REPORT OF ACTIVITIES

ON THE

WEST PORCUPINE PROPERTY

(REEVES JOINT VENTURE)

PROJECT NO. 602

REEVES, PENHORWOOD, SEWELL

AND KENOGAMING TOWNSHIPS

NTS: 42 B/1

HEMLO GOLD MINES INC.

Qual # 2.8966

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Timmins, Ontario
May, 1996

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SUMMARY

The West Porcupine project is a large land package centred approximately sixty (60) kilometers west of the City of Timmins. The property overlies a sequence of rock units which may be the equivalent to the stratigraphy that hosts the gold deposits in the Timmins camp ie. lower Tisdale and Delora formations.

Eighty four (84) kilometers of linecutting, and magnetometer surveying were completed, followed by forty one (41) kilometers of induced polarization surveys.

The results of this work are documented in this report.

INTRODUCTION

This report documents the geophysical efforts undertaken on the West Porcupine property situated approximately 60 kilometers west of the City of Timmins. The report will provide results from work completed.

Since the property's acquisition in 1991, Hemlo Gold Mines has been actively evaluating the economic potential of a stratigraphic package interpreted to be equivalent to the lower Tisdale Volcanics , adjacent to the western projection of the Destor Porcupine Fault Zone. This structural and stratigraphic sequence hosts numerous gold deposits in the south Timmins area such as the Aunor (2.5 million ounces produced) and the Delnite Mine (0.9 million ounces produced).

Geophysical (induced polarization/magnetometer) surveys have been completed on the Deerfoot Lake grid, and on a smaller grid in the area east of the Bromley Patents. The grid in the latter area will be referred to as the Nat River grid. Encouraging results have been received in each of the gridded areas with further work to follow.

The resulting data from this work is documented within this report and appendices attached.

LOCATION AND ACCESS

The project area is centered approximately on the corner of the four adjoining townships of Sewell, Reeves, Penhorwood and Kenogaming, located 60 kilometers west of the City of Timmins. Several bush roads and main roads (Kukatush, Penhorwood and Akweskw Lake road) provide access to all quarters of the property. Several old and new drill roads provide excellent equipment access.

PROPERTY STATUS

The West Porcupine property was optioned from Glen Auden Resources Ltd and Golden Dragon Resources Ltd, under the "Reeves Joint Venture" agreement, dated March 12th, 1991.

The option consists of 322 claims (342 claim units) in Sewell, Reeves, Kenogaming and Penhorwood townships. Negotiations were in progress at year end for additional claims. Table 1 summarizes the present claim position.

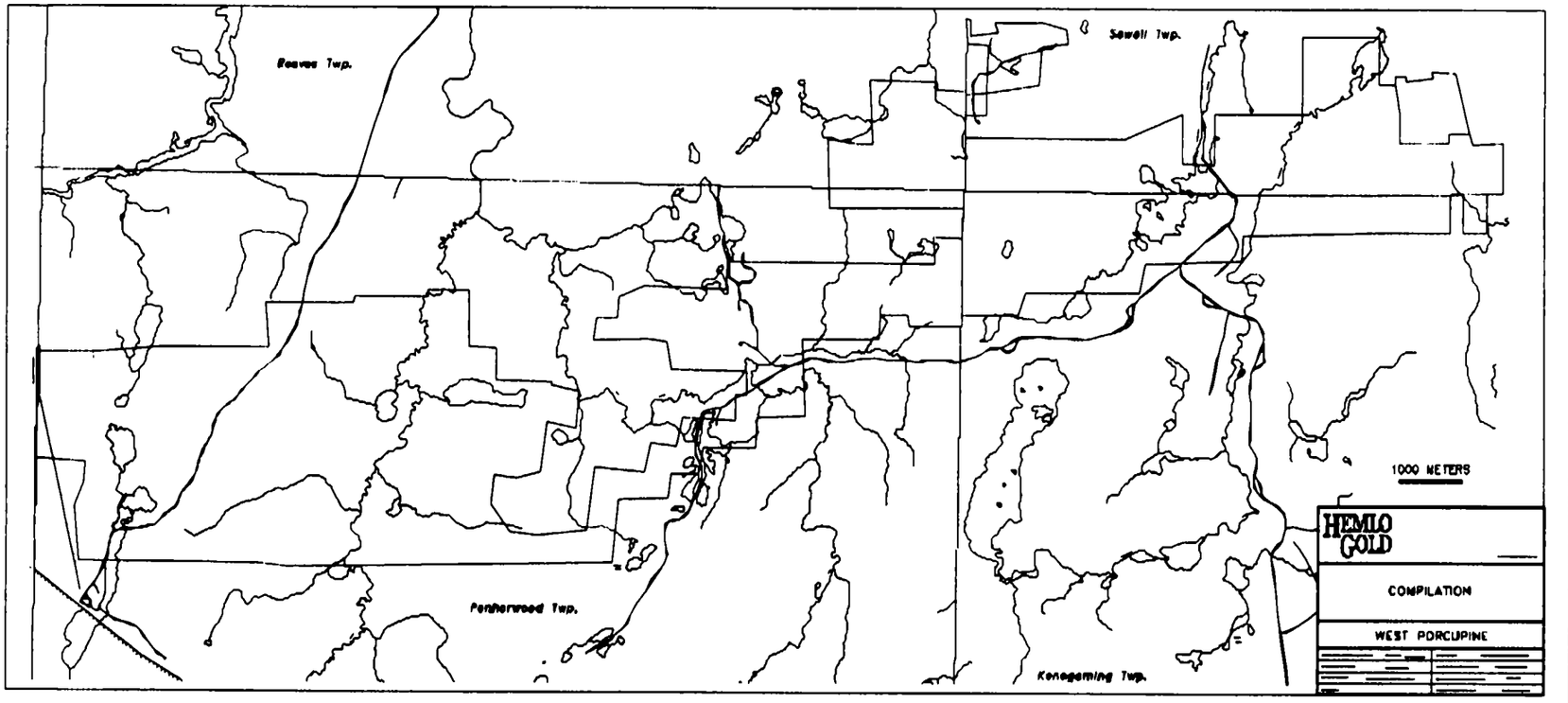
REGIONAL GEOLOGY

The West Porcupine project is situated within the Neoarchean-aged northern lobe of the Swayze Greenstone Belt. Although largely separated by the emplacement of the Kenogamissi batholith, this lobe appears to be the western equivalent of the Abitibi Greenstone Belt. Stratigraphic similarities to the (lower) Tisdale Group and the (Upper) Deloro

TABLE 1
"Reeves Joint Venture"
Sewel-Reeves-Kenogaming-Penhorwood Townships, Ontario

639 978-980	(3)	639 983	(1)	699 883	(1)	699 885-887	(3)
699 997-998	(2)	724 554	(1)	755 310-318	(9)	848 909-915	(7)
878 419	(1)	893 527-529	(3)	901 327-337	(11)	901 339-341	(3)
901 348-354	(7)	901 359-360	(2)	924 165-184	(20)	924 165-184	(20)
929 609-612	(4)	932 074-075	(2)	933 528	(1)	933 545-546	(2)
933 559-576	(18)	944 882	(1)	944884-886	(3)	944 889-890	(2)
944 893-894	(2)	944 897-902	(6)	944 905	(1)	944 909-914	(6)
947 089	(1)	947 096-102	(7)	947 105-109	(5)	947 131	(1)
947 148-150	(3)	947 251-252	(2)	947 256-259	(4)	947 264-267	(4)
948 318-329	(12)	950 026-034	(9)	951 803	(1)	969 707-708	(2)
973 446-447	(2)	987 251-257	(7)	987 259	(1)	988 109-117	(9)
990 669-673	(5)	995 929	(1)	996 651	(1)	996 809-810	(2)
996 846-885	(40)	997 201-204	(4)	1027 908-920	(13)	1175 080-083	(4)
1176 365-366	(2)	1176 507-509	(3)	1176 960-969	(10)	1176 971-987	(17)
1177 115-124	(10)	1180 939-953	(15)	1180 963	(1)	1201 517 (4 units)	
1201 518 (16 units)							

Total: 342 claim units



group volcanics found within the Porcupine Mining Camp have been identified. These two groups are separated by a major deformation zone, interpreted to be the Destor-Porcupine Fault, tracking westward across the project area for approximately 22 kilometers. These supracrustal rocks are typically striking in an easterly direction, steeply dipping and have been metamorphosed to the greenschist facies.

A sizeable body of serpentinized ultramafic and associated gabbroic units has been emplaced within the central portion of the project area.

Large granitic batholiths border the greenstone belt, while numerous smaller stocks and plutons intrude the core volcanics. Finally, late stage proterozoic diabase dikes intrude all other rock units.

PROPERTY GEOLOGY

In the Deerfoot area, drill-indicated stratigraphy and geophysical interpretations have shown the area to be underlain by ultramafic volcanics, variably altered/mineralized mafic volcanics, numerous feldspar $\pm$ quartz porphyries, sericitized quartz porphyry. This stratigraphy is in the southern portion of the Deerfoot grid. Further to the south, a highly magnetic gabbroic intrusive has been intersected in drilling. A geophysically interpreted, northeast-east regional diabase dyke occurs south of the gabbro. Towards the southern boundary, an iron formation has been interpreted from the magnetic data and interpolations from previous drilling to the west and east.

Present exploration and previous work indicates that the Four Corner's area is underlain by metamorphosed mafic volcanics, sediments (greywacke/argillite) and minor ultramafic volcanics. These units are variably mineralized with pyrite (locally to 25%), minor pyrrhotite, graphite, and locally visible gold in quartz veins. The alteration in the Four Corners is carbonatization, silicification and locally developed sericite. These units are intensely sheared and are within the influence of the Deerfoot splay, an offshoot of the Destor Porcupine Fault Zone

In the Nat River area, variably textured basalt occurs in the main grid area intruded by bodies of quartz and quartz feldspar porphyry. To the north, a wide sedimentary package of greywackes and argillites has been located. Strong IP anomalies suggest that graphitic zones occur within the sedimentary units, a feature not observed in outcrop. The mafic package is in possible fault contact to the south with talc/chlorite variably altered ultramafics which host the Hemlo occurrence (1.5 g/t).

EXPLORATION HISTORY

Previous exploration efforts completed on the optioned property are briefly summarized below.

1984-1988: Land package acquired by Glen Auden/Golden Dragon. Geological mapping and lithogeochemistry work completed. Selective linecutting, geophysical surveys (magnetics and I.P.) and trenching carried out on the eastern claim block. Dighem airborne geophysical survey flown over the western claim block. Estimated expenditures total $203,000.

1989: American Barrick Options Property.

East Block Activities: Prospecting, sampling, geological mapping and the completion of 11 diamond drill holes (1561m).

West Block Activities: Linecutting, selective geophysical surveys (magnetics and VLF). A total of 8 holes drilled (1472m).

Option returned to the vendor on November 10, 1989. Estimated expenditures (for both blocks) total $440,000.

CURRENT EXPLORATION

A brief summary of the exploration efforts completed by Noranda (on behalf of Hemlo) since the properties acquisition in 1991 follows:

1991: Geological Mapping: carried out during the early summer by Noranda personnel. Utilized the existing grid system (1989-American Barrick) in the Jehann to Far Lakes area, (west claim block).

Deerfoot Lake Magnetics: a total of 39.6 line km were cut and surveyed (total field magnetics) by John Hussey (geophysical contractor), during June and July, 1991. An interpretation prepared by a staff geophysicist may be referenced in the appendices.

Mechanized Stripping: as a result of the recent mapping programme, two areas showing encouraging alteration/mineralization were stripped and cleaned of overburden, then mapped and sampled (cut channel and/or grabs). A report describing the field work and results is included within Appendix VIII.

Induced Polarization: in order to delineate the extent of the significant pyrite-silica-ankerite-fuchsite development exposed by the recent stripping, a small survey was compited in the vicinity of the Nat River (West Branch). A total of 4.55 line km was surveyed (Pole-DiPole, n=4) by Rayan Exploration, (geophysical contractor) during early December, 1991. Geophysical sections may be found within the back pockets.

1992: Diamond Drilling: during March 1992, a total of 5 holes (1063m) were drilled to evaluate two stratigraphic sections straddling the Nat River (west branch), approximately 1 km apart.

1993: Claim Staking: during late January, 1993, a toal of five claims (14 units) were staked in north-eastern Penhorwood Township, in order to make the east and west blocks contiguous. This will enable the transfer of (future) assessment credits throughout the entire optioned property. This new step-shaped claim group will be maintained by Hemlo.

West Block Magnetics: during the winter of 1993, a total of 23 line km were cut and surveyed (total field magnetics), northwest of Far Lake in Penhorwood Township.

Diamond Drilling: throughout June, 1993, a total of 5 drill holes (1422m) were completed in the Deerfoot Lake, Jehann Lake and Nat River (west branch) areas.

1994: Diamond drilling continued in the Deerfoot and Four Corners area. Limited Geophysics completed.

1995: Geophysical surveys done in the Deerfoot and Nat River areas. Diamond drilling in these areas bring the total holes to forty one (41).

GEOPHYSICS

Geophysical surveys on the West Porcupine project during the report period were conducted in four stages; December 1[illegible]4, February/March 1995, December 1995/January 1996, and February 1996, by three separate contractors. Each survey was done based on results from diamond drilling and initial surveying on a new section of the property.

M.C. Exploration completed the induced polarization on the Deerfoot west extension and the Nat River grid as well as completing the magnetometer surveys on those areas plus the east extension of the Deerfoot grid. Belanger Geophysics surveyed the east extension of the Deerfoot grid. Quantec IP surveyed the detailed grid around hole WDF96-41, while Hussey Geophysics completed the magnetometer survey on the grid.

A total of 41.8 kilometers of Induced Polarization; 84.6 kilometers of linecutting and 84.6 kilometers of magnetometer surveying was completed.

The following section gives details of the results and the reader is referred to the pseudosections and magnetic maps under separate cover for intimate details.

Induced Polarization

Deerfoot Grid-West Extension

The IP surveys at the western extension of the Deerfoot grid reveal several weak to moderate chargeability anomalies striking at 065° to 075° . All of the interpreted chargeability and resistivity anomalies are indicated on the IP/Resistivity interpretation map.

Line 2500E to 3900E at 1000S: A moderate strength chargeability anomaly is located between L3900E/825S to L2500E/1150S, where it strikes southwesterly off the grid. This horizon becomes stronger towards the west and is well defined on line 2500E.

Line 4300E-North Extension: Line 4300E between 400N and 1500N exhibits four very strong chargeability anomalous located at 625N, 1110N, 1250N, and 1445N. North flanking resistivity highs are also associated with the anomalies at 625N and 1250N. These anomalies appear to represent near surface accumulations of disseminated to semi-massive sulphides or graphitic horizons.

Line 4900E: Three strong chargeability anomalies are interpreted at 450N, 725N, and 1150N with closely flanking (N) resistivity highs at 450N and 1225N. These anomalies are

slightly less anomalous than those on 4300E and likely represent the eastern extension of those horizons.

Lines 2500E to 3900E at 300S: A weak to moderate chargeability anomaly extends between L2500E/400S and L3900E/50N. There are no associated resistivity anomalies. The most prospective responses along this horizon are those at L2900E/325S and L3100E/220S. The responses comprising this anomalous horizon are weak and poorly defined.

Lines 2500E to 3700E; N of BL: Several weak to moderate chargeability anomalies exist in this part of the grid. The two strongest and best defined targets are located at L2700E/365N and L2500E/115N. These anomalous may be related. They appear to strike off the grid to the west. The best secondary anomalies is located at L3100E/650N. There are no associated resistivity anomalies with the previously discussed IP anomalies.

Deerfoot Grid-East Extension: The IP survey carried out between 6900E and 8100E was conducted as a frequency domain (phase) IP survey. Several significant phase anomalies were outlined.

A strongly anomalous horizon trends from 6900E/120S to L7700E/60N. None of the anomalies on this horizon are fully defined due to the grid limits; however, drill targeting could be accomplished. These chargeability anomalies are so strong that they may represent conductive horizons. A strongly chargeable, wide anomaly at L7500E/350N is reported to coincide with northwest-southeast striking Proterzoic diabase dyke (see geology map).

Several other strong, well defined phase anomalies occur, which represent valid drill targets. These exist at L7300E/710N, L7300E/200N and L8100E/315N.

In addition, several weak to moderate phase anomalies were revealed which are well defined and represent valid drill targets. These are located at L6900E/280N, L7100E/340N and 60N, L7700E/300N and L7900E/210N.

Nat River Grid

The IP survey on the Nat River grid has revealed several significant chargeability anomalies which vary in intensity from weak to strong. Generally, the anomalies horizons are striking at 060°. One significant chargeability trend occurs between L5800E/800N and L6400E/1000N. This trend is best defined on lines 6000E and 6200E, and is open to the east and west.

The other significant chargeability anomaly is found between L6000E/480N and L6800E/800N. This horizon displays moderate chargeability with no associated resistivity anomalies. The best defined anomaly is at L6600E/700N. Several other weak responses are outlined and displayed on the interpretation map.

Magnetics

West Porcupine Grid

Most of the data on this gird were collected at 12.5 meter intervals on 200 meter spaced survey lines, but the central portion includes some 100 meter spaced lines. Although

the lines were cut at a North-South angle, the magnetic data were gridded at approximately North 75 degrees East to better conform to the trend of the local geology. A coloured and shaded relief map was produced at 1:5000 scale and black line contours were overlain. The minimum contour interval chosen was 50 Gammas.

Nat River Grid

Magnetic data were collected on 100 meter spaced survey lines at 12.5 meter intervals. Gridding was performed using a minimum curvature algorithm (random data orientation) and a colour map with black line contours is presented at 1:5000 scale. The minimum contour interval is 25 Gammas.

Discussion

West Porcupine Grid

The **strong magnetic lineament** that trends across the southern part of the grid from 1200S on L2500E through to 4200N on L8200E is probably a magnetic (diabase) dike. The **concentration of magnetic linears** that occurs south of this feature between L4900E and L7700E may represent iron formation(s). These strong magnetic features that are easily correlated line-to-line make good markers that can be used to identify the presence of, and in some cases the date relationship and movement along, faults that intersect them.

There are also some approximately **north-south trending diabase dikes** that can be identified. One of these occurs between the north end of L4500E and the south end of L4700E. It's presence is best defined between 700N and 1400N on L4500E but other magnetic highs, particularly those at 100S on lines 4500E and 4600E, and 300S on line

4600E, suggest its presence. The fault associated with this dike has caused visible disruption in the east-north-east trending geology which is particularly visible near the baseline, and in the area of economic interest where other strongly magnetic features exist. It appears that the iron formations that occur south of the east-north-east diabase described in the preceding paragraph have been cut-off and do not occur west this fault.

Other north-south trending diabases that can be identified include one that affects the magnetic field measured along L7700E, one along L6400E, another that occurs on the south end of line 3200E through to the north end of lines 3300E and 3400E, and possibly one that occurs at the north end of line 3100E. There are strong offsets or cut-offs associated with the last two features, and a magnetic high 'pocket' that is isolated by them can be identified between 100N and 400N on lines 2900E through 3300E.

Mineralization and alteration of potential economic interest has been identified 200 to 300 meters north of the baseline in drill holes spaced at 100 to 200 meter intervals along lines 5000E through 6100E. The mineralization occurs in an altered mafic volcanic (basalt) that is surrounded by ultramafics with an irregularly shaped porphyry (thickness varies 10-110m) occurring 100 to 200 meters to the south. A 100 meter wide magnetic low feature corresponds very well with the mapped location of the porphyry between lines 2500E and 5500E. Although the porphyry is situated in a broad magnetic low east of L5500E to L6600E, a precise correlation with a unique mag feature is difficult. From 250N on L6600E to 600N on 7300E, the correlation of the porphyry unit to a well-defined magnetic low is again very good.

West of L5100E a **strong but narrow magnetic high** unit occurs south of the porphyry and a similar, but more weakly magnetic unit occurs to the north. East of L5100E there are indications that both of these units are present, but the representative magnetic highs are less coherent and weaker. While there is no obvious correlation between magnetic signature and alteration or mineralization, the best mineralization does occur under a poorly defined magnetic high located on line 5500E. The weak magnetic highs and lows along these two trends may be useful to identify alteration (as lows), or the presence of more or less ultramafic vs. basalt (high vs. low), if a careful correlation to geology is made. Identification of the altered basalt unit following the proposed plunge to the west is hampered by the magnetic highs, associated with the north-south dike and associated fault off-set, that are present on lines 4500E, 4600E and 4700E.

There are some **interesting magnetic signatures** that occur within or immediately south of the magnetic low porphyry signature. Although there are no mapped indications of mineralization associated with these features they are geophysically anomalous. The first of these, located at 900S on L2900E is a strong magnetic low surrounded by a narrow magnetic high aureole. This annular signature is typical of an isolated intrusive or vertical pipe. The next features are two isolated magnetic highs that could also represent isolated intrusives, one of these is located at 600S on L3600E and the other is located at 425N on L7200E. Finally, a strong and isolated magnetic low signature is present at 150S on L5000E. Any of these isolated magnetic features could easily be modeled for a more precise indication of dip, depth and width if they are to be targeted for further work.

Between lines 4900E and 7600E, the magnetic low porphyry signature occurs within a broad (100-400 meters wide) magnetic low package. Generally contains an **isolated magnetic low trend** that is south of, similar to, slightly stronger than, and sub-parallel to, the magnetic low signature of the porphyry. Because this isolated feature only occurs north of the concentration of magnetic high linears that probably represent the iron formation(s) on the south part of the grid, as described above; it is likely that it simply represents the northern low part of the magnetic dipole signature of those iron formation units.

Another **narrow magnetic low trend** occurs between the baseline on L7000E and 175N on L7600E. This feature is located between the east-west dike to the north, and what are probably iron formations to the south. It is similar in width, magnitude and stratigraphic location to another magnetic low that is located between 700S on L4700E and 550S on L5200E. It is likely that these signatures represent the return to magnetic background between two parallel magnetic high features rather than an anomalous magnetic low. However, given the strong magnetic high signatures of the iron formations and diabase dikes, and the relatively weak magnetic low signatures of the porphyry unit and the alteration, it is difficult to represent this case with certainty.

Nat River Grid

A **regional gradient** between highs to the west and lows to the east is well defined. This could be the remnants of a deep and/or large magnetic high source present somewhere west of the grid.

The **north-south magnetic high linear** present on L5800E could represent a diabase dike, but more information would be needed west of the surveyed grid to confirm this interpretation.

It is likely that the **northeast trending string of magnetic highs** located between 350S on L5800E and the BL on L6300E are related, and these may represent a dike or iron formation. The **strong magnetic high** at 200N on lines 6600E and 6700E is on strike with this feature and may be related, although this signature may also be related to the **strong magnetic highs** that occur along L6600E from 200N to 500N and at 500N on 6500E. Alternatively this entire signature could represent a tightly folded iron formation, or part of a north-south trending diabase.

Another, more poorly defined, **east-north-east trending magnetic high** signature is present from 300N on L5800E through to 775N on L7000E. This signature may represent a narrow diabase or a contact.

CONCLUSIONS AND RECOMMENDATIONS

Geophysical surveying on the West Porcupine project area has located significant anomalies worthy of follow-up by geological mapping or diamond drilling. In the two areas discussed in this report, some follow-up by drilling has been completed with limited to moderate success. Evaluation of the remaining anomalies based on the known geology in drilling and surface exposures will be an aid to the locating of additional drilling.

Considering the above conclusion, it is recommended that mapping be done on the northern portion of the Nat River grid with geochemical sampling done in areas of low outcrop exposures. These geochem samples would be humus assayed for gold as well as indicator elements like Arsenic, Molybdenite, etc.

In the Deerfoot grid area, targeting of additional drilling will be more difficult due to the amount of drilling which has been done to date. However, as stated above, the advantage of direct correlation between drill results and geophysical results should make the targeting more precise.

Respectfully Submitted

HEMLO GOLD MINES INC.

Robert Calhoun
Senior Project Geologist

APPENDIX I

SURVEY PROCEDURES

SURVEY PROCEDURE

MAGNETICS

Theory:

The magnetic method is based on measuring alteration in the shape and magnitude of the earth's naturally occurring magnetic field caused by changes in the magnetization of the rocks in the earth.

These changes in magnetization are due mainly to the presence of the magnetic minerals, of which the most common is magnetite, and to a lesser extent ilmenite, pyrrhotite, and some less common minerals.

Magnetic anomalies in the earth's field are caused by changes in two types of magnetization: induced and remanent (permanent). Induced magnetization is caused by the magnetic field being altered and enhanced by increases in the magnetic susceptibility of the rocks, which is a function of the concentration of the magnetic minerals.

Remanent magnetism is independent of the earth's magnetic field, and is the permanent magnetization of the magnetic particles (magnetite, etc.) in the rocks. This is created when these particles orient themselves parallel to the ambient field when cooling. This magnetization may not be in the same direction as the present earth's field, due to changes in the orientation of the rock or the field.

The most common method of measuring the total magnetic field in ground exploration is with a proton precession magnetometer. This device measures the effect of the magnetic field on the magnetic dipole of hydrogen protons. This dipole is caused by the "spin" of the proton, and in a magnetometer these dipoles in a sample of hydrogen-rich fluid are oriented parallel to a magnetic field applied by an electric coil surrounding the sample. After this magnetic field is removed, the dipoles begin to precess (wobble) around their orientation under the influence of the ambient earth's magnetic field. The freguency of this precession is proportional to the earth's magnetic field intensity.

Field Method:

The magnetics data was collected with an EDA PPM 350 proton procession magnetometer, which measures the absolute value of the earth's magnetic field to an accuracy of +/- 1 gammas. The magnetometer was carried down the survey line by a single operator, with the sensor mounted on an aluminum pole to remove it from any surface geologic noise. Readings were taken at 12.5m intervals.

The readings were corrected for changes in the earth's total field (diurnal drift) with an EDA PPM 400 base station magnetometer, which recorded readings every 30 seconds as the survey was being conducted. The data from both magnetometers was then dumped with a computer and base corrected values were computed.

GEM Systems
ADVANCED MAGNETOMETERS

GSM-19

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Phone: (905) 764-8008
Fax: (905) 764-9329

2. INSTRUMENT SPECIFICATIONS

2.1 Magnetometer / Gradiometer

Resolution:	0.01 nT (gamma), magnetic field and gradient.
Accuracy:	0.2 nT over operating range.
Range:	20,000 to 120,000 nT, automatic tuning requiring initial set-up.
Gradient Tolerance:	Over 10,000 nT/m
Operating interval:	3 seconds minimum, faster optional. Readings initiated from keyboard, external trigger, or carriage return via RS-232-C.
Input/Output:	6 pin weatherproof connector, RS-232C, and (optional) analog output.
Power Requirements:	12 V, 200 mA peak (during polarization), 30 mA standby, 300mA peak in gradiometer mode
Power Source:	Internal 12 V, 1.9 Ah sealed lead-acid battery standard, others optional. An External 12V power source can also be used.
Battery Charger:	Input: 110 220 VAC, 50/60 Hz and or 12 VDC (optional). Output: 12V dual level charging.
Operating Ranges:	Temperature: -40 °C to +60 °C. Battery Voltage: 10.0 V minimum to 15V maximum. Humidity: up to 90% relative, non condensing.
Storage Temperature:	-50°C to +65°C
Dimensions:	Console: 223 x 69 x 240mm. Sensor staff: 4 x 450mm sections. Sensor: 170 x 71mm dia. Weight: Console 2.1kg Staff 0.9kg Sensors 1.1kg each.

3. INSTRUMENT DESCRIPTION

3.1 Physical Overview

The parts of the GSM-19 magnetometer/gradiometer are as follows.

- The sensor is a dual coil type designed to reduce noise and improve gradient tolerance. The coils are electrostatically shielded and contain a proton rich liquid in a pyrex bottle, which also acts as an RF resonator.
- The sensor cable is coaxial, typically RG-58/U, up to 100m long
- The staff is made of strong aluminum tubing sections (plastic staff optional). This construction allows for a selection of sensor elevations above ground during surveys. For best precision the full staff length should be used. Recommended sensor separation in gradiometer mode is one staff section (56cm from sensor axis to sensor axis), although two or more sections are sometimes used for maximum sensitivity.
- The console contains all the electronic circuitry. It has a 16 key keyboard, a 4 x 20 character alphanumeric display, and sensor and power/input/output connectors. The keyboard also serves as an ON-OFF switch.
- The power/input/output connector also serves as RS232C input/output and optionally as analog output and/or contact closure triggering input.
- The keyboard, front panel, and connectors are sealed i. e. the instrument can operate under rainy conditions.
- The charger has 2 levels of charging, full and trickle, switching automatically from one to another. Input is normally 110V 50/60Hz. Optionally, 12 VDC input can be provided.
- The all-metal housing of the console guarantees excellent EMI protection.

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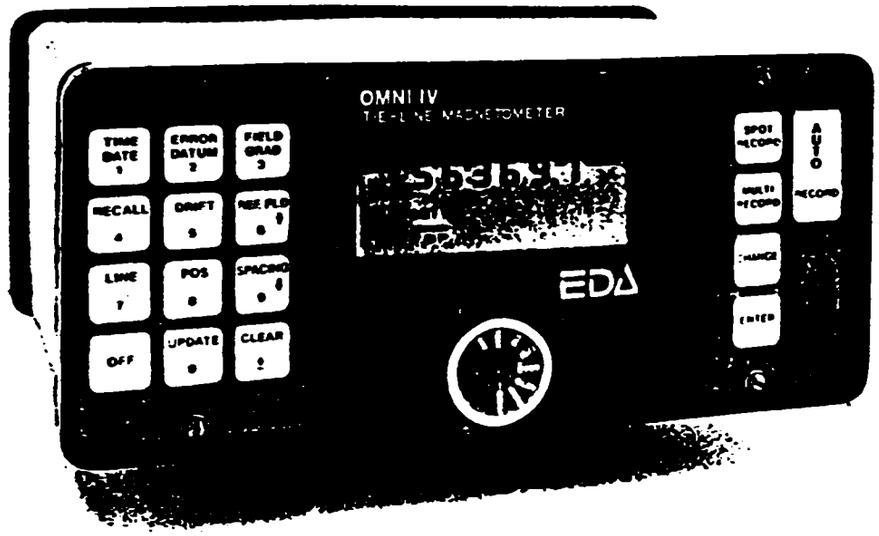
*Overhauser Effect

In contrast to a standard proton magnetometer sensor, where only a proton rich liquid is required to produce a precession signal, the Overhauser Effect sensor must also have a free radical added to the liquid. This free radical ensures the presence of free unbound electrons that couple with protons, producing a two-spin system. A strong RF magnetic field is used to disturb the electron-proton coupling by saturating free electron resonance line; the polarization of protons in the sensor liquid is greatly

OMNI IV
'Tie-Line' Magnetometer

EDA



- Four Magnetometers In One
- Self Correcting for Diurnal Variations
- Reduced Instrumentation Requirements
- 25% Weight Reduction
- User Friendly Keypad Operation
- Universal Computer Interface
- Comprehensive Software Packages

Specifications

Dynamic Range	18,000 to 110,000 gammas. Roll-over display feature suppresses first significant digit upon exceeding 100,000 gammas.
Tuning Method	Tuning value is calculated accurately utilizing a specially developed tuning algorithm
Automatic Fine Tuning	± 15% relative to ambient field strength of last stored value
Display Resolution	0.1 gamma
Processing Sensitivity	± 0.02 gamma
Statistical Error Resolution	0.01 gamma
Absolute Accuracy	± 1 gamma at 50,000 gammas at 23°C ± 2 gamma over total temperature range
Standard Memory Capacity	
Total Field or Gradient	1,200 data blocks or sets of readings
Tie-Line Points	100 data blocks or sets of readings
Base Station	5,000 data blocks or sets of readings
Display	Custom-designed, ruggedized liquid crystal display with an operating temperature range from –40°C to +55°C. The display contains six numeric digits, decimal point, battery status monitor, signal decay rate and signal amplitude monitor and function descriptors.
RS 232 Serial I/O Interface	2400 baud, 8 data bits, 2 stop bits, no parity
Gradient Tolerance	6,000 gammas per meter (field proven)
Test Mode	A. Diagnostic testing (data and programmable memory) B. Self Test (hardware)
Sensor	Optimized miniature design. Magnetic cleanliness is consistent with the specified absolute accuracy.
Gradient Sensors	0.5 meter sensor separation (standard), normalized to gammas/meter. Optional 1.0 meter sensor separation available. Horizontal sensors optional.
Sensor Cable	Remains flexible in temperature range specified, includes strain-relief connector
Cycling Time (Base Station Mode)	Programmable from 5 seconds up to 60 minutes in 1 second increments
Operating Environmental Range	–40°C to +55°C; 0–100% relative humidity; weatherproof
Power Supply	Non-magnetic rechargeable sealed lead-acid battery cartridge or belt; rechargeable NiCad or Disposable battery cartridge or belt; or 12V DC power source option for base station operation.
Battery Cartridge/Belt Life	2,000 to 5,000 readings, for sealed lead acid power supply, depending upon ambient temperature and rate of readings
Weights and Dimensions	
Instrument Console Only	2.8 kg, 238 x 150 x 250mm
NiCad or Alkaline Battery Cartridge	1.2 kg, 235 x 105 x 90mm
NiCad or Alkaline Battery Belt	1.2 kg, 540 x 100 x 40mm
Lead-Acid Battery Cartridge	1.8 kg, 235 x 105 x 90mm
Lead-Acid Battery Belt	1.8 kg, 540 x 100 x 40mm
Sensor	1.2 kg, 56mm diameter x 200mm
Gradient Sensor (0.5 m separation - standard)	2.1 kg, 56mm diameter x 790mm
Gradient Sensor (1.0 m separation - optional)	2.2 kg, 56mm diameter x 1300mm
Standard System Complement	Instrument console; sensor; 3-meter cable, aluminum sectional sensor staff, power supply, harness assembly, operations manual.
Base Station Option	Standard system plus 30 meter cable
Gradiometer Option	Standard system plus 0.5 meter sensor

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THE INDUCED POLARIZATION METHOD

Induced Polarization (IP) is the measurement of a residual voltage in rocks that remains after the interception of a primary voltage. It includes many types of dipolar charge distributions set up by the passage of current through consolidated or unconsolidated rocks. Among the causes are concentration polarization and electrokinetic effects in all rocks and the phenomenon of overvoltage in rocks containing electronic conductors such as metallic sulphides and graphite.

The term overvoltage applies to secondary voltages set up by a current in the earth which decays when that current is interupted. These secondary effects may be measured by pick up or potential electrodes.

IP as we generally know it is a method of prospecting for low grade sulfide ores where metallic particles, sulfides in particular, give an anomalous response. Barren rock (with certain exceptions) gives a low response.

In practise, IP is measured in one of two ways: In the pure form, a steady current of some seconds (nominally 2 seconds) is passed and abruptly interupted. The slowly decaying transient voltages existing in the ground are measured after interuption. This is know as "pulse" or "time domain" IP. The factor Vs/Vp is the integrated product for a specified time and several readings are averaged thus suppressing noise and coupling effects. The resultant "m" or chargeability is essentially an unitless value.

The second method entails a comparison of the apparent resistivity using sinusoidal alternating currents of 2 frequencies within the normal range of 0.1 to 10.0 cps. The factor used to represent the IP effect by this method is the Percent Frequency Effect (PFE) and is defined by
(R1-R2)/R1 x 100% where R1 and R2 are the apparent resistivities at the low and high frequency.

USE and LIMITATIONS

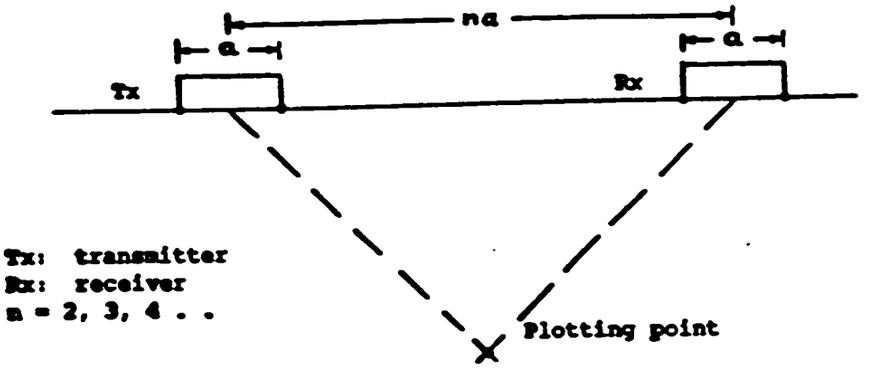
The effective depth of penetration of any IP survey is a function of the resistivity of the surface layer with respect to the resisitivity of the lower layer. All arrays have different effects from this resistivity contrast - some are less affected than others. When the surface layer is 0.01 of the lower layer, the effective penetration is very poor hence the term "masking".

The size of the target therefore becomes important when detection is desirous under a conductive surface layer. The Frequency methods are the most adversely effected by masking as inductive coupling can be much greater than the response.

The IP effect was initially developed for the prospecting of large porphyry copper ore bodies. Since that time, it has been successfully adapted for the search of sulphide bodies in the Canadian Shield and elsewhere. It is also useful as a structural mapping tool.

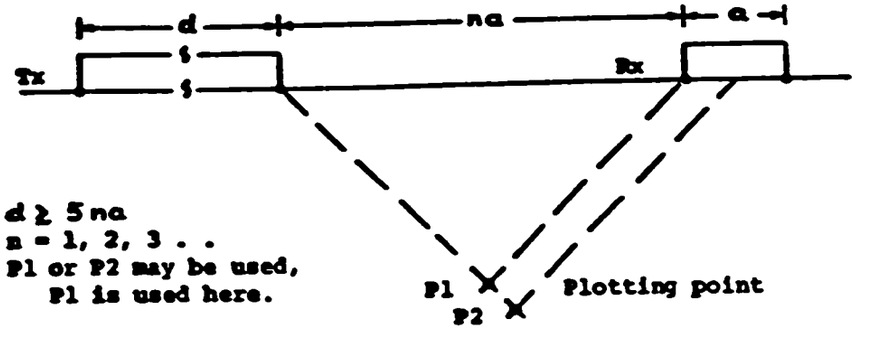
THE MOST COMMON ARRAYS

DIPOLE-DIPOLE



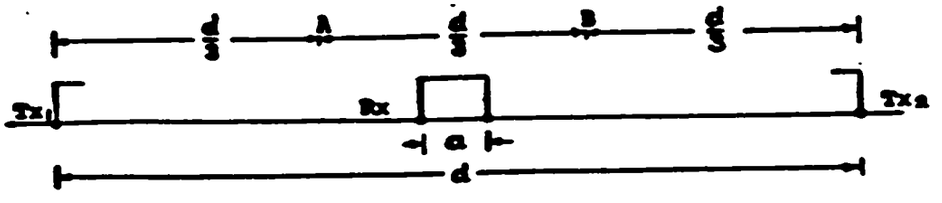
Tx: transmitter
Rx: receiver
n = 2, 3, 4 . .

