreline (original)

Transmission line

Wooded area

NOTE

LOTS 1 TO 6, CONCESSIONS I TO 6 MAY BE STAKED IN THE SAME MANNER AS MINING CLAIMS IN UNSURVEYED TERRITORY. MAY 16,1946—FILE 83.5—MINING ACT SEC. 45 R.S.O 1980 (52 A 1946)

LAND REQUIRED FOR RAILWAY PURPOSES SHOWN THUS:

FILES 4826 & 4841

PARTS OF CON. 1, 2, 4, 5 & 6 SUBDIVISION ANNULLED.

DISPOSITION OF CROWN LANDS

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

Cancelled

Reservation

Sand & Gravel

DATE OF ISSUE
FEB 10 1989
SUDBURY
MINING RECORDER'S OFFICE

Map base and land disposition drafting by Surveys and Mapping Branch, Ministry of Natural Resources.

The disposition of land, location of lot fabric and parcel boundaries on this index was compiled for administrative purposes only.

41I15SW0136 2.12228 HUTTON

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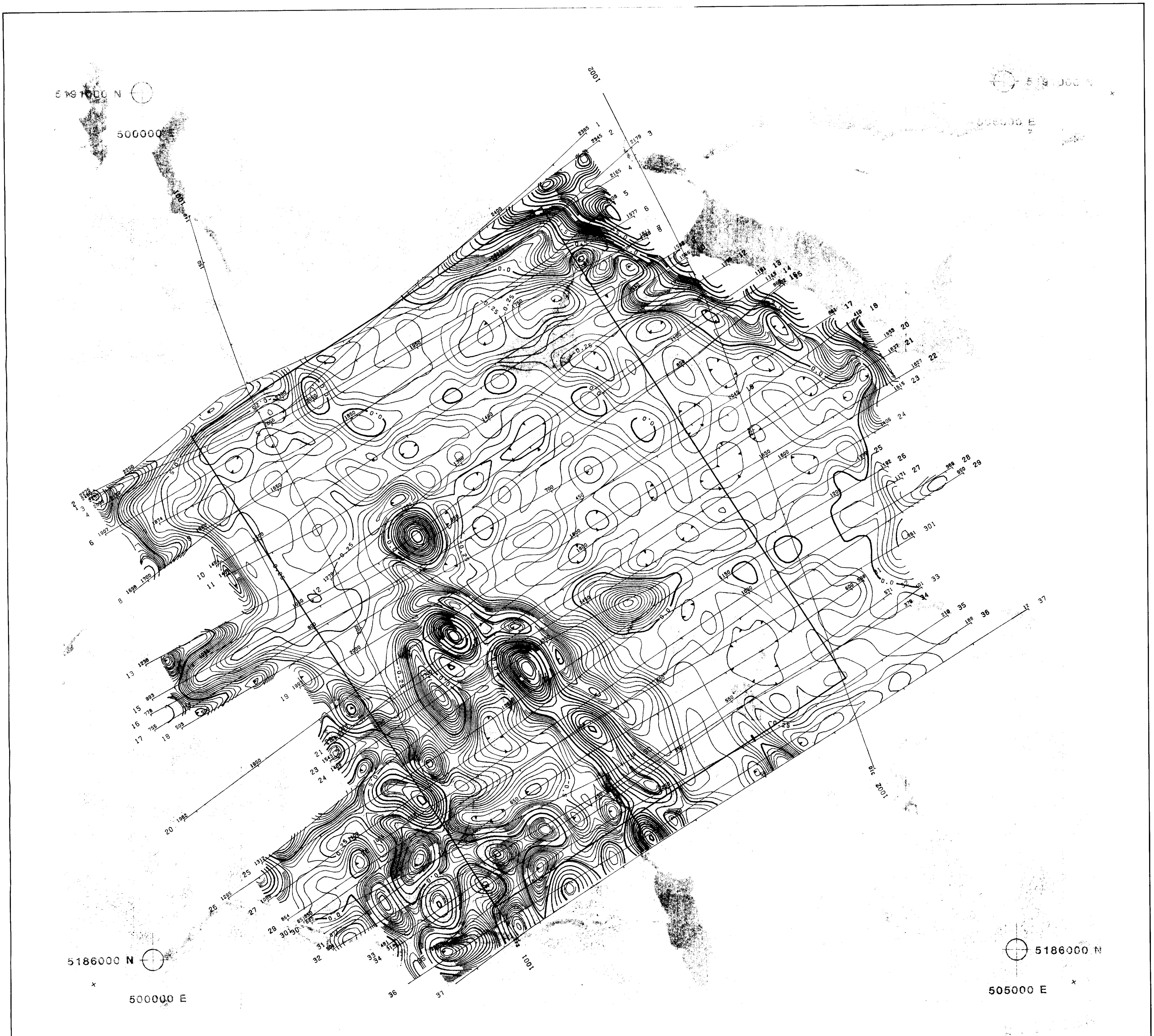

