GEOPHYSICAL REPORT
on the
Magnetic, Electromagnetic and
Induced Polarization Surveys
on the
Currie/Bowman Property
of
CROSS LAKE MINERALS LTD.
Bowman Township
District of Cochrane
Larder Lake Mining Division
by
Richard Lachapelle, B.Sc.Ing.Jr.
October, 1989

M-288

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ABSTRACT

A combined magnetic, electromagnetic and induced polarization survey performed during the months of September and October, 1989, on the Currie/Bowman Property of Cross Lake Minerals Ltd. of Toronto, Ontario delineated several weak conductors in mafic and ultramafic units.

A follow-up program totalling $25,067.90 is recommended in order to investigate the known anomalies and other anomalies that could have economic potential for base metals.

INTRODUCTION

From September 19, 1989 to October 24, 1989, a program of line cutting and geophysical surveying was conducted on the Currie/Bowman property of Cross Lake Minerals of 301-121 Richmond Street West, Toronto, Ontario.

The survey comprised total field magnetic, horizontal loop electromagnetic (HLEM Max Min II) and time-domain induced polarization.

The survey was conducted as a follow-up to an airborne electromagnetic survey done by the Ontario Government (OGS, 1984), an evaluation report (Boivin and Desrosiers, 1987), a geophysical report (Hodges, 1988) and a geological report (Abernethy, 1988) all of which delineated structures and anomalies which might be indicative or associated with possible economic mineral deposits.

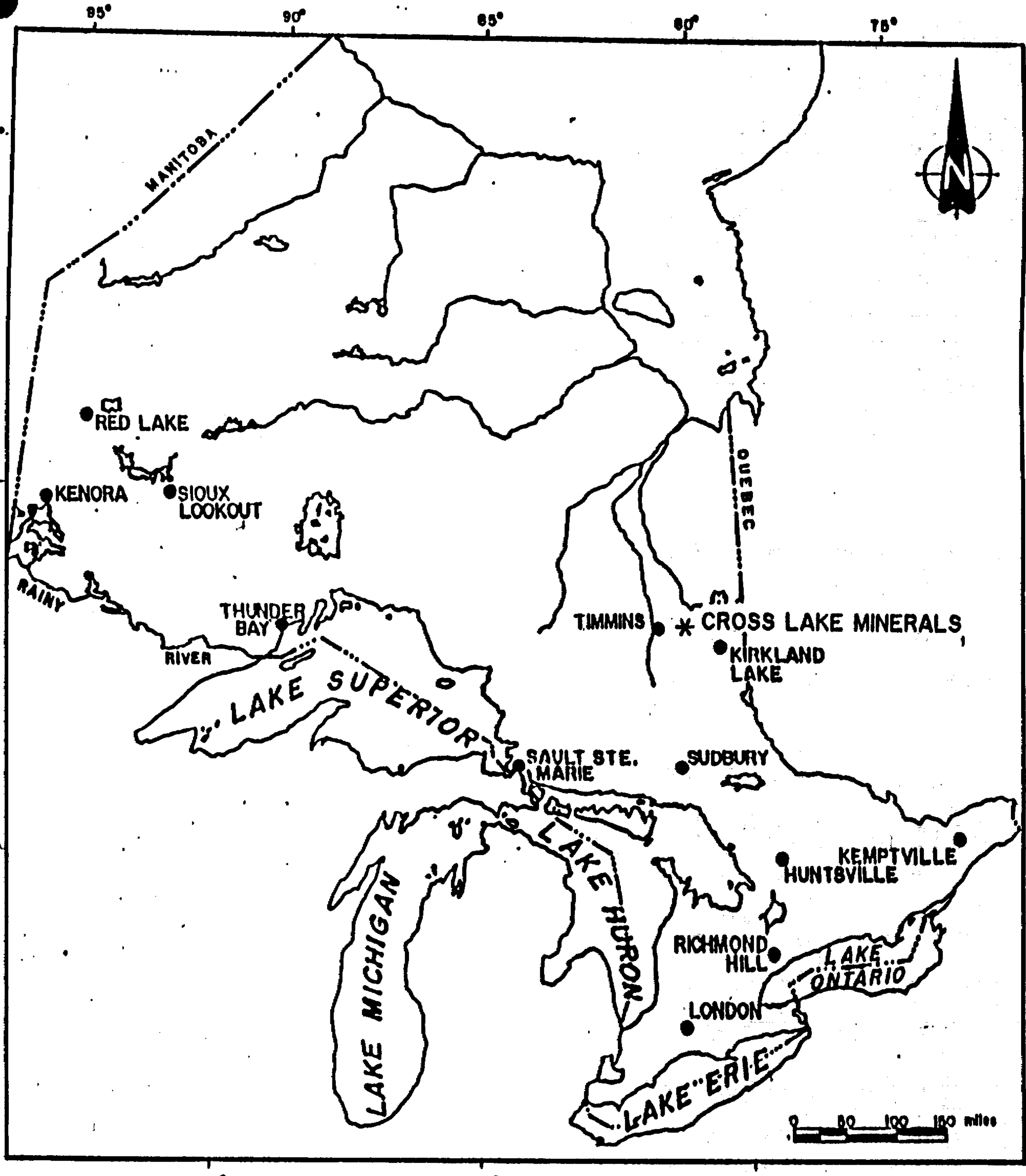
LOCATION AND ACCESS

The property is located in concessions II, III, IV and V, lots 3 to 9 in Bowman Township, Ontario (Figures 1 and 2).

The property is approximately 1 km south of Matheson and can be easily accessed by numerous roads.

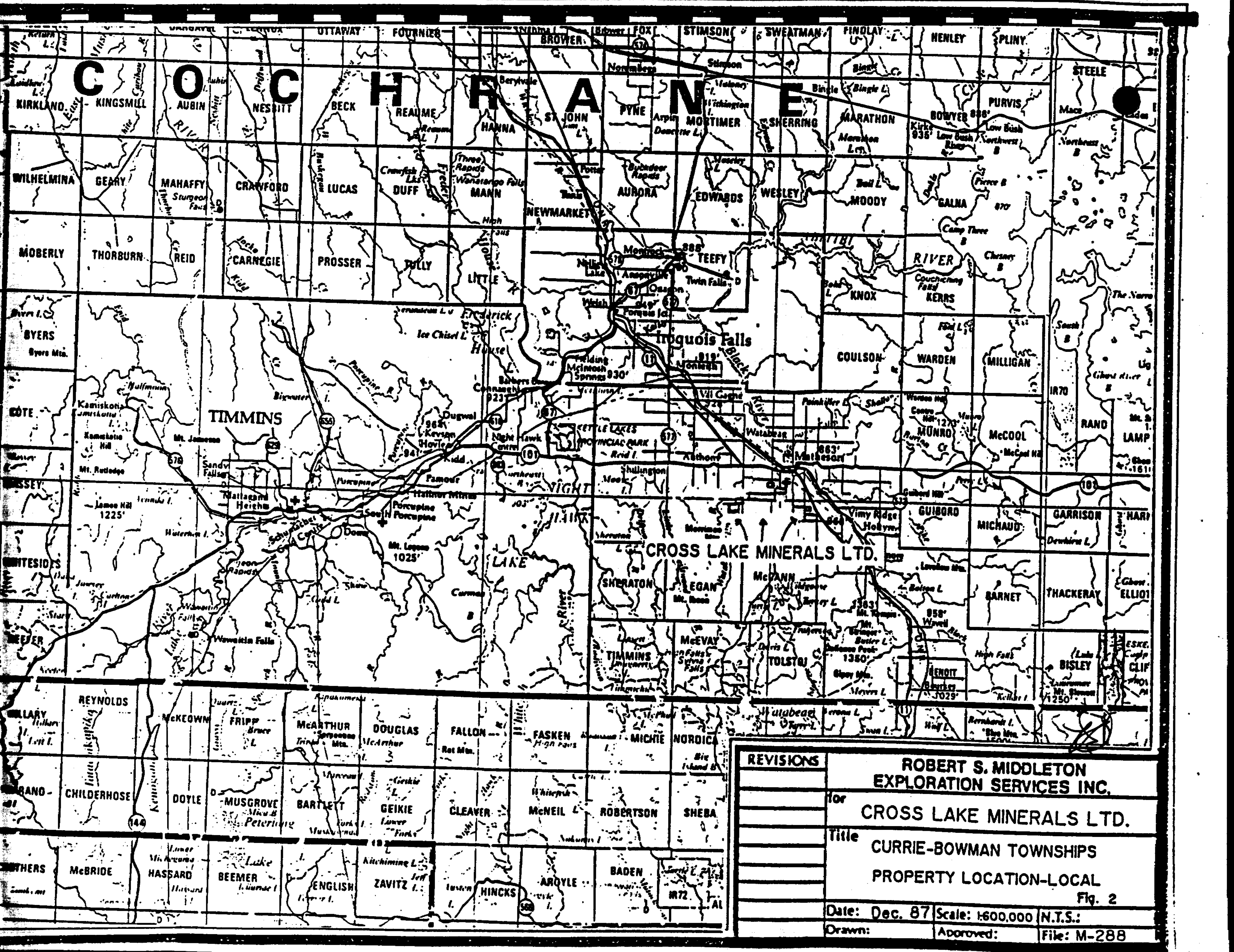
CLAIM GROUP

The property consists of 181 unpatented non-contiguous mining claims in Bowman and Currie Townships, Larder Lake Mining Division, Ontario. The geophysical surveys were conducted on the following claims:



PROVINCE OF ONTARIO

REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.
	for CROSS LAKE MINERALS
	Title CURRIE-BOWMAN TOWNSHIPS PROPERTY LOCATION-REGIONAL
	Fig. 1
	Date: Dec. 87 | Scale: 1"=180mi | N.T.S.



