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REPORT

ON

VLF-EM ELECTROMAGNETIC AND MAGNETIC SURVEYS

HORWOOD LAKE AREA

DISTRICT OF SUDBURY

f o r

INGAMAR EXPLORATIONS LIMITED

Toronto, Ontario
June, 1980

D. Jones, M.Sc.
Geophysicist

1. INTRODUCTION

This report presents the results of VLF-EM electromagnetic and magnetic surveys completed on behalf of Ingamar Explorations Limited over the Horwood Lake grid, Horwood township during March - April, 1980 by M P H Consulting Limited of Toronto. Previous exploration data available for the property have been examined. Recommendations are made for further gold exploration work on the property.

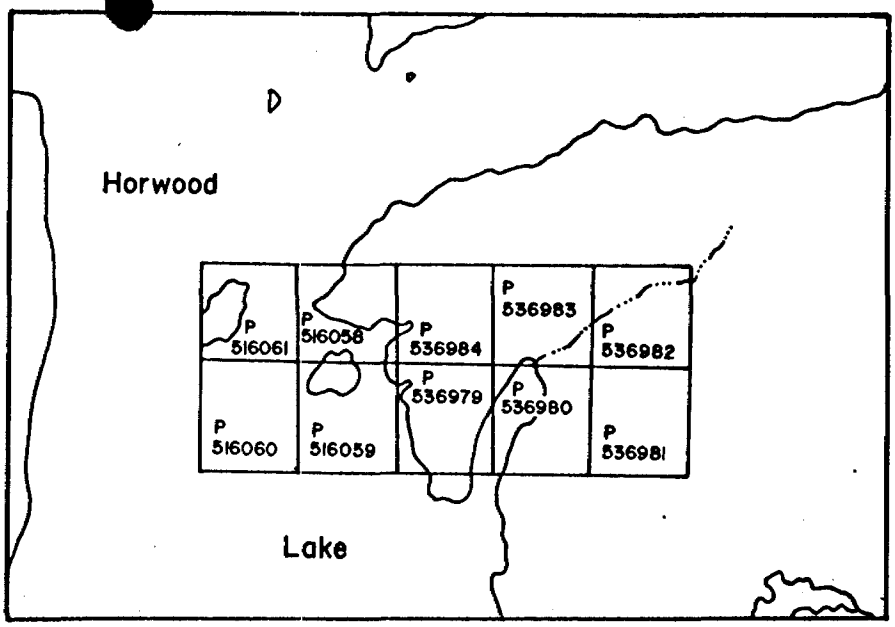
2. LOCATION AND ACCESS

The property consists of ten contiguous unpatented mining claims in the central portion of Horwood township, Sudbury Mining District, NTS Reference Sheet No. 42B1. The claims are numbered P 516058 - P 516061 and P 516979 - P 516984.

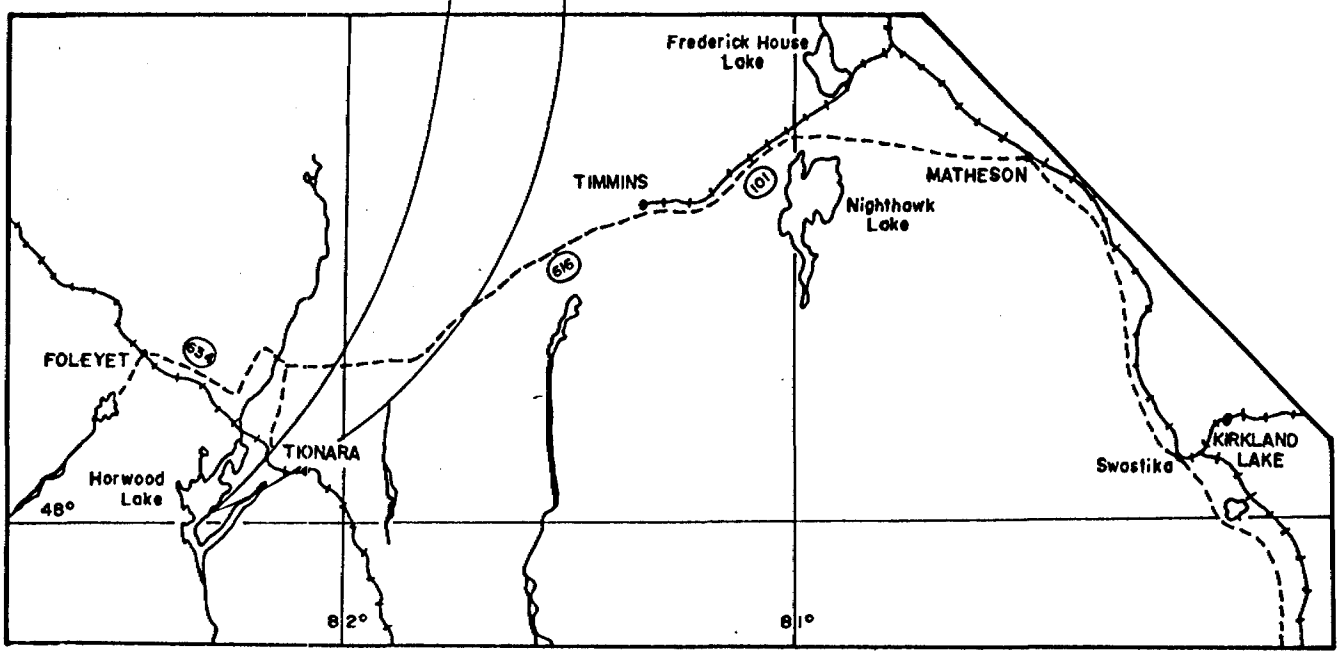
Horwood township is approximately 65 miles southwest of Timmins, (Figure 1).

