2205

REPORT ON AIRBORNE GEOPHYSICAL SURVEYS PORT HARDY AREA, BRITISH COLUMBIA ON BEHALF OF GIANT EXPLORATIONS LTD.

92L/12W

by

Richard O. Crosby, B.Sc., P.Eng.
and
John P. Steele, B.Sc.

September 23, 1969

CLAIMS:
(Complete list on following page)

LOCATION:
About 30 miles west of Port Hardy
British Columbia
127° 50° 45'
Nanaimo Mining Division

DATES:
June 27 through July 1, 1969

CLAIMS:

Name		Record Number
SHEILA	1 - 14	22682 - 22695
AMY	1 - 16	22666 - 22681
SILVIA	1 - 8	18263 - 18272
ALVIS	1, 2	18525 - 18526
RAIN	1 - 4	18213 - 18216
AUDRY	2, 3	18261 - 18262
MARY	1	24599
HPH	1 - 3	8597 - 8599
LPS	1 - 4	17859 - 17862
RLH	1 - 3	17863 - 17865
TCH		18645
RAS	1 - 4	17866 - 17869
HSW	1 - 3	18640 - 18642
NORMAN	1, 2	17385 - 17304
DOLORES		18015
DEBBI		18016
DIANE		18017
DODI		18018
DOLLY		18019
DONNA		18020
GIGI		18021
JOANNE		18022
NOXIE		18023
PAGODA		18024
WEEVILS CLUB		18025
ALDERBUSH		18026
YVETTE		18529
RENEE		18528
SUN	3 - 8	16385 - 16390
TAXI	1, 2	18537 - 18538
BETTY	1 - 6	18530 - 18535
NORMA		18035
CRAB		18037
LAST POST		18039
LAST GASP		18040
ARAPAHOE		18038
JUDY		18036
RACKAFRATZ		18034
HILLSIDE		18032
OPEN UP		18030
PEA POT		18028
ONE FRACTION		8934
TWO FRACTION		18935
AMEX IT FR		18042
FINGER FR		18041

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SUMMARY

Helicopter-borne electromagnetic and magnetometer surveys were executed over approximately 15 square miles in the Nahwitti Lake - Port Hardy area, British Columbia. Ten electromagnetic conductors have been revealed. All the conductors showed association with a magnetic feature but not a direct correlation.

Lacking geological information, only general recommendations for ground follow-up have been made.

REPORT ON AIRBORNE GEOPHYSICAL SURVEYS PORT HARDY AREA, BRITISH COLUMBIA ON BEHALF OF GIANT EXPLORATIONS LTD.

INTRODUCTION

From June 27 through July 1, 1969 airborne geophysical surveys were executed on behalf of Giant Explorations Ltd. in the Nahwitti Lake area, near Port Hardy, British Columbia, covering approximately 16 square miles (see Plate 1).

The airborne survey included electromagnetic and magnetometer measurements. The former employed a Scintrex HEM-701 electromagnetic unit and the latter a Scintrex NPM-1 nuclear resonance, total intensity magnetometer.

Appendix A, attached, gives full details of the airborne geophysical equipment and the ancillary equipment employed, as well as the treatment of data resulting from these surveys. In the case of the present surveys a Hiller SL-4 helicopter, on charter from Haida Northwestern Helicopters, was employed as the basic transport vehicle.

The elctromagnetic survey lines were flown at a nominal 1/8 mile line interval. Flight navigation and flight path recovery have been based upon photomosaics on the scale of approximately 1" = 1320 feet.

The magnetometer sensor and the EM "bird" were flown separately behind the helicopter, the former 50' below the helicopter and the latter 100' below the helicopter.

The purpose of the present program was to map the distribution of the subsurface conductors in the survey area. In the survey area the targets of economic interest are metallic sulphide bodies. The electromagnetic data provide the basic information realting to the possible presence of such bodies. The purpose of the magnetometer survey results is primarily one of correlation with the electromagnetic conductors.

PRESENTATION OF DATA

The results of the geophysical surveys are presented on Plates 1, 2, 3 and 4, on the scale of 1" = 1320'. Some topographic features and flight lines are shown on the plates. Plate 1 shows the magnetic contours. The contours are at an interval of 100 gammas or less, according to magnetic relief. Plate 2 shows the electromagnetic results. Conductor half-widths and peak locations are shown, coded as described in Appendix "A". The in-phase amplitude, in-phase of out-of-phase ratio and magnetic correlation (if any) are indicated for each conductor intersection. Plate 4 shows an interpretation of geological structure on the basis of the magnetic results.