REVISIONS

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

for CROSS LAKE MINERALS LTD.

Title CURRIE-BOWMAN TOWNSHIPS
PROPERTY LOCATION-LOCAL

Fig. 2

Date: Dec. 87	Scale: 1:600,000	N.T.S.:
Drawn:	Approved:	File: M-288

Claims	*Number*	*Township*	*Recording Date*
937761-64 inclusive	4	Bowman	February 1, 1988
988408-09 inclusive	2	Bowman	December 31, 1987
988412-19 inclusive	8	Bowman	December 31, 1987
988420-21 inclusive	2	Bowman	January 7, 1988
988428-29 inclusive	2	Bowman	January 7, 1988
1001815-20 inclusive	6	Bowman	January 7, 1988
1030657-60 inclusive	4	Bowman	February 1, 1988
1117071-72 inclusive	2	Bowman	August 18, 1989
Total	34 claims		

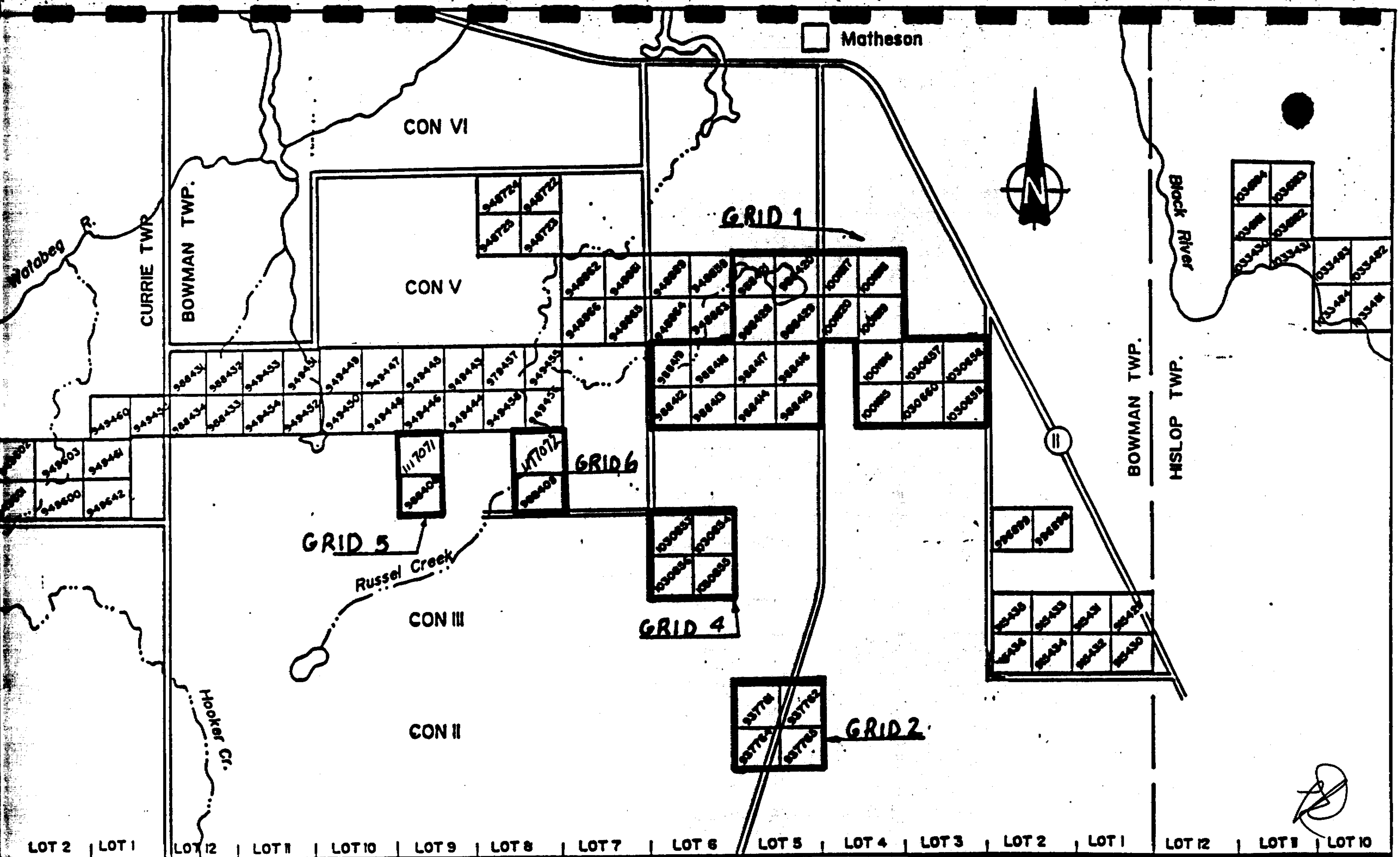
The claims along with the grids to which they belong are shown in Figure 3. The recorded holder of all these claims except 1117071 et al. is Cross Lake Minerals Ltd. Claims 1117071 et al. are held by Gordon Young of 150 3rd Avenue, Timmins, Ontario P4N 1C5.

REGIONAL GEOLOGY

The following is quoted from Abernethy, 1988:

"The Cross Lake Minerals Ltd. properties lie within the Archean Abitibi Volcano-sedimentary greenstone belt of Northeastern Ontario. The Currie-Bowman area is dominated by east-west trending steeply dipping volcanic rocks and tuffs with minor interflow sedimentary rock. Regional metamorphic grade ranges from lower to upper greenschist facies.

A regional lithogeochemical survey has identified three distinct volcanic groups in the Currie-Bowman Area consisting of the Komatiitic Stoughton-Roguemaure Group (possibly Lower Tisdale Group) in the northern half of the area, the tholeiitic Kinojevis Group in the lower half of the area, and the central un-named calc-alkaline Group. The Cross Lake Minerals properties straddle the boundary between the



REVISIONS	
	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.
	for CROSS LAKE MINERALS
	Title CLAIM LOCATION CURRIE-BOWMAN PROJECT CURRIE, BOWMAN AND HISLOP TWPS

Date: Nov. 1988	Scale: 1:50,000	N.T.S.: FIG. 3
Drawn: R.A./A.M.	Approved:	File: M288

tholeiitic Kinojevis Group and the un-named calc-alkaline Group.

Regional economically important deposits which lie at or near the same stratigraphy as the Cross Lake property are the Tillex Cu-Zn-Pb-Ag-Au deposit in Currie Township, the Unigold (ex Seaway Copper Mines) Zn-Pb-Au deposit in Bond Township, the Ross Au Mine in Hislop Township and possibly the Cu-Ni and Cu-Zn-Pb deposit of Langmuir and Carmen Townships."

PROPERTY GEOLOGY

The following is quoted from Abernethy, 1988:

"The Cross Lake Minerals properties are extensively covered by overburden and swamp deposits with only 1% outcrop. Outcrops consist of mafic intrusive and extrusive rocks, intermediate to felsic intrusive to pyroclastic rocks and diabase.

Mafic intrusive rocks were found in two locations. An outcrop in the southwest corner of claim number 949456 consisted of a dark-green, medium to coarse-grained, massive gabbro. The outcrop was non-descript showing no obvious foliation, weak jointing at erratic angles and no quartz veining or significant alteration. A second similar appearing outcrop of gabbro occurred in northwest quadrant of claim number 1030656 of Grid #4. The gabbroic rocks may represent coarser-grained phases of thick mafic flow rocks or may represent separate distinct subvolcanic feeder chambers of the chemically equivalent massive flows of the tholeiitic Kinojevis Group.

Komatiitic to tholeiitic basalts are the most common lithology found on the southern claims of the properties. The basalts are *variably jet black to grey to pale green, fine-grained, massive to moderately foliated, magnetic to non-magnetic and variably carbonatized, silicified and chloritized. Pillow basalts and flow breccias were found only in rocks of Grid #5. The variable appearance and chemistry (komatiitic to calc-alkaline) of basalts in concessions III and IV of Bowman and Currie Townships suggest the existence of an interdigitated transition zone from the un-named calc-alkaline Group to the north and the tholeiitic Kinojevis Group to the south.*

Intermediate to felsic pyroclastic rocks were found on the flanks of a resistive diabase dyke in lots 7 and 8 of concession V in Bowman Township. The pyroclastic rocks range from very coarse-grained volcanic breccia/agglomerate to fine-grained ash tuffs and crystal tuffs. In the southwest corner of claim 948865 is a low density, very coarse-grained agglomerate containing sub-angular porphyritic, monolithic autobrecciated clasts in a siliceous, feldspar crystalline matrix. The agglomerate is bleached white on weathered surface and pale chloritic green on fresh surface with minor quartz vein stringers and traces of 1% pyrite and chalcopyrite. A large outcrop near the northern boundary of claim 948865 consists of a black, fine-grained, well banded cherty/siliceous ash tuff. The essential pyroclasts are fine-grained (.5-2 mm) lithic fragments, feldspar crystals and, rarely, quartz shards, in an aphanitic siliceous matrix. The rock is thinly (1-5 cm) bedded, trending east-west and dipping between 50 to 60 degrees to the south.