Access to Horwood Lake is afforded by an Ontario Ministry of Natural Resources access road which departs south from Highway 616 at a point ten miles south of Highway 101. Access to the ten claim group is then by boat. Access is also possible by air using fixed wing aircraft or helicopter from Timmins.

LOCATION MAP



Scale 1" = $\frac{1}{2}$ Mile



Scale 1" = 20 Miles

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INGAMAR EXPLORATIONS LIMITED	
HORWOOD LAKE	
Location Map	
Project No.	By:
Scale:	Drawn:
Drawing No:	Date:
MPH Consulting Limited	

3. GEOLOGY

The property lies within variably foliated Archean mafic to intermediate metavolcanic rocks of the Swayze Greenstone Belt. The geology of the Horwood Lake area was mapped by V. G. Milne and F. W. Breaks in 1971 and was published in 1972 (Horwood Township, District of Sudbury, Ontario Department of Mines and Northern Affairs, Preliminary Map P748).

A minor amount of geological reconnaissance was carried out on the property during the course of the geophysical surveying.

The local structural trend is east-northeast with steep dips to the northwest. Shearing is common and is invariably accompanied by chloritization, carbonatization and/or silicification. Quartz and quartz-carbonate veins and stockworks invade the volcanics and appear to host the gold mineralization on the property.

Rock types mapped on the property include an exposure of metagabbro in the northeast corner of the claim block, a hornblende-quartz diorite outcrop in the south-central portion of the property, and several occurrences of the Horwood Peninsula pluton (quartz diorite) in the southeast corner.

4. ECONOMIC GEOLOGY

Three gold showings have been identified on the property.

The main gold showing occurs on the north edge of the small island straddling the common boundary between Claims 516058 and 516059. It consists of a series of east-west to northwest striking, vertically dipping, quartz-carbonate veins and stockworks varying in width from 4 to 18 inches within carbonatized volcanic and dioritic rocks. The veins contain disseminated to massive concentrations of pyrite, pyrrhotite, and chalcopyrite. Previous drilling by Kerr Addison Mines Limited on the auriferous quartz-carbonate structure defined a zone 500 ft long and 4 ft wide averaging 0.204 oz/ton. The zone may be open at both ends and to depth.

A similar type of showing occurs on the east shore of the southern inlet in the vicinity of 12 + 00S, line 18 + 00E. A total of 12 samples reported by Kerr Addison Mines Limited in 1958 on a quartz vein zone returned an average value of .195 oz/ton Au over 12 inches, the samples being taken over a strike length of approximately 360 ft.

The Stock vein occurrence consists of chalcopyrite, pyrite and pyrrhotite in a northwest striking quartz vein which varies in width from 4 to 36 inches. Selected grab samples taken by F. P. Tagliamente in 1960 from this vein

returned values up to 1.33 oz/ton Au with traces of silver.

5. PREVIOUS WORK

J. E. Lefever (1949-1959) drilled 32 x-ray holes on the property averaging approximately 80 feet in depth each. (The best gold assays were reported from a hole near the south end of line 15E. A sludge sample ran 7.8 oz Au and the core gave 0.56 oz/T Au over 10 feet.)

Kerr Addison Mines Limited (1960) completed a programme of magnetometer surveying and diamond drilling over the main showing in response to a reported grab sample value of 5.46 oz Au recorded in 1958. The drilling programme outlined a narrow zone of gold and sulphide bearing quartz-carbonate stringers and veins within a sheared diorite.

A small magnetometer anomaly southwest of the main showing was drilled and proved to be a magnetite-bearing diorite.

The Stack vein was investigated by three diamond drill holes. Minor sulphide mineralization within quartz-carbonate stringers transecting diorite was intersected with one sulphide-rich sample returning 0.38 oz gold.

In 1972 Noranda Exploration Co. Ltd. carried out a McPhar SS-15 vertical loop EM and Fluxgate Magnetometer survey on the property. Two weak EM conductors were found; one northwest of Blueberry Island and the other south of the island.

The magnetometer survey substantiated the general east-west structural trend of the area and delineated several north-south striking diabase dykes.

6. SURVEY PARAMETERS

6.1 Linecutting

The linecutting was carried out during the winter of 1980 by Ingamar Explorations Limited. An east-west baseline was established with crosslines at 300 ft intervals. All lines were chained and picketed at 100 ft intervals. Approximately 14 miles of line was cut, chained and picketed.

6.2 VLF-EM Survey

Approximately 12.75 miles of VLF-EM surveying was carried out on the property with stations at 100 ft intervals. Seattle, Washington was the transmitting station with a survey frequency of 18.6 KHz.

