ROYAL OAK MINES INC.

SEMPLE-HUTT PROPERTY

1994 ASSESSMENT REPORT

GEOPHYSICS

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MINING LANDS BRANCH

Submitted by:

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Project Geologist
Eastern Canada Exploration

Qual.# 2.10523

4 January 1995

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CONTENTS

1.0 Summary and Conclusions

During December, 1994, Royal Oak Mines Inc. hired M.C. Exploration Services Inc. to complete 12.0 km of Time Domain Induced Polarization (I.P.) and Total Field Proton Precession Magnetic (T.F.M.) survey work on their Semple-Hutt property located about 62 km south of Timmins, Ontario.

This work was successful in outlining several areas which responded favourably to the I.P. survey, and work to determine the cause of these I.P. responses, consisting of drilling and/or trenching, is warranted.

2.0 Property Description, Location and Access

The Semple-Hutt property consists of 42 claim units (672 ha) located about 62 km south of Timmins (Figure 1). These claims are within Semple and Hutt townships, and are listed in Table 1 and shown in Figure 2. The property is owned by Royal Oak Mines Inc., P.O. Bag 2010, Timmins, Ontario, P4N 7X7.

Road access to the property is provided by the Langmuir Road, originating in South Porcupine, to where it crosses Wicks Road (Hwy 566), which provides access to the northern portion of the property.

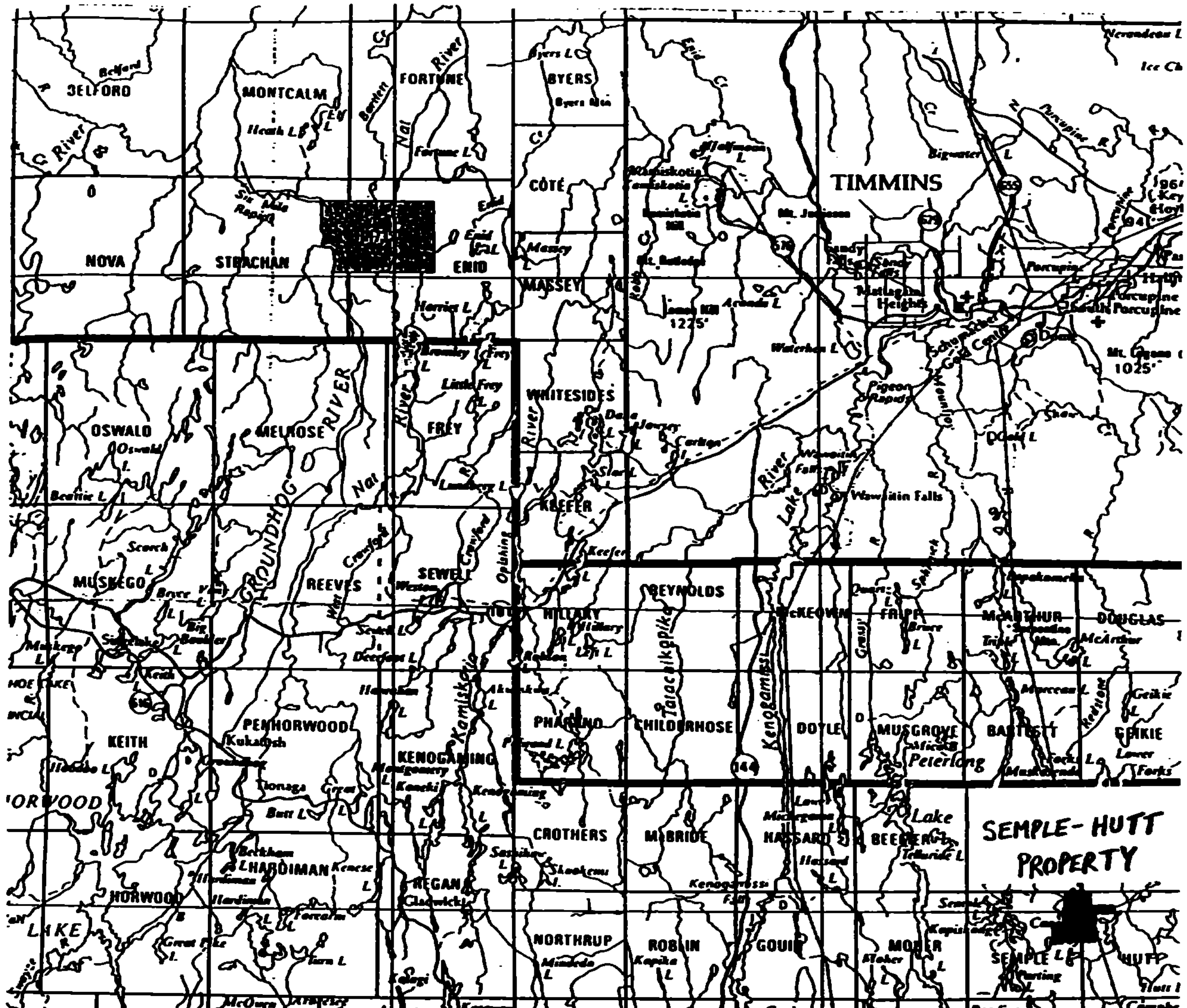


FIGURE 1: Location Map

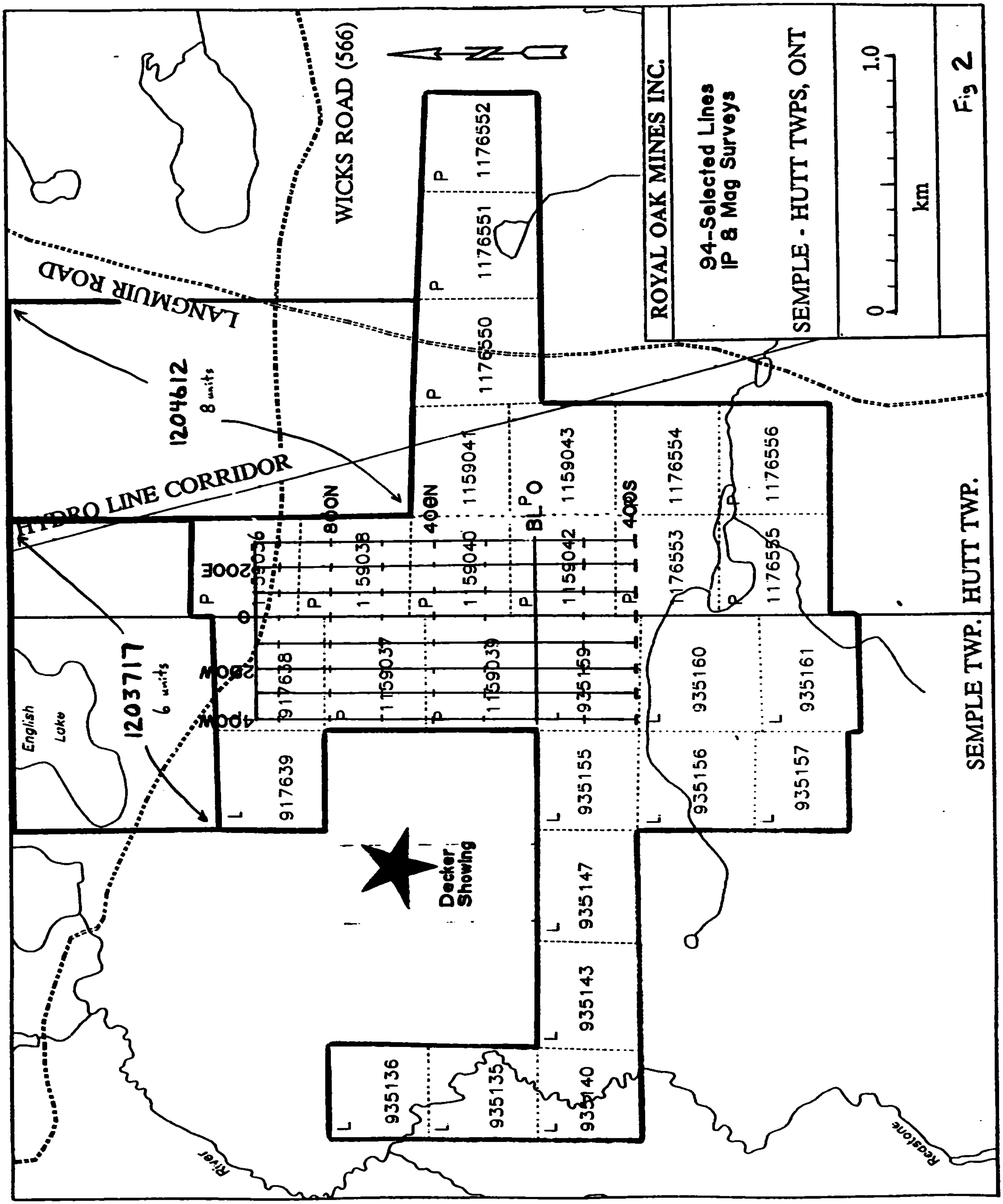

ROYAL OAK MINES INC.
94-Selected Lines
IP & Mag Surveys
SEMPLE - HUTT TWPS, ONT
0
1.0
km
Fig 2
WICKS ROAD (566)
LANGMUIR ROAD
HYDRO LINE CORRIDOR
1204612
8 units
1203717
6 units
English
Lake
Decker
Showing
SEMPLE TWP.
HUTT TWP.
River
Redstone
800N
400N
BL 0
400S
200E
0
200W
400W
1176552
1176551
1176550
1159041
1159043
1176554
1176556
1159036
1159038
1159040
1159042
1176553
1176555
917638
1159037
1159039
935159
935160
935161
917639
935155
935156
935157
935147
935143
935136
935135
935140

TABLE 1

CLAIM LIST
SEMPLE-HUTT PROPERTY

Claim Number	Number of Units	Township
935135	1	Semple
935136	1	Semple
935140	1	Semple
935143	1	Semple
935147	1	Semple
935155	1	Semple
935156	1	Semple
935157	1	Semple
935159	1	Semple
935160	1	Semple
935161	1	Semple
917638	1	Semple
917639	1	Semple
1159037	1	Semple
1159039	1	Semple
1159036	1	Hutt
1159038	1	Hutt
1159040	1	Hutt
1159041	1	Hutt
1159042	1	Hutt
1159043	1	Hutt
1176550	1	Hutt
1176551	1	Hutt
1176552	1	Hutt
1176553	1	Hutt
1176554	1	Hutt
1175555	1	Hutt
1175556	1	Hutt
1203717	6	Semple/Hutt
1204612	8	Hutt
Total	42 units (672 ha)	

3.0 Past Work and Geology

Work in the area of the property dates back to 1958, when Jonsmith Mines Ltd. exposed what is now called the Decker Showing, a series of gold-bearing quartz veins within deformed mafic volcanics. This showing is about 500 m west of the area covered by this report (Fig. 2).

In 1962, geophysical and geological surveys and 5,095 feet of drilling was done by Hollinger, covering the Semple-Hutt property, with work focussing on a pyritic graphite horizon near the small lake in the southern part of the property. Work between 1972 to 1979 consisted mainly of geophysical surveys, and three holes were drilled by Essex Minerals in the area covered by and surrounding the current property.

The Decker Showing was re-worked in 1986-1988 by Pamorex Minerals, who did an I.P. survey, mapping, sampling, as well as drilling seven holes totalling 2,442 feet. Assay results from drilling were disappointing, as they were not as extensive as those from surface sampling.

The property was covered by the Ontario Department of Mines in Map 2291 (1968). The map indicates the bedrock of the property to consist of a sequence of mafic, intermediate and felsic volcanics which have been folded into an east-plunging syncline, which has been subsequently cross-folded.

In 1992, the property was mapped by Royal Oak Mines Inc.

4.0 1994 Program

Between December 5 and 20, 1994, M.C. Exploration Services Inc. (P.O. Box 362, Porcupine, Ontario, P0N 1C0) completed 12.0 km of I.P. and magnetometer survey work, which was supervised by Richard Daigle.

The details of this work are in the Appendix, in a report written by R. Daigle, along with the pertinent maps and pseudo-sections.

5.0 Conclusions and Recommendations

As covered in the Geophysical Report (Appendix) several areas were outlined by the I.P. survey which require further work.

Possible near-surface sulphide mineralization occurs at Line 0 at 0+25S and Line 0 at 5+75N, two areas that require testing by mechanical stripping.

The high chargeability on Line 2E at 7+00N requires drill testing.

Lower priority additional work includes drill testing of the mag and resistivity highs on Lines 0 to 3E north of the baseline.

6.0 List of References

Hogan, J. (1988) Pamorex Minerals Inc., 1987 Exploration Summary Report, Decker Property, Semple Township.

Londry, D. (1987) Report on Geophysical Work, Decker Property, Semple Township.

O.D.M. Map 2291 (1968); Semple and Hutt Townships.

STATEMENT OF QUALIFICATIONS

I, Peter G. Harvey, of the City of Timmins, Province of Ontario, do hereby certify that:

1 I received a B.Sc. degree (Honours) in Geology from Lakehead University, Thunder Bay, Ontario, in 1985.

2 I have been employed as a geologist by various mining companies in Ontario since 1985.

3 I am the author of this report.

4 I have no direct interest, nor do I have any shares of any company exploring the properties described in this report, nor on any adjacent or surrounding properties.