The EM and magnetometer data are presented together with altimeter and fiducial recording on a dual trace Moseley recorder. In order to record three traces on the dual trace recorder in-phase and out-of-phase utilize the same pen by alternately displaying one trace, then shifting the mean recording level and recording the other trace. The in-phase trace is displayed for a period twice that of the out-of-phase to distinguish between the traces.

The original geophysical traces are on the following scales:

EM	1" = 100 parts per million
MAGNETOMETER	1" = 100 gammas with automatic steps of 500 gammas. The magnetic base level is 57,000 gammas.

DISCUSSION OF RESULTS

The electromagnetic responses of interest obtained during the current survey are listed in Table 1. They are mainly of low amplitude and medium to low conductivity.

Conductors have been connected between flight lines where this appeared logical. All the conductors lie between two magnetic peaks which are continuous across the flight area but the conductors themselves show no magnetic character of their own. This linear magnetic feature has been interpreted to reflect a possible fault zone and the conductors are coincident with this feature. The conductors in the north central part of the survey area are coincident with the junction of two possible fault traces, and as such provide an interesting area for further study.

As a first approximation the selection of targets from the two target areas could be based upon conductivity, category, magnetic correlation, etc. and weighted by all geological information directly available to Giant Exploration Limited.

To examine selected targets on the ground and to determine their precise location, a combination of surveys on small grids, possibly comprising geological, geochemical, electromagnetic and

magnetometer investigation is recommended.

Respectfully submitted,

SEIGEL ASSOCIATES LIMITED

John P. Steele, B.Sc.
Geophysicist

Richard O. Crosby, B.Sc., P.Eng.
Geophysicist

Vancouver, B.C.
September 23, 1969

DOMINION OF CANADA:

PROVINCE OF BRITISH COLUMBIA.

TO WIT:

In the Matter of a geophysical survey on behalf of Giant Explorations Limited

I, E.M. Flett for Seigel Associates Limited

of 750 - 890 West Pender Street, Vancouver

in the Province of British Columbia, do solemnly declare that helicopter-borne electromagnetic and magnetometer surveys have been executed on some claims in the Port Hardy area, British Columbia between June 27 to July 1, 1969. The following expenses were incurred:

(1)	Wages:			
	J. Steele	5 days @ $50.00/day	$250.00	
	T. Szanto	5 days @ $35.00/day	175.00	
	R. Gibbons	5 days @ $27.50/day	137.50	
				$ 562.50
(2)	Transportation & shipping to the job			1,246.46
(3)	Transportation on the job - helicopter			2,712.50
(4)	Food & Living Expenses			479.38
(5)	Use of geophysical equipment	5 days @ $175.00/day		875.00
(6)	Paid to Seigel Associates Limited to cover geophysicist's supervision, calculating, plotting and fairdrawing data and preparation of final reports.			1,662.50
				$7,538.34

And I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act."

Declared before me at the City of Vancouver, in the Province of British Columbia, this 21 day of January, 1970, A.D.

E M Flett

A Commissioner for taking Affidavits within British Columbia or
A Notary Public in and for the Province of British Columbia.

Sub-mining Recorder

In the Matter of

Statutory Declaration

(CANADA EVIDENCE ACT)

TABLE ONE

LINE	ANOMALY	PEAK FIDUCIAL	ELECTRICAL CHARACTER	MAGNETIC CHARACTER
1	A	0039	Category 1 Poor Conductor	No
2	A	0068	" 1 Poor Conductor	No
3	A	0145	" 2 Poor Conductor	No
4	A	0162	" 2 Poor Conductor	No
5	A	0229	" 2 Poor Conductor	No
6	A	0239	" 2 Poor Conductor	No
7	B	--	CONDUCTING ZONE	No
18	B	1109	" 1 Med./Poor Cond.	No
19	B	1241	" 1 Poor Conductor	No
20	B	1333	" 1 Good Conductor	No
21	B	1465	" 1 Poor Conductor	No

APPENDIX 'A'

DESCRIPTION OF AIRBORNE SYSTEMS

ELECTROMAGNETIC SYSTEM - SCINTREX HEM-701

Equipment

The Scintrex HEM-701 is a solid state, fixed-configuration, electromagnetic system especially designed for helicopter transport. It consists of two coaxial coils, one serving as transmitter and the other as receiver, which are mounted, 30 ft. apart, in a rigid "bird" with their axes horizontal and in the direction of flight. The bird is towed approximately 100 ft. below the helicopter, by means of a suitable cable which also carried electrical signals and power to and from the bird.