6.3 Magnetic Survey

Approximately 14 miles of magnetometer surveying was carried out on the property. Station observations were at 100 ft intervals on both the crosslines and baselines.

7. INSTRUMENTATION

7.1 VLF Survey

The VLF-EM method employs as a source, one of the numerous submarine communications transmitters in the 15 to 25 KHz band located throughout the world. At the surface of the earth these radio waves propogate predominantly in a single mode along the earth-air interface. This mode is known as the "surface wave" . Over flat homogeneous ground in the absence of vertical conductive discontinuities the magnetic field component of this radio wave is horizontal and perpendicular to its direction of propogation.

Where non-horizontal structures such as faults, contacts and conductors give rise to changes in ground conductivity, secondary modes are generated which produce a vertical component of the magnetic field. This produces an elliptical polarization of the total field in a plane perpendicular to the direction of propogation.

Commercial VLF instruments enable detection of disturbing structures by measuring the tilt angle of the major axis of the polarization ellipse. On flat homogeneous ground the tilt angle will be zero, but in the vicinity of conducting disturbances it will acquire a finite value.

Direction of tilt indicates direction of the disturbing structure. Ability to deduce such parameters as depth, depth extent, dip, and width of anomalous structures is minimal. Fortunately, this does not seriously affect location of points where VLF profiles cross the upper limit of dipping structures which can be identified as areas of greatest change in tilt angle per unit of distance.

The transmitting station used during the survey was Seattle, Washington at 18.6 KHz.

The data is presented as profiles with positive to the right, negative to the left. The instruments specifications are given in Appendix I.

7.2 Magnetometer Systems

An Exploranium/Geometrics Model G816 Proton Precession field magnetometer was used to survey the grid. This system utilizes the precession of spinning protons of a hydrogen atom within a hydrocarbon fluid. These spinning magnetic dipoles (protons) are polarized by applying a magnetic field using a current within a coil of wire. When the current is discontinued the protons precess about the earth's magnetic field and in turn generate a small current in the wire. This frequency of precession is proportional to the earth's total magnetic field.

This instrument is read directly in gammas which is the absolute value of the earth's total field for that station.

Correction of the magnetic data for instrument and diurnal drift was done by re-occupying previously established base stations periodically (approximately every 2 hours) during the course of the survey. In this manner a drift curve can be established and adjustment of the field readings can be made such that they are all related to an established datum. Instrument specifications are presented in Appendix I.

8. GEOPHYSICAL INTERPRETATION

8.1 VLF-EM

In that the electromagnetic frequencies used for VLF-EM surveying are high with respect to other exploration geophysical techniques, any change in lateral resistivity will give rise to anomalies. Because of this, the discriminatory power of VLF-EM is restricted to topographic versus non-topographic conductors. This discrimination has been applied to this survey area in that only non-topographic conductors have been tabled on the maps (see Map 2). Further quantitative interpretation of the VLF-EM data is tenuous at best, however some depth values have been calculated and are shown on Map 2.

A first derivative map was constructed from the VLF-EM data (see Map 2) to assist in delineating the conductive axes.

Ten conductive axes have been outlined on the maps and are labelled 'A' through 'J'. The main conductive trend is essentially east-west.

Conductor 'A' is a fairly strong conductor that was found on the baseline at 24 + 00W. It was open to the west. The eastern end of the conductor was not mapped since line 21 + 00W was not surveyed north of the baseline. Conductor depth estimate was 60 ft.

Conductor 'B' was located between 1 + 00N and 4 + 00N and on Lines 12 + 00W to 21 + 00E. The western extent is its strongest conductive portion and shows evidence of folding. No depth estimates were made for this conductor.

Conductor 'C' - This is a short strike length conductor of moderate conductivity located on Lines 9 + 00W and 12 + 00W between 4 + 00N and 5 + 50N. It is estimated to be at a depth of approximately 100 ft.

Conductor 'D' - This conductor is located between Lines 33 + 00E and 42 + 00E. It is a zone of fair to moderate conductivity contained within a longer conductive horizon. No depth estimate was made due to incomplete profile extent, however inspection of the first derivative contours indicate a fairly deep source.

Conductor 'E' - This conductor straddles the baseline between Lines 24 + 00E and 33 + 00E. It shows as a discrete anomaly within a longer conductive zone. Depth of the conductive axes is estimated at $\sim$ 150 feet.

Conductor 'F' - This is a one line anomaly showing a fair to moderate conductivity and is centered at 30 + 00E, 4 + 50S. A depth of approximately 80 ft was estimated from profile interpretation.

Conductor 'G'- this conductor, located in the southeast portion of the property, is an arcuate conductor open to the east. It shows moderate conductivity and a depth of approximately 20 ft. This southeast portion of the property shows a marked increase in conductor activity, with the conductors in this area showing mainly a west-southwesterly strike rather than the east-west strike prevalent in the remainder of the area.

Conductor 'H' - this is a discrete conductor situated south of the baseline between lines 24 + 00 to 39 + 00S for a strike length of approximately 1500 feet. Within its length it shows three areas of local high conductivity. Depth estimates show an easterly plunge along its length with estimates at the western and eastern ends of 30 ft and 60 ft respectively.