Dated this 4 th day of Jan 1995, Timmins, Ontario.

Peter Harvey

Peter G. Harvey
Project Geologist
Eastern Canada Exploration
Royal Oak Mines Inc.

APPENDIX

Geophysical Report

Maps

I.P. Pseudo-Sections

Geophysical Agenda

Royal Oak Mines Inc. of Timmins, ON, completed 12 kilometers of Time Domain Induced Polarization Survey on the Semple-Hutt Property. M. C. Exploration Services Inc. (MCX) of Porcupine, ON, completed eight sections of IP survey using the Dipole Dipole Array reading n 1 to 6 with a Dipole Spacing "a" of 50 meters. Crews accessed the property travelling 70 km's south down the langmuir bush road out of Porcupine, ON. The fixed transmitter located along the Wicks road supplied power for all eight lines where crews started surveying line 300E then progressed westerly up to line 400W. Lines100E, 0+00, 100W and 200W were problematical when crews attempted to achieve sufficient current for good penetration. Penetrating the high contact-resistance (from 10 to 30 Kohm's) involved using up to four grounding rods with a water-salt-copper sulfate solution to finaly lower the contact resistance for adequate penetration. Production was cut back by 50% until line 300W was reached. The IP survey statisics is included on the following page.

A Total Field Proton Precession Magnetic (TFM) Survey was then requested by Royal Oak and carried out by MCX on Dec. 19th, 1994. The EDA PPM-350 in conjunction with the EDA PPM-400 base station was used to cover the similar 12 km's of NS grid lines. The detailed TFM survey read 970 stations and is leveled with a reference field of 57925nT's. The base station was located on tie line 1100N/ 150W. The TFM data range for the survey is from 57031 to 59969nT's with a mean of 58043nT's.

Equipment specifications and survey procedures are featured in the reports addendum.

The main objective of the geophysical program is to attempt to delineate a geological setting which may host auriferous quartz vein within intermediate to mafic metavolcanics. The showing developed by Pamourex in 1987-88 is assumed to strike near N70DegT. The showing is recognized with the following; minor conductivity where trenching revealed a zone of erratic quartz-calcite veining in silicified, carbonatized and sheared andesite with the quartz and adjacent wallrock well mineralized with disseminated to euthedral pyrite (J. Hogan, 1988 Exploration Summary Report). The mapped east plunging synclinal structure (ODM map 2291) which in turn has been cross-folded onto itself will concern geophysical interpretations.

IP Survey Statistics

line No.	samples taken	Vp (mV's) min-mean-max	Ig (Amps) min-mean-max	SP (mV's) min-mean-max	Survey Direct
300E	153	4.6-334-3064	0.37-2.72-1.8	-104|-2|117	S
200E	153	6.6-210-1437	0.38-1.90-4.5	-254|-7|236	N
100E	148	1.4-298-3589	0.24-1.80-3.2	-304|-5|236	S
0+00	146	1.1-942-32K	0.18-1.20-2.8	-415|-6|453	N
100W	150	1.2-810-15K	0.19-0.78-2.8	-348|-3|486	S
200W	150	2.9-809-24K	0.18-0.89-2.5	-121|-5|112	N
300W	149	1.4-1627-24K	0.20-1.0-2.77	-224|-1|221	S
400W	150	1.3-2514-27K	0.22-0.8-2.60	-175|-2|200	N

_1196 total stations read

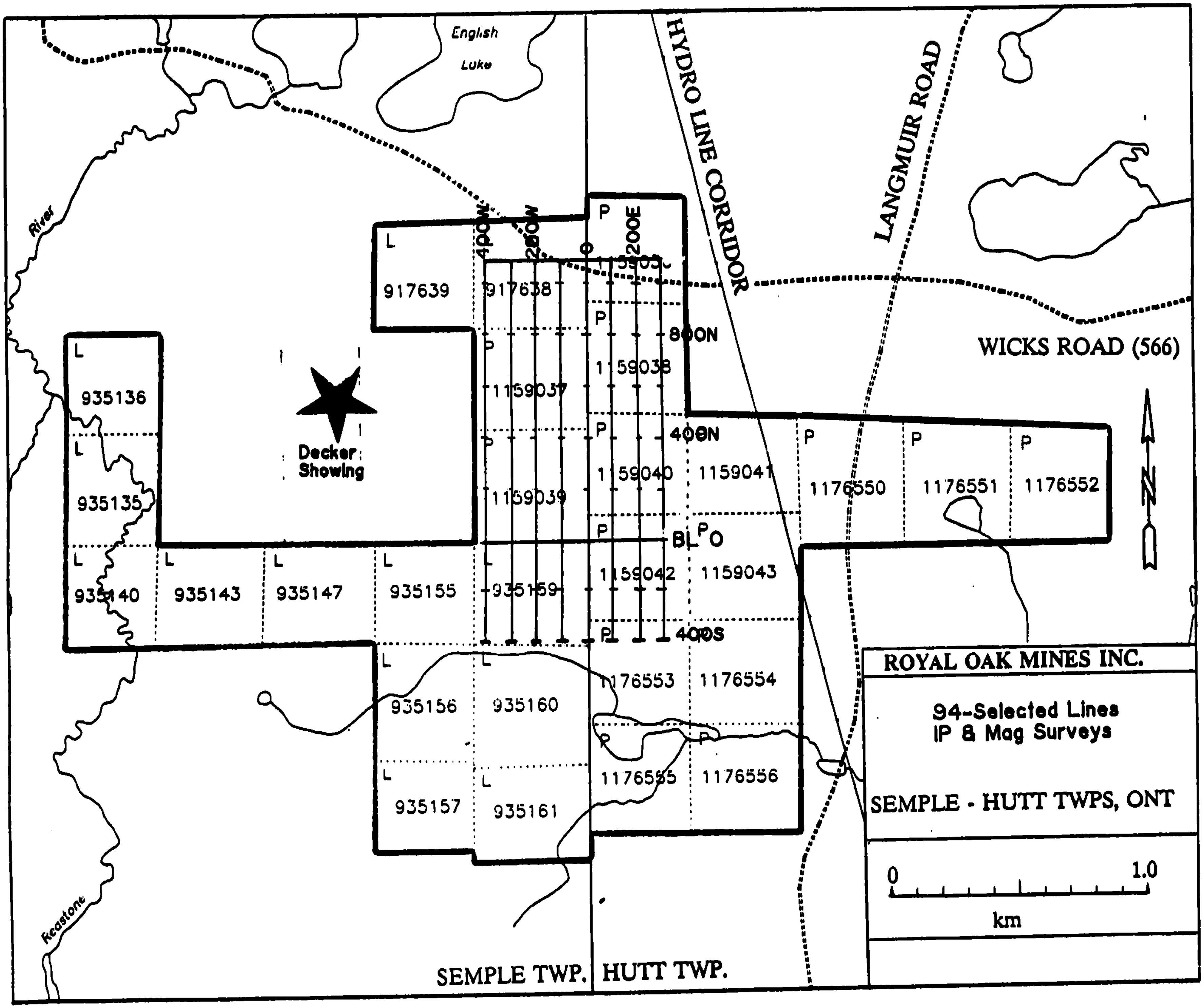
_17 samples lost due to high contact resistance

_10 samples lost due to low resistivity (current channeling along strata conductor)

Current Electrode always on N end of traverse

Project: Semple-Hutt, DplDpl, n=1 to 6 & a = 50m's, Dec 94.

Vp; Primary Voltage Ig; Induced Current


English
Lake
River
HYDRO LINE CORRIDOR
LANGMUIR ROAD
WICKS ROAD (566)
N
Decker
Showing
400W
200W
0
200E
800N
400N
BL
0
400S
917639
917638
1159037
1159038
1159039
1159040
1159041
1159042
1159043
1176550
1176551
1176552
935136
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SEMPLE TWP.
HUTT TWP.
ROYAL OAK MINES INC.
94-Selected Lines
IP & Mag Surveys
SEMPLE - HUTT TWPS, ONT
0
1.0
km

IP Section Evaluations

Line 300E is the first of eight lines read and has four separate anomalies. The first most southern anomaly is obscured (off line) and has a chargeability effect reaching 7 V/mV's with an apparent resistivity of 85 to 245 ohm's/ 50 meters. This characteristic implies sediments underlie the south segment of line 300E. The second IP anomaly from 50N to 250N with lower IP effects (than the afore mentioned), happens within a high apparent resistivity and is characteristic to possible ultramafic intrusive type rocks. The third IP anomaly at 700N with IP high and moderately low apparent resistivity happens along a postulated felsic/intermediate to mafic contact. The fourth IP anomaly is obscured to the north and implies probable sediment type rocks from 800N to 900N. The response over this limited segment correlates with mapped intermediate to mafic metavolcanics (ODM map 2291) thus attributing the lower apparent resistivity to graphite content. Section 300E will be used as a guide to what may be expected on the remaining eight traverses.

The high apparent resistivity responses on the west portion of the grid are nearer to surface comparable to line 300E. This is conformable to the east plunging synclinal structure. The sections show anomalies dipping south from line 300W to line 200E, thus implying that the synclinal structure undertakes an upright tilt near line 100E. The IP high/ resistivity low running along the south limit of the survey implies a felsic/ intermediate to mafic contact runs near 200S across all the lines (4W to 3E). A similar contact runs from line 400W/ 875N to line 0/875N, then takes a sinuous trend crossing line 100E/800N and then line 0 again at 375N and is traceable up to line 200W to then become confined. This occurs in conjunction with the mapped cross-fold seen on ODM map 2291. The broad high IP effects at the north limit of line 300E implies this line runs along strike. Another along strike response is seen on line 400W where a prominent resistivity high occurs. A moderately high resistivity response interrupting the broad high postulates an ultramafic/volcanic contact. The abiding ultramafic (ODM map 2291) on line 400W/50N agrees with the IP survey and is then projected easterly across the grid. The classical IP effect seen on lines 300E and 200E with associated apparent resistivity response infers an intruding ultramafic unit with an upright tilt. Several intense high apparent resistivities due to near surface (or outcrop) effects obscure the deeper n levels, these problematical areas occur as follows; L400W/ 100S to 500N, L300W/ 50N to 550N, L200W/ 100N & 500N to 700N, L100W/ 150N & 550N to 700N and L0/ 125N & 600N to 700N. Two of these surface effects have corresponding significant IP effects located on line 0 at 25S and 575N. Other similar near surface targets occur on lines 100W/ 25N & 525N and 200W/ 25N & 475N & 700N. The near surface high IP effect on line 300W/ 75S happens with a lower apparent resistivity implying a target within intermediate to mafic metavolcanics.

Magnetic Evaluation

The magnetic results on Plan 1 are contoured at a 50 nanoTesla interval and show discontinuous trends. A broad high magnetic susceptibility reaching 1398 nT's intruding from the west (line 0 from 300N to 600N) up to line 0 occurs in conjunction with a high resistivity/ chargeability anomaly which infers a probable ultramafic unit. Two narrower high magnetic trends intruding from the west also happen on line 400W at 125S and 50N, the northern high mag at 50N correlates with mapped ultramafic unit seen on ODM map 2291. These highs then take a sinuous SE trend and become diffused. The most north weak twin highs from line 100E to line 300E associated with high resistivity and chargeability infer that a probable ultramafic unit follows this sinuous trend. The weak high magnetic anomaly seen on line 0 at 150S implies probable sulfide mineralization. The two mag lows seen on line 0 from 525N to 450N and 50N to 50S perhaps reflect alteration, however are likely dipole effects from the flanking mag highs. The high mag reaching beyond 1900 nT's above background seen at the north limit of line 300W correlates with the mag high mapped by D. Londry (1987 Geophysical Report). This high magnetic trend was then associated with variable concentrations of disseminated magnetite appearing to confirm a localized, tight fold in the area of the main zone.

Implications

The IP survey delineates several targets of significance where further testing is warranted. The near surface effects can perhaps be investigated by stripping. Two prominent key areas suggesting near surface sulfide mineralization are as follows; Line 0/25S and Line 0/575N. Both of these targets are traceable on line 100W and happen near surface. The IP high resistivity low on line 200E at 700N merits drill testing, however it can perhaps be correlated with the near surface anomaly seen on line 0 at 575N. Drill testing of the mag, IP, and resistivity highs trending across lines 0 to 300E north of the baseline would confirm the source of the intrusive unit.

Recommending more TFM survey be done on the target area in an EW direction at 100m intervals. This type survey can be done on compass orientated lines and tied into existing cut lines. The mag and IP targets seen at the north limit of the gridded area are problematical and warrant further investigation.

R. J. Daigle.
Dec. 27, 1994.

I, Richard Daigle of Timmins, Ontario

Certify

1. Three years of HLEM (max-min) evaluation under the supervision of Mr. J. Betz (1979 - 1981).

2. Five years conducting, evaluating Geophysical surveys for Kidd Creek Mines Ltd under supervision of Mr. D. Londry (1981 - 1985).