The system operates at 1600 Hertz. Changes in the alternating magnetic field at the receiver coil are observed and these changes are converted into two components, one whose phase is the same as that of the transmitted signal (the "In-Phase" component) and the other whose phase is 90° apart (the "Out-of-Phase" component). These changes are expressed in terms of the normal undistorted primary field. They are so small as to be expressed usually in parts-per-million or p.p.m.

The In-Phase and Out-of-Phase variations are presented in graphic time-shared form on a single channel of a graphic recorder. The full scale chart width employed is commonly 1000 p.p.m., although in areas of low geologic noise levels 500 p.p.m. may be employed. At one or more points during each flight the scale sensitivity is checked by means of calibration signals, usually 100 p.p.m. on each trace.

The reference or "zero" level for each EM trace is an arbitrary one and is obtained empirically from the regional level of each trace. These levels may drift slowly during a flight because of temperature changes affecting the bird dimensions. These drifts are very gradual and are readily distinguishable from much quicker, local changes due to conductors of a geologic origin. Similarly, severe turbulence effects sometimes introduce low-order, primarily in-phase disturbances which are of such short period that they may also readily be distinguished from the effects of geologic conductors.

Man-made disturbances are often to be seen, including power lines, pipe lines, metal fences, railways, etc. The former are

generally recognizable as such because they usually show through as cyclic noise of irregular shape and phase relationship. Non-energized, grounded power lines (e.g. 3 phase systems) may also give rise to proper conductor indications, however. Such indications, as well as those from pipe lines and metal fences, etc. are usually of short duration and can be distinguished from proper geologic sources except for very narrow, near-surface lenses. In some instances ground investigation may be necessary in order to resolve the ambiguity of possible source. Whereas the airborne geophysical crew attempts to note visible man-made conductors of the above types, the ground moves by so rapidly at the low flight elevation employed that 100% recognition of such sources cannot be expected from the air.

The normal terrain clearance of the bird is 100 ft. - 200 ft. depending on the surface topography and tree cover, etc., with the helicopter 100 ft. above. The established useful depth of detection of the system for moderate-to-large conducting bodies is about 350 ft. sub-bird under conditions of low extraneous geologic noise, i.e. where the general level of conductivity of the overburden and rock types of the area is low. The useful depth of detection of the system is therefore between 150 ft. and 250 ft. beneath the ground surface under these conditions.

Interpretation of Results

The EM records are interpreted to determine the presence of conducting bodies and to obtain some information relating to their character. The intervalometer time marks (see below) are synchronized with the positioning camera film strip (also see below) and thereby permit the relating of the conductors with appropriate ground locations. The altimeter data (see below) indicate, for each conductor, what the terrain clearance was at the time of detection.

A plan is prepared, either using a subdued photo-mosaic ("grayflex") or an overlay from a mosaic or topographic plan as base. The flight path of each survey line is obtained by means of "tie points", which are features on the mosaic or topographic plan which are also recognizable on the positioning camera film. The flight path is interpolated between these tie points.

For each conductor the following quantities are measured and recorded.

a) Half width. This is the distance between the points of half the maximum conductor disturbance. For a very thin, steeply dipping body or pipe line, etc., the half width will be about 1.6 times its depth below the bird. If the bird is at a mean conductor clearance of 150 ft. the half width would be about 250 ft. Larger half widths reflect either more deeply buried or, more likely,

thicker conductors.

Flat-lying conductors (e.g. overburden) characteristically give large half widths.

The conductor half width is indicated on the plan by an open bar symbol along the flight line. In the event of very narrow conductors only the peak location may be shown (see below).

b) Peak Location. The in-phase conductor peak location is shown on the plan by a circle in the appropriate location. In the case of broad conductors or closely spaced multiple conductor zones there may be more than one peak, in which event all major peaks are shown. If a conductor is of short half width there may be no room for a half width bar and only the peak circle will be shown. A conductor which is likely man-made will be indicated by an X rather than by a circle.

c) In-Phase and Out-of-Phase Amplitudes. These amplitudes are scaled from the EM traces and noted in parts per million. On the flight plan, opposite each peak location (circle) will be given the peak in-phase amplitude and the ratio of peak in-phase to peak out-of-phase response (see below).

d) Conductor Coding. Conductor intersections are graded in electrical categories 1, 2 and 3, based on the in-phase amplitude but taking into account the terrain clearance. For tabular bodies such as sheet-like ore deposits, strata bound conductors and overburden, their response drops off almost in accordance with the inverse cube power of the elevation. Assuming an average 50 ft. of overburden, a category 1 conductor has a peak in-phase response equivalent to 350 p.p.m. or over at 100 ft. bird terrain clearance. A category 2 conductor has a peak in-phase response under similar conditions of between 100 p.p.m. and 350 p.p.m. A category 3 conductor has an equivalent peak in-phase response of less than 100 p.p.m.