Conductor 'I' - is a short (2 line) conductor showing moderate conductivity. Interpreted depth was approximately 50 ft. The conductor was centered at 9 + 00S on line 21 + 00E.

Conductor 'J' - this conductor centered at 17 + 00S on line 39 + 00E is arcuate and open to the east. It is of fair conductivity with an estimated depth of approximately 20 ft.

From inspection most of the conductors showed a steep northerly to vertical dip. The major conductive trend was east-west.

The conductive bodies show mainly as finite length conductive zones within longer, linear conductive horizons. An example of this is Conductor 'B'. The horizon containing 'B' extends the entire length of the grid and is open at either end. Other short length conductors have been mapped within this extension.

Some discrete conductors have been found and mapped, the majority of which are located in the southeast corner of the grid.

8.2 Magnetic Survey - the proton precession magnetic survey of the area confirms the general east-west strike direction outlined by the VLF-EM survey.

The most prominent magnetic feature in the area is a north-south striking magnetic high located in the central portion of the grid. This high is interpreted to reflect a diabase dyke. This dyke distorts the east-west magnetic picture giving the northeastern corner of the grid a more northwest-southeast trend.

The north-south dyke bisects the area into a magnetically active eastern and a quieter western portion.

In the quiet western portion the magnetic anomalies are very localized. The largest magnetic relief of approximately 800 gammas is located over the southern shore of Blueberry Island. The magnetic gradients associated with these anomalies indicate shallow sources. The magnetic zone situated 300 ft west of Blueberry Island, Ont. was drilled by Kerr Addison Mines in February, 1960 and 95' of secondary magnetite was intersected which explains the zone.

A narrow linear anomalous zone was mapped at approximately 9 + 00N between lines 3 + 00W to 3 + 00E. The magnetic gradients indicate a shallow source. Profile evaluation of the anomaly indicates a steepening of the northly dip from east to west along the anomaly.

The remaining magnetic expression in the western portion of the grid is fairly gentle with the southwest corner of the map having little or no relief.

East of the diabase dyke, the magnetic activity shows a marked increase, with most of the anomalies being narrow lenticular and apparently formational in nature. This is most notable in the southern 1000 ft of this area.

8.3 Discussion

Since neither of the two surveys undertaken on the property

are direct surveys for gold mineralization, the interpretational approach has been to try to correlate the known gold mineralization with a geophysical expression from either survey and, from this, attempt to outline additional potentially interesting zones.

The three gold zones on this property have been discussed in Section 4 of this report.

8.3.1 Main Gold Showing - no direct correlation was found between the main gold showing and any VLF-EM conductive axis. It is possible that this gold showing is situated on the southern flank of the VLF-EM conductor is 'B' (Map 2). This being the case, the eastward extension of Conductor 'B' could be of interest.

The probable cause of this VLF-EM anomaly is a felsic volcanic/diorite contact as mapped by the Kerr Addison Mines Ltd. drilling in 1960 (Assessment Report T2123, DDH No. 8).

Inspection of the magnetics at the main showing shows the gold zone to be situated in a relatively broad magnetic low of approximately 50 gammas. The extension of the broad magnetic anomaly both east and west, from the gold zone thus far outlined, suggests that possible further work is

warranted along strike from the known mineralization. A localized negative magnetic zone situated in the central portion of this broad low was found to be coincident with the approximate location of the gold bearing horizon found in DDH No. 1 (see Map No. 3 with reference to Assessment Report T2133.)

Inspection of the diamond drill logs indicates that a volume increase of quartz carbonate could possibly explain the localized magnetic low as quartz has a relative small negative succeptability and the diorite host rock has a relative positive succeptability.

A second untested local negative magnetic anomaly, directly along strike from the main showing, at 11 + 00W on the baseline and within the same broad magnetic low is thus of direct interest.

Projection of the gold bearing horizon eastward and southward appears to parallel the southeast arm of the broad low magnetic zone and indicates the possibility that DDH No. 6 was not drilled deep enough to intersect the economic horizon.

8.3.2 Stack View - The Stack vein located at approximately 37 + 50E, 1 + 50N showed no useful direct

geophysical expression as regards further delineation of possible extensions to the vein.

8.3.3 Horwood Lake Inlet Showing - A third gold showing is located on the east shore of the southern inlet at approximately 12 + 00S between lines 18 + 00E and 21 + 00E. Accurate location of this showing with respect to the survey lines was not possible during the survey due to snow coverage. The approximate outcrop area and the mineralization is shown on Map 2.

Approximately 150-200 ft north of this gold showing a well-defined conductive horizon (Conductor 'H') was traced over approximately 1500 ft. (see Map 2). A coincident magnetic low upgrades this zone considering the apparent gold association with the magnetic low in the main zone.

The correlation of the VLF-EM and the magnetic response is well-defined in that the conductive axis outlined by the VLF-EM derivative map is immediately south of the magnetic axis (see Maps 2 and 3) and the pinching and swelling of the magnetic horizon is mirrored by the VLF-EM even to the seemingly separate magnetic zone on Line 36 + 00E, 11 + 50S.

The proximity of the diabase dyke to these active magnetic zones and the conformable nature of the anomalies suggest that narrow sill like zones may be the causative source of these anomalies.