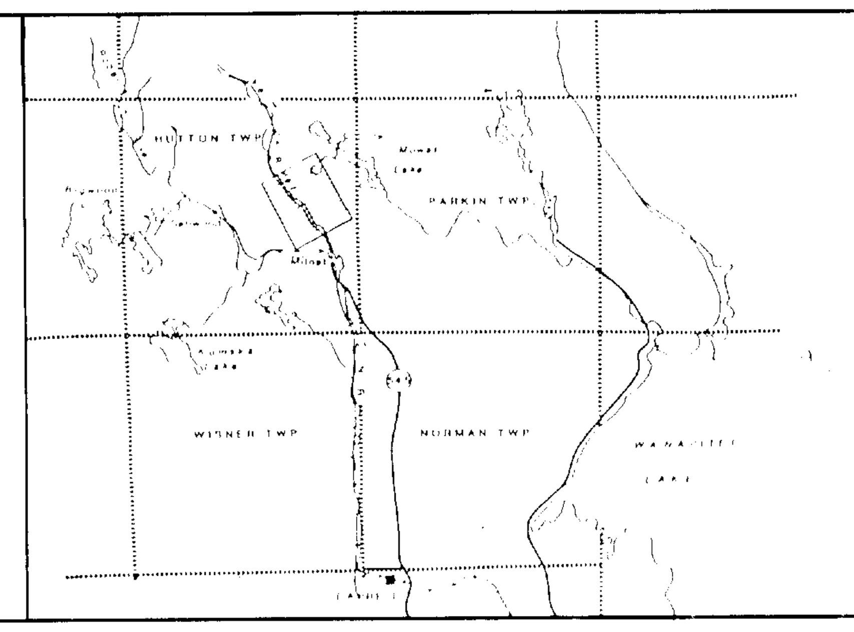

LEGEND

Terrain Clearance	100 metres
Line Spacing	100 metres
Property Boundary	———

VERTICAL MAGNETIC GRADIENT

2.500 gammas/metre	———
0.500 gammas/metre	———
0.100 gammas/metre	———
0.025 gammas/metre	- - -

