GEOPHYSICAL REPORT ON THE STANGIFF LAKE GRID AND HORWOOD LAKE GRID HORWOOD TOWNSHIP PROJECT

FOR

NORTHGATE EXPLORATION LIMITED

Toronto, Ontario
May 1981

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MPH Consulting Limited

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SUMMARY

During February and March of 1981, M P H Consulting Limited carried out a geophysical programme on behalf of Northgate Exploration Limited on their Horwood Township project in Northeastern Ontario.

The purpose of this survey was to map the property magnetically and electromagnetically and to possibly outline areas of interest for any subsequent follow-up work.

The area is underlain by Archean mafic to intermediate metavolcanics with basically an east-west structural trend. Previous mapping has indicated strong shearing on the property, inevitably accompanied by chloritization, carbonatization and/or silicification.

The gold mineralization at the Tionaga Mine on the east shore of Horwood Lake was contained in a carbonatized shear zone impregnated by quartz veining. Sulphide mineralization, pyrite, pyrrhotite with minor chalcopyrite accompanied the gold mineralization. Disseminated gold also occurs in some of the porphyry intrusive rocks in the Horwood area.

The geophysical surveys outlined numerous conductive horizons within the property boundary. A number of these targets were coincident with small magnetic expressions which

upgrades the anomalies.

The area to the east of Horwood Lake is recommended for further work due to the presence of several feldspar porphyry stocks and the numerous VLF-EM targets outlined by the geophysical surveying.

The extensive thickness of overburden in the area west of Horwood Lake has possibly reduced the penetrative capability of the VLF-EM.

As a result of this programme, recommendations for further work include a detailed geological and geochemical programme. Following this, a re-evaluation of all the geophysical targets should be carried out at which time more detailed recommendations could be made.

1. INTRODUCTION

During the period from February 14, 1981 to March 10, 1981, M P H Consulting Limited of Toronto, Ontario carried out a programme of VLF-EM and magnetic surveying on behalf of Northgate Exploration Limited of Toronto, Ontario on Northgate's Horwood Township project in northeastern Ontario.

This report describes the exploration techniques employed, the results of the ground exploration work and makes recommendations for further exploration of the property.

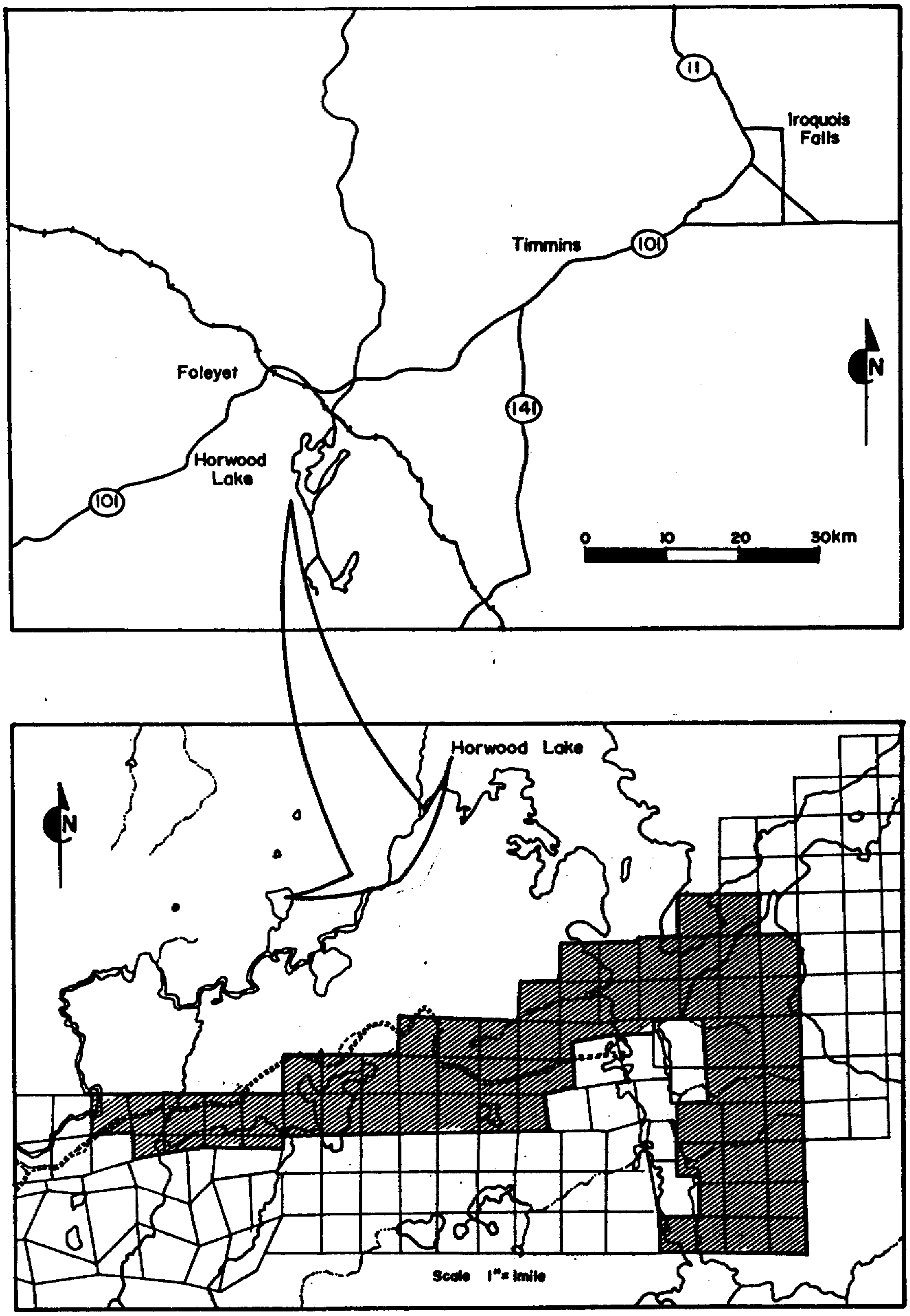
2. LOCATION AND ACCESS

The property consists of 63 contiguous unpatented mining claims in the southwest corner of Horwood Township in the Porcupine Mining Division, District of Sudbury in northeastern Ontario, NTS Reference Sheet No. 42B1.

The claims are numbered 529282 - 529287 inclusive, 529292, 529293, 529313 - 529316 inclusive, 529943 - 529951 inclusive, 529297 - 529302 inclusive, 529342 - 529361 inclusive, 568631 - 568634 inclusive, 568627, 568628, 568639, 528640, and 571506 - 571513 inclusive.

Horwood Township is approximately 80 km southwest of Timmins, Ontario (Figure 1).

Access to the property is afforded via a series of maintained lumber roads which depart south from Highway 101 approximately 5 km west of the Town of Foleyet in northeastern Ontario.



NORTHGATE EXPLORATION LIMITED

HORWOOD LAKE PROJECT

LOCATION MAP

Project No.	By.
Scale	Drawn
Drawing No.	Date.

MPH Consulting Limited

3. SURVEY PARAMETERS

3.1 Survey Grid

The survey grid was established in the fall of 1980 with the baseline of the Stangiff Lake grid established with the point 0+00 at post Number 3 of Claim 565946. This line was driven east for a distance of 2800 meters and west for 1800 meters. Crosslines were established on this line at 120 meter intervals with station intervals on both the crosslines and baselines at 30 meter intervals.

The Horwood Lake grid was also established in the fall of 1980. For this grid point, 0+00 on the baseline was at post Number 1 of Claim number 568639. This baseline was driven due west for a distance of 1200 m to the east shore of Horwood Lake. Crosslines were established on this baseline at 120 meter intervals. The crosslines were driven north and south of the baseline to the property boundary. Tielines were established at distances of 100 meters and 200 meters both north and south of the baseline to enable accurate control of the survey lines.

This grid was extended to the west shore of Horwood Lake by M P H personnel during the geophysical surveying to provide additional detail and to cover the postulated Horwood Lake fault.

M P H personnel also located a grid on Hardiman Bay to cover the Hardiman Bay Fault. Line spacing of 120 meters and station intervals of 30 meters were used as grid parameters.

3.2 VLF-EM

Approximately 80 km of VLF-EM surveying was conducted on the property. Cutler, Maine (transmitting at 17.8 kHz) was the transmitting station used as a signal source. The signal propagation direction intersects the supposed geological structure of this property at $\sim 80^{\circ}$ which will afford good coupling with any mineralized zones conformable with the geologic strike. A 30 meter station interval was used for this survey.

3.3 Magnetic Survey

Approximately 80 km of total field proton magnetometer surveying was conducted on this survey area. Routine coverage of the area was at 30 meter intervals with 15 meter stations utilized in anomalous areas to provide additional detail.

3.4 Personnel

The following is a list of M P H personnel who were connected with this project:

D. Jones, M.Sc.	Consulting Geophysicist	Toronto, Ontario
D. Hall	Party Chief	Toronto, Ontario
T. Kraft	Geophysical Operator	Toronto, Ontario
M. Bickers	Geophysical Operator	Toronto, Ontario
M. Nadjiwan	Geophysical Operator	Wiarton, Ontario

In addition to the main property, a geophysical survey was conducted over six patented mining claims. These claims were located mainly covering Horwood Lake but with a small portion on land.

Approximately 15 km of lines were laid out on the lake and surveyed with both the VLF-EM and the proton magnetometer systems.

Additionally, a small grid was located on and covering Hardiman Bay. Approximately 8 km of VLF-EM and proton magnetometer surveying was conducted on this grid.

Several reconnaissance lines of horizontal loop EM surveying were also carried out on the property in an attempt to outline the Horwood Lake fault.

4. 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).

The local structural trend is east-west with steep dips to the northwest. Tops are mapped to be southwards indicating overturning of the geology. Shearing is common and is invariably accompanied by chloritization, carbonization and/or silicification. Quartz and quartz-carbonate veins and stockworks invade the volcanics and appear to host the gold mineralization on the property (Tionaga Mine).

Rock exposure was not particularly good in the western portion of the survey property with some mafic to intermediate volcanics exposed along with some mafic intrusions.

East of Horwood Lake the outcrop density increased with numerous mafic to intermediate volcanic showings mapped. In many cases quartz feldspar porphyry zones were mapped in contact with the volcanics, producing a geologic environment similar to that of the Tionaga Mine, located on the east shore of Horwood Lake.

5. INSTRUMENTATION

5.1 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 propagate predominantly in a single mode along the earth-air interface. This mode is known as the 'surface wave'. Over flat homogenous ground in the absence of vertical conductive discontinuities, the magnetic field component of this radio wave is horizontal and perpendicular to its direction of propagation.

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 Cutler, Maine at 17.8 kHz. The data is presented as profiles with positive to the left, negative to the right. The instruments specifications are given in Appendix I.

5.2 Magnetometer System

A McPhar Model GP70 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 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.

Magnetic data was corrected for diurnal variations using a Barringer M123 base station magnetic recorder.

Deviations from a chosen base value were measured every ten seconds throughout the day. These deviations were then used to reduce field survey results to a constant datum plane.

The instruments' specifications are presented in Appendix I.

6. PRESENTATION OF FIELD DATA

All the field data is presented in a series of maps at the horizontal scale of 1:3000.

The VLF-EM data is presented as profiled data along the survey lines and is plotted at a vertical scale of 1 cm = 10°. In addition, the profiled data has been reduced to produce a first derivative contour map of the survey area.

The first derivative values were computed as a simple gradient of percent change per unit distance. Each derivative value was plotted at the midpoint of the two tilt angle values from which it was computed.

The data was originally plotted such that negative derivative values outlined the conductive axes of the anomalies. Consequently only the negative derivative values have been contoured.

The magnetic data is presented as a series of isomagnetic contours superimposed on a map of corrected magnetic values recorded at each station. Contour lines at 100 gamma intervals were found suitable to highlight the magnetic expression from the survey area.

7. INTERPRETATION

7.1 Stangiff Lake Grid

Magnetics - The magnetics on the grid outlined a basic east-west axial trend.

The western half of the grid area showed a fairly high magnetic relief with two north-south striking features (1000 gammas) on lines 8+40W and 3+60W being the major features in the area. (see Map 1.) These two zones are believed to be diabase dykes which crosscut the geologic stratigraphy of the area. Additionally a number of small, discrete east-west striking magnetic highs were mapped.

Interpretation of the north-south striking magnetic features in the west zone showed a vertical dip and a depth estimate of approximately 30 meters.

The magnetic pattern outlined in the western portion of the grid appear to suggest possible banding of rock units within the stratigraphy. From the known geology, the source of the magnetics is possibly mafic flows within the volcanics.

Proceeding eastward the magnetic relief noticeably decreases, this could possibly relate to a change in rock type with the contact at approximately 9+60E, with the lower susceptibility rock on the east. Alternately, an increase in overburden coverage could explain the observation.

Eastward of 9+60E the magnetic survey has not outlined any magnetically anomalous zones and the magnetic relief of the order of approximately 100 gammas.

A number of discrete magnetic lows have been outlined on Stangiff Lake grid area. No causative source has been assigned to these zones although based on previous experience in similar environments chemical alteration at contact zones could possibly be ascribed as causal sources.

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 mainly to topographic versus non-topographic conductors. This discrimination has been applied to this survey area in that only non-topographic conductors have been labelled on the maps (see Maps 5, 6). Further quantitative interpretation of the VLF-EM data is tenuous at best, however some depth values have been calculated and are shown on Maps 5 and 6.

First derivative maps were constructed from the VLF-EM data (see Maps 5 and 6) to assist in delineating the conductive axes.

The VLF-EM survey outlined conductive areas labelled 'A' through 'H' on the VLF-EM first derivative map (Map 3).

The VLF-EM survey conducted on the property outlined an east-west trend conformable with the magnetics. (Maps 5 and 6). The conductive anomalies observed were weak to medium strength, narrow, discrete horizons conformable to the geologic strike of the area.

From the truncations and deviations of the VLF-EM derivative data a number of crosscutting features (faults) have been outlined and are presented in Maps 5 and 6.

The possible diabase intrusive outlined magnetically on lines 4+80 and 3+60E can also be outlined from the electromagnetic survey (Map 5). The western magnetic feature observed on line 8+40E is apparently truncated by an east-west conductive horizon (cp Maps 1 and 5).

Between lines 10+80 and 22+80E the electromagnetic surveying has not outlined any strongly anomalous features. This reinforces the supposition that the grid consists of two dissimilar rock types with a common western boundary paralleling line 9+60E.

Anomaly 'A' - This conductive zone is located at the northern property boundary between lines 0+00 and 7+20W. (Map 5). The zone itself is a discrete conductive horizon superimposed with a longer conductive body. The eastern continuity of Anomaly 'A' can possibly be traced to 8+40E with Anomaly 'E' at its eastern extensions.

Anomaly 'A' appears to be split in two portions by a diabase intrusive at line 4+80E. The western half of 'A' shows no magnetic correlation, however, the eastern portion is coincident with a magnetic gradient (cp Maps 1 5). Depth estimates for the west and east halves are 15 and and 19 meters respectively. Dip estimates for both zones was 90^{o}.

Anomaly 'B_1' - Anomaly 'B_1' is located at approximately 2+75N between lines 10+80 and 6+00W and has a strike length of 480 meters. (Map 5). The zone is a narrow discrete anomaly with a northwest-southeast strike. The zone is on the western flank of a topographic high but the topography is not believed to be the causal source of Anomaly 'B_1'. Comparison of the VLF-EM derivative map with the magnetics shows a small magnetic correlation with the strongest portion of the conductive horizon.

Comparison of the two maps also indicates that Anomaly 'B_1' truncates the northern extent of the "diabase" intrusive.

Interpreted depth from this zone was approximately 10 meters.

Anomaly 'B_2' - This zone, located at approximately 0+50N between lines 3+60 and 1+20W is a possible eastern continuation of Anomaly 'B_1'. A north-south diabase dyke cross-cutting the stratigraphy separates 'B_1' and 'B_2' with the western portion of 'B_2' moved southwards.

The conductive axis of Anomaly 'B_2' is located in an area of large magnetic gradients with the axis of 'B_2' largely coincided with a magnetic low (cp Maps 1 and 5).

The location of the conductive horizon in such an intensely active and apparently fractured geophysically upgrades the area although should the north-south striking magnetic highs be attirutable to diabase the area is geologically not of high priority.

Depth and dip estimates from this zone were approximately 9 meters and 90^{o} respectively.

Anomaly 'C' - Anomaly 'C' was located at approximately 3+00N between 13+20 and 16+60W (Map 5). The anomaly appears bounded on either end by north-south faulting although a possible western extension can be traced to line 18+00E. This anomalous zone shows no magnetic signature.

Anomaly 'D' - This zone is located at approximately 1+00N between lines 8+40 and 12+00W (Map 5). The anomaly is a narrow, discrete, anomaly with a depth estimate of approximately 15 meters and a near vertical dip. Its eastern end is truncated at the postulated diabase intrusive on line 8+40W while its western end is bounded by an interpreted north-south fault. Anomaly 'D' shows correlation with a very small magnetic high (50 gammas).