The probable source of this magnetic anomaly is quartz carbonate with a felsic volcanic/dioritic contact responsible for the VLF-EM response. A possible anomalous source is graphite since this is a good conductor and also has negative magnetic succeptability. However no graphite has been recorded in any of the mapping or drilling carried out on the property to date.

8.3.4 Remainder of Property - South of Conductor 'H' a series of magnetic highs and lows were mapped none of which showed any associated conductivity. This however does not downgrade those zones since none of the known gold showings on the property exhibit any direct conductive expression.

Profiling of the magnetics on Line 21 + 00E from 0 + 00 to 18 + 50S showed the possibility of these lows being negative lobes associated with magnetic highs giving a dipolar effect. While this is possible on Line 21 + 00E similar inspection of Lines 30 + 00E and 36 + 00E(where other local magnetic

and electromagnetic highs are situated) tend to disprove this. However, this possibility should be borne in mind regarding further work in this area.

No other coincident magnetic and electromagnetic trends were found in the survey area.

Several other discrete conductive horizons have been mapped which possibly warrant further investigation. In addition several magnetic horizons exhibiting relative lows could be of interest. More conclusive data regarding mineral association with geophysical responses is required from the area before definite conclusions regarding anomaly priority can be established.

9. CONCLUSIONS

The VLF-EM survey has outlined 10 conductive zones on the property. Of these only one (Conductor 'H')has shown any magnetic correlation. No structural information was extractable from the VLF-EM data, and no causative conductive sources could be assigned to any of the anomalies. The major magnetic feature outlined was a north-south striking diabase dyke crosscutting the dominantly east-west trend of the area.

A magnetic low possibly associated with the main gold showing has been outlined. This possible association could be used as an indication for further mineralization. An untested magnetic low situated along strike from the main zone has been outlined and should be diamond drilled to test this hypothesis.

A magnetic low associated with Conductor 'H' upgraded the conductor in view of the apparent magnetic low association with the main zone, and further investigation of the conductor is warranted.

The gold showing on the eastern arm of Horwood Lake inlet does not appear to have been adequately tested and should be investigated further.

The Stack vein shows no apparent geophysical signature. Further investigation of this showing should be undertaken after

the main showing and the Horwood Lake inlet showing have been evaluated so that the additional data can be used to better appraise the Stack vein prior to drilling.

10. RECOMMENDATIONS

10.1 General

In that disseminated sulphides including pyrite, pyrrhotite and chalcopyrite have been reported on each of the known gold showings it would appear that there is at least a partial gold-sulphide association. An induced polarization survey is recommended to outline areas of sulphide concentration and potential gold-sulphide association on the property.

10.2 Main Showing

The localized magnetic low at 11 + 00W on the baseline should be drill explored. A 250 ft hole at 11 + 00W, 1+00N drilled at an azimuth of 180° at an angle of -50° should adequately test the zone.

The broad magnetic low defined by the reconnaissance survey should be surveyed with a closely-spaced magnetometer survey to accurately locate any localized magnetic lows. In particular, the southeast-striking arm of this magnetic low should be detailed since projection of the known mineralized zone eastwards appears to extend into this untested zone. Any localized magnetic lows within this area should be drill tested.

If an I.P. survey is conducted, any zones of I.P. response

within the magnetic low should also be drill tested.

10.3 Stack Vein

No work is recommended at this time. This showing should be re-examined after additional geological information is obtained from further work elsewhere on the property.

10.4 Horwood Lake Inlet Showing

Detailed geological mapping should be carried out to determine the attitudes of the auriferous veins and the nature of the host lithologies. Following this a re-evaluation of the geophysical data should be undertaken. Specific diamond drill recommendations will be made on completion of this work.

VLF-EM Conductor 'H' and associated magnetic lows should be diamond drill tested because of its proximity to the above showing. Three holes are recommended as follows:

Hole	Collar	Dip	Azimuth	Length
2	L.24 + 00E 8 + 50S	50°	180	250 ft
3	L.30 + 00E 9 + 50S	50°	180	250 ft
4	L.36 + 00E 10 + 50S	50°	180	250 ft