POLE-DIPOLE



d ≥ 5na
n = 1, 2, 3 . .
P1 or P2 may be used,
P1 is used here.

GRADIENT

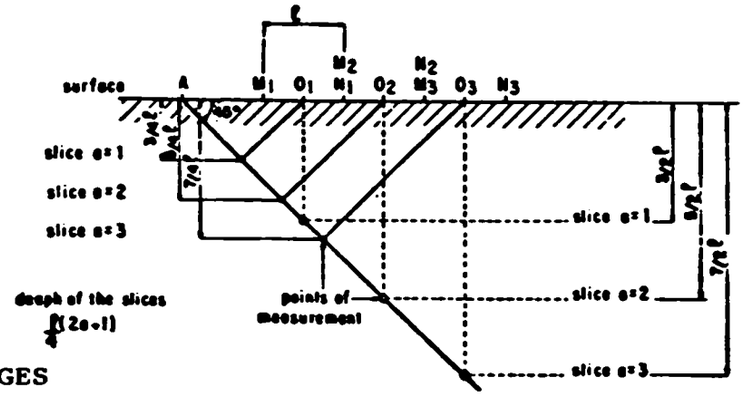


Data plotted at Rx centre
A, B = limits of Rx traverse
d/a > 30

Pole Dipole Array

The use of the Pole Dipole array is much less common then the Dipole Dipole array but it has distinct advantages. The most notable advantage is the much stronger current density obtained from the single current pole on the traverse. This results in the strongest potential voltage measurable from any of the arrays. This stronger signal to noise permits operation in noisier areas and areas of thicker overburden.

This array is set up similar to that of the Dipole Dipole array except that one current electrode is fixed at geometric infinity or 10a (10 times the potential dipole) across strike. The plot point is mid way between the on line current and the centre of the potential electrodes.



ADVANTAGES

1. Good SP rejection. The strong signal to noise ratio effectively *eliminates the SP effect.*
2. *Not susceptible to "masking" effects. This is the recommended array in areas of conductive overburden.*
3. *A fairly sensitive and selective array.*
4. *Returns highest Vp of all arrays. Hence it is ideal for work in noisy areas.*
5. *Relatively faster than Dipole Dipole.*
6. *Low inductive coupling.*

DISADVANTAGES

1. *Asymmetrical response - peak is only over the source when the spacing "a" is less than the depth of investigation. There will occur a double peak with the stronger of the two on the current side of the potential. This requires that moving current be always kept in the same relative position to the measuring dipole.*
2. *Requires communication between current on line and transmitter.*

INDUCED POLARIZATION SURVEY

The Time Domain Method for Measuring IP

There are two basic systems or methods for the measurement of IP:

a) Frequency Domain
b) Time Domain

In this lecture we shall discuss the Time Domain method, its advantages and limitations.

The phenomena of induced polarization was reported in the literature as early as 1920 by Schlumberger. However, modern development of the method in the U.S. are generally dated to Bleil (1953). When a steady-state current into the earth is interrupted, it is observed that the voltage monitored at some point in the vicinity of the electrode generally does not immediately drop to zero. Instead, the voltage drops to some voltage V and thereafter decays with the time toward zero (see Figure 1).

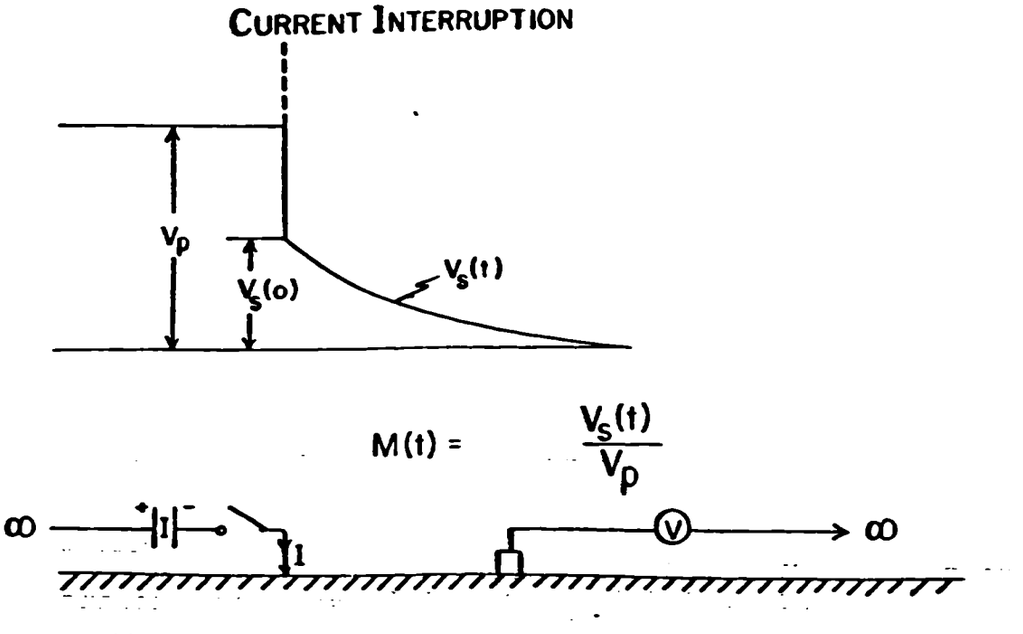


FIGURE 1: Schematic illustration of the transient type measurement of IP response.

The decay voltage or transient voltage indicates that the earth's resistivity is not simply resistive, but also has a reactive term too. The earth's resistivity is in general complex and might better be called an impedivity. The term complex resistivity is more frequently being invoked to describe the total nature of the earth's resistivity. Modern time domain or transient techniques for measuring IP have developed from this very simple method of observing the IP response. A measure of the IP response, called CHARGEABILITY (M), is simply the amplitude of the secondary or decay voltage Vs (t) relative to the amplitude of the steady state voltage measured Vp while the current was on (see Figure 1).

The secondary voltage is usually much smaller then the primary voltage, so it is usual to express the secondary voltage in units of millivolts while retaining the units of volts for the primary voltage. Thus, the units of IP as measured using a pulse transient technique are often given as mv/V. If the secondary voltage and the primary voltage are expressed in the same units, their ratio (i.e. Vs/Vp) is a dimensionless fraction. Sometimes, therefore, the IP response (chargeability) will be expressed as a percent.

The definition of chargeability as suggested in Figure 1 indicates that it is a function of time. Thus, there are an infinite number of possibilities for the definition of a single parameter which characterizes the measured chargeability or IP response. Much of the ongoing IP research today is centered around studying the total decay curve or, equivalently, the frequency spectra of the IP response, to determine additional information pertaining to the nature of the source of the IP response.

Modern time domain IP surveying instrumentation provides an efficient way of periodically repeating the experiment described in Figure 1. The time domain transmitter periodically pulses the current circuit. In addition, it commutates the polarity of the pulses. The transmitter waveform is illustrated in Figure 2. It is standard practice for the current ON time to be equal to the current OFF time. The ratio of the current ON time to the fundamental repetition period of the transmitter is often called the DUTY CYCLE and therefore when current on time equals the current off time the transmitter has a 50 percent duty cycle. An 8 sec repetition period (0.125Hz) and a 50 percent duty cycle is the most common IP transmitter waveform. However, there are some transmitters available for which both the duty cycle and the fundamental period can be varied.

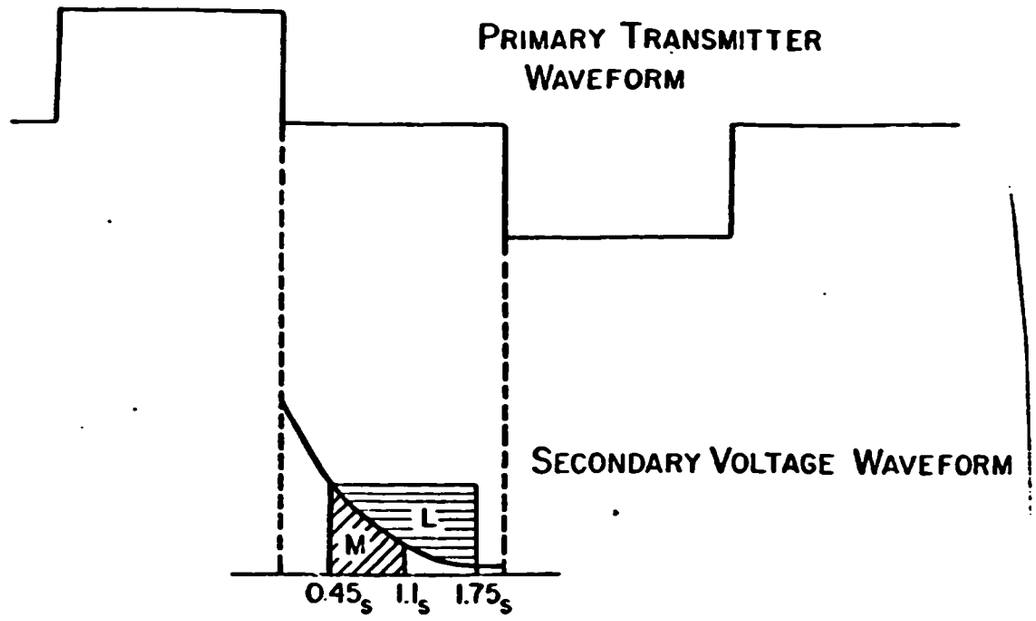


FIGURE 2: Definition of the Newmont IP Parameters "L" and "M".

Standard Definitions for Chargeability (M)

Figure 1 suggests that the IP parameter, chargeability varies with time and so it does. However, for practical reasons the entire decay curve is generally not sampled. Instead, the secondary voltage is sampled one or more times at various interals.

Because the secondary voltage is received at extremely low levels in many prospecting situations, measurements of its amplitude at any given time is extremely susceptible to noise. Therefore, the secondary voltage is usually integrated for a period of time called a gate. Thus, if the noise has a zero mean, the integration will tend to cancel the noise. Figure 2 illustrates the "Newmont" gates. The Newmont M factor is a standard time domain IP parameter throughout North America. The gate delay (i.e. the time after current interruption before integration starts), 0.45 sec was chosen to allow enough time for normal electromagnetic effects and any capacitive coupling effects between the transmitter and receiver to attenuate so that the secondary voltage consists only of the IP decay voltage.

In many, but not all, prospecting situations, the 450 msec delay before integration is sufficient time for any electromagnetic effects to have decayed away. The gate width is arbitrary but it is generally chosen to be an integral multiple of 60 Hz periods (i.e. 16.7 msec) so that the effect of 60 Hz noise is cancelled in the integration. The Newmont M gate width is 39 periods long while the L parameter is 78 periods long. The Newmont L factor as defined in Figure 1 is a parameter which helps to signal the presence of anomalous decay curve shape. The ratio of L to M (i.e. L/M) is unity whenever a typical IP decay curve is encountered. When L/M departs significantly from unity in a prospecting situation, the presence of EM coupling is strongly indicated. The reader is referred to Swift (1973) for an analysis of this parameter.

Multiple Gate Time Domain Receivers

The foregoing discussion suggests that there is more information in a time-domain decay curve than a simple chargeability. Indeed, contemporary research in the IP method is now directed toward an analysis of the entire waveform. In order to obtain more information on the decay curve shape, most IP instrument manufacturers make a receiver which is capable of measuring more than one gate along the transient. Figure 3 schematically illustrates one-half of a time domain waveform and 4 arbitrary along the secondary voltage. The gate definitions are arbitrary, subject only to practical considerations mentioned earlier. However, the gates which are farther out in the decay curve necessarily must integrate a signal of much lower amplitude. As a result, it is usual to increase the gate widths by some multiple of the first gate width. Figure 3 suggests a binary increase in the width. Some instruments choose the gate widths and calibration constants so that whenever a decay curve having the standard shape of an IP response is measured, the chargeabilities measured at each gate are the same.

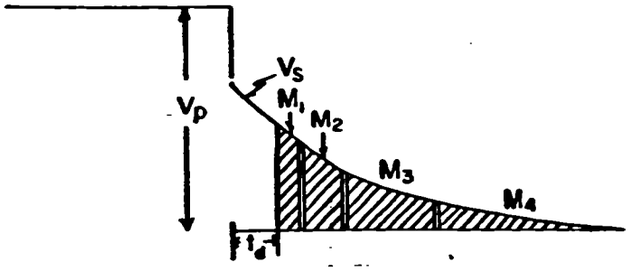
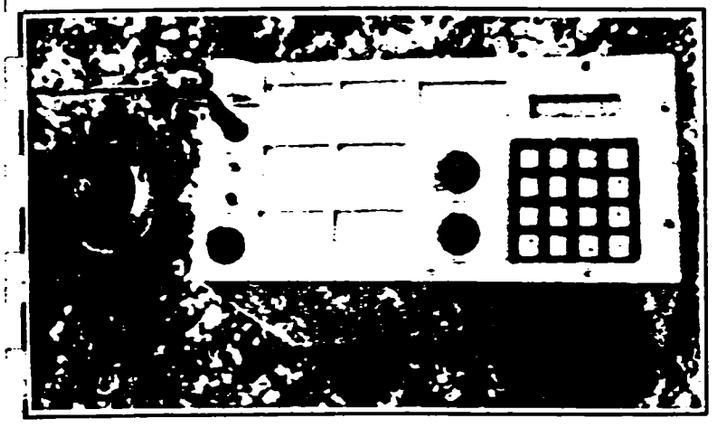


FIGURE 3: Figure 3, typical chargeability gate definition on a multi-gate time domain IP receiver.

SIX DIPOLE TIME DOMAIN IP RECEIVER



The TDR-6 induced polorization receiver is a highly cost-effective instrument for the detailed measurements of induced polorization and resistivity phenomenon. Up to six dipoles can be measured simultaneously, thus increasing survey production.

A wide input voltage range, up to 30V, simplifies surveys over the narrow shallow conductors of large resistivity contrast. Input signal indicators are provided for each dipole. All data are displayed on a 2 x 16 character LCD module and any selected parameters can be monitored on a separate analogue meter for noise evaluation during the stacking/averaging.

Although the TDR-6 receiver is automatic it allows full control and communications with the operator at all times during measurements.

Since the input signal synchronizes the receiver at each cycle, the transmitter timing stability is not critical and any standard time domain transmitter can be used.

Data are stored in internal memory with a capacity of up to 2700 readings ie 450 stations. The data format is directly compatible with the GEOSOFT IP Plotting System without the necessity of an instrument conversion progra-

FEATURES

- Wide input signal range
- Automatic self-potential cancellation
- Stacking/averaging of Vp and M for high measurement accuracy in noisy environments
- High rejection of power line interference
- Continuity resistance test
- Switch selectable delay and integration time
- Multiwindow chargeability measurements
- Digital output for data logger
- Six channel input provided
- Compatible with standard time domain transmitters
- Alpha-numeric LCD display
- Audio indicator for automatic SP compensation
- Portable

SPECIFICATIONS

Dipoles		1 to 6 simultaneously
Input Impedance		10 megohm
Input Voltage (VP)	-range	100µV - 30V (automatic)
	-accuracy	.25%
	-resolution	10 microvolt
Self Potential (SP)	-range	±2.0 volt
	-accuracy	1%
Automatic SP Compensation		±1.0 volt
Chargeability (M)	-range	300 mV/V
	-accuracy	.25%
	-resolution	.1 mV/V
Automatic Stacking		2 to 32 cycles
Delay Time		Programmable
Integration Time (each gate)		Programmable
Total Chargeability Time		During integration time for all gates
Synchronization Signal		From channel 1 or 6
Filtering	- Power Lines	Dual Notch 60/180 Hz or 50/150 Hz, 100 dB
	- Other	Anti-alias, RF and spike rejections
Internal Test		Vp = 1 volt/M=30 mV/V
Ground Resistance Test		0 - 200 k ohm
Transmitting Time		1, 2, 4 and 8 sec. pulse duration ON/OFF (standard time domain transmitter)
Digital Display		Two lines 16 alphanumeric LCD
Analogue Meters		Six - monitoring input signal and course resistance testing
Controls - push button		Reset
- toggle		Start - Stop
- rotary		Rs - IN - Test
- rotary (data scroll)		Display
- rotary (data scroll)		Dipole
- keypad		16 key - 4 x 4
Memory Capacity		2700 readings (450 stations at 6 dipoles)
Data Output	-serial I/O port	RS232C baud rate programmable
	-compatibility	GEOSOFT IP System
Temperature Range	-operating	-30°C to +50°C
	-storage	-40°C to +60°C
Power Supply		Four 1.5V D cells
Dimensions		31 x 16 x 29 cm (12.25 x 6.25 x 11.5 in.)
Weight		6.5 kg (14.3 lbs)

Androtex reserves the right to change specifications when it results in product improvement

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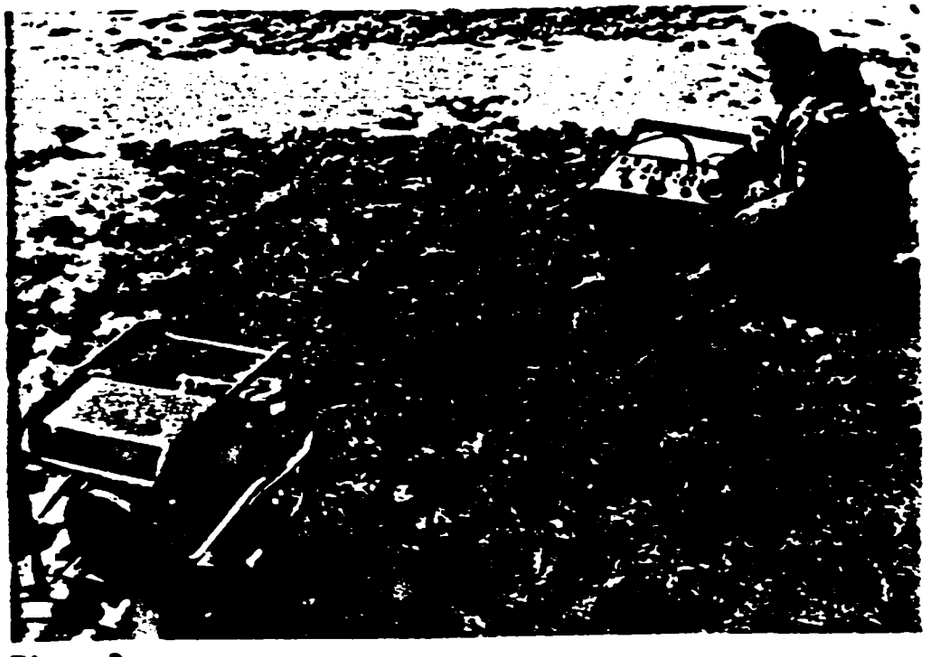
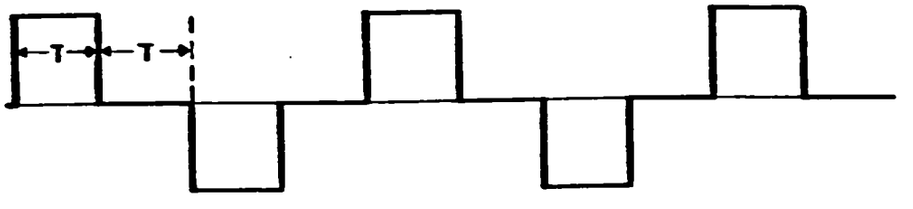


Figure 2
The TSQ-3 Transmitter and Motor-Generator Set

Time Domain: T = 1,2,4 or 8 seconds, switch selectable



Frequency Domain: $T = \frac{1}{f}$ and f = 0.1, 0.3, 1.0 or 3.0 Hz.

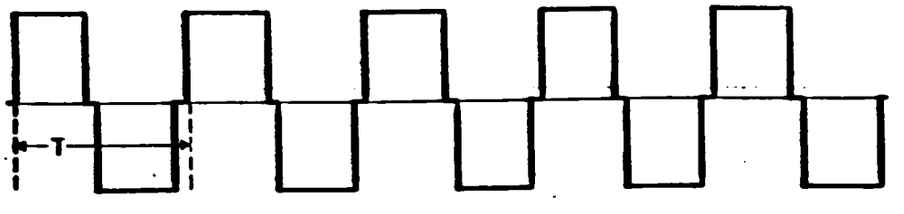


Figure 3
The TSQ-3 Output Waveforms

The Motor-Generator Set consists of a reliable Briggs and Stratton four stroke engine, coupled to a brushless permanent magnet alternator. The transmitter design employs solid-state components both for power switching and control circuits. Output waveforms and frequencies are switch selectable; square wave continuous for frequency domain and square wave interrupted for time domain. The programmer is crystal controlled for high stability. While care still must be taken when working with high voltages, the TSQ-3 features overload, underload and thermal protection for maximum safety. Stabilization circuitry ensures that the output current is automatically controlled to within ±0.1% for up to 20% external load or ±10% input voltage variations. Voltage, current and circuit resistance are presented on a LED digital display.

Basically, the Motor-Generator and Transmitter function as follows. The motor turns the generator (alternator) which produces 800 Hz, three phase, 230 V AC. This energy is transformed upwards according to a front panel voltage setting in a large transformer housed in the TSQ-3. The resulting AC is then rectified in a rectifier bridge. Commutator switches then control the DC voltage output according to the waveform and frequency selected.

2. TSQ-3 Transmitter Console & Motor - Generator Specifications

Transmitter Console	
Output Power	3000 VA maximum
Output Voltages	300, 400, 500, 600, 750, 900, 1050, 1200, 1350 and 1500 volts, switch selectable
Output Current	10 amperes maximum
Output Current Stability	Automatically controlled to within ±0.1% for up to 20% external load variation or up to ±10% input voltage variations.
Stabilization Over-range Protection	High voltage shuts off automatically if the control range of 20% is exceeded.
Digital Display	Light emitting diodes permit display up to 1999 with variable decimal point; switch selectable to read input voltage, output current, external circuit resistance, dual current range, switch selectable.

Current Reading Resolution	10 mA on coarse range (1-10A). 1 mA on fine range (0-2A)
Frequency Domain Waveform	Square wave, approximately 6% off at each polarity change
Frequency Domain	Standard: 0.1, 0.3, 1.0 and 3.0 Hz, switch selectable. Optional: any number of frequencies in range 0.1 to 5 Hz.
Time Domain Cycle Timing	t:t:t:t; on:off:on:off: automatic
Time Domain Polarity Change	Each 2t; automatic
Time Domain Pulse Durations	Standard: t=1,2,4,8,16 and 32 seconds Optional: any other timings
Time and Frequency Stability	Crystal controlled to better than 0.1% with external clock option better than 20 ppm over operating temperature range.
Efficiency	.78
Operating Temperature Range	-30°C to +50°C
Overload Protection	Automatic shut-off at 3000 VA.
Underload Protection	Automatic shut-off at current below 85 mA
Thermal Protection	Automatic shut-off at internal temperature of 85°C
Dimensions	350 mm x 530 mm x 320 mm
Weight	25.0 kg
Motor-Generator	
Type	Motor flexibly coupled to alternator and installed on a frame with carrying handles.
Motor	Briggs and Stratton, four stroke, 8 HP

Alternator	Permanent magnet type, 800 Hz, three phase 230 V AC at full load.
Output Power	3500 V A maximum
Dimensions	520 mm x 715 mm x 560 mm.
Weight	72.5 kg.
Total System	
Shipping Weight	150 kg includes transmitter console, motor-generator, connecting cables and reusable wooden crates.

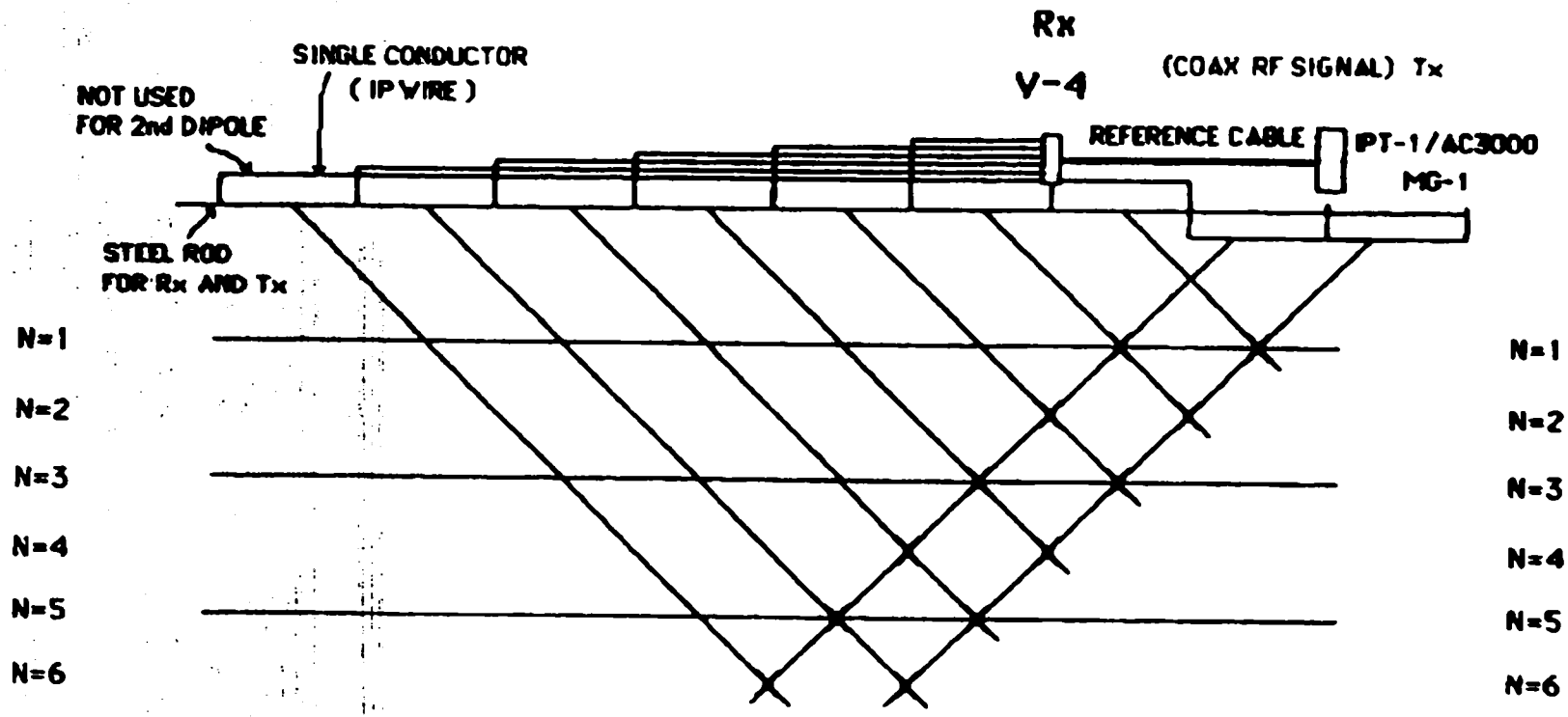
In Table 1 the maximum output current from the transmitter at certain values of load resistance is given for each position of the output voltage selector switch. The maximum load resistance limit occurs because of the built-in underload protection which shuts off the transmitter if the output is less than 85 mA. Figure 4 is a graph of output current vs voltage.

3. Theory of Operation

Power is supplied to the TSQ-3 transmitter through the alternator input connector from the three phase, 800 Hz alternator driven by a single cylinder, 4 stroke 8 HP engine. The main advantages of this brushless, permanent magnet alternator are: high efficiency, high overload capacity, short circuit immunity and minimum maintenance. The 10 m long input cable has four conductors, three for the three phases and the fourth to connect the alternator housing and the back pack to the TSQ-3 grounding lug. An additional grounding lug is provided on the mounting frame of the motor-generator which must be grounded as well.

Figure 5 is a block diagram showing the basic function of the TSQ-3 transmitter.

Two of three input phases are sensed by the Overload Sensors. In case of an overload, the Protection Circuits open the solid-state Input Switches. The same action takes place if the output current drops below 85 mA, which is sensed by the Open Loop Sensor. If the current stabilization range of 20% is exceeded, the Over-Range Sensor initiates the same action.



NOTE: V-4 CAN READ N-1 to N-6 SIMULTANEOUSLY FROM Tx DIPOLE
WHEN 2nd Tx DIPOLE IS READ EVERYTHING MOVES AHEAD 2 SEPARATIONS
THIS METHOD CAN BE USED FOR DIPOLE-DIPOLE OR POLE-DIPOLE CONFIGURATIONS

ADVANTAGES :

- ONLY 2 HIGH VOLTAGE WIRES (REDUCES COUPLING)
- REDUCED SETUP TIME (WIRES CAN BE PULLED LINE TO LINE)
- NO OVERLAP OF SETUPS TO FILL IN DEEPER (N) VALUES
- REFERENCE CABLE ELIMINATES CALIBRATION ERRORS AND DATA CORRECTION

PRESENTION

WE USING GEOSOFT SOFTWARE

THE PRESENTION IS ON PSEUDO-SECTIONS

PLAN MAPS OF FILTERS (1,2,3,4) IN COLOR IS AVAIBLE FOR IP/RESISTIVITY

DATA IS DELIVERED ON DISQUETTE.

HIGH PERFORMANCE EQUIPEMENT

RECEIVER (RX)	TURBO V4(PHOENIX GEOPHYSICS)
TRANSMITTER (TX)	MODEL IPT-1, 3000 WATTS 60 OR 120V. 3,PHASE, 350-1000HZ
MOTOR GENERATOR	MODEL MG1 OR MG2 1000VA, 400HZ 3-PHASE, 45-75V,2CYCLE ENGINE, 3HP HONDA

CREW

THE CONTRACTOR WILL SUPPLY AT LEAST TOW EXPERENCES OPERATOR AND THREE TECHNICIAN TO CARRY OUT THE FEILD OPERATIONS.


A NEW
DIMENSION
IN INSTRUMENTATION
PHOENIX
PHOENIX Geophysics
SPECTRAL RECEIVER
MODEL V-4

The Turbo V4 is an upgraded version of the V4 receiver, with a new, high-performance CPU board.

The Turbo V4 processor is 50 times faster than the original V4 processor, and features 12 times as much ROM/RAM memory for stored programs and data.

Programs for the Turbo V4 are written in high-level languages; the data processing is therefore much more efficient and intelligent than on the old CPU, which used assembler language only.

Also, the new CPU is programmable*. Users can develop their own programs in FORTRAN or C language using the IBM PC (or compatible), then download them into the V4. This capability means the V4 will remain up-to-date for years, and can be matched precisely to the user's applications.

* Optional.

SPECIFICATIONS

Analog Section

Number of channels	2, 4, 6 or 8 (in pairs)
Dynamic range	± 10 volts
Frequency range	1024 sec to 4 kHz (SIP); 4 sec to 4 kHz (CSAMT) in binary or 2/3 binary steps.
Input impedance	More than 100 megohms at low frequencies.
Powerline filtering	Triple notch 40 db powerline filter for 1/3/5 harmonics of 50/60 Hz. Switchable in/out.
Other filtering	Bad sample rejection; offset adjustment; programmable anti-alias filters; slope correction (TDIP) all under processor and/or manual control.
Gain	Automatic or manual control, range of 1 to 640.
DC offset	Processor controlled DC offset control, range: ± 2.5 volts.
Calibration	Manual external calibration; processor-controlled, internal calibration with built-in calibration/test signals: 1/128 Hz to 4 kHz ±5 v, 200 ohm impedance; 50% or 100% duty cycle.
Sensitivity	Sufficient for stand alone controlled source applications.

Digital Section

Processor/CPU board	32/16 bit NS32C016 with NS32081 maths coprocessor. Clock rate 6-10 MHz. Programmable interrupt controller with 16 request lines. MULTIBUS interface. DIN connectors. On-board real time clock.
Monitor firmware	Monitor firmware interfaces to National 32000 series software development tools. Also provides run time environment, terminal handler, debugger execute module, floating point support module and interrupt handler.
Applications firmware	Initially offered with geophysical applications firmware, for IP in time, frequency, or phase domain; spectral IP; resistivity; and CSAMT. Other offerings (such as FDEM) may become available from time to time. The user may develop proprietary applications in FORTRAN 77, PASCAL or C on VAX, IBM PC or compatibles and download into the V4.
CPU board memory	Up to 576 Kbyte RAM + 320 Kbyte ROM.
Serial I/O	Optional RS-232 port with selectable baud rate. Can drive RS-232 printer.
Parallel I/O	8 bit port with max 1/2 MHz transfer rate. For vest-pocket printer or external computer.
Timing	Internal crystal clock; processor-controlled resetting for synchronized operation with transmitters. Optional external precision clock.
A-D conversion	16-bit resolution, 12.5 kHz conversion rate.

Mechanical

Weight	approx. 13 kg
Dimensions	32 × 36 × 27 cm high
Case	resilient, tough PVC alloy
Connectors	3 multipin connectors for analog inputs, 2 of which have power for external sensors.

Environmental

Operating temperature	−10°C to +50°C (−20°C with LCD heater)
Storage temperature	−50°C to +60°C
Humidity	Splashproof, may be operated in light rain
Shock and vibration	Suitable for transport in bush vehicles.

Battery

12 v / 6 Ah rechargeable battery. Nominal 10 h continuous operation at +20°C. Provision for external 12V battery supply.

Inputs

Signal channel	Three multipin connectors for 8 analog inputs. (6 + 1 + 1)
Battery	Multipin connector for external battery or for charging of the internal battery @ 12 V, approx 1.2 A.
Remote clock signal	Optional input.
Current Monitor	Twin plugs for RF modulated signal from transmitter (for real-time deconvolution)

Outputs

Analog meters	Eight analog meters
Display	16 char × 4 lines LCD
Analog outputs	8 outputs for analog recorders, etc. ±5V range. (Optional)
External isolated transmitter drive	Via special purpose isolated RF link.
Calibration signal	Twin connectors

Switches and Controls

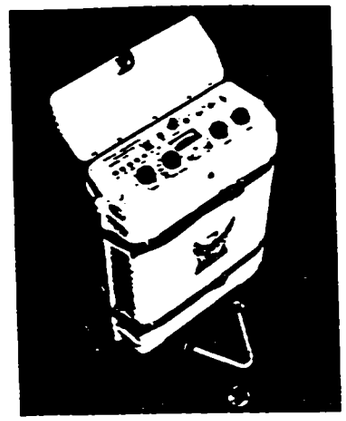
Keyboard	20-key alphanumeric/command keypad (waterproof).
On/off	2 position rotary.
Meter Mode	2 position toggle, AC or DC
Battery test	2 position toggle.
Input Select	2 position rotary

Note : Specifications subject to change. Customized configurations are available.

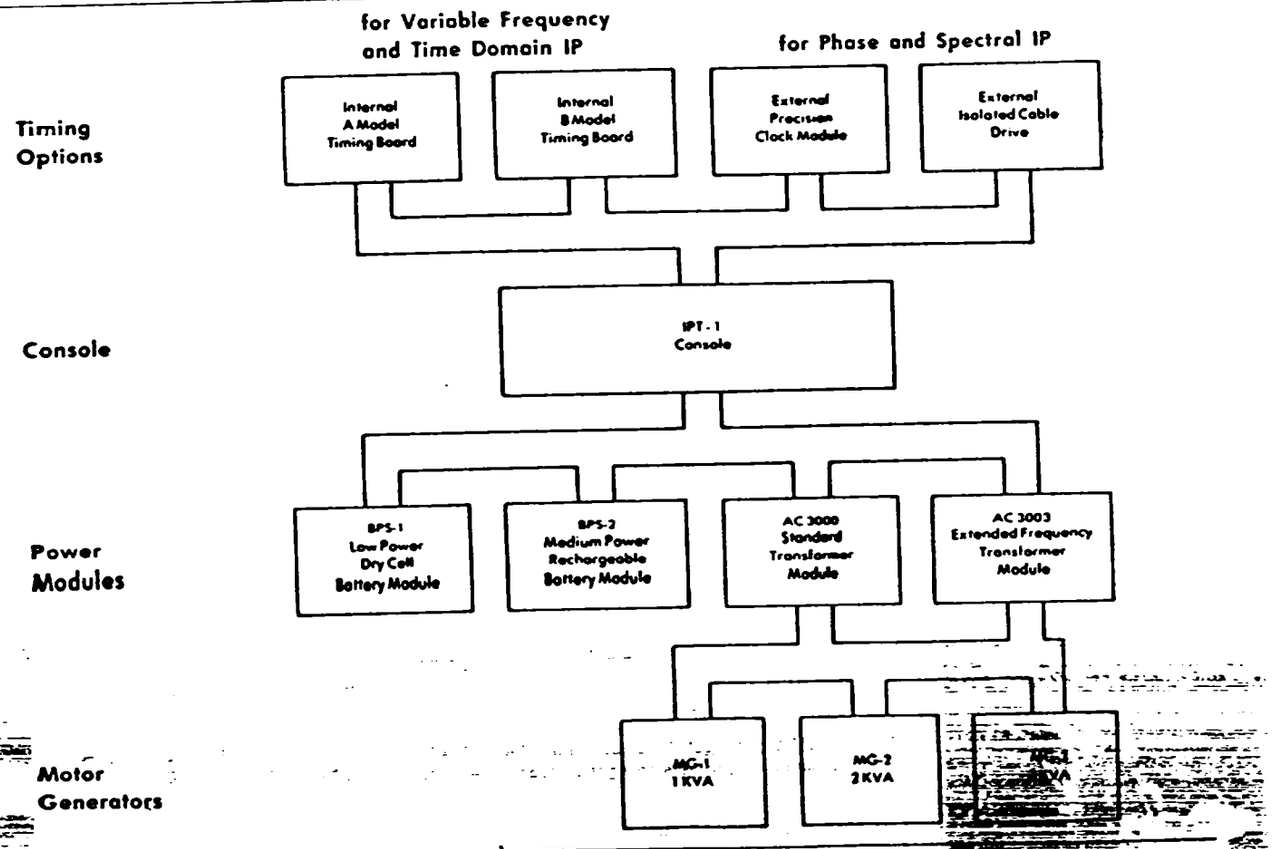
IPT-1

Variable Frequency, Time Domain and Phase IP Transmitter

- **Reliable:** Backed by twenty years experience in the design and worldwide operation of induced polarization and resistivity equipment
- **Versatile:** Can be used for resistivity, variable frequency IP, time domain IP or phase angle IP measurements
- **Stable:** Excellent current regulation
- **Lightweight, portable**
- **Wide selection of power sources**
- **Low cost**



Transmitter Configurations



PHOENIX GEOPHYSICS LIMITED

Geophysical Consulting and Contracting, Instrument Manufacture, Sale and Lease

Head Office: 200 Yorkland Blvd. Willowdale, Ont., Canada M2J 1R5. Tel: (416) 491-7340
310 - 885 Dunsmuir St. Vancouver, B.C., Canada V6C 1N5. Tel: (604) 684-2285
4690 Ironton St. Denver, Colorado, U.S.A. 80239. Tel: (303) 373-0332

Timing Options

INTERNAL TIMING BOARD

There are two available internal timing boards. Both have the same internally mounted crystal oscillator with a stability of 50 PPM over the temperature range -40°C to +60°C.