3 Six years contracting various geophysical surveys in Bathurst, N.B. (1986 - 1991).

4. Third year as geophysical evaluator for M. C. Exploration Services Inc., Timmins Ontario.

6. I have no direct interest in the property reported upon.

Dated Dec 27th, 94.

Timmins, Ontario.

Mr. R. J. Daigle

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 frequency of this precession is proportional to the earth's magnetic field intensity.

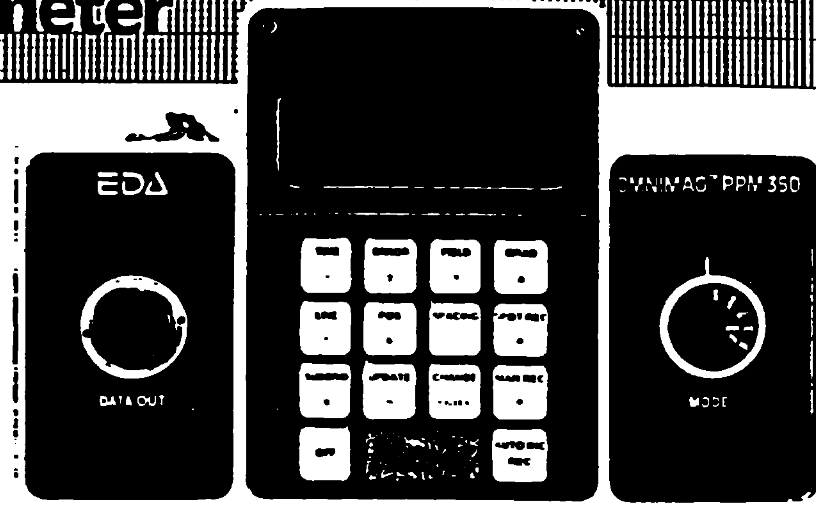
Field Method:

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.

OMNIMAG PPM-350 Total Field Magnetometer

EDA



The PPM-350 is the latest addition to EDA's OMNIMAG* ™ series of magnetometers and gradiometers. It is engineered to provide users with the latest state-of-the-art advances in microprocessor technology, including many features that are unique in the field.

Major benefits and features Include:

- Significant increase in productivity
- Lowered survey costs
- Automatic diurnal correction
- Programmable grid coordinates
- Highly reproduceable data
- Ergonomic design
- Simplified fieldwork
- Computer-compatible

EDA

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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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).

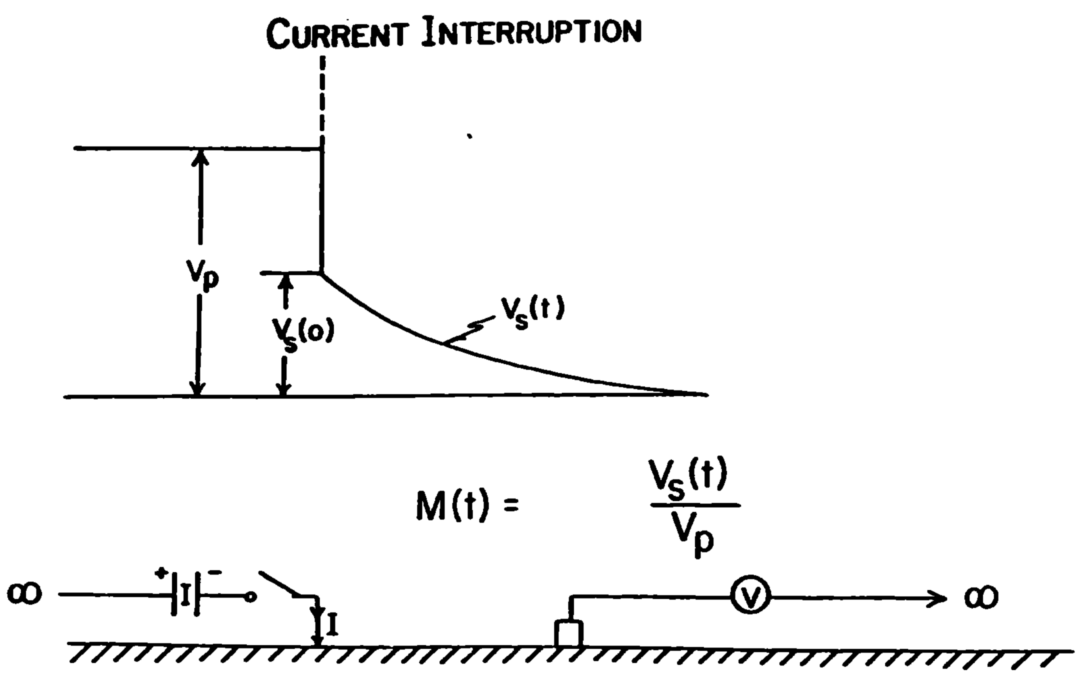


FIGURE 1: Schematic illustration of the transient type measurement of IP response.

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.

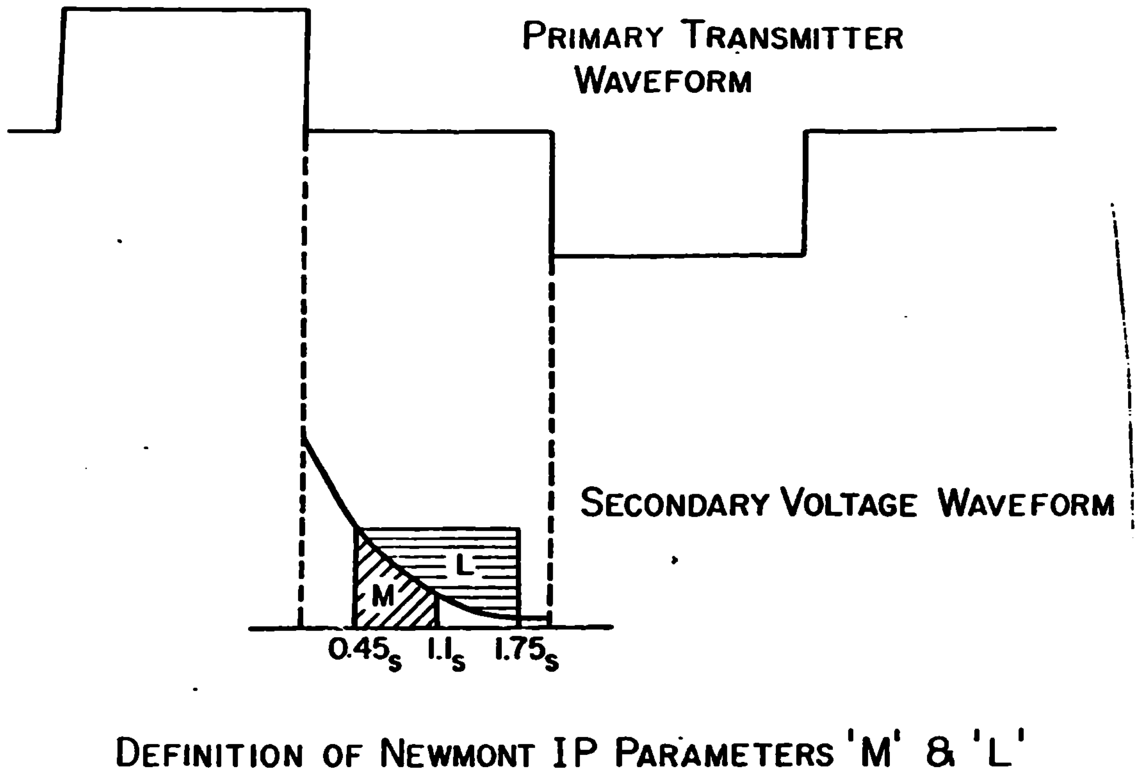


FIGURE 2: Definition of the Newmont IP Parameters "L" and "M".

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.

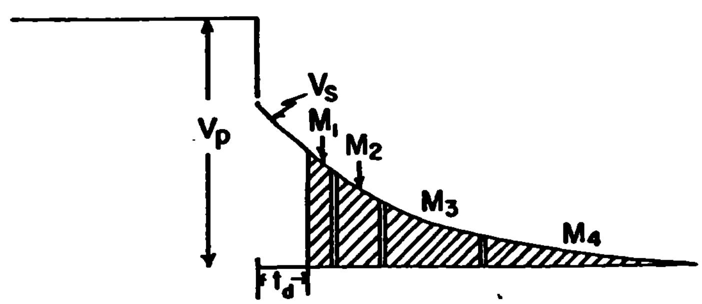
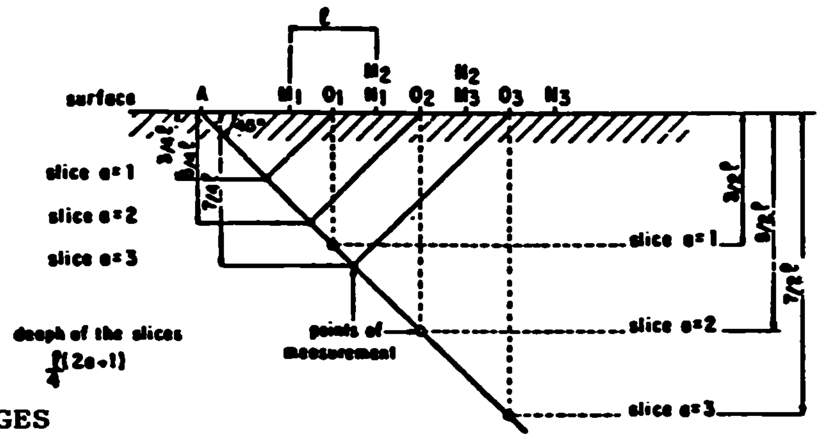


FIGURE 3: Figure 3, typical chargeability gate definition on a multi-gate time domain IP receiver.

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

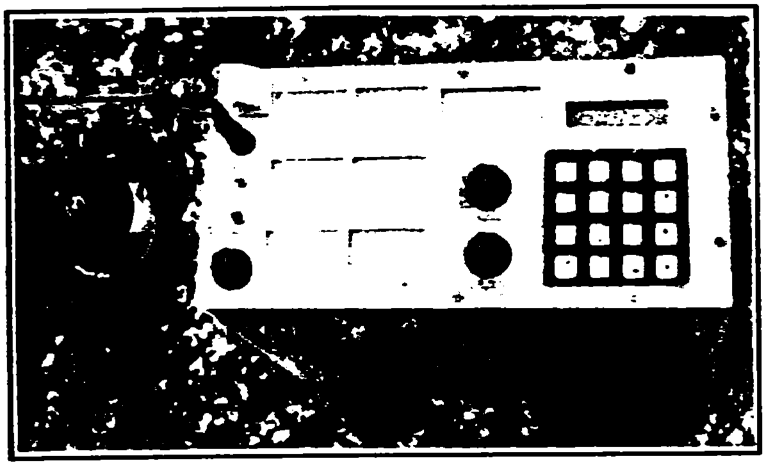
1. Good SP rejection. The strong signal to noise ratio effectively *eliminates the SP effect.*
2. *Not susceptible to "masking" effects. This is the recommended array in areas of conductive overburden.*
3. *A fairly sensitive and selective array.*
4. *Returns highest Vp of all arrays. Hence it is ideal 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.*

ANDROTEX TDR - 6

SIX DIPOLE TIME DOMAIN IP RECEIVER



The TDR-6 induced polarization receiver is a highly cost-effective instrument for the detailed measurements of induced polarization 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 program.