Two similar appearing feldspar porphyry outcrops are on the north boundary of claim 996899 and near the western claim line of *claim 948860. The feldspar porphyry is buff white on weathered surface, coarse-grained, massive, and intermediate in composition. The feldspar phenocrysts comprise 40-60% of the rock and are medium-grained (1-5 mm), zoned, euhedral plagioclase crystals in an aphanitic green chloritic matrix. The rock is variably carbonatized with very minor quartz vein stringers and traces of pyrite and, in the claim group 1 porphyry, traces of chalcopyrite.*

A large resistive olivine diabase dyke outcrops in the southeast corner of Grid #5 and continues northeastward to the western part of Grid #1. The diabase is rusty tan on weathered surface and dark green/black on fresh surface, ophitic, medium-grained, massive and moderately magnetic."

PREVIOUS WORK

The following is quoted from Abernethy, 1988:

"Owing to the strategic location (centred between the prolific Porcupine and Kirkland Lake mining camps) and easy access, all outcrops in the map area have been extensively prospected and evidence of previous work such as blasted pits can be found at most outcrops. Prospecting previous to the early 1970's had centred on gold with the reported occurrence of several gold showings immediately adjacent to the Cross Lake property. With the Tillex syndicates' Cu-Zn-Pb-Ag-Au discovery on the Currie-Bowman Township property in 1974, the area was also recognized as a potential base metal environment. Due to extensive sand, clay and till cover in the area (less than 1% bedrock exposure) most of the recent

prospecting has been restricted to deep sensing geophysical techniques and overburden geochemical techniques in addition to several diamond drill programs on, and adjacent to the properties. Below is a list of previous workers on and adjacent to the properties as researched in the assessment files of the Ministry of Mines and Northern Development offices in Kirkland Lake. Work performed on patented mining lands may not be filed at Kirkland Lake and is unknown to the author.

Bowman Township

	Year	Company	Type of Work
1.	?	Bird, S.J.	1 DDH - 122'
2.	1967	Selco	1 DDH - 578'
3.	1971	Young/Davidson-Foster option	5 DDH - 1360'
4.	1974,75	Tillex Syndicate	Geology, ground magnetic survey, ground electromagnetic survey 2 OVDH - 86' 3 DDH - 945'
5.	1981-84	Asarco	Geology, ground magnetic survey, ground electromagnetic survey 28 OVDH - 2668' 5 DDH - 2356'

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 normally taken at 25m intervals, and at 12.5m intervals where a high gradient or anomaly was observed by the operator.

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 20 seconds as the survey was being conducted. The data from both magnetometers was then dumped with a computer and base corrected values were computed.

SURVEY PROCEDURE

MAX-MIN II

Theory

The Max-Min II is a frequency domain, horizontal loop electromagnetic (HLEM) system, based on measuring the response of conductors to a transmitted, time varying electromagnetic field.

The transmitted, or primary EM field is a sinusoidally varying field at any of five different frequencies. This field induces an electromotive force, (emf), or voltage, in any conductor through which the field passes. This is defined by:

$$\oint E.dl = \frac{\partial \phi}{\partial t} \quad \text{(the Faraday Induction Principle)}$$

where E is the electric field strength in volts/metre (and so $\oint E.dl$ is the emf around a closed loop) and ϕ is the magnetic flux through the conductor loop. This emf causes a "secondary" current to flow in the conductor in turn generating a secondary electromagnetic field.

This changing secondary field induces an emf in the receiver coil (by the Faraday law) at the same frequency, but which differs from the primary field in magnitude and phase. The difference in phase (the phase angle) is a function of the conductance of the conductor(s), both the target and the overburden and host rock.

The magnitude of the secondary is also dependant on the conductance, and also on the dimensions, depth, and geometry of the target, as well as on the interference from overburden and the host rock.

These two parameters (phase angle and magnitude) are measured by measuring the strength of the secondary field in two components: the real field or that part "in-phase" with the primary field; and the imaginary field, or that part in "quadrature" or 90 degrees out of phase from the primary field.

The magnitude and phase angle of the response is also a function of the frequency of the primary field. A higher frequency field generates a stronger response to weaker conductors, but a lower frequency tends to pass through weak conductors and penetrate to a greater depth. The lower frequency also tends to energise the full thickness of a conductor, and gives a better measure of its true conductivity-thickness product (conductance).

For these reasons two or more frequencies are usually used; the lower for penetration and accurate measure of good conductors, and the higher frequency for strong response to weak conductors.

Distinction between conductive targets, overburden, and host rock responses are made by studying the shape of the secondary field, and the difference in the frequency responses.

The transmitted primary field also creates an emf in the receiver coil, which is much stronger than the secondary, and which must be corrected for by the receiver. This is done by electronically creating an emf in the receiver, whose magnitude is determined by the distance from receiver to transmitter as set on the receiver, and whose phase is derived from the receiver via an interconnecting wire.

Field Method

The Max-Min II survey was carried out in the "maximum coupled" mode (horizontal co-planar). The transmitter and receiver are carried in-line down the survey line separated by a constant distance (in this case 150m) with the receiver leading. Three transmitter frequencies were used: 444 Hz, 1777 Hz and 3555 Hz and readings were taken every 25m. The transmitter and receiver are connected by a cable, for phase reference and operator communication.

SURVEY PROCEDURE

INDUCED POLARIZATION/RESISTIVITY

Theory

The induced polarization (IP) and resistivity exploration methods are electrical methods based on measuring the response of the earth to an applied direct current.

The principle is to apply a known electric current to the earth, and measure the electric potential created by it at the survey location. The resistivity, a bulk property of the rock itself, is calculated from the difference between the applied *current and the measured potential, corrected for the geometry of the current and potential electrode configuration.*

The induced polarization measurement is based on the "over-voltage" effect. Most of the electric current carried by the earth is conducted by the flow of ions in the solutions filling the pore spaces in the rock. At the surface of any metallic particle in the path of current low, the ionic flow in the solution is changed to an electronic flow in the metal. In the process of the change, an electric charge of trapped ions is built up at the surface of the metal, storing a small voltage. If the voltage increases, the apparent resistance of the rock also increases. If the applied current flow is decreased or stopped, the voltage will create a potential in the opposite direction to the original applied current, and start a current flowing in the opposite direction.

In time domain induced polarization the applied current is abruptly stopped, and the reverse potential created by the over-voltage effect is measured over time as it quickly decays. The definition of chargeability is:

$$M = \frac{V(t = \infty) - V(t = 0)}{V(t = \infty)}$$

where $V(t = 0)$ *is the voltage at turnoff, and* $V(t = \infty)$ *is the late-time voltage. This is usually measured over a certain time period after turn-off as an integral of voltage over time, corrected for the length of the time period, and normalised to the voltage at time 0. It is usually expressed in millivolts per volt (mV/V).*

The over-voltage charge taken time to build-up or decay, so that if the applied current is caused to oscillate more and more frequently, the apparent resistance will decrease, as the over-voltage does not have time to build at higher frequencies. This effect is used to measure the IP effect in frequency domain IP surveys, wherein the current is applied at two or more frequencies, and the *"percent frequency effect" (PFE) is calculated from the change in resistivities (P) between the different frequencies.*

$$PFE = \frac{P\ (low\ freq) - P\ (high\ freq)}{P\ (high\ freq)} \times 100\%$$

Although not identical, for most purposes the PFE is approximately equal to the chargeability.

Because the IP effect responds to effects on small metallic particles, it is particularly useful for detecting disseminated metallic minerals. Also because of this, it will respond strongly to the "membrane polarization" created by the electric charges resident on clay particles or layered or fibrous minerals.

Field Method

The survey was conducted using a pole-dipole array with a dipole length of 25m and array spacings of n = 1,2,3,4, dipole and dipole length of 50m and array spacings of n = 1,2,3,4. These array configurations involve having a dipole for the receiver measuring Vp, the potential and a single current transmitter electrode on the grid, separated from the receiver dipole by each 'n' interval in turn. The other current electrode, 'the infinity' is situated 2 kilometers or more from the grid.

For this survey the measurements were taken in the time domain, so the transmitted current was a bipolar on-off square wave with each on or off lasting two seconds. Measurements of resistivity and chargeability were taken.

PERSONNEL AND EQUIPMENT

The following personnel from Middleton Exploration Services Inc. conducted the surveys:

Brad Malpage, Technician
Darryl Ball, Technician
Tom V. Cardinal, Technician
Tom Bolton, Technician
Melvin Booth, Labourer
Rodney Booth, Labourer
Mark St-Louis, Labourer

The equipment used were an EDA Instruments PPM 350 Field magnetometer and PPM 400 base station magnetometer, an Apex Parametrics Max Min II System, a Scintrex IPR-11 Time-domain induced polarization receiver and a Scintrex TSQ-3, 3 kw Transmitter. Specifications for these instruments are included in Appendix A.

SURVEY STATISTICS

The line cutting totalled 67.09 km, on which line 67.09 km of magnetics, 35.5 line km of three frequency electromagnetics (Max Min II), and 3.2 line km of time-domain induced polarization were surveyed.

The survey required 18 days to complete, of which three days were lost due to inclement weather and one day used for mobilization/demobilization.