Model A :

STANDARD FREQUENCY SERIES
Frequency domain mode
±DC, .062, .125, .25, 1, 2 and 4 Hz.
Time domain mode
2 sec +, 2 sec off, 2 sec -, 2 sec off.
Simultaneous transmission mode
.25 and 4.0 Hz standard, other pairs available.

OPTIONAL FREQUENCY SERIES (change link on board)
Frequency domain mode
±DC, .078, .156, .313, 1.25, 2.5, and 5.0 Hz.
Time domain mode
1.6 sec +, 1.6 sec off, 1.6 sec -, 1.6 sec off.
Simultaneous transmission mode
.313 and 5.0 Hz standard, other pairs available.

Model B :

The main difference between this timing board and the model A board is that the duty cycle is variable. Frequency domain operation is obtained by setting the duty cycle to 100% and selecting any of nine binary frequencies from 1/64 Hz to 4 Hz. Various time domain waveforms may be obtained by choosing any of the nine frequencies and a duty cycle of 25%, 50% or 75%. The standard 2 sec +, 2 sec off, 2 sec -, 2 sec off time domain waveform is chosen by selecting a duty cycle of 50% and a frequency of .125 Hz.

EXTERNAL HIGH PRECISION CRYSTAL CLOCKS

The IPT-1 may be driven by external high precision crystal clock modules such as the CL-1 and transmitter driver or CL-2 and transmitter driver. These clock modules were designed for use as a time reference between the IPT-1 or IPT-2 transmitters and the Phoenix IPV-2 phase IP receiver. The aging rate of the CL-1 clock module is 5×10^{-10}/day (0.11 mrad/hr at 1 Hz) and the stability of the CL-2 clock module is 10^{-7}/day (2.26 mrad/hr at 1 Hz). These clock modules weigh 7.5 kg., however space is provided for as much as 5 kg of additional internal batteries for operating the CL-1 oven heated clocks all day at -40°C. Clock modules produced by other manufacturers of induced polarization receivers are also compatible with the IPT-1.

EXTERNAL ISOLATED CABLE DRIVE

The isolated cable drive option allows the IPT-1 to be driven by the timing circuitry of the IPV-3 spectral IP receiver. The maximum distance allowed between transmitter and receiver is 500m. For efficient spectral IP field surveying, the distance between the transmitter and receiver is always maintained at one electrode interval. Thus the maximum convenient electrode interval, using the isolated cable drive option, is 500m. The IPV-3 measures the current plus six voltage dipoles (n = 1,6) simultaneously.

Console

Ammeter Ranges : 30 mA, 100 mA, 300 mA, 1A, 3A and 10A full scale.

Meter Display : A meter function switch selects the display of current level, regulation status, input frequency, output voltage, control voltage and line voltage.

Current Regulation : The change in output current is less than 0.2% for a 10% change in input voltage or electrode impedance.

Protection : The current is turned off automatically if it exceeds 150% full scale or if it is less than 5% full scale.

Internal Power Modules

BPS-1 DRY CELL BATTERY POWER MODULE

Output Voltage : 90V, 180V and 360V.

Output Current : 1 mA to 1A maximum.

Output Power : Recommended maximum output power is 30 watts. Absolute maximum output power is 100 watts.

Power Supply : 8x45V dry cell batteries (Eveready 482, Mallory 202 or equivalent). Normal field operation, with low output power, results in an average battery life expectancy of one month. Operation with the absolute maximum output power results in much shorter battery life.

Control Supply : 4 x 6V lantern batteries (Eveready 409, Mallory 908 or equivalent) connected in series/parallel are used to provide the 40 to 70 mA at 12V required for the control circuitry. Average battery life expectancy is six months.

Operating Temperature : 0°C to +60°C.

BPS-2 RECHARGEABLE BATTERY POWER MODULE

Output Voltage : 50V, 106V, 212V, 425V, and 850V.

Output Current : 3 mA to 3A.

Output Power : Maximum output power is 300 watts. Above this output power a protective cut-out is engaged to prevent battery and circuit damage.

Batteries : 4 x 12V rechargeable gell cell batteries connected in series/parallel have a capacity of 9 A-hr. External batteries (such as car or motorcycle batteries) may also be used. A special cord and plug are provided for this mode of operation. An adaptor cord connects the 12V batteries in parallel with the 12V charging unit.

Operating Temperature : -40°C to +60°C. Below 0°C the capacity of the batteries is significantly reduced (by 70% at -40°C).

AC 3000 TRANSFORMER POWER MODULE

Output Voltage : 75V, 150V, 300V, 600V and 1200V.

Output Current : 3 mA to 10A.

Output Power : Maximum continuous output power is
3KW with MG-3 motor generator,
2KW with MG-2 motor generator and
1KW with MG-1 motor generator.

Input Power : Three phase, 400 Hz (350 to 1000 Hz), 60V (50V to 80V) is standard.
Three phase, 400 Hz (350 to 1000 Hz), 120V (100V to 160V) is optional.

Current Regulation : Achieved by feedback to the alternator of the motor generator unit.

Operating Temperature : -40°C to +60°C.

Thermal Protection : Thermostat turns off at 65°C and turns back on at 55°C internal temperature.

AC 3003 TRANSFORMER POWER MODULE

Same as AC 3000 except for:

Output Voltage : 44V, 87V, 175V, 350V and 700V.

Frequency Range : DC to 3000 Hz under external drive (all other power modules have a maximum frequency of 5 Hz).

General

Dimensions : 20 x 40 x 55 cm (9 x 16 x 22 in).

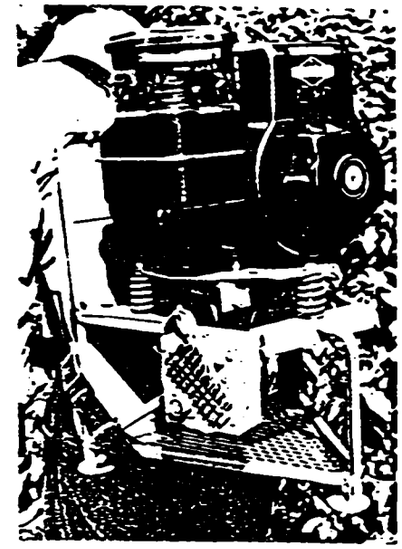
Weight : 13 kg (29 lb) with BPS-1.
13 kg (29 lb) with BPS-2.
17 kg (37 lb) with AC-3000.
18 kg (40 lb) with AC-3003.

Standard Accessories : Pack frame, manual. At least one of the four possible power modules is required. The transformer power modules in turn require one of the three external 1KVA, 2KVA, 3KVA, motor generators and a connecting cable.

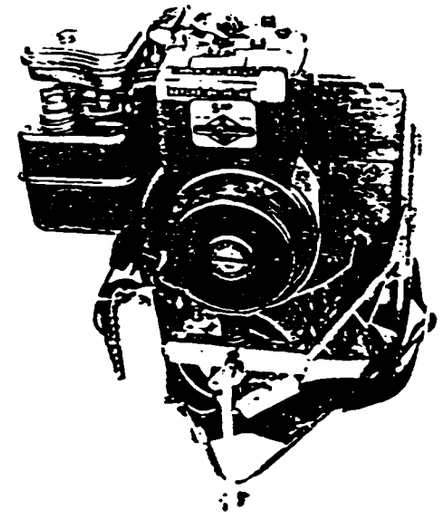
Motor Generators

There are three motor generators, differing in weight and power, which can be used with the transformer power modules. All three supply three phase. 400 Hz (350 to 600 Hz), 60V (45V to 80V). The voltage is regulated by feedback from the transmitter.

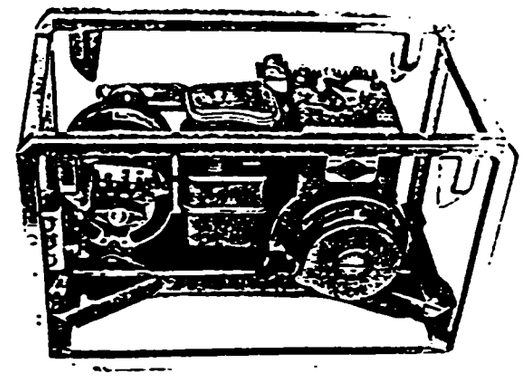
MG - 1 : This lightweight unit is designed for easy portability in areas of moderately high resistivity. It is well suited for massive sulfide exploration in Northern Canada, Europe and Asia, as well as general IP and resistivity surveys in rugged, mountainous areas around the world. The motor is a 4-cycle Briggs and Stratton which produces 3 HP at 3600 rpm. The dimensions of the unit, including packframe, are 40 x 45 x 60 (16 x 18 x 24 in). Total weight is 25 kg (55 lb).



MG - 2 : 2KVA motor generator. This versatile unit is adequate for the vast majority of IP and resistivity surveys conducted worldwide. It is light enough to be carried by one man, yet powerful enough for most survey requirements. The motor is a 4-cycle Briggs and Stratton which produces 5 HP at 3600 rpm. The dimensions of the unit, including packframe, are 40 x 45 x 60 cm (16 x 18 x 24 in). Total weight is 34 kg (75 lb).



MG - 3 : 3KVA motor generator. This two-man portable unit is designed for surveys in areas which require additional power. The motor is a 4-cycle Briggs and Stratton which produces 8 HP at 3600 rpm. The unit is mounted in a square frame with dimensions 40 x 48 x 75 cm (16 x 19 x 29 in). Total weight is 55 kg (120 lb).



POCKETS

Ministry of Northern Development and Mines
Ontario

Report of Work Conducted After Recording Claim

Mining Act

Transaction Number: W9660.00434

Personal information collected on this form is obtained under the authority of the Mining Act. This information will be used for correspondence. Questions about this collection should be directed to the Provincial Manager, Mining Lands, Ministry of Northern Development and Mines, Fourth Floor, 159 Cedar Street, Sudbury, Ontario, P3E 6A5, telephone (705) 670-7264

Recorded 15735

Instructions:
- Please type or print and submit in duplicate.
- Refer to the Mining Act and Regulations for Recorder.
- A separate copy of this form must be comple
- Technical reports and maps must accompany
- A sketch, showing the claims the work is assigned to, must accompany this form.

42A04NW0066 2 16735 SEWELL

900

Recorded Holder(s) Hemlo Gold Mines Inc./Michel Gam/Robert Robitaille/Claude Tremblay		**Client No.** 143550/116037/166181
Address Po Box 1205, 60 Shirley Street South, Timmins, Ont P4N 8R9		**Telephone No.** (705) 268-9600
Mining Division Porcupine	**Township/Area** Sewell/Reeces/Kenogaming/Penherwood	**M or G Plan No.** M1074/63239/63247/63299
Dates Work Performed From: September 19, 1994	To: February 29, 1996	

Work Performed (Check One Work Group Only)

	Work Group	Type
	Geotechnical Survey	Linecutting, Mag & IP Surveys
	Physical Work, Including Drilling	
	Rehabilitation	
	Other Authorized Work	
	Assays	
	Assignment from Reserve	

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AUG 30 1996
MINING LANDS BRANCH

Total Assessment Work Claimed on the Attached Statement of Costs $ 86615.00

Note: The Minister may reject for assessment work credit all or part of the assessment work submitted if the recorded holder cannot verify expenditures claimed in the statement of costs within 30 days of a request for verification.

Persons and Survey Company Who Performed the Work (Give Name and Address of Author of Report)

Name	Address
See Schedule	

(attach a schedule if necessary)

Certification of Beneficial Interest * See Note No. 1 on reverse side

I certify that at the time the work was performed, the claims covered in this work report were recorded in the current holder's name or held under a beneficial interest by the current recorded holder.	**Date** June 24, 1996	**Recorded Holder or Agent (Signature)**

Certification of Work Report

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

Name and Address of Person Certifying Robert Calhoun % Po Box 1205, 60 Shirley St. South, Timmins, Ont P4N 7J5		
Telepone No. (705) 268-9600	**Date**	**Certified By (Signature)**

For Office Use Only

Total Value Cr. Recorded	**Date Recorded** Sept. 24/96	**Mining Recorder** undated Gary White	**Received Stamp**
	Deemed Approval Date	**Date Approved**	
	Date Notice for Amendments Sent		

RECEIVED
JUN 26 1996
130 C KR
PORCUPINE MINING DIVISION

0241 (03/91)

Details for Work Report # ABCNT96.329

Work Report# for Applying Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assesment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve:Work to be Claimed at a Future Date
	P 0,839,980	1	782.00		782.00	
	P 0,839,983	1	840.00		840.00	
	P 0,878,419	1	854.00	454.00	400.00	
	P 0,893,527	1	426.00		426.00	
	P 0,893,528	1	403.00		403.00	
	P 0,893,529	1	1,009.00		1,009.00	
	P 0,921,399	1	409.00		409.00	
	P 0,921,400	1	384.00		384.00	
	P 0,924,165	1	593.00		593.00	
	P 0,924,166	1	1,026.00		1,026.00	
	P 0,924,167	1	1,012.00		1,012.00	
	P 0,924,168	1	1,468.00		1,468.00	
	P 0,924,169	1	743.00		743.00	
	P 0,924,170	1	819.00		819.00	
	P 0,924,171	1	1,474.00		1,474.00	
	P 0,924,172	1	1,073.00		1,073.00	
	P 0,924,173	1	670.00		670.00	
	P 0,924,174	1	1,327.00		1,327.00	
	P 0,924,175	1	998.00		998.00	
	P 0,924,176	1	1,175.00		1,175.00	
	P 0,924,177	1	692.00		692.00	
	P 0,933,576	1	768.00		768.00	
	P 0,947,131	1	426.00		426.00	
	P 0,947,258	1	823.00		823.00	
	P 0,947,259	1	636.00	400.00	236.00	
	P 0,947,264	1	1,006.00	400.00	606.00	
	P 0,947,265	1	870.00		870.00	
	P 0,947,266	1	1,081.00	400.00	681.00	
	P 0,947,267	1	804.00	400.00	404.00	
	P 0,987,251	1	103.00	103.00		
	P 0,987,252	1	88.00	88.00		
	P 1,175,080	1	221.00	400.00		
	P 1,175,081	1	309.00	400.00		
	P 1,175,082	1	177.00	400.00		
	P 1,175,083	1	477.00	477.00		
	P 1,176,385	1	1,884.00	400.00	1,284.00	
	P 1,176,386	1	2,267.00	168.00	2,099.00	
	P 1,176,508	1	513.00	400.00	113.00	
	P 1,176,960	1	1,250.00	400.00	850.00	
	P 1,176,961	1	1,082.00	400.00	682.00	
	P 1,176,963	1	181.00	400.00		
	P 1,176,964	1	177.00	400.00		
	P 1,176,966	1	1,660.00	400.00	1,260.00	
	P 1,176,967	1	1,257.00	400.00	857.00	
	P 1,176,969	1	1,001.00	400.00	601.00	
	P 1,176,971	1	891.00	400.00	491.00	
	P 1,176,972	1	1,108.00	400.00	708.00	
	P 1,176,973	1	939.00	400.00	539.00	

2.16 7 25

Work Report# for Applying Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assesment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve:Work to be Claimed at a Future Date
	P 1,176,974	1	442.00	442.00		
	P 1,176,975	1	227.00	400.00		
	P 1,176,976	1	638.00	400.00	238.00	
	P 1,176,977	1	172.00	400.00		
	P 1,176,978	1	265.00	400.00		
	P 1,176,979	1	698.00	400.00	298.00	
	P 1,176,980	1	1,464.00	400.00	1,064.00	
	P 1,176,981	1	783.00	21.00	762.00	
	P 1,176,982	1	1,978.00	400.00	1,578.00	
	P 1,176,983	1	2,122.00	391.00	1,731.00	
	P 1,176,984	1	749.00	400.00	349.00	
	P 1,176,985	1	1,009.00	400.00	609.00	
	P 1,176,986	1	686.00	400.00	286.00	
	P 1,176,987	1	684.00	400.00	284.00	
	P 1,177,116	1	49.00	400.00		
	P 1,177,117	1	198.00	400.00		
	P 1,177,118	1	892.00	400.00	492.00	
	P 1,177,119	1	1,923.00	400.00	1,523.00	
	P 1,177,120	1	1,223.00	400.00	823.00	
	P 1,177,121	1	553.00	400.00	153.00	
	P 1,177,122	1	600.00	400.00	200.00	
	P 1,177,123	1	2,689.00	400.00	2,289.00	
	P 1,177,124	1	2,557.00	400.00	2,157.00	
	P 1,180,953	1	3,064.00	400.00	2,664.00	
	P 1,180,963	1	1,069.00	400.00	669.00	
	P 1,204,672	8	8,583.00		8,583.00	
	P 1,204,674	2	245.00	800.00		
	P 1,204,675	6	631.00	2,400.00		
	P 0,944,914	1	0.00	146.00		
	P 0,947,089	1	0.00	400.00		
	P 0,947,096	1	0.00	400.00		
	P 0,947,097	1	0.00	400.00		
	P 0,947,098	1	0.00	400.00		
	P 0,947,099	1	0.00	400.00		
	P 0,947,100	1	0.00	400.00		
	P 0,947,108	1	0.00	400.00		
	P 0,947,109	1	0.00	400.00		
	P 0,947,148	1	0.00	400.00		
	P 0,947,149	1	0.00	400.00		
	P 0,947,150	1	0.00	400.00		
	P 0,947,251	1	0.00	400.00		
	P 0,947,252	1	0.00	400.00		
	P 0,947,256	1	0.00	400.00		
	P 0,947,257	1	0.00	400.00		
	P 0,899,883	1	0.00	400.00		
	P 0,948,318	1	0.00	400.00		
	P 0,948,319	1	0.00	400.00		
	P 0,948,320	1	0.00	400.00		

2.16735

Work Report# for Applying Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assesment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve:Work to be Claimed at a Future Date
	P 0,948,321	1	0.00	400.00		
	P 0,948,325	1	0.00	400.00		
	P 0,948,326	1	0.00	400.00		
	P 0,948,328	1	0.00	400.00		
	P 0,948,329	1	0.00	400.00		
	P 0,950,026	1	0.00	400.00		
	P 0,950,027	1	0.00	400.00		
	P 0,950,028	1	0.00	400.00		
	P 0,950,029	1	0.00	400.00		
	P 0,950,030	1	0.00	400.00		
	P 0,950,031	1	0.00	400.00		
	P 0,950,032	1	0.00	400.00		
	P 0,950,033	1	0.00	400.00		
	P 0,950,034	1	0.00	400.00		
	P 0,951,803	1	0.00	400.00		
	P 1,027,916	1	0.00	400.00		
	P 1,027,917	1	0.00	400.00		
	P 1,027,918	1	0.00	400.00		
	P 1,204,622	1	0.00	400.00		
	P 1,204,673	1	0.00	400.00		
	P 0,899,997	1	0.00	400.00		
	P 0,899,998	1	0.00	400.00		
	P 0,755,310	1	0.00	400.00		
	P 0,755,311	1	0.00	400.00		
	P 0,755,312	1	0.00	400.00		
	P 0,755,313	1	0.00	400.00		
	P 0,755,314	1	0.00	400.00		
	P 0,755,315	1	0.00	400.00		
	P 0,755,316	1	0.00	400.00		
	P 0,755,317	1	0.00	400.00		
	P 0,755,318	1	0.00	296.00		
	P 0,848,909	1	0.00	400.00		
	P 0,848,910	1	0.00	400.00		
	P 0,848,911	1	0.00	400.00		
	P 0,848,912	1	0.00	400.00		
	P 0,848,913	1	0.00	400.00		
	P 0,848,914	1	0.00	400.00		
	P 0,848,915	1	0.00	400.00		
	P 0,969,707	1	0.00	400.00		
	P 0,969,708	1	0.00	400.00		
	P 0,973,446	1	0.00	400.00		
	P 0,973,447	1	0.00	400.00		
	P 0,988,109	1	0.00	400.00		
	P 0,988,110	1	0.00	400.00		
	P 0,988,111	1	0.00	400.00		
	P 0,988,112	1	0.00	400.00		
	P 0,988,113	1	0.00	400.00		
	P 0,988,114	1	0.00	400.00		

2.19735

Work Report# for Applying Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assesment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve Work to be Claimed at a Future Date
	P 0.988,115	1	0.00	400.00		
	P 0.988,116	1	0.00	400.00		
	P 0.988,117	1	0.00	400.00		
	P 0.990,669	1	0.00	400.00		
	P 0.990,670	1	0.00	400.00		
	P 0.990,671	1	0.00	400.00		
	P 0.990,672	1	0.00	400.00		
	P 0.990,673	1	0.00	400.00		
	P 0.995,929	1	0.00	400.00		
	P 0.996,651	1	0.00	400.00		
	P 0.996,809	1	0.00	400.00		
	P 0.996,810	1	0.00	400.00		
	P 0.996,846	1	0.00	400.00		
	P 0.996,847	1	0.00	400.00		
	P 0.996,848	1	0.00	400.00		
	P 0.996,849	1	0.00	400.00		
	P 0.996,850	1	0.00	400.00		
	P 0.996,851	1	0.00	400.00		
	P 0.996,852	1	0.00	400.00		
	P 0.996,853	1	0.00	400.00		
	P 0.996,854	1	0.00	400.00		
	P 0.996,855	1	0.00	400.00		
	P 0.996,856	1	0.00	400.00		
	P 0.996,857	1	0.00	400.00		
	P 0.996,858	1	0.00	400.00		
	P 0.996,859	1	0.00	400.00		
	P 0.996,860	1	0.00	400.00		
	P 0.996,861	1	0.00	400.00		
	P 0.996,862	1	0.00	400.00		
	P 0.996,863	1	0.00	400.00		
	P 0.996,864	1	0.00	400.00		
	P 0.996,865	1	0.00	400.00		
	P 0.996,866	1	0.00	400.00		
	P 0.996,867	1	0.00	400.00		
	P 0.996,868	1	0.00	167.00		
	P 1.176,507	1	0.00	400.00		
	P 1.176,509	1	0.00	400.00		
	P 1.176,982	1	0.00	400.00		
	P 1.176,985	1	0.00	400.00		
	P 1.176,988	1	0.00	400.00		
	P 1.177,115	1	0.00	400.00		
	P 1.180,939	1	0.00	400.00		
	P 1.180,940	1	0.00	400.00		
	P 1.180,941	1	0.00	400.00		
	P 1.180,942	1	0.00	400.00		
	P 1.180,943	1	0.00	400.00		
	P 1.180,944	1	0.00	400.00		
	P 1.180,945	1	0.00	400.00		

Work Reports for Applying Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assesment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve: Work to be Claimed at a Future Date
	P 1.180.946	1	0.00	400.00		
	P 1.180.947	1	0.00	394.00		
	P 1.180.948	1	0.00	400.00		
	P 1.180.949	1	0.00	400.00		
	P 1.180.950	1	0.00	400.00		
	P 1.180.951	1	0.00	400.00		
	P 1.180.952	1	0.00	400.00		
	P 1.193.124	4	0.00	1.600.00		
	P 1.193.125	3	0.00	1.200.00		
	P 1.193.126	2	0.00	800.00		
	P 1.193.127	2	0.00	800.00		
	P 1.193.128	3	0.00	1.200.00		
	P 1.204.330	6	868.00			868.00
	P 1.204.331	13	1.881.00			1.881.00
	P 1.204.334	13	4.911.00			4.911.00
	P 1.204.340	2	3.008.00			3.008.00

Total Number of Claims	Total Value Work Done	Total Value Work Applied	Total Assigned From	Total Reserve
208	86.615.00	75,947.00	58,551.00	10,668.00

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2.16733

Credits you are claiming in this report may be cut back. In order to minimize the adverse affects of such deletions, please indicate from which claims you wish to priorize the deletion of credits. Please mark (x) one of the following:

1. [ ] Credits are to be cut back starting with the claims listed last, working backwards.

2. [ ] Credits are to be cut back equally over all claims contained in this report of work.

3. [x] Credits are to be cut back as priorized on the attatched appendix.

4. [ ] Credits are to be cut back starting with the claims that have reserve credits.

In the event that you have not specified your choice of priority, option one will be implemented.

Note 1: Examples of beneficial interest are unrecorded transfers, option payments, memorandum of agreements, etc., with respect to the mining claims.
Note 2: If work has been performed on patented or leased land, please complete the following:

I certify that the recorded holder had a beneficial interest in the patented or leased land at the time the work was performed.	Signature	Date

Work Reports for Applying Reserve	Claim Number (see Note 2)	# of Claim Units	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve: Work to be Claimed at a Future Date
	P [illegible]	1	780.00		780.00	
	P [illegible]	1	340.00		340.00	
	P 0.876.419	1	824.00	424.00	400.00	
	P 0.893.527	1	428.00		428.00	
	P 0.893.528	1	403.00		403.00	
	P 0.893.529	1	1,003.00		1,003.00	
	P 0.921.399	1	403.00		403.00	
	P 0.921.400	1	384.00		384.00	
	P 0.924.160	1	533.00		533.00	
	P 0.924.166	1	1,022.00		1,022.00	
	P 0.924.167	1	1,012.00		1,012.00	
	P 0.924.168	1	1,458.00		1,458.00	
	P 0.924.169	1	743.00		743.00	
	P 0.924.170	1	813.00		813.00	
	P 0.924.171	1	1,474.00		1,474.00	
	P 0.924.172	1	1,073.00		1,073.00	
	P 0.924.173	1	870.00		870.00	
	P 0.924.174	1	1,327.00		1,327.00	
	P 0.924.175	1	993.00		993.00	
	P 0.924.176	1	1,175.00		1,175.00	
	P 0.924.177	1	632.00		632.00	
	P 0.933.078	1	785.00		785.00	
	P 0.947.191	1	425.00		425.00	
	P 0.947.253	1	923.00		923.00	
	P 0.947.253	1	636.00	400.00	236.00	
	P 0.947.254	1	1,008.00	400.00	608.00	
	P 0.947.255	1	870.00		870.00	
	P 0.947.256	1	1,031.00	400.00	631.00	
	P 0.947.257	1	824.00	400.00	424.00	
	P 0.967.251	1	103.00	103.00		
	P 0.967.252	1	86.00	86.00		
	P 1.175.030	1	821.00	400.00		
	P 1.175.031	1	303.00	400.00		
	P 1.175.032	1	477.00	400.00		
	P 1.175.033	1	477.00	477.00		
	P 1.176.355	1	1,684.00	400.00	1,284.00	
	P 1.176.356	1	2,267.00	159.00	2,038.00	
	P 1.176.358	1	513.00	400.00	113.00	
	P 1.176.360	1	1,250.00	400.00	850.00	
	P 1.176.361	1	1,082.00	400.00	682.00	
	P 1.176.363	1	181.00	400.00		
	P 1.176.364	1	177.00	400.00		
	P 1.176.365	1	1,650.00	400.00	1,250.00	
	P 1.176.367	1	1,257.00	400.00	857.00	
	P 1.176.368	1	1,301.00	400.00	901.00	
	P 1.176.371	1	881.00	400.00	481.00	
	P 1.176.372	1	1,103.00	400.00	703.00	
	P 1.176.373	1	803.00	400.00	403.00	

Details for Work Report # PDW7-91-000

Work Records for Additional Reserve	Claim Number and Type	% of Claim Owned	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Value Assigned from this Claim	Reserve Work to be Carried Forward to Future Date
	1P 1.176.874	1	441.00	441.00		
	1P 1.176.875	1	441.00	441.00		
	1P 1.176.876	1	441.00	441.00	441.00	
	1P 1.176.877	1	441.00	441.00		
	1P 1.176.878	1	441.00	441.00		
	1P 1.176.879	1	441.00	441.00	441.00	
	1P 1.176.880	1	1,764.00	441.00	1,764.00	
	1P 1.176.881	1	735.00	21.00	735.00	
	1P 1.176.882	1	1,176.00	441.00	1,176.00	
	1P 1.176.883	1	2,205.00	441.00	1,764.00	
	1P 1.176.884	1	735.00	441.00	441.00	
	1P 1.176.885	1	1,029.00	441.00	588.00	
	1P 1.176.886	1	588.00	441.00	441.00	
	1P 1.176.887	1	882.00	441.00	294.00	
	1P 1.177.115	1	42.00	441.00		
	1P 1.177.117	1	735.00	441.00		
	1P 1.177.118	1	882.00	441.00	441.00	
	1P 1.177.119	1	1,323.00	441.00	1,323.00	
	1P 1.177.120	1	1,323.00	441.00	882.00	
	1P 1.177.121	1	882.00	441.00	441.00	
	1P 1.177.122	1	882.00	441.00	441.00	
	1P 1.177.123	1	2,646.00	441.00	2,205.00	
	1P 1.177.124	1	2,352.00	441.00	1,911.00	
	1P 1.180.953	1	3,864.00	441.00	3,864.00	
	1P 1.180.963	1	1,323.00	441.00	882.00	
	1P 1.204.672	8	8,565.00		8,565.00	
	1P 1.204.674	2	245.00	882.00		
	1P 1.204.675	5	851.00	2,646.00		
	1P 0.944.914	1	0.00	245.00		
	1P 0.947.089	1	0.00	441.00		
	1P 0.947.096	1	0.00	441.00		
	1P 0.947.097	1	0.00	441.00		
	1P 0.947.098	1	0.00	441.00		
	1P 0.947.099	1	0.00	441.00		
	1P 0.947.100	1	0.00	441.00		
	1P 0.947.102	1	0.00	441.00		
	1P 0.947.109	1	0.00	441.00		
	1P 0.947.146	1	0.00	441.00		
	1P 0.947.149	1	0.00	441.00		
	1P 0.947.150	1	0.00	441.00		
	1P 0.947.251	1	0.00	441.00		
	1P 0.947.252	1	0.00	441.00		
	1P 0.947.256	1	0.00	441.00		
	1P 0.947.257	1	0.00	441.00		
	1P 0.699.693	1	0.00	441.00		
	1P 0.945.919	1	0.00	441.00		
	1P 0.945.919	1	0.00	441.00		
	1P 0.945.922	1	0.00	441.00		

2.16798

Details for work Record # 4001781.000

Work Required for Assessment Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Value Assigned to other Claim	Reserve work to be Applied at a Future Date
	P 0.948.321	1	0.00	400.00		
	P 0.948.322	1	0.00	400.00		
	P 0.948.323	1	0.00	400.00		
	P 0.948.324	1	0.00	400.00		
	P 0.948.325	1	0.00	400.00		
	P 0.950.026	1	0.00	400.00		
	P 0.950.027	1	0.00	400.00		
	P 0.950.028	1	0.00	400.00		
	P 0.950.029	1	0.00	400.00		
	P 0.950.030	1	0.00	400.00		
	P 0.950.031	1	0.00	400.00		
	P 0.950.032	1	0.00	400.00		
	P 0.950.033	1	0.00	400.00		
	P 0.950.034	1	0.00	400.00		
	P 0.951.303	1	0.00	400.00		
	P 1.027.315	1	0.00	400.00		
	P 1.027.317	1	0.00	400.00		
	P 1.027.318	1	0.00	400.00		
	P 1.204.522	1	0.00	400.00		
	P 1.204.673	1	0.00	400.00		
	P 0.699.337	1	0.00	400.00		
	P 0.699.338	1	0.00	400.00		
	P 0.755.314	1	0.00	400.00		
	P 0.755.315	1	0.00	400.00		
	P 0.755.316	1	0.00	400.00		
	P 0.755.317	1	0.00	400.00		
	P 0.755.318	1	0.00	400.00		
	P 0.755.319	1	0.00	400.00		
	P 0.755.320	1	0.00	400.00		
	P 0.755.321	1	0.00	400.00		
	P 0.755.322	1	0.00	400.00		
	P 0.755.323	1	0.00	400.00		
	P 0.755.324	1	0.00	400.00		
	P 0.755.325	1	0.00	400.00		
	P 0.755.326	1	0.00	400.00		
	P 0.755.327	1	0.00	400.00		
	P 0.755.328	1	0.00	400.00		
	P 0.848.303	1	0.00	400.00		
	P 0.848.310	1	0.00	400.00		
	P 0.848.311	1	0.00	400.00		
	P 0.848.312	1	0.00	400.00		
	P 0.848.313	1	0.00	400.00		
	P 0.848.314	1	0.00	400.00		
	P 0.848.315	1	0.00	400.00		
	P 0.969.707	1	0.00	400.00		
	P 0.969.708	1	0.00	400.00		
	P 0.975.446	1	0.00	400.00		
	P 0.975.447	1	0.00	400.00		
	P 0.998.103	1	0.00	400.00		
	P 0.998.110	1	0.00	400.00		
	P 0.998.111	1	0.00	400.00		
	P 0.998.112	1	0.00	400.00		
	P 0.998.113	1	0.00	400.00		
	P 0.998.114	1	0.00	400.00		

2.1073

Work Reports for Applying Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve: Work to be Claimed at a Future Date
	P 0.995.110	1	0.00	400.00		
	P 0.995.113	1	0.00	400.00		
	P 0.995.117	1	0.00	400.00		
	P 0.990.869	1	0.00	400.00		
	P 0.990.870	1	0.00	400.00		
	P 0.990.871	1	0.00	400.00		
	P 0.990.872	1	0.00	400.00		
	P 0.990.873	1	0.00	400.00		
	P 0.995.929	1	0.00	400.00		
	P 0.996.054	1	0.00	400.00		
	P 0.996.809	1	0.00	400.00		
	P 0.996.810	1	0.00	400.00		
	P 0.996.343	1	0.00	400.00		
	P 0.996.347	1	0.00	400.00		
	P 0.996.348	1	0.00	400.00		
	P 0.996.349	1	0.00	400.00		
	P 0.996.850	1	0.00	400.00		
	P 0.996.851	1	0.00	400.00		
	P 0.996.852	1	0.00	400.00		
	P 0.996.853	1	0.00	400.00		
	P 0.996.854	1	0.00	400.00		
	P 0.996.855	1	0.00	400.00		
	P 0.996.856	1	0.00	400.00		
	P 0.996.857	1	0.00	400.00		
	P 0.996.858	1	0.00	400.00		
	P 0.996.859	1	0.00	400.00		
	P 0.996.860	1	0.00	400.00		
	P 0.996.861	1	0.00	400.00		
	P 0.996.362	1	0.00	400.00		
	P 0.996.863	1	0.00	400.00		
	P 0.996.864	1	0.00	400.00		
	P 0.996.865	1	0.00	400.00		
	P 0.996.866	1	0.00	400.00		
	P 0.996.867	1	0.00	400.00		
	P 0.996.868	1	0.00	167.00		
	P 1.176.507	1	0.00	400.00		
	P 1.176.509	1	0.00	400.00		
	P 1.176.362	1	0.00	400.00		
	P 1.176.365	1	0.00	400.00		
	P 1.176.368	1	0.00	400.00		
	P 1.177.115	1	0.00	400.00		
	P 1.180.339	1	0.00	400.00		
	P 1.180.340	1	0.00	400.00		
	P 1.180.341	1	0.00	400.00		
	P 1.180.342	1	0.00	400.00		
	P 1.180.343	1	0.00	400.00		
	P 1.180.344	1	0.00	400.00		
	P [illegible]	1	0.00	[illegible]		

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Work Report# for Applying Reserve	Claim Number (see note 2)	# of Claim Units	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Values Assigned from this Claim	Reserve: Work to be Claimed at a Future Date
	P 1,190,345	1	0.00	400.00		
	P 1,190,347	1	0.00	384.00		
	P 1,190,348	1	0.00	400.00		
	P 1,190,349	1	0.00	400.00		
	P 1,190,350	1	0.00	400.00		
	P 1,190,351	1	0.00	400.00		
	P 1,190,352	1	0.00	400.00		
	P 1,190,124	4	0.00	1,600.00		
	P 1,190,125	3	0.00	1,200.00		
	P 1,190,126	2	0.00	800.00		
	P 1,190,127	2	0.00	800.00		
	P 1,190,128	3	0.00	1,200.00		
	P 1,204,330		958.00			958.00
	P 1,204,331		1,331.00			[illegible]
	P 1,204,334		4,911.00			4,911.00
	P 1,204,340		3,008.00			3,008.00

Total Number of Claims	Total Value Work Done	Total Value Work Applied	Total Assigned From	Total Reserve
208	80,845.00	73,847.00	56,801.00	10,505.00

2.19725

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Credits you are claiming in this report may be cut back. In order to minimize the adverse affects of such deletions, please indicate from which claims you wish to priorize the deletion of credits. Please mark (x) one of the following:

1. [ ] Credits are to be cut back starting with the claims listed last, working backwards.

2. [ ] Credits are to be cut back equally over all claims contained in this report of work.

3. [x] Credits are to be cut back as priorized on the attatched appendix.

4. [ ] Credits are to be cut back starting with the claims that have reserve credits.

In the event that you have not specified your choice of priority, option one will be implemented.

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Note 1: Examples of beneficial interest are unrecorded transfers, option agreements, memorandum of agreements, etc. with respect to the mining claims.

Note 2: If work has been performed on patented or leased land, please complete the following:

I certify that the recorded holder had a beneficial interest in the patented or leased land at the time the work was performed.	Signature	Date

Ministry of Northern Development and Mines

Ministère du Développement du Nord et des mines

Ontario

Statement of Costs for Assessment Credit

État des coûts aux fins du crédit d'évaluation

Mining Act/Loi sur les mines

Transaction No./N° de transaction

2.13439

Personal information collected on this form is obtained under the authority of the Mining Act. This information will be used to maintain a record and ongoing status of the mining claim(s). Questions about this collection should be directed to the Provincial Manager, Minings Lands, Ministry of Northern Development and Mines, 4th Floor, 159 Cedar Street, Sudbury, Ontario P3E 6A5, telephone (705) 670-7284.

Les renseignements personnels contenus dans la présente formule sont recueillis en vertu de la Loi sur les mines et serviront à tenir à jour un registre des concessions minières. Adresser toute question sur la collecte de ces renseignements au chef provincial des terrains miniers, ministère du Développement du Nord et des Mines, 159, rue Cedar, 4e étage, Sudbury (Ontario) P3E 6A5, téléphone (705) 670-7284.