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

ANDROTEX LIMITED
GEOPHYSICAL INSTRUMENTS

6815 REXWOOD RD. UNIT 1
MISSISSAUGA, ONTARIO, L4V 1M2
Phone: (416) 677-7919 CANADA

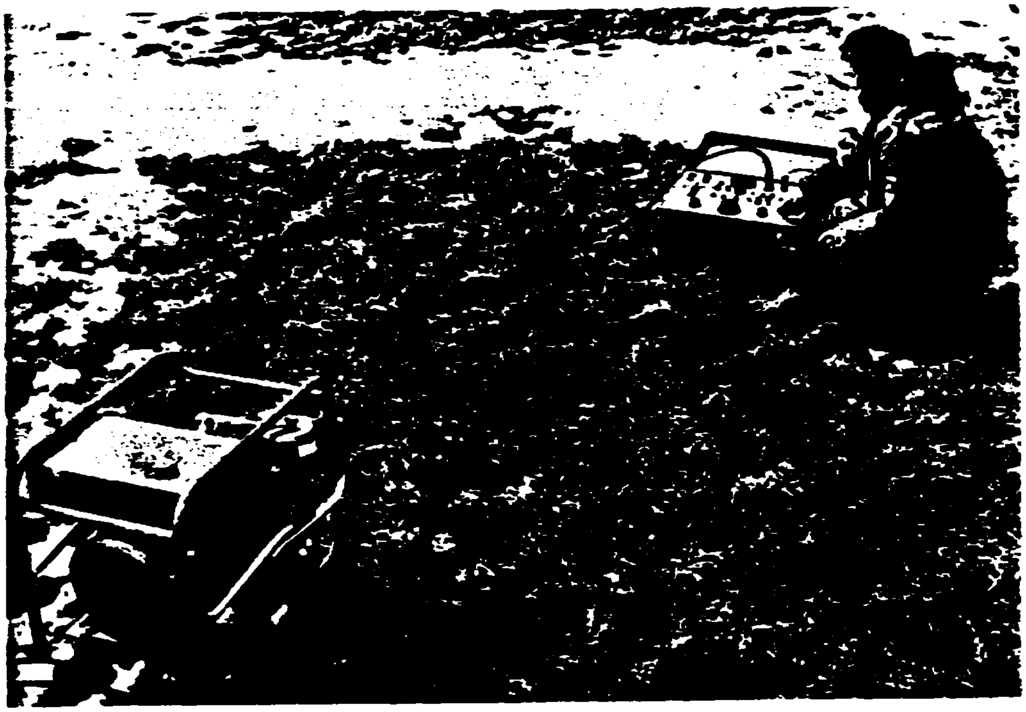
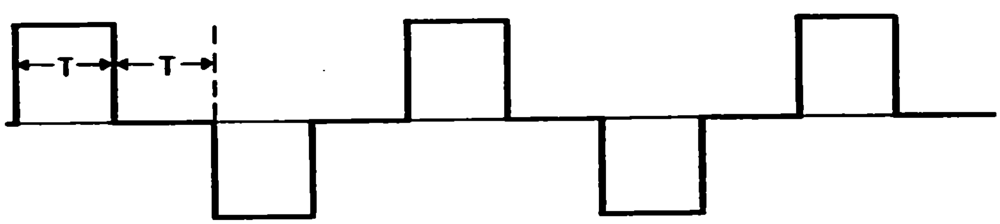


Figure 2
The TSQ-3 Transmitter and Motor-Generator Set

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.**

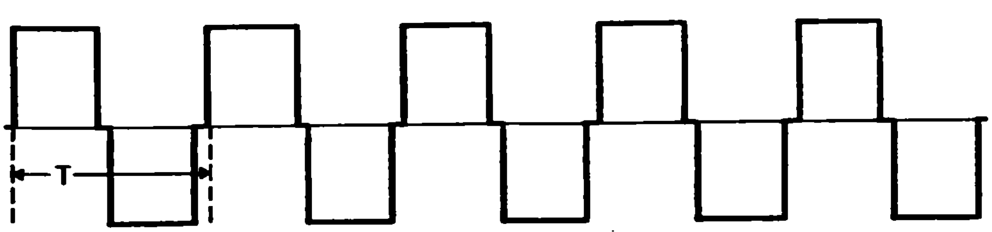


Figure 3
The TSQ-3 Output Waveforms

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.

Ministry of Northern Development and Mines
Ontario

Report of Work Conducted After Recording Claim

Mining Act

Transaction Number
W9560.00001

Personal information collected on this form is obtained under the authority of the Mir this collection should be directed to the Provincial Manager, Mining Lands, Minis Sudbury, Ontario, P3E 6A5, telephone (705) 670-7264.

42A03SE0018 2.15909 SEMPLE

900

Instructions:
- Please type or print and submit in duplicate.
- Refer to the Mining Act and Regulations for requirements of filing assessmen or consu ...ning Recorder.
- A separate copy of this form must be completed for each Work Group.
- Technical reports and maps must accompany this form in duplicate.
- A sketch, showing the claims the work is assigned to, must accompany this form.

Recorded Holder(s)		Client No.
ROYAL OAK MINES INC.		136226
Address: P.O. BAG 2010, TIMMINS, ONT P4N 7X7		Telephone No.: 360-1141
Mining Division: PORCUPINE	Township/Area: SEMPLE and HUTT TWPS	M or G Plan No.: M-1100 and G-3948
Dates Work Performed From: Dec 5 1994	To: Dec 20 1994	

Work Performed (Check One Work Group Only)

	Work Group	Type
✓	Geotechnical Survey	Geophysical Survey - I.P. and Mag
	Physical Work, Including Drilling	
	Rehabilitation	
	Other Authorized Work	
	Assays	
	Assignment from Reserve	

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Total Assessment Work Claimed on the Attached Statement of Costs $ 10,110.00

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
Peter Harvey (Author)	c/o ROYAL OAK MINES, P.O. Bag 2010, Timmins, Ont P4N 7X7
M.C. Exploration Services Inc.	Po Box 362, Porcupine, Ont. P0N 1C0

(attach a schedule if necessary)

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

	Date	Recorded Holder or Agent (Signature)
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.	Jan 4 '95	Peter Harvey

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: Peter Harvey c/o ROYAL OAK MINES, P.O. Bag 2010, Timmins, Ont P4N 7X7

Telepone No.	Date	Certified By (Signature)
360-1141	Jan 4 '95	Peter Harvey

For Office Use Only

Total Value Cr. Recorded	Date Recorded	Mining Recorder	Received Stamp
$10,110.00		(undated) T. Birkley	RECEIVED JAN 4 1995 PORCUPINE MINING DIVISION
	Deemed Approval Date: April 4, 1995	Date Approved	
	Date Notice for Amendments Sent		

0241 (03/91)

W9560.00001

Work Report Number for Applying Reserve	Claim Number (see Note 2)	Number of Claim Units	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Value Assigned from this Claim	Reserve: Work to be Claimed at a Future Date
2.15909	935136	1	ø	400		
	935135	1	ø	400		
	935140	1	ø	400		
	935143	1	ø	ø		
	935147	1	ø	ø		
	935155	1	ø	ø		
	935156	1	ø	400		
	935157	1	ø	400		
	935159 ✓	1	1444	400	~~1044~~ 934 PH	110
	935160	1	ø	400		
	935161	1	ø	400		
	917638 ✓	1	723	400	323	
	917639	1	ø	400		
	1159037 ✓	1	1444	400	1044	
	1159039 ✓	1	1444	400	1044	
	1159036 ✓	1	723	400	323	
	1159038 ✓	1	1444	400	1044	
	1159040	1	1444	400	1044	
	1159041	1	ø	400		
	1159042 ✓	1	1444	400	1044	
	1159043	1	ø	400		
	1176550	1	ø	400		
	1176551	1	ø	400		
	1176552	1	ø	400		
	1176553	1	ø	400		
	1176554	1	ø	400		
	1176555	1	ø	400		
	1176556	1	ø	400		
	Total Number of Claims		Total Value Work Done: 10,110	Total Value Work Applied: 10,000	Total Assigned From: ~~6910~~ 6800 PH	Total Reserve: 110

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

1. ☐ Credits are to be cut back starting with the claim listed last, working backwards.
2. ☑ Credits are to be cut back equally over all claims contained in this report of work.
3. ☐ Credits are to be cut back as priorized on the attached appendix.

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 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

0241 (03/91)

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: W9560.00001

2.15909

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) 670-7264.

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) 670-7264.

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 Geophysics	10,110.00	
			10,110.00
Supplies Used Fournitures utilisées	Type		
Equipment Rental Location de matériel	Type		
		Total Direct Costs Total des coûts directs	10,110.00

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		
Food and Lodging Nourriture et hébergement			
Mobilization and Demobilization Mobilisation et démobilisation			
		Sub Total of Indirect Costs Total partiel des coûts indirects	
		Amount Allowable (not greater than 20% of Direct Costs) Montant admissible (n'excédant pas 20 % des coûts directs)	
		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)	10,110.00

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MINING LANDS BRANCH

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
	× 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
	× 0,50 =	

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 Project Geologist (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 le plus exact 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: Peter Harvey — Date: Jan 4 '95

0212 (04/91)

Nota : Dans cette formule, lorsqu'il désigne des personnes, le masculin est utilisé au sens neutre.

Ontario

Ministry of Northern Development and Mines
Ministère du Développement du Nord et des Mines

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

Our File: 2.15909
Transaction #: W9560.00001

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

March 28, 1995

Mining Recorder
Ministry of Northern Development & Mines
60 Wilson Avenue
1st Floor
Timmins, Ontario
P4N 2S7

Dear Sir:

Subject: APPROVAL OF ASSESSMENT WORK CREDITS ON MINING CLAIMS P.935159 ET AL IN SEMPLE AND HUTT TOWNSHIPS

Assessment work credits have been approved as outlined on the original report of work. The credits have been approved under Section 14, Geophysics, Mining Act Regulations.

The approval date is March 27, 1995.

If you have any questions regarding this correspondence, please contact Lucille Jerome at (705) 670-5855.

ORIGINAL SIGNED BY:

Ron C. Gashinski
Senior Manager, Mining Lands Section
Mining and Land Management Branch
Mines and Minerals Division

LJ/jl
Enclosure:

cc: Resident Geologist
Timmins, Ontario

Assessment Files Library
Sudbury, Ontario

Royal Oak
Mines Inc.

Eastern Canada Exploration Division
P.O. Bag 2010
Timmins, Ontario
P4N 7X7

Tel: (705) 360-1141
Fax: (705) 360-1532

1 August 1994

2.15909

Ontario Mining Recorder's Offices
Ministry of Northern Development and Mines

RE: Authorization of Paul Coad, Richard Labine, Peter Harvey, Reno Pressacco and/or Diane Carter to act as agent for Royal Oak Mines Inc. when dealing with the submission of work reports

This is to certify that Paul Coad, Richard Labine, Peter Harvey, Reno Pressacco and/or Diane Carter are authorized to act as agents for Royal Oak Mines Inc. for the purpose of filing assessment work credits and their distribution for a period of one (1) year or until further notice.

Yours truly,

ROYAL OAK MINES INC.

Ross F. Burns
Vice President, Exploration

RFB/lha

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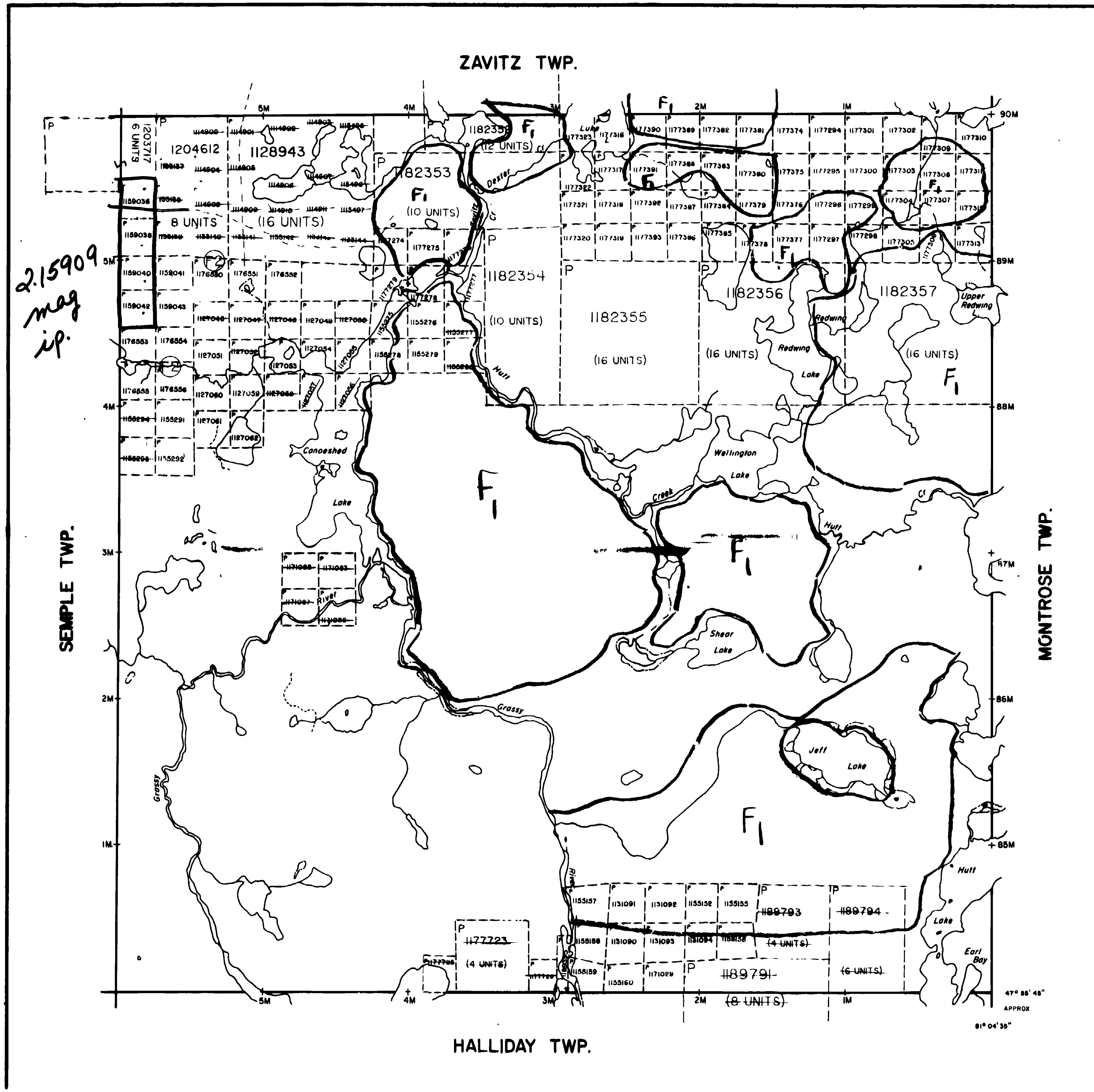
MAR 24 1995
MINING LANDS BRANCH

HUTT TWP.



