Assessment Report

Airborne INPUT Electromagnetic & Magnetometer Survey

NIMP GROUP

(Nimpkish #1 1059(12); Nimpkish #2 1060(12);
Nimp 1067(1)

Nanaimo Mining Division
92L/7W

50°21'N 126°28'W

For

MINTEK RESOURCES LIMITED

By

Stephen P. Quin, B.Sc., ARSM
Mining Geologist

MINTEK RESOURCES LIMITED

Robert DeCarle B.A.Sc.
Chief Geophysicist

Questor Surveys Limited

February 1983

Table of Contents

List of Illustrations

MINTEK RESOURCES LTD.

NIMPKISH CLAIMS

NTS 92 L

PROPERTY LOCATION MAP

0 100 200 MILES
0 100 200 300 KILOMETRES

PAMICON DEVELOPMENTS LTD.

DRAWN	PROJECT	DATE	FIG.
PAMICON	NIMPKISH	FEB. 83	1

1. INTRODUCTION

Mintek Resources owns a copper gold showing on the east shore of Nimpkish Lake, North-Central Vancouver Island, B.C. See Figure 1.

On July 7, 1982 Questor Surveys Limited flew a helicopter borne INPUT EM and magnetometer survey over the property, totaling 33.7 line kilometres.

2. THE PROPERTY

The claims consist of two 2-post claims and one modified grid claim of 16 units overlapping. The claims are:

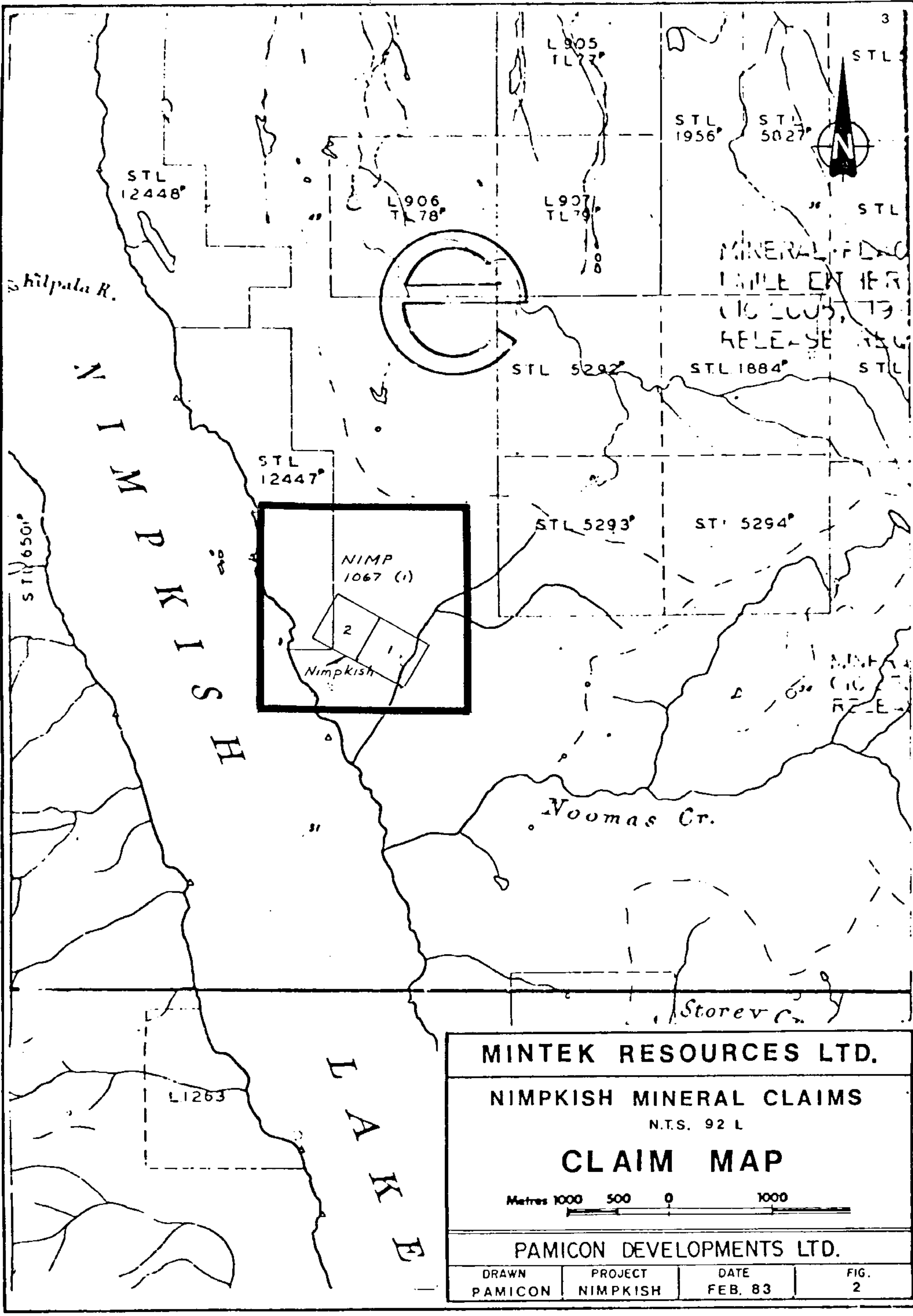
Name	Units	Record No.
Nimpkish #1	1	1059(12)
Nimpkish #2	1	1060(12)
Nimp		1067(1)

They were grouped as the Nimp Group on December 23, 1982. See Figure 2.

3. ITEMIZED COST STATEMENT

33.7km of airborne INPUT EM and magnetometer.

Survey	$ 9,575
Mobilization Fee	1,950
	$11,525



MINTEK RESOURCES LTD.

NIMPKISH MINERAL CLAIMS

N.T.S. 92 L

CLAIM MAP

Metres 1000 500 0 1000

PAMICON DEVELOPMENTS LTD.