INTERPRETATION

The results of the surveys are presented for each grid and summarized on interpretation maps for each grid. Magnetic domains are interpreted by large zones of distinct magnetic signature and are denoted Mnk, where n is the zone subscript and k is the grid subscript; for instance M12 would refer to magnetic zone 1 of grid 2. Lithological contacts are interpreted at the boundaries of some magnetic domains. Faults are interpreted by breaks in the magnetic signatures. Electromagnetic conductor axes are denoted Ak or Bk, where k is the grid subscript.

Grid 1 (Figures 4a, 4b, 4c, 4d and 4e)
Magnetic Survey

Most of this grid is characterized by a low magnetic relief with values ranging from 500 gammas over base level to isolated areas where the magnetic signature is 1500 to 2000 gammas over base level. The general trend of the interpreted magnetic domains of this grid is northeast. A gradual transition is observed from low magnetic signature (M11) in the south-central part of the grid to medium magnetic signature (M21) in the north-central part of the grid. However, it is difficult to discern any clear northeasterly trending lithological contact between M11 and M21, its location remaining very subjective. This transition is interpreted to represent a possible gradation between the un-named calc-alkaline Group to the south interpreted by Jensen and Baker (1986) and the Stoughton-Roquemaure Group to the north (Abernethy, 1988). A few linear bands of higher magnetic signature (M21) are interpreted within M11.

Three sets of faults are interpreted, their respective trends are 065, 090 and 110. Due to lack of magnetic relief, it is difficult to estimate the relative ages of these faults.

HLEM Survey

The electromagnetic survey delineated two weak conductor axes denoted respectively A1-A1 and B1-B1. These axes coincide with INPUT EM anomalies delineated by the airborne survey (OGS, 1984) and are interpreted to possibly represent sulfide horizons within possible felsic pyroclastic rocks. However, these HLEM anomalies are much weaker than would be expected considering the conductivity-thickness products interpreted by the airborne EM survey. Conductor A1-A1 is delimited by an interpreted fault.

Grid 2 (Figures 5a, 5b, 6a and 6b)
Magnetic Survey

The magnetic relief of this grid is relatively high, ranging from a low of approximately 500 gammas above base level in the northwest corner of the grid as expressed by magnetic domain M12, to a high of approximately 2000 gammas above base level as expressed by M32.

Magnetic domain M12 is characterized by a low magnetic signature and has a semi-circular shape. It is therefore interpreted to possibly represent a felsic intrusive body. Magnetic domain M22 has a signature of medium intensity, with an average of 1500 gammas above base level and dominates in area the property. It is interpreted to possibly represent mafic volcanic units within the Kinojevis Group. Magnetic domain M32 has a high magnetic signature with an average of 2000 gammas above base level, it is interpreted to possibly represent mafic to ultramafic units within the Kinojevis Group.

Two sets of faults are interpreted, their respective trends are 085 and 110.

Induced Polarization Survey

The short survey delineated a weak chargeability anomaly near the contact between M12 and M22. This anomaly is interpreted to possibly represent a sulfide horizon at the felsic/mafic contact. The absence of several data points on the pseudo-section does not allow a good definition of this anomaly.

Grid 4 (Figures 6c, 6d, 7a and 7b)
Magnetic Survey

The magnetic survey delineated three distinct magnetic domains. Domain M14 is characterized by a low signature of approximately 200 gammas above base level. Domain M24 is characterized by a medium signature of approximately 1000 gammas above base level. Domain M34 is characterized by a high signature of approximately 2000 gammas above base level.

Domain M14 is interpreted to possibly represent east to northeasterly trending sills of felsic pyroclastic rocks. Domain M24 is interpreted to possibly represent easterly trending mafic volcanic sills. Domain M34 covers most of the grid and is interpreted to possibly represent mafic to ultramafic units.

One fault trending in a 110 degree azimuth is interpreted.

Induced Polarization Survey

The short survey failed to delineate any significant anomaly.

Grid 5 (Figures 8a, 8b, 8c, 8d and 8e)
Magnetic Survey

The magnetic survey delineated three distinct magnetic domains. Domain M15 is characterized by a medium and quiet signature of approximately 1200 gammas above base level. Domain M25 is characterized by a medium signature of approximately 1400 gammas above base level. Domain M35 is characterized by a high signature of approximately 2000 gammas above base level.

Domain M15 is interpreted to possibly represent mafic volcanic units. Domain M25 is interpreted to possibly represent a gradation between mafic to ultramafic units. Domain M35 is interpreted to possibly represent ultramafic units.

HLEM Survey

The electromagnetic survey delineated a very weak conductor denoted A5-A5 which extends from station 15+00S on line 10+00E to station 14+00S on line 12+00E. This weak anomaly is associated with magnetic domain M35 and is interpreted to possibly represent weak sulfide mineralization within the ultramafic units. Due to the weakness of the conductor, it can also be interpreted to possibly represent a conductive overburden response.

Grid 6 (Figures 9a, 9b, 9c, 9d and 9e)
Magnetic Survey

The magnetic survey did not delineate any specific magnetic domain other than a general transition from a medium magnetic signature of approximately 1400 gammas above base level in the southeast corner of the grid to a high magnetic signature of approximately 3000 gammas above base level in the northwest corner of the grid. This transition is interpreted to possibly represent a gradation between mafic volcanic units in the southeast to ultramafic units in the northwest. An easterly trending fault is interpreted at approximately station 14+50S. The very high values of approximately 7000 gammas above base level, observed in the northwest corner of the grid, should be dismissed as they represent cultural effects.

HLEM Survey

The electromagnetic survey delineated a very weak conductor denoted A6-A6 which extends from station 12+25S on line 21+00E to station 13+00S on line 23+00E. This weak anomaly is interpreted to possibly represent weak sulfide mineralization within the mafic to ultramafic units. Due to the weakness of the conductor, it can also be interpreted to possibly represent a conductive overburden response. The conductors delineated by the airborne survey (OGS, 1984) were not detected during this survey.

CONCLUSIONS AND RECOMMENDATIONS

Grid 1

The combined magnetic and electromagnetic surveys delineated two conductor axes within the un-named calc-alkaline Group. These conductors are weak but are nonetheless coincident with airborne INPUT EM anomalies, therefore further work should be considered for this grid. A follow-up induced polarization survey is recommended in order to investigate the extent, nature and alteration of the conductors.

Grid 2

The combined magnetic and short induced polarization surveys delineated a weak chargeability anomaly at an interpreted mafic/felsic contact. This anomaly, despite its weakness does merit further investigation. Follow-up horizontal loop electromagnetic and/or induced polarization surveys should be conducted on the entire grid in order to investigate the possibility of other conductors. Diamond drilling would follow establishment of more promising targets.

Grid 4

The combined magnetic and short induced polarization surveys did not delineate any conductors of interest. However, the coverage of the IP survey was very limited and should not be taken as an indication of lack of conductors. Therefore follow-up horizontal loop electromagnetic and/or induced polarization surveys are recommended in order to investigate the presence of conductors. Diamond drilling would follow establishment of more promising targets.

Grid 5

The combined magnetic and electromagnetic surveys delineated a very weak conductor within interpreted ultramafic units. A limited follow-up induced polarization survey covering the conductor axis is recommended in order to investigate its nature and extent.

Grid 6

The combined magnetic and electromagnetic surveys delineated a very weak conductor within interpreted mafic to ultramafic units. A limited follow-up induced polarization survey covering the conductor axis is recommended in order to investigate its nature and extent.

Table 1 summarizes the recommended work; Table 2 details the budget of recommended work.

TABLE 1

Grid #	Lines	Stations	Type of Survey	Comments
1	16+00W– 0+00	BL–8+00S	IP, a=50m n = 1,..,4	Investigation of A1–A1 and B1–B1, lines every 200m.
2	0+00– 8+00E	BL–8+00S	HLEM, 444-1777Hz a=150m	Investigation of conductors
2	0+00 2+00E 4+00E 8+00E	BL–8+00S	IP, a=50m n=1,...,4	Extend IP coverage
4	0+00– 8+00E	BL–8+00S	HLEM, 444-1777Hz a=150m	Investigation of conductors
4	0+00– 8+00E	BL–8+00S	IP, a=50m n=1,...,4	Extend IP coverage, lines every 200m
5	10+00E 12+00E	8+00S– 16+00S	IP, a=50m n=1,...,4	Investigation of A5–A5
6	21+00E 23+00E	8+00S– 16+00S	IP, a=50m n=1,...,4	Investigation of A6–A6

BUDGET

GRID 1	
Induced polarization survey: 6 days @ $1,350./day	$ 8,100.00
GRID 2	
HLEM survey: 7.2 km @ $172./km	1,032.00
Induced polarization survey: 2.5 days @ $1,350./day	3,375.00
GRID 4	
HLEM survey: 7.2 km @ $172./km	1,032.00
Induced polarization survey: 3 days @ $1,350./day	4,050.00
GRID 5	
Induced polarization survey: 1 day @ $1,350./day	1,350.00
GRID 6	
Induced polarization survey: 1 days @ $1,350./day	1,350.00
Interpretation Report	2,500.00
SUB-TOTAL	$22,789.00
10% Contingency	2,278.90
TOTAL	$25,067.90

Respectfully submitted

Richard Lachapelle ing. jr

Richard Lachapelle, B.Sc.Ing.Jr.