Respectfully submitted,

D. Jones

DJ:g

D. Jones, M.Sc.
Geophysicist

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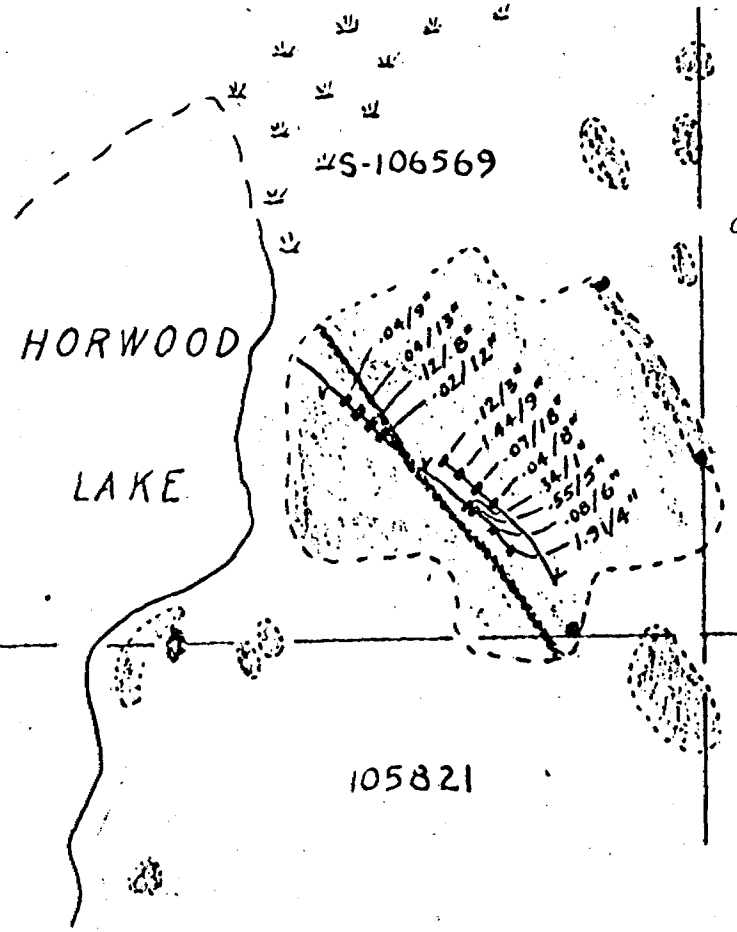


over 12"
.03
.043
.08
.02
.03
1.08
.105
.026
.03
.23
.04
.63

North

LEGEND

- Diabase
- Quartz vein and pits
- Algoman granite and quartz feldspar porphyry
- Keewatin volcanics

2.31 / 12 .07/12" Ounces gold per ton over length of sample

Scale 1" = 330'

.196 Note - All pits approximately 4' x 10' x 4'

Geology after O.D.M. Vol. XLVI, Pt. II, 1937

105821

.196 over 5'30'

KERR-ADDISON GOLD MINES LTD.

HORWOOD LAKE GROUP

SHOWING

PITS AND CHANNEL SAMPLES

JUNE, 1958

KEITH TWP M-962

SILK TWP M-1115

HARDIMAN TWP M-916

VTON TWP M-3471

DALE TWP M-2828

THE TOWNSHIP
OF

2.3366

HORWOOD

DISTRICT OF
SUDBURY

PORCUPINE
MINING DIVISION

SCALE: 1-INCH = 40 CHAINS

DISPOSITION OF CROWN LANDS

PATENT, SURFACE AND MINING RIGHTS
" , SURFACE RIGHTS ONLY
" , MINING RIGHTS ONLY
LEASE, SURFACE AND MINING RIGHTS
" , SURFACE RIGHTS ONLY
" , MINING RIGHTS ONLY
LICENCE OF OCCUPATION
ROADS
IMPROVED ROADS
KING'S HIGHWAYS
RAILWAYS
POWER LINES
MARSH OR MUSKEG
MINES
CANCELLED C