DRAWN	PROJECT	DATE	FIG.
PAMICON	NIMPKISH	FEB. 83	2

4. STATEMENT OF QUALIFICATIONS

I, Stephen Paul Quin, of 1504 - 1260 Nelson Street, Vancouver, B.C. state that

a) I am a permanent employee of Mintek Resources Ltd. with offices at suite 104 - 1055 Dunsmuir Street, Vancouver, B.C.

b) I graduated from the Royal School of Mines, London, Great Britain, with a Bachelor's Honours degree in Mining Geology in 1980.

c) I have been employed by Mintek Resources Ltd. and its predecessor, Cathedral Minerals Ltd., for a period of two-and-a-half years, since graduation.

28 February 1983.

Stephen P. Quin B.Sc., ARSM
Mining Geologist

NAME	:	ROBERT J. deCARLE
OCCUPATION	:	Chief Geophysicist
EDUCATION	:	Graduated from Lakehead University in 1967 receiving a Mining Technology Diploma. Michigan Technological University - B.A.Sc. in Geophysics, 1970.
PROFESSIONAL AFFILIATIONS	:	Society of Exploration Geophysicists Canadian Institute of Mining & Metallurgy Canadian Exploration Geophysical Society (KEGS)
EXPERIENCE	:	1965 — Summer spent with Noranda Mines Ltd., as underground scram helper.
	:	1966 — Summer spent with Anaconda American Brass carrying out electromagnetic and magnetic surveys in Ontario.
	:	1967-69 — Summers spent with Hudson Bay Exploration and Development Co., as a geophysical technician and prospector.
	:	1970-Present — Joined Questor Surveys Limited as a Geophysicist. Responsible for reduction of airborne data both in the field and in-house. Also carried out interpretation and report writing. Became Chief Geophysicist in 1975, responsible for all data reduction personnel, geophysicistts and geologists associated with airborne surveys.
COUNTRIES WORKED IN	:	Canada, United States, South Africa.
LANGUAGES SPOKEN	:	English, French.
PASSPORT #	:	FB 334746 Expires June 16, 1986.

5. GEOPHYSICAL REPORT

The complete report on the Nimpkish survey is included here.

HELICOPTER INPUT E.M. SURVEY

IMPERIAL METALS CORPORATION

NIMP AREA, VANCOUVER ISLAND

BRITISH COLUMBIA

FILE NO: 24H35D SEPTEMBER, 1982

Questor Surveys Limited, 6380 Viscount Road, Mississauga, Ontario L4V 1H3

CONTENTS

INTRODUCTION

This report contains the results of a helicopter MK VI INPUT survey flown in the Nimp Area, Vancouver Island, British Columbia, on July 7, 1982.

A brief description of the survey procedure is included.

The survey mileage was 33.7 line kilometres and the survey was performed by QUESTOR SURVEYS LIMITED. The survey aircraft was a Bell 205 Helicopter C-GLMC and the operating base was Campbell River, British Columbia.

The area outline is shown on a 1:50,000 map at the end of this report. This is part of the National Topographical Series, Sheet Number 92L/7.

The following were the personnel involved with the airborne survey:

Pilot - Dan Davis
Navigator - Bill Smith
Operator - Dennis Borsoi
Engineer - Laughin Currie
Geophysicist - Robert de Carle

SURVEY PROCEDURE

Terrain clearance was maintained as close to 122 metres as possible, with the E.M. Bird at approximately 45 metres above the ground. Rough terrain could be a factor for the helicopter not being at 122 metres. A normal S-pattern flight path using approximately one half kilometre turns was used. Consecutive lines were flown in alternate directions for the sole purpose of interpreting dipping conductors. This phenomenon will be dealt with later.

A line spacing of 150 metres was used over the entire survey area with an approximate east-west flight direction.

The equipment operator logged the flight details and monitored the instruments. It was the responsibility of the geophysicist to maintain and check the ground magnetic station, Geometrics G-806, which was recording the daily diurnal changes. The results of these recordings have been included in the final shipment.

MAP COMPILATION

The base map for navigation and flight path recovery was supplied to the contractor by the client. These mylars were at a scale of approximately 1:10,000. The final map was reproduced at a scale of 1:10,000 on stable transparent film from which white prints can be made. A copy of the map layout is located on each sheet using topographical reference numbers. The map sheet is a 4.5 minute photographic quadrangle.

Flight path recovery was accomplished by comparison of the 35mm half frame film with the mosaic in order to locate the fiducial points. Most picked points are between 400 and 600 metres depending on the difficulty of the area, some picked points are much in excess of this figure.

DATA PRESENTATION

The results of the INPUT survey are presented to the client in the following manner:

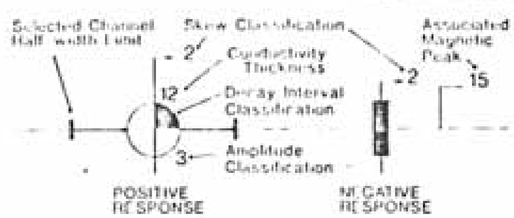
- a blank 4.5 minute photographic base at a scale of 1:10,000;
- a photographic base showing combined INPUT anomalies, half peak width of channel 2, conductive overburden, selected targets, skew classification and flight lines at a scale of 1:10,000;
- a clear overlay showing the contoured form of the total magnetic field at a scale of 1:10,000.

See Appendix for a comprehensive description of the interpretational approach used in helicopter INPUT surveys.

QUESTOR's conventional form for presenting the helicopter INPUT data on a base map is as follows and is self-explanatory.

DECAY INTERVAL CLASSIFICATION:

- 1 Channel (340 microseconds)
- 2 Channel (540 microseconds)
- 3 Channel (840 microseconds)
- 4 Channel (1,240 microseconds)
- 5 Channel (1,740 microseconds)
- 6 Channel (2,340 microseconds)



RESULTS

The survey block is located approximately 125 kilometres west of Campbell River, British Columbia with the area centered on co-ordinates 126° 57' and 50° 25'. The small area bounds on the east shore of Nimpkish Lake.