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BOIVIN, L. and DEROSIER, C.
1987 *Evaluation Report on the Cross Lake Minerals Ltd. properties, Currie and Bowman Townships, Ontario . NTS 42A/7-8-9-10 (District of Cochrane)*

HODGES, G.
1988 *Geophysical Report on the properties of Cross Lake Minerals Ltd. Currie and Bowman Townships, January 1988*

OGS
1984 *Airborne Electromagnetic and Total Intensity Magnetic Survey, Matheson-Black River Area, Bowman Township, District of Cochrane; by Questor Surveys Limited for the Ontario Geological Survey, Map 80594 Geophysical/Geochemical Series, Scale 1:20,000, Survey and Compilation March to July 1983.*

CERTIFICATION

I, Richard Lachapelle, of 136 Cedar Street South, in the City of Timmins, Province of Ontario, certify as follows concerning my report on the Cross Lake Minerals Ltd. property in Currie and Bowman Townships, Province of Ontario and dated October 30, 1989:

1. *I am a junior member in good standing of l'Ordre des Ingenieurs du Quebec.*

2. *I am a graduate of l'Universite de Sherbrooke, Sherbrooke, Quebec with a B.Sc. degree in Physics, obtained in 1984.*

3. *I am a graduate of l'Ecole Polytechnique de Montreal, Montreal, Quebec with a B.Ing degree in Geological Engineering obtained in 1987.*

4. *I have been practising in Canada since 1987.*

5. *I have no direct interest in the properties, leases, or securities of Cross Lake Minerals Ltd., nor do I expect to receive any.*

6. *The attached report is a product of:*
   a) *Examination of data included in the report which was collected on the property concerned.*

Dated this 30th day of October, 1989
TIMMINS, Ontario

Richard Lachapelle ing. jr

Richard Lachapelle, B.Sc.Ing.Jr.
Geophysicist

APPENDIX A

Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Input Potential Dipoles	1 to 6 simultaneously.
Input Impedance	4 megohms.
Input Voltage (Vp) Range	100 microvolts to 6 volts for measurement. Zener diode protection up to 50V.
Automatic SP Bucking Range	± 1.5 V.
Chargeability (M) Range	0 to 300 mV/V (mils or 0/00)
Absolute Accuracy of Vp, SP and M	Vp; ± 3% of reading for Vp > 100 microvolts. SP; ± 3% of SP bucking range. M; ± 3% of reading or minimum ± 0.5m V/V.
IP Transient Program	Ten transient windows per input dipole. After a delay from current off of t, first four windows each have a width of t, next three windows each have a width of 6t and last three windows each have a width of 12t. The total measuring time is therefore 58t. t can be set at 3, 15, 30 or 60 milliseconds for nominal total receive times of 0.2, 1, 2 and 4 seconds.
VP Integration Time	In 0.2 and 1second receive time modes; 0.51sec. In 2 second mode; 1.02sec. In 4 second mode; 2.04 sec.
Transmitter Timing	Equal on and off times with polarity change each half cycle. On/off times of 1, 2, 4 or 8 seconds with ± 2.5% accuracy are required.
Header Capacity	Up to 17 four digit headers can be stored with each observation.
Data Memory Capacity	Depends on how many dipoles are recorded with each header. If four header items are used with 6 dipoles of SP, Vp and 10 M windows each, then about 200 dipole measurements can be stored. Up to three Optional Data Memory Expansion Blocks are available, each with a capacity of about 200 dipoles.
External Circuit Check	Checks up to six dipoles simultaneously using a 31Hz square wave and readout on front panel meters, in range of 0 to 200k ohms.
Filtering	RF filter, spheric spike removal; switchable 50 or 60Hz notch filters, low pass filters which are automatically removed from the circuit in the 0.2 sec receive time.
Internal Calibrator	1000 mV of SP, 200 mV of Vp and 2.43 mV/V of M provided in 2 sec pulses.

Technical Description of the IPR-11 Broadband Tim●Domain IP Receiver

Digital Display	Two, 4 digit LCD displays. One presents data, either measured or manually entered by the operator. The second display: 1) indicates codes identifying the data shown on the first display, and 2) shows alarm codes indicating errors.
Analog Meters	Six meters for: 1) checking external circuit resistance, and 2) monitoring input signals.
Digital Data Output	RS-232C compatible, 7 bit ASCII, no parity, serial data output for communication with a computer, digital printer, digital storage device or modem.
Standard Rechargeable Power Supply	Eight rechargeable NiCad D cells provide approximately 15 hours of continuous operation at 25°C. Supplied with a battery charger, suitable for 110/230V, 50 to 400 Hz, 10W.
Disposable Battery Power Supply	At 25°C, about 40 hours of continuous operation are obtained from 8 Eveready E95 or equivalent alkaline D cells. At 25°C, about 16 hours of continuous operation are obtained from 8 Eveready 1150 or equivalent carbon-zinc D cells.
Dimensions	345 mm x 250 mm x 300 mm, including lid.
Weight	10.5 kg, including batteries.
Operating Temperature Range	-20 to +55°C, limited by display.
Storage Temperature Range	-40 to +60°C.
Standard Items	Console with lid and set of rechargeable batteries, RS-232C cable and adapter, 2 copies of manual, battery charger.
Optional Items	Multidipole Potential Cables, Data Memory Expansion Blocks, Crystal Clock, SOFT II Programs, Printer, Cassette Tape Recorder, Disk Drive or Modem.
Shipping Weight	25 kg includes reusable wooden shipping case.

At Scintrex we are continually working to improve our line of products and beneficial innovations may result in changes to our specifications without prior notice.

SCINTREX

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Concord Ontario Canada
L4K 1B5

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Fax: (416) 669-5132
Telex: 06-964570

Geophysical and Geochemical Instrumentation and Services

SCINTREX TSQ-3 3000 W

Time and Frequency Domain IP and Resistivity Transmitter

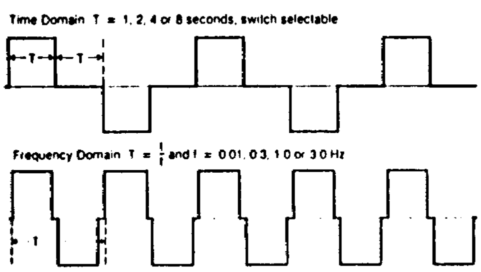
Function

The TSQ-3 is a multi-frequency, square wave transmitter suitable for induced polarization and resistivity measurements in either the time or frequency domain. The unit is powered by a separate motor-generator.

The favourable power/weight ratio and compact design of this system make it portable and highly versatile for use with a wide variety of electrode arrays. The medium range power rating is sufficient for use under most geophysical conditions.

The TSQ-3 has been designed primarily for use with the Scintrex Time Domain and Frequency Domain Receivers, for combined induced polarization and resistivity measurements, although it is compatible with most standard time domain and frequency domain receivers. It is also compatible with the Scintrex Commutated DC Resistivity Receivers for resistivity surveying. The TSQ-3 may also be used as a very low frequency electromagnetic transmitter.

Basically the transmitter functions 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 by 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. Excellent output current stability is ensured by a unique, highly efficient technique based on control of the phase angle of the three phase input power.



Waveforms output by the TSQ-3

Features

Current outputs up to 10 amperes, voltage outputs up to 1500 volts, maximum power 3000 VA.

Solid state design for both power switching and electronic timing control circuits.

Circuit boards are removable for easy servicing.

Switch selectable wave forms: square wave continuous for frequency domain and square wave interrupted with automatic polarity change for time domain.

Switch selectable frequencies and pulse times.

Overload, underload and thermal protection for maximum safety.

Digital readout of output current.

Programmer is crystal controlled for very high stability.

Low loss, solid state output current regulation over broad range of load and input voltage variations.

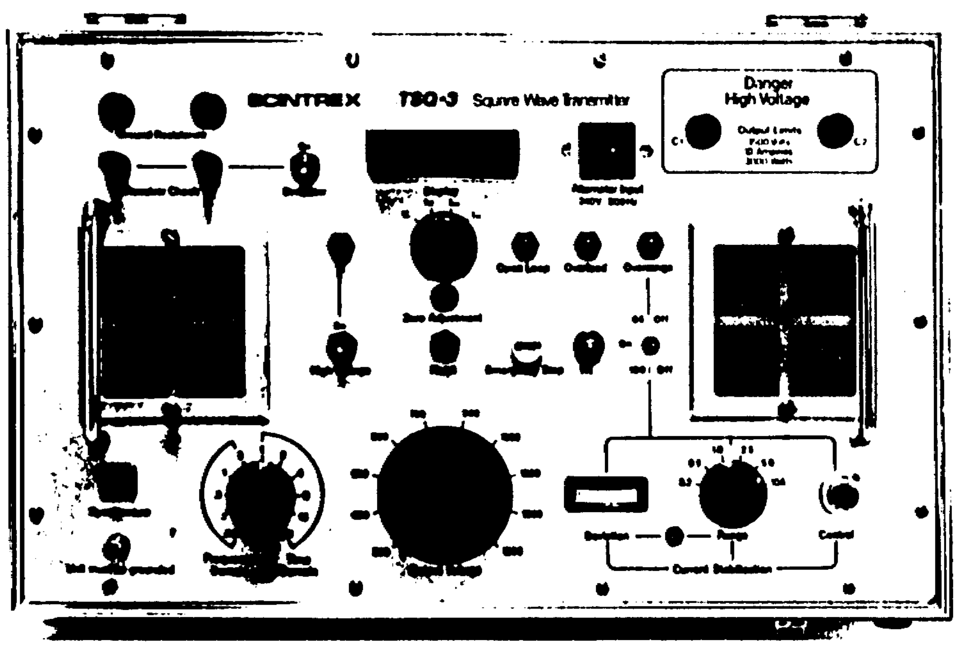
Rectifier circuit is protected against transients.