1. Direct Costs/Coûts directs

Type	Description	Amount Montant	Totals Total global
Wages Salaires	Labour Main-d'oeuvre		
	Field Supervision Supervision sur le terrain		
Contractor's and Consultant's Fees Droits de l'entrepreneur et de l'expert-conseil	Type L.C	24,368.00	
	Magnetometer	6221.00	
	IP	5323.00	80,862.00
Supplies Used Fournitures utilisées	Type		
Equipment Rental Location de matériel	Type		
		Total Direct Costs Total des coûts directs	80,862.00

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2. Indirect Costs/Coûts indirects

** Note: When claiming Rehabilitation work indirect costs are not allowable as assessment work.
Pour le remboursement des travaux de réhabilitation, les coûts indirects ne sont pas admissibles en tant que travaux d'évaluation.

Type	Description	Amount Montant	Totals Total global
Transportation Transport	Type Rental Truck/Skidoo(s)	650.00	
			650.00
Food and Lodging Nourriture et hébergement	Accomodation/meals 4men, 6days	1603.00	1603.00
Mobilization and Demobilization Mobilisation et démobilisation	Travel days, 4men, 3 separate occasions	3560.00	3560.00
		Sub Total of Indirect Costs Total partiel des coûts indirects	5753.00
		Amount Allowable (not greater than 20% of Direct Costs) Montant admissible (n'excédant pas 20 % des coûts directs)	5753.00
		Total Value of Assessment Credit (Total of Direct and Allowable Indirect costs) / Valeur totale du crédit d'évaluation (Total des coûts directs et indirects admissibles)	86615.00

Note: The recorded holder will be required to verify expenditures claimed in this statement of costs within 30 days of a request for verification. If verification is not made, the Minister may reject for assessment work all or part of the assessment work submitted.

Note : Le titulaire enregistré sera tenu de vérifier les dépenses demandées dans le présent état des coûts dans les 30 jours suivant une demande à cet effet. Si la vérification n'est pas effectuée, le ministre peut rejeter tout ou une partie des travaux d'évaluation présentés.

Filing Discounts

1. Work filed within two years of completion is claimed at 100% of the above Total Value of Assessment Credit.

2. Work filed three, four or five years after completion is claimed at 50% of the above Total Value of Assessment Credit. See calculations below:

Total Value of Assessment Credit		Total Assessment Claimed
	x 0.50 =	

Remises pour dépôt

1. Les travaux déposés dans les deux ans suivant leur achèvement sont remboursés à 100 % de la valeur totale susmentionnée du crédit d'évaluation.

2. Les travaux déposés trois, quatre ou cinq ans après leur achèvement sont remboursés à 50 % de la valeur totale du crédit d'évaluation susmentionné. Voir les calculs ci-dessous.

Valeur totale du crédit d'évaluation		Évaluation totale demandée
	x 0.50 =	

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Certification Verifying Statement of Costs

I hereby certify:
that the amounts shown are as accurate as possible and these costs were incurred while conducting assessment work on the lands shown on the accompanying Report of Work form.

that as Lands Manager (Recorded Holder, Agent, Position in Company) I am authorized

to make this certification

Attestation de l'état des coûts

J'atteste par la présente :
que les montants indiqués sont aussi exacts que possible et que ces dépenses ont été engagées pour effectuer les travaux d'évaluation sur les terrains indiqués dans la formule de rapport de travail ci-joint.

Et qu'à titre de _____ (titulaire enregistré, représentant, poste occupé dans la compagnie) je suis autorisé

à faire cette attestation.

Signature

Date June 25, 1996

Ministry of
Northern Development
and Mines

Ministère du
Développement du Nord
et des Mines

Ontario

Geoscience Assessment Office
933 Ramsey Lake Road
6th Floor
Sudbury, Ontario
P3E 6B5

Telephone: (705) 670-5853
Fax: (705) 670-5863

September 24, 1996

Gary White
Mining Recorder
60 Wilson Avenue, 1st Floor
Timmins, ON
P4N 2S7

Dear Sir or Madam:

Submission Number: 2.16735

Subject: Transaction Number(s): W9660.00434

After reviewing the Work Report(s) we have prepared this letter and the attached summary, which lists the results of our review. Requirements of the Assessment Work Regulation may not have been fully met. Please examine the summary to determine the next course of action concerning the identified Work Report(s).

NOTE: The 90 day deemed approval provision, subsection 6(7) of the Assessment Work Regulation, is no longer in effect for this submission.

PLEASE NOTE ANY REQUESTED REVISIONS MUST BE SUBMITTED IN DUPLICATE.

If the anniversary dates for the mining claims affected by this correspondence have not passed, a number of options are available. Please contact the Mining Recorder to discuss these options.

If you have any questions regarding this correspondence, please contact Bruce Gates at (705)670-5856.

Yours sincerely,

ORIGINAL SIGNED BY
Ron C. Gashinski
Senior Manager, Mining Lands Section
Mines and Minerals Division

Correspondence ID: 10236
Copy for: Assessment Library

Work Report Assessment Results

Submission Number: 2.16735

Date Correspondence Sent: September 24, 1996 **Assessor:** Bruce Gates

Transaction Number	First Claim Number	Township(s) / Area(s)	Status	Approval Date
W9660.00434	639980	REEVES, KENOGAMING, PENHORWOOD, SEWELL	Approval	September 24, 1996

Section:

14 Geophysical MAG
14 Geophysical IP

Correspondence to:

Mining Recorder
Timmins, ON

Resident Geologist
Timmins, ON

Assessment Files Library
Sudbury, ON

Recorded Holder(s) and/or Agent(s):

George J. Koleszar
HEMLO GOLD MINES INC.
TORONTO, ONTARIO

MICHEL GEORGE CARON
SOUTH PORCUPINE, Ontario

ROBERT ROCKY ROBITAILLE
TIMMINS, ONTARIO

CLAUDE TREMBLAY
TIMMINS, ONTARIO

Correspondence ID: 10236

REFERENCES

AREAS WITHDRAWN FROM DISPOSITION

M.R.O. – MINING RIGHTS ONLY
S.R.O. – SURFACE RIGHTS ONLY
M.+ S. – MINING AND SURFACE RIGHTS

	Township	Order No.	Date	Disposition	File
	- 43/70 W 30/77	11/3/77	S.R.O.	135748
	FC 43/70 W 9/78	10/4/78	S.R. + M.R.	98543
	SEC 43/70 W 10/78	14/11/78	S.R.O.	135748
	DUMP ATTENUATION ZONE (R9)			
R8	SEC 38/80 W 46/83	14/8/83	S.R. + M.R.	

R8 NOT OPEN FOR STAKING. BONA VIDE APPLICATION UNDER PUBLIC LANDS ACT PENDING 21/01/87

F1 THIS TWP SUBJECT TO FORESTRY ACTIVITY IN 1995/96. AREAS DESIGNATED EXACTLY AS SUBMITTED BY MNR TIMMINS.

R9 SURFACE AND MINING RIGHTS WITHDRAWN FROM PROSPECTING, STAKING OUT, SALE OR LEASE UNDER SECTION 35 OF THE MINING ACT, R.S.O. 1990 DATED 96-MAY-29 ORDER NO. W-P 7/95 NER

SAND AND GRAVEL

M.T.C. PIT 1877
M.T.C. PIT SN-1 FILE 135748
M.T.C. PIT 1878

MELROSE TWP.
FREY TWP.
KEEFER TWP.
REEVES TWP.
HILLARY TWP.
KENOGAMING TWP.
PHARAND TWP.

2.16735 MAG. IP

THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

LEGEND

- HIGHWAY AND ROUTE No.
- OTHER ROADS
- TRAILS
- SURVEYED LINES:
  - TOWNSHIPS, BASE LINES, ETC.
  - LOTS, MINING CLAIMS, PARCELS, ETC.
- UNSURVEYED LINES:
  - LOT LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION OR COMPOSITE PLAN
- RESERVATIONS
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES
- TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
" , SURFACE RIGHTS ONLY	⊕
" , MINING RIGHTS ONLY	○
LEASE, SURFACE & MINING RIGHTS	■
" , SURFACE RIGHTS ONLY	⊟
" , MINING RIGHTS ONLY	▤
LICENCE OF OCCUPATION	▼
ORDER-IN-COUNCIL	OC
RESERVATION	
CANCELLED	
SAND & GRAVEL	

NOTE: MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6, 1913, VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP. 380, SEC. 63, SUBSEC. 1.

SCALE: 1 INCH = 40 CHAINS

FEET 0 1000 2000 4000
METRES 0 200 1000 (1 KM)

L.U.P. LAND USE PERMIT ON FILE.

TOWNSHIP

SEWELL

M.N.R. ADMINISTRATIVE DISTRICT
TIMMINS
MINING DIVISION
PORCUPINE
LAND TITLES / REGISTRY DIVISION
SUDBURY

Ontario Ministry of Natural Resources — Land Management Branch

Date MARCH, 1985

Number G-3247

CHECKED BY MCR. PLACED ON ACTIVE FILE 90/05/08. BK

2.16735

42A04NW0066 2.16735 SEWELL

REFERENCE

AREAS WITHDRAWN FROM DISPOSITION

M.R.O. – MINING RIGHTS ONLY
S.R.O. – SURFACE RIGHTS ONLY
M.+ S. – MINING AND SURFACE RIGHTS

	Description	Order No.	Date	Disposition	File
W	400' RESERVE			S. R. O.	136537
W	SEC. 43/70	W. 91/78	27/02/72	S. R. O.	163006 V.2
W	SEC. 36/80		11/7/81	S. R. O.	136537
W	ORDER OF THE MINISTER #53/81 DATED MARCH 30/87 WITHDRAWS MINING AND SURFACE RIGHTS UNDER SECTION 36 OF THE MINING ACT R.S.O. 1980				

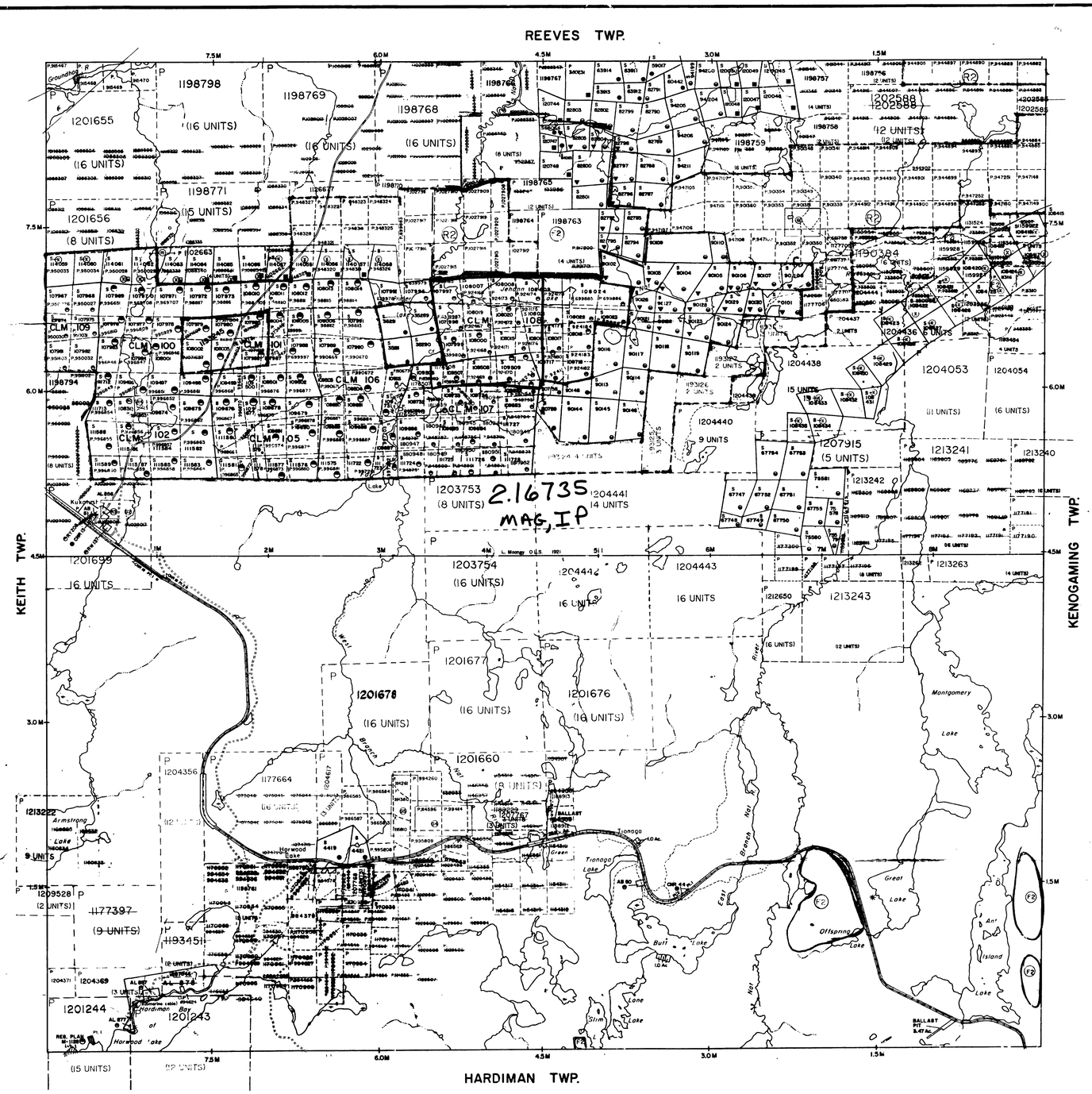
SAND AND GRAVEL

W	GRAVEL	FILE	38729
W	GRAVEL PIT	FILE	13555 V.6
W	GRAVEL	FILE	106274
W	QUARRY PERMIT #22805 ISSUED FOR THE REMOVAL OF QUARTZ JULY 1, 1987.		
W	QUARRY PERMIT # 22806 ISSUED FOR THE REMOVAL OF QUARTZ SEPT. 10, 1987		
●	CANCELLED PATENT AND LEASED CLAIMS		

(R2) SURFACE AND MINING RIGHTS WITHDRAWN FROM PROSPECTING, STAKING OUT, SALE OR LEASE UNDER SECTION 35 OF THE MINING ACT R.S.O. 1990 DATED 25-MAY-29 ORDER NO. M.N.R. 7/85 MDR

(F2) THIS TWP. SUBJECT TO FOREST ACTIVITIES IN 1995/96 FURTHER INFORMATION AVAILABLE ON FILE.

THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.



LESEND

- HIGHWAY AND ROUTE No.
- OTHER ROADS
- TRAILS
- SURVEYED LINES: TOWNSHIPS, BASE LINES, ETC.
- LOTS, MINING CLAIMS, PARCELS, ETC.
- UNSURVEYED LINES: LOT LINES
- PARCEL BOUNDARY
- MINING CLAIMS ETC.
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION OR COMPOSITE PLAN
- RESERVATIONS
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES
- TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
" , SURFACE RIGHTS ONLY	●
" , MINING RIGHTS ONLY	●
LEASE, SURFACE & MINING RIGHTS	■
" , SURFACE RIGHTS ONLY	■
" , MINING RIGHTS ONLY	■
LICENCE OF OCCUPATION	▼
ORDER-IN-COUNCIL	OC
RESERVATION	◔
CANCELLED	●
SAND & GRAVEL	◔

LAND USE PERMIT
NOTE: MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 6, 1913, VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP. 380, SEC. 63, SUBSEC 1.

SCALE: 1 INCH = 40 CHAINS

FEET 0 1000 2000 4000 6000 8000
METRES 0 200 1000 2000
(1 KM) (2 KM)

ACTIVATED JANUARY 30, 1990

TOWNSHIP
PENHORWOOD
M.N.R. ADMINISTRATIVE DISTRICT
CHAPLEAU
MINING DIVISION
PORCUPINE
LAND TITLES / REGISTRY DIVISION
SUDBURY

Ontario Ministry of Natural Resources — Land Management Branch

Date MARCH 1985

Number G-3244

2.16735

2.16735 MAG,IP SEWELL TWP.

REFERENCE

ARE AS WITHDRAWN FROM DISPOSITION

M.R.O. – MINING RIGHTS ONLY
S.R.O. – SURFACE RIGHTS ONLY
M.+ S. – MINING AND SURFACE RIGHTS

Description	Order No.	Date	Disposition	File

(1) PROPOSED COTTAGING AREAS NOTICE RECEIVED DECEMBER 22, 1988

~~(2) THIS TWP. IS SUBJECT TO FOREST ACTIVITY IN 1992/93. FURTHER INFORMATION AVAILABLE ON FILE.~~

(F2) THIS TWP. SUBJECT TO FOREST ACTIVITY IN 1995/96. FURTHER INFORMATION AVAILABLE ON FILE.

F.O. FILED ONLY REC'D DEC.12/94.

(12) SURFACE AND MINING RIGHTS WITHDRAWN FROM PROSPECTING, STAKING OUT, SALE OR LEASE UNDER SECTION 35 OF THE MINING ACT R.S.O. 1990 DATED 95-MAY-29 ORDER NO. W-P 7/95 MER

THE INFORMATION THAT APPEARS ON THIS MAP HAS BEEN COMPILED FROM VARIOUS SOURCES, AND ACCURACY IS NOT GUARANTEED. THOSE WISHING TO STAKE MINING CLAIMS SHOULD CONSULT WITH THE MINING RECORDER, MINISTRY OF NORTHERN DEVELOPMENT AND MINES, FOR ADDITIONAL INFORMATION ON THE STATUS OF THE LANDS SHOWN HEREON.

PENHORWOOD TWP.

CLOTHIERS TWP.

PHARAND TWP.

REGAN TWP.

LEGEND

- HIGHWAY AND ROUTE No.
- OTHER ROADS
- TRAILS
- SURVEYED LINES
  - TOWNSHIPS, BASE LINES, ETC
  - LOTS, MINING CLAIMS, PARCELS, ETC
- UNSURVEYED LINES
  - LOT LINES
  - PARCEL BOUNDARY
  - MINING CLAIMS ETC
- RAILWAY AND RIGHT OF WAY
- UTILITY LINES
- NON-PERENNIAL STREAM
- FLOODING OR FLOODING RIGHTS
- SUBDIVISION OR COMPOSITE PLAN
- RESERVATIONS
- ORIGINAL SHORELINE
- MARSH OR MUSKEG
- MINES
- TRAVERSE MONUMENT

DISPOSITION OF CROWN LANDS

TYPE OF DOCUMENT	SYMBOL
PATENT, SURFACE & MINING RIGHTS	●
" , SURFACE RIGHTS ONLY	●
" , MINING RIGHTS ONLY	●
LEASE, SURFACE & MINING RIGHTS	■
" , SURFACE RIGHTS ONLY	■
" , MINING RIGHTS ONLY	■
LICENCE OF OCCUPATION	▼
ORDER-IN-COUNCIL	OC
RESERVATION	R
CANCELLED	C
SAND & GRAVEL	S

NOTE: MINING RIGHTS IN PARCELS PATENTED PRIOR TO MAY 4, 1913, VESTED IN ORIGINAL PATENTEE BY THE PUBLIC LANDS ACT, R.S.O. 1970, CHAP. 380, SEC. 83, SUBSEC. 1

SCALE: 1 INCH = 40 CHAINS

FEET 0 1000 2000 4000 6000 8000
METRES 0 500 1000 2000

TOWNSHIP
KENOGAMING

M.N.R. ADMINISTRATIVE DISTRICT
TIMMINS
MINING DIVISION
PORCUPINE
LAND TITLES / REGISTRY DIVISION
SUDBURY

Ministry of Natural Resources — Land Management Branch
Ontario

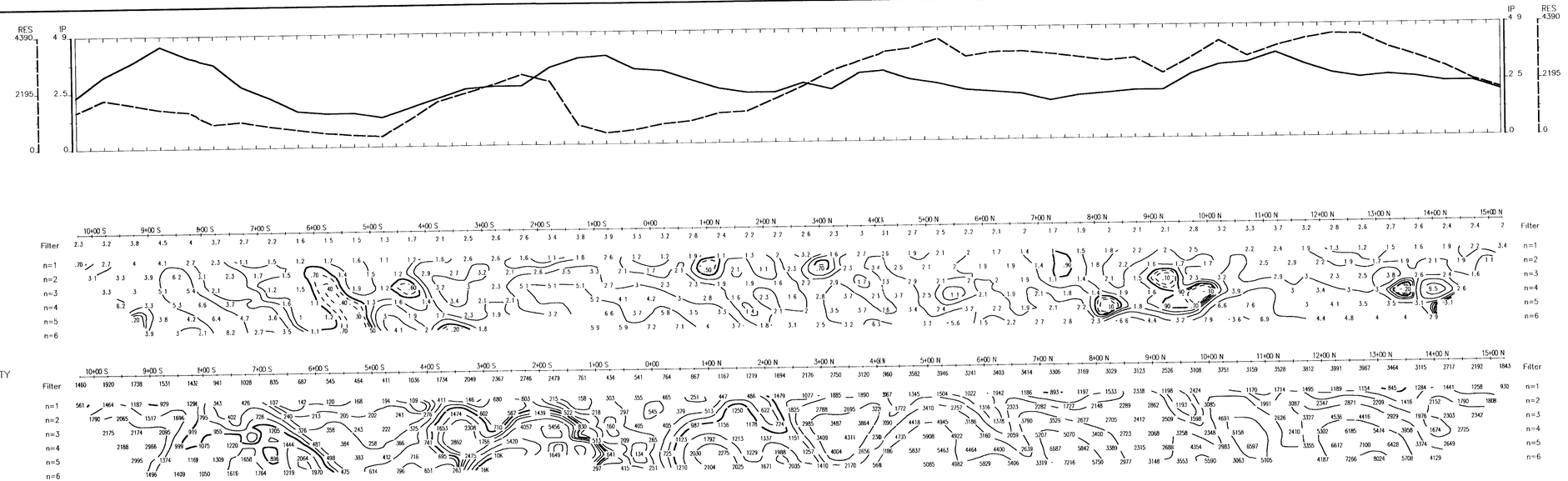
Date APRIL 1 95
ACTIVATED JULY 29, 1992 BY D.C.
CHECKED BY G.W.

Number G-3239

G-3238

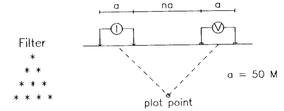
2.16735

220



Line 3500 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10...

Scale 1:5000

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(meters)

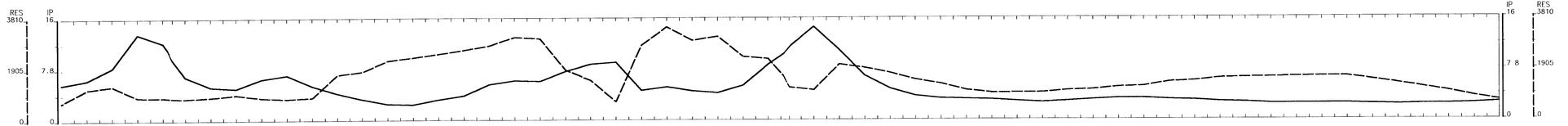
2.16735

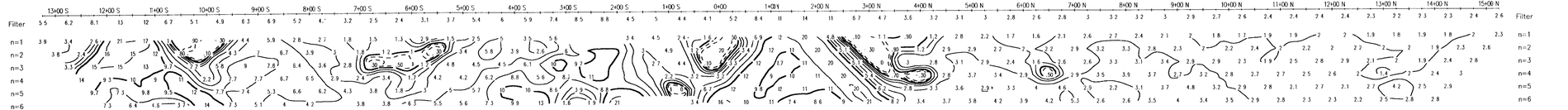
HEMLO GOLD MINES INC.

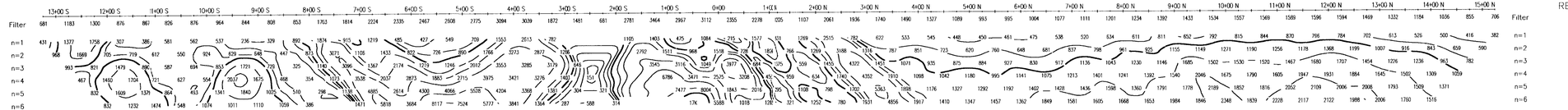
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.

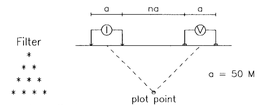






Line 2500 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

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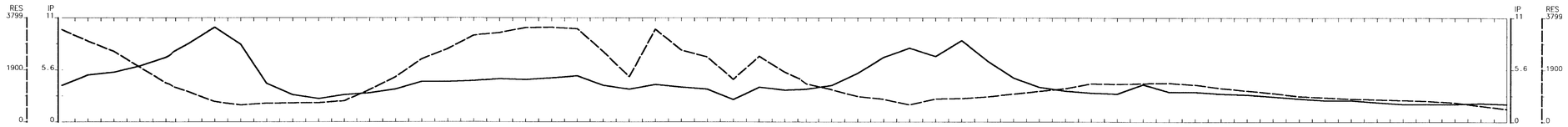
(meters)

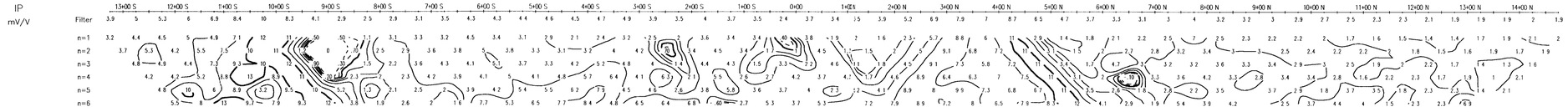
HEMLO GOLD MINES INC.

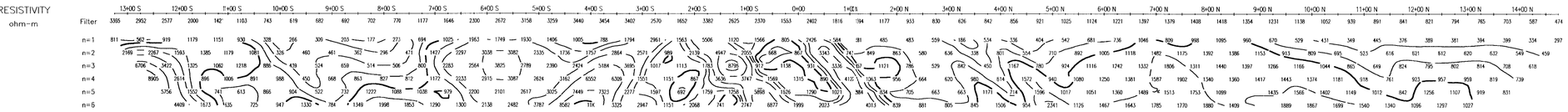
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.







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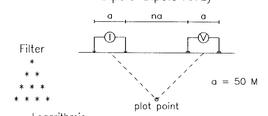
Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

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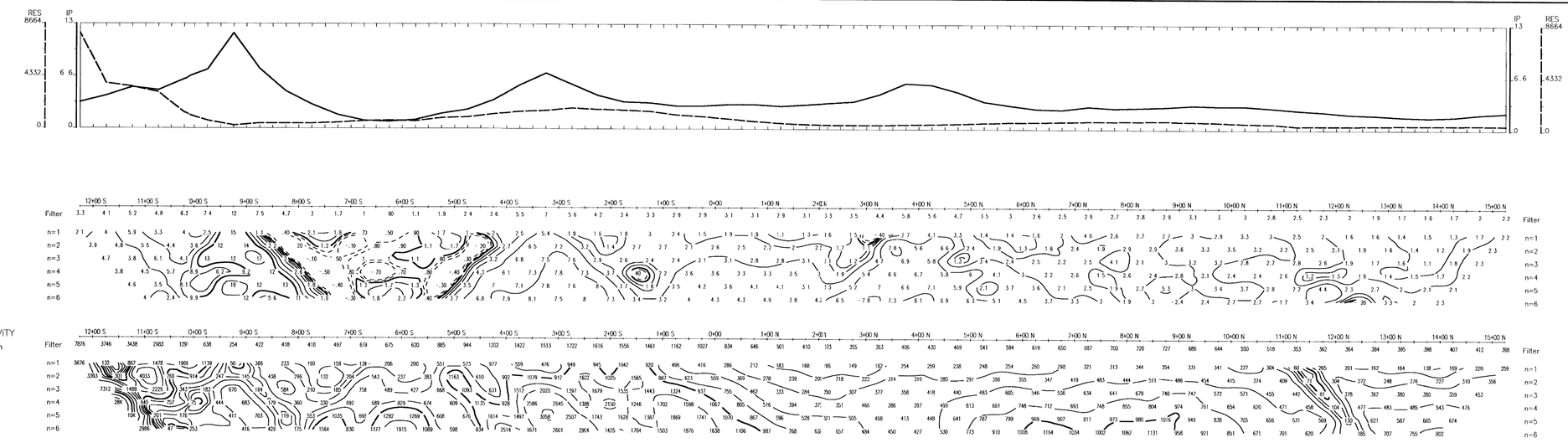
(meters)

HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

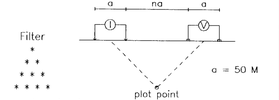
Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.



Line 2900 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

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(meters)

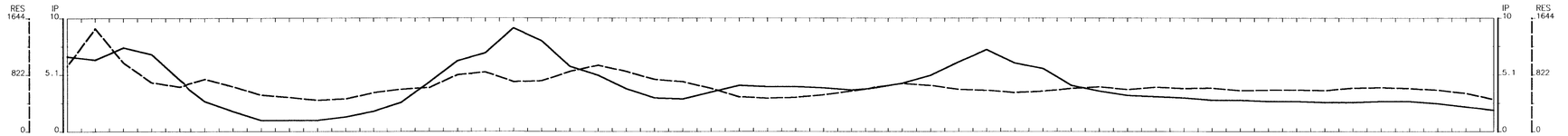
2.16735

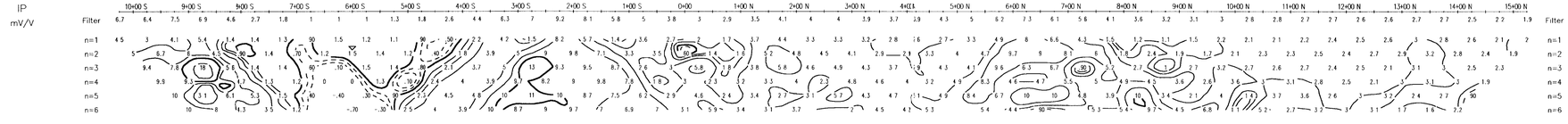
HEMLO GOLD MINES INC.

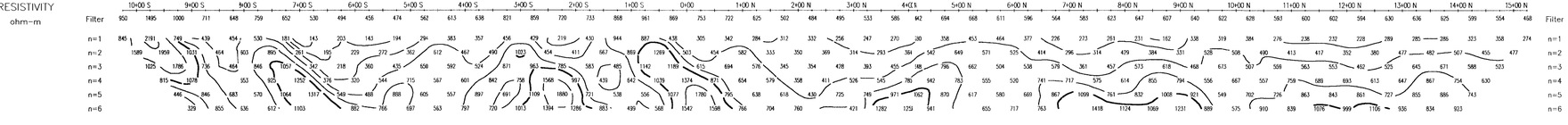
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.

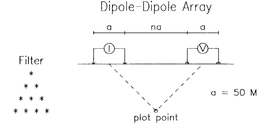






Line 3100 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,...

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

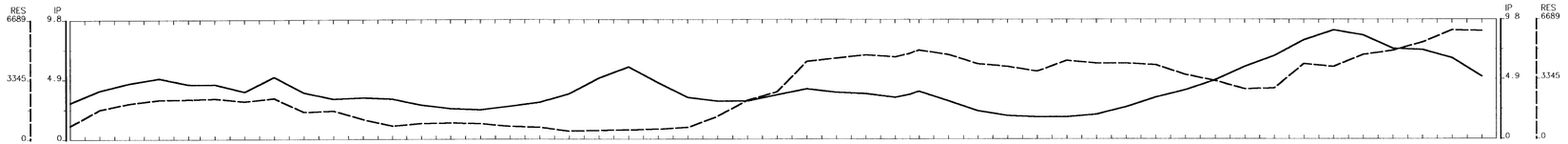
2.16735

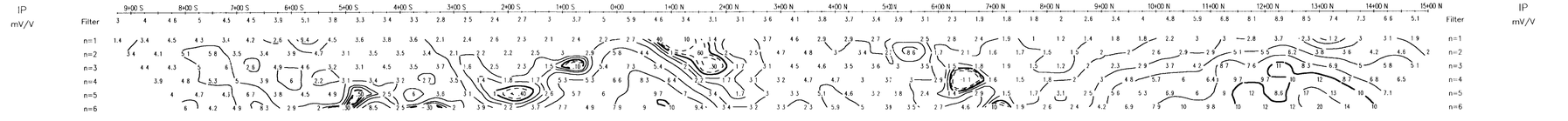
HEMLO GOLD MINES INC.

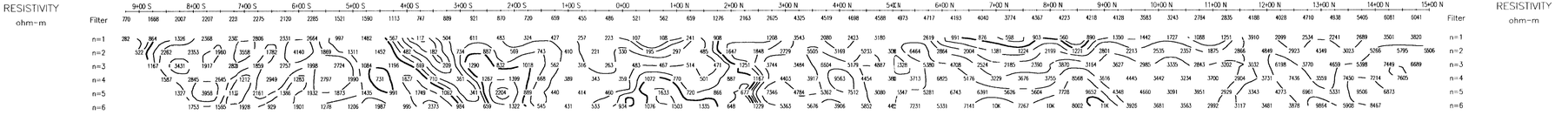
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.

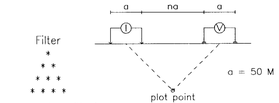






Line 3700 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

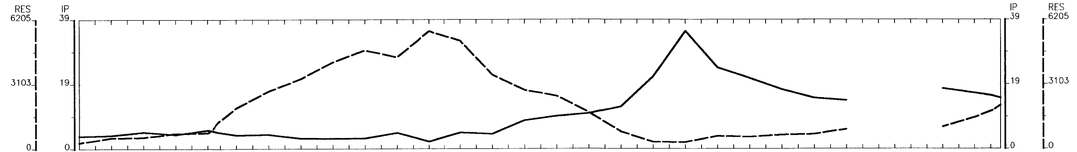
2.16735

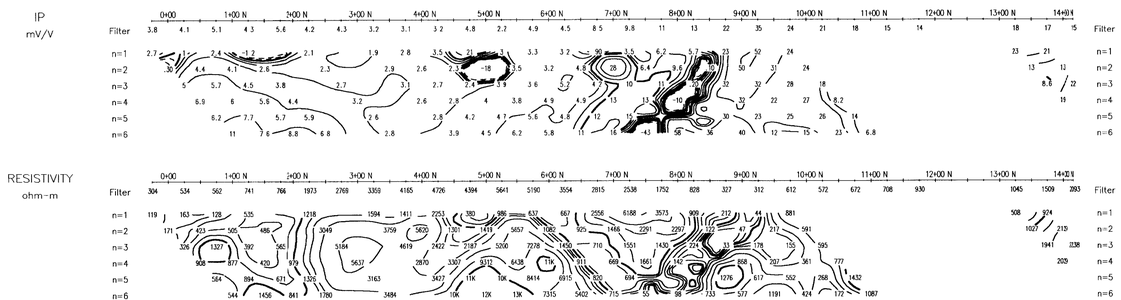
HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.





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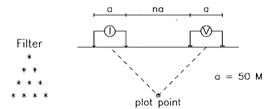
Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

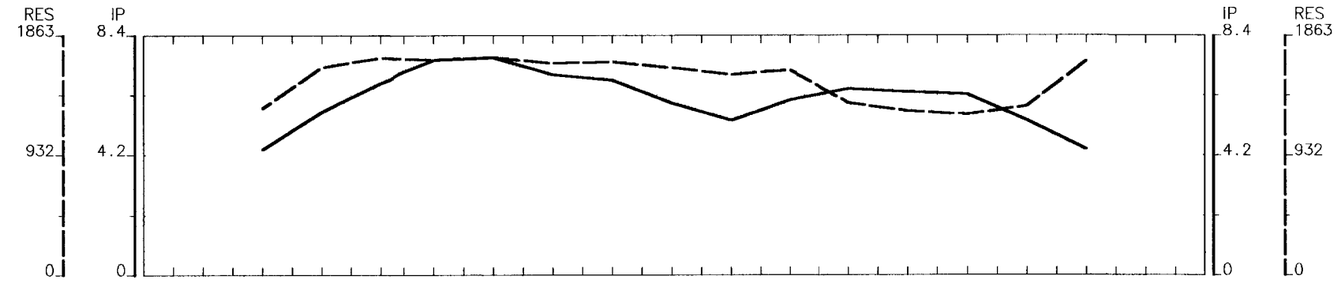
2.16735

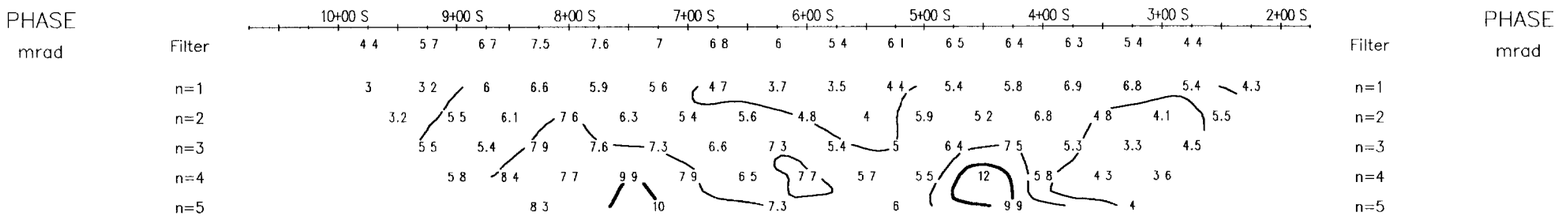
HEMLO GOLD MINES INC.

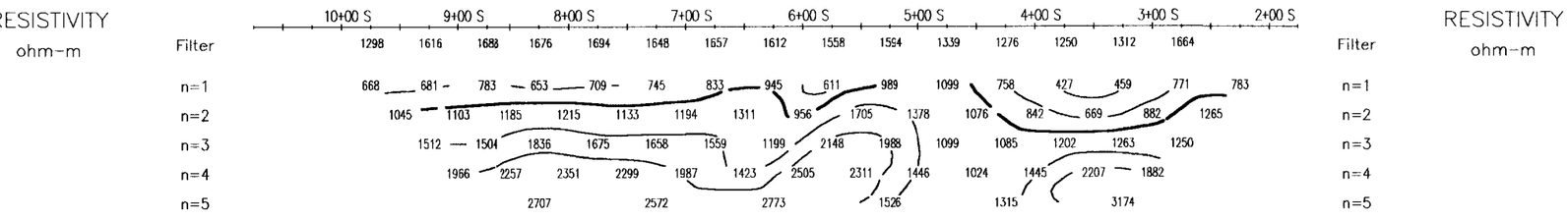
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

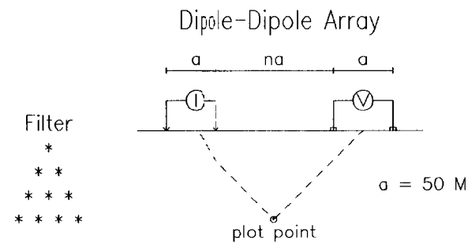
M C EXPLORATION LTD.