IMPERIAL METALS CORPORATION

AIRBORNE MAGNETIC SURVEY

VERTICAL MAGNETIC GRADIENT
Calculated From Total Field

BANNAGAN PROPERTY
HUTTON TWP. ONTARIO

N.T.S. NO. 42I/15	DRAWING NO. A-814-2
SCALE 1:10,000	DATE January 1989

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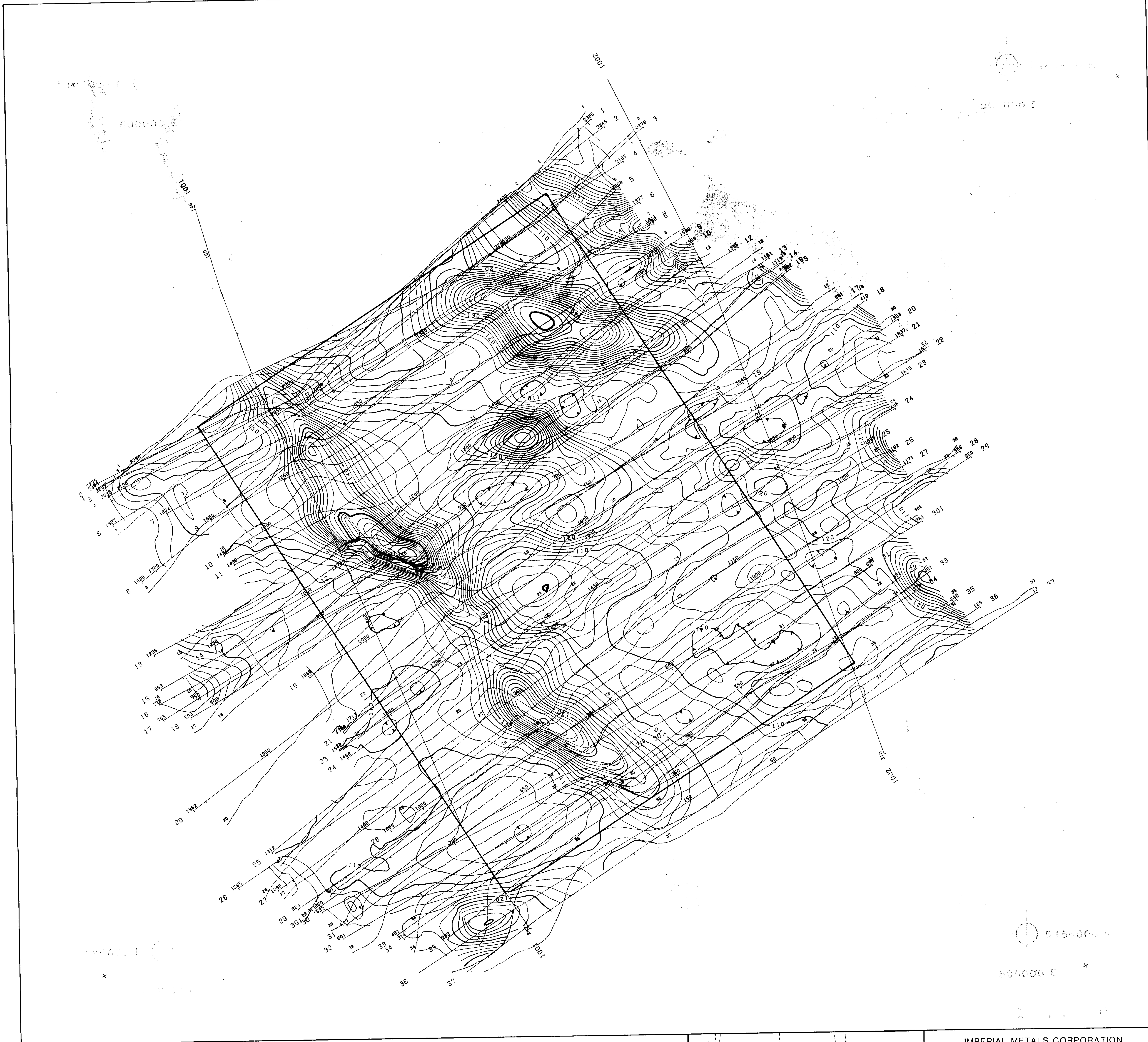