Anomaly 'E' - This zone is an arcuate conductive horizon located near the western extent of the property between lines 12+00 and 18+00W with the anomaly being open to the west. Two interpreted north-south striking faults crosscut the anomaly in areas of greatest flexture. No magnetic signature is associated with any portion of the anomaly. A depth estimate of approximately 10 meters and a steep northward dip was interpreted from the VLF-EM data.

Anomaly 'F' - Anomaly 'F_1' is located at approximately 1+50N and between lines 6+00 and 8+40E (Map 5). This zone strikes approximately northwest-southeast and intersects at an oblique angle a number of conductive horizons which are probably related to topographically induced features associated with Stangiff Lake.

A smaller conductive horizon Anomaly 'F_2' appears to intersect Anomaly 'F_1' at line 7+20E although the major conductive portion of 'F_2' is located on line 9+60E.

The main portion of both 'F_1' and 'F_2' coincides with magnetic lows of approximately 300 gammas.

Both anomalies are in the main, broad diffuse zones with the derivative amplitudes indicating weakly conductive anomalous targets. The diffusivity of the anomalies precluded depth estimates.

Anomaly 'G' - Anomaly 'G' is a fairly strong discrete semi-arcuate conductive horizon located at approximately 2+00N between lines 19+20 and 25+20E with the anomaly being open eastward (Map 6). An interpreted north-south fault structure bisects the zone at its flexture point although no lateral movement is observed from the VLF-EM first derivative data. Anomaly parameters interpreted from the strongest conductive portion of the zone indicated a depth of approximately 15-20 meters and a steep northward to westward dip.

The zone exhibited no magnetic signature.

A second anomaly 'G_2' has been outlined as being a sub-parallel zone however inspection of the data shows this anomaly being exactly coincident with a small pond and this anomaly is deemed topographic.

Anomaly 'H' - This anomaly was located at approximately 7+50N between lines 24+00 and 28+80E (Map 6) and was the largest amplitude anomaly outlined on this grid. The anomaly was open eastwards. This zone was superimposed on and is subparallel to a large diffuse weakly conductive horizon. Estimated depth from this zone was approximately 12 meters. The anomaly is sharply curtailed at its eastern extreme by an interpreted north-south fault.

Anomaly 'H' shows no magnetic signature.

ANOMALY 'I' ('I_1', 'I_2', 'I_3')

This zone is a broad, weakly conductive horizon on which a number of stronger conductive zones are superimposed (Map 6).

The horizon is located at approximately 12+00N and between line 16+80 and 32+40E and is open eastward. The zone straddles tieline 2+00N between lines 16+80 and 32+40E and is open eastward. Anomaly 'I' is coincident with a topographic low which hosts a creek feeding into Horwood Lake. The strength and persistence of several of the discrete anomalies both with and remote from any topographic influences leads to the conclusion that the topography is not the sole causal source of the anomalies.

Anomalies 'I_1', 'I_2', and 'I_3' are short discrete subparallel conductive zones with depth estimates interpreted at 15, 20 and 23 meters respectively.

None of the anomalies showed any direct magnetic coincidence although both, 'I_2' and the western portion of 'I_1' were flanking 50 gamma discrete magnetic lows.

Anomaly 'J' - Anomaly 'J' is a linear arcuate anomaly located at approximately 6+00N between lines 21+60 and 28+80E with the anomaly open to the east. The eastern portion of this zone parallels a topographic low which may in part be contributing to the anomaly's amplitude. A series of north-south faults crosscuts this zone (Map 6). No magnetic signature was coincident with this zone. Estimated depth of this zone is 20 meters.

Anomaly 'K' - This zone is located near the northern boundary of the property between lines 25+20E and 28+80E. (Map 6.) The conductive zone is fairly broad and is comprised of a number of subparallel conductive horizons. No depth estimates were obtainable from these horizons.

No direct magnetic signature was attributable to Anomaly 'K' although a portion of the anomaly was flanking a small 50 gamma magnetic low.

7.2 Horwood Lake and Hardiman Bay Grids

This grid is located immediately east of the Stangiff Lake grid.

Magnetics - The magnetic survey conducted on this property outlined an east-west strike as was observed on the Stangiff Lake grid.

A number of patented claims separate the two grids with continuity between the two grids maintained at the northern extent of the property.

The low magnetic relief observed on the Horwood Lake grid is similar to that observed on the eastern portion of the Stangiff Lake area (cp Maps 2 and 7).

The magnetic data recorded on Horwood Lake itself showed little or no magnetic activity and no anomalous trends were observed on the survey lines covering the lake area.

East of Horwood Lake, the magnetics data showed a higher magnetic relief with a number of small, discrete isolated anomalies outlined. The majority of the magnetic activity was concentrated in the southeast corner of the area with several anomalies of 500 gammas observed.

No structural interpretation was possible from the magnetic data and no magnetic signature was evident from the Horwood Lake fault. This fault is postulated to strike approximately north-south and in this area is generally believed to be located under the lake.

A small grid was located with its baseline paralleling and bisecting Hardiman Bay in the north-central portion of the area. Crosslines were established on this baseline and covered all of Hardiman Bay (see Map 10).

The magnetically surveyed crosslines did not outline any magnetic signature from the Hardiman Bay fault.

VLF-EM - The VLF-EM survey outlined a basic east-west trend conformable with the magnetic data.

From this grid area there is a marked topographic effect superimposed on the VLF-EM data, which has been recognized in that only anomalies deemed non-topographic have been labelled on the first derivative map (Map 9). These zones are discussed in detail in the following sections.

While the interpreted topographically induced anomalous horizons have not been discussed in this report, the anomalies should not be discarded and further ground follow-up should also address these anomalies. The author believes that in some cases the strength and persistence of some of these horizons may possibly be due in part to conductive zones.

No indication of any north-south structural features were directly interpretable from the VLF-EM data (Map 9) and in particular no direct response was noted correspondingly to either the postulated Horwood Lake fault (Map 9) or to the Hardiman Bay fault (Map 12).

The marked difference in electromagnetic response either side of Horwood Lake however could indicate the presence of two dissimilar environments and thus possibly indicate the presence of the Horwood Lake fault by inference.

No geophysical data was collected in Claim No. 25337 and 25339 as no lines were cut. Extrapolation westward of the geophysical data from line 9+60W and the data available on line 13+20N indicate a fairly strong VLF-EM anomaly could be expected in this region. This, coupled with the knowledge of past gold production from a small mine situated at 9+10N on line 13+20W, leads to speculation of a possible VLF-EM anomaly coincident with the deposit. From similar speculative extrapolation, a small magnetic low could also be coincident with the deposit.

These tentative conclusions however cannot be used as criteria for assessing the remaining geophysical targets on this grid but possibly could be useful should the fill in data be supplied at a later date.

<u>Anomaly 'L'</u> - Anomaly 'L' is located at approximately 13+50N between lines 4+80 and 7+20W. It consists of two discrete, sub-parallel conductors housed within a longer

weakly conductive horizon. The conductive zones are estimated to be at a depth of 12-15 meters. No dip interpretation was possible from the data. Anomaly 'L' exhibited no direct magnetic signature although the anomaly did flank two magnetic lows.

Anomaly 'M' - This anomaly is a short discrete two line conductive horizon located at approximately 8+10N on lines 1+20 and 2+40W. The anomaly amplitude and conductive gradients indicate a narrow near surface anomaly. Interpreted depth was 10 meters and inspection of the profile indicated a vertical dip. The anomaly was paralleling a discrete well-formed magnetic low of 100 gammas (cp Maps 8 and 10).

Anomaly 'N' - This anomalous complex consists of a number of sub-parallel conductive zones striking east-west and straddling tieline 1+00S between lines 0+00 and 10+80W with the zones all being open to the east.

The zones are large amplitude targets with the data indicating pinching and swelling of the conductive horizons particularly in the southern zone.

None of the stronger conductive sectors of the zones show any magnetic correlation although a discrete magnetic high of approximately 1000 gammas is directly coincident with the weak pinched-out section on lines 4+80 and 6+00W. This possibly indicated that a later intrusive has penetrated the conductive horizon disrupting the stratiformed conductor. Depth of conductive axes for various portions of Anomaly 'N' were consistently about 10 meters.

<u>Anomaly 'O'</u> - This conductive zone is located at 10+20S between lines 0+00 and 2+40W. Interpretation of the data indicates a narrow, discrete arcuate conductor at a depth of $\sim$12 m. No magnetic signature was observed from the electromagnetic anomaly and no causal source was attributable to the zone.

<u>Anomaly 'P'</u> - Anomaly 'P' is a short two line conductive zone situated between lines 8+40 and 9+60W at 6+60S. Inspection of the derivative data indicated a depth of $\sim$10 m and a vertical to steep southward dip. No coincident magnetic anomaly was found and no causative source can be ascribed to this anomaly.

<u>Anomaly 'Q'</u> - Anomaly 'Q' is situated in the extreme southeast corner of the grid and comprised of a fairly large amplitude zone on line 3+60W which splits into two distinct anomalies eastward of this line with both zones being open to the east.

Depth estimates from Anomaly 'Q' were approximately 10 meters.

The southern arm of Anomaly 'Q' and the western single zone both show good correlation with a distinct magnetic low which possibly indicate a graphitic causal source (graphite having a relatively negative susceptability). Alternatively, mineralization accompanied by chlorite or carbonitized alteration could be the causative source.

Anomaly 'R' - Anomaly 'R' is a small two line anomaly located at 2+40S on lines 2+40 and 3+60W.

The anomaly is striking northeast-southwest and is slightly oblique to the main geologic trend of the area. The anomalous amplitude indicates a weakly conductive horizon. A small discrete magnetic high of 500 gammas is directly coincident with this zone and possibly indicates a sulphitic source.

A number of other weakly conductive zones were observed on the property and although they have not been described in detail, they are however acknowledged in that conductive axis and where possible a depth estimate has been interpreted for each. This data has been presented in the first derivative map (see Map 9). None of these remaining anomalies showed any magnetic correlation.

MaxMin II Horizontal Loop - Three lines of horizontal loop MaxMin II anomalies were conducted on the east-west tie-lines and the baseline.

The purpose of this work was to attempt to outline the Horwood Lake fault zone.

This data is presented in Map 12. A weakly conductive zone displaying a mainly out-of-phase response was outlined. The conductive axis interpreted has been transcribed onto the VLF-EM first derivative map (Map 9).

This north-south feature is of interest in that it appears to be on strike with or close to the Tionaga Mine and could possibly exert some structural influence on the deposit.

Alternatively, the response could be due to the Horwood Lake fault.

At this time the lack of data precludes any definite identification of the source.

8. CONCLUSIONS

The surveys conducted on the property outlined an east-west geologic trend prevalent to the area.

The magnetics outlined two features crosscutting this geologic trend in the western portion of the property. These are believed to represent intrusive diabase which probably holds no economic significance. The largest magnetic relief was located in this western region. Proceeding eastward, the decrease in magnetic activity suggests a possible change in rock type, with the common boundary located at 9+60E.

The low magnetic relief precluded any structural interpretation from the data on both the Stangiff Lake or Horwood Lake grids.

The VLF-EM surveying outlined numerous conductors in detail within the survey area. The majority of which were narrow discrete horizons conformable to the geologic strike of the area.

A large number of anomalies, especially in the eastern portion of the property have been initially rejected as being topographically induced although these should be reconsidered as any further information becomes available from the property.

Seventeen anomalous zones have been outlined as a result of the interpretation and have been discussed in detail in the report.

Of these zones three 'B_1', 'D' and 'P' showed a directly coincidental magnetic high, indicating the possibility of a sulphitic source while four of the targest 'F', 'K', 'M' and 'Q' exhibited magnetic lows which could indicate alteration zones in the vicinity of contact zones.

The remainder of the anomalies showed no magnetic character.

Speculative interpretation has indicated the possibility of a VLF-EM response and a magnetic low being associated with the Tionaga Mine. It must be stressed however that lack of data precludes confirmation of this and the response should not be used as a method of grading the geophysical response from the remainder of the property.

Neither the VLF-EM or the magnetic surveys showed any response attributable to either the Horwood Lake or Hardiman Bay faults.

The MaxMin II Horizontal Loop Survey was carried out in an attempt to outline the Horwood Lake fault and has outlined a weakly conductive feature which could possibly represent the Horwood Lake fault. The large distance between the surveyed lines defies determination of an accurate strike azimuth although the similarity in profile characteristics indicate a similar source in all cases. The apparent proximity of this north-south feature to the Tionaga Mine also makes this feature of interest.

9. RECOMMENDATIONS

While the VLF-EM and magnetic surveys have outlined a number of possibly interesting zones, no quantitative data concerning the causative sources of these anomalies can be made and as such, no diamond drill targets can be recommended to intersect either gold or sulphide mineralization.

The geological information available from the area indicates that gold mineralization at the Tionaga Mine was associated with carbonatized shear zones impregnated by quartz veining, and accompanied by sulphide mineralization typically pyrite, pyrrohotite and possibly chalcopyrite.

The presence of the carbonization indicates either a vein-type alteration or a syngenetic chemical sediment type deposition. The presence of the magnetic low believed to be coincident with the deposit favours the former conclusion.

It is strongly recommended that a detailed ground mapping programme be initiated with the mapping referenced to the geophysical grid.

Emphasis should be placed on the ground directly eastward of Horwood Lake in that previous mapping has indicated several feldspar porphyry/volcanic contacts in the area. Any alteration zones derived are of particular interest bearing in mind the geology of the Tionaga Mine.

Whole rock geochemistry is recommended in conjunction with the geologic mapping programme to assist in rock and alteration identification. This should also be carried out with trace gold analysis.

In addition the geophysical data at and near the Tionaga Mine should, if possible be obtained.

After re-evaluation of the geophysical anomalies in light of the geological information, recommendations can be made at that time regarding any further exploration work to fully evaluate the property.

Respectfully submitted,

CERTIFICATE

I, David Jones of Toronto, Ontario hereby certify that:

1) I hold a Bachelor of Technology degree in Applied Physics from the University of Bradford, England, and a Master of Science degree in Applied Geophysics from McGill University in Montreal.

2) I have practised my profession in exploration continuously since graduation.

3) I have based conclusions and recommendations contained in this report on knowledge of the area, my previous experience with the geophysical techniques used and on the results of the field work conducted on the property during February - March, 1981 which was carried out under my supervision.

4) I hold no interest, directly or indirectly in this property other than professional fees, nor do I expect to receive any interest in the property or in Northgate Exploration Limited or any of its subsidiary companies.

Toronto, Ontario

David Jones, M.Sc.

APPENDIX I

EM16

VLF Electromagnetic Unit

Pioneered and patented exclusively by Geonics Limited, the VLF method of electromagnetic surveying has been proven to be a major advance in exploration geophysical instrumentation.

Since the beginning of 1965 a large number of mining companies have found the EM16 system to meet the need for a simple, light and effective exploration tool for mining geophysics.

The VLF method uses the military and time standard VLF transmissions as primary field. Only a receiver is then used to measure the secondary fields radiating from the local conductive targets. This allows a very light, one-man instrument to do the job. Because of the almost uniform primary field, good response from deeper targets is obtained.

The EM16 system provides the *in-phase* and *quadrature* components of the secondary field *with the polarities indicated.*

Interpretation technique has been highly developed particularly to differentiate deeper targets from the many surface indications.

Principle of Operation
The VLF transmitters have vertical antennas. The magnetic signal component is then horizontal and concentric around the transmitter location.