Geologically, the rock types in the area have been described as being basaltic and andesitic lavas, agglomerates, breccias and tuffs. These rock units are considered part of the Karmutsen Group (Upper Triassic). Overlying this rock unit are crystalline limestone, along with minor volcanic rocks of the Quatsino Formation. These rock types are also considered to be part of the Upper Triassic age group. Intruded into this environment are Upper Jurassic intrusions of quartz monzonite, granodiorite, quartz diorite and diorite. It has been stated by Gunning (1932) that there are two principal types of mineralization within this type of environment; (1) that which occurs in the limestone or underlying volcanic rocks at or very close to the contact of the quartz diorite, and (2) certain lead-zinc-copper replacement bodies in the limestone. This was the description for an area to the south of this survey block known as the Smith Group. "The first mentioned are typical contact metamorphic deposits. The country rock has been largely or entirely converted to a mixture of silicates including garnet, epidote, pyroxene, actinolite and chlorite with or without crystalline calcite. The metallic minerals, including pyrrhotite, chalcopyrite, magnetite, pyrite and zinc blende, are irregularly distributed in this altered zone. By far, the most important showings of this type lie in the limestone." With this type of mineralized horizon within this survey block, it would be difficult, if not impossible, to intercept such a conductor with the INPUT system. The mineralized zones are irregular in strike continuity, have narrow widths and display only fair conductivity. "The second type of mineralization consists of galena, sphalerite, pyrrhotite, chalcopyrite and pyrite and it follows the contact of the Quatsino limestone with underlying volcanic rocks."

There were very few INPUT anomalies intercepted in this survey block which could be related to the above mineralized environment. If galena-sphalerite predominates with lesser amounts of pyrrhotite and pyrite, this type of mineralization will produce only a poor response, if one at all. From the descriptions by Gunning, the zones are altered to a great degree with numerous fault zones offsetting the ore.

Referring to line 40050, it will be noted that there is an anomaly at the extreme end of the flight line. It is in an area where the helicopter, in all probability, is in a turn so the location of the intercept is unknown. In fact, the anomaly will be located somewhere off the east end, well beyond the map. I am mentioning this aspect to make aware to the client, the existence of a conductor in this direction. Intercept 40070B is extremely weak and further work based on the INPUT response is not warranted. Intercept 40080A (ZONE 1), displays a little better response and may be related to a bedrock source. It also has magnetic correlation and thus one may suspect pyrrhotite as being the cause. Referring to the geology map, it will be noted that the axis of the conductor correlates with or is very close to the contact between the Karmutsen volcanics and the overlying Quatsino Formation. A reconnaissance survey is suggested but on a low priority basis only. Intercept 40100A displays an extremely weak electromagnetic response and further work is not recommended in this area.

A number of responses were picked up along the west boundary of the survey block. These correlate with and are caused by the railway tracks. The slight stagger or herringbone effect which results when lines are flown in opposite directions is related to the absence of an extra second lag for cultural effects.

In summary, only one possible zone should be considered in any future ground programme, this being ZONE 1.

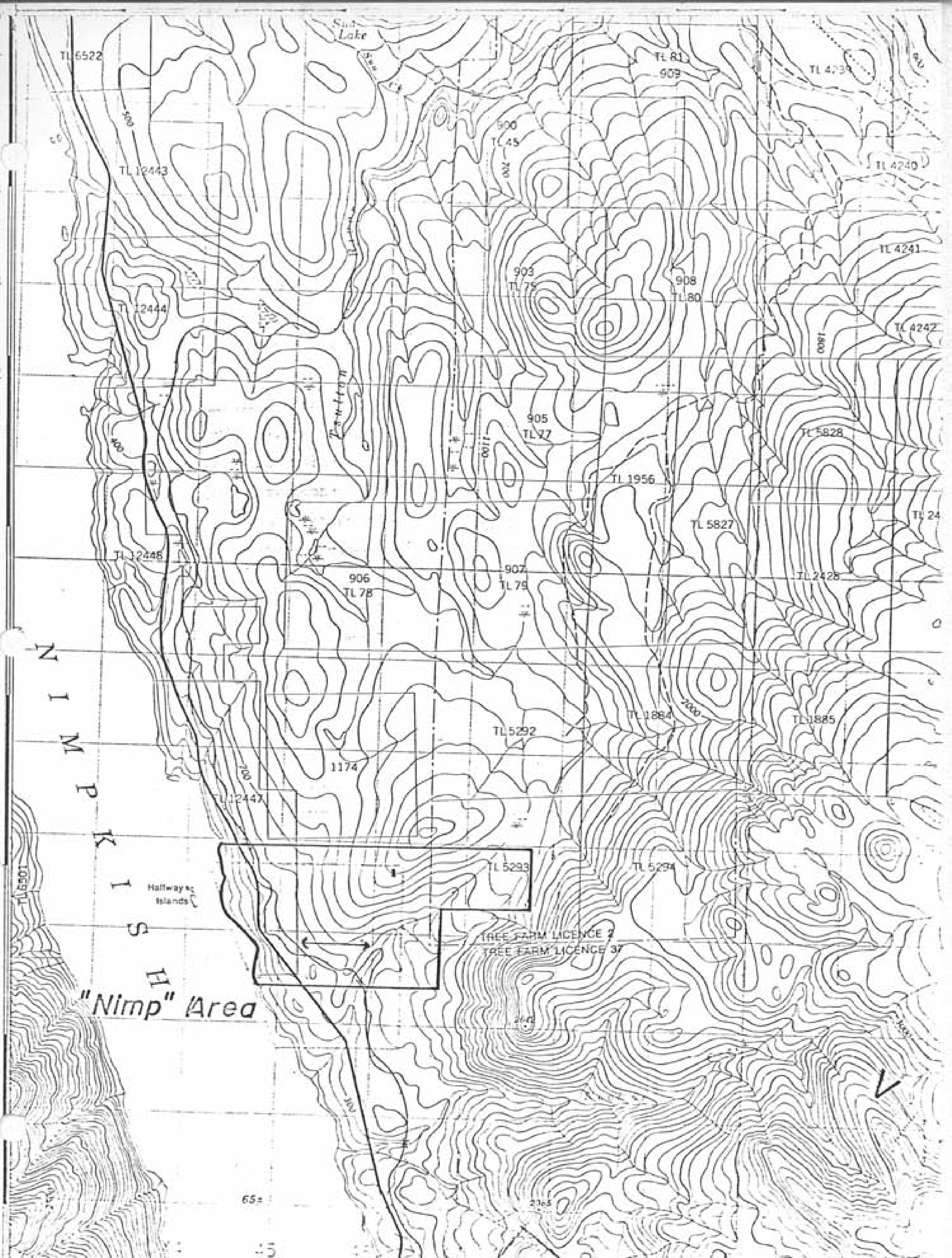
R.J. de Carle

R.J. de Carle,
Chief Geophysicist.