2.15909 mag ip.

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	Ⓢ

~~THIS TWP [redacted] FURTHER INFORMATION ON FILE.~~
~~THIS TWP IS SUBJECT TO FOREST ACTIVITY IN 1993/94 FURTHER INFORMATION ON FILE.~~

SCALE 1 INCH = 40 CHAINS 2.15909

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

Ⓕ THIS TWP IS SUBJECT TO FOREST ACTIVITY IN 1995/96 FURTHER INFORMATION AVAILABLE ON FILE

TOWNSHIP
HUTT

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

ISSUED 12 · 199? PORCUPINE MINING DIVISION

RECEIVED MAR 24 1995 MINING LANDS BRANCH

Ontario
Ministry of Natural Resources
Ministry of Northern Development and Mines

Date JUNE, 1992
ACTIVATED JULY 16, 1992 BY D.C.
CHECKED BY G.W.

Number
G-3948

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

42A03SE0018 2.15909 SEMPLE

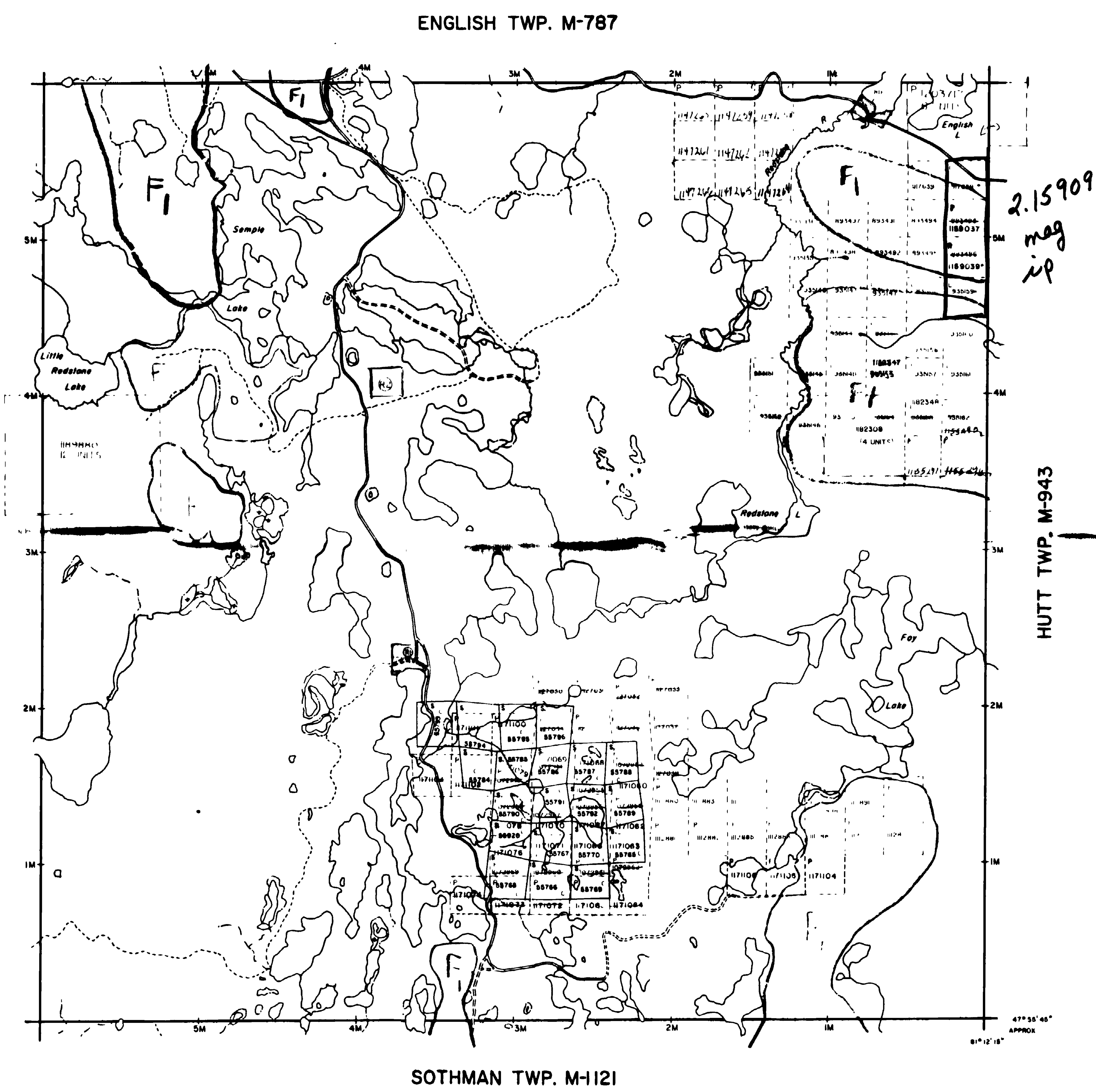
200

HUTT TWP.

G-394

M-1100

SEMPLE TWP.



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

NOTES

400' surface rights reservation along the shores of all lakes and rivers.

F1 - SUBJECT TO FORESTRY ACTIVITY
1994/95
1995/96

Areas withdrawn from staking under Section 43 of the Mining Act (R.S.O. 1970)

Order	File	Date	Disposition
(R1) W18/78	188543	10/4/78	S.R.O.

(R2) MINING AND SURFACE RIGHTS WITHDRAWN FROM PROSPECTING, STAKING OUT, SALE OR LEASE UNDER SECTION 35 OF THE MINING ACT R.S.O 1990 ORDER NO. W-F 44/94 NER DATED 94-MAY-02

ACTIVATED APRIL 24, 1990 DC

LEGEND

PATENTED LAND	Ⓟ or ●*
PATENTED FOR SURFACE RIGHTS ONLY	◒*
LEASE	
LICENSE OF OCCUPATION	L.O.
CROWN LAND SALES	C.S.
LOCATED LAND	Loc.
CANCELLED	C.
MINING RIGHTS ONLY	M.R.
SURFACE RIGHTS ONLY	S.R.O.
HIGHWAY & ROUTE NO.	(17)
ROADS	
TRAILS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	⚒

*used only with summary plans or when space is limited

2.15909

RECEIVED MAR 24 1995 MINING LANDS BRANCH

TOWNSHIP OF

SEMPLE

DISTRICT OF SUDBURY

PORCUPINE MINING DIVISION

PORCUPINE MINING DIVISION

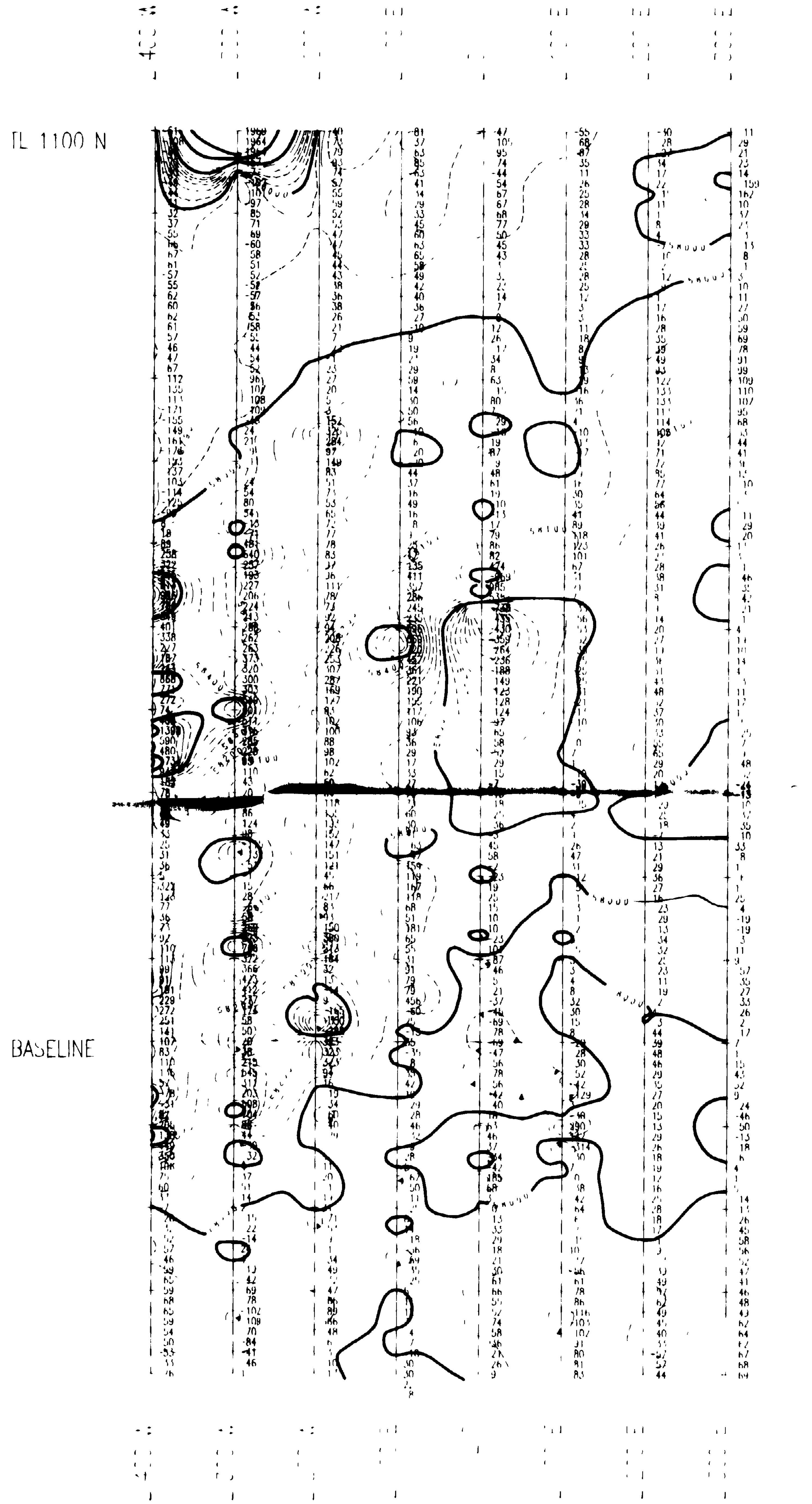
SCALE : 1 INCH - 40 CHAINS (1/2 MILE)

DR. R W NOBLE	PLAN NO. M-1100
DATE APR. 22, 71	

ONTARIO
DEPARTMENT OF MINES
AND NORTHERN AFFAIRS

42A03SE0018 2.15909 SEMPLE

210



LEGEND

Total Field Magnetic Contours
58000nT Base Subtracted
Pen 1, 50 nT Interval, 57050-59950 nT's
Pen 2, 100 nT Interval, 57800-59800 nT's
Pen 3, 500 nT Interval, 58000-59500 nT's

Base Station, 1100N/150W, 57925nT Ref. Fld
970 Surveyed Station, Mean 58433nT's
58046nT to 64292nT Magnetic Range.