Line 3900 E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

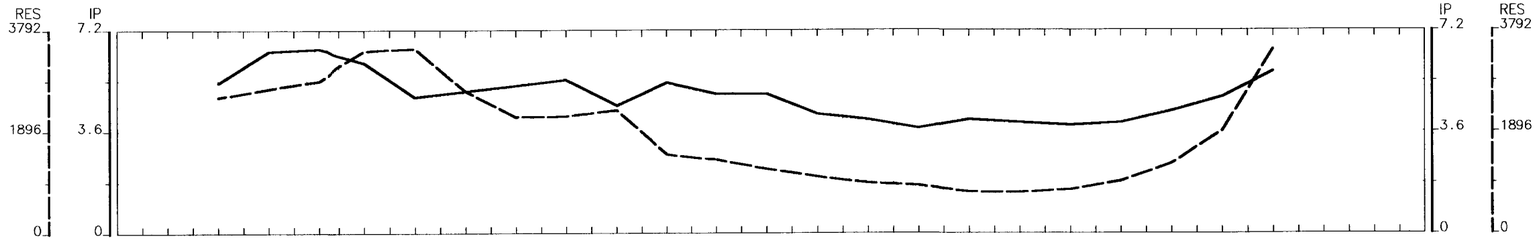
(meters)

HEMLO GOLD MINES INC.

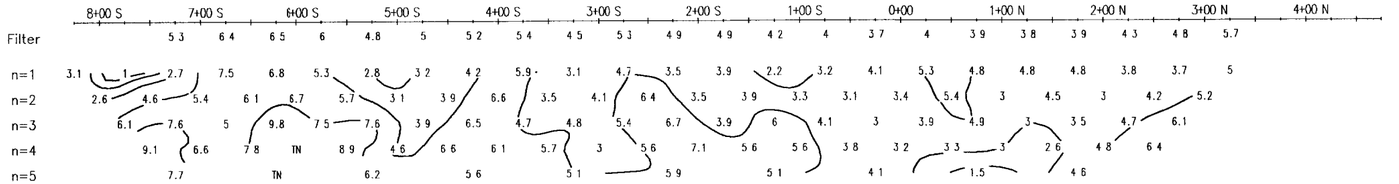
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

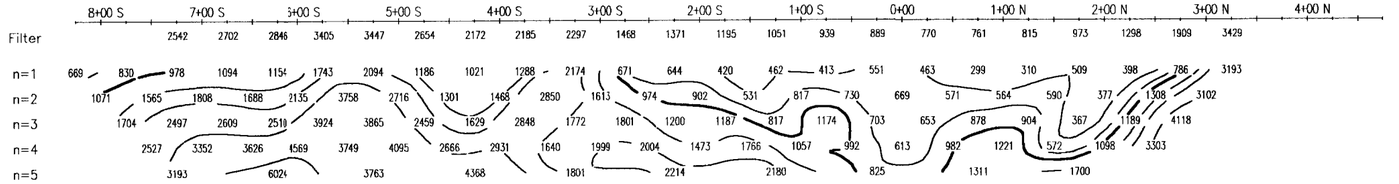


PHASE
mrad



PHASE
mrad

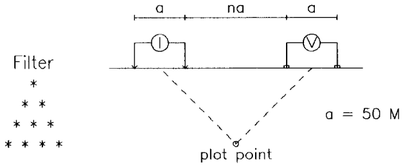
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 4300 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

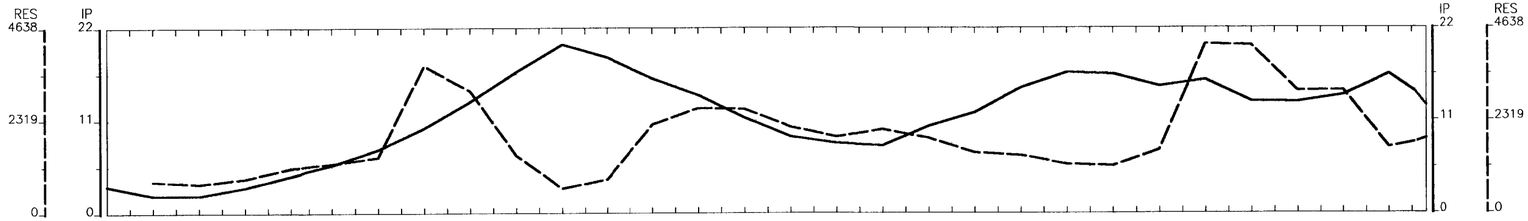
50 0 50 100 150 200 250 300
(meters)

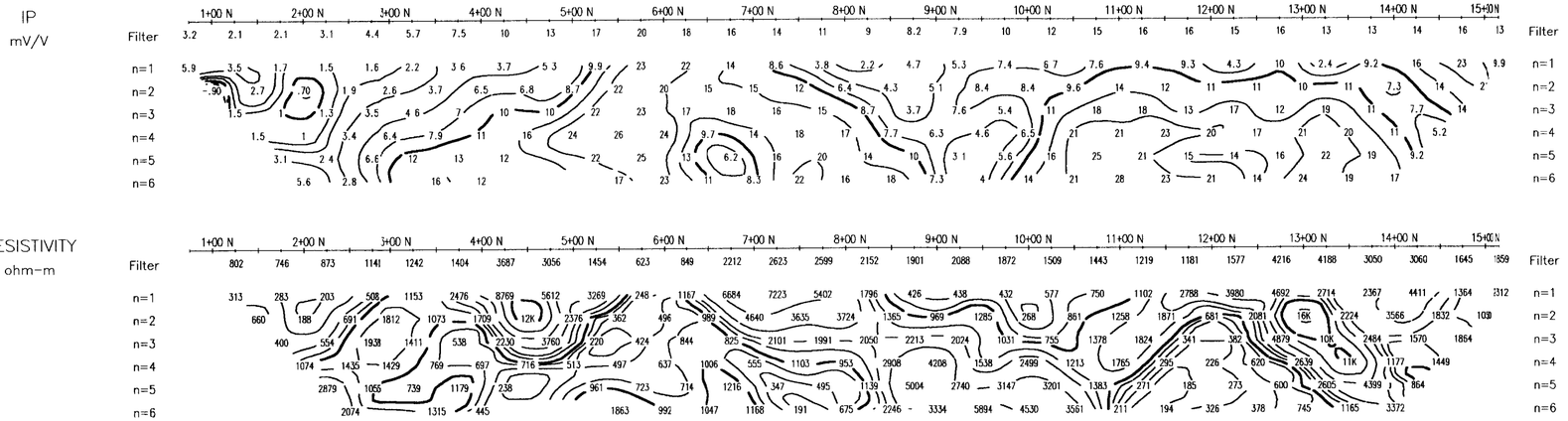
HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

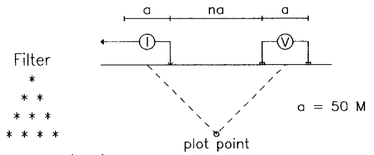
BELANGER GEOPHYSICS LTD.





Line 4300 E

Pole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

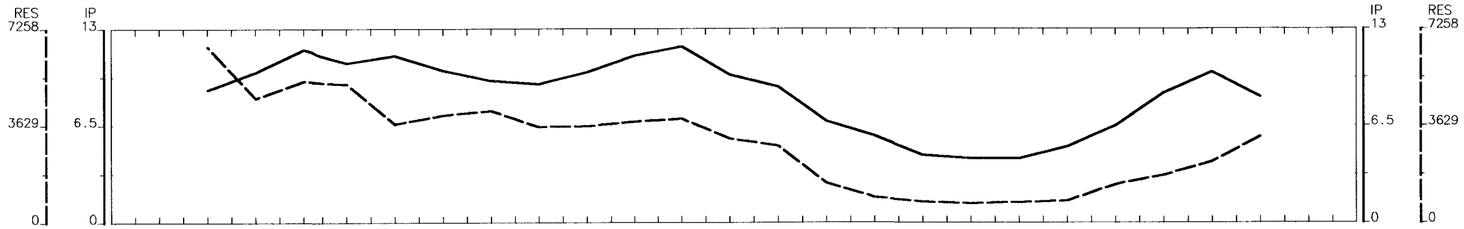
2.16735

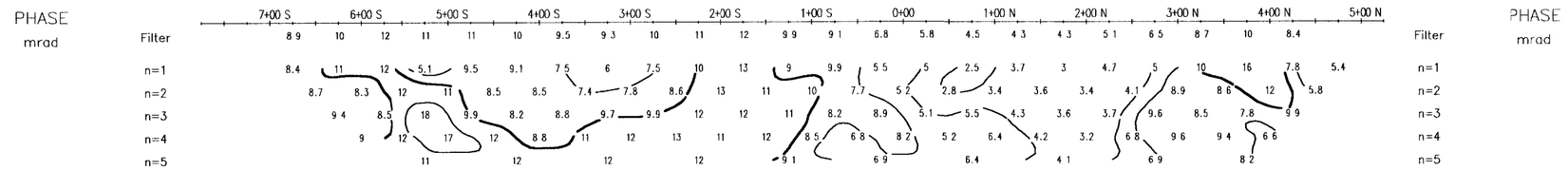
HEMLO GOLD MINES INC.

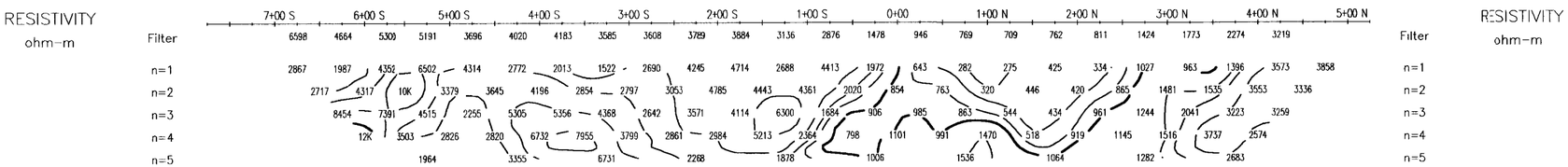
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.

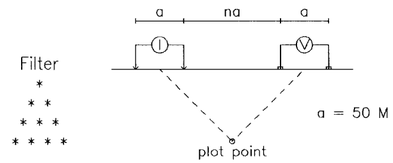






Line 4500 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

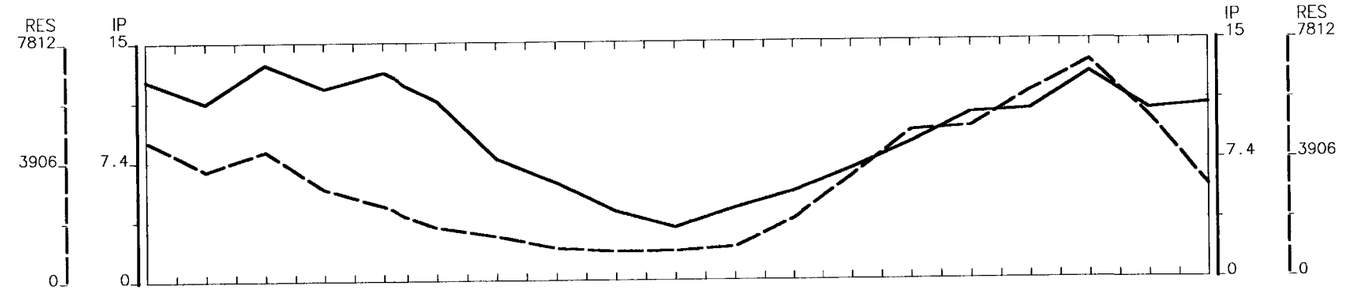
(meters)

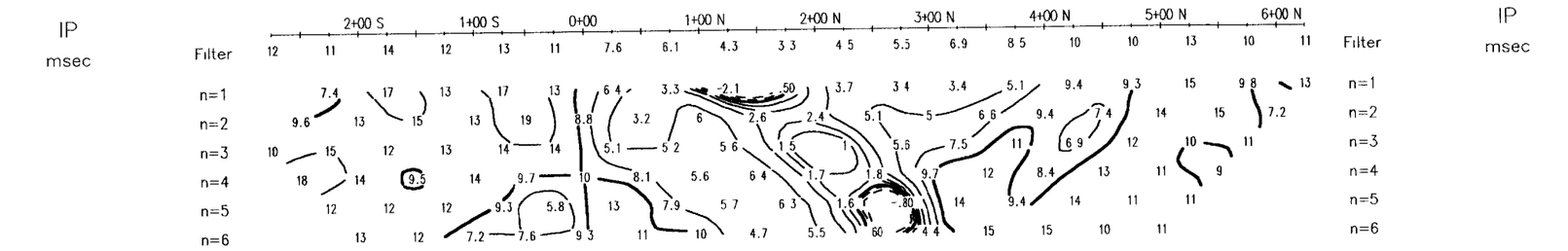
HEMLO GOLD MINES INC.

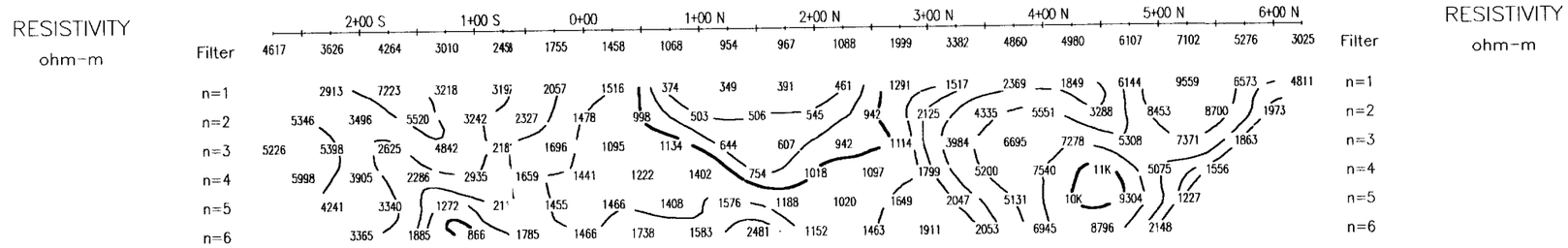
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

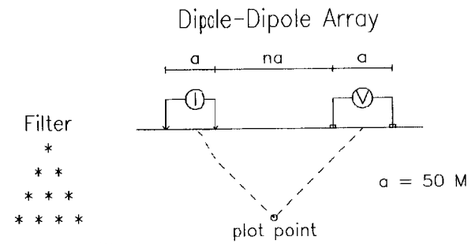
BELANGER GEOPHYSICS LTD.







Line 4600E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

Scale 1:5000

50 0 50 100 150 200 250 300

(meters)

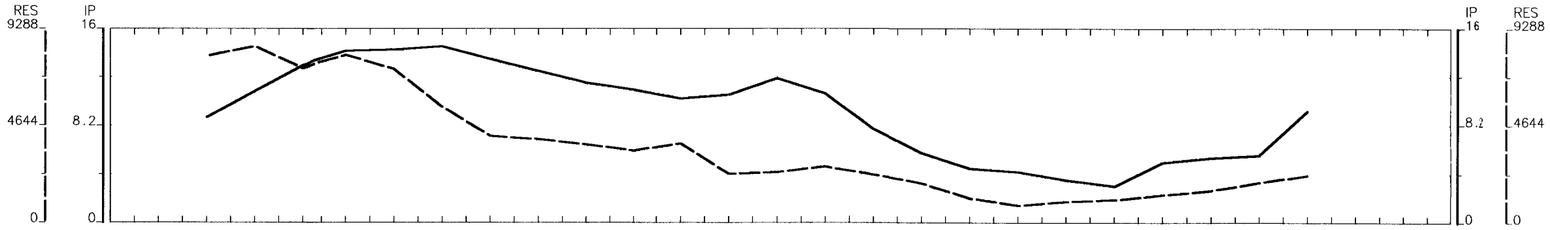
2.16735

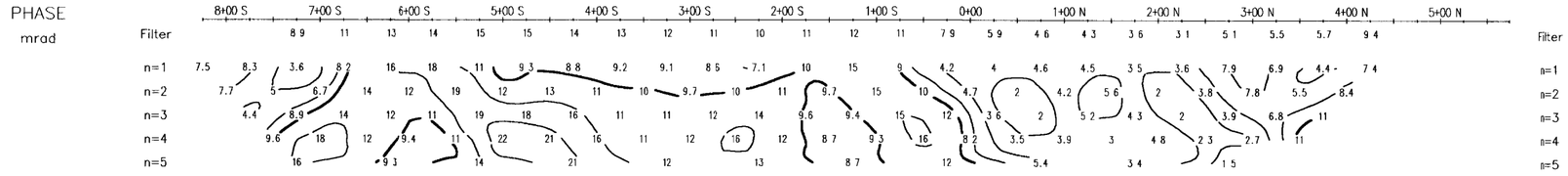
HEMLO GOLD MINES INC.

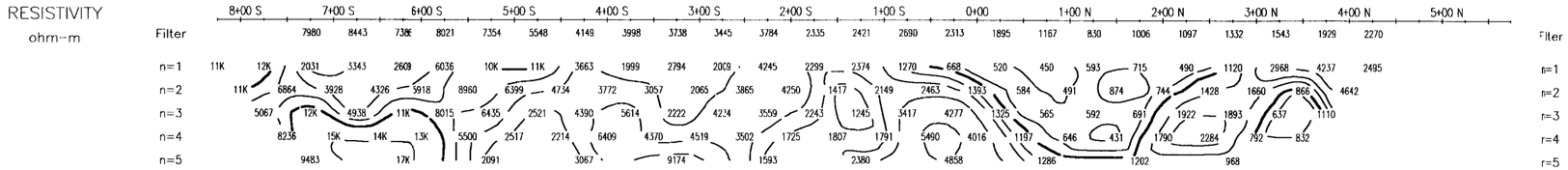
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/10
MJ/RC

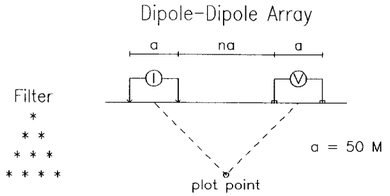
QUANTEC IP LTD.







Line 4700 E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

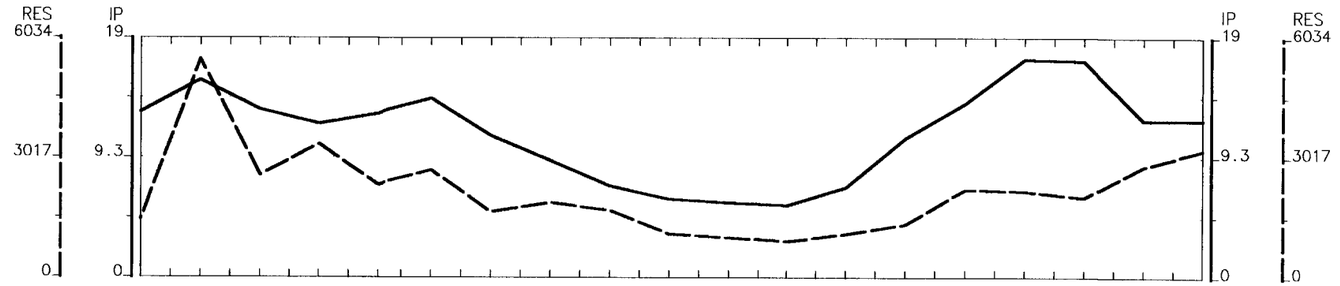
(meters)

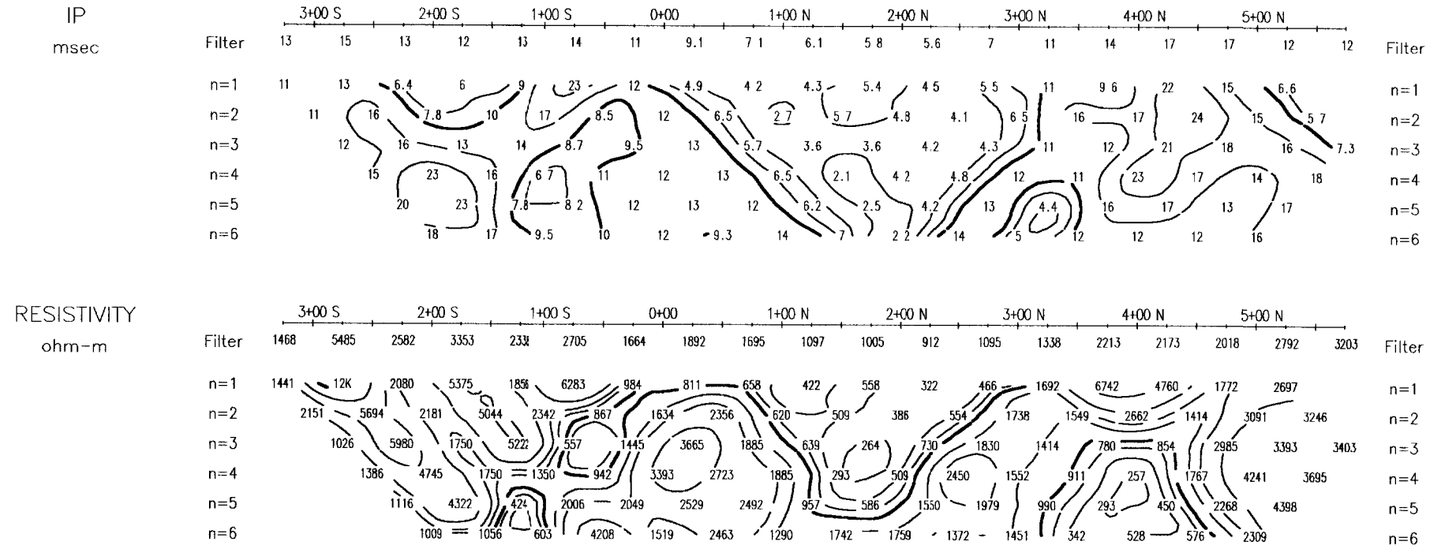
HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

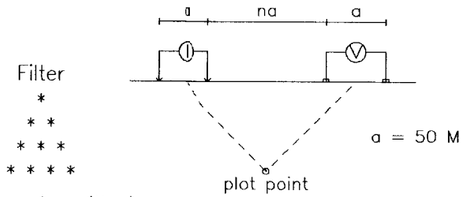
BELANGER GEOPHYSICS LTD.





Line 4800E

Dipole-Dipole Array



Logarithmic Contours 1, 15, 2, 3, 5, 7.5, 10, . .

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

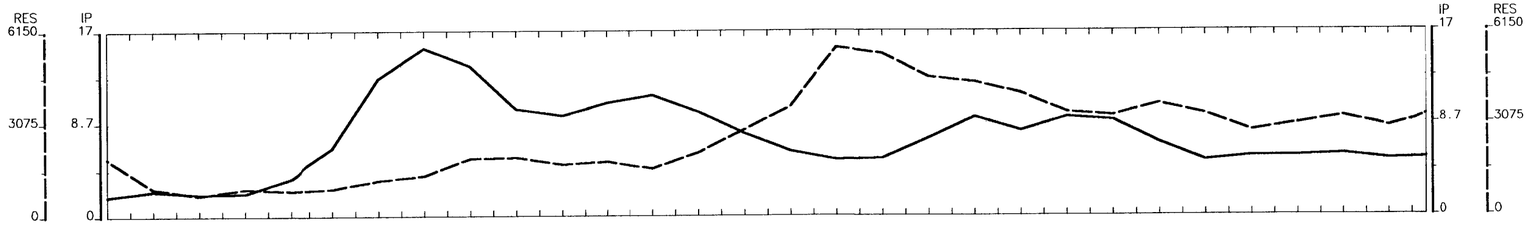
2.16735

HEMLO GOLD MINES INC.

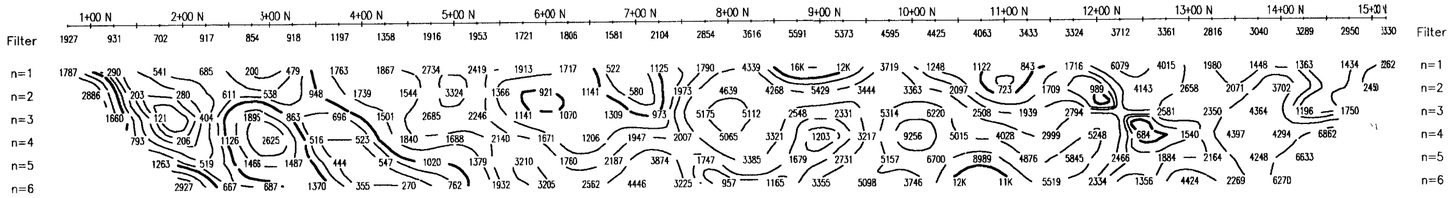
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/10
WJ/RC

QUANTEC IP LTD.

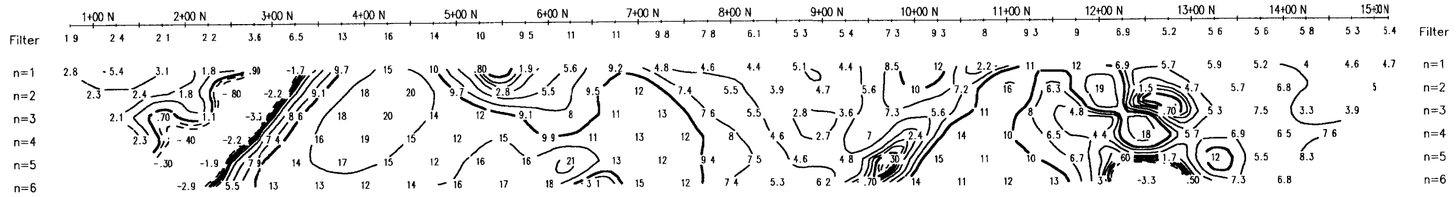


RES
ohm-m



RES
ohm-m

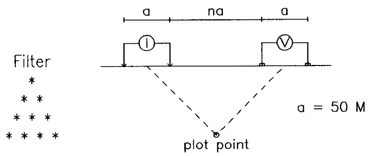
PHASE
mrad



PHASE
mrad

Line 4900 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

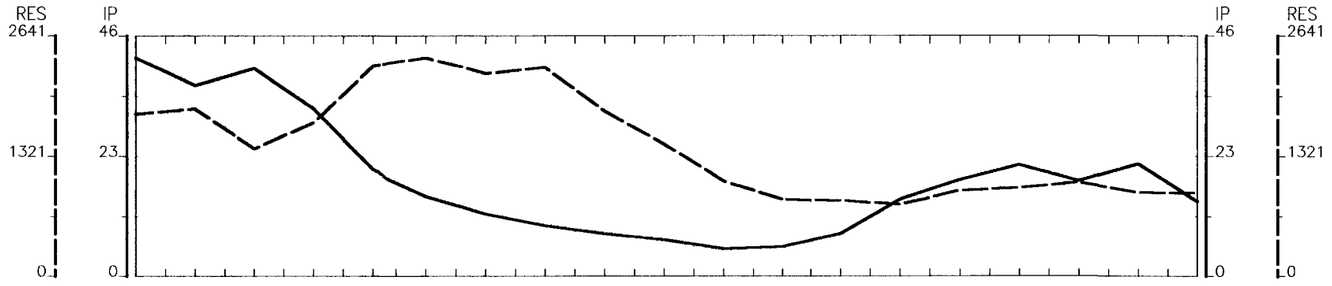
50 0 50 100 150 200 250 300
(meters)

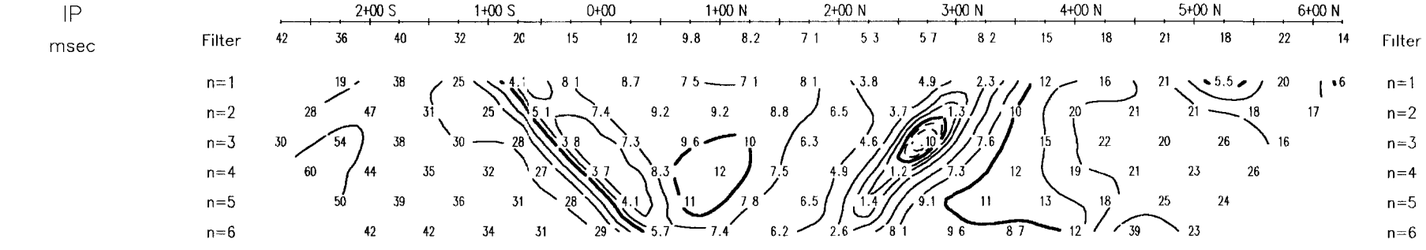
HEMLO GOLD MINES INC.

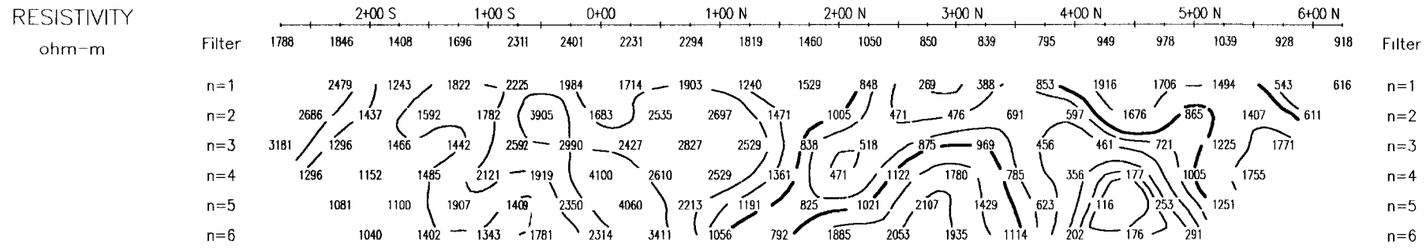
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/06/26
M JOHNSTON/R CALHOUN

MC EXPLORATION LTD.

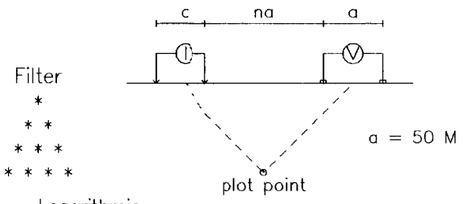






Line 5000E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

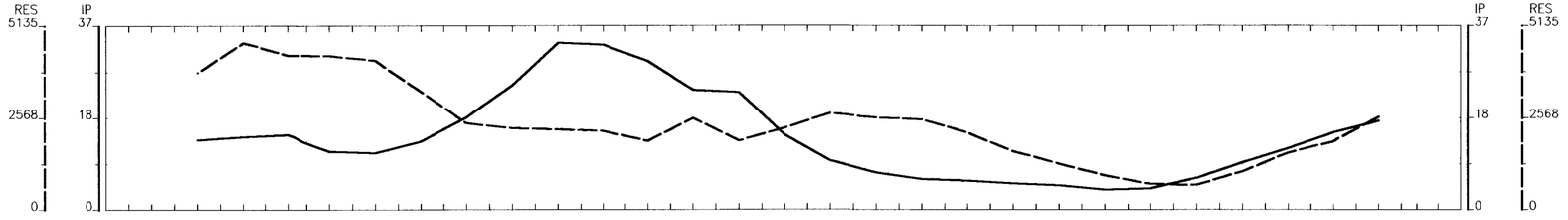
2.16735

HEMLO GOLD MINES INC.

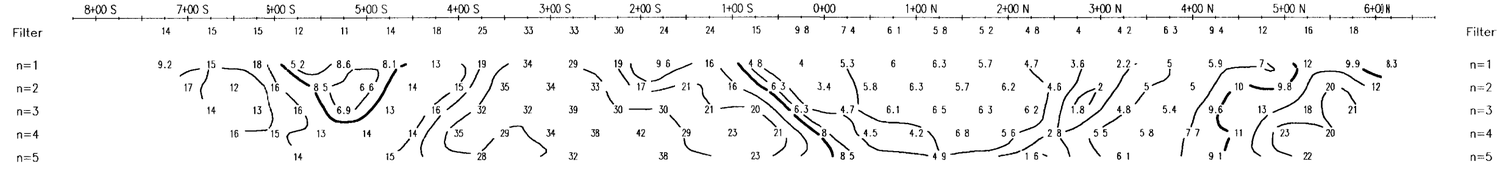
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/10
MJ/RC

QUANTEC IP LTD.

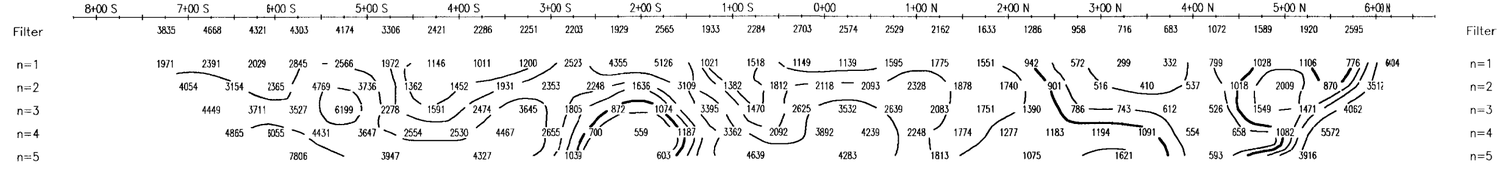


PHASE
mrad



PHASE
mrad

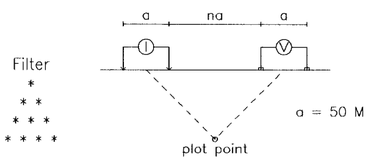
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 5100 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

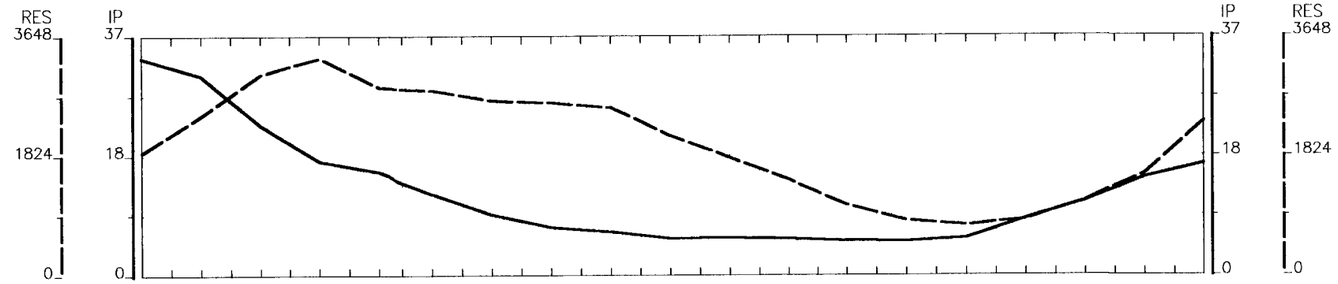
50 0 50 100 150 200 250 300
(meters)

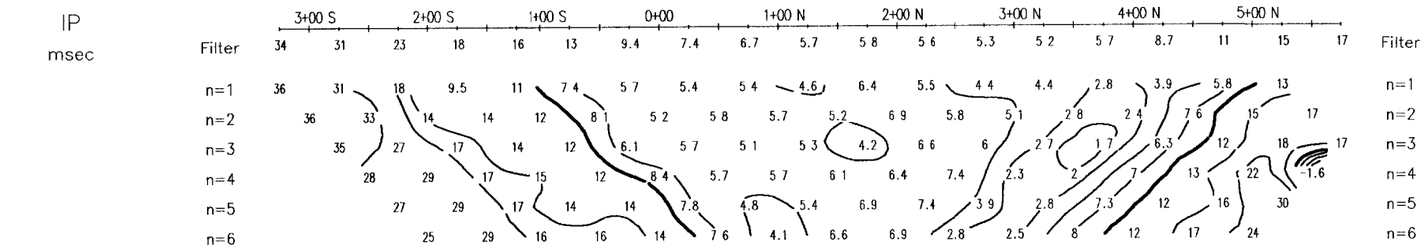
HEMLO GOLD MINES INC.

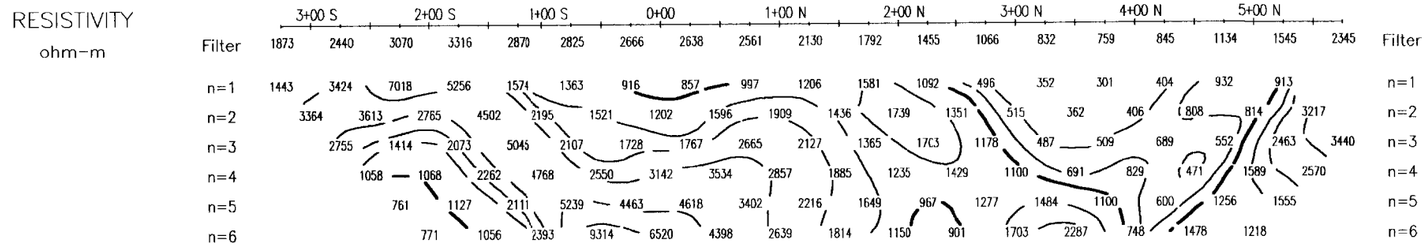
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

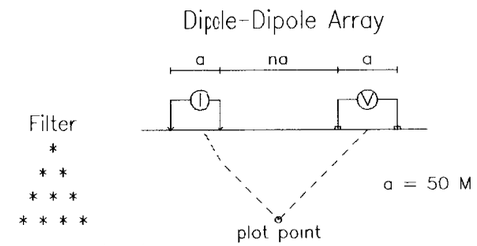
BELANGER GEOPHYSICS LTD.







Line 5200E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

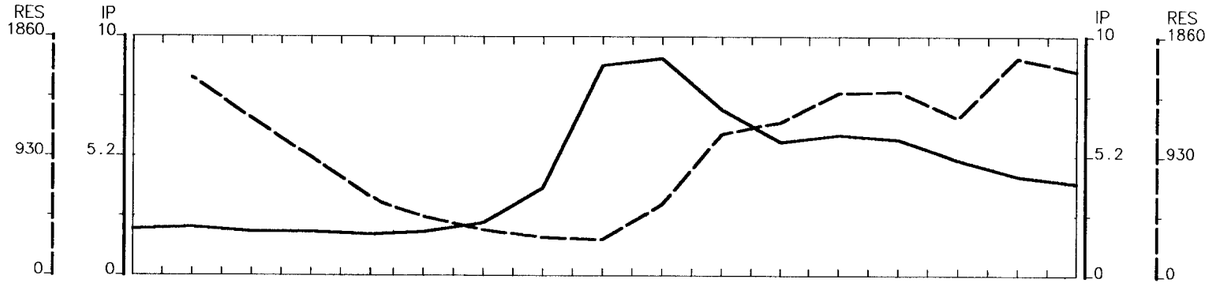
2.16735

HEMLO GOLD MINES INC.