References

Gunning, H.C., 1932, Preliminary Report on the Nimpkish Lake Quadrangle, Vancouver Island, British Columbia; Geological Survey of Canada, Summary Report 1931, pt. A, pp. 22-35.

Hoadley, J.W., 1953, Geology and Mineral Deposits of the Zeballos - Nimpkish Area, Vancouver Island, British Columbia, Geological Survey of Canada, Memoir 272.



TL 6522
TL 12443
TL 12444
TL 12448
TL 12447
TL 6501
TL 81
909
900
TL 45
TL 4240
TL 4241
903
908
TL 80
TL 4242
905
TL 77
TL 5828
TL 1956
TL 5827
906
TL 78
907
TL 79
TL 2428
TL 1884
TL 1885
TL 5292
1174
TL 5293
TL 5294
TREE FARM LICENCE 2
TREE FARM LICENCE 37
Halfway Islands
N I M P K I S H
"Nimp" Area

APPENDIX

EQUIPMENT

The helicopter is equipped with a Mark VI INPUT (R) E.M. system and Sonotek P.M.H. 5010 Proton Magnetometer. Radar altimeters are used for vertical control. The outputs of these instruments together with fiducial timing marks are recorded by means of galvanometer type recorders using light sensitive paper. Thirty-five millimeter half frame cameras are used to record the actual flight path.

BARRINGER/QUESTOR MARK VI INPUT (R) SYSTEM

The Induced Pulse Transient (INPUT) system is particularly well suited to the problems of overburden penetration. Currents are induced into the ground by means of a pulsed primary electromagnetic field which is generated in a transmitting loop around the helicopter. By using half sine wave current pulses and a loop of large turns-area, the high output power needed for deep penetration is achieved.

The induced current in a conductor produces a secondary electromagnetic field which is detected and measured after the termination of each primary pulse. Detection is accomplished by means of a receiving coil towed behind the helicopter on two hundred and fifty feet of cable, and the received signal is processed and recorded by equipment in the helicopter. Since the measurements are in the time domain rather than the frequency domain common to continuous wave systems, interference effects of the primary transmitted field are eliminated. The secondary field is in the form of a decaying voltage transient originating in time at the termination of the transmitted pulse. The amplitude of the transient is, of course, proportional to the amount of current induced into the conductor and, in turn, this current is proportional to the dimensions, the conductivity and the depth beneath the helicopter.

The rate of decay of the transient is inversely proportional to conductivity. By sampling the decay curve at six different time intervals, and recording the amplitude of each sample, an estimate of the relative conductivity can be obtained. By this means, it is possible to discriminate between the effects due to conductive near-surface materials such as swamps and lake bottom silts, and those due to genuine bedrock sources. The transients due to strong conductors such as sulphides exhibit long decay curves and are therefore commonly recorded on all six channels. Sheet-like surface materials, on the other hand, have short decay curves and will normally only show a response in the first two or three channels.

The samples or gates are positioned at 340, 540, 840, 1240, 1740 and 2340 micro-seconds after the cessation of the pulse. The widths of the gates are 200, 200, 400, 400, 600 and 600 micro-seconds respectively.

For homogeneous conditions, the transient decay will be exponential and the time constant of decay is equal to the time difference at two successive sampling points divided by the log ratio of the amplitudes at these points.

SONOTEK P.M.H. 5010 PROTON MAGNETOMETER

The magnetometers which measure the total magnetic field have a sensitivity of 1 gamma and a range from 20,000 gammas to 100,000 gammas.

Because of the high intensity field produced by the INPUT transmitter, the magnetometer results are recorded on a time-sharing basis. The magnetometer head is energized while the transmitter is on, but the read-out is obtained during a short period when the transmitter is off. The precession frequency is being recorded and converted to gammas during the 0.2 second interval when there is no power in the transmitter loop.

For this survey, a lag factor has been applied to the data. Magnetic data recorded on the analogue records at fiducial 10.00 for example would be plotted at fiducial 9.95 on the mosaics.

DATA SYMBOLOGY

The symbols used to designate the anomalies are shown in the legend on each map sheet and the anomalies on each line are lettered in alphabetical order in the direction of flight. Their locations are plotted with reference to the fiducial numbers on the analog record.

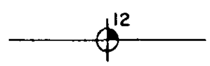
A sample record is included to indicate the method used for correcting the position of the E.M. Bird and to identify the parameters that are recorded.

All the anomaly locations, magnetic correlations, conductivity-thickness values and the amplitudes of channel number 2 are listed on the data sheets accompanying the final maps.

POSITIVE ANOMALY SYMBOL

A symbol ascribed to spatially represent the position of peak response amplitude from a conventional secondary field direction. The convention is based on the response type most frequently detected with the geometrical configuration of the system.

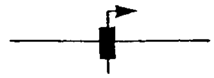
CONDUCTIVITY-THICKNESS



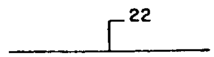
A numerical value based on a ratio between early and late channel amplitudes. It normalizes the DECAY INTERVAL CLASSIFICATION against the AMPLITUDE CLASSIFICATION to derive a value based on the temporal rate of decay of the secondary field.

SELECTED CHANNEL HALF WIDTH LIMIT

A planimetric representation of the profile-derived half-width of a positive response. It may also be used to indicate the group half-width of multiple responses.

NEGATIVE ANOMALY SYMBOL 

A symbol ascribed to spatially represent the position of peak response amplitude from a reverse secondary field direction- (see POSITIVE ANOMALY SYMBOL)

ASSOCIATED MAGNETIC PEAK 

A symbol ascribed to spatially represent the position and magnitude of a magnetic susceptibility anomaly proximate to a recognized conductivity anomaly. For purposes of plotting simplifications, only positive monopoles and the positive component of dipolar responses are mapped in this manner.

GENERAL INTERPRETATION

The INPUT system will respond to conductive overburden and near-surface horizontal conducting layers in addition to bedrock conductors. Differentiation is based on the rate of transient decay, magnetic correlation and the anomaly shape together with the conductor pattern and topography.