Specifications

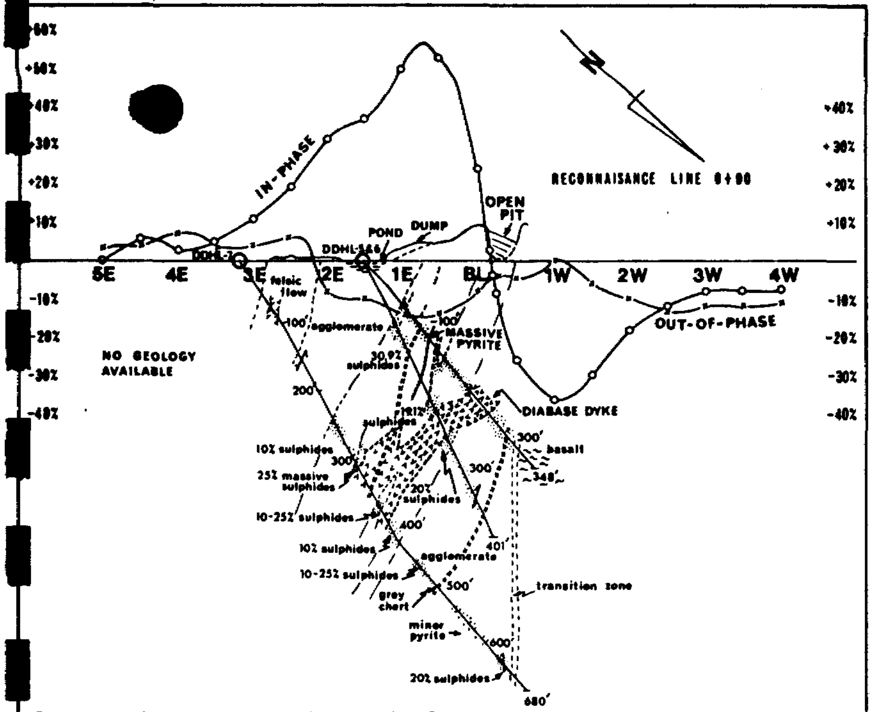
Source of primary field	VLF transmitting stations.
Transmitting stations used	Any desired station frequency can be supplied with the instrument in the form of plug-in tuning units. Two tuning units can be plugged in at one time. A switch selects either station.
Operating frequency range	About 15-25 kHz.
Parameters measured	(1) The vertical in-phase component (tangent of the tilt angle of the polarization ellipsoid). (2) The vertical out-of-phase (quadrature) component (the short axis of the polarization ellipsoid compared to the long axis).
Method of reading	In-phase from a mechanical inclinometer and quadrature from a calibrated dial. Nulling by audio tone.
Scale range	In-phase ± 150%; quadrature ± 40%.
Readability	± 1%.
Reading time	10-40 seconds depending on signal strength.
Operating temperature range	−40 to 50° C.
Operating controls	ON-OFF switch, battery testing push button, station selector, switch, volume control, quadrature, dial ± 40%, inclinometer dial ± 150%.
Power Supply	6 size AA (penlight) alkaline cells. Life about 200 hours.
Dimensions	42 x 14 x 9 cm (16 x 5.5 x 3.5 in.)
Weight	1.6 kg (3.5 lbs.)
Instrument supplied with	Monotonic speaker, carrying case, manual of operation, 3 station selector plug-in tuning units (additional frequencies are optional), set of batteries.
Shipping weight	4.5 kg (10 lbs.)

GEONICS LIMITED

Designers & manufacturers of geophysical instruments

subsidiary of Deering Milliken Inc.

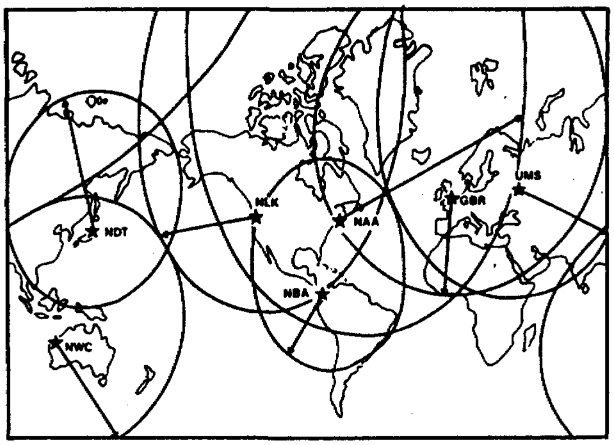
2 Thorncliffe Park Drive,
Toronto/Ontario/Canada
M4H 1H2
Tel: 425-1824
Cables: Geonics



Courtesy of Newfoundland & Labrador Corp. Ltd.

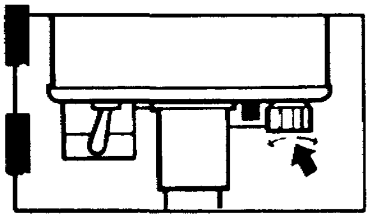
M 16 Profile over Lockport Mine Property, Newfoundland

dditional case histories on request.



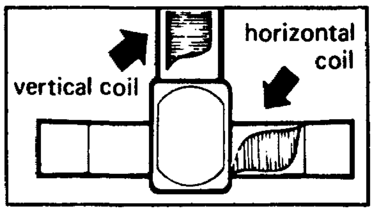
Areas of VLF Signals

Coverage shown only for well-known stations. Other reliable, fully operational stations exist. For full information regarding VLF signals in your area consult Geonics Limited. Extensive field experience has proved that the circles of coverage shown are very conservative and are actually much larger in extent.



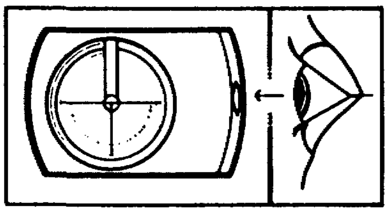
ation Selector

o tuning units can be plugged at one time. A switch selects either station.



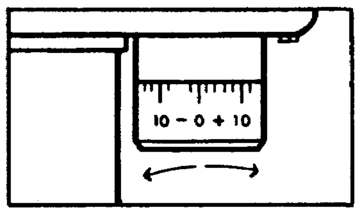
Receiving Coils

Vertical receiving coil circuit in instrument picks up any vertical signal present. Horizontal receiving coil circuit, after automatic 90° signal phase shift, feeds signal into quadrature dial in series with the receiving coil.



In-Phase Dial

shows the tilt-angle of the instrument for minimum signal. This angle is the measure of the vertical in-phase signal expressed in percentage when compared to the horizontal field.



Quadrature Dial

is calibrated in percentage markings and nulls the vertical quadrature signal in the vertical coil circuit.

y selecting a suitable transmitter station as a source, the M 16 user can survey with the most suitable primary field azimuth.

he EM 16 has two receiving coils, one for the pick-up of the orizontal (primary) field and the other for detecting any anomalous vertical secondary field. The coils are thus orthoonal, and are mounted inside the instrument "handle".

he actual measurement is done by first tilting the coil assembly to minimize the signal in the vertical (signal) coil and en further sharpening the null by using the reference signal buck out the remaining signal. This is done by a calibrated quadrature" dial.

The tangent of the tilt angle is the measure of the vertical in-phase component and the quadrature reading is the signal at right angles to the total field. All readings are obtained in per centages and do not depend on the absolute amplitude of the primary signals present.

The "null" condition of the measurement is detected by the drop in the audio signal emitted from the patented resonance loudspeaker. A jack is provided for those preferring the use of an earphone instead.

The power for the instrument is from 6 penlight cells. A battery tester is provided.

McPHAR GP-70 Proton Magnetometer

Measures absolute magnitude of total magnetic field

1 gamma sensitivity.

10 scale ranges: 20,000 to 100,000 gammas

Digital readout with long life, light emitting diodes.

Noise cancelling toroidal sensor.

Wide operating temperature range.

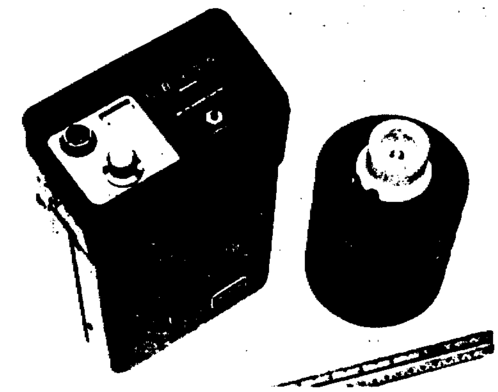
Model GP-70 is a reliable, light weight, proton magnetometer designed for field operation under widely varying environmental conditions. It measures the absolute magnitude of the total magnetic field within the range of 20,000 to 100,000 gammas to an absolute accuracy of ± 1 gamma and ± 15 parts per million of the field under measurement, over the temperature range of -30° to + 50° C.

The instrument is simple to operate. A complete reading is obtained in 3.5 seconds by depressing a push button. The field intensity is read directly in gammas from a five digit display consisting of light emitting diodes. A 10 position switch sets the appropriate range.

The instrument is powered by internally mounted size "D" alkaline batteries (standard) or by non-ferrous rechargeable batteries (optional). The rechargeable batteries have virtually zero magnetic effect and permit full use of the magnetometer sensitivity even with close spacing between the sensor and console.

A battery meter shows condition of batteries at all times and allows

Back-packed sensor allows for hands-free operation



anticipation of when batteries should be replaced.

The GP-70 noise cancelling toroidal sensor minimizes effect of external interference from man made sources. In high electrical noise areas, further improvement in signal to noise ratio can be achieved by keeping the push button depressed during a reading. This procedure automatically doubles the sensor polarize time, creating a higher signal output from the sensor.

Model GP-70 comes complete and ready for use with console, carrying strap, sensor, extending aluminum staff, spare batteries, instruction manual; all in a sturdy transit case.

An optional feature of the GP-70 is the back pack sensor harness. This option allows for a hands-free operation of the magnetometer, a major benefit in areas of rough terrain or thick vegetation.

Specifications

Sensitivity: 1 gamma

Range: 20,000 to 100,000 gammas in ten switch positions.

Operating Temperature: -40° to 55° C.

Absolute Accuracy: ± 1 gamma and ± 15 parts per million of measured field over range of -30° to + 50° C.

Sensor: Noise cancelling toroidal coil is electro-statically balanced to minimize interference between sensor and console.

Read Out: 3.5 seconds total - by push button. Double polarizing time by keeping button depressed.

Display: 5 digits on long life, light emitting diodes.

Electronic Circuits: Integrated circuits complying with military specifications used throughout.

Console: Sturdy aluminum housing with rubber light shield and shock guard.

Dimensions: Console - 3" x 6" x 9.5" (7.5 x 15 x 24 cm)
Sensor - 4.5" x 5" (10.5 x 12.7 cm)
Staff - 5 ft. (1.5 m) extended
2 ft (0.6 m) collapsed

Weights:
Console 3.8 lbs. (1.7 kg)
Sensor and cable 5 lbs. (2.3 kg)
Aluminum staff 1 lb. (0.45 kg)
12 Alkaline "D" cells 3 lbs (1.1 kg)

Power Supply: Standard - 12 internally mounted alkaline "D" cells provide over 10,000 readings at 25° C. decreasing to approximately 1,000 readings at -30°C. **Optional:** Internally mounted rechargeable non-ferrous batteries and charger. Over 3,000 readings between charges.

Battery Indicator: A miniature meter monitors battery life and helps predict battery replacement time.

McPhar Instrument Corporation

Head Office:

55 Tempo Avenue,
Willowdale, Ontario, Canada M2H 2R9
Tel: (416) 497-1700 Telex: 0623541
Cable: McPHAR TOR

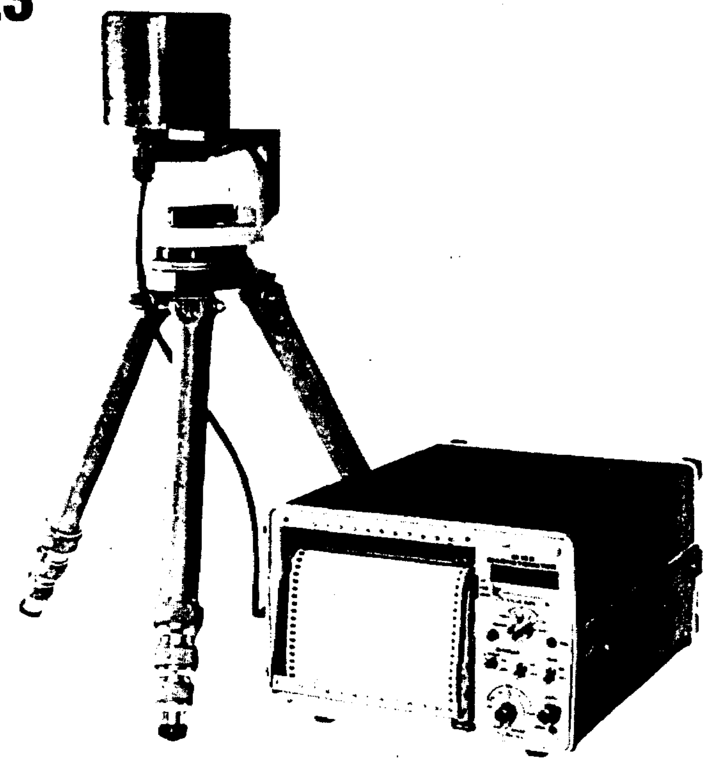
Sales agents in:

Africa, Asia, Australia, Europe, North & South America

Contact McPhar Instrument Corp. head office for the agent in your area.

BARRINGER RESEARCH

BASE STATION MAGNETOMETER
Model BM-123



DESCRIPTION

The Barringer BM-123 magnetometer system uses the proton precession principle to measure the earth's total magnetic field intensity. There is no need for levelling or calibration of the sensor and it is unaffected by external influences such as temperature, etc.

FEATURES

- Magnetometer neatly combined with analog recorder in console measuring only 17" x 12" x 8" (43.2 cm x 30.5 cm x 20.3 cm)
- powered by mains AC or 24 Volts DC
- Full 1 gamma or 0.5 gamma sensitivity
- Fully adjustable cycling rate from 2 seconds to 99 minutes in 1 second stages
- BCD output readily adaptable to digital cassette or other magnetic type recording
- To save power chart recorder can be made to operate only when magnetometer cycles

APPLICATIONS

– Storm monitoring
– Diurnal variation monitoring
– Observatory measurements including three component measurements with the use of Helmholtz coils

TYPICAL SYSTEM COMPONENTS

– Magnetometer console, including 5-inch chart recorder
– Toroidal sensor
– Connecting cable
– Tripod
– Power supply (optional)

SPECIFICATIONS

CONSOLE MODEL M-123-1

Sensitivity	1 gamma throughout the range
Accuracy	± 1 gamma at 24 volts dc
Range	20,000 to 100,000 gammas in 12 overlapping settings
Cycle Rates:	
Continuous Cycling	0.6, 0.8, 1.2 and 1.9 seconds
Automatic Cycling	2 seconds to 99 minutes in 1 second steps
Manual Cycling	pushbutton single cycling at 1.9 seconds
External Cycling	actuated by a 2.5 to 12 volt pulse longer than 1 millisecond
Outputs:	
Analog	front panel select 0 to 99 gammas or 0 to 990 gammas
Fiducial Marker	internal selection of 1 second to 99 minutes in 1 second steps
Visual	5 digit numeric display directly in gammas
External Outputs:	
Analog	2 channels, 0 to 99 gammas and 0 to 990 gammas at 1 milliamp or 1 volt Full Scale Deflection
Digital	BCD 1, 2, 4, 8 code, TTL compatible 0 State — 0 to 0.5 volts 1 State — 2.5 to 5 volts
Fiducial Mark	Relay closure or open state selected internally from 1 second to 99 minutes
Size	8″ x 12″ x 17″ (20.3 cm x 30.5 cm x 43.2 cm) (fits under a commercial airline seat)
Weight	20 lbs (9.1 kg)
Operating Temperature	−28°C to +65°C
Power Requirements	Magnetometer 12 to 30 volts dc 60 to 200 milliamps maximum Recorder 12 to 30 volts dc 0.5 to 0.9 amps maximum
Options	Component Spares Kit — a selection of critical solid state components and fuses required for general console maintenance Board Spares Kit — a complete selection of plug-in PC boards for maintenance of the console on longer term surveys

HIGH SENSITIVITY CONSOLE MODEL M-123-2

Sensitivity	0.5 gammas at 1.9 seconds
Accuracy	±0.5 gammas at 1.9 seconds

All other specifications the same as Model M-123-1

MAGNETOMETER ELECTRONICS ONLY MODEL M-123-3

Size	6″ high x 7″ wide x 6″ deep (15.2 cm x 17.8 cm x 15.2 cm) can fit a standard 19″ (48.3 cm) rack
Weight	approximately 5 lbs (2.3 kg)
Outputs	5 digit display in gammas
External Outputs	same as model M-123-1 above

CONSOLE OPTIONS

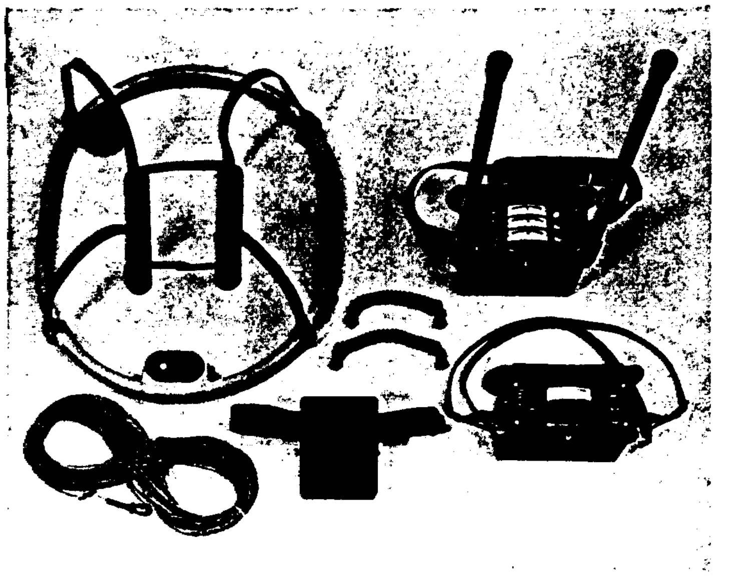
Digital Cassette Recording — various systems available, details on request
Hewlett-Packard Recorder Spares
Hewlett-Packard Recording Supplies — chart paper and disposable pens

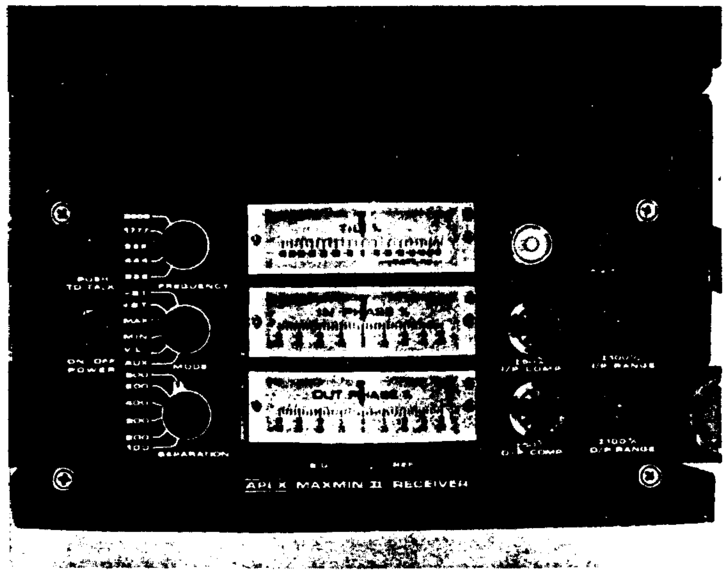
Barringer Research Limited
304 Carlingview Drive
Metropolitan Toronto
Rexdale, Ontario, Canada M9W 5G2
Phone: 416-675-3870
Telex: 06-968743

Representative:

APEX MAXMIN II PORTABLE EM

- Five frequencies: 222, 444, 888, 1777 and 3555 Hz.
- Maximum coupled (horizontal-loop) operation with reference cable.
- Minimum coupled operation with reference cable.
- Vertical-loop operation without reference cable.
- Coil separations: 25, 50, 100, 150, 200 and 250 m (with cable) or 100, 200, 300, 400, 600 and 800 ft.
- Reliable data from depths of up to 180 m (600 ft).
- Built-in voice communication circuitry with cable.
- Tilt meters to control coil orientation.