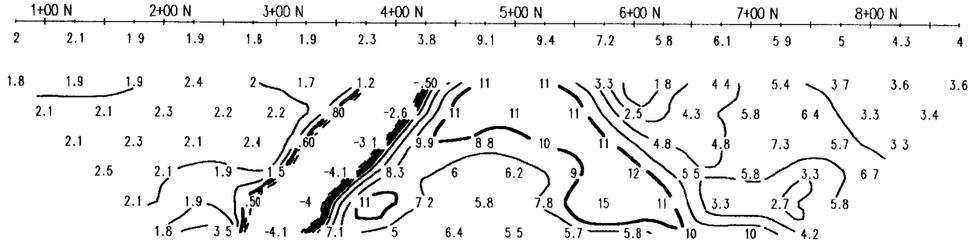
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/10
MJ/RC

QUANTEC IP LTD.

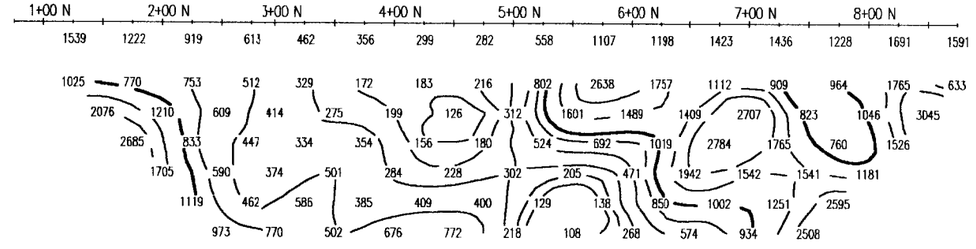


IP
mV/V



IP
mV/V

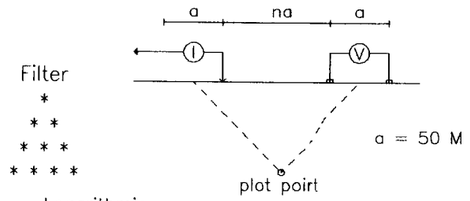
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

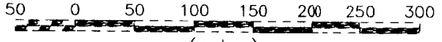
Line 5300 E

Pole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

Scale 1:5000

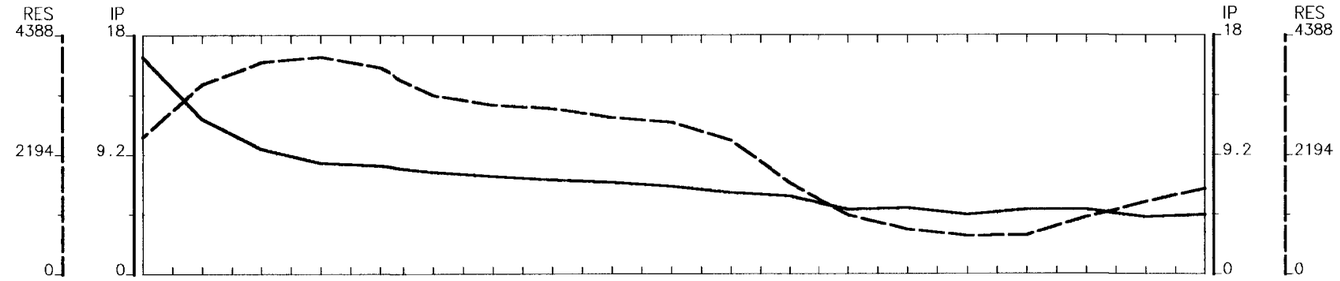


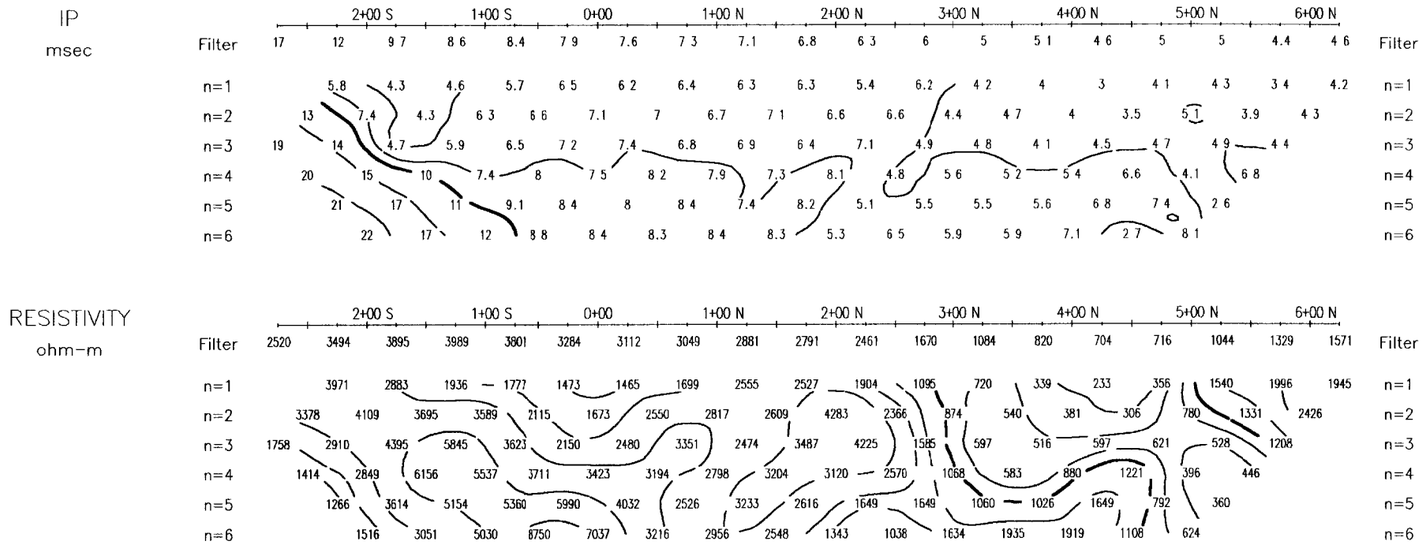
HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

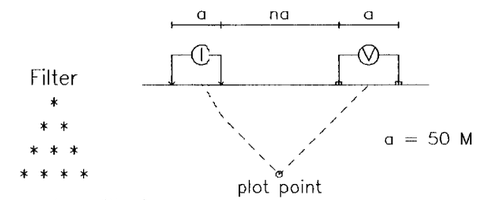
M C EXPLORATION LTD.





Line 5400E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

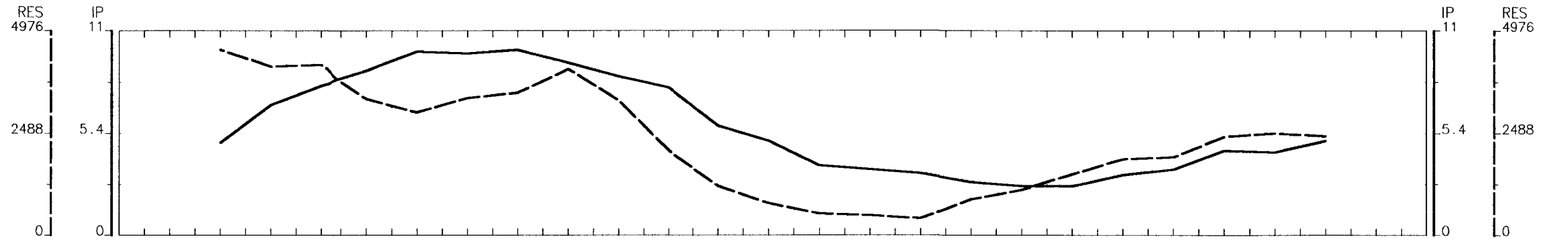
2.16735

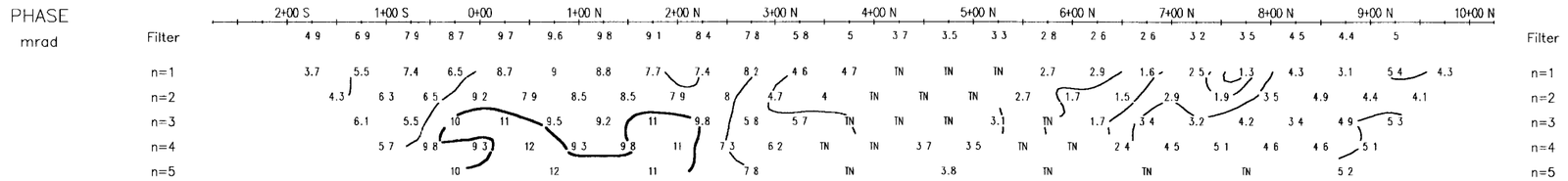
HEMLO GOLD MINES INC.

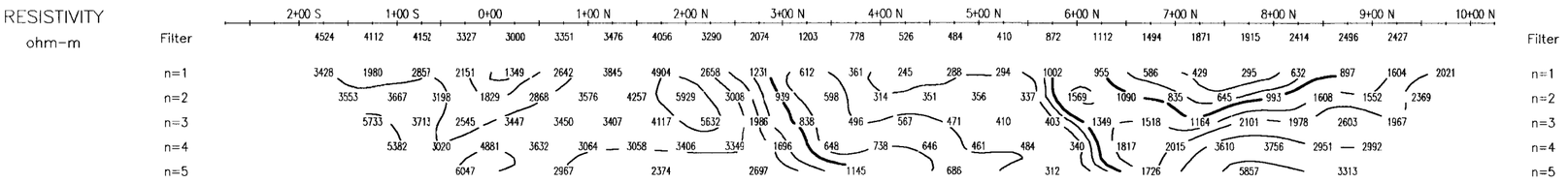
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/10
MJ/RC

QUANTEC IP LTD.

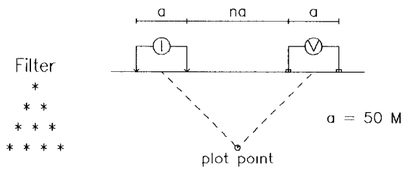






Line 5500 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

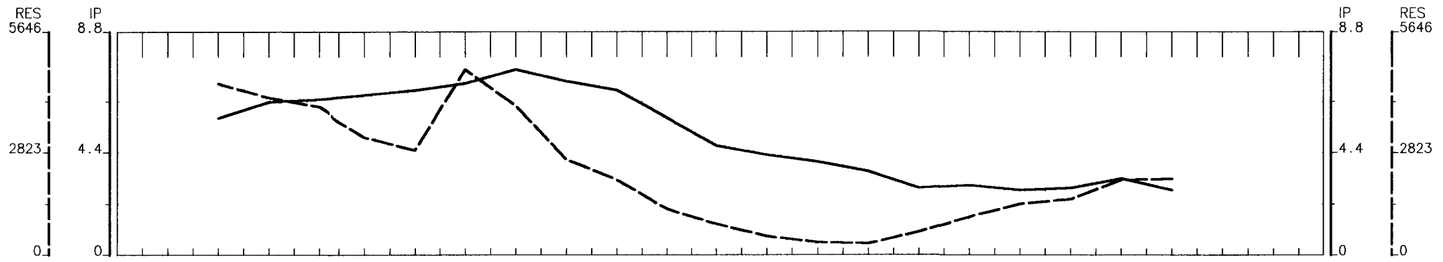
(meters)

HEMLO GOLD MINES INC.

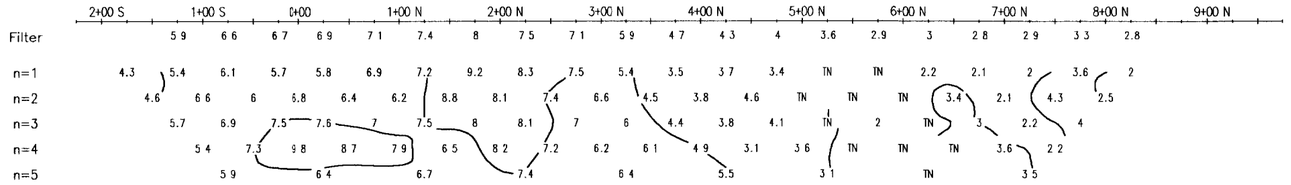
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

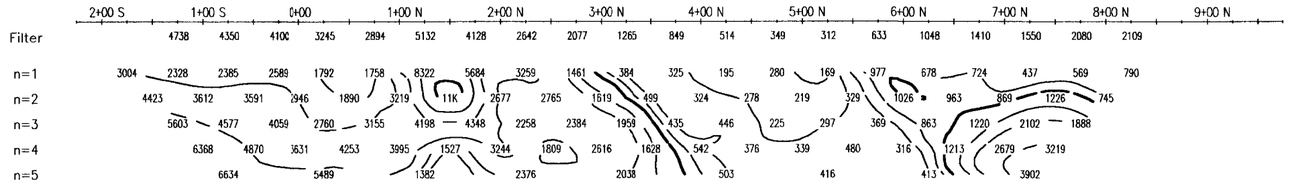


PHASE
mrad



PHASE
mrad

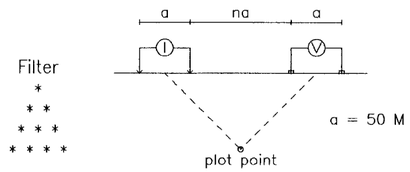
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 5600 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

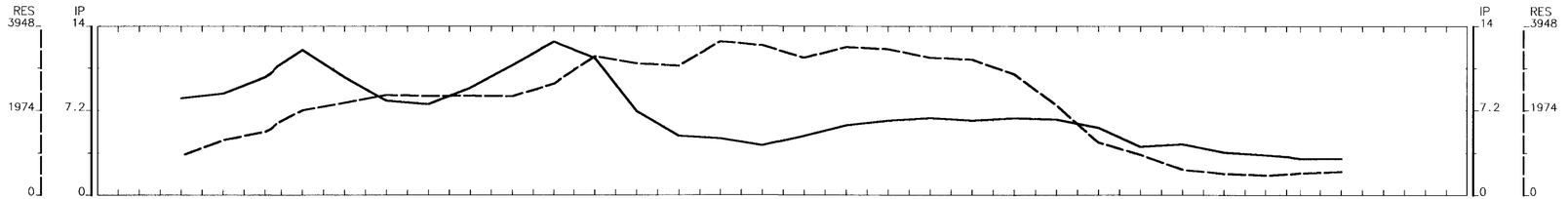
50 0 50 100 150 200 250 300
(meters)

HEMLO GOLD MINES INC.

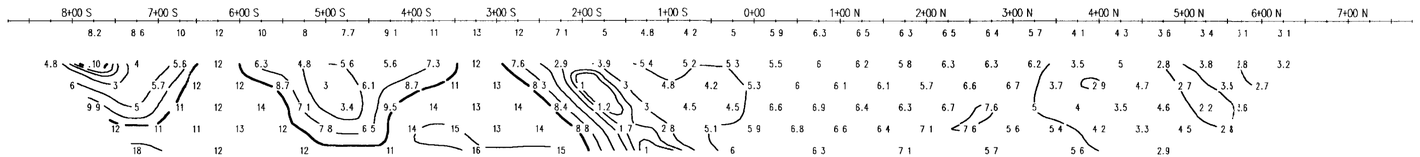
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

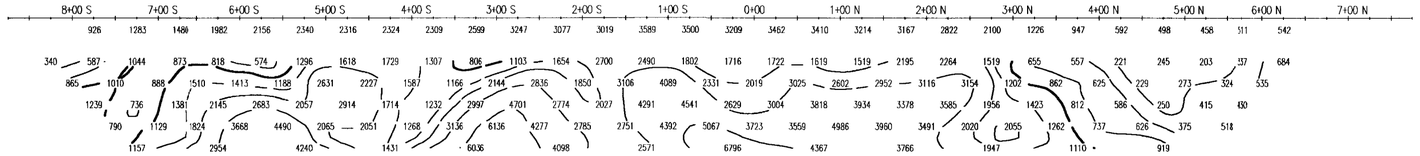


PHASE
mrad



PHASE
mrad

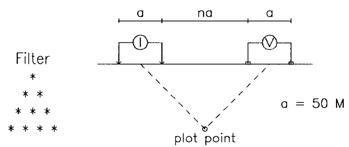
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 5700 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

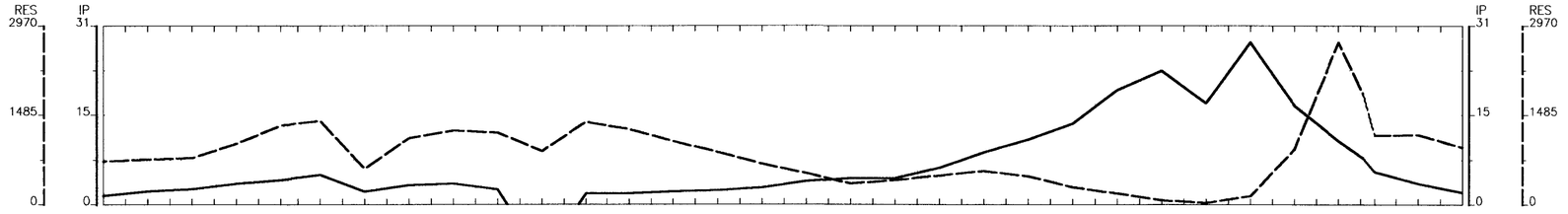
50 0 50 100 150 200 250 300
(meters)

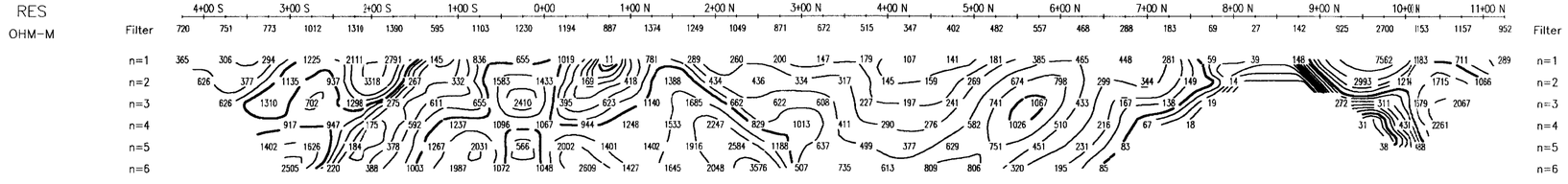
HEMLO GOLD MINES INC.

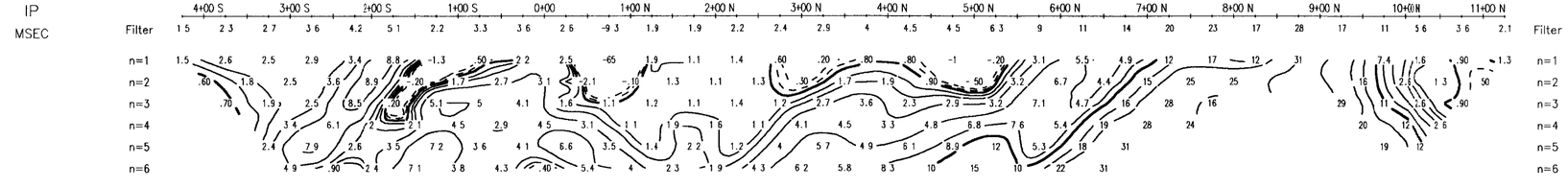
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

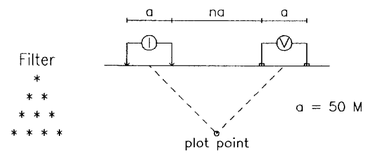






Line 5800 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

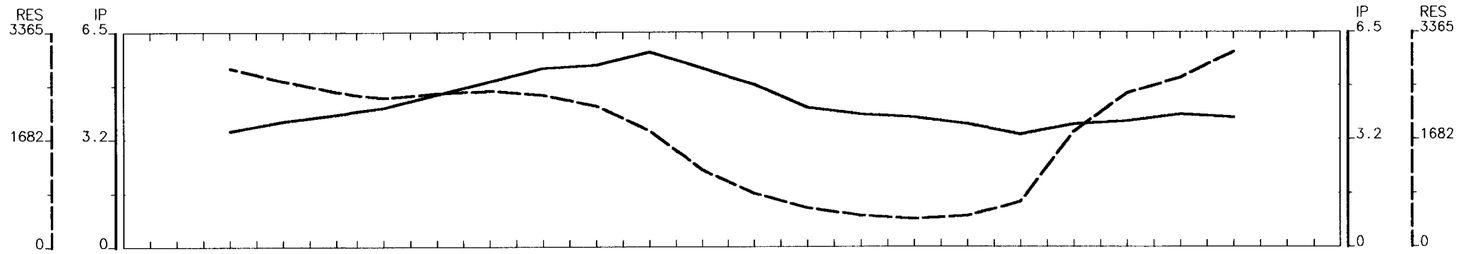
HEMLO GOLD MINES INC

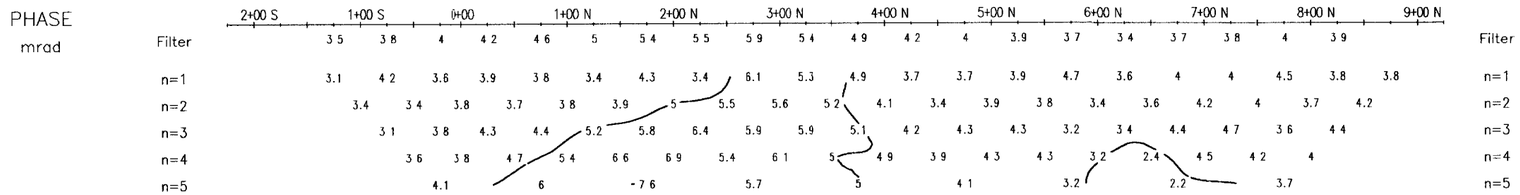
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
NAT RIVER GRID

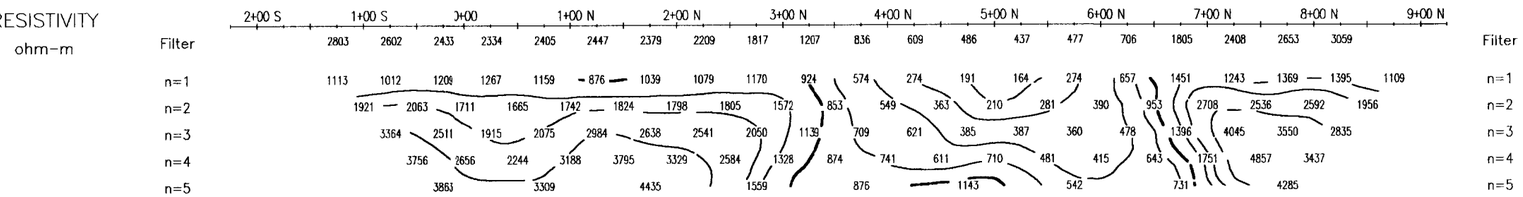
Date: 96/03/03
MJ/RC

M C EXPLORATION LTD.

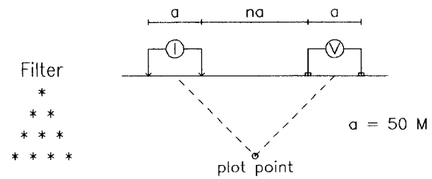
Line 5800 E







Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

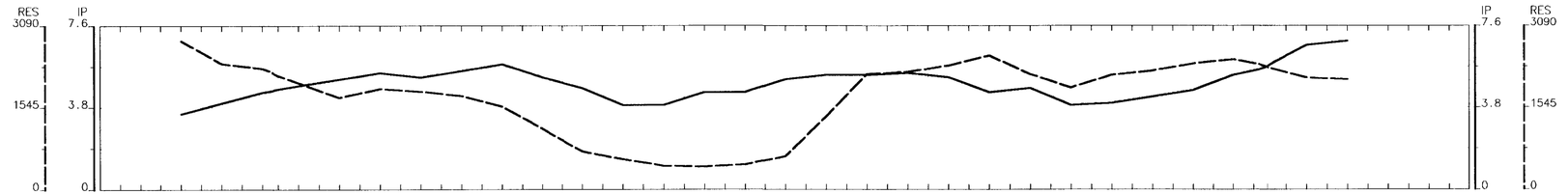
50 0 50 100 150 200 250 300
(meters)

HEMLO GOLD MINES INC.

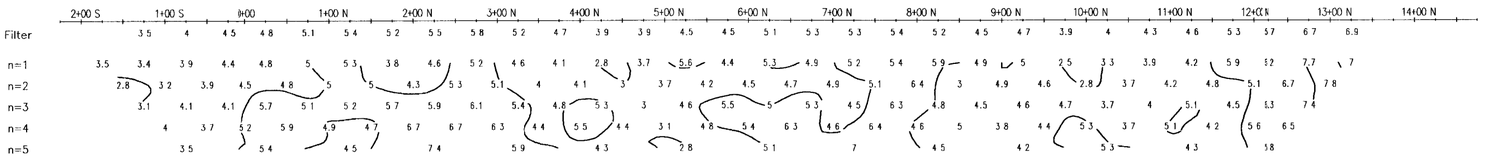
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

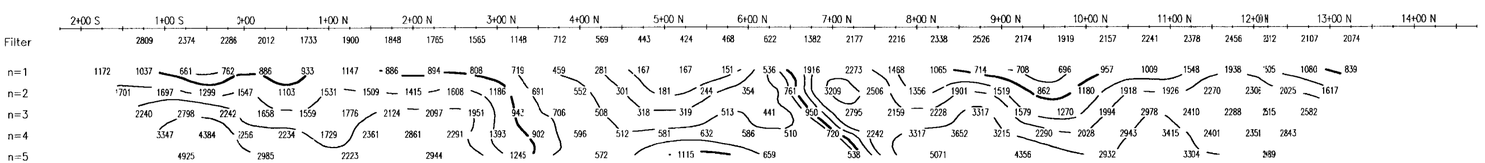


PHASE
mrad



PHASE
mrad

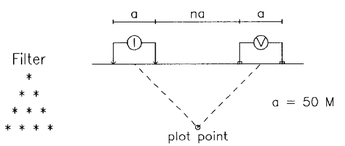
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 5900 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

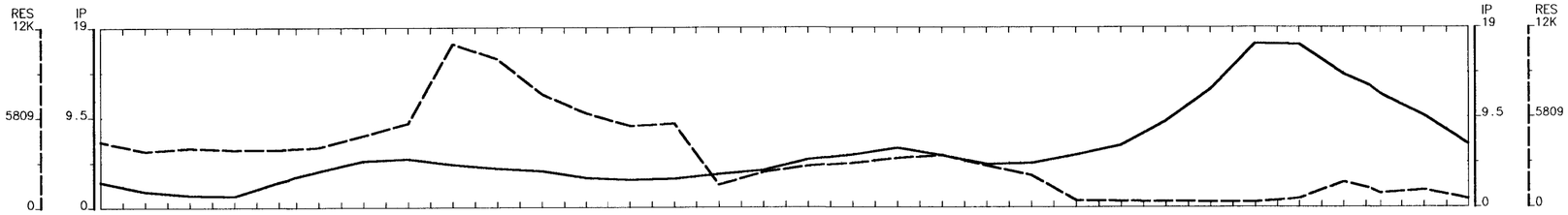
50 0 50 100 150 200 250 300
(meters)

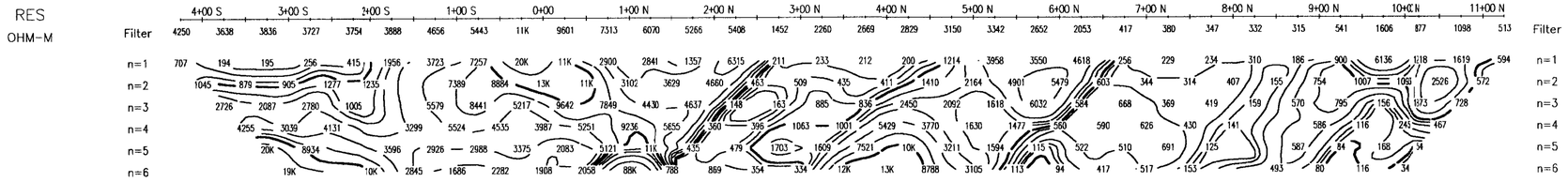
HEMLO GOLD MINES INC.

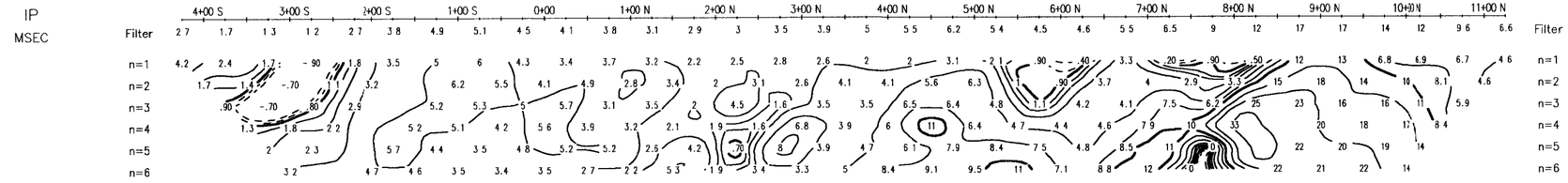
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

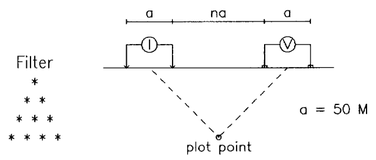






Line 6000 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

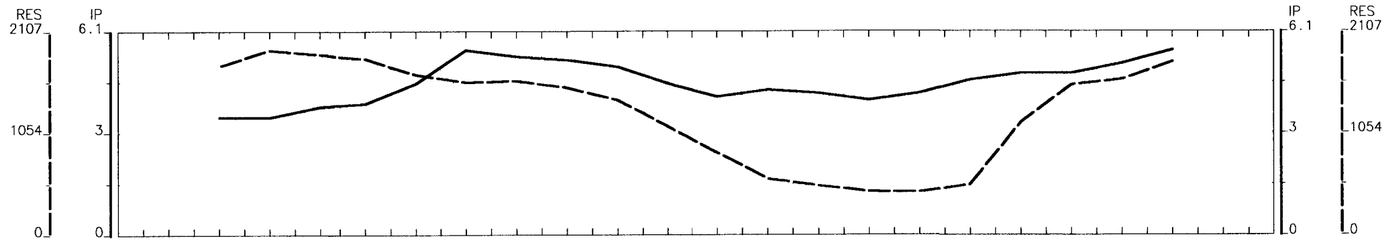
50 0 50 100 150 200 250 300
(meters)

HEMLO GOLD MINES INC

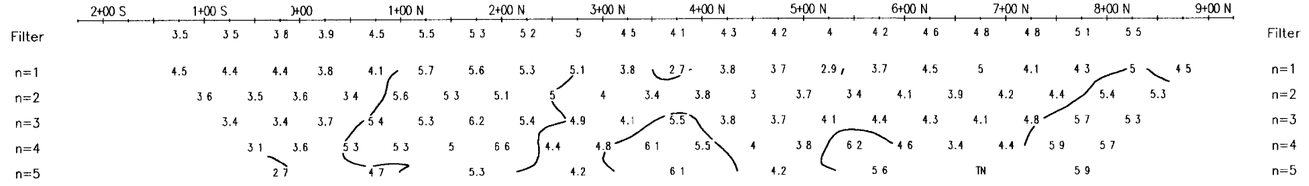
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
NAT RIVER GRID

Date: 96/03/03
MJ/RC

M C EXPLORATION LTD.

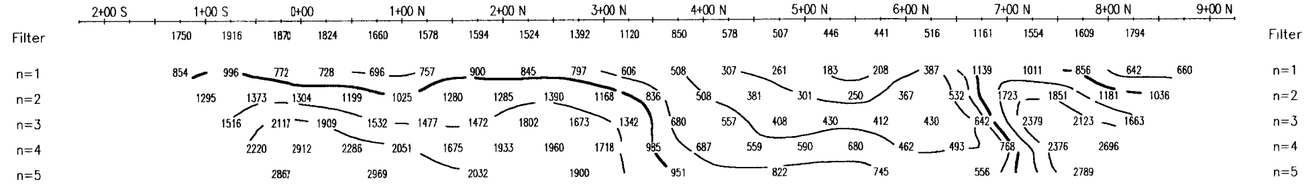


PHASE
mrad



PHASE
mrad

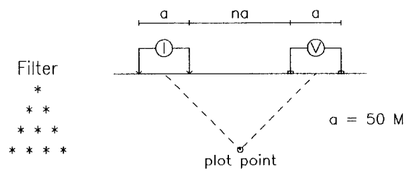
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 6000 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

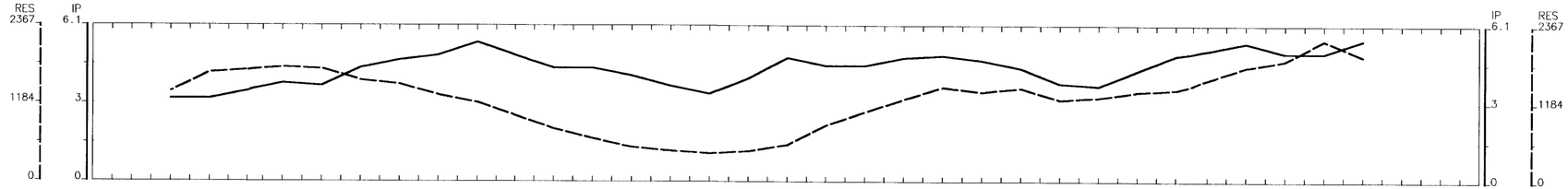
50 0 50 100 150 200 250 300
(meters)

HEMLO GOLD MINES INC.

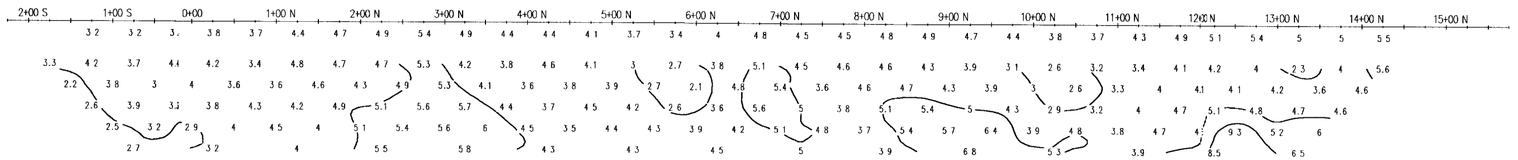
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

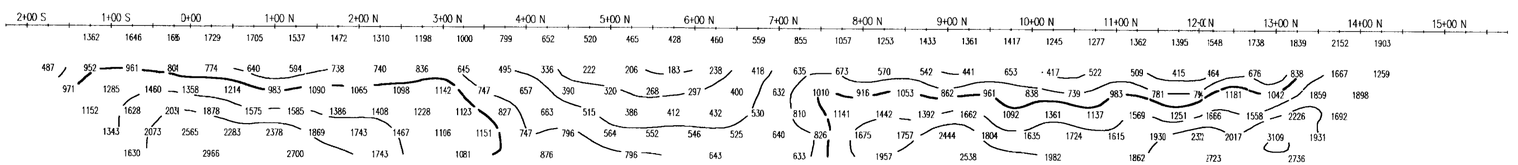


PHASE
mrad



PHASE
mrad

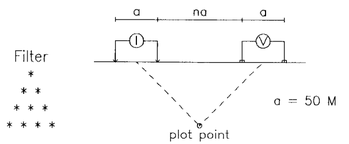
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 6100 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

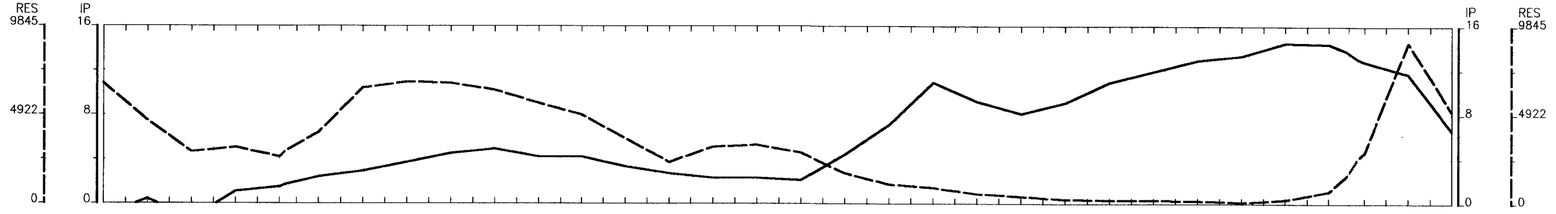
50 0 50 100 150 200 250 300
(meters)

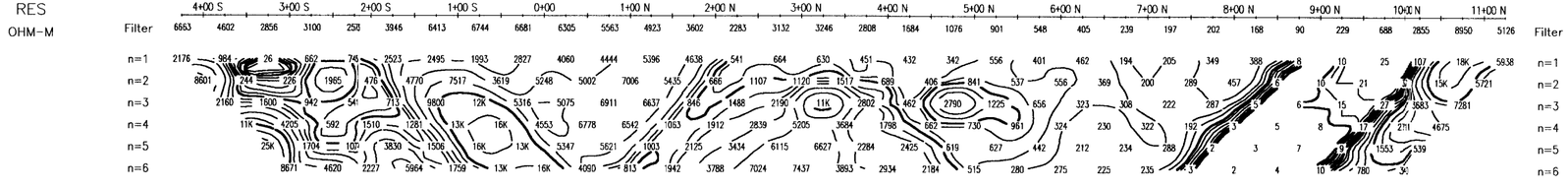
HEMLO GOLD MINES INC.