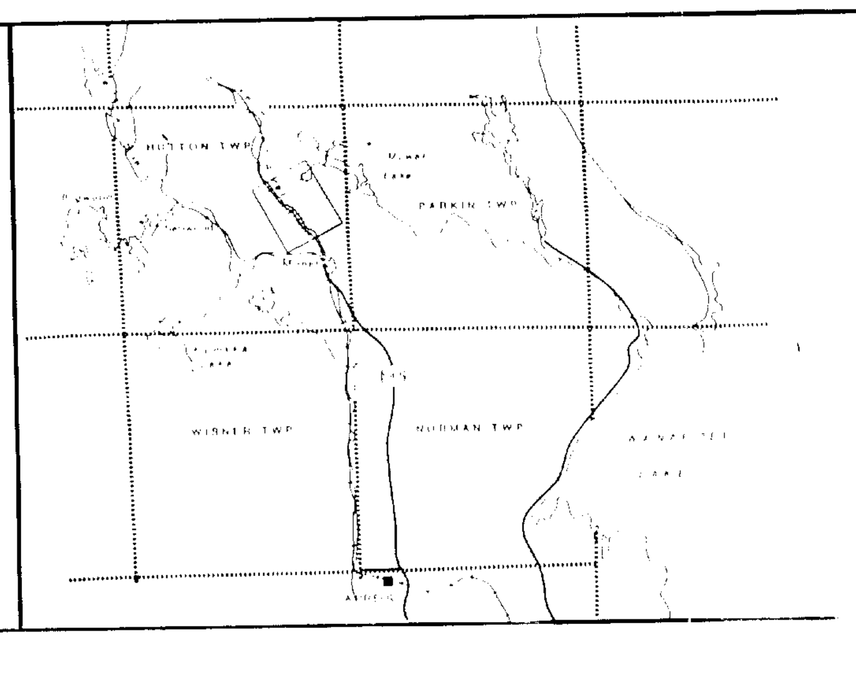
LEGEND

Terrain Clearance .... 100 metres
Line Spacing .... 100 metres
Property Boundary

TOTAL FIELD STRENGTH (Contours)
50%
10%
2%

QUADRATURE (Profiles Along Flight Lines)
Normal Slope — Reverse Slope
+ 10% / Flight Line / − 10%