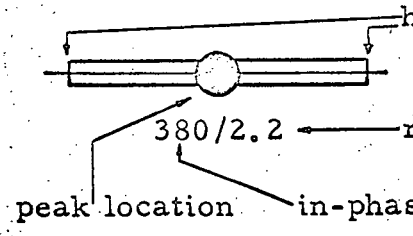
The respective peak circles are shaded to reflect their electrical category, with category 1 fully shaded, category 2 half shaded and category 3 unshaded.

For each conductor peak the ratio of peak in-phase to peak out-of-phase amplitude is calculated and plotted on

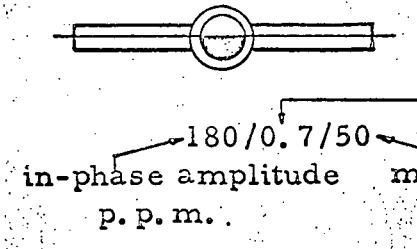
the plan. This ratio is indicative of a conductivity-size factor for the conductor. Large, high conducting bodies such as massive sulphides or graphite and sea-water, etc., generally have ratios of 3 or over. Moderate conductivity-size bodies will have ratios between 1 and 3. Poor conductivity bodies (e.g. most overburden and some sulphide and graphitic zones) will have ratios of less than 1. In areas where there is a clear differentiation in conductivity between the targets of potential economic interest and other possible conductors, the ratio is a diagnostic feature. In some areas, however, there is an overlap of conductivity ranges and then the ratio cannot be too rigidly relied upon.

Where magnetic data is available, preferably from a coincident recording magnetometer, any correlating magnetic activity will be noted for the pertinent conductor peak. A conductor peak with apparently direct magnetic correlation will be indicated by a double concentric circle. Although a conducting body which is appreciably magnetic is more likely to be a sulphide body than one which is non-magnetic, there are many very important base metal ore bodies which are quite non-magnetic.

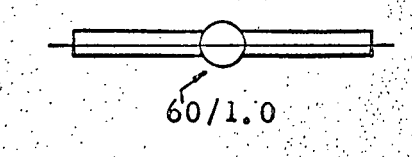
Examples of conductor coding are given below.



Category one, no magnetic correlation.



Category two, magnetic correlation.



Category three, no magnetic correlation.

X

Probably man-made conductor.

MAGNETOMETER - SCINTREX NPM-1

The Scintrex NPM-1 nuclear resonance airborne magnetometer is based on a Newmont modification of a Varian Associates magnetometer and is produced under license to both companies. It is a very light weight, solid state unit, especially designed for use in a helicopter or light fixed-wing aircraft where weight is an important consideration.

Its cycle period is 1.1 seconds. Each cycle it measures the total intensity of the earth's magnetic field and this quantity, in gammas, is recorded, in analogue form, on a suitable graphic recorder. The full scale sensitivity is usually 1000 gammas and the recorder automatically steps each 500 gammas. In very active areas a full scale sensitivity of 5000 gammas with steps of 2,500 gammas may be employed. Only the magnetic variations are actually recorded although the absolute base level may be established from the NPM-1 as well.

The magnetic sensing head may be on a cable as much as 100 ft. below the aircraft or, in some installations, may be rigidly attached to the aircraft on a suitable boom.

The intrinsic noise level of each reading is about 5 gammas.

Where it is intended to contour the NPM-1 information it is customary to fly tie lines across the survey grid. A fixed magnetic field monitor is often used as well, on the ground, primarily to indicate periods of magnetic storms during which the aeromagnetic data should be considered as unreliable.

The aeromagnetic data may be contoured if desired, using a contour interval of 25 gammas or up, depending on the amount of magnetic relief. Alternatively they may be used simply for purposes of correlation with simultaneously obtained electromagnetic data to determine which conductor zones are appreciably magnetic.

ANCILLARY EQUIPMENT

1. Altimeter

A Bonzer, high frequency solid state radioaltimeter is employed to continuously indicate the mean terrain clearance of the helicopter or other transporting aircraft. The altimeter is installed in the aircraft (unless otherwise indicated) so that the elevation of the sensing birds (electromagnetic or magnetic) will be less by the usual vertical displacement of these birds below the aircraft.

The output of the Bonzer may be expressed in analogue form on a suitable graphic recorder, or may be, for convenience, converted to a semi-digital form on a recorder side pen. In the latter event the altimeter record is a series of spaced pulses whose separation is proportional to the mean terrain clearance.