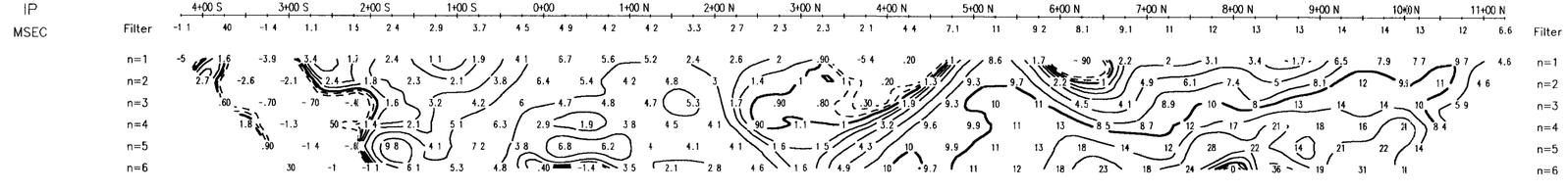
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

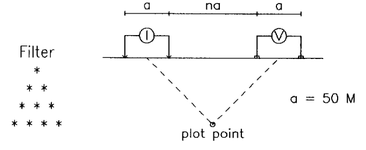






Line 6200 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

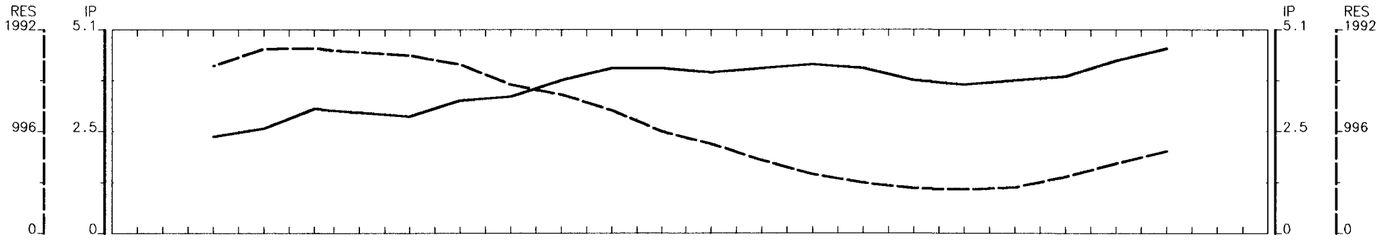
(meters)

HEMLO GOLD MINES INC

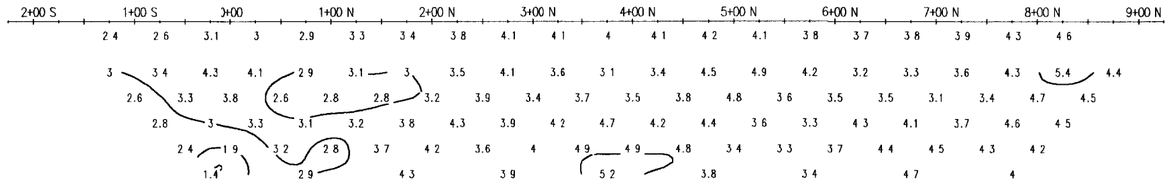
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
NAT RIVER GRID

Date: 96/03/03
MJ/RC

M C EXPLORATION LTD.

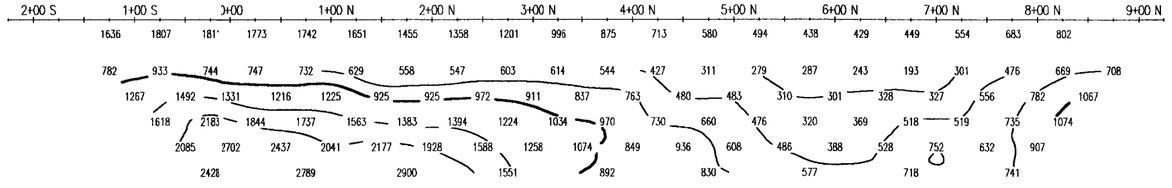


PHASE
mrad



PHASE
mrad

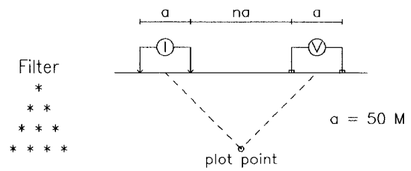
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 6200 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

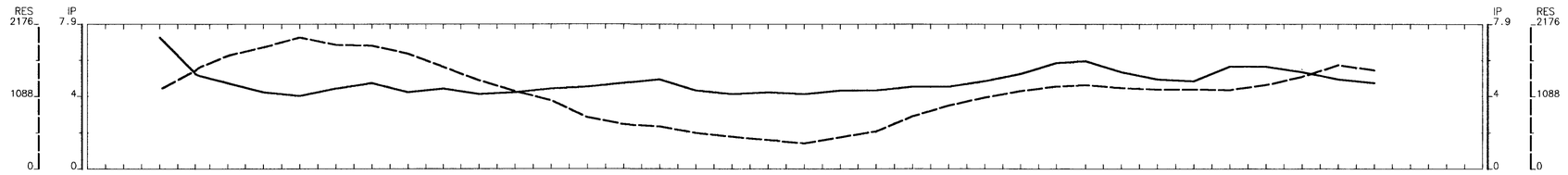
50 0 50 100 150 200 250 300
(meters)

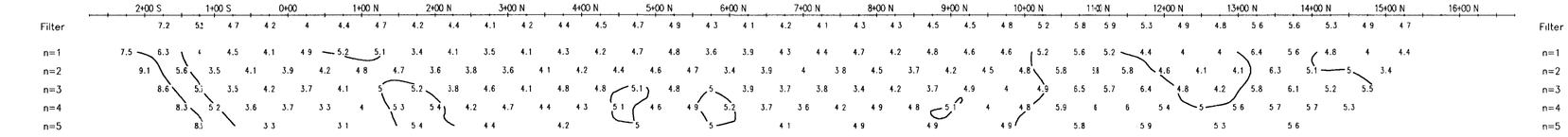
HEMLO GOLD MINES INC.

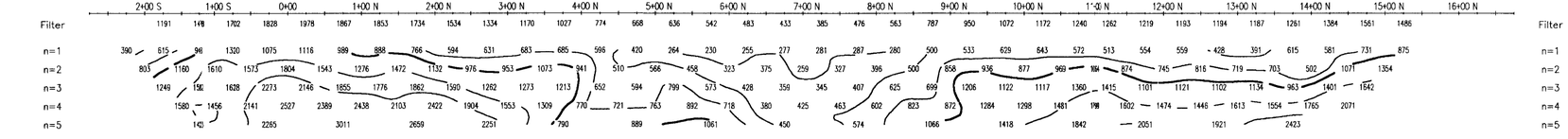
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

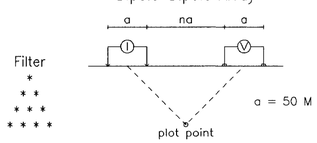






Line 6300 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

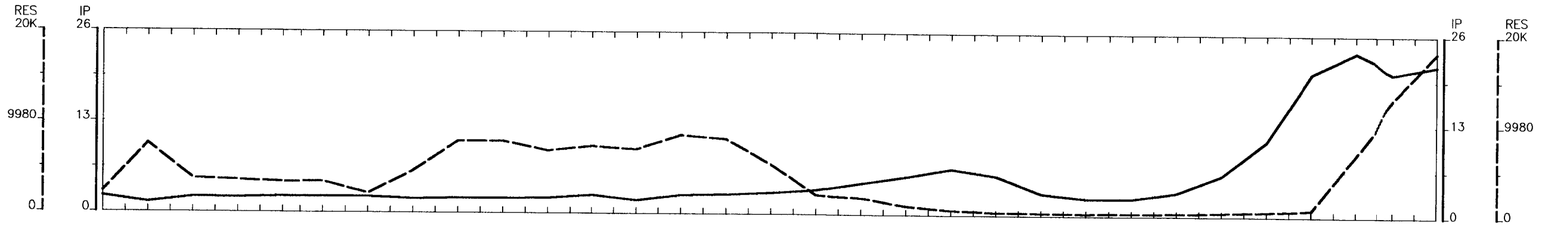
50 0 50 100 150 200 250 300
(meters)

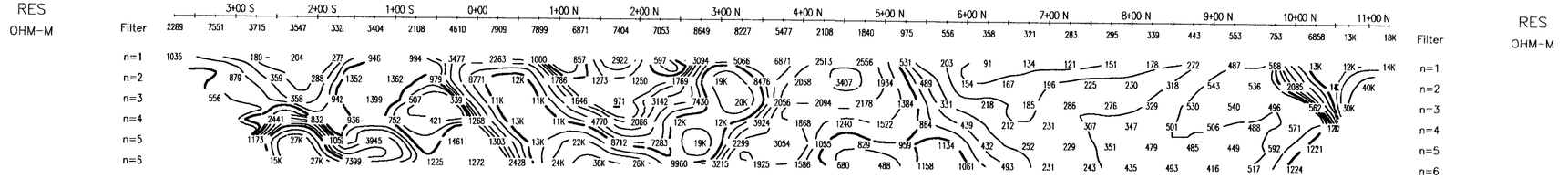
HEMLO GOLD MINES INC.

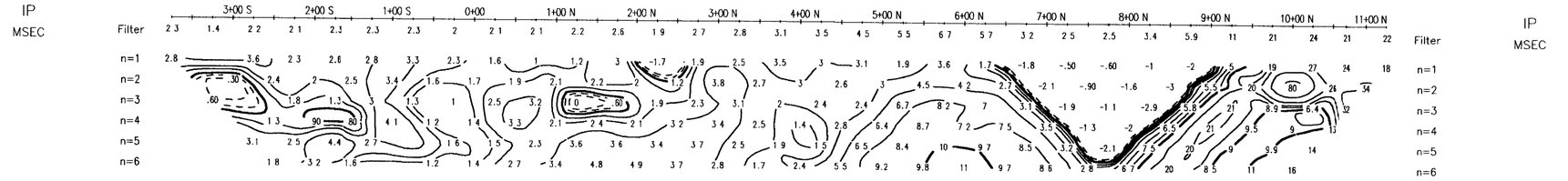
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

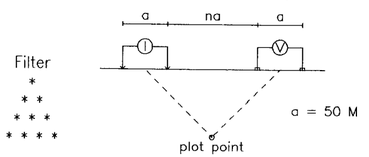






Line 6400 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

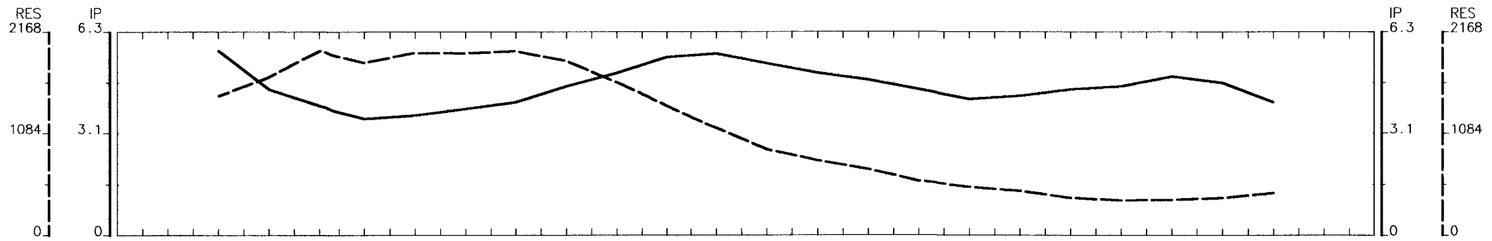
50 0 50 100 150 200 250 300
(meters)

HEMLO GOLD MINES INC

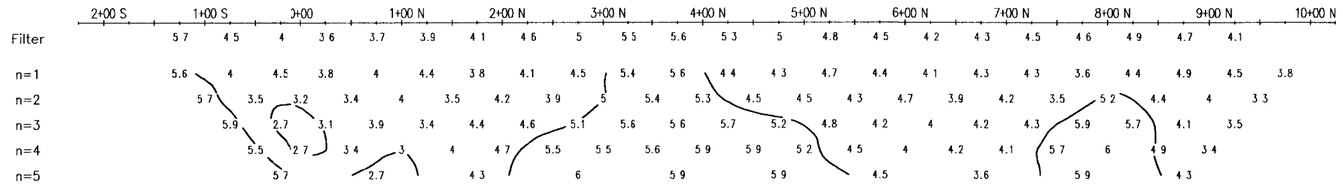
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
NAT RIVER GRID

Date: 96/03/03
MJ/RC

M C EXPLORATION LTD.

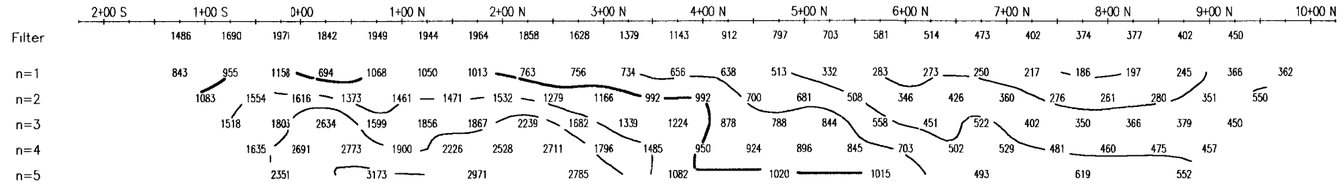


PHASE
mrad



PHASE
mrad

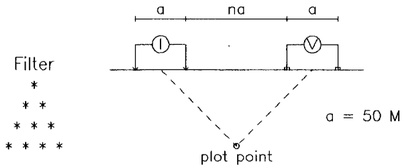
RESISTIVITY
ohm-m



RESISTIVITY
ohm-m

Line 6400 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, ..

2.16735

Scale 1:5000

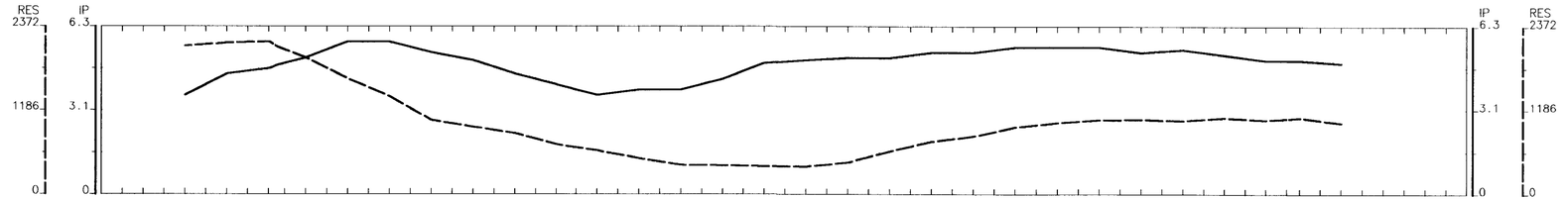
50 0 50 100 150 200 250 300
(meters)

HEMLO GOLD MINES INC.

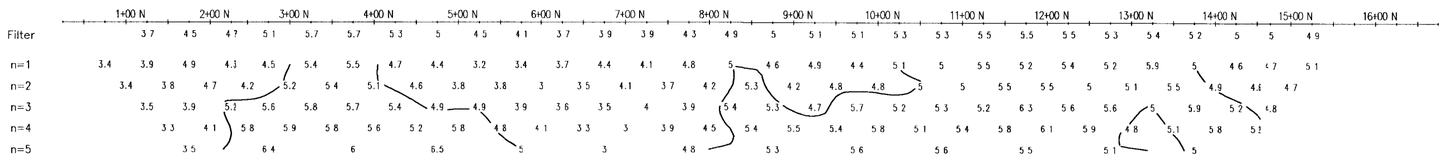
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

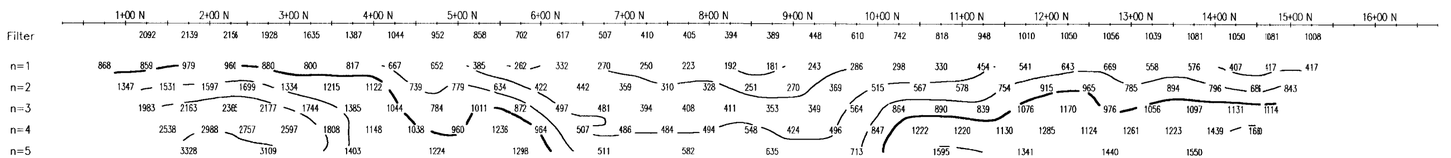
BELANGER GEOPHYSICS LTD.



PHASE
mrad

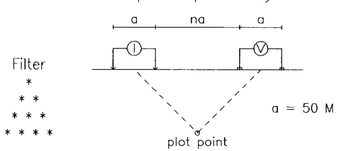


RESISTIVITY
ohm-m



Line 6500 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

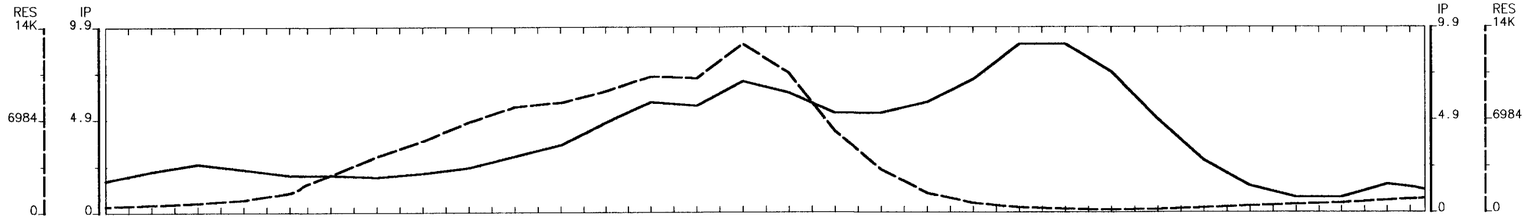
50 0 50 100 150 200 250 300
(meters)

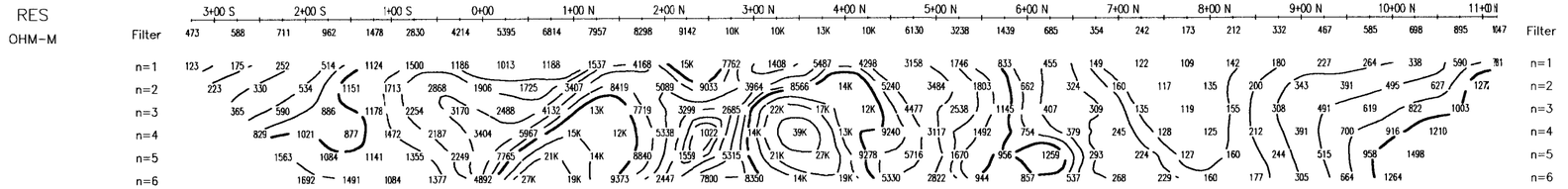
HEMLO GOLD MINES INC.

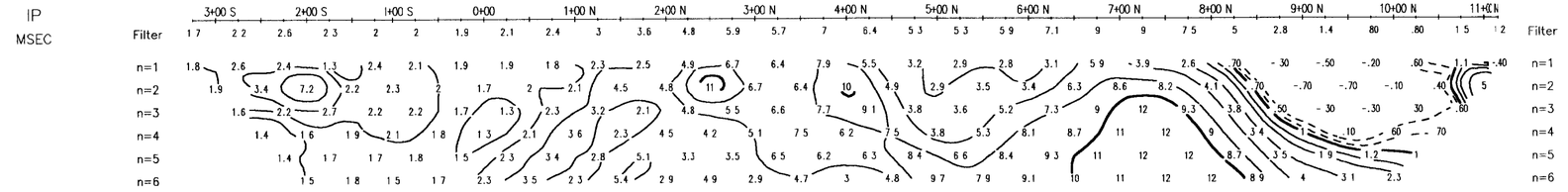
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

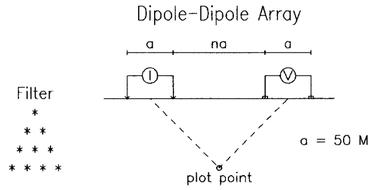
BELANGER GEOPHYSICS LTD.







Line 6600 E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

50 0 50 100 150 200 250 300

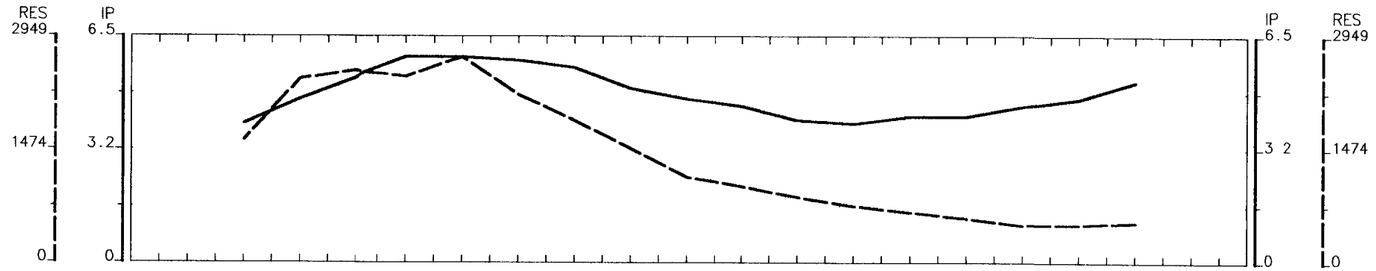
(meters)

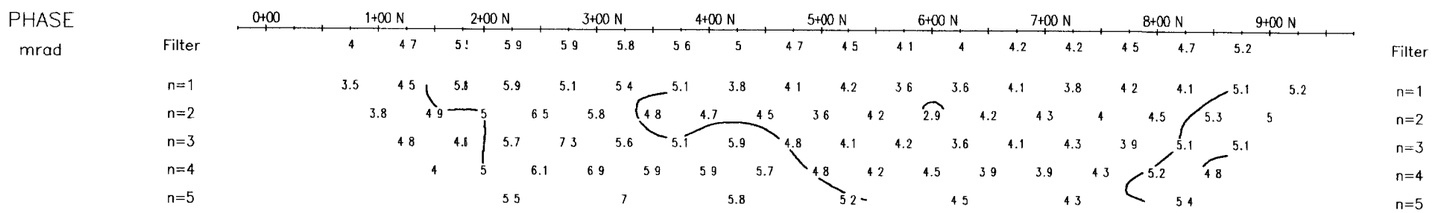
HEMLO GOLD MINES INC

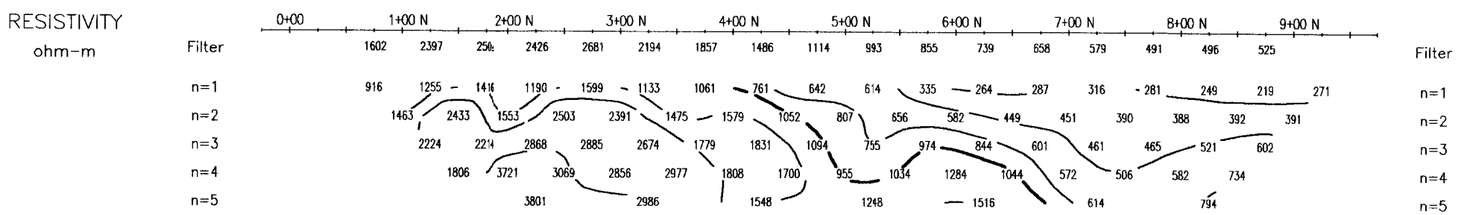
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
NAT RIVER GRID

Date: 96/03/03
MJ/RC

M C EXPLORATION LTD.

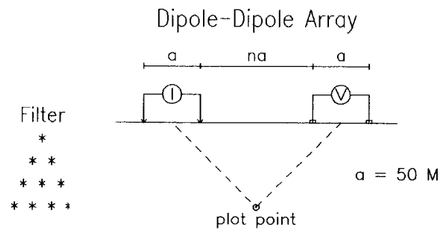






Line 6600 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

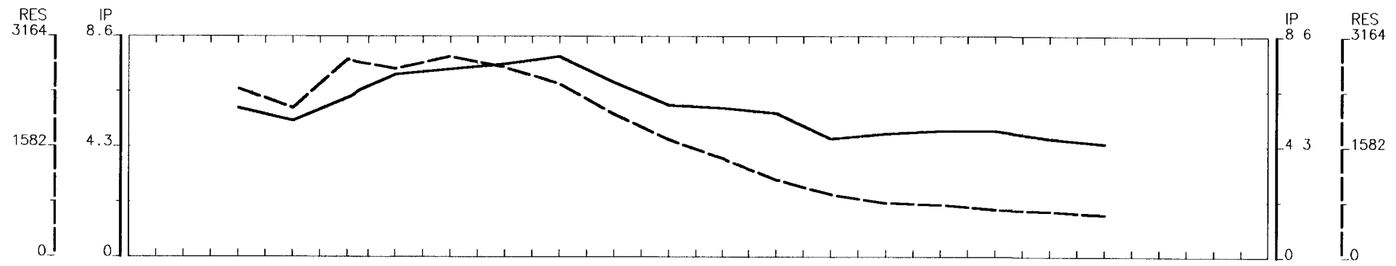
(meters)

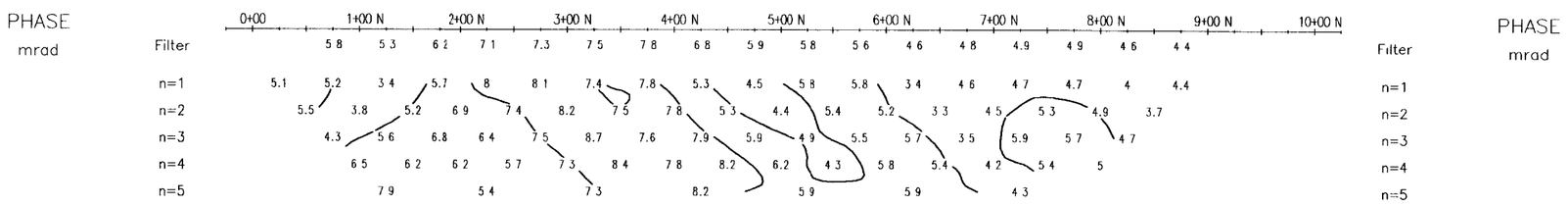
HEMLO GOLD MINES INC.

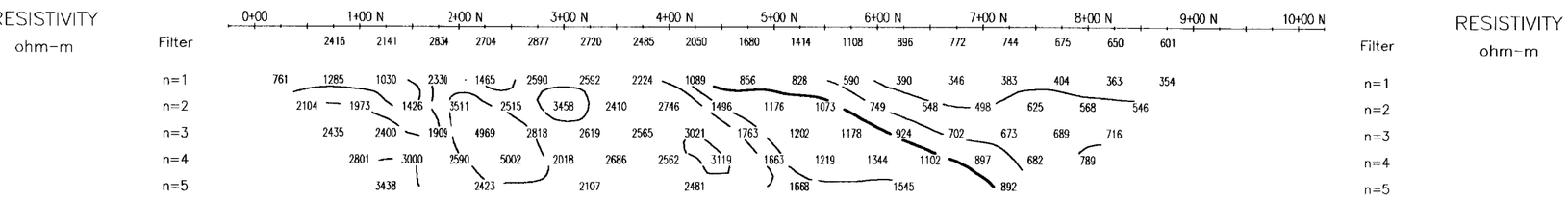
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/26
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

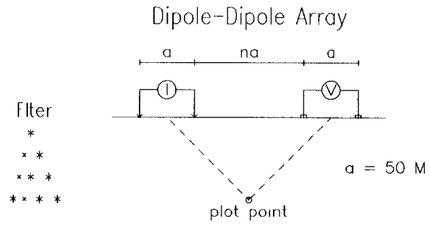






Line 6700 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

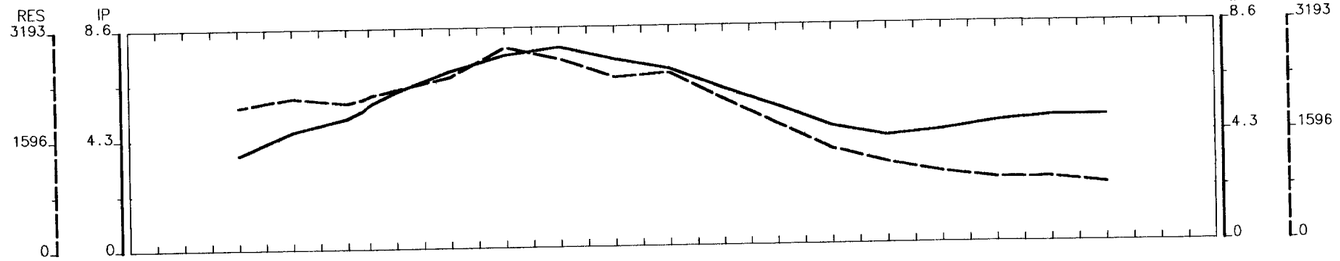
(meters)

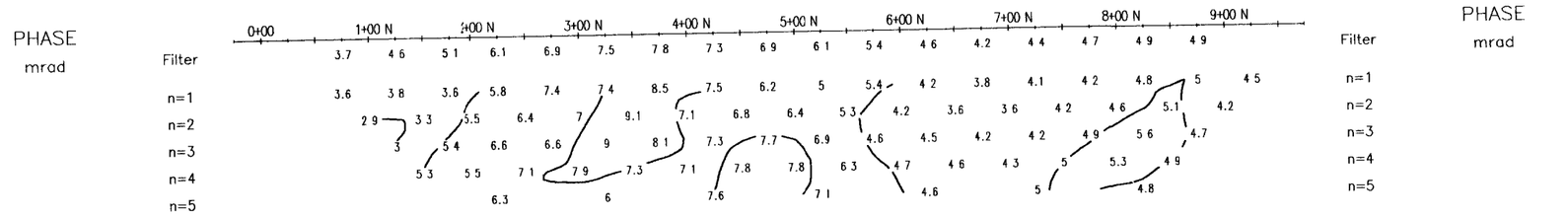
HEMLO GOLD MINES INC.

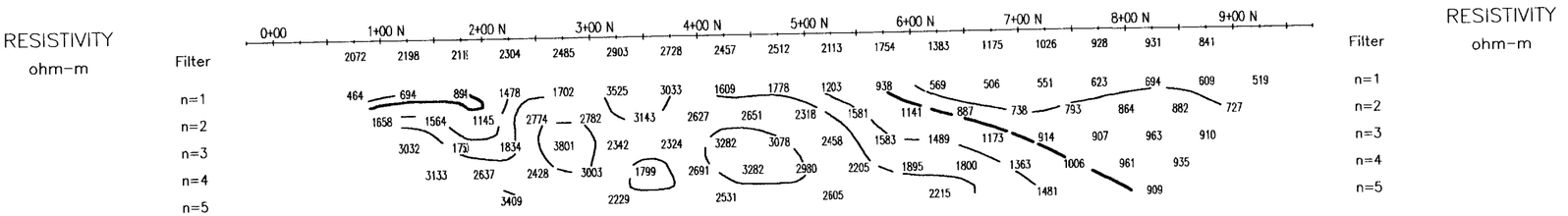
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/24
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

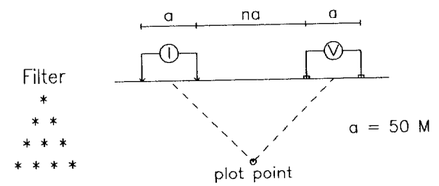






Line 6800 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

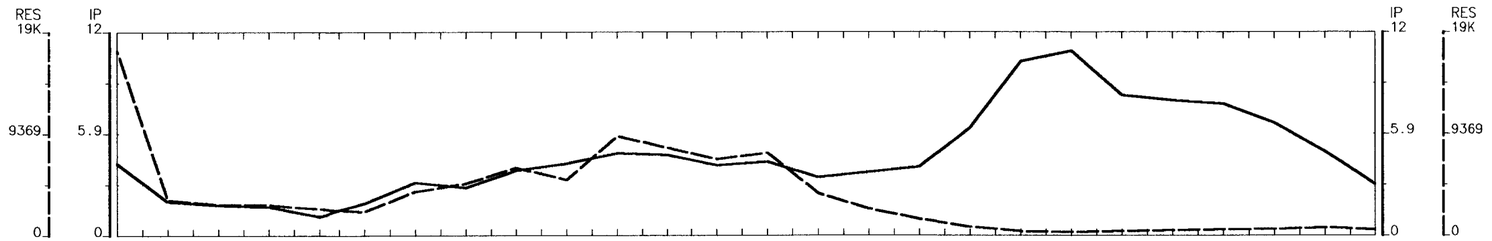
50 0 50 100 150 200 250 300
(meters)

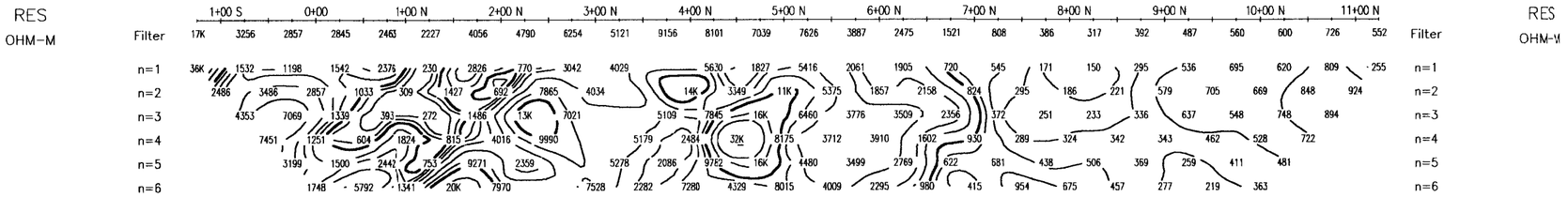
HEMLO GOLD MINES INC.

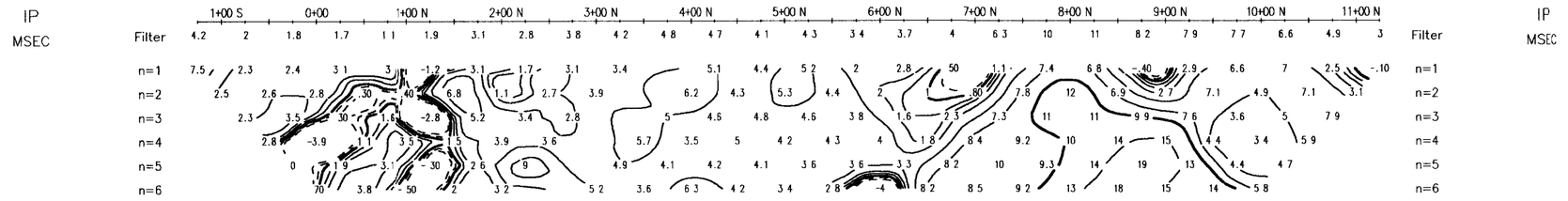
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT (602)
DEERFOOT GRID

Date: 96/06/26
M JOHNSTON/B CALHOUN

BELANGER GEOPHYSICS LTD.

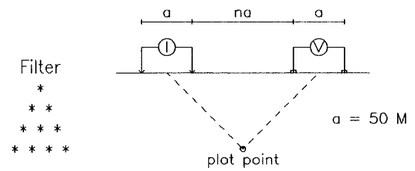






Line 6800 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

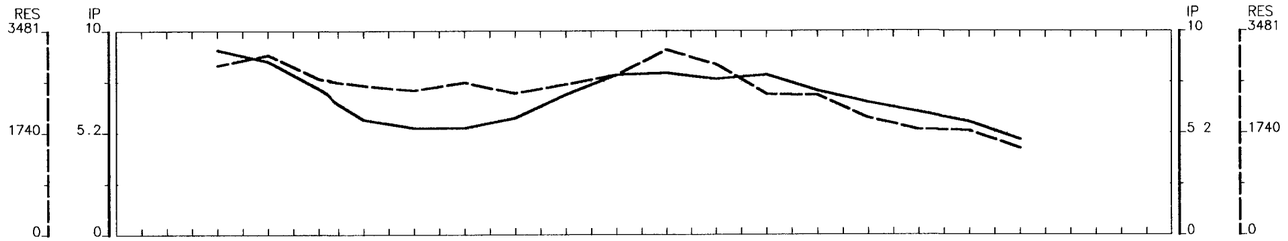
(meters)

HEMLO GOLD MINES INC

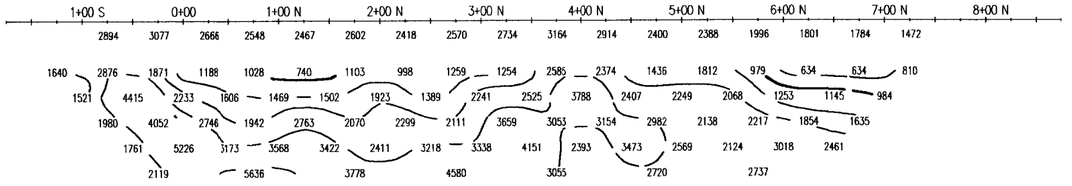
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
NAT RIVER GRID

Date: 96/03/03
MJ/RC

M C EXPLORATION LTD.

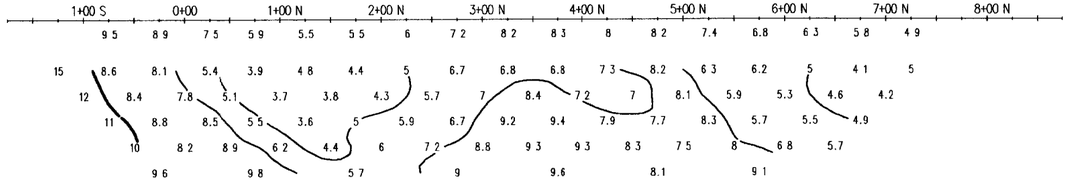


RES



RES

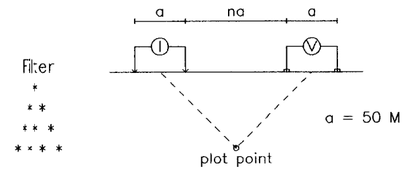
PHASE



PHASE

Line 6900 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

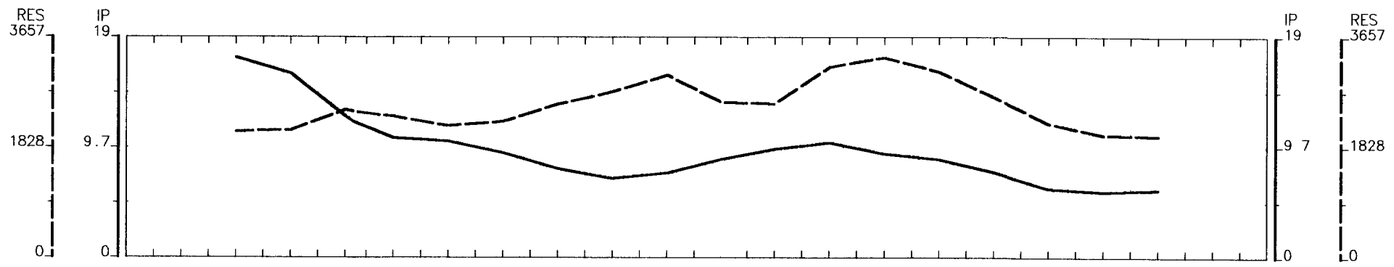
50 0 50 100 150 200 250 300
(meters)

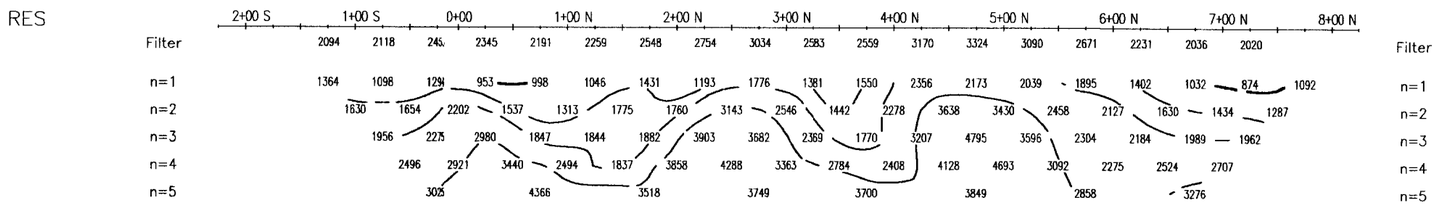
HEMLO GOLD MINES INC.