VLF Transmitter
A Cutler, 24.0 kHz
muth 098



IMPERIAL METALS CORPORATION

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

BANNAGAN PROPERTY
HUTTON TWP. ONTARIO

N.T.S. NO. 42I/15	DRAWING NO. A-814-3
SCALE: 1:10,000	DATE: January 1989

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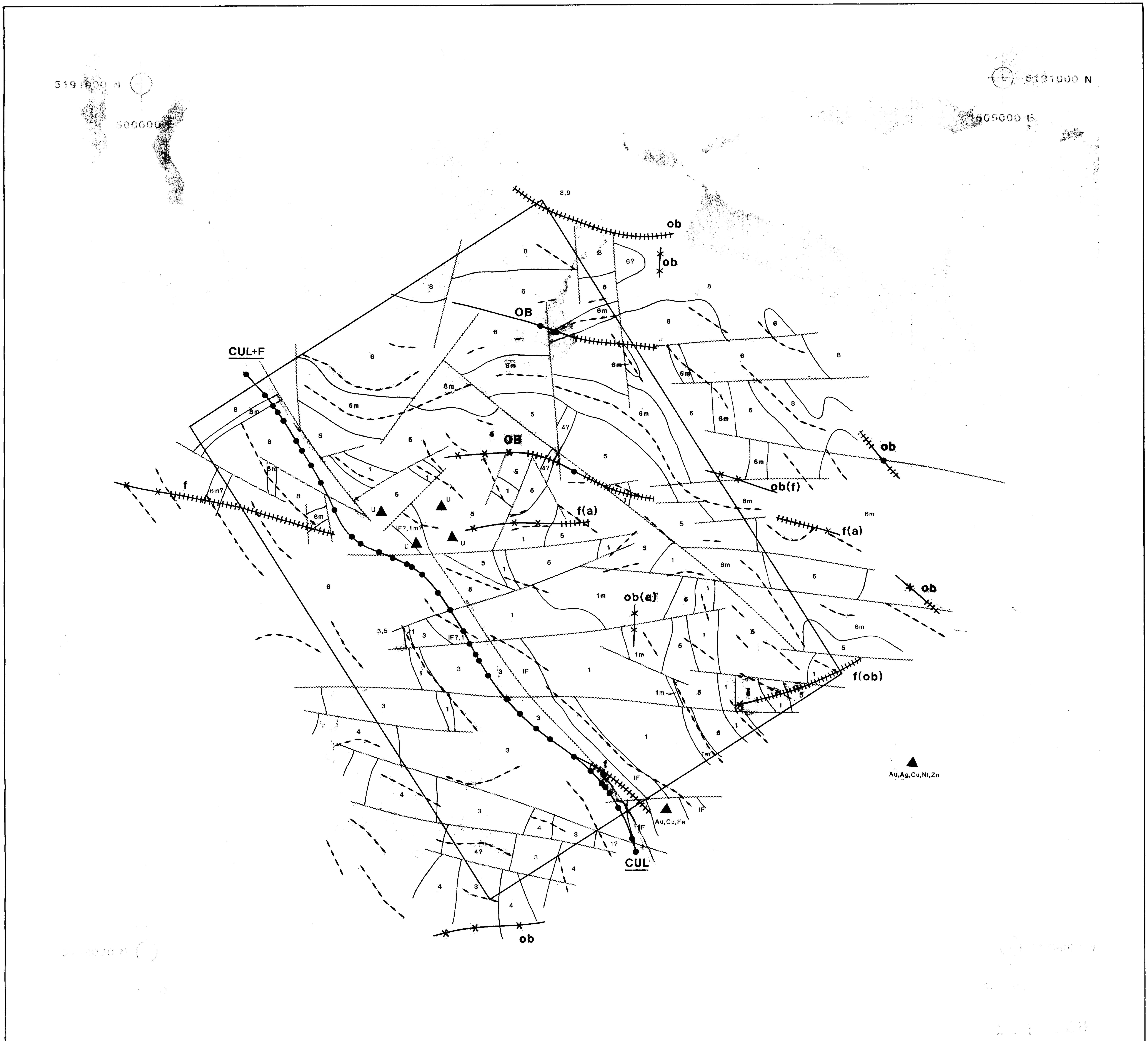

41I15SW0136 2.12228 HUTTON

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VLF Transmitter
NAA Cutler, 24.0 kHz
Azimuth 098

PROTEROZOIC

9	Gowganda Formation
8m	Magnetic unit within 8.
8	Serpent Formation
6m	Magnetic unit within 6.
6	Bruce Formation
5	Mississagi Formation