SPECIFICATIONS :

Frequencies: 222, 444, 888, 1777 and 3555 Hz.

Modes of Operation:

MAX: Transmitter coil plane and receiver coil plane horizontal (Max-coupled; Horizontal-loop mode). Used with refer. cable.

MIN: Transmitter coil plane horizontal and receiver coil plane vertical (Min-coupled mode). Used with reference cable.

V.L. : Transmitter coil plane vertical and receiver coil plane horizontal (Vertical-loop mode). Used without reference cable, in parallel lines.

Coil Separations: 25, 50, 100, 150, 200 & 250m (MMII) or 100, 200, 300, 400, 600 and 800 ft. (MMIIF). Coil separations in V.L. mode not restricted to fixed values.

Parameters Read:

- In-Phase and Quadrature components of the secondary field in MAX and MIN modes.
- Tilt-angle of the total field in V.L. mode.

Readouts:

- Automatic, direct readout on 90 mm (3.5") edgewise meters in MAX and MIN modes. No nulling or compensation necessary.
- Tilt angle and null in 90 mm edgewise meters in V.L. mode.

Scale Ranges:

In-Phase: ±20%, ±100% by push-button switch.
Quadrature: ±20%, ±100% by push-button switch.
Tilt: ±75% slope.
Null (V.L.): Sensitivity adjustable by separation switch.

Readability: In-Phase and Quadrature: 0.25% to 0.5%; Tilt: 1%.

Repeatability: ±0.25% to ±1% normally, depending on conditions, frequencies and coil separation used.

Transmitter Output:

- 222 Hz : 220 Atm^2
- 444 Hz : 200 Atm^2
- 888 Hz : 120 Atm^2
- 1777 Hz : 60 Atm^2
- 3555 Hz : 30 Atm^2

Receiver Batteries: 9V trans. radio type batteries (4). Life: approx. 35 hrs. continuous duty (alkaline, 0.5 Ah), less in cold weather.

Transmitter Batteries: 12V 6 Ah Gel-type rechargeable battery. (Charger supplied).

Reference Cable: Light weight 2-conductor teflon cable for minimum friction. Unshielded. All reference cables optional at extra cost. Please specify.

Voice Link: Built-in intercom system for voice communication between receiver and transmitter operators in MAX and MIN modes, via reference cable.

Indicator Lights: Built-in signal and reference warning lights to indicate erroneous readings.

Temperature Range: -40°C to +60°C (-40°F to +140°F).

Receiver Weight: 6 kg (13 lbs.)

Transmitter Weight: 13 kg (29 lbs.)

Shipping Weight: Typically 60 kg (135 lbs.), depending on quantities of reference cable and batteries included. Shipped in two field/shipping cases.

Specifications subject to change without notification.

APEX PARAMETRICS LIMITED
200 STEELCASE RD. E., MARKHAM, ONT., CANADA, L3R 1G2

Phone: (416) 495-1612 Cables: APEXPARA TORONTO Telex: 06-966773 NORDVIK TOR

Ministry of Natural Resources
Ontario

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

#4

41016NW0025 2.4419 HORWOOD

900

2.4419

The Mini... — Do not use shaded areas below.

Type of Survey(s)	Township or Area
Geophysical-Magnetometer, Electromagnetic	Horwood Township

Claim Holder(s)	Prospector's Licence No.
Northgate Exploration Limited W8206-434	T 835

Address: P.O. Box 143, 1 First Canadian Place, Toronto, Ontario M5X 1C7

Survey Company	Date of Survey (from & to)	Total Miles of line Cut
MPH Consulting	10 80 – 5 81	74 km + 5 km over lake

Name and Address of Author (of Geo-Technical report): D. Jones, MPH Consulting, 141 Adelaide Street West, Toronto M5H 3L5

Credits Requested per Each Claim in Columns at right

Special Provisions	Geophysical	Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	- Electromagnetic	40
	- Magnetometer	20
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	
	Magnetometer	
	Radiometric	

RECEIVED
NOV 25 1982
MINING LANDS SECTION

RECORDED
NOV 5 1982
Receipt No. ....

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Expend. Days Cr.	Prefix	Number	Expend. Days Cr.
P	~~529282~~ Cancelled	60	P	529347	60
	~~529283~~ "	60		529348	60
	529284	60		529349	60
	~~529285~~ Cancelled	60		529350	60
	529286	60		529351	60
	~~529287~~ Cancelled	60		529352	60
	529292	60		529353	60
	529293	60		529354	60
	529297	60		529355	60
	529298	60		529356	60
	529299	60		529358	60
	529300	60		529360	60
	529301	60		565943	60
	529302	60		565944	60
	529313	60		~~565945~~ Cancelled	60
	529314	60		565946	60
	529315	60		565947	60
	529316	60		565948	60
	529342	60		565949	60
	529343	60		565950	60
	529344	60		565951	60
	529345	60		568627	60
	529346	60		568628	60

Total number of mining claims covered by this report of work: 61

over

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.

Date	Recorded Holder or Agent (Signature)
October 29,1982	[signature]

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
3240	Nov 5/82	[signature]
	Date Approved as Recorded	Branch Director
	83.02.16	[signature]

Certification Verifying Report of Work

I hereby certify that I have a personal and intimate knowledge of the facts set forth in the Report of Work annexed hereto, having performed the work or witnessed same during and/or after its completion and the annexed report is true.

Name and Postal Address of Person Certifying
G. Harper, Ph.D., P. Eng., 26 Orchard Crescent, Toronto, Ontario M8Z 3E1

Date Certified	Certified by (Signature)
October 29, 1982	[signature]

Assessment Work Breakdown

Man Days are based on eight (8) hour Technical or Line-cutting days. Technical days include work performed by consultants, draftsmen, etc..

Type of Survey

Technical Days				Technical Days Credits		Line-cutting Days		Total Credits		No. of Claims		Days per Claim
	X	7	=		+		=		÷		=	

Type of Survey

Technical Days				Technical Days Credits		Line-cutting Days		Total Credits		No. of Claims		Days per Claim
	X	7	=		+		=		÷		=	

Type of Survey

Technical Days				Technical Days Credits		Line-cutting Days		Total Credits		No. of Claims		Days per Claim
	X	7	=		+		=		÷		=	

Type of Survey

Technical Days				Technical Days Credits		Line-cutting Days		Total Credits		No. of Claims		Days per Claim
	X	7	=		+		=		÷		=	

Prefix	Number	Expend. Days Credit
P	568631	60
	568632	60
	568633	60
	568634	60
	568639	60 Cancelled
	568640	60 Cancelled
	571506	60
	571507	60
	571508	60
	571509	60
	571510	60
	571511	60
	571512	60
	571513	60
	529361	60

Ministry of Natural Resources
Ontario

Geotechnical Report Approval

File 2.4419

A.S.A.P Please. Feb 7/83

Mining Lands Comments

- you wanted to see again

☑ To: Geophysics Mr Barlow

Comments

☑ Approved ☐ Wish to see again with corrections | Date Feb 9/83 | Signature [signature]

☐ To: Geology - Expenditures

Comments

☐ Approved ☐ Wish to see again with corrections | Date | Signature

☐ To: Geochemistry

Comments

☐ Approved ☐ Wish to see again with corrections | Date | Signature

☐ To: Mining Lands Section, Room 6462, Whitney Block. (Tel: 5-1380)

1593 (81/10)

Ministry of Natural Resources
Ontario

Your file:

1983 01 11 Our file: 2.4419

Northgate Exploration Limited
Suite 3140
P.O. Box 143
1 First Canadian Place
Toronto, Ontario
M5X 1C7

Attention: Debra Collins.

Dear Sirs:

RE: Geophysical (Electromagnetic & Magnetometer) Survey submitted on Mining Claims P 529282 et al in the Township of Horwood.

Enclosed are the EM and VLF-EM maps in duplicate for the above mentioned survey. Please plot the raw data at each station point and return the maps to this office.

For further information, please contact Mr. F.W. Matthews at 965-1380.

Yours very truly,

RAW DATA HAS BEEN PLOTTED ON PROFILE MAPS
R Y

E.F. Anderson
Director
Land Management Branch

Whitney Block, Room 6450
Queen's Park
Toronto, Ontario
M7A 1W3
Phone: 416/965-1380

RECEIVED
FEB -7 1983
MINING LANDS SECTION

A. Barr:sc

Encls:

cc: Mining Recorder
Timmins, Ontario

Ontario Ministry of Natural Resources

Geotechnical Report Approval

RUSH/URGENT

File 2.4419

Mining Lands Comments

A.S.A.P. please

☑ To: Geophysics Mr. Barlow.

Comments

EM map needs raw readings plotted
VLF map needs " " "

☐ Approved ☑ Wish to see again with corrections | Date Jan 3/83 | Signature Ry Barlow

☐ To: Geology - Expenditures

Comments

☐ Approved ☐ Wish to see again with corrections | Date | Signature

☐ To: Geochemistry

Comments

☐ Approved ☐ Wish to see again with corrections | Date | Signature

☐ To: Mining Lands Section, Room 6462, Whitney Block. (Tel: 5-1380)

1593 (81/10)

January 15, 1982 2.4419

Office of the Mining Recorder
Ministry of Natural Resources
60 Wilson Avenue
Timmins, Ontario
P4N 2S7

Dear Sir:

We have received reports and maps for a Geophysical (Electromagnetic and Magnetometer) Survey submitted under Special Provisions (credit for Performance and Coverage) on Mining Claims P.529282 et al, in the Township of Horwood.

This material will be examined and assessed and a statement of assessment work credits will be issued.

Yours very truly,

E.F. Anderson
Director
Land Management Branch

Whitney Block, Room 6450
Queen's Park
Toronto, Ontario
M7A 1W3
Phone: 416/965-1380

J. Skura/bk

cc: Northgate Exploration Limited
Toronto, Ontario
Attention: Debra Collins

NORTHGATE EXPLORATION LIMITED
SUITE 3140, P.O. BOX 143, 1 FIRST CANADIAN PLACE, TORONTO, CANADA M5X 1C7 • TELEPHONE (416) 362-6683 • TELEX 06-217766

December 14, 1981

Ministry of Natural Resources
Whitney Block, 90 Wellesley St. W.
Queen's Park
Toronto, Ontario
M7A-1W3

RECEIVED
DEC 15 1981
MINING LANDS SECTION

Attn: Mr. Fred Matthews

Re: Our File No. 2.3957

Dear Mr. Matthews:

With reference to our file number 2.3957, originally submitted in July 1981, we are now re-submitting all the geophysical data for assessment purposes.

In order to clarify the discrepancies between the new Horwood Township Claim Map and the corresponding MPH Geophysical Map, the following changes should be noted.

1) It appears that on the VLF-EM Profile Map of the Horwood Lake Grid, and the corresponding Magnetic Map, claim P-529357 has been omitted. It is located between claims P-529356 and 529360, on the enclosed copy of the updated claim sheet.

2) In addition, claims 25337 and 25339 have erroneously been placed too far to the south. On the enclosed claim map the resultant piece of ground north of claim 25337 has been designated "NO OPEN GROUND". The two claims should in fact cover this ground. With the correction of this error, came the realization that a portion of land would have been left unstaked by our company. Thus in July of 1981, claim P-619052 was staked to cover the open ground.

3) On the VLF-EM Profile Map of the Stangiff Lake Grid- Sheet 2, and the corresponding Magnetic Map, three claims have been cancelled; P-529586, 565943 and 565944. The cancellation was caused by the overstaking of the above claims over patented ground: claims 40728, 40729 and 40730.

All of the above changes have been verified and approved by the acting Mining Recorder in Timmins, Mr. George Koleszar.

The corrected Geophysical Maps are in the process of being drafted and will be submitted to your office in the New Year. Please accept the enclosed maps as a preliminary guide to the assessment of the geophysical work.

If any further information is required, please do not hesitate to contact me.

Yours truly

Debra Collins

Debra Collins
Project Co-Ordinator

Claim List for Horwood Township

P - 529282 1/2
P - 529283 ✓
P - 529284 ✓
P - 529285 ✓
529286 ✓
P - 529287 ✓
P - 529297 ✓
P - 529298 ✓
P - 529299 3/4
P - 529300 ✓
P - 529301 ✓
P - 529302 ✓
✓ P - 529292 ✓
✓ P - 529293 1/2
P - 529313 ✓
P - 529314 ✓
P - 529315 ✓
P - 529316 ✓
P - 529342 ✓
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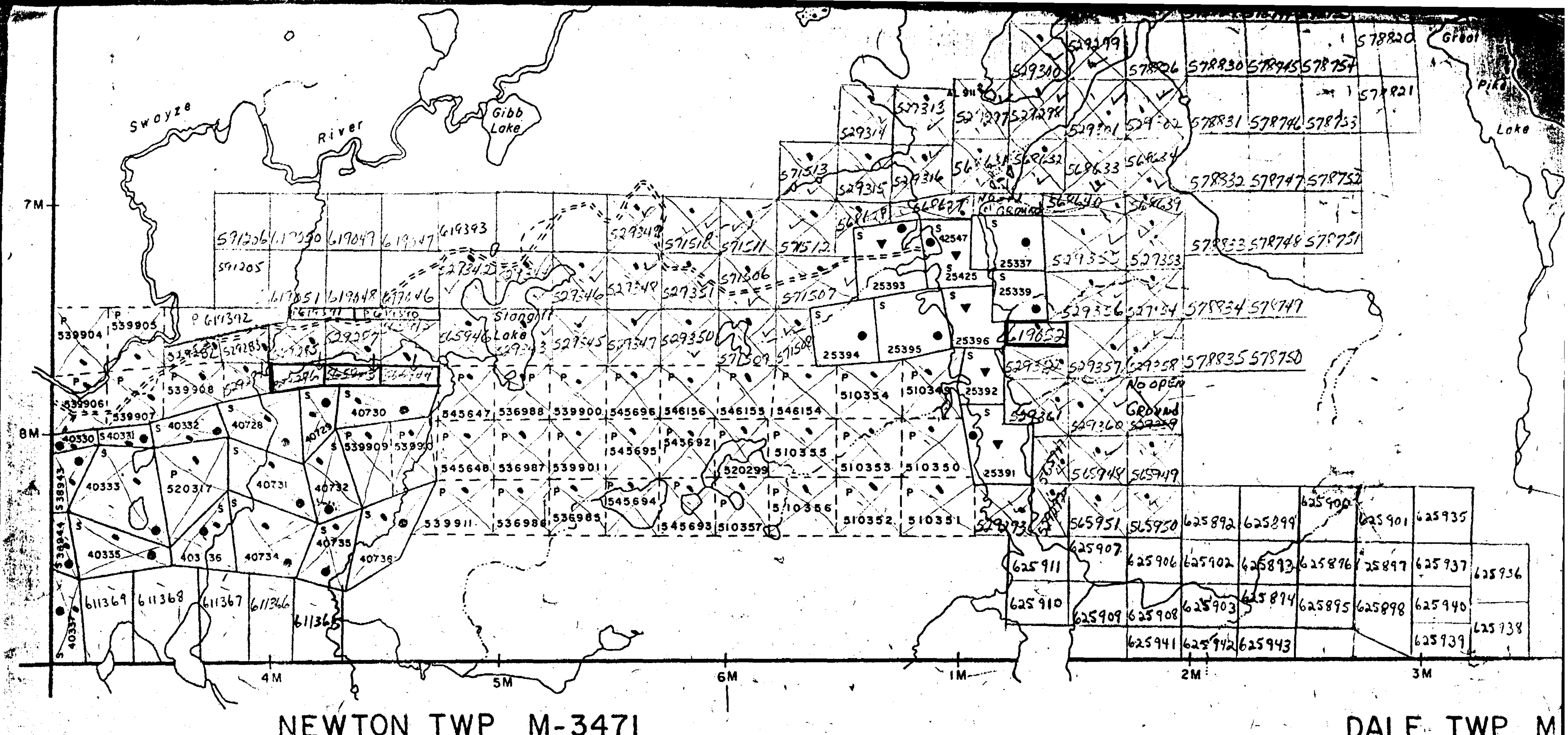
P - 529354 ✓
P - 529355 ✓
P - 529356 ✓
P - 529357 no credits asked
✓ P - 529358 ✓
✓ P - 529360 ✓
✓ P - 529361 ✓