Power lines sometimes produce spurious anomalies but these can be identified by reference to the monitor channel.

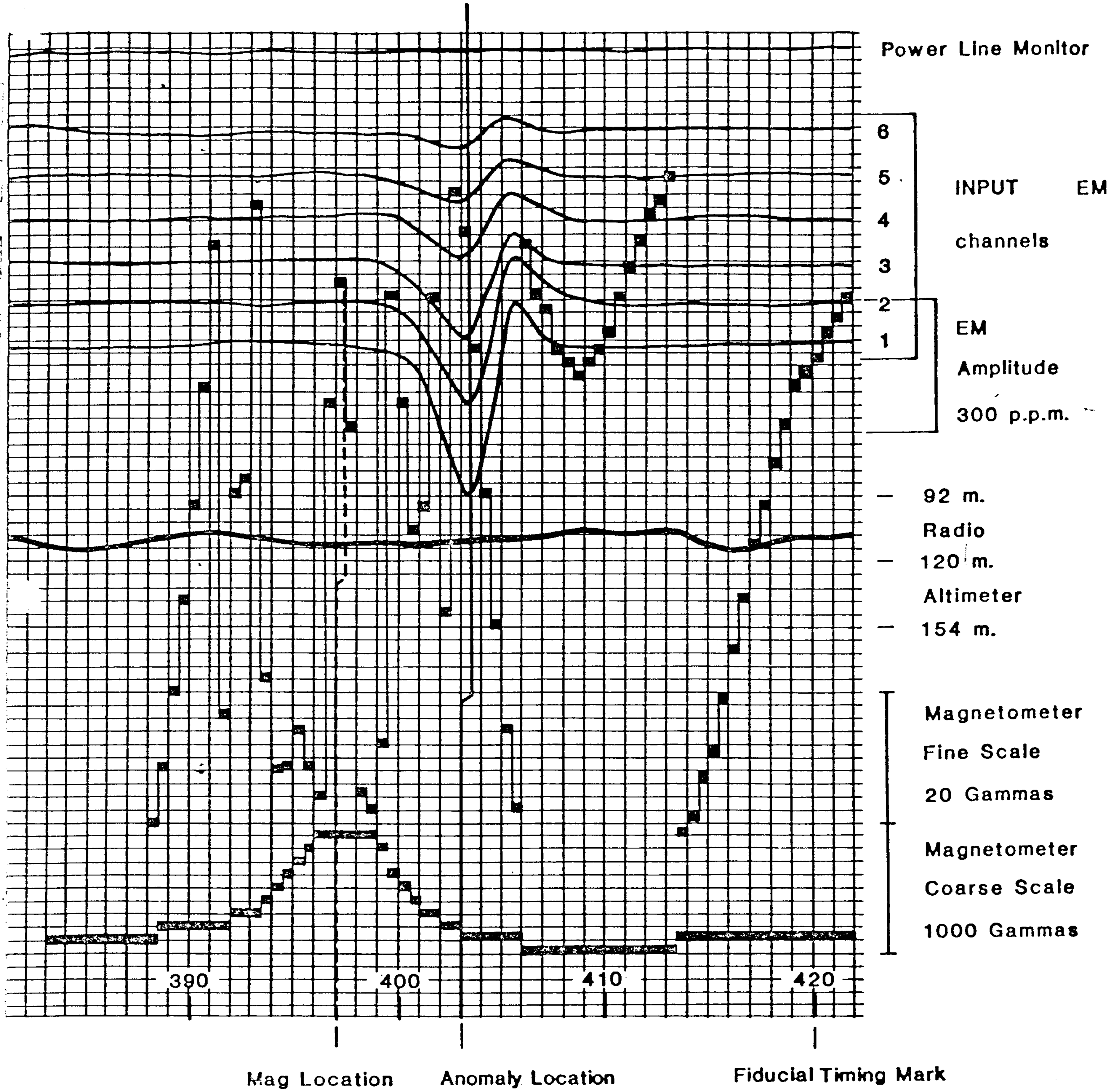
Railroad and pipeline responses are recognized by studying the film strips.

Graphite or carbonaceous material exhibits a wide range of conductivity. When long conductors without magnetic correlation are located on or parallel to known faults or photographic linears, graphite is most likely the cause.

Contact zones can often be predicted when anomaly trends coincide with the lines of maximum gradient along a flanking magnetic anomaly. It is unfortunate that graphite can also occur as relatively short conductors and produce attractive looking anomalies. With no other information than the airborne results, these must be examined on the ground.