ARCHEAN

4	Mafic Intrusives
3	Granitic Rocks
1m	Magnetic unit within 1.
1	Mafic Metavolcanics
IF	Iron Formation

LEGEND

Terrain Clearance .... 100 metres
Line Spacing .... 100 metres
Property Boundary

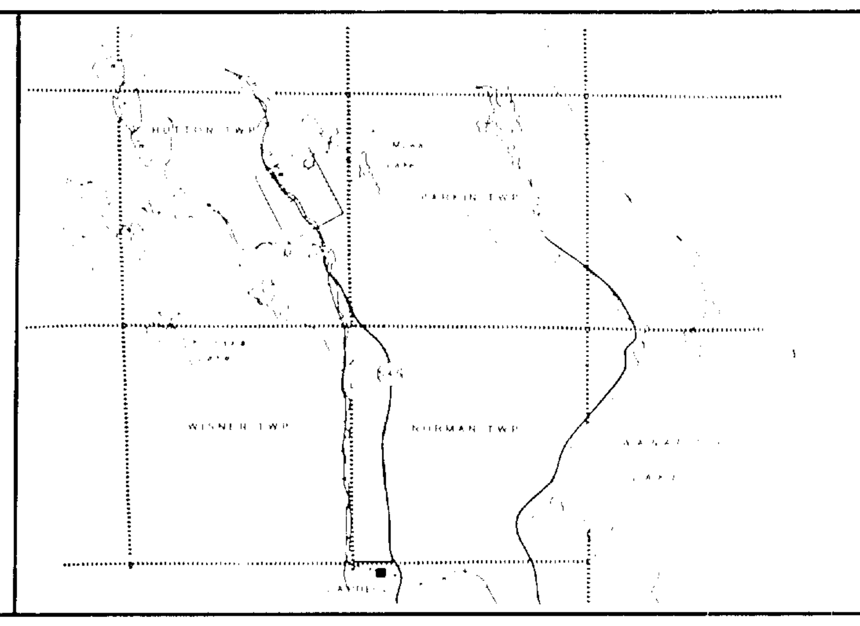
INTERPRETATION

Contact
Fault
Leading edge of shadow image of vertical magnetic gradient.