565944 ✓
P - 565945 ✓
P - 565946 ✓
P - 565947 ✓
P - 565948 ✓
P - 565949 ✓
P - 565950 ✓
P - 565951 ✓
P - 568627 ✓
P - 568628 ✓
P - 568631 ✓
P - 568632 ✓
P - 568633 ✓
P - 568634 ✓
P - 568639 ✓
P - 568640 ✓
P - 571506 ✓
P - 571507 ✓
P - 571508 ✓
P - 571509 ✓
P - 571510 ✓
P - 571511 ✓
P - 571512 ✓
P - 571513 ✓
P - 619052 no credits asked

Total of 60 claims



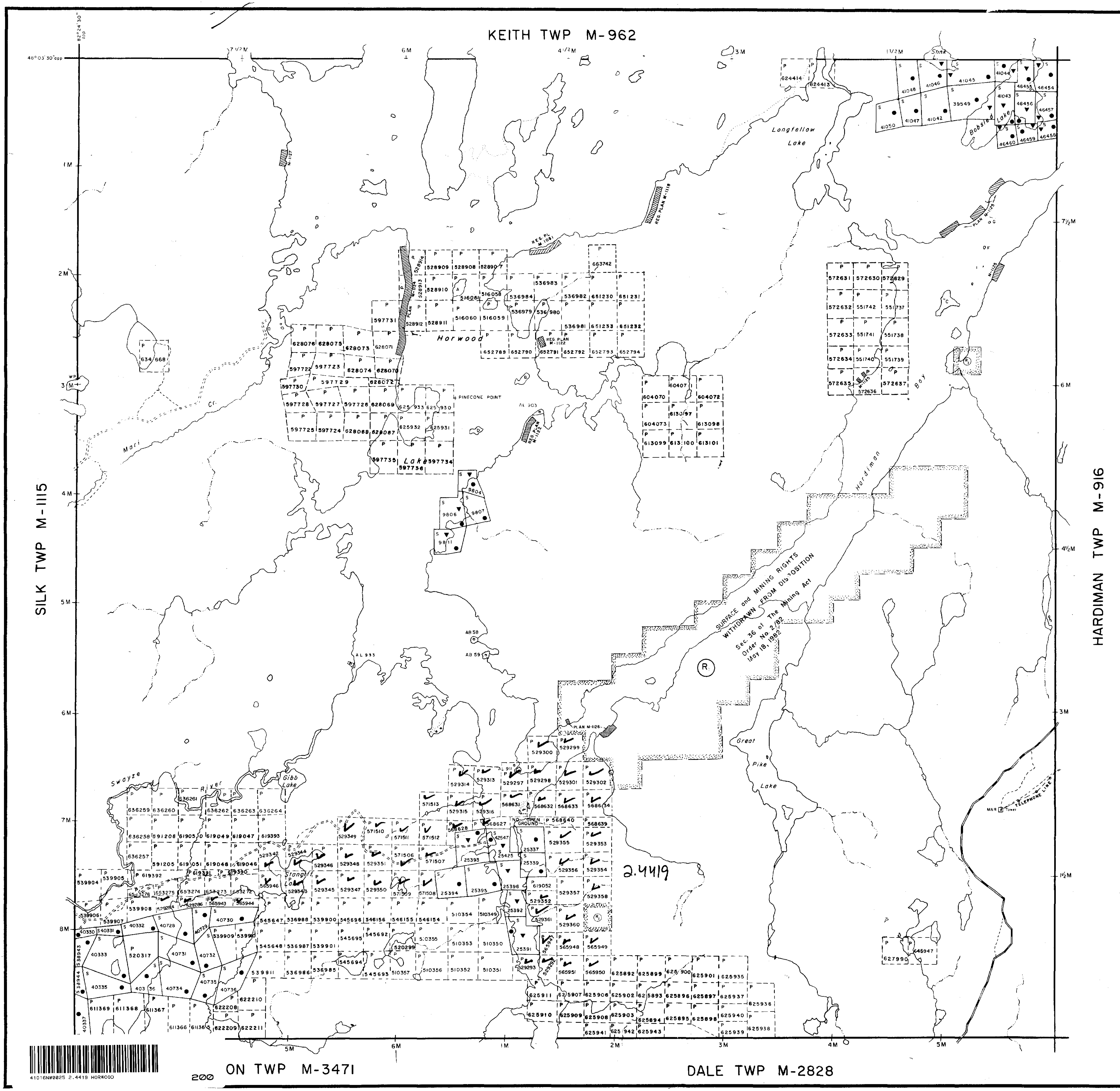
please note the above claims; they have been referred to in our covering letter

Taken from 1981 HORWOOD TOWNSHIP Claim Map.

TRIM LINE

Northgate Exploration - Horwood 2.4419

	EM	Mag			
P 529284	✓	✓	P 565951	✓	✓
86	✓	✓	568627	✓	✓
92	✓	✓	28	✓	✓
93	✓	✓	31	✓	✓
97	✓	✓	32	✓	✓
98	✓	✓	33	✓	✓
99	✓	✓	34	✓	✓
529300	✓	✓	571506	✓	✓
01	✓	✓	07	✓	✓
02	✓	✓	08	✓	✓
13	✓	✓	09	✓	✓
14	✓	✓	10	✓	✓
15	✓	✓	11	✓	✓
16	✓	✓	12	✓	✓
42	✓	✓	13	✓	✓
43	✓	✓	529361	✓	
44	✓	✓			
45	✓	✓			
46	✓	✓			
47	✓	✓			
48	✓	✓			
49	✓	✓			
50	✓	✓			
51	✓	✓			
52	✓	✓			
53	✓	✓			
54	✓	✓			
55	✓	✓			
56	✓	✓			
58	✓	✓			
60	✓	✓			
565943	✓	✓			
44	✓	✓			
46	✓	✓			
47	✓	✓			
48	✓	✓			
49	✓	✓			
50	✓	✓			



41O16NW0025 2.4419 HORWOOD

200

THE TOWNSHIP OF

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

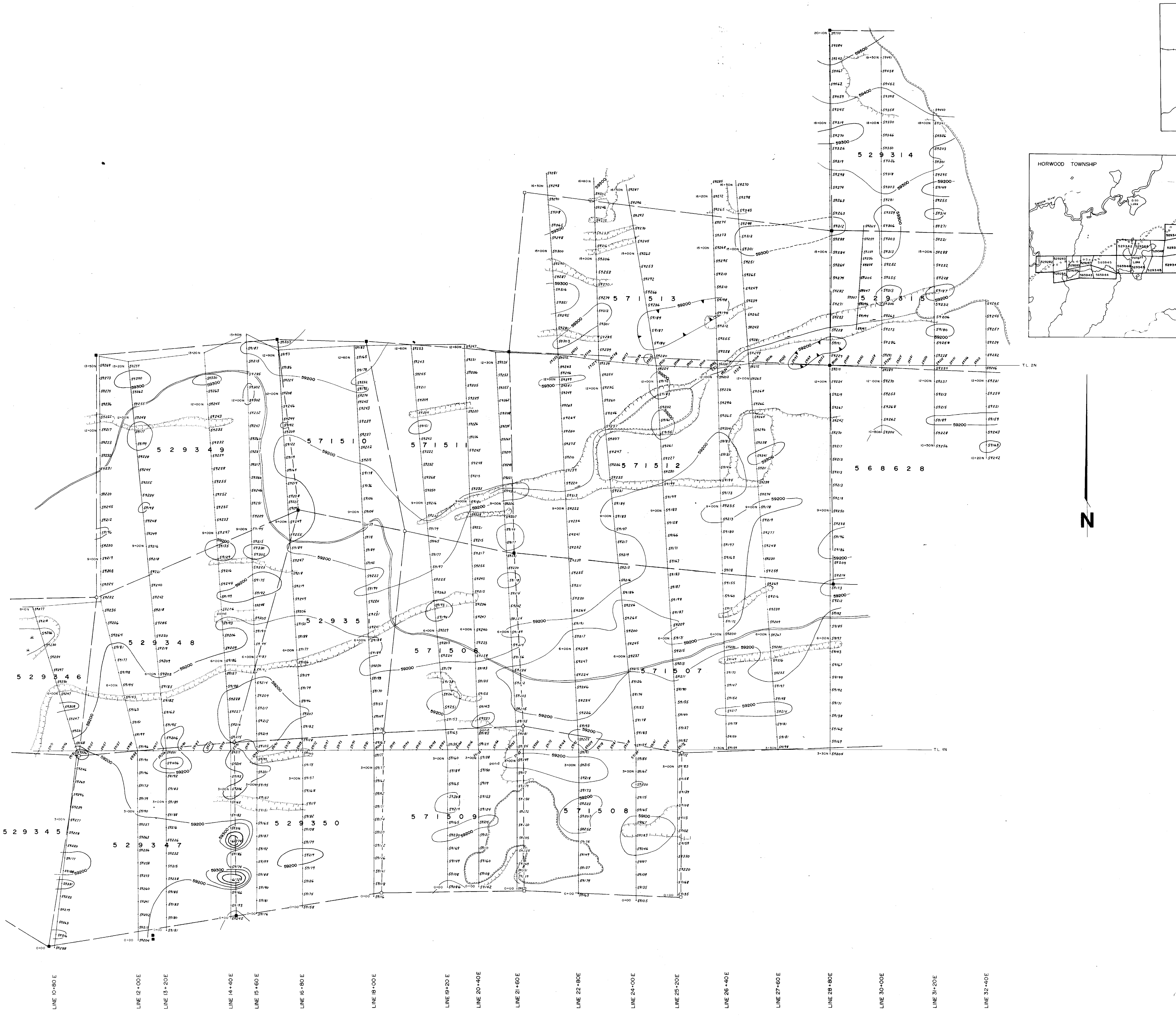
Areas withdrawn from staking under Section 36 of the Mining Act (R.S.O. 1980),

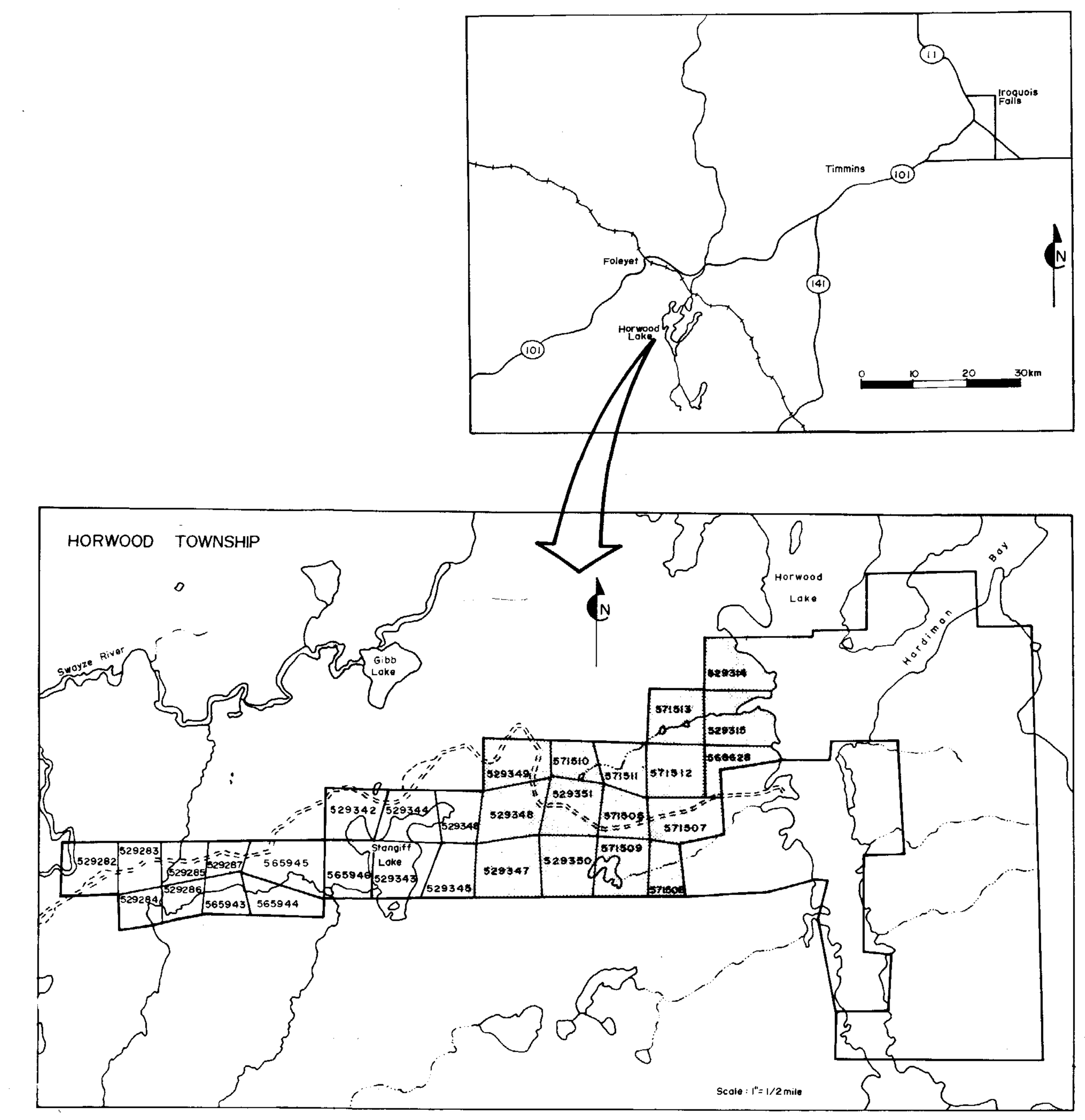
Order No.	File	Date	Disposition
Ⓡ W. 2/82		18/5/82	S.R. & M.R.