2. Positioning Camera

A Vinten Mark 3 16 mm positioning camera is employed with a wide angle lens. Photographs of the ground are taken with sufficient frequency to give a complete record of the flight path of the aircraft or helicopter. The frequency of exposure is controlled by the intervalometer referred to below.

3. Intervalometer

A Scintrex IA-2 intervalometer provides regularly spaced timing pulses which drive the positioning camera exposure mechanism and produces synchronous "fiducial marks" on the side pen of the geophysical graphic recorder or recorders. Because of the synchronization of the geophysical traces and the positioning camera it is then possible to relate the geophysical events of interest to their proper ground location. The timing pulse frequency may be adjusted in accordance with the ground speed of the aircraft so that an adequate flight path record is obtained.

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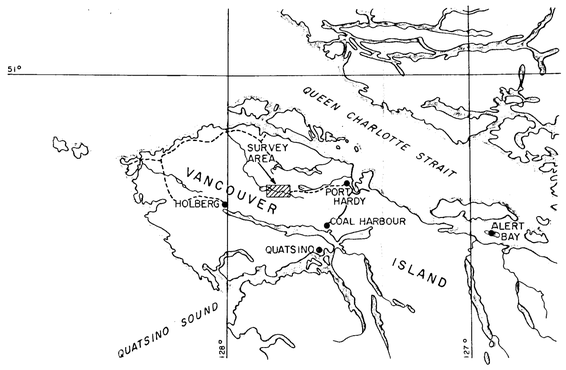


LOCATION MAP

1320 0 1320 2640 FEET
SCALE: 1" = 1320'

PLATE 3

GIANT EXPLORATIONS LIMITED (N.P.L.)