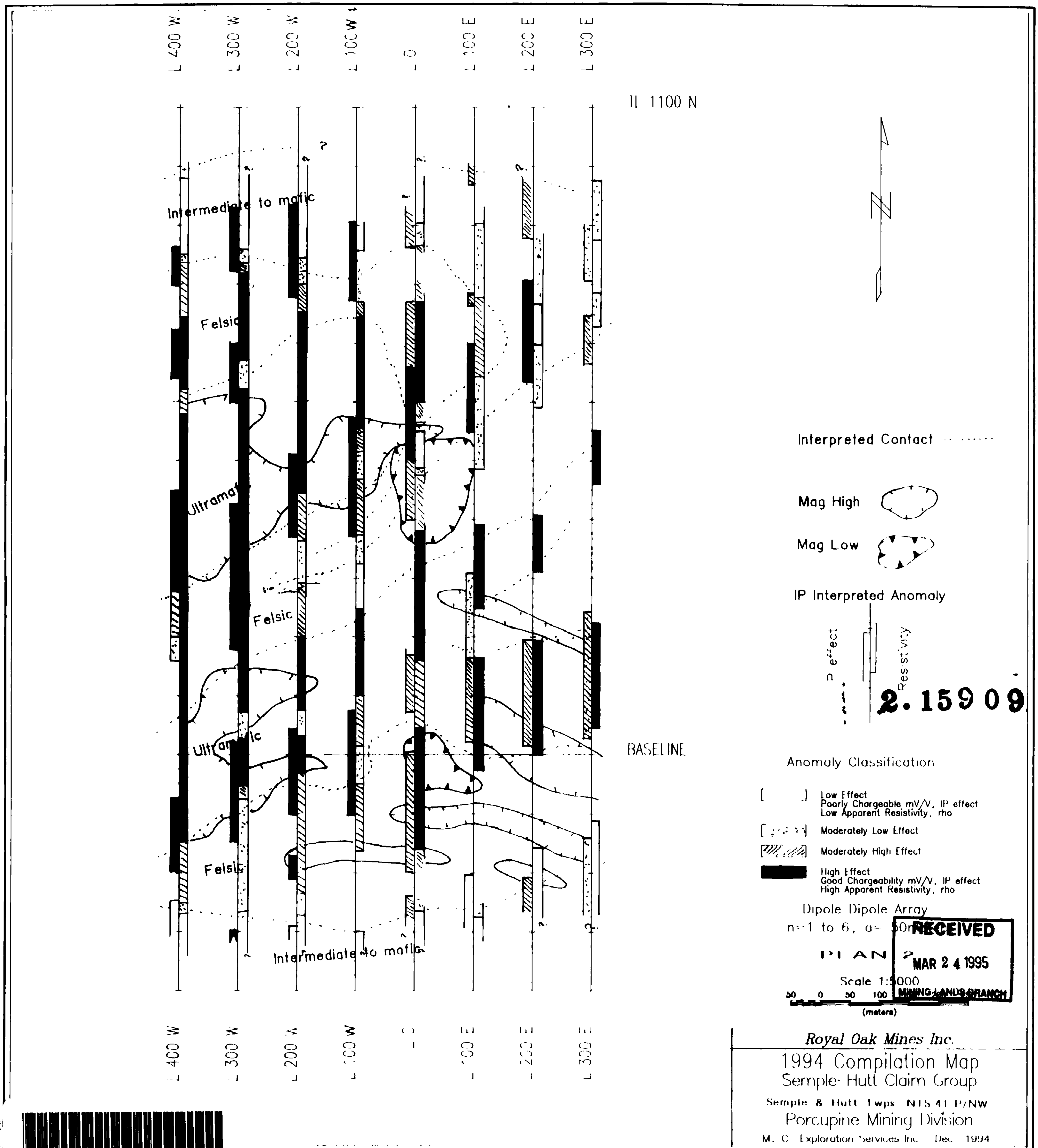
INSTRUMENTS
OMNI IV PPM 350, portable unit
OMNI IV PPM 400, base station unit

PLAN 1

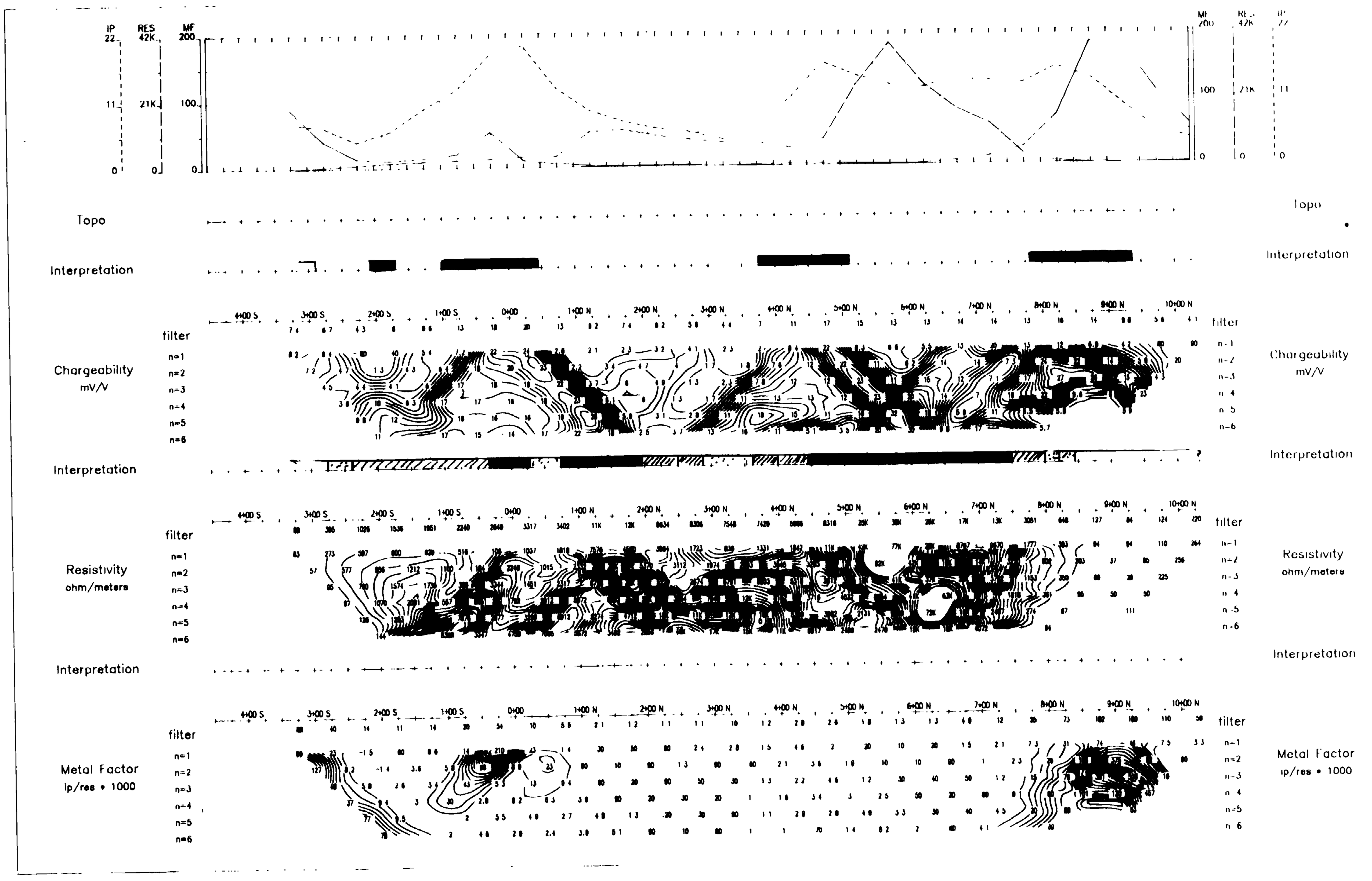
Scale 1:5000
50 0 50 100 150 200 250
(meters)

2.15909

ROYAL OAK Mines Inc.
Magnetic Survey
Semple Hutt Claim Group
Semple & Hutt Twps., NTS:41 P/NW
Porcupine Mining Division
M... Exploration Services Inc. Dec. 1994



L 400 W
L 300 W
L 200 W
L 100 W
L 0
L 100 E
L 200 E
L 300 E
TL 1100 N
Intermediate to mafic
Felsic
Ultramafic
Felsic
Ultramafic
Felsic
Intermediate to mafic
BASELINE
Interpreted Contact
Mag High
Mag Low
IP Interpreted Anomaly
Resistivity
2.15909
Anomaly Classification
Low Effect
Poorly Chargeable mV/V, IP effect
Low Apparent Resistivity, rho
Moderately Low Effect
Moderately High Effect
High Effect
Good Chargeability mV/V, IP effect
High Apparent Resistivity, rho
Dipole Dipole Array
n=1 to 6, a= 50m
PLAN
Scale 1:5000
50 0 50 100
(meters)
Royal Oak Mines Inc.
1994 Compilation Map
Semple-Hutt Claim Group
Semple & Hutt Twps NTS 41 P/NW
Porcupine Mining Division
M. C. Exploration Services Inc. Dec. 1994



RECEIVED
MAR 2 4 1995
MINING LANDS BRANCH

2.15909

L 200W

Dipole Dipole Array

a = 50M

plot point

Filter n1 n2 n3 n4

	Cont Intervals	Profiles
Resistivity	250 ohm/meter	
Chargeability	1.0 mV/V	
Metal Factor	10 %	

INSTRUMENTS

Androtex TDR6, Time Domain Receiver
1760mSec Total Intergration Time, 80mS Delay
MI (80+80+80+80+160+160+160+320+320+320) mSec
Scintrex ISQ 3 Tansmitter
8Second Total Duty Cycle, 2Sec On/Off Time.

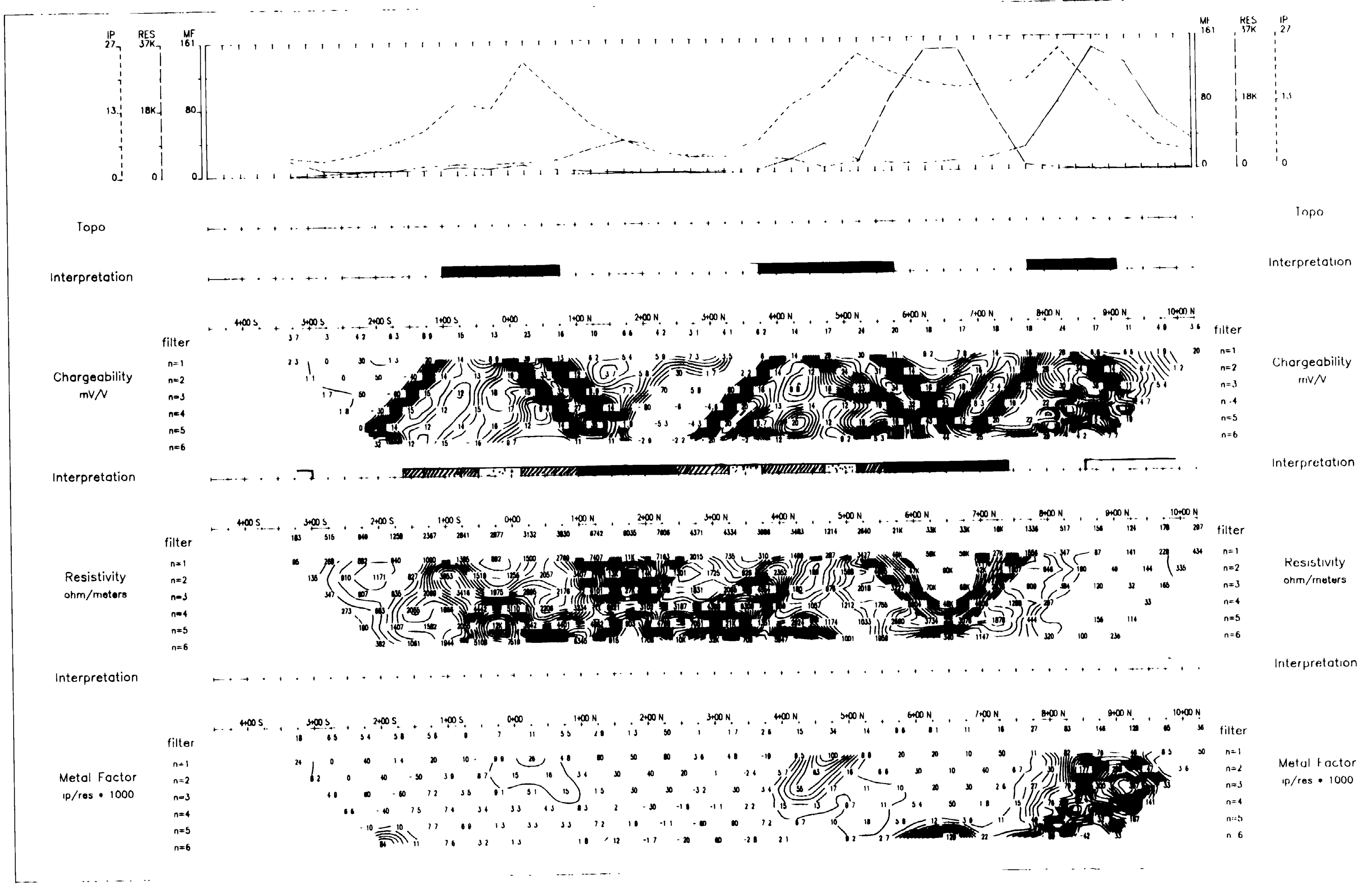
INTERPRETATION

- Low Effect — Poorly Chargeable mV/V, IP effect; Low Apparent Resistivity, rho
- Moderately Low Effect
- Moderately High Effect
- High Effect — Good Chargeability mV/V, IP effect; High Apparent Resistivity, rho

Scale 1:5000 (meters)

Royal Oak Mines Inc

Induced Polarization Survey
Semple Hutt Claim Group
Hutt Twp. NTS: 41 - P / NW
Porcupine Mining Division
M. C. Exploration Services Inc. Dec 1994.



L 100W

Dipole Dipole Array

a = 50M

plot point

Filter n1 n2 n3 n4

	Cont Intervals	Profiles
Resistivity	250 ohm/meter	
Chargeability	1.0 mV/V	
Metal Factor	10 %	

INSTRUMENTS

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Scintrex ISQ-3 Tansmitter
8Second Total Duty Cycle, 2Sec On/Off Time.

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Scale 1:5000 (meters)

Royal Oak Mines Inc.