DATE OF ISSUE
FEB 15 1983
Ministry of Natural Resources
TORONTO

PLAN NO.- M-936

ONTARIO
MINISTRY OF NATURAL RESOURCES
SURVEYS AND MAPPING BRANCH





LEGEND

McPHAR GP - 70 PROTON MAGNETOMETER

59046 ABSOLUTE MAGNETIC VALUE (gammas)

MAGNETIC CONTOUR

MAGNETIC DEPRESSION

CONTOUR INTERVALS

500 GAMMAS

100 GAMMAS

CLAIM POST LOCATION

CLAIM POST LOCATED BY EXTRAPOLATION

CLAIM LINE

LAKE, POND

CREEK (arrow indicates flow)

SWAMP

SLOPE

ROAD

Northgate Exploration Limited

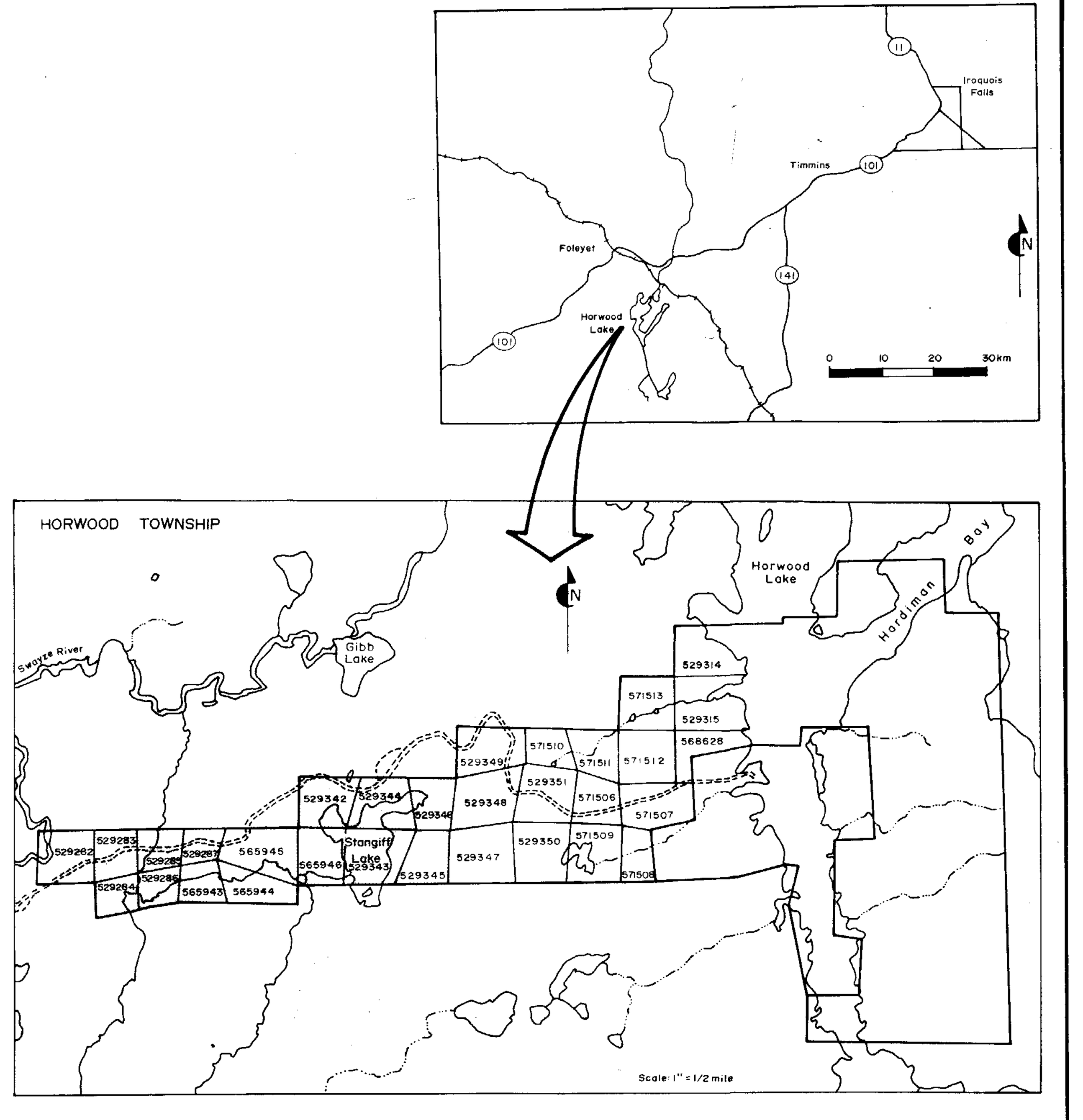
HORWOOD TOWNSHIP PROJECT
STANGIFF LAKE GRID - Sheet I

MAGNETOMETER SURVEY

Project No: C 428	By: D. Jones
Scale: 1:3000	Drawn: EJ
Drawing No: 1	Date: March, 1981

MPH Consulting Limited

210



LEGEND

McPHAR GP-70 PROTON MAGNETOMETER

- 59046 ABSOLUTE MAGNETIC VALUE (gammas)
- MAGNETIC CONTOUR
- MAGNETIC DEPRESSION
- CONTOUR INTERVALS
- 500 GAMMAS
- 100 GAMMAS
- CLAIM POST LOCATION
- CLAIM POST LOCATED BY EXTRAPOLATION
- CLAIM LINE
- LAKE, POND
- CREEK (arrow indicates flow)
- SWAMP
- SLOPE
- ROAD

Northgate Exploration Limited

HORWOOD TOWNSHIP PROJECT
STANGIFF LAKE GRID - Sheet 2

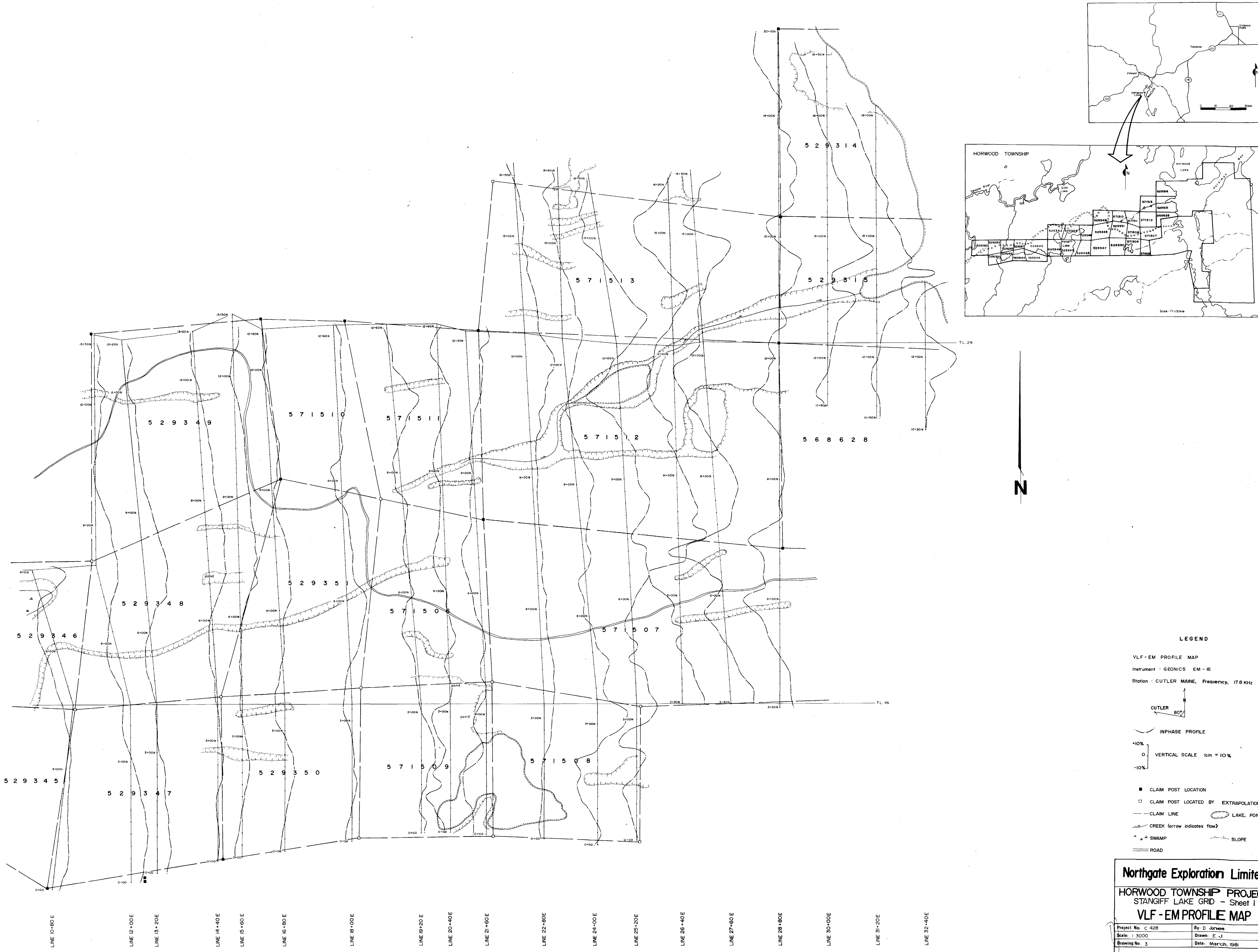
MAGNETOMETER SURVEY

Project No.: C 429	By: D. Jones
Scale: 1:3000	Drawn: E.J.
Drawing No.: 2	Date: March, 1981

MPH Consulting Limited

2.4419

220



LEGEND

VLF-EM PROFILE MAP

Instrument : GEONICS EM-16

Station : CUTLER MAINE, Frequency, 17.8 KHz

CUTLER 80°

INPHASE PROFILE

+10% / 0 / -10% VERTICAL SCALE 1cm = 10%

■ CLAIM POST LOCATION

□ CLAIM POST LOCATED BY EXTRAPOLATION

CLAIM LINE

LAKE, POND

CREEK (arrow indicates flow)

SWAMP

SLOPE

ROAD

Northgate Exploration Limited

HORWOOD TOWNSHIP PROJECT
STANGIFF LAKE GRID - Sheet I

VLF-EM PROFILE MAP

Project No: C 428	By: D Jones
Scale: 1:3000	Drawn: E.J.
Drawing No: 3	Date: March, 1981

MPH Consulting Limited

230

Northgate Exploration Limited

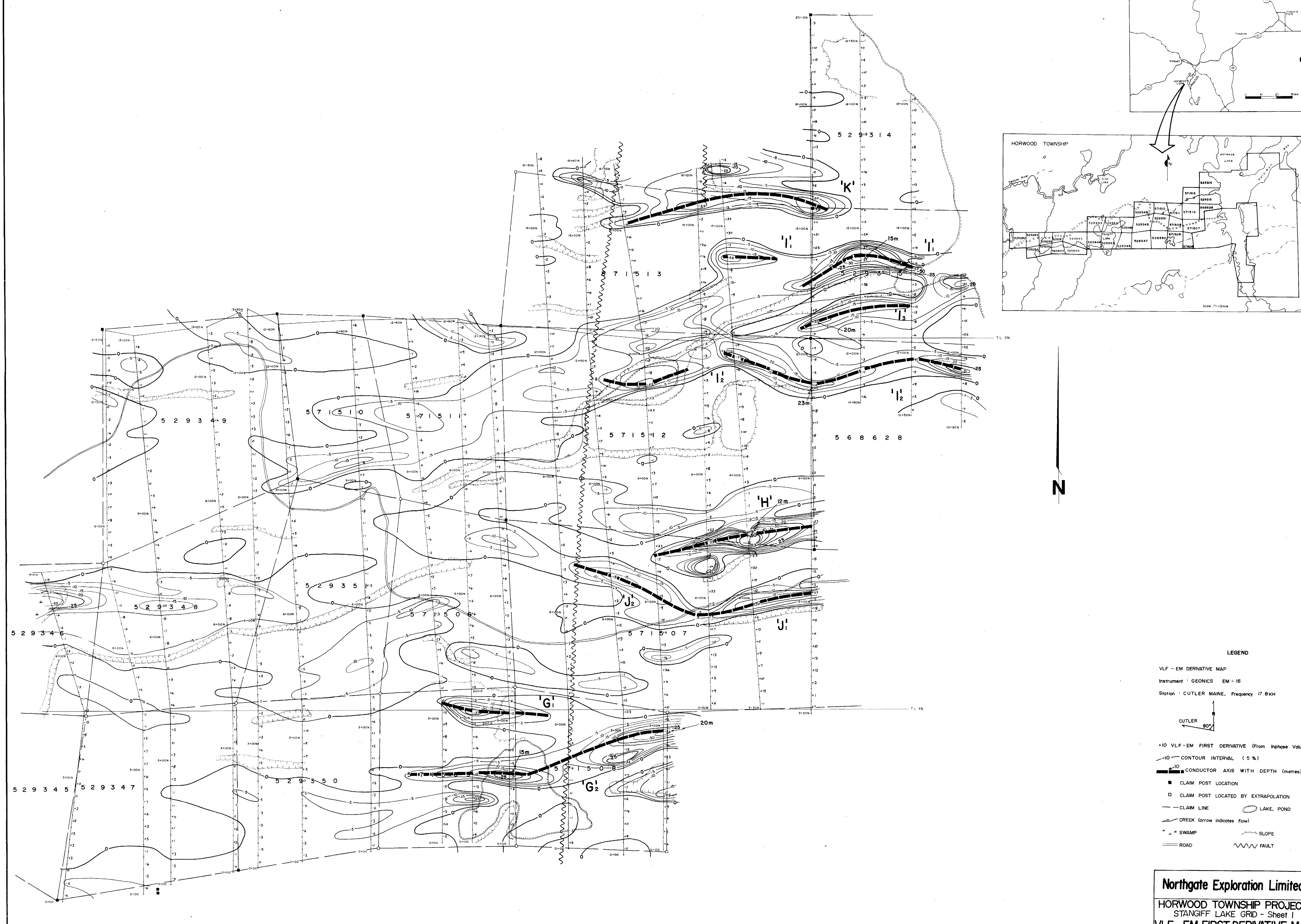
HORWOOD TOWNSHIP PROJECT
STANGIFF LAKE GRID - Sheet 2

VLF - EM PROFILE MAP

Project No. C 429	By D. Jones
Scale 1:3000	Drawn E.J.
Drawing No. 4	Date March, 1981

MPH Consulting Limited

240



LEGEND

VLF - EM DERIVATIVE MAP

Instrument : GEONICS EM - 16

Station : CUTLER MAINE, Frequency 17.8 KH

CUTLER 80°

+10 VLF - EM FIRST DERIVATIVE (From Inphase Values)

-10 CONTOUR INTERVAL (5 %)

10 CONDUCTOR AXIS WITH DEPTH (metres)

■ CLAIM POST LOCATION

□ CLAIM POST LOCATED BY EXTRAPOLATION

CLAIM LINE

LAKE, POND

CREEK (arrow indicates flow)

SWAMP

SLOPE

ROAD

FAULT

Northgate Exploration Limited

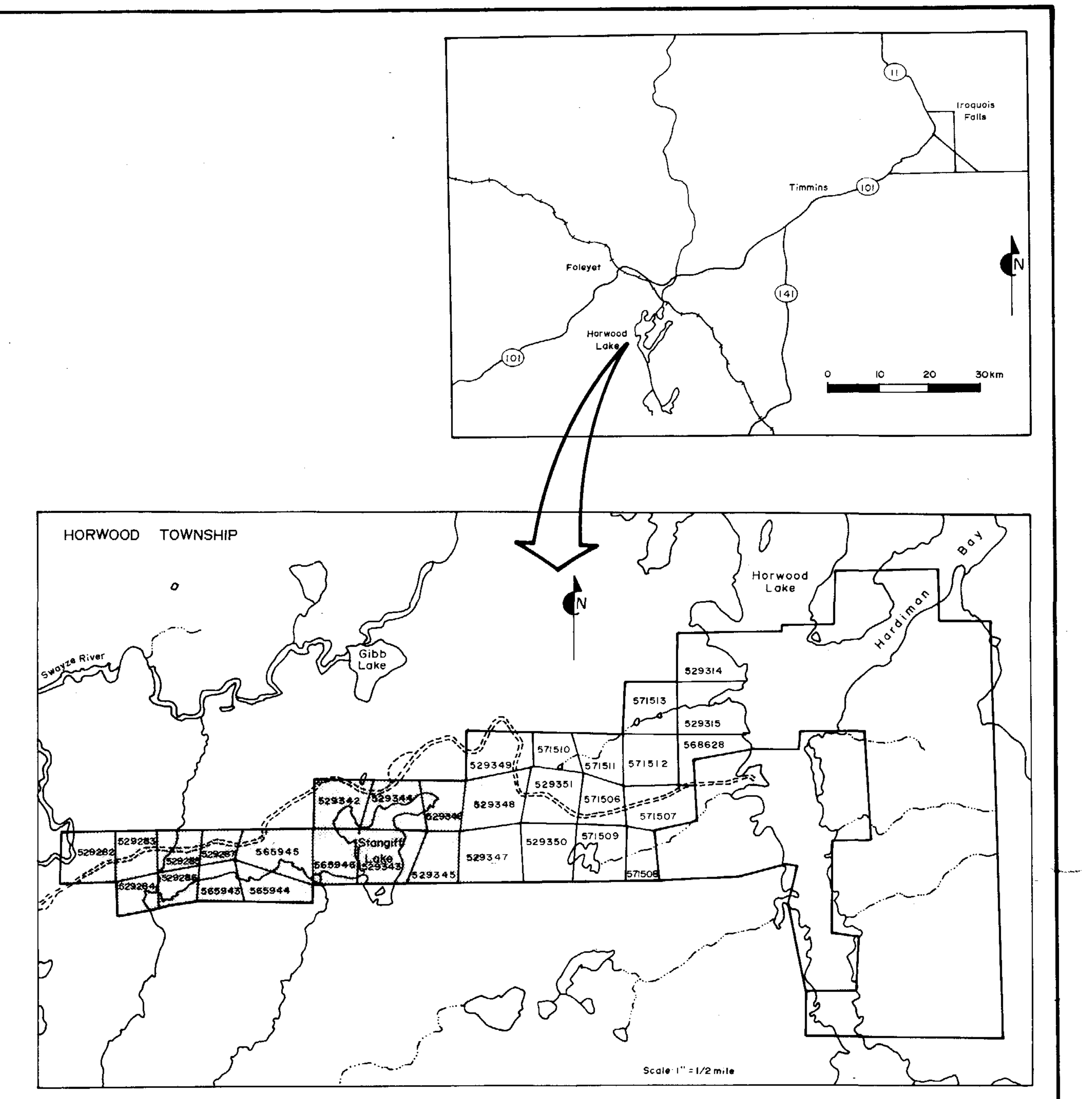
HORWOOD TOWNSHIP PROJECT

STANGIFF LAKE GRID - Sheet I

VLF - EM FIRST DERIVATIVE MAP

Project No: C 428	By: D. Jones
Scale: 1:3000	Drawn: E.J.
Drawing No: 5	Date: March, 1981