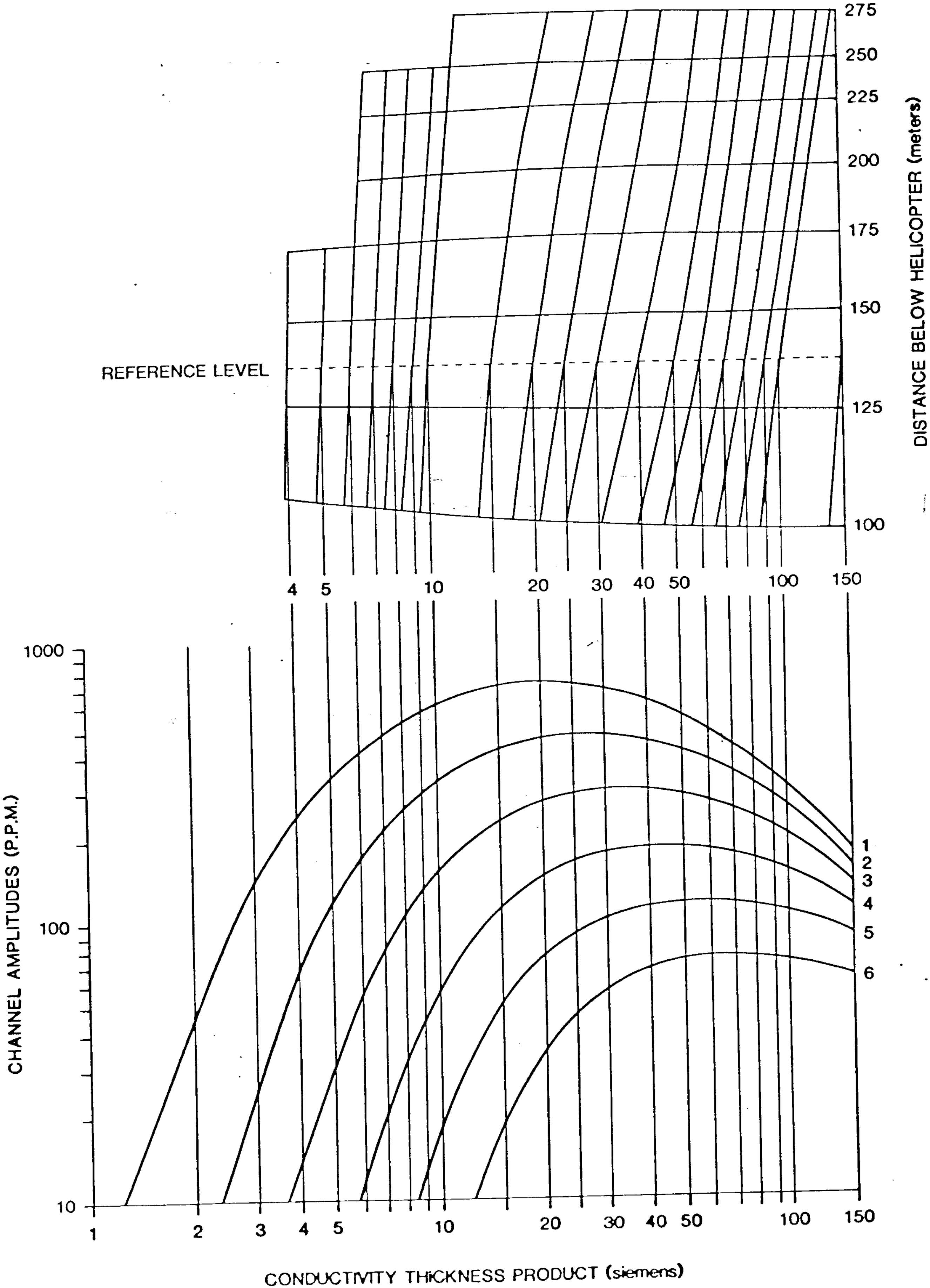
Serpentinized peridotites often produce anomalies with a character that is fairly easy to recognize. The conductivity which is probably caused in part by magnetite, is fairly low so that the anomalies often have fairly large response on channel # 1, they decay rapidly and they have strong magnetic correlation. INPUT E.M. anomalies over massive magnetites show a relationship to the total Fe content. Below 25-30%, very little or no response at all is obtained but as the percentage increases the anomalies become quite strong with a characteristic rate of decay which is usually greater than that produced by massive sulphides.

Commercial sulphide ore bodies are rare and those that respond to helicopter survey methods usually have medium to high conductivity. Limited lateral dimensions are to be expected and many have magnetic correlation caused by magnetite or pyrrhotite. Provided that the ore bodies do not occur within formational conductive zones as mentioned above, the anomalies caused by them will usually be recognized on an E.M. map as priority targets.