PORT HARDY AREA, BRITISH COLUMBIA

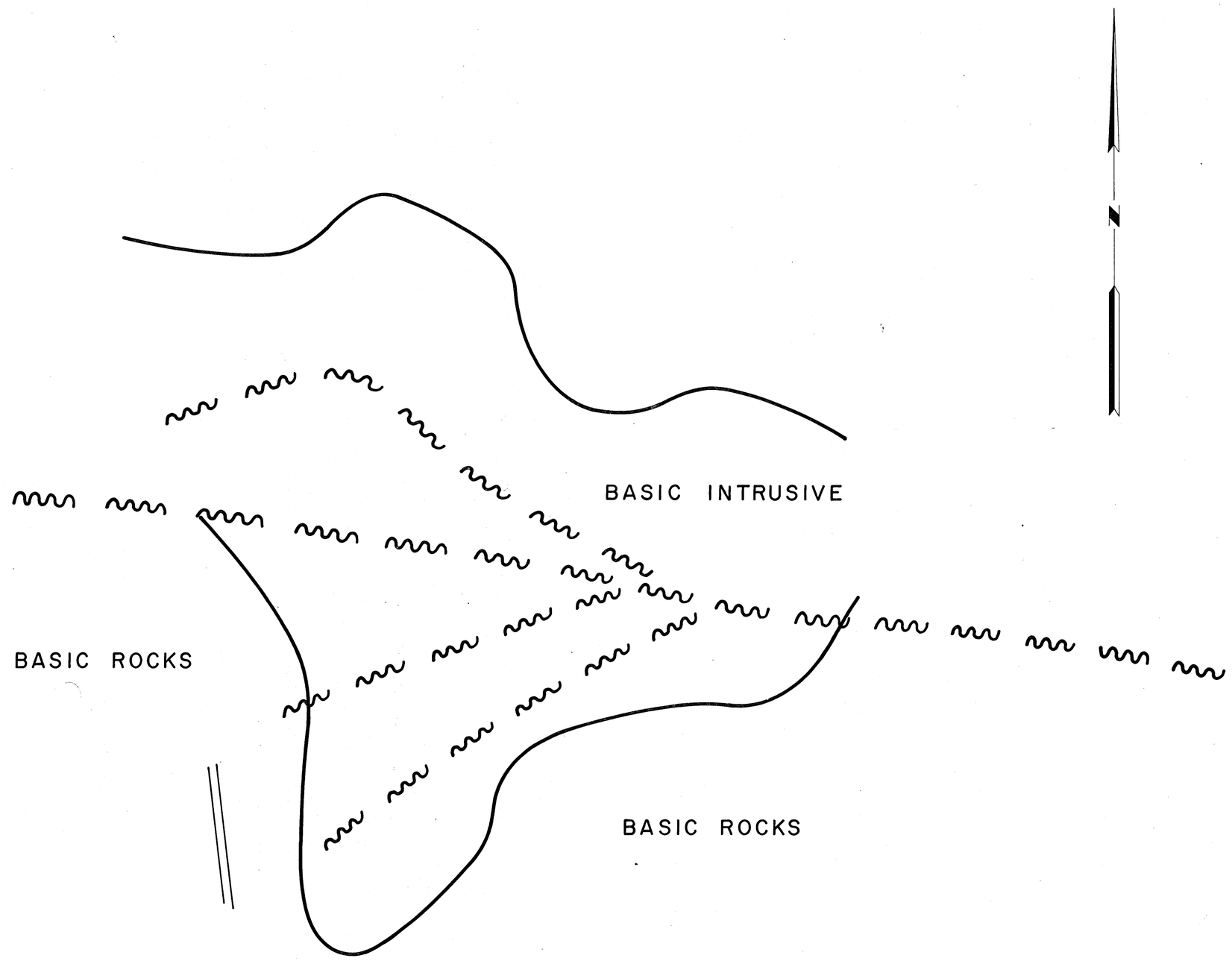
AIRBORNE GEOPHYSICAL SURVEY

CLAIMS PLAN

SCALE: 1" = 1320'

SURVEY BY SEIGEL ASSOCIATES LIMITED
FLOWN AND COMPILED JUNE-JULY, 1969
AIRCRAFT TERRAIN CLEARANCE 500'
FLIGHT LINE SPACING 600'

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA



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LEGEND

- L9 — 0427 — FLIGHT LINE, FLIGHT LINE NUMBER AND NUMBERED FIDUCIAL POINT
- 500 GAMMA ISOMAGNETIC CONTOUR INTERVAL
- 100 GAMMA ISOMAGNETIC CONTOUR INTERVAL
- MAGNETIC LOW
  BASE VALUE ARBITRARY
- RIVER
- ROAD
- PROBABLE FAULT
- GEOLOGICAL BOUNDARY
- PROBABLE DYKE

PLATE 4

GIANT EXPLORATIONS LIMITED (N.P.L.)