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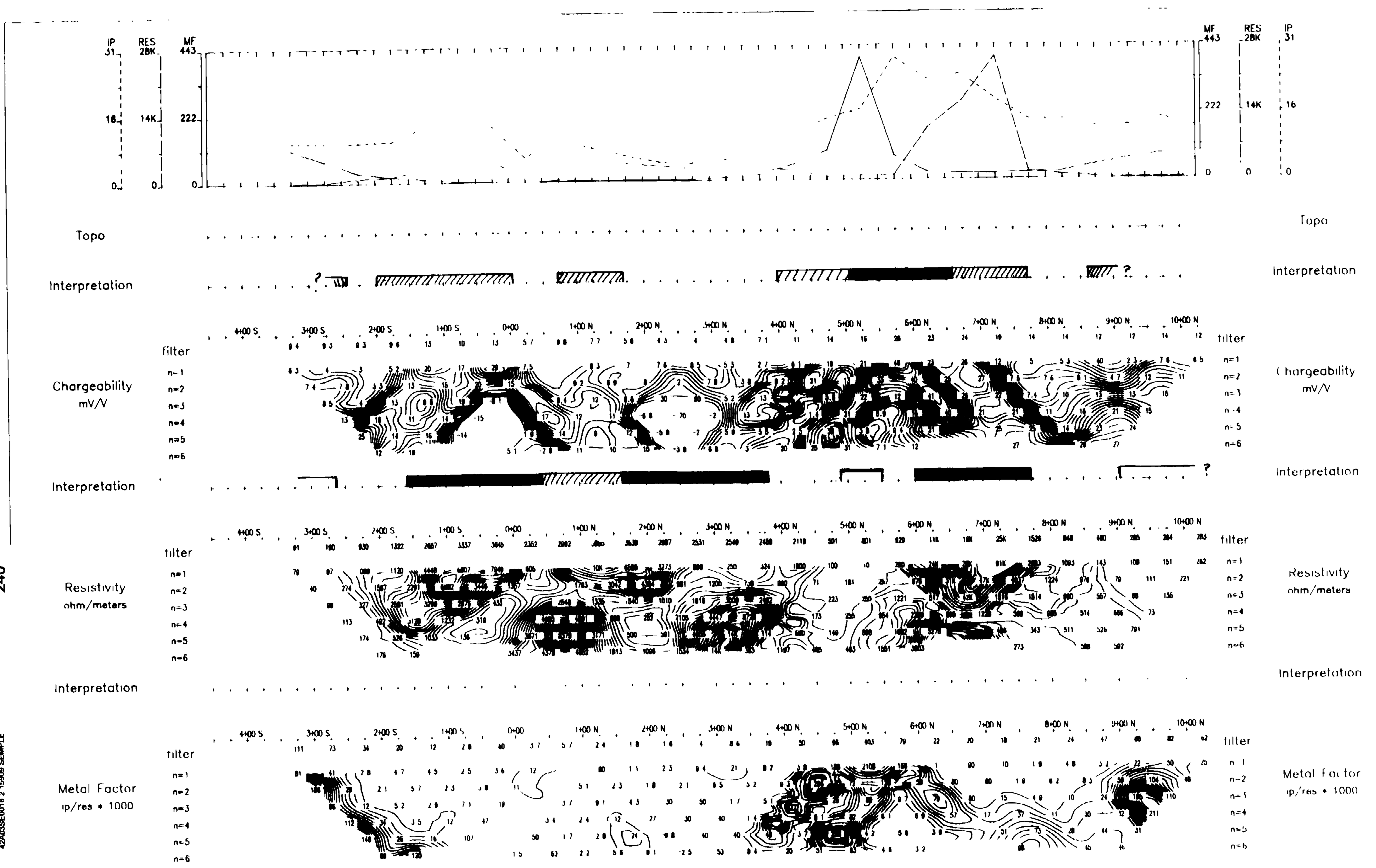
Semple Hutt Claim Group
Hutt Twp. NTS: 41 P / NW
Porcupine Mining Division
M. C. Exploration Services Inc. Dec 1994.



L 0+00

Dipole-Dipole Array

a = 50M

plot point

Filter n1 n2 n3 n4

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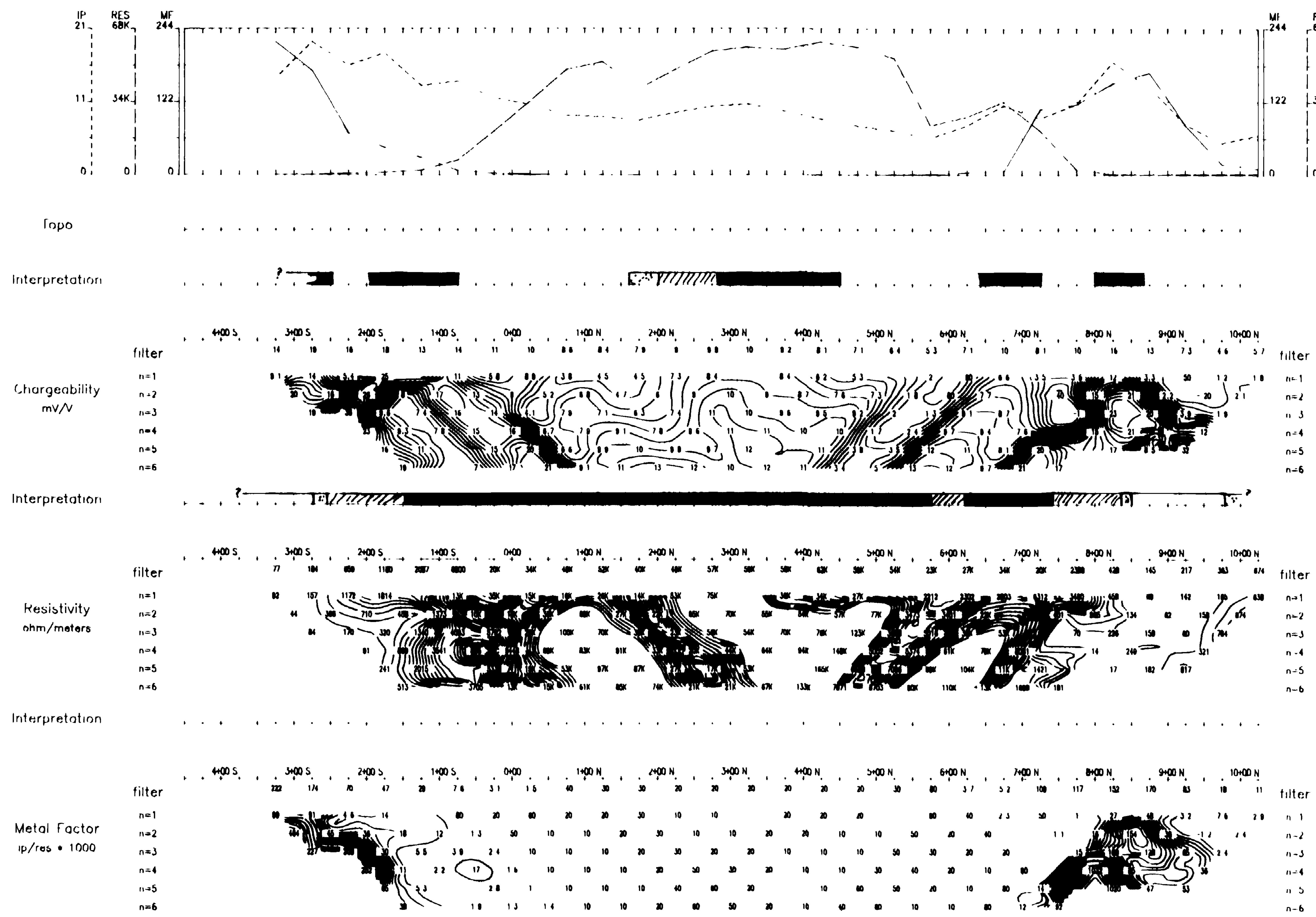
Porcupine Mining Division
M. C. Exploration Services Inc. Dec 1994



L 400W

2.15909

Dipole-Dipole Array

a=50M

plot point

Filter

n1
n2
n3
n4

	Cont. Intervals	Profiles
Resistivity	250 ohm/meter	
Chargeability	1.0 mV/V	
Metal Factor	10 %	

INSTRUMENTS

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1760mSec Total Intergration Time, 80mS Delay
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Scintrex TSQ-3 Tansmitter
8Second Total Duty Cycle, 2Sec On/Off Time

INTERPRETATION

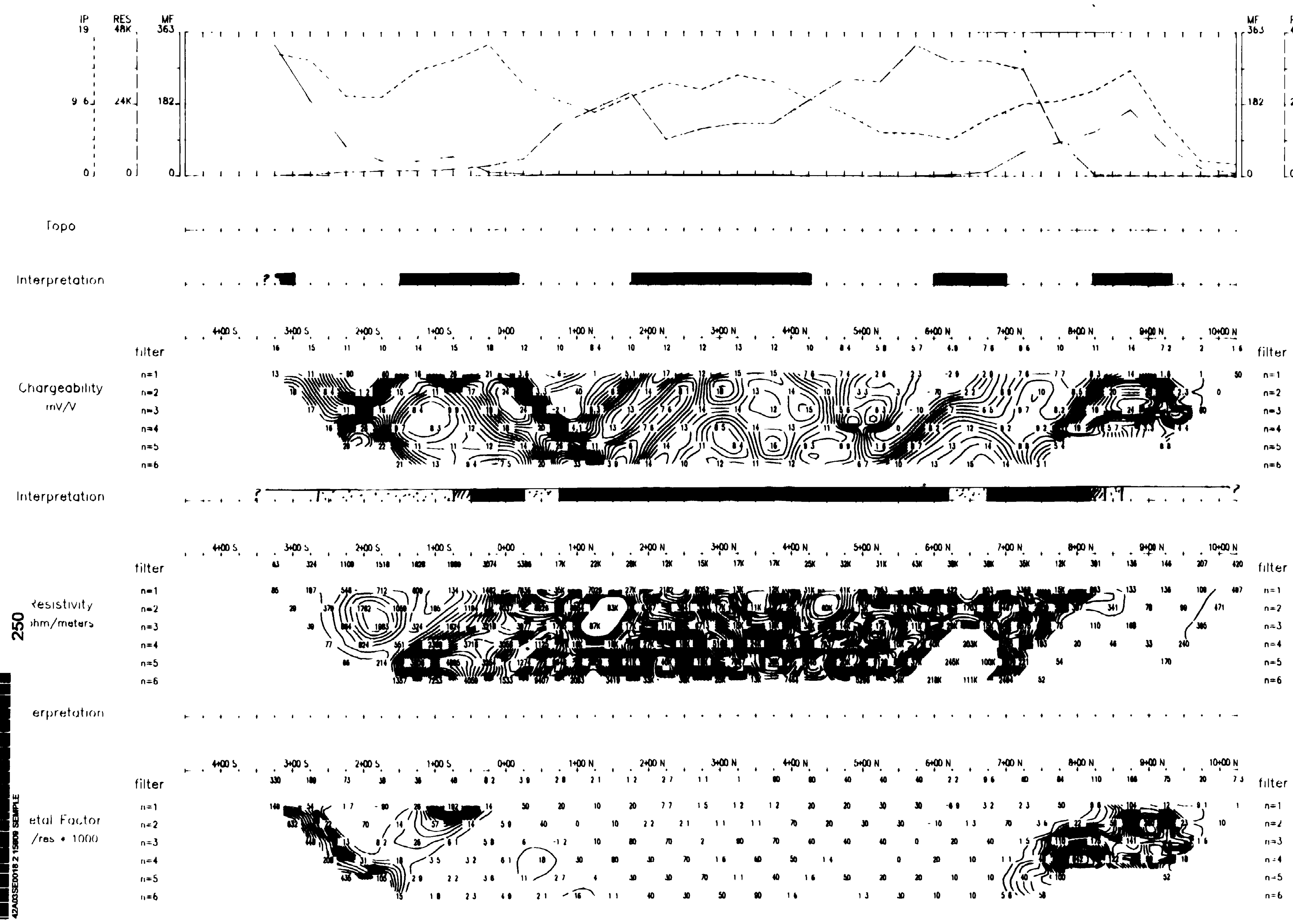
Low Effect Poorly Chargeable mV/V, IP effect Low Apparent Resistivity, rho
Moderately Low Effect
Moderately High Effect
High Effect Good Chargeability mV/V, IP effect High Apparent Resistivity, rho

Scale 1:5000

50 0 50 100 150 200 250 300 (meters)

Royal Oak Mines Inc

Induced Polarization Survey
Semple - Hutt Claim Group
Hutt Twp. NTS: 41 P / NW
Porcupine Mining Division
M. C. Exploration Services Inc. Dec 1994.