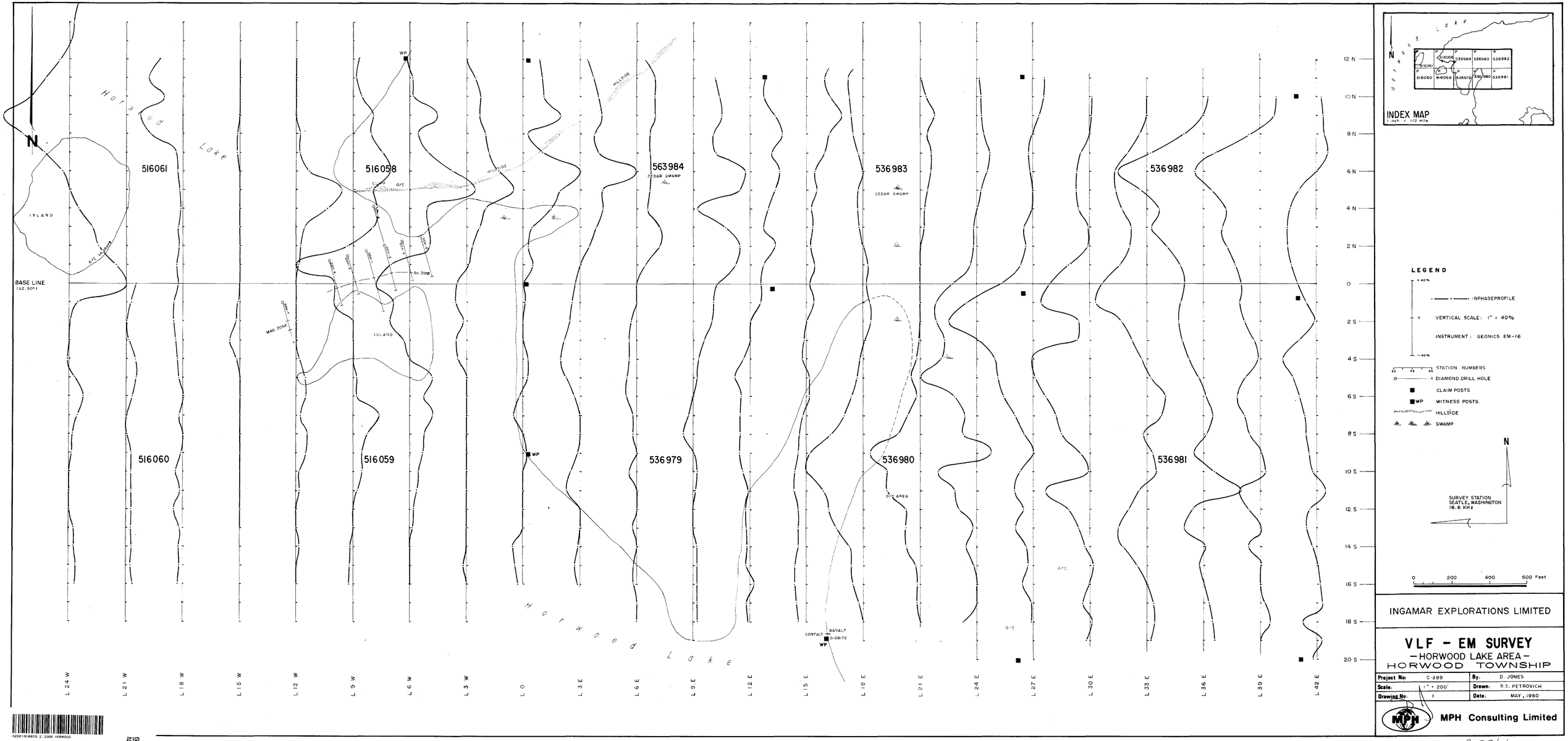
NOTES

400' Surface Rights Reservation
along the shores of all lakes & rivers

DATE OF ISSUE
DEC 3 - 1980
SURVEYS AND MAPPING
BRANCH

PLAN NO.- M-936

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH



LEGEND

- +40%
- INPHASEPROFILE
- 0 VERTICAL SCALE: 1" = 40%
- -40%
- INSTRUMENT: GEONICS EM-16
- STATION NUMBERS
- DIAMOND DRILL HOLE
- CLAIM POSTS
- WP WITNESS POSTS.
- HILLSIDE
- SWAMP

N

SURVEY STATION
SEATLE, WASHINGTON
18.6 KHz

0 200 400 600 Feet

INGAMAR EXPLORATIONS LIMITED

VLF - EM SURVEY

- HORWOOD LAKE AREA - HORWOOD TOWNSHIP

Project No:	C-399	By:	D. JONES
Scale:	1" = 200'	Drawn:	B.S. PETROVICH
Drawing No:	1	Date:	MAY, 1980

MPH Consulting Limited

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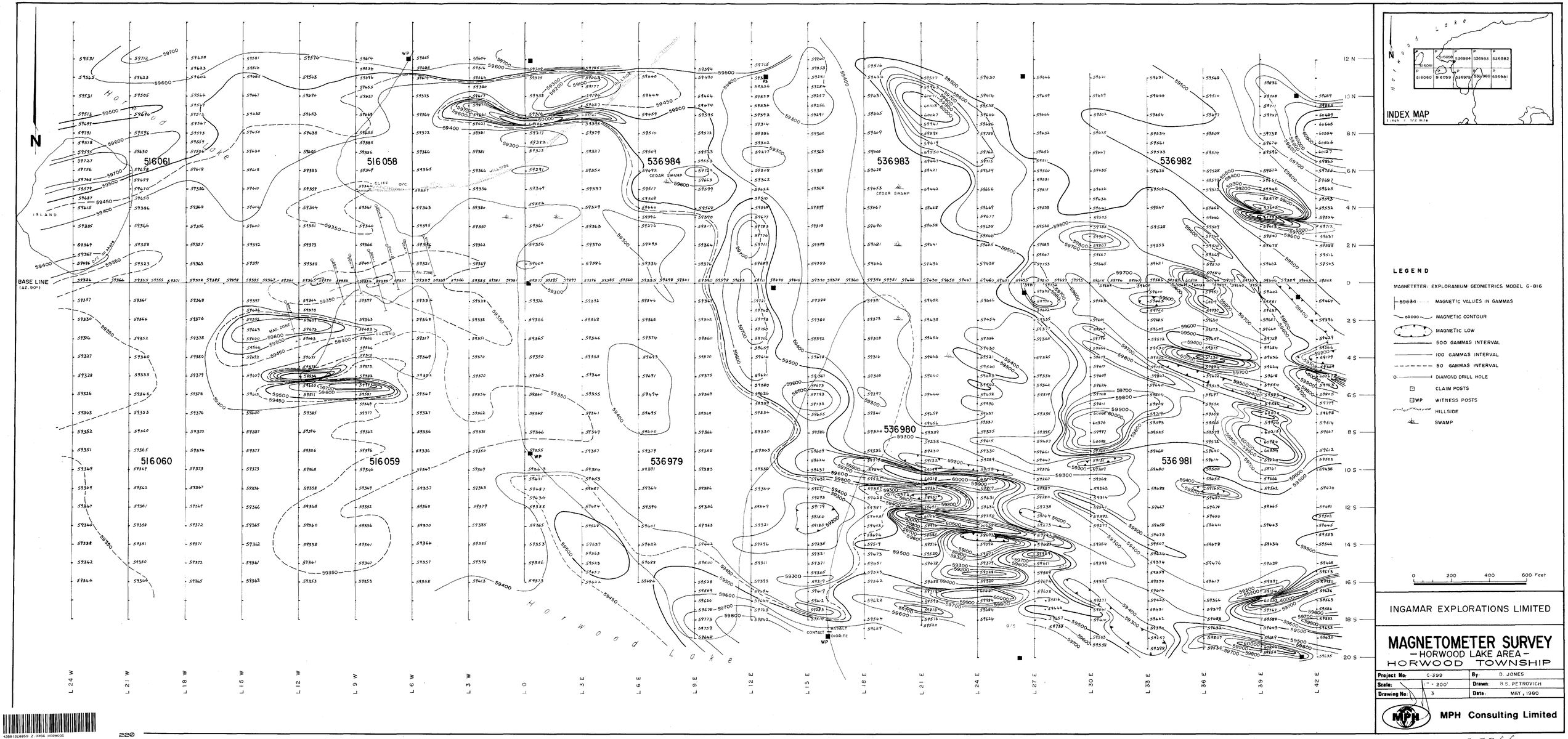