Excellent power/weight ratio and efficiency.

Designed for field portability; motor-generator is installed on a convenient frame and is easily man-portable. The transmitter is housed in an aluminum case.

The motor-generator consists of a reliable Briggs and Stratton four stroke engine coupled to a brushless permanent magnet alternator.

New motor-generator design eliminates need for time domain dummy load.



Technical Description of TSQ-3/3000W Time and Frequency Domain IP and Resistivity Transmitter

TSQ-3 transmitter with portable motor generator unit

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 50% external load variation or up to ±10% input voltage variation
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
Absolute Accuracy	± 3% of full range
Current Reading Resolution	10 mA on coarse range (0-10A) 1 mA on fine range (0-2A)
Frequency Domain Waveform	Square wave, continuous with approximately 6% off time at polarity change
Frequency Domain Frequencies	Standard: 0.033, 0.1, 0.3, 1.0 and 3.0 Hz, switch selectable Optional: any number of frequencies in range 0 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 or 32 seconds Optional: any other timings
Period Time Stability	Crystal controlled to better than .01%. An optional high stability clock provides stabilization to better than 1 ppm over -20/ + 50° C.
Efficiency	.78
Operating Temperature Range	-30° C to + 50° C
Overload Protection	Automatic shut-off at 3300 VA
Underload Protection	Automatic shut-off at current below 100 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.
Power Source	
Type	Motor flexibly coupled to alternator and installed on a frame with carrying handles.
Motor	Briggs and Stratton, four stroke, 8 H.P.
Alternator	Permanent magnet type, 800 Hz, three phase 230 V AC.
Output Power	3500 VA 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 re-usable wooden crates.

SCINTREX

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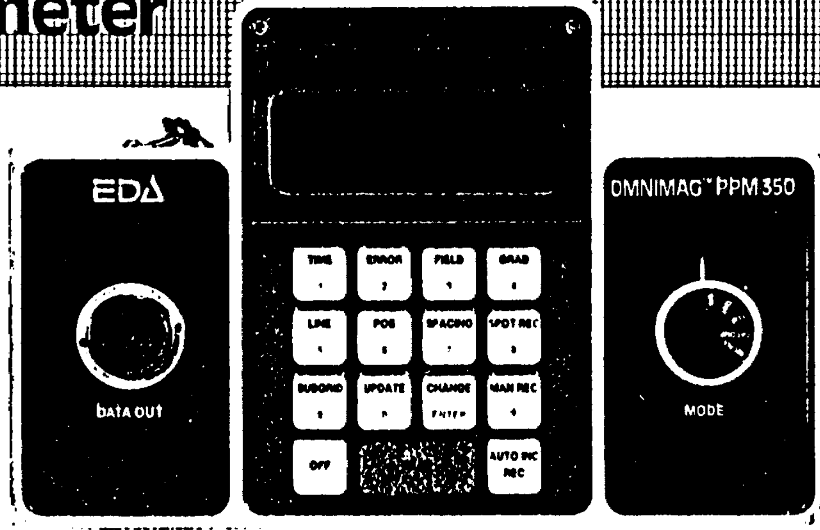
Cable: Geoscint Toronto

Geophysical and Geochemical Instrumentation and Services

OMNIMAG PPM-350 Total Field Magnetometer



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 93,000 gammas
Sensitivity	±0.02 gamma
Statistical Error Resolution	0.01 gamma
Standard Memory Capacity	1383 data blocks or readings
Absolute Accuracy	±15 ppm at 23°C, 50 ppm over the operating temperature range
Display Resolution	0.1 gamma
Capture Range	±25% relative to ambient field strength of last stored value
Display	Custom-designed, ruggedized liquid crystal display with an operating temperature range from −35°C to +55°C
Gradient Tolerance	5,000 gammas per meter
Sensor	Optimized miniature design. Magnetic cleanliness is consistent with the specified absolute accuracy
Sensor Cable	Remains flexible in temperature range; includes low strain connector
Operating Environmental Range	−35°C to +55°C; 0–100% relative humidity; weather-proof
Power Supply	Non-magnetic rechargeable sealed lead acid battery cartridge or belt; or, Disposable "C" cell battery cartridge or belt
Battery Cartridge Life	2,000 to 5,000 readings, depending upon ambient temperature and rate of readings
Weight and Dimensions	
Instrument Console only	3.4 kg, 238 x 150 x 250 mm
Lead Acid Battery Cartridge	1.9 kg
Sensor	1.2 kg, 56 mm diameter x 200 mm
System Complement	Electronics console; sensor with 3-meter cable; sensor staff; power supply; harness assembly; operation manual.

EDA is a pioneer in the development of advanced geophysical systems and has created many innovations that increase field productivity and lower survey costs.

EDA's OMNIMAG series consists of the PPM-350 Total Field Magnetometer, PPM-400 Base Station Magnetometer, and the PPM-500 Vertical Gradiometer. Contact us *now* for details.

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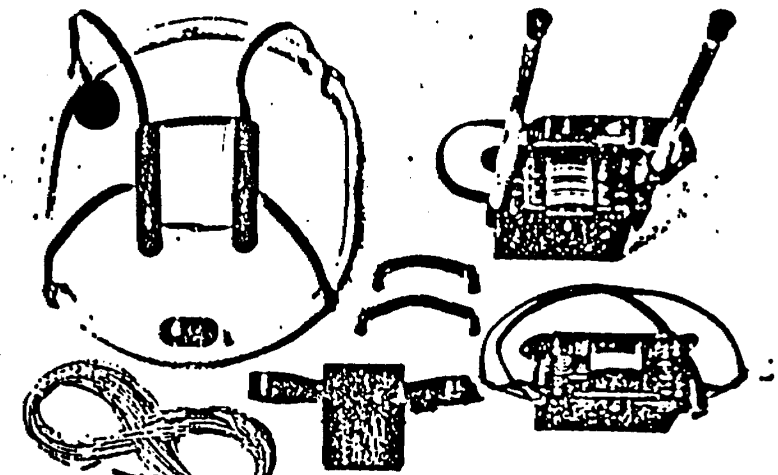
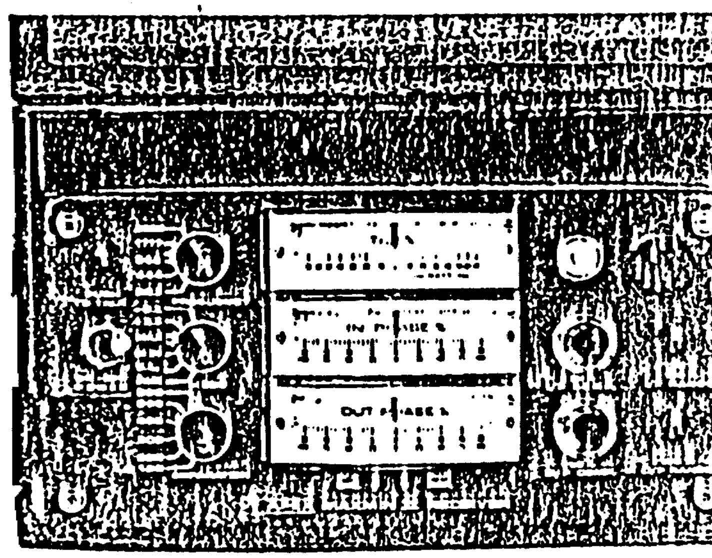
(416) 425-7800

In U.S.A.
E D A Instruments Inc.
5151 Ward Road
Wheat Ridge, Colorado
U.S.A. 80033
Telex: 00 450681 DVR
(303) 422-9112

Printed in Canada





SPECIFICATIONS :

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

Modes of Operation:

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

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

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

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

Parameters Read:

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

Readouts:

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

Scale Ranges:

NOW ALSO ±4% QUADRATURE FULL SCALE.

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

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

Repeatability: ±0.25% to ±1% normally, depe on conditions, frequencies an separation used.

Transmitter Output:

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

Receiver Batteries: 9V trans. radio type batteri Life: approx. 35 hrs. continuo ty (alkaline, 0.5 Ah), less in weather.

Transmitter Batteries: 12V 6 Ah Gel-type rechar battery. (Charger sup

Reference Cable: Light weight 2-conductor cable for minimum friction. Ur ed. All reference cables op at extra cost. Please sp

Voice Link: Built-in intercom syste voice communication betwe ceiver and transmitter ope in MAX and MIN modes, v ference cable.

Indicator Lights: Built-in signal and reference ing lights to indicate erro readings.

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

Receiver Weight: 8kg (13 lbs.)

Transmitter Weight: 13kg (29 lbs.)