L 300W

Dipole-Dipole Array

a=50M

plot point

Filter

n1
n2
n3
n4

	Cont. Intervals	Profiles
Resistivity	250 ohm/meter	
Chargeability	1.0 mV/V	
Metal Factor	10 %	

INSTRUMENTS

Androtex TDR6, Time Domain Receiver
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8Second Total Duty Cycle, 2Sec On/Off Time

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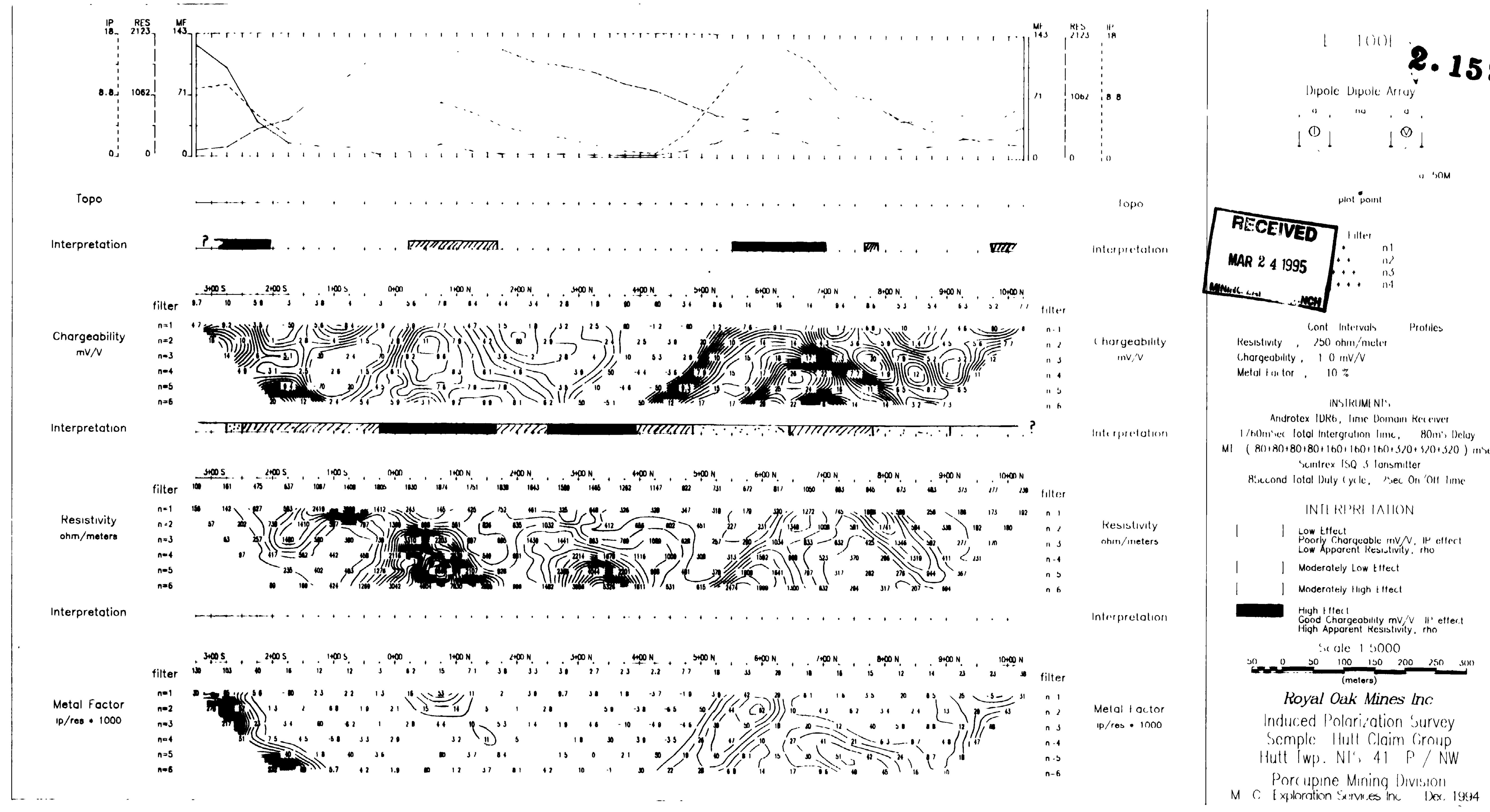
M. C. Exploration Services Inc. Dec 1994


2.15909
L 100E
Dipole Dipole Array
plot point
RECEIVED
MAR 24 1995
Filter
n1
n2
n3
n4
Cont. Intervals
Profiles
Resistivity , 250 ohm/meter
Chargeability , 1.0 mV/V
Metal Factor , 10 %
INSTRUMENTS
Androtex TDR6, Time Domain Receiver
1760mSec Total Intergration Time, 80mS Delay
MF (80+80+80+80+160+160+160+320+320+320) mSec
Scintrex TSQ 3 Tansmitter
8Second Total Duty Cycle, 2Sec On/Off Time
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Moderately High Effect
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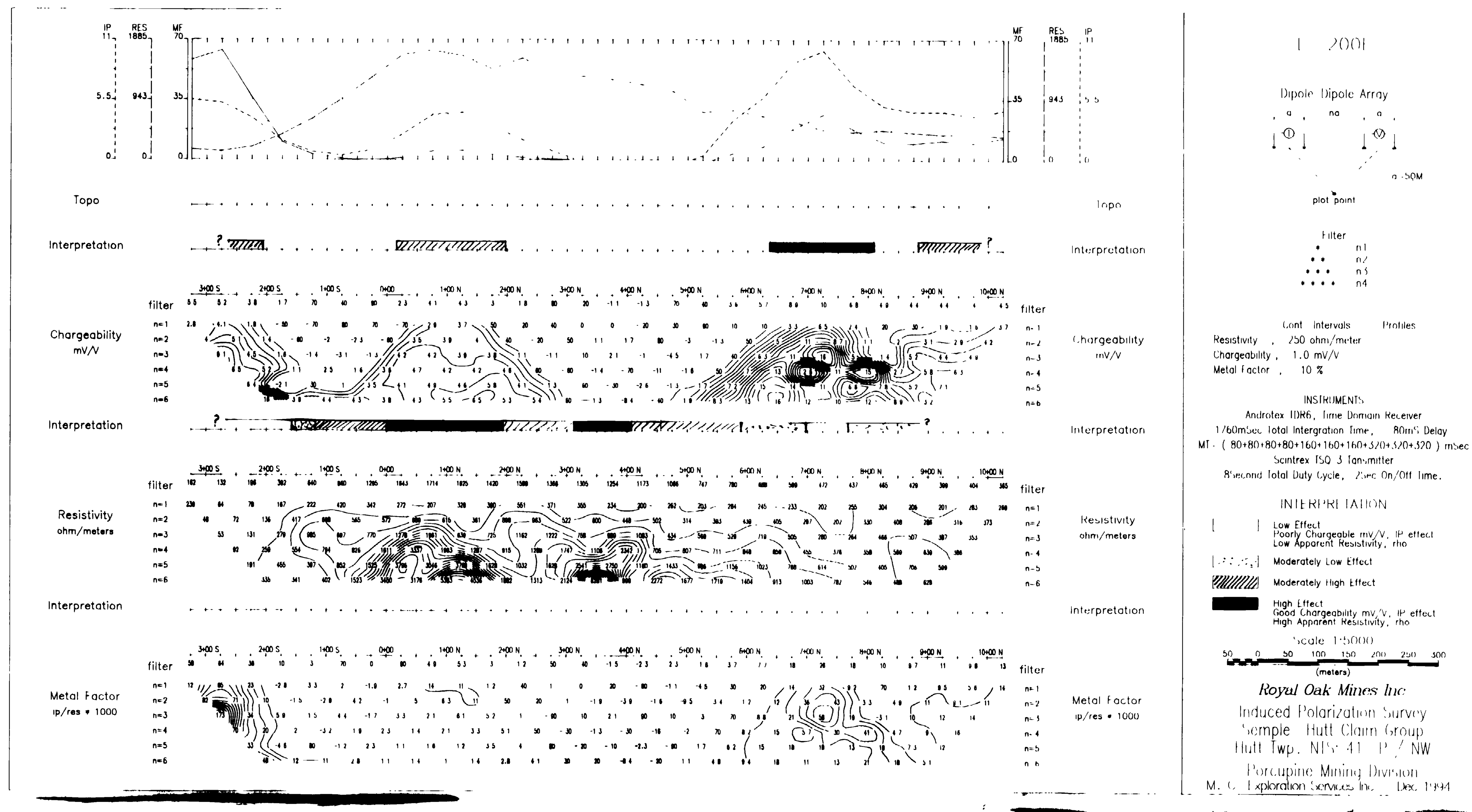
Good Chargeability mV/V, IP effect
High Apparent Resistivity, rho
Scale 1:5000
(meters)
Royal Oak Mines Inc
Induced Polarization Survey
Semple - Hutt Claim Group
Hutt Twp., NTS 41 P / NW
Porcupine Mining Division
M. C. Exploration Services Inc. Dec. 1994
Topo
Interpretation
Chargeability mV/V
Resistivity ohm/meters
Metal Factor ip/res * 1000
filter


L 200E
Dipole Dipole Array
plot point
Filter
n1
n2
n3
n4
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Profiles
Resistivity , 250 ohm/meter
Chargeability , 1.0 mV/V
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(meters)
Royal Oak Mines Inc
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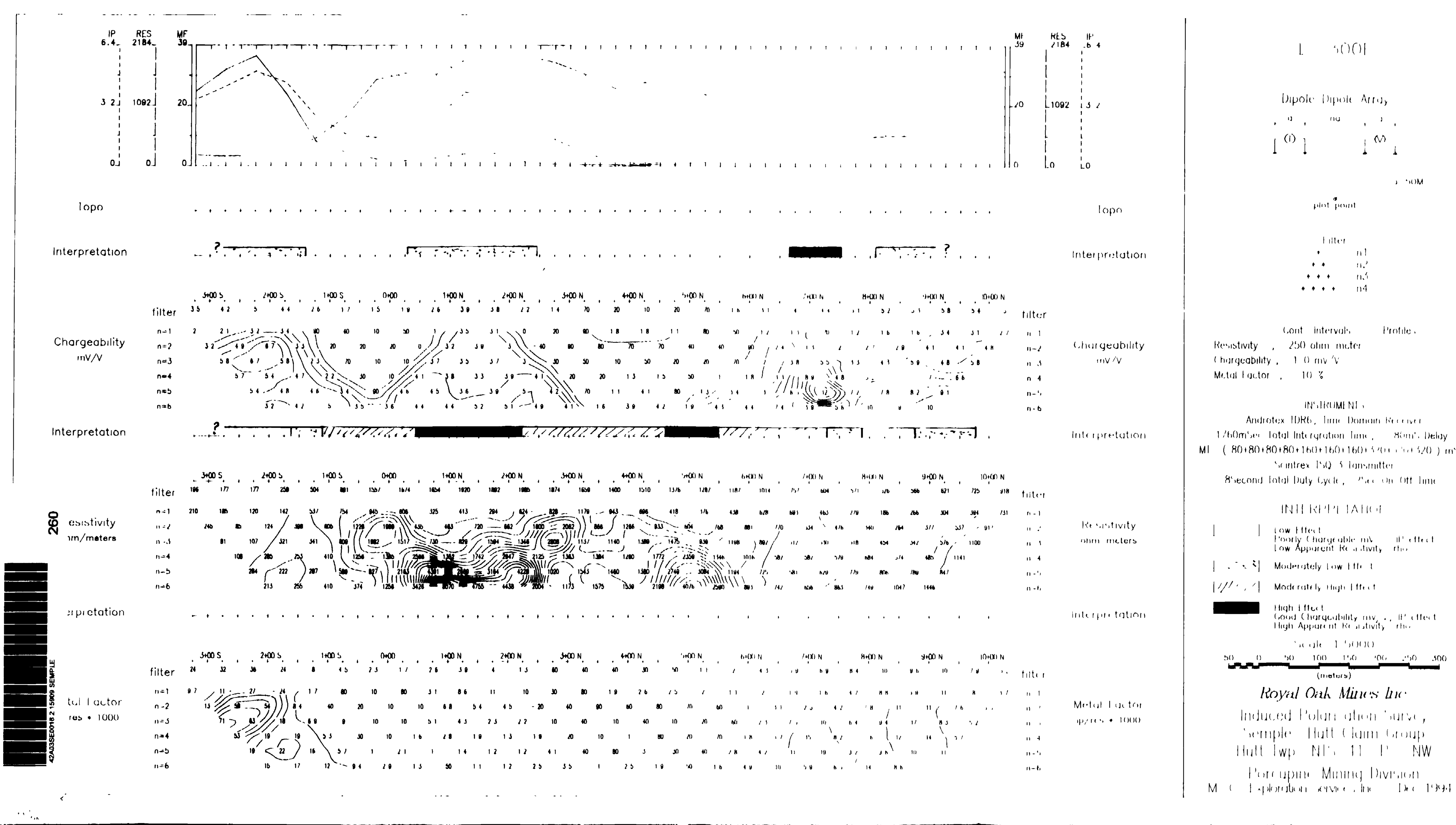
Hutt Twp., NTS 41 P / NW
Porcupine Mining Division
M. C. Exploration Services Inc. Dec. 1994
Topo
Interpretation
Chargeability mV/V
Resistivity ohm/meters
Metal Factor ip/res * 1000
filter


L 300E
Dipole Dipole Array
Cont. Intervals
Profiles
Resistivity , 250 ohm/meter
Chargeability , 1.0 mV/V
Metal Factor , 10 %
INSTRUMENTS
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Royal Oak Mines Inc
Induced Polarization Survey
Semple - Hutt Claim Group
Hutt Twp. NTS 41 P NW
Porcupine Mining Division
Dec. 1994
Topo
Interpretation
Chargeability mV/V
filter
260