MPH Consulting Limited



LEGEND

VLF - EM DERIVATIVE MAP

Instrument : GEONICS EM - 16

Station : CUTLER MAINE, Frequency 17.8 KHz

CUTLER 80°

+10 VLF-EM FIRST DERIVATIVE (From Inphase Values)

—10— CONTOUR INTERVAL (5%)

10 CONDUCTOR AXIS WITH DEPTH (metres)

FAULT

■ CLAIM POST LOCATION

□ CLAIM POST LOCATED BY EXTRAPOLATION

— CLAIM LINE

LAKE, POND

CREEK (arrow indicates flow)

SWAMP

SLOPE

ROAD

Northgate Exploration Limited

HORWOOD TOWNSHIP PROJECT

STANGIFF LAKE GRID - Sheet 2

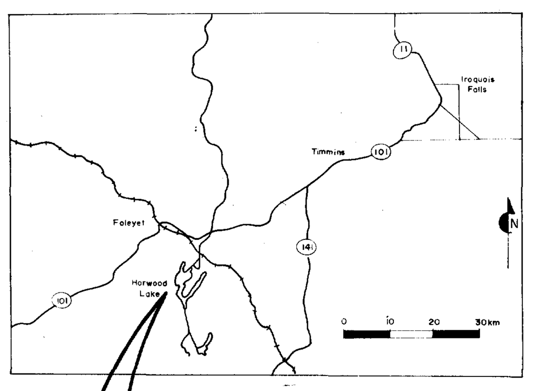
VLF - EM FIRST DERIVATIVE MAP

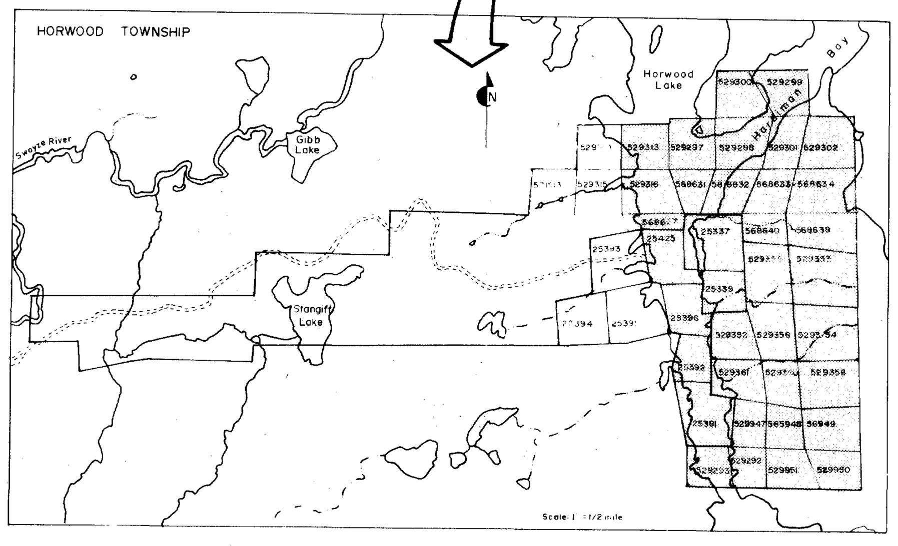
Project No: C 428	By: D. Jones
Scale: 1:3000	Drawn: E.J.
Drawing No: 6	Date: March, 1981

MPH Consulting Limited

260


HORWOOD TOWNSHIP
LINE 18+00W
LINE 16+80W
LINE 15+60W
LINE 14+40W
LINE 13+20W
LINE 12+00W
LINE 10+80W
LINE 9+60W
LINE 8+40W
LINE 7+20W
LINE 6+00W
LINE 4+80W
LINE 3+60W
LINE 2+40W
LINE 1+20W
LINE 0+00
21+00N
TL 2 N
18+00N
15+00N
12+00N
TL 1 N
9+00N
6+00N
3+00N
B.L. 0+00
BASE LINE AZIMUTH 86°
3+00S
TL 1 S
6+00S
9+00S
12+00S
TL 2 S
LEGEND
McPHAR GP-70 PROTON MAGNETOMETER
59046 ABSOLUTE MAGNETIC VALUE (gammas)
MAGNETIC CONTOUR
MAGNETIC DEPRESSION
CONTOUR INTERVALS
500 GAMMAS
100 GAMMAS
CLAIM POST LOCATED BY EXTRAPOLATION
CLAIM POST LOCATION
CLAIM LINE
SLOPE
SWAMP
CREEK (arrow indicates flow)
LAKE
Northgate Exploration Limited
HORWOOD TOWNSHIP PROJECT
HORWOOD LAKE GRID
MAGNETOMETER SURVEY
Project No: C428
By D. JONES
Scale: 1:3000
Drawn: D. H.
Drawing No: 7
Date: March, 1981
MPH Consulting Limited
2.4419





LEGEND

VLF-EM PROFILE MAP

Instrument GEONICS EM-16

Station CUTLER MAINE, Frequency, 17 8 KHz

CUTLER 80° N

Inphase Profile

+10%
0
-10%

Vertical Scale 1cm = 10 %

Claim Post Located By Extrapolation

Claim Post Location

Claim Line

Slope

Swamp

Creek Arrow Indicates Flow

Lake , Pond

Northgate Exploration Limited

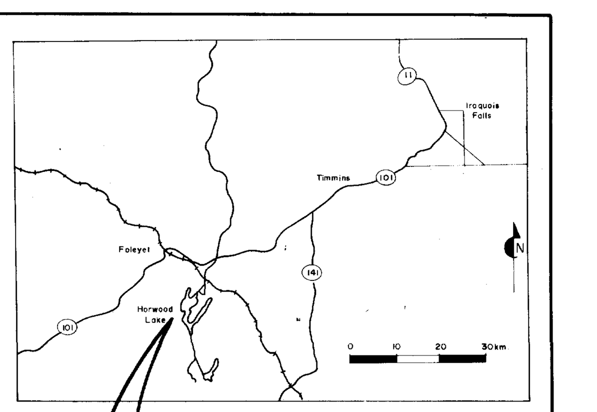
HORWOOD TOWNSHIP PROJECT

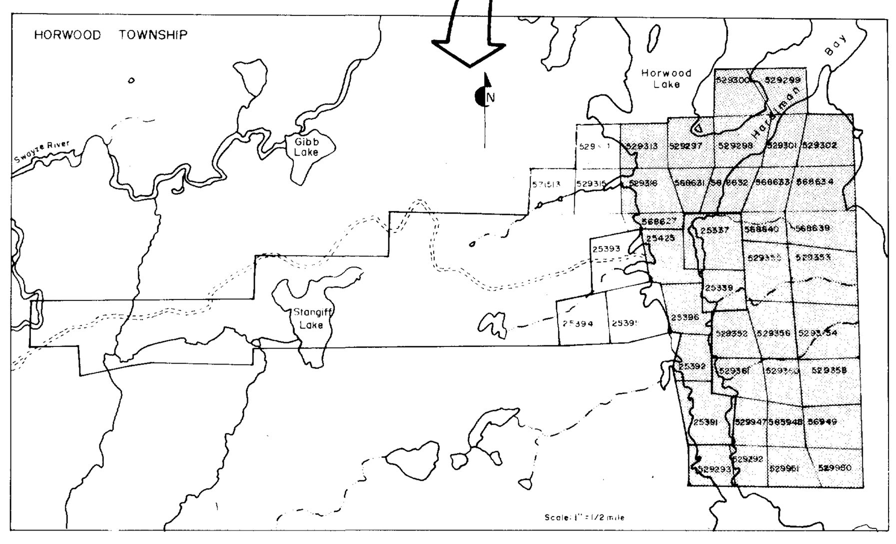
HORWOOD LAKE GRID

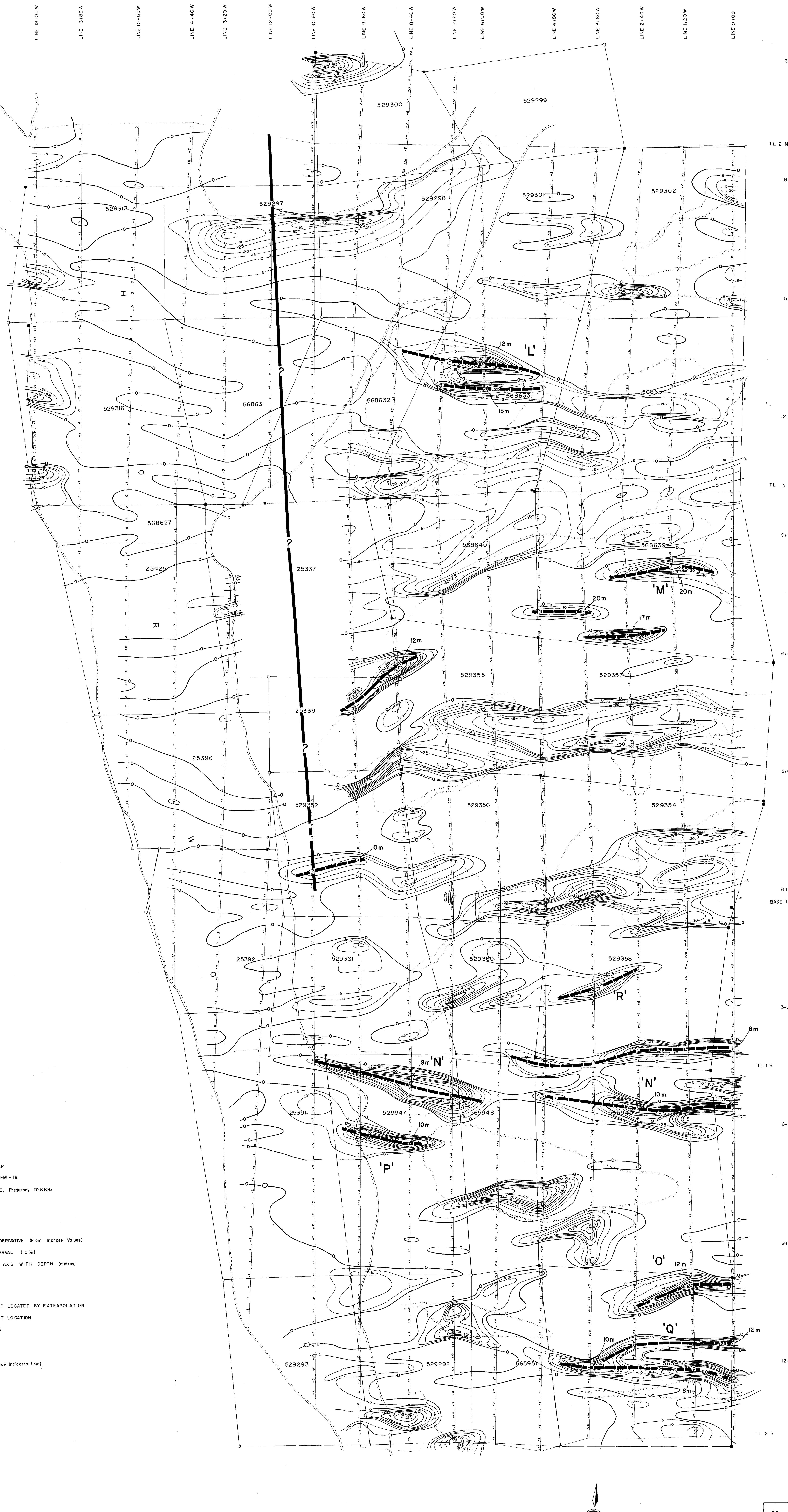
VLF-EM PROFILE MAP

Project No: C428	By: D. JONES
Scale: 1:3000	Drawn: D. H.
Drawing No: 8	Date: March, 1981

MPH Consulting Limited







LEGEND

VLF - EM DERIVATIVE MAP

Instrument : GEONICS EM - 16

Station : CUTLER MAINE, Frequency 17·8 KHz

CUTLER 80°

N

+10 VLF-EM FIRST DERIVATIVE (From Inphase Values)

-10 CONTOUR INTERVAL (5%)

10 CONDUCTOR AXIS WITH DEPTH (metres)

CLAIM POST LOCATED BY EXTRAPOLATION

CLAIM POST LOCATION

CLAIM LINE

SLOPE

SWAMP

CREEK (arrow indicates flow)

LAKE

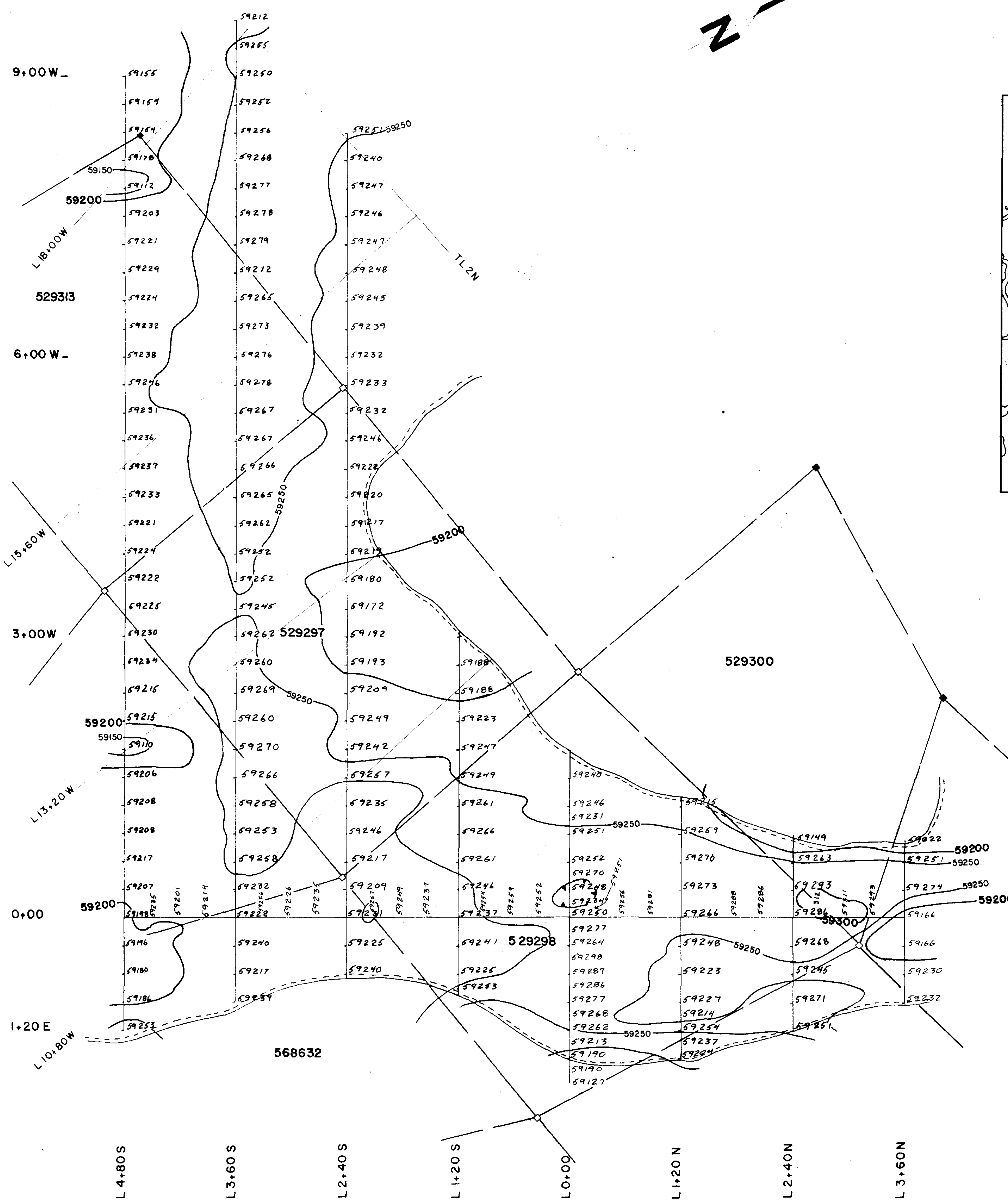
Northgate Exploration Limited

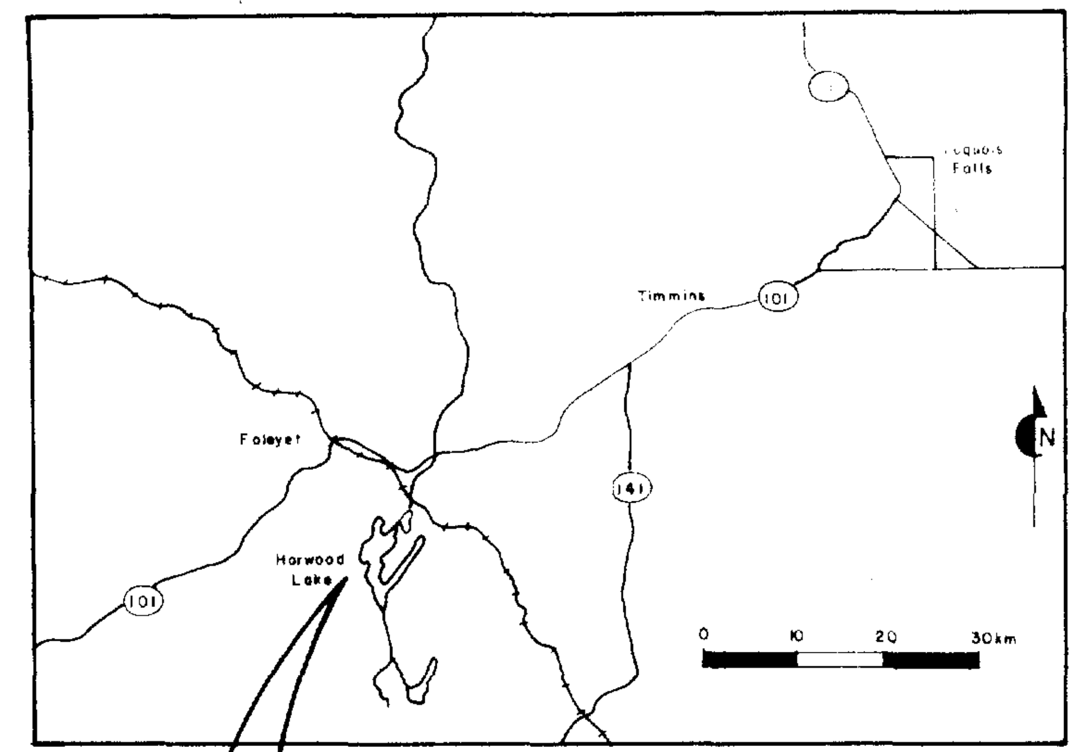
HORWOOD TOWNSHIP PROJECT
HORWOOD LAKE GRID