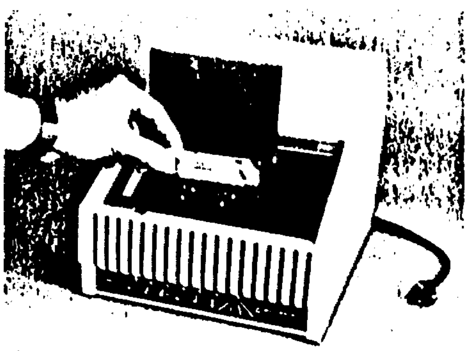
Shipping Weight: Typically 60kg (135 lbs.), d ing on quantities of refe cable and batteries in Shipped in two field/shipping

Specifications subject to change without notif

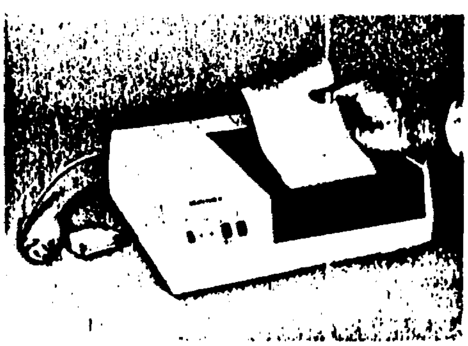
APEX PARAMETRICS LIMITED
200 STEELCASE RD. E., MARKHAM, ONT., CANADA, L3R 1G2

Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Input Potential Dipoles	1 to 6 simultaneously
Input Impedance	4 megohms
Input Voltage (Vp) Range	100 microvolts to 6 volts for measurement. Zener diode protection up to 50 V
Automatic SP Bucking Range	±1.5 V
Chargeability (M) Range	0 to 300 mV/V (mils or 0/00)
Absolute Accuracy of Vp, SP and M	Vp; ±3% of reading for Vp > 100 microvolts SP; ±3% of SP bucking range M; ±3% of reading or minimum ±0.5m V/V
Resolution of Vp, SP and M	Vp; 1 m V above 100 m V approaching 1 microvolt at 100 microvolt SP; 1 m V M; 0.1 m V/V except for M_0 to M_3 in 0.2 second receive time where resolution is 0.4 m V/V.
IP Transient Program	Ten transient windows per input dipole. After a delay from current off of t, first four windows each have a width of t, next three windows each have a width of 6t and last three windows each have a width of 12t. The total measuring time is therefore 58t. t can be set at 3, 15, 30 or 60 milliseconds for nominal total receive times of 0.2, 1, 2 and 4 seconds.
Vp Integration Time	In 0.2 and 1 second receive time modes; 0.51 sec In 2 second mode; 1.02 sec In 4 second mode; 2.04 sec
Transmitter Timing	Equal on and off times with polarity change each half cycle. On/off times of 1, 2, 4 or 8 seconds with ±2.5% accuracy are required.
Header Capacity	Up to 17 four digit headers can be stored with each observation.
Data Memory Capacity	Depends on how many dipoles are recorded with each header. If four header items are used with 6 dipoles of SP, Vp and 10 M windows each, then about 200 dipole measurements can be stored. Up to three Optional Data Memory Expansion Blocks are available, each with a capacity of about 200 dipoles.
External Circuit Check	Checks up to six dipoles simultaneously using a 31 Hz square wave and readout on front panel meters, in range of 0 to 200 k ohms.
Filtering	RF filter, spheric spike removal; switchable 50 or 60 Hz notch filters, low pass filters which are automatically removed from the circuit in the 0.2 sec receive time.
Internal Calibrator	1000 mV of SP, 200 mV of Vp and 24.3 mV/V of M provided in 2 sec pulses.
Digital Display	Two, 4 digit LCD displays. One presents data, either measured or manually entered by the operator. The second display; 1) indicates codes identifying the data shown on the first display, and 2) shows alarm codes indicating errors.
Analog Meters	Six meters for; 1) checking external circuit resistance, and 2) monitoring input signals.
Digital Data Output	RS-232C compatible, 7 bit ASCII, no parity, serial data output for communication with a digital printer, tape recorder or modem.



Industry standard cassette recorders such as this MFE-2500 can be connected directly to the IPR-11.



DP-4 Digital Printer

Technical Description of the IPR-11 Broadband Time Domain IP Receiver

Standard Rechargeable Power Supply	Eight Eveready CH4 rechargeable NiCad D cells provide approximately 15 hours of continuous operation at 25°C. Supplied with a battery charger, suitable for 110/230 V, 50 to 400 Hz, 10 W.
Disposable Battery Power Supply	At 25°C, about 40 hours of continuous operation are obtained from 8 Eveready E95 or equivalent alkaline D cells. At 25°C, about 16 hours of continuous operation are obtained from 8 Eveready 1150 or equivalent carbon-zinc D cells.
Dimensions	345 mm x 250 mm x 300 mm, including lid.
Weight	10.5 kg, including batteries.
Operating Temperature Range	-20 to +55°C, limited by display.
Storage Temperature Range	-40 to +60°C.
Standard Items	Console with lid and set of rechargeable batteries, 2 copies of manual, battery charger.
Optional Items	Multidipole Potential Cables, Data Memory Expansion Blocks, Statistical Analysis Program, Crystal Clock, SPECTRUM Program, Digital Printer, Cassette Tape Recorder, Modem.
Shipping Weight	25 kg includes reusable wooden shipping case.

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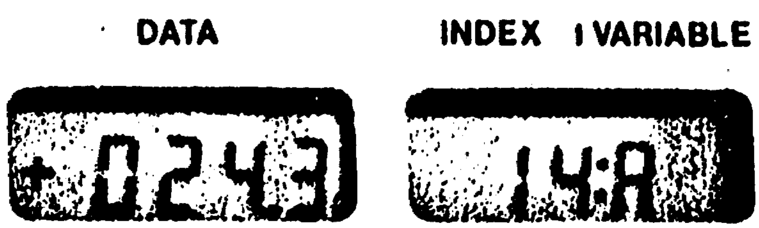
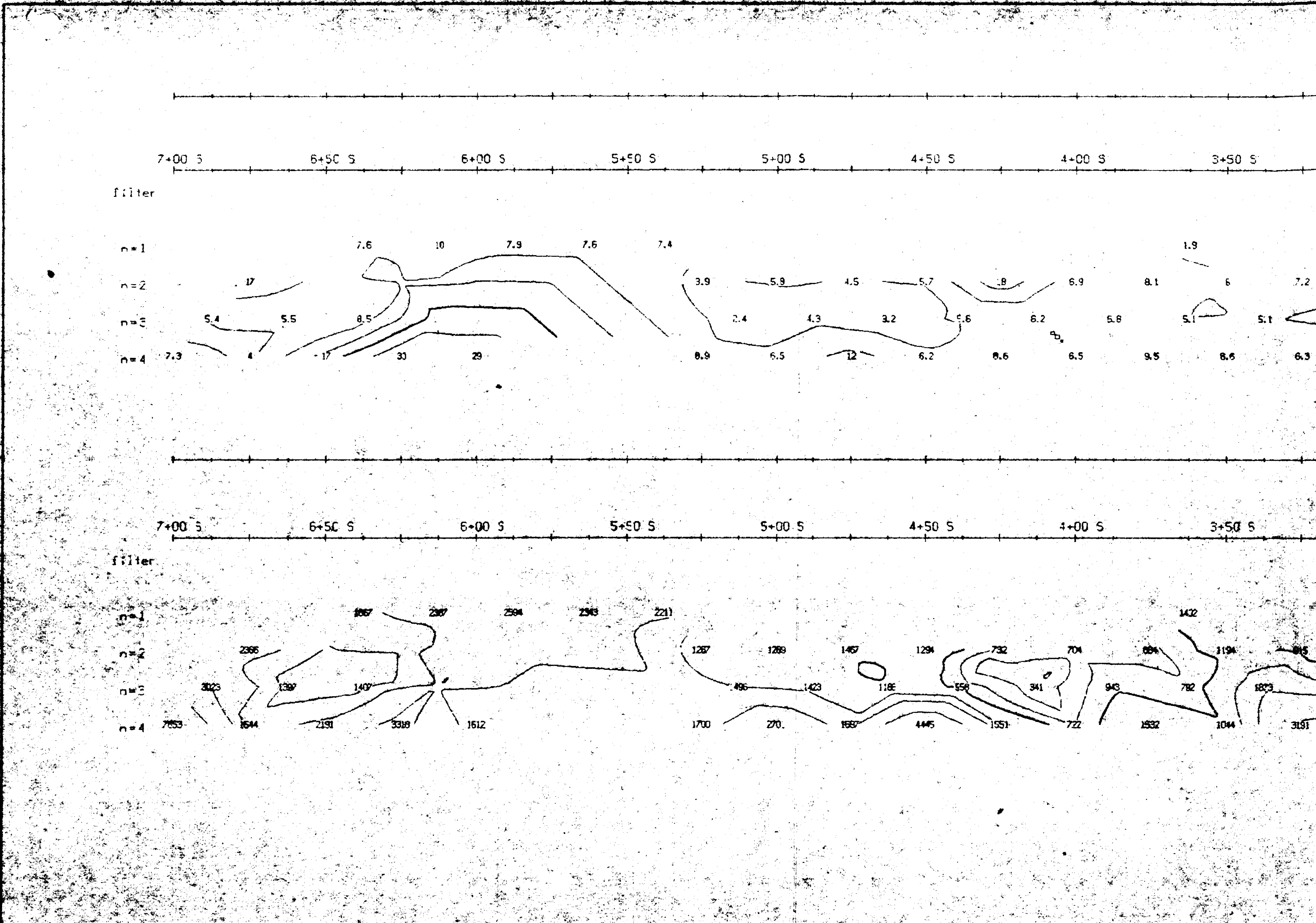