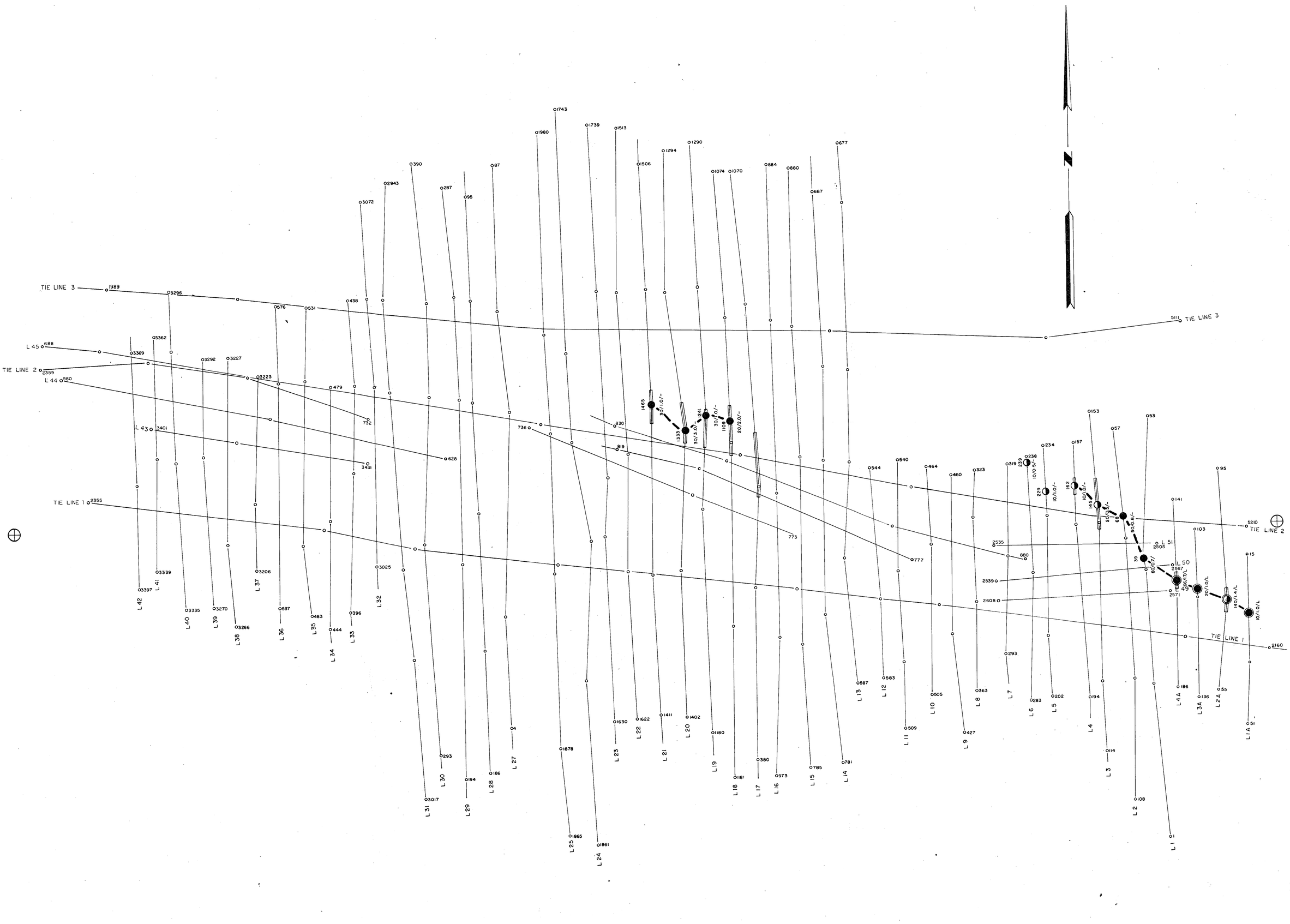
PORT HARDY AREA, BRITISH COLUMBIA

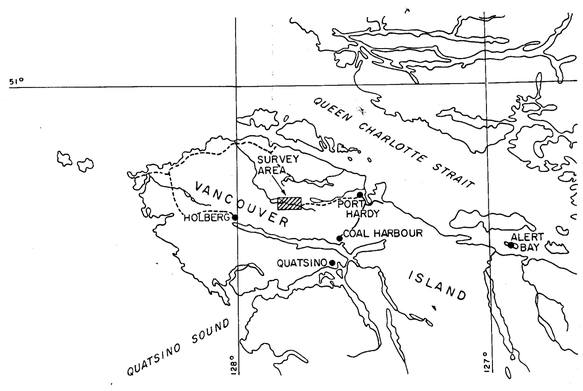
AIRBORNE GEOPHYSICAL SURVEY

GEOPHYSICAL INTERPRETATION

SCALE: 1" = 1320'

SURVEY BY SEIGEL ASSOCIATES LIMITED
FLOWN AND COMPILED JUNE-JULY, 1969





LOCATION MAP

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2205 MAP #2

1320 0 1320 2640 FEET
SCALE: 1" = 1320'

LEGEND:

- FLIGHT LINE, FLIGHT LINE NUMBER & NUMBERED CONTROL POINT
- 1st CATEGORY E.M. ANOMALY
- 2nd CATEGORY E.M. ANOMALY
- E.M. ANOMALY WITH MAGNETIC CORRELATION and 72 PPM / Ratio of IN PHASE / Magnetic Correlation IN-PHASE / over OUT OF PHASE / AMPLITUDE IN GAMMAS
- EXTENT OF E.M. ANOMALY AND PEAK LOCATION
- CONDUCTOR AXIS

PLATE 2

GIANT EXPLORATIONS LIMITED (N.P.L.)

PORT HARDY AREA, BRITISH COLUMBIA

AIRBORNE GEOPHYSICAL SURVEY

ELECTROMAGNETIC CONDUCTORS

HEM-701

SCALE: 1" = 1320'

SURVEY BY SEIGEL ASSOCIATES LIMITED
FLOWN AND COMPILED JUNE-JULY, 1969
AIRCRAFT TERRAIN CLEARANCE 500'
FLIGHT LINE SPACING 600'