VLF-EM Conductor Axes

Normal Quadrature
Reverse Quadrature
Total Field Only

See text for classification of VLF-EM conductor axes



IMPERIAL METALS CORPORATION

AIRBORNE MAGNETIC SURVEY
INTERPRETATION

BANNAGAN PROPERTY
HUTTON TWP. ONTARIO

N.T.S. NO. 42I/15 | DRAWING NO. A-814-4
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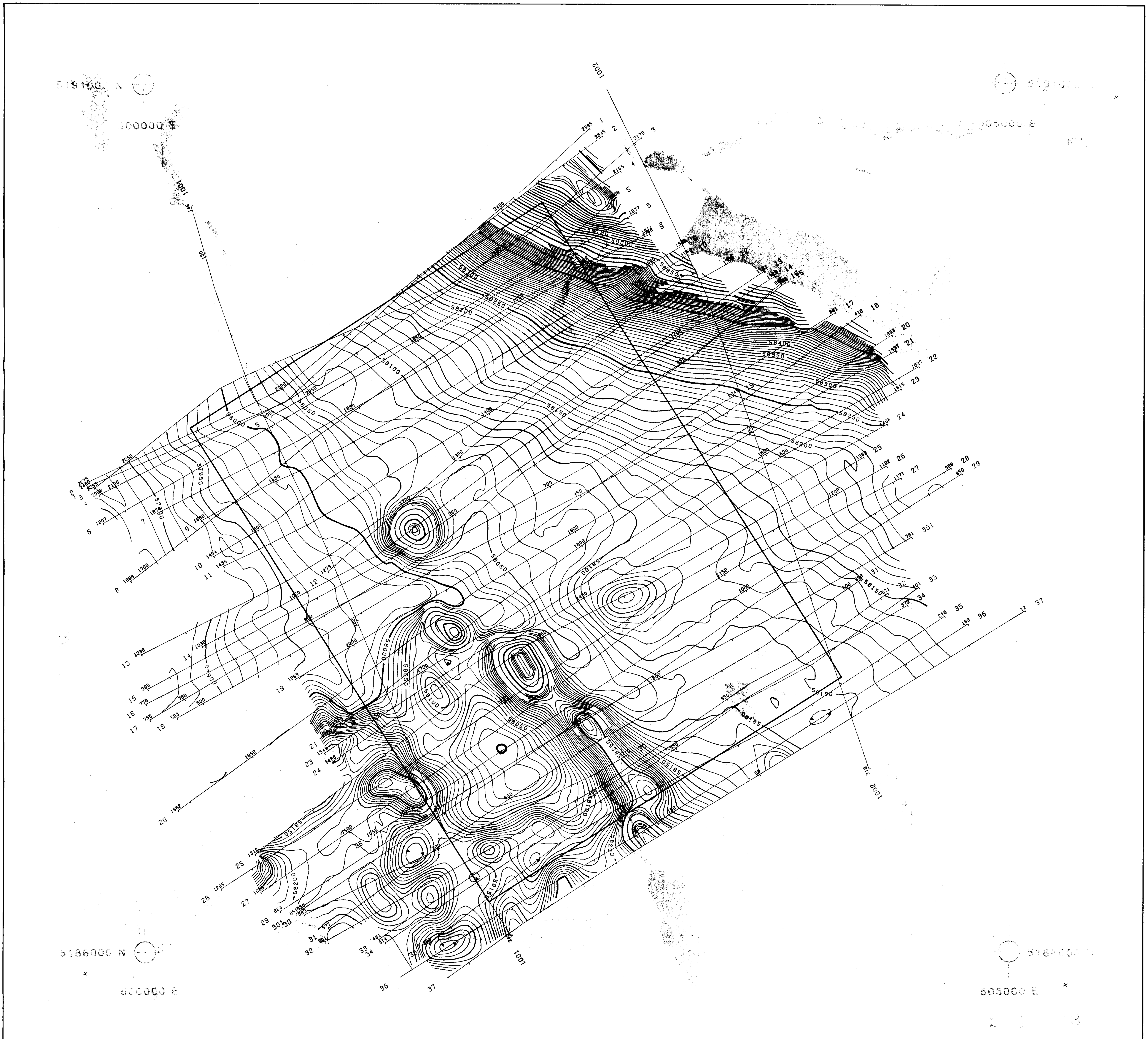
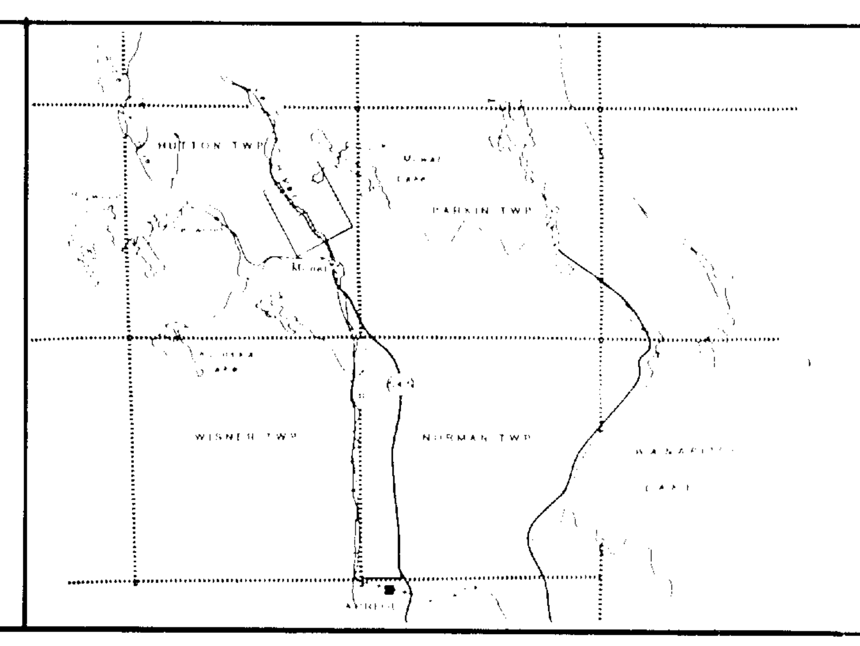


LEGEND

Terrain Clearance	100 metres
Line Spacing	100 metres
Property Boundary	

TOTAL MAGNETIC FIELD

1000 gammas	
250 gammas	
50 gammas	
10 gammas	



IMPERIAL METALS CORPORATION

AIRBORNE MAGNETIC SURVEY
TOTAL MAGNETIC FIELD

BANNAGAN PROPERTY
HUTTON TWP. ONTARIO

N.T.S. NO. 42I/15	DRAWING NO. A-814-1
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