IPR-11 LCD displays, actual size


7+00 S
6+50 S
6+00 S
5+50 S
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3+50 S
filter
n=1
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n=3
n=4
7+00 S
6+50 S
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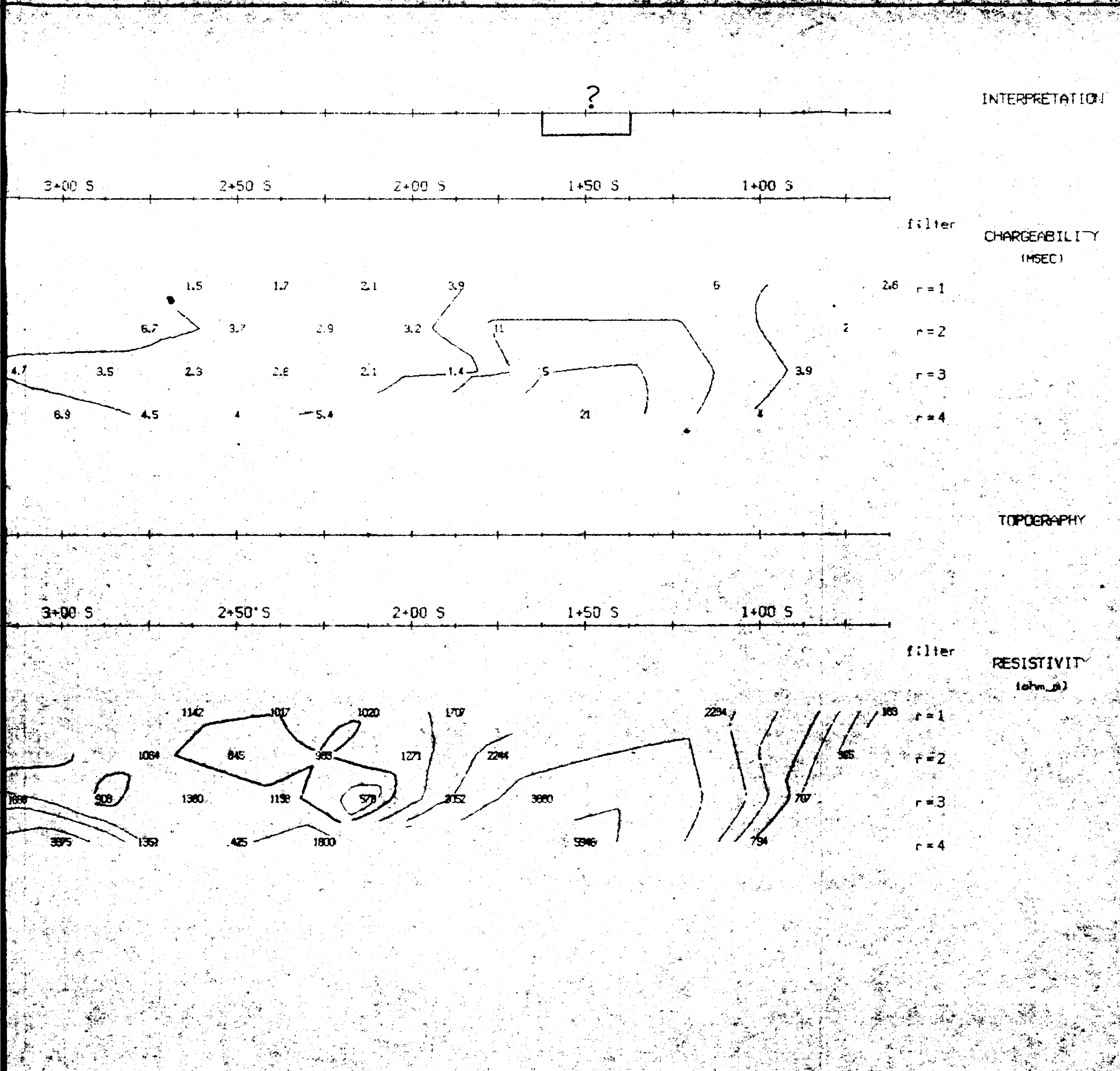
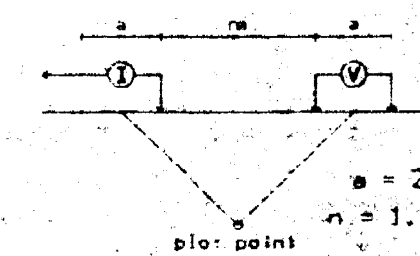


3+00E

Pole-Dipole Array



Filtered Profiles

Resistivity
Chargeability
Metal Factor

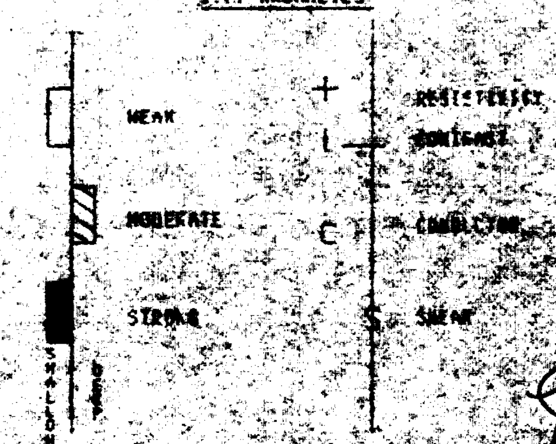
Logarithmic Contours : 1, 1.5, 2, 3, 5, 7.5, 10....

Instrument: Scintrex IPR-II

Transmitter: Scintrex SQ-3

Operator: B. Malpage

I.P. ANOMALIES



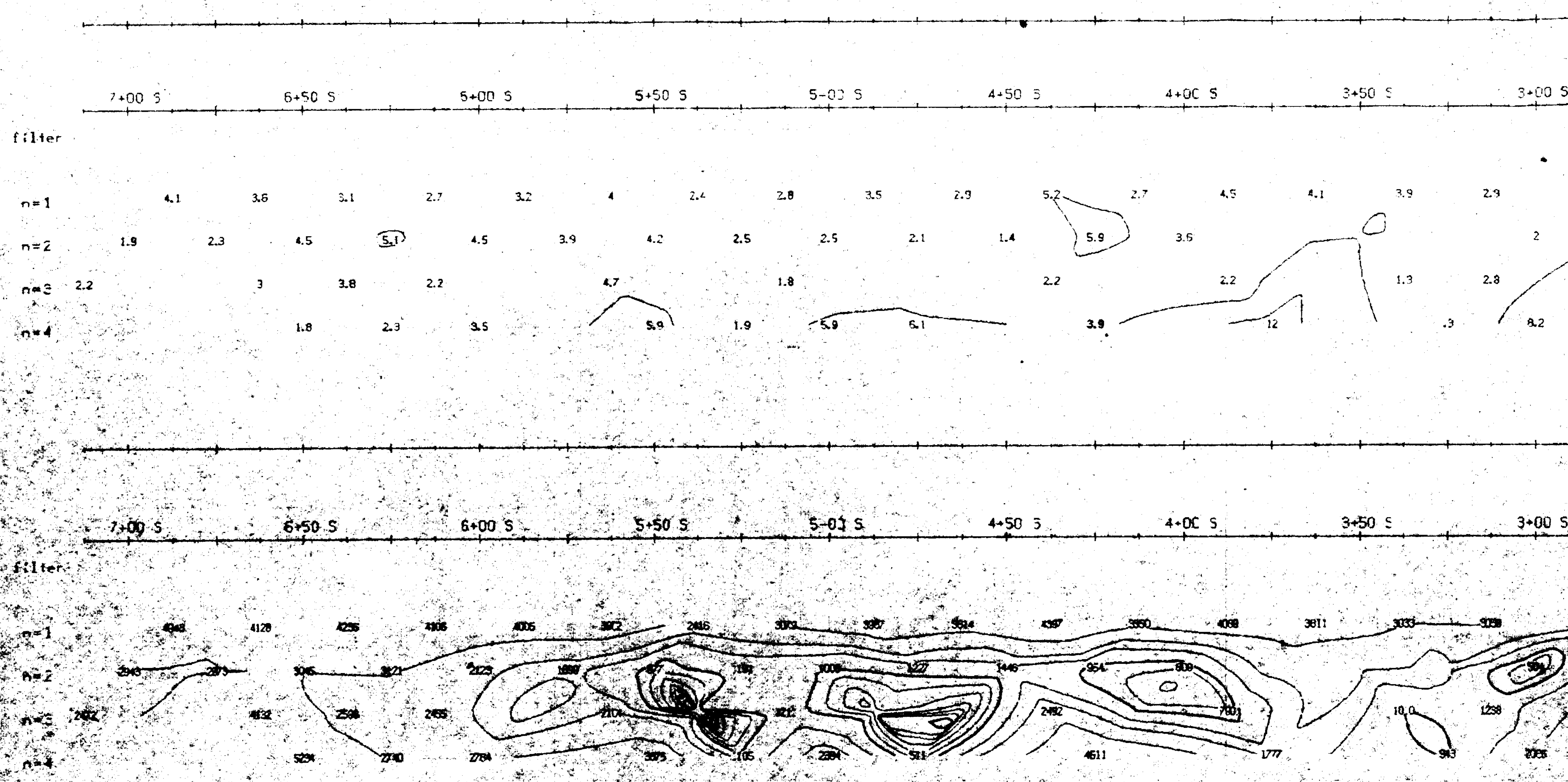
ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

for CROSS LAKE MINERALS LTD.