LEGEND

MAGNETETER: EXPLORANIUM GEOMETRICS MODEL G-816

- 59634 — MAGNETIC VALUES IN GAMMAS
- 59000 — MAGNETIC CONTOUR
- MAGNETIC LOW
- 500 GAMMAS INTERVAL
- 100 GAMMAS INTERVAL
- 50 GAMMAS INTERVAL
- DIAMOND DRILL HOLE
- CLAIM POSTS
- WP — WITNESS POSTS
- HILLSIDE
- SWAMP

0 200 400 600 Feet

INGAMAR EXPLORATIONS LIMITED

MAGNETOMETER SURVEY
– HORWOOD LAKE AREA –
HORWOOD TOWNSHIP

Project No:	C-399	By:	D. JONES
Scale:	1" = 200'	Drawn:	B.S. PETROVICH
Drawing No:	3	Date:	MAY, 1980

MPH Consulting Limited

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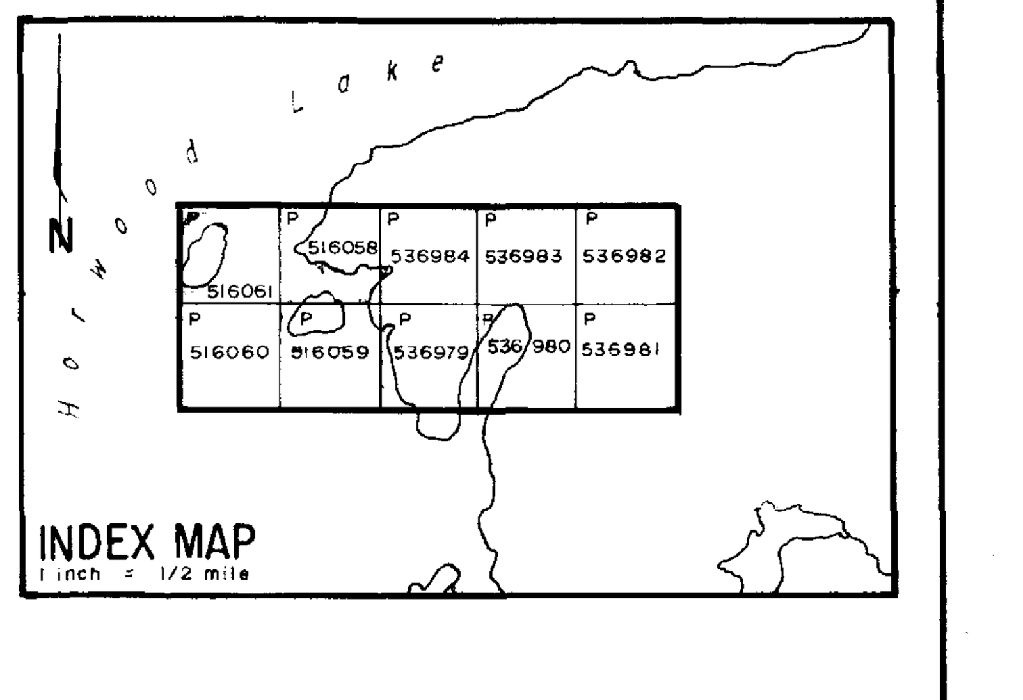

LEGEND

+10 VLF - EM FIRST DERIVATIVE FROM INPHASE VALUES

CONTOUR INTERVAL 10%

INSTRUMENT: GEONICS EM-16

STATION NUMBERS

DIAMOND DRILL HOLE

CONDUCTOR DEPTH IN FEET

CONDUCTOR AXIS

CLAIM POSTS

WP WITNESS POSTS

HILLSIDE

SWAMP

N

SURVEY STATION
SEATTLE, WASHINGTON
18.6 KHz

0 200 400 600 Feet

INGAMAR EXPLORATIONS LIMITED

VLF DERIVATIVE MAP

– HORWOOD LAKE AREA –
HORWOOD TOWNSHIP

Project No:	C-399	By:	D. JONES
Scale:	1" = 200'	Drawn:	B.S. PETROVICH
Drawing No:	2	Date:	MAY, 1980

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