Representative INPUT Magnetometer and Altimeter Recording

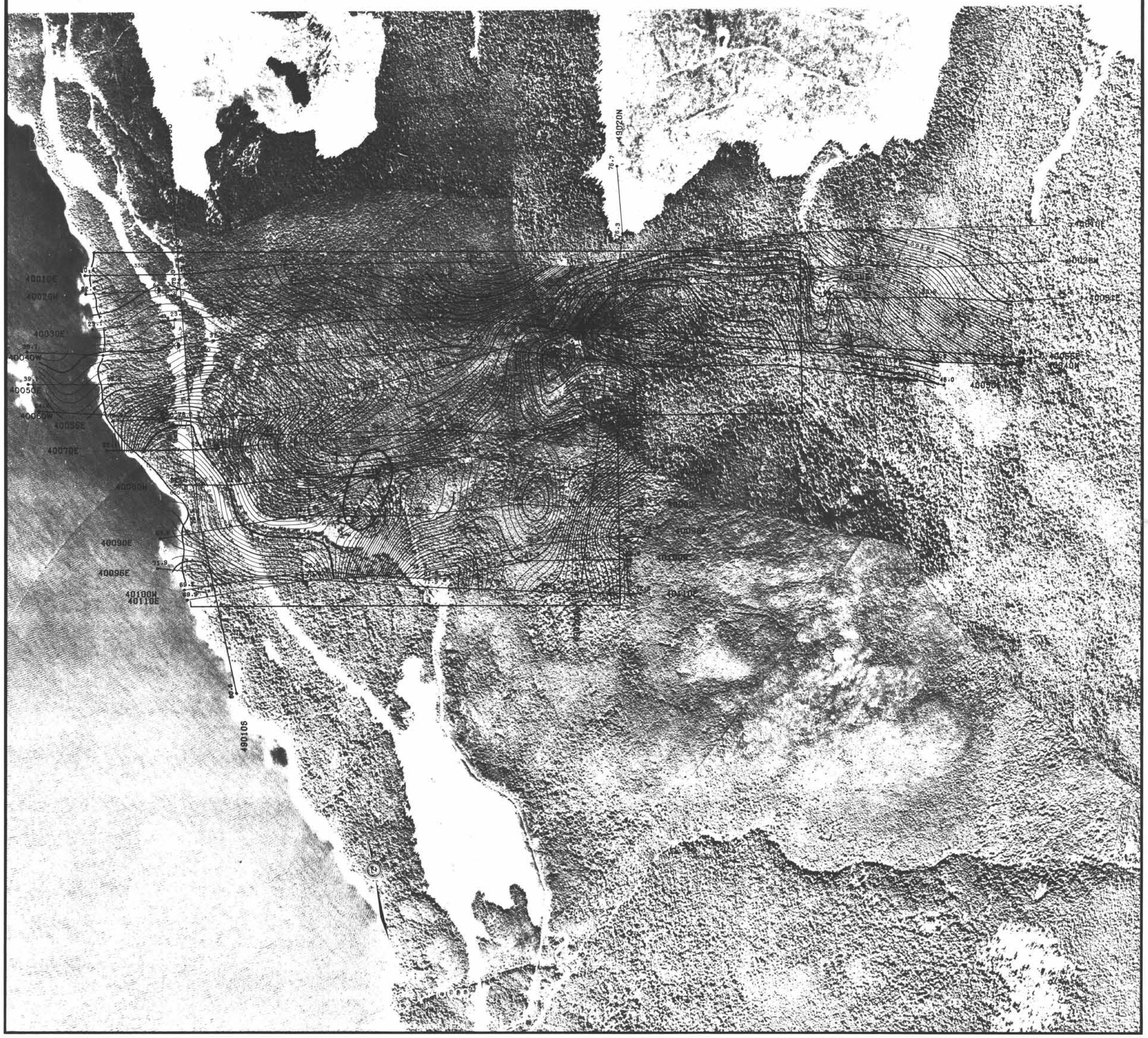
HELICOPTER INPUT
VERTICAL HALF PLANE
CONDUCTIVITY / DEPTH NOMOGRAM



HORIZONTAL COIL 24H35 BLOCK D

	ANOMALY	FIDUCIAL	CHANNELS	HALF WIDTH LEFT	HALF WIDTH RIGHT	HW	AMPLITUDE CLASS	SKEW	SIG-T	ASSOCIATED MAG POSITION	MAGNETIC VALUE
C	40010A	11.15	2	-	-	-	1	-	NC	10.85	330
C	40020A	22.00	4	-	-	-	1	-	10	21.95	300
C	40030A	24.05	3	-	-	-	1	-	10	23.70	300
C	40040A	37.80	4	-	-	-	1	-	15	37.70	240
C	40050A	40.45	3	-	-	-	1	-	9	40.25	280
C	40055A	78.22	2	-	-	-	1	-	NC	78.35	400
C	40055B	78.60	2	-	-	-	1	-	NC	-	-
C	40060A	53.55	4	-	-	-	1	-	15	53.45	320
C	40070A	55.85	4	-	-	-	1	-	14	55.40	470
	40070B	58.25	1	-	-	-	-	-	NC	57.95	200
	40080A	61.55	2	-	-	-	1	-	NC	61.55	90
C	40080B	62.55	3	-	-	-	1	-	15	61.65	650
C	40090A	64.10	3	-	-	-	1	-	7	63.40	660
	40090B	64.78	1	-	-	-	-	-	NC	64.65	60
	40100A	67.00	2	-	-	-	1	-	NC	67.25	90
	40100B	68.05	3	-	-	-	1	-	11	-	-
	40110A	71.70	2	-	-	-	1	-	NC	71.85	150
	49010A	78.35	2	-	-	-	1	-	NC	-	-
	49010B	78.90	2	-	-	-	1	-	NC	-	-
	49010C	78.35	2	-	-	-	1	-	NC	-	-
	49020A	74.45	2	-	-	-	1	-	NC	-	-

Note: C denotes cultural effects (road or railway).



INPUT

DECAY INTERVAL CLASSIFICATION

1 Channel (340 microseconds)
2 Channel (540 microseconds)
3 Channel (840 microseconds)
4 Channel (1240 microseconds)
5 Channel (1740 microseconds)
6 Channel (2340 microseconds)

POSITIVE RESPONSE — NEGATIVE RESPONSE

AMPLITUDE CLASSIFICATION
(UNCORRECTED FOR ALTITUDE)

Class 1 (-100 ppm)
Class 2 (100-199 ppm)
Class 3 (200-399 ppm)
Class 4 (400-1000 ppm)
Class 5 (-1000 ppm)

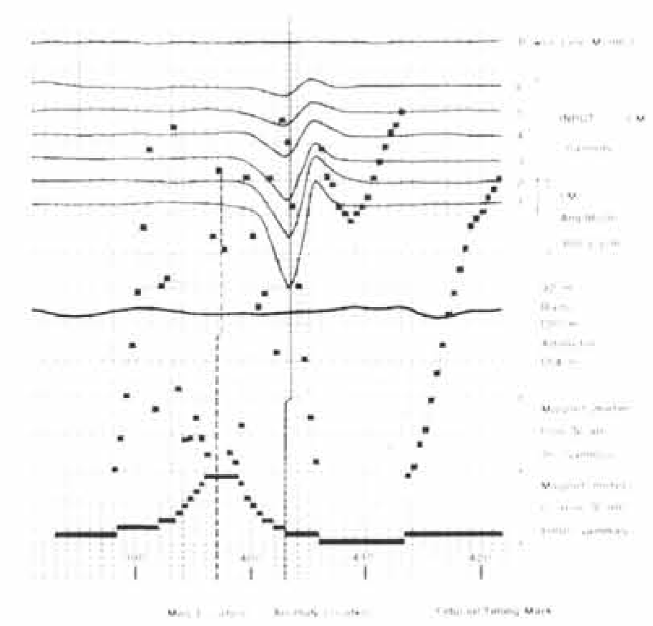
SKEW CLASSIFICATION
(DIP INDICATION)

Class 1 .25 subfiducial
Class 2 .25 - .49 subfiducial
Class 3 .50 - .74 subfiducial
Class 4 .74 subfiducial
(Arrow indicates skew direction)

10 GAMMA CONTOUR LINE
50 GAMMA CONTOUR LINE
500 GAMMA CONTOUR LINE
(1 GAMMA = 1 NANOTESLA IN SI UNITS)
MAGNETIC DEPRESSION

INTERPRETATION

Conductor Axis, with reference number (good definition)
Conductor Axis, with reference number (poor definition)
Vertical Conductor
Conductor Dip
Selected Zone, with reference number
Surficial Conductivity
Fault Zone



Representative INPUT Magnetometer and Altimeter Recording

DESCRIPTIVE NOTES

The aircraft is equipped with the Barringer/Questor Mark VI INPUT* airborne E.M. System and the Sonotek PMH 5010 Proton Precession Magnetometer and Sonotek SDS 1200 Series Data Acquisition System. The INPUT* system will respond to conductive overburden and near surface horizontal conducting layers in addition to bedrock conductors. Discrimination of conductors is based on the rate of transient decay, magnetic correlation and the anomaly shape together with the conductor pattern and topography.