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA

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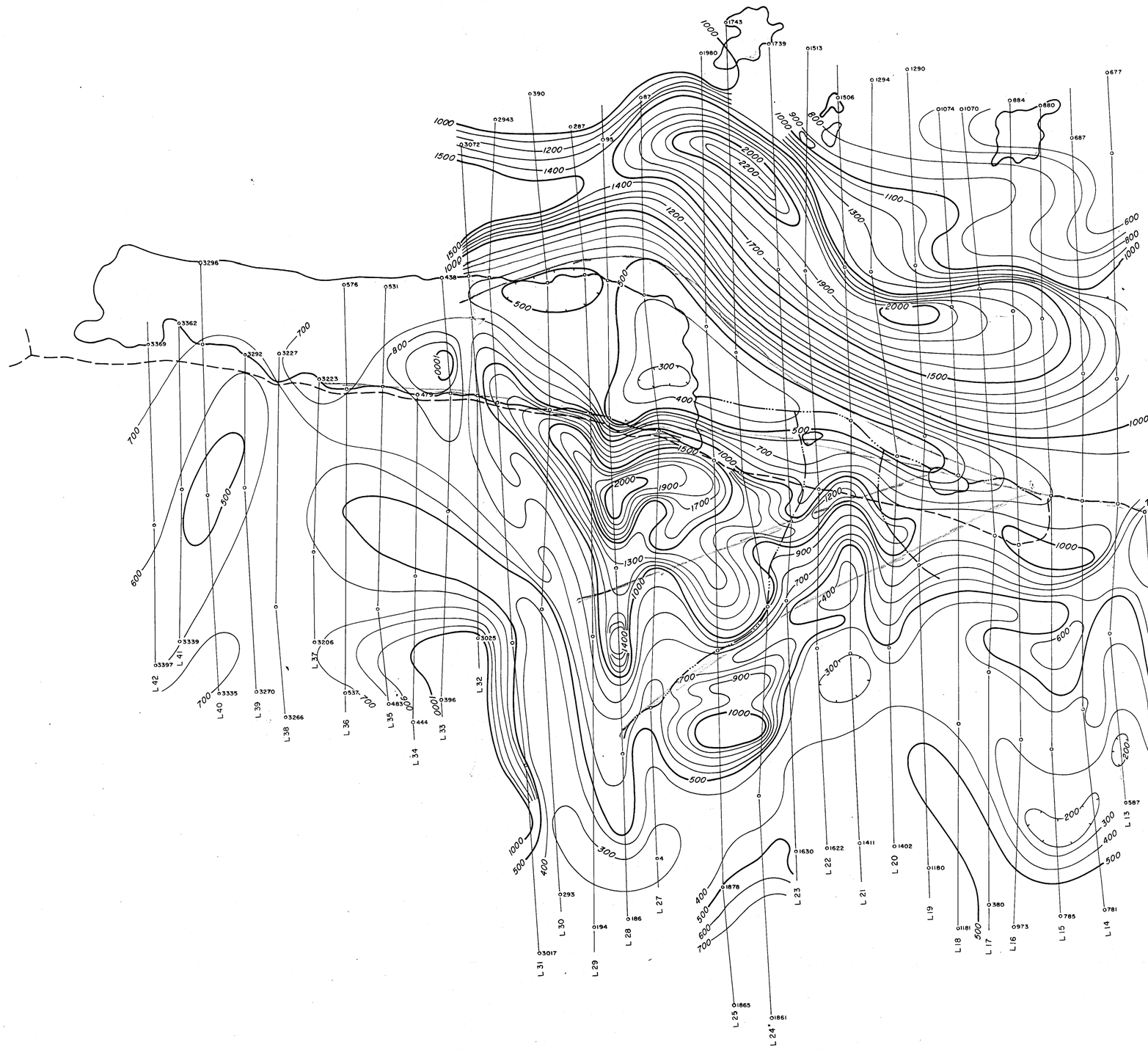

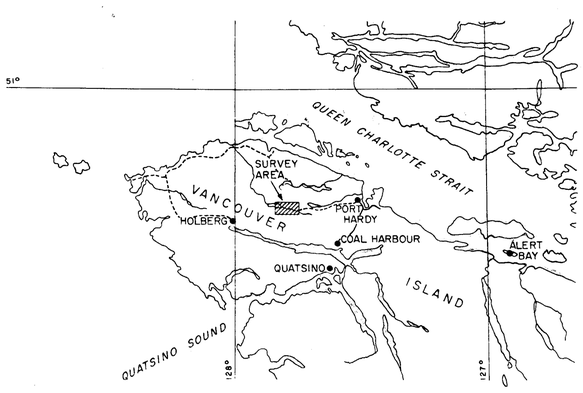

LOCATION MAP

Department of
Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 2205 MAP #1

1320 0 1320 2640 FEET
SCALE : 1" = 1320'

LEGEND

- FLIGHT LINE, FLIGHT LINE NUMBER AND NUMBERED FIDUCIAL POINT
- 500 GAMMA ISOMAGNETIC CONTOUR INTERVAL
- 100 GAMMA ISOMAGNETIC CONTOUR INTERVAL
- MAGNETIC LOW
- BASE VALUE ARBITRARY
- RIVER
- ROAD

PLATE I

GIANT EXPLORATIONS LIMITED (N.P.L.)

PORT HARDY AREA, BRITISH COLUMBIA

AIRBORNE GEOPHYSICAL SURVEY

MAGNETOMETER CONTOUR PLAN

NPM-1

SCALE : 1" = 1320'

SURVEY BY SEIGEL ASSOCIATES LIMITED
FLOWN AND COMPILED JUNE - JULY, 1969
AIRCRAFT TERRAIN CLEARANCE 500'
FLIGHT LINE SPACING 600'

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