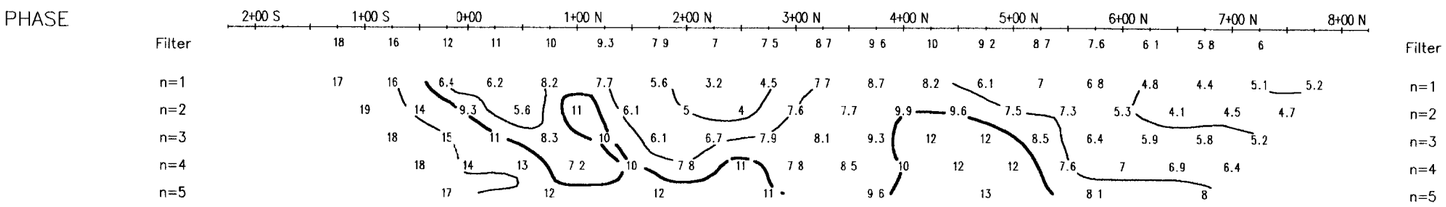
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/02/28
M JOHNSTON/R CALHOUN

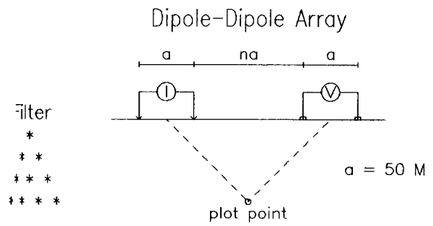
BELANGER GEOPHYSICS







Line 7100 E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

50 0 50 100 150 200 250 300

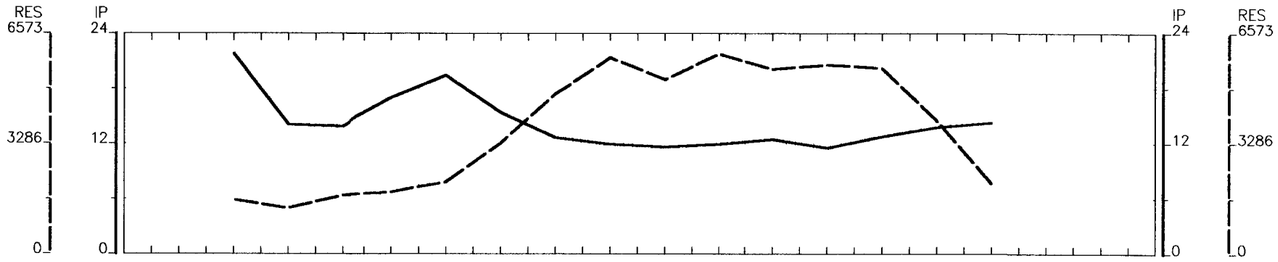
(meters)

HEMLO GOLD MINES INC.

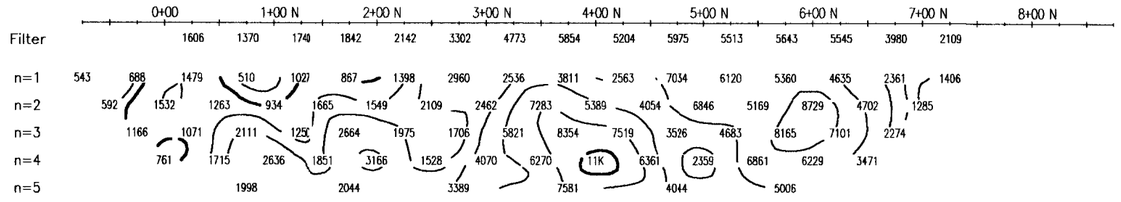
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/02/28
M JOHNSTON/R CALHOUN

BELANGER GEOPHYSICS

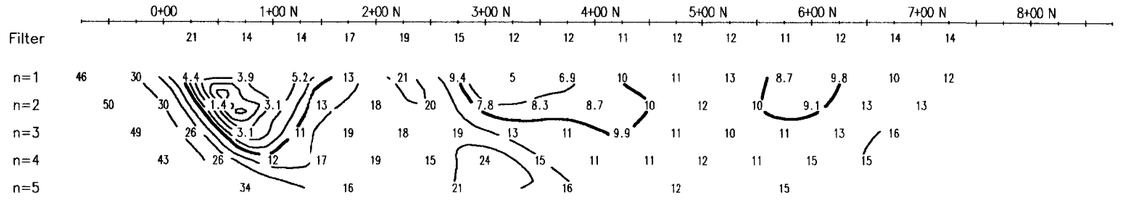


RES



RES

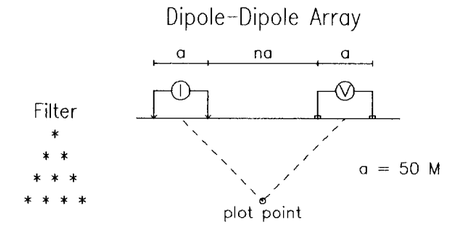
PHASE



PHASE

Line 7300 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

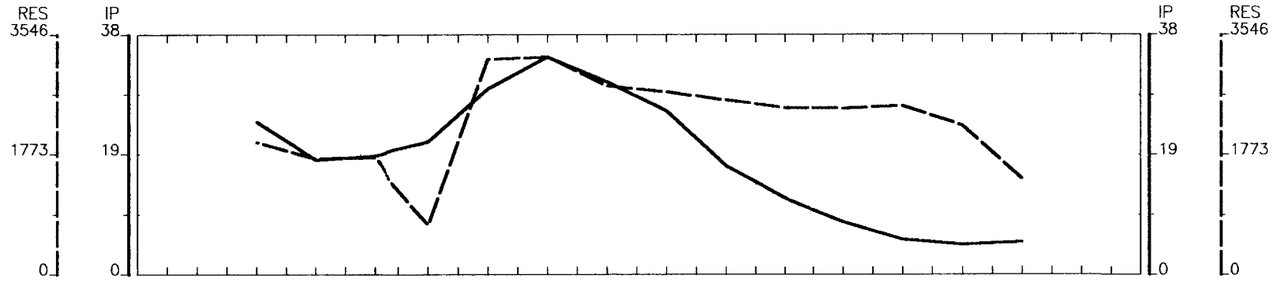
50 0 50 100 150 200 250 300
(meters)

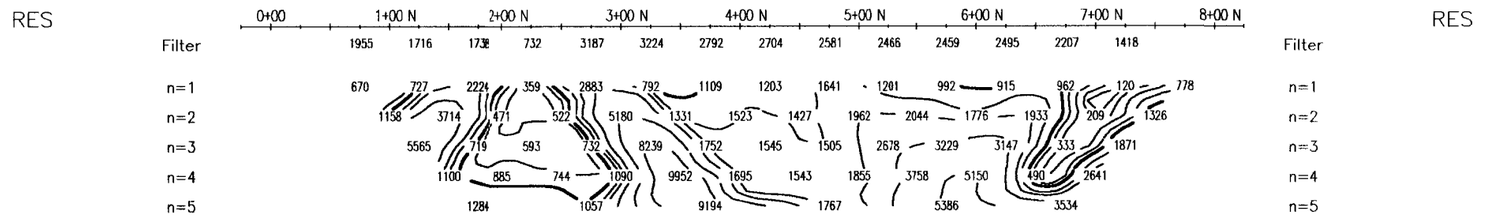
HEMLO GOLD MINES INC.

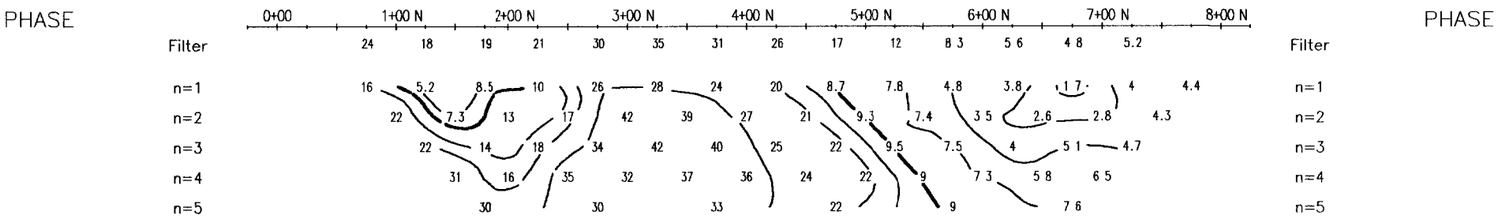
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/02/28
M JOHNSTON/R CALHOUN

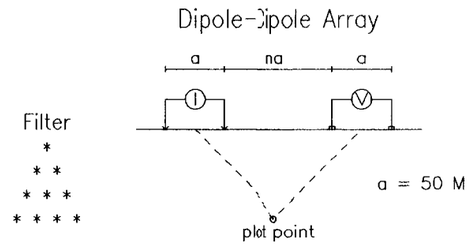
BELANGER GEOPHYSICS







Line 7500 E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

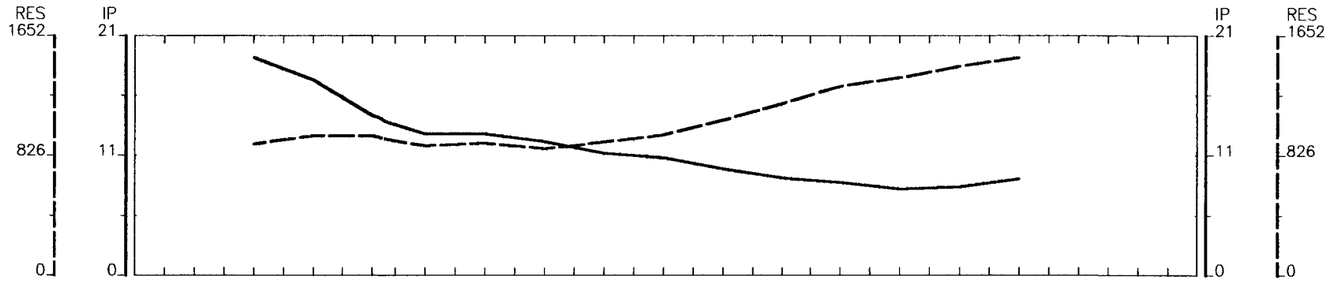
(meters)

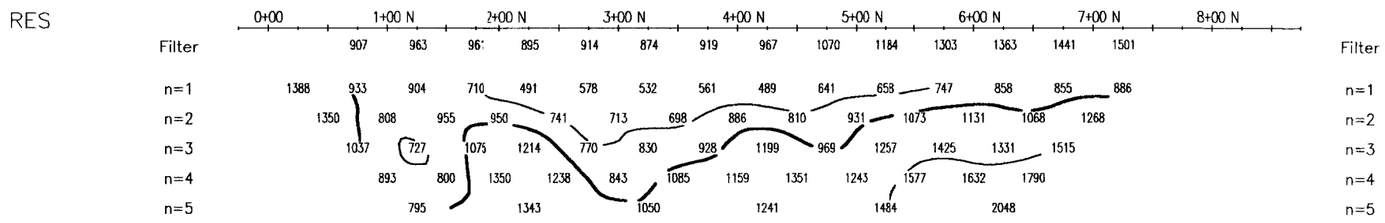
HEMLO GOLD MINES INC.

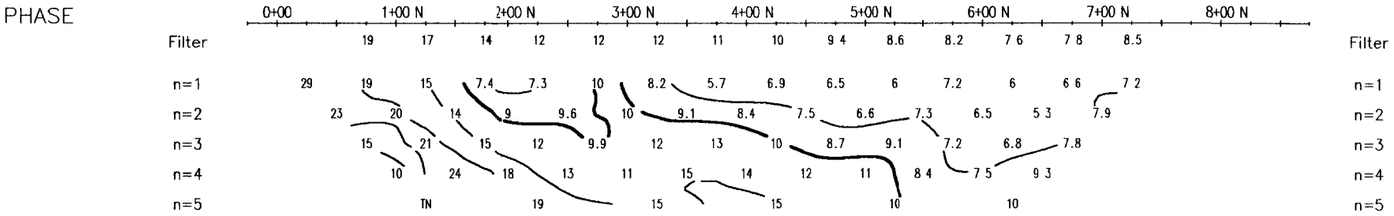
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/02/28
M JOHNSTON/R CALHOUN

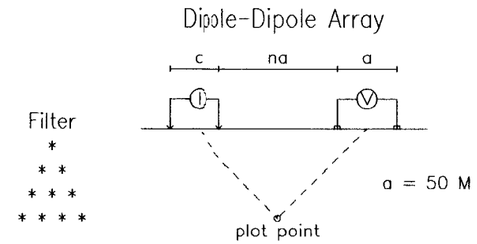
BELANGER GEOPHYSICS







Line 7700 E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

2.16735

Scale 1:5000

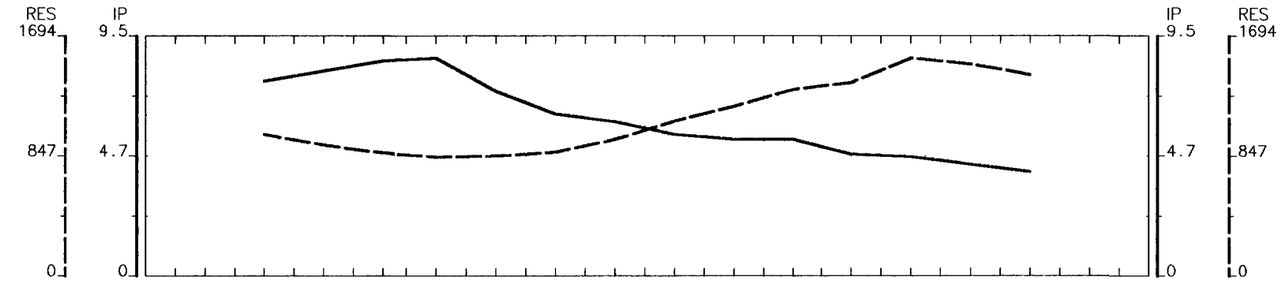
50 0 50 100 150 200 250 300
(meters)

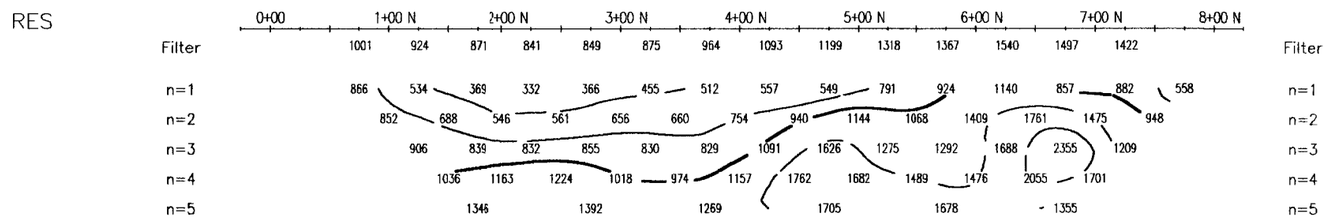
HEMLO GOLD MINES INC.

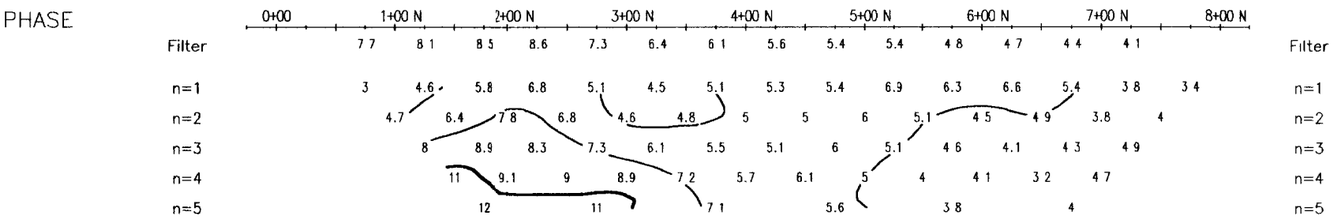
INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/02/28
M JOHNSTON/R CALHOUN

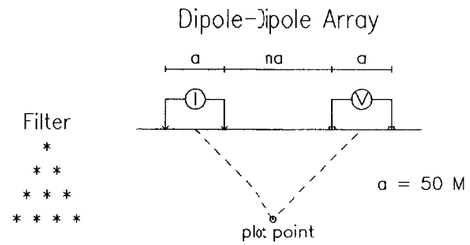
BELANGER GEOPHYSICS







Line 7900 E



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, . .

2.16735

Scale 1:5000

50 0 50 100 150 200 250 300

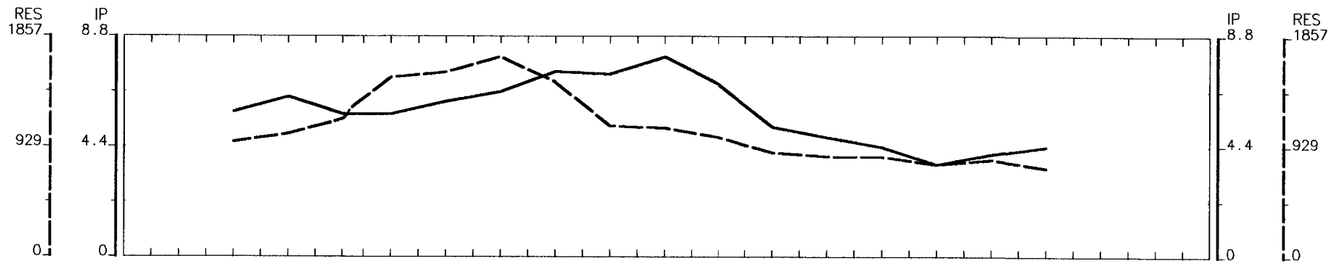
(meters)

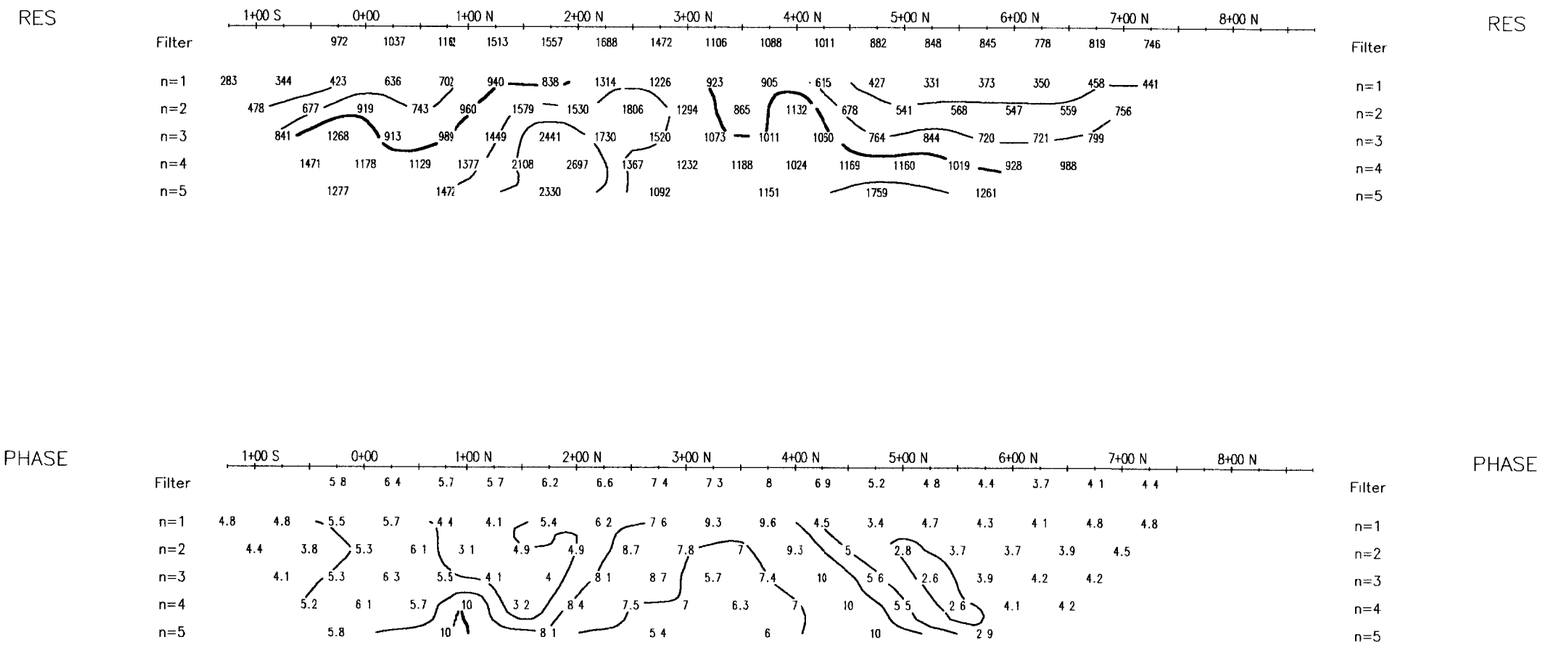
HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/02/28
M JOHNSTON/R CALHOUN

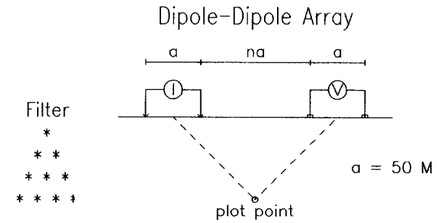
BELANGER GEOPHYSICS





Line 8100 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

2.16735

Scale 1:5000

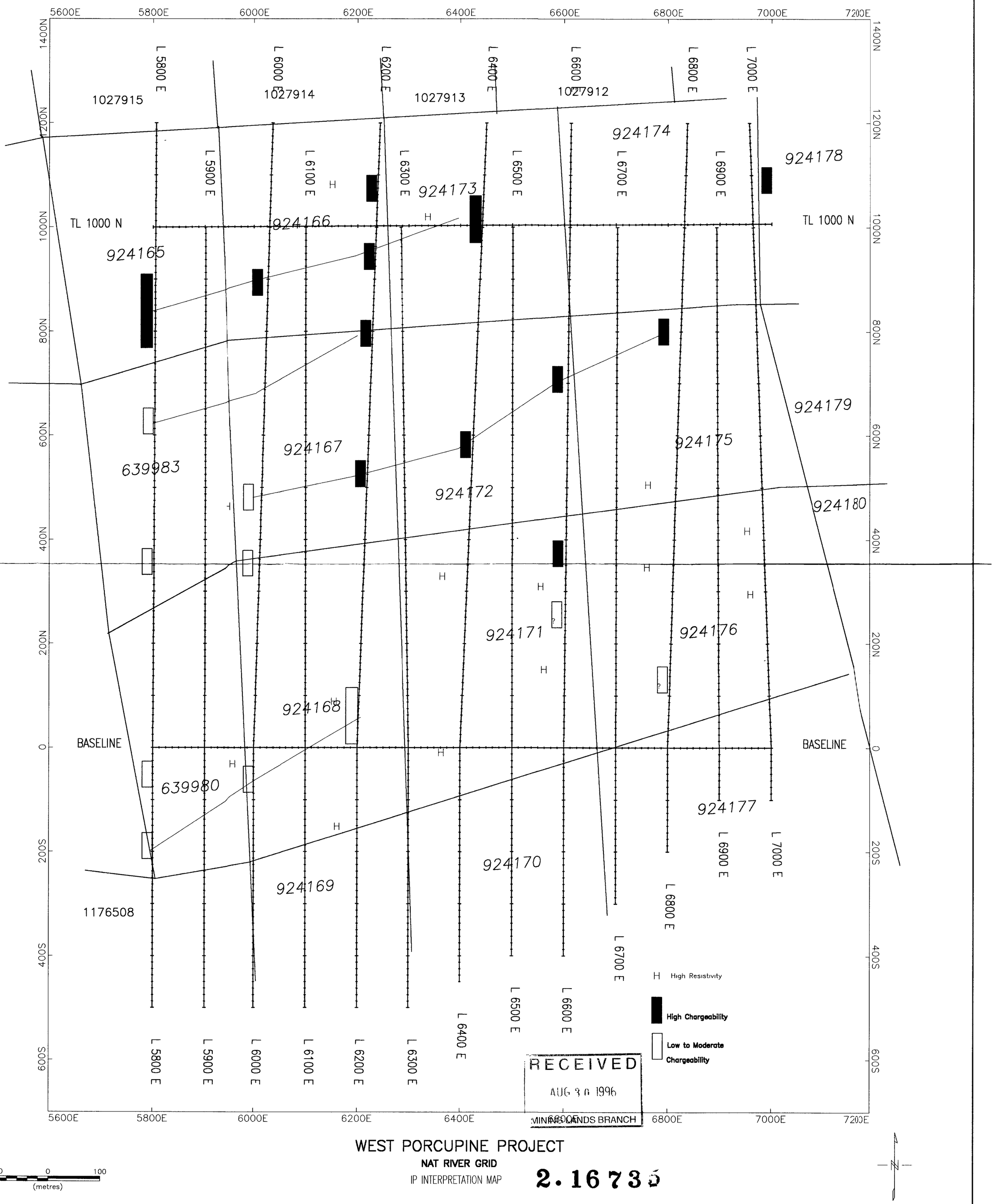
50 0 50 100 150 200 250 300
(meters)

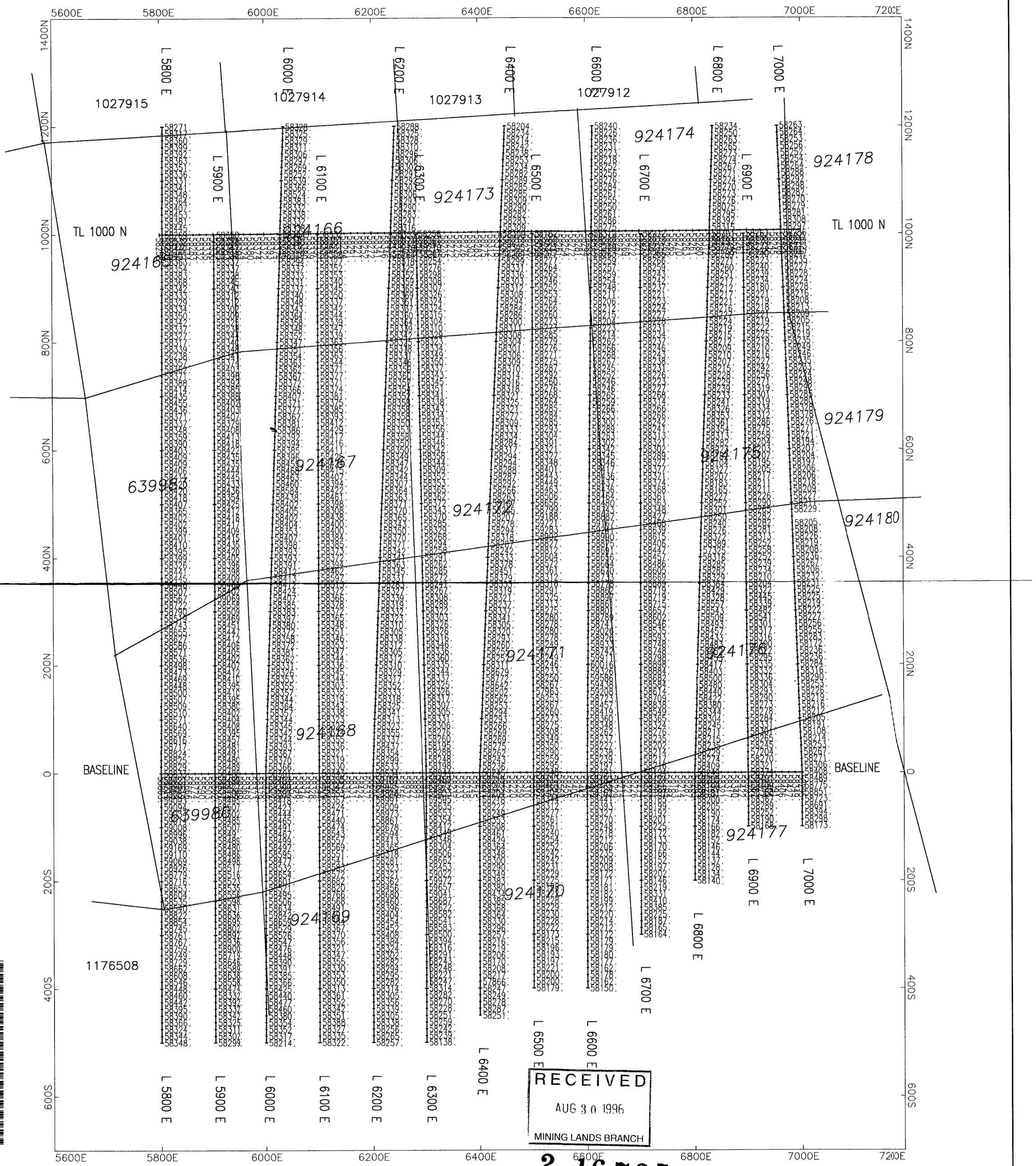
HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROECT (602)
DEERFOOT GRID

Date: 96/02/28
M JOHNSTON/R CALHOUN

BELANGER GEOPHYSICS


5600E
5800E
6000E
6200E
6400E
6600E
6800E
7000E
7200E
1400N
1200N
1000N
800N
600N
400N
200N
0
200S
400S
600S
L 5800 E
L 5900 E
L 6000 E
L 6100 E
L 6200 E
L 6300 E
L 6400 E
L 6500 E
L 6600 E
L 6700 E
L 6800 E
L 6900 E
L 7000 E
1027915
1027914
1027913
1027912
924174
924178
924173
924166
924165
TL 1000 N
924179
924167
639983
924175
924172
924180
924171
924176
924168
BASELINE
639980
924177
924169
924170
1176508
H High Resistivity
High Chargeability
Low to Moderate Chargeability
RECEIVED
AUG 30 1996
MINING LANDS BRANCH
100 0 100
(metres)
WEST PORCUPINE PROJECT
NAT RIVER GRID
IP INTERPRETATION MAP
2.16735
42A04NW0066 2.16735 SEWELL
700



42A04NW0066 2.16735 SEWELL

710

100 0 100
(metres)

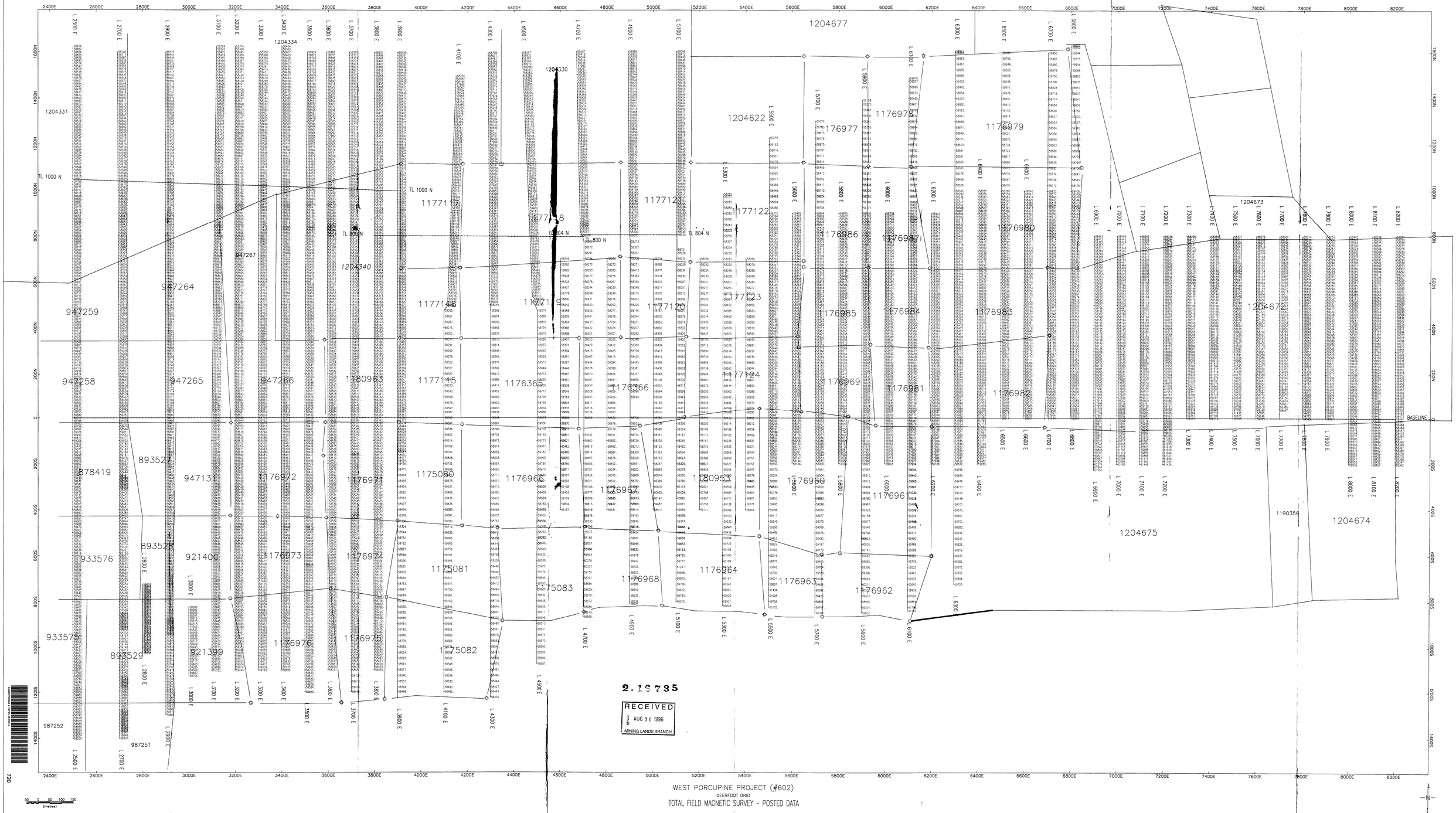
RECEIVED
AUG 30 1996
MINING LANDS BRANCH

2.16735

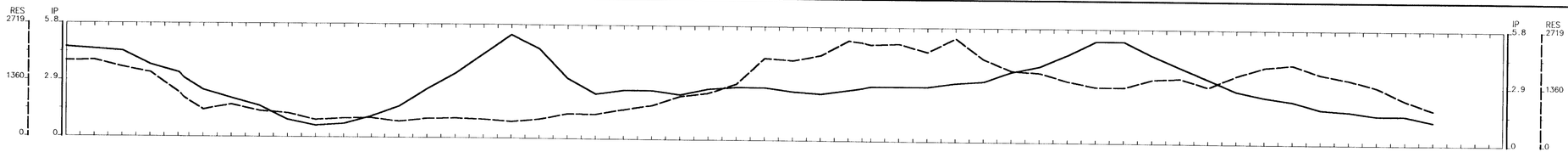
WEST PORCUPINE PROJECT

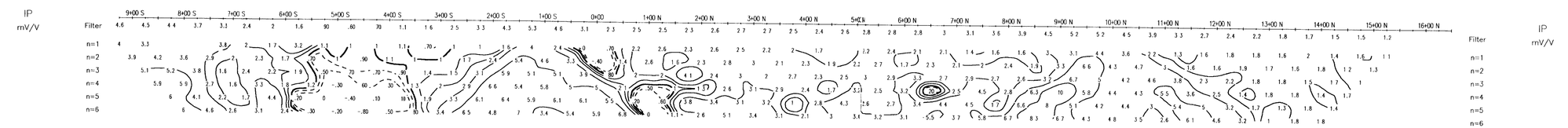
NAT RIVER GRID

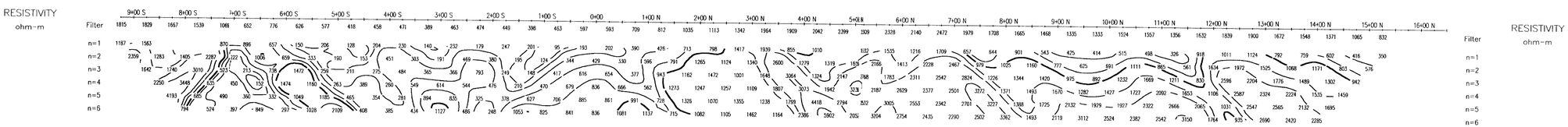
TOTAL FIELD MAGNETIC SURVEY - POSTED DATA


2.16735
RECEIVED
AUG 30 1996
MINING LANDS BRANCH
WEST PORCUPINE PROJECT (#602)
DEERFOOT GRID
TOTAL FIELD MAGNETIC SURVEY - POSTED DATA
BASELINE
TL 1000 N
TL 800 N
TL 804 N
1204677
1204622
1204673
1204674
1204675
1204672
1204334
1204330
1204331
1204340
1176977
1176979
1176986
1176987
1176980
1176985
1176984
1176983
1176969
1176981
1176982
1176966
1176960
1176962
1176963
1176964
1176968
1176696
1176972
1176971
1176973
1176974
1176975
1176976
1175080
1175081
1175082
1175083
1177122
1177123
1177124
1177125
1177126
1177127
1177128
1177129
1177130
1177131
1177132
1177133
1177134
1177135
1177136
1177137
1177138
1180963
1180955
1190359
947267
947264
947259
947258
947265
947266
878419
893527
947131
933576
921400
933575
893529
921399
987252
987251

1204677
1204334
1204330
1204331
1204622
1176977
1176978
1176979
1204673
1177117
1177121
1177118
1177122
1176986
1176987
1176980
947267
947264
1204340
947259
1177116
1177119
1177120
1177123
1176985
1176984
1176983
1204672
947258
947265
947266
1180963
1177115
1176365
1176366
1177124
1176969
1176981
1176982
878419
893527
947131
1176972
1176971
1175080
1176966
1176967
1180953
1176960
1176961
1190359
1204674
1204675
933576
893528
921400
1176973
1176974
1175081
1176968
1176964
1176963
1176962
933575
893529
921399
1176976
1176975
1175082
987252
987251
TL 1000 N
TL 800 N
TL 804 N
BASELINE
2.16735
RECEIVED
AUG 30 1996
MINING LANDS BRANCH
High Chargeability
Moderate Chargeability
Resistivity High H
730
50 0 50 100 150 (metres)
WEST PORCUPINE PROJECT (#602)
DEERFOOT GRID
INDUCED POLARIZATION & RESISTIVITY ANOMALIES

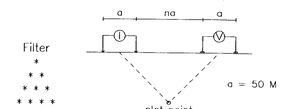






Line 3300 E

Dipole-Dipole Array



Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10,..

Scale 1:5000

50 0 50 100 150 200 250 300
(meters)

2.16735

HEMLO GOLD MINES INC.

INDUCED POLARIZATION SURVEY
WEST PORCUPINE PROJECT
DEERFOOT GRID

Date: 96/06/06
MJ/BC

M C EXPLORATION LTD.