* Registered Trade Mark of Barringer Research Limited

INTERPRETATION REFERENCES

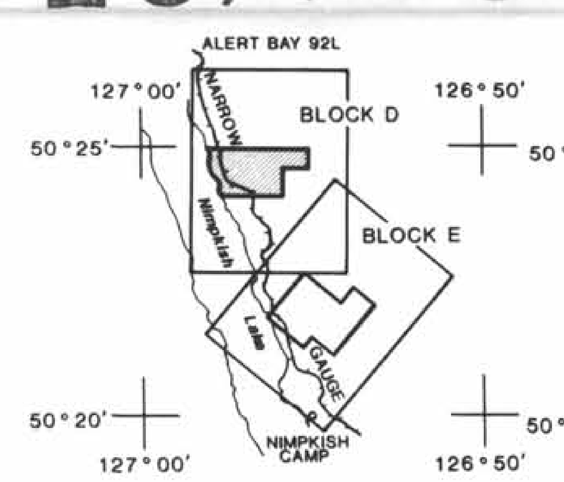
Becker, A., Gauvreau, C. and Collett, L.S.
1972 Scale Model Study of Time Domain Electromagnetic Response of Tabular Conductors. Canadian Mining and Metallurgical Bulletin. Volume 65, No. 725, p. 90-96.

Dyck, A.V., Becker, A. and Collett, L.S.
1974 Surficial Conductivity Mapping with the Airborne INPUT* System. Canadian Mining and Metallurgical Bulletin. Volume 67, No. 744, p. 104-109.

New Developments in the INPUT* Airborne E.M. System

GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,986



Approx. Scale 1: 10000

HELICOPTER MK VI INPUT® SURVEY
(Horizontal Coil)
TOTAL MAGNETIC INTENSITY SURVEY

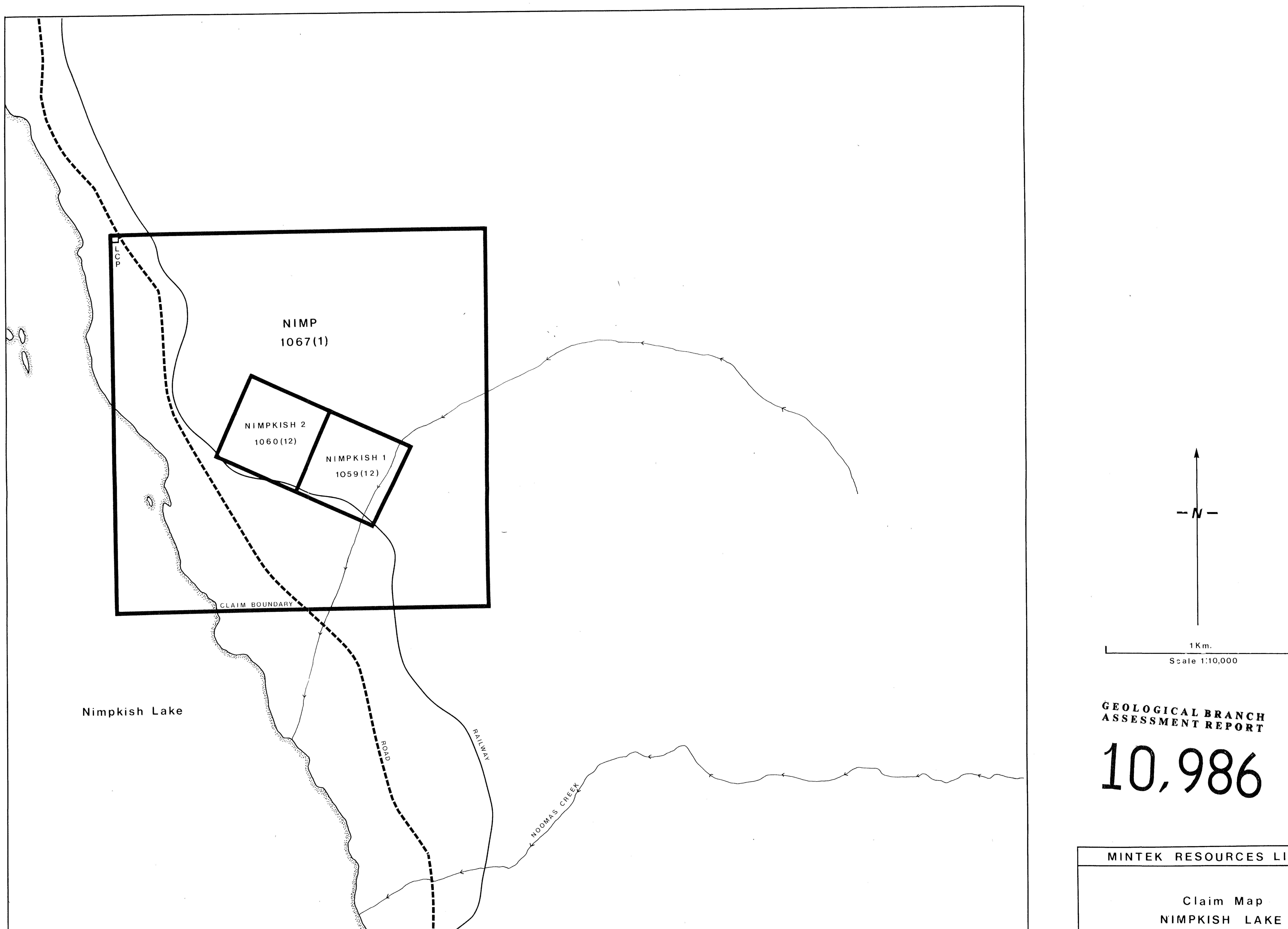
IMPERIAL METALS CORPORATION

NIMP AREA

Province of BRITISH COLUMBIA

FILE NO.	SHEET NO.	DATE	DRAWN BY
24H35D	1 of 1	July, 1982	Dataplotting Services Inc

Questor Surveys Limited
Mississauga, Ontario Canada



GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,986

MINTEK RESOURCES LIMITED		
Claim Map NIMPKISH LAKE		
NANAIMO MIN. DIV.	S.P. QUIN B.Sc.	FEB 1983