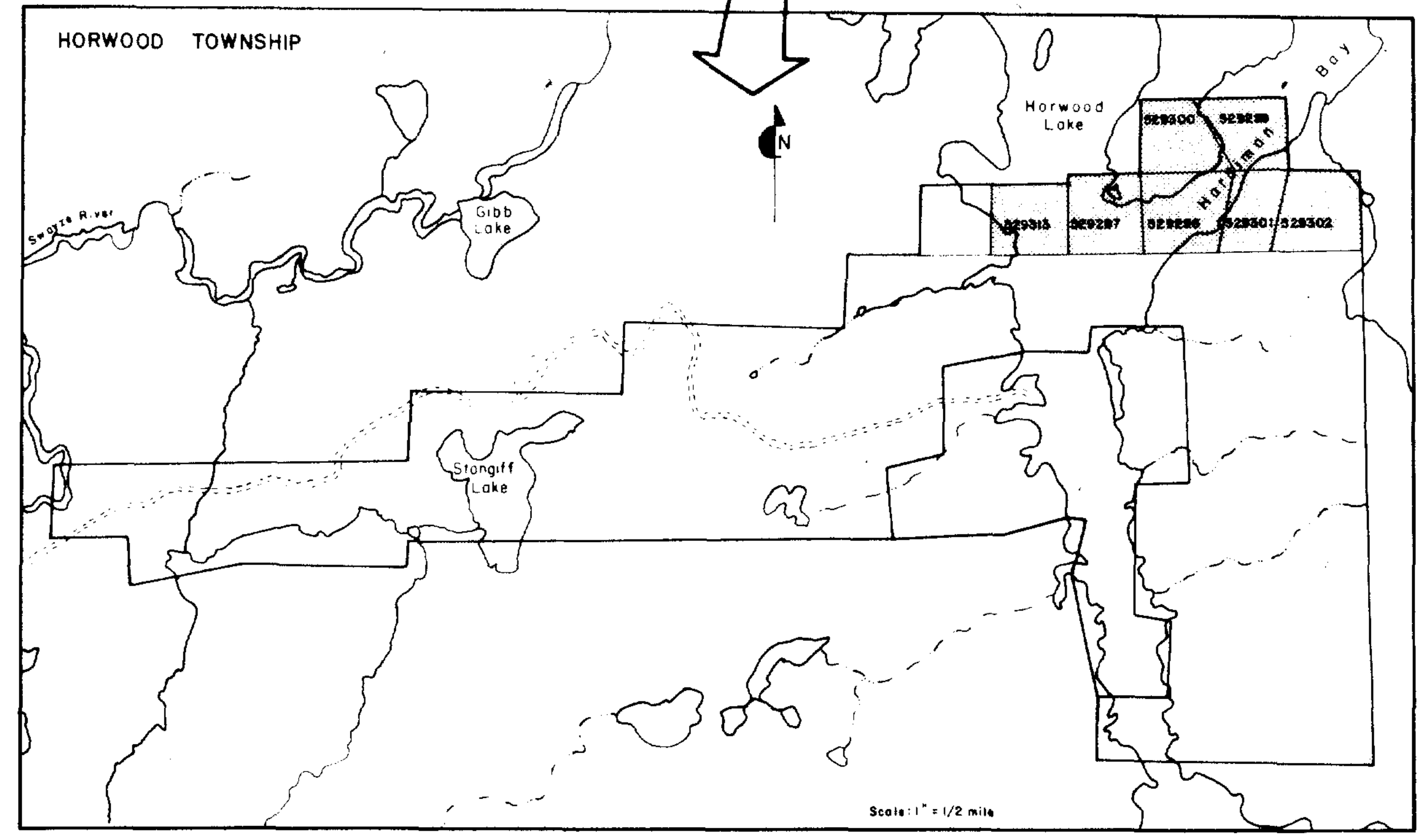
VLF - EM FIRST DERIVATIVE MAP

Project No: C428	By: D. JONES
Scale: 1:3000	Drawn: D. H.
Drawing No: 9	Date: March, 1981

MPH Consulting Limited







LEGEND

McPHAR GP-70 PROTON MAGNETOMETER

59046 ABSOLUTE MAGNETIC VALUE (gammas)

MAGNETIC CONTOUR

MAGNETIC DEPRESSION

CONTOUR INTERVALS

100 GAMMAS

50 GAMMAS

■ CLAIM POST LOCATION

□ CLAIM POST LOCATED BY EXTRAPOLATION

— — CLAIM LINE

LAKE

0 60 90 150

Northgate Exploration Limited

HORWOOD TOWNSHIP PROJECT

HARDIMAN BAY GRID

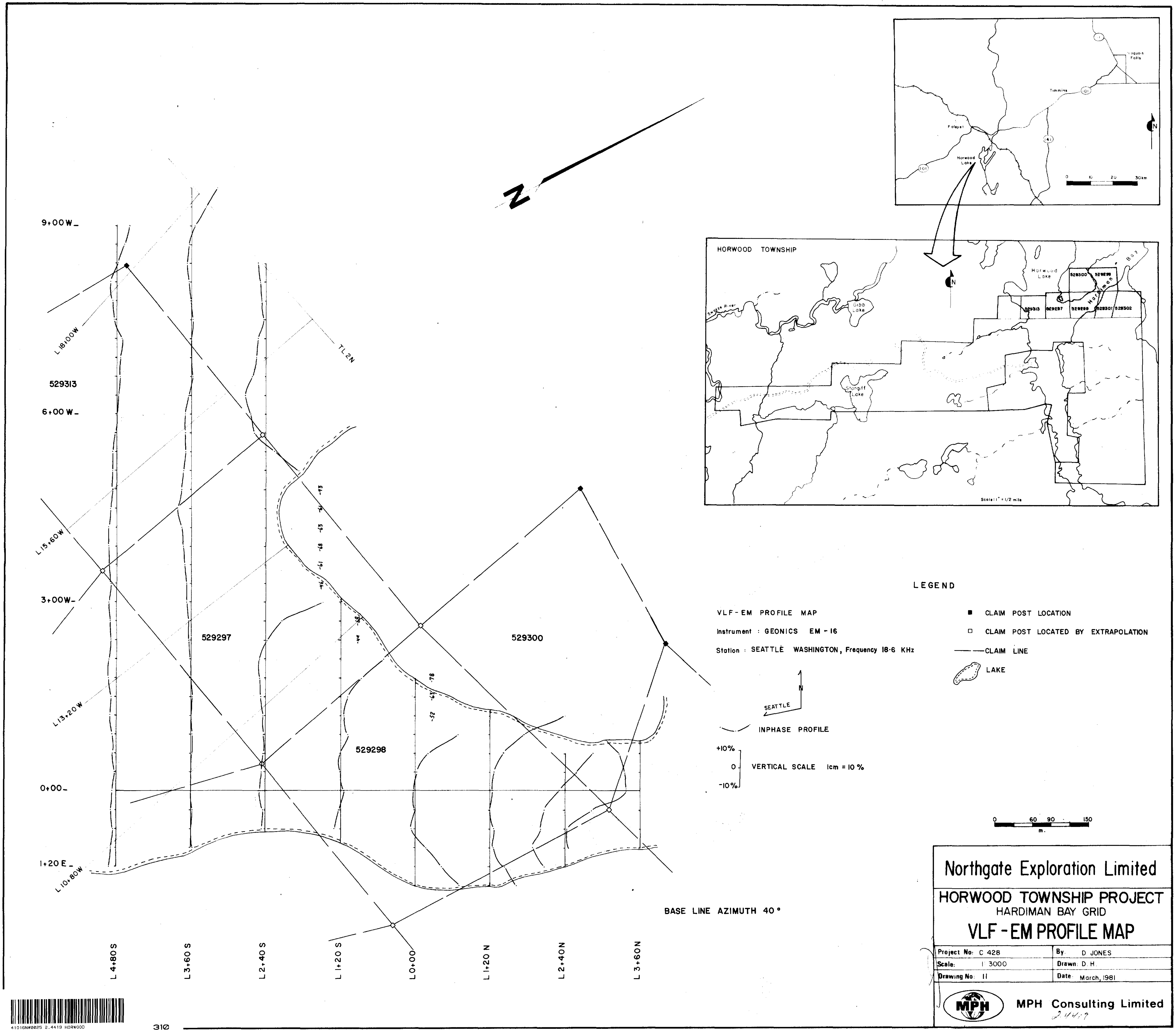
MAGNETOMETER SURVEY

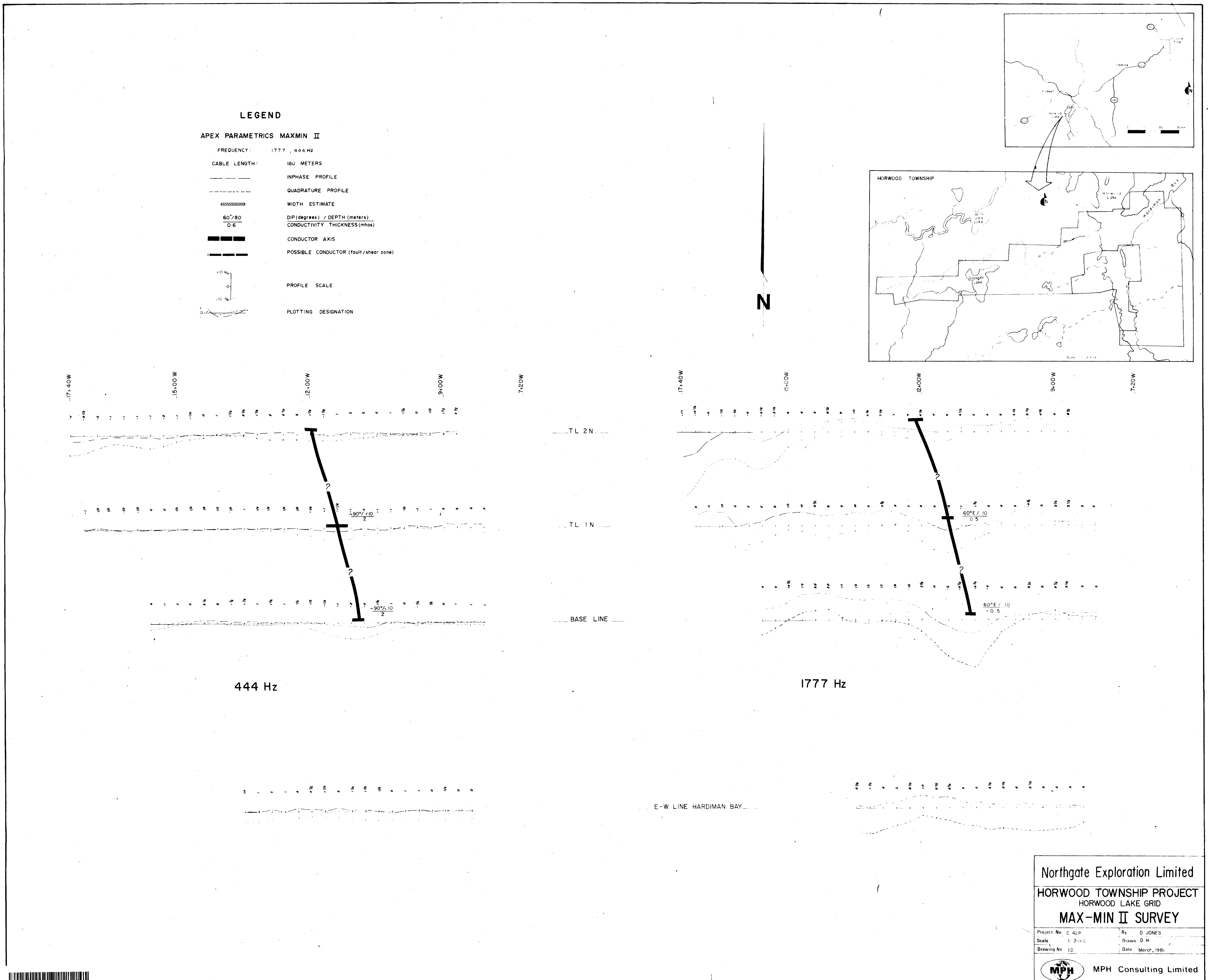
Project No: C 428	By D JONES
Scale: 1 3000	Drawn: D H.
Drawing No 10	Date: March, 1981

MPH Consulting Limited

41016NW0025 2.4419 HORWOOD

300


N
9+00W
6+00W
3+00W
0+00
1+20E
L18+00W
L15+60W
L13+20W
L10+80W
TL 2N
529313
529297
529298
529300
L 4+80S
L 3+60S
L 2+40S
L 1+20S
L 0+00
L 1+20N
L 2+40N
L 3+60N
BASE LINE AZIMUTH 40°
HORWOOD TOWNSHIP
Horwood Lake
Gibb Lake
Hardiman Bay
529300
529299
529313
529297
529298
529301
529302
Timmins
Foleyet
Horwood Lake
0
10
20
30km
LEGEND
VLF-EM PROFILE MAP
Instrument : GEONICS EM-16
Station : SEATTLE WASHINGTON, Frequency 18·6 KHz
SEATTLE
N
INPHASE PROFILE
+10%
0
-10%
VERTICAL SCALE 1cm = 10 %
CLAIM POST LOCATION
CLAIM POST LOCATED BY EXTRAPOLATION
CLAIM LINE
LAKE
0
60
90
150
m.
Northgate Exploration Limited
HORWOOD TOWNSHIP PROJECT
HARDIMAN BAY GRID
VLF-EM PROFILE MAP
Project No: C 428
By: D JONES
Scale: 1 3000
Drawn: D. H.
Drawing No: 11
Date: March, 1981
MPH
MPH Consulting Limited


LEGEND
APEX PARAMETRICS MAXMIN II
FREQUENCY: 1777 , 444 Hz
CABLE LENGTH: 180 METERS
INPHASE PROFILE
QUADRATURE PROFILE
WIDTH ESTIMATE
60°/80
0·6
DIP (degrees) / DEPTH (meters)
CONDUCTIVITY THICKNESS (mhos)
CONDUCTOR AXIS
POSSIBLE CONDUCTOR (fault/shear zone)
+10 %
0
-10 %
PROFILE SCALE
PLOTTING DESIGNATION
N
HORWOOD TOWNSHIP
17+40W
15+00W
12+00W
9+00W
7+20W
TL 2N
TL 1N
BASE LINE
~90°/<10
2
60°E / 10
0·5
444 Hz
1777 Hz
E-W LINE HARDIMAN BAY
Northgate Exploration Limited
HORWOOD TOWNSHIP PROJECT
HORWOOD LAKE GRID
MAX-MIN II SURVEY
Project No. C 42P
Scale 1:5000
Drawing No. 12
By D. JONES
Drawn D.H.
Date March, 1981
MPH
MPH Consulting Limited

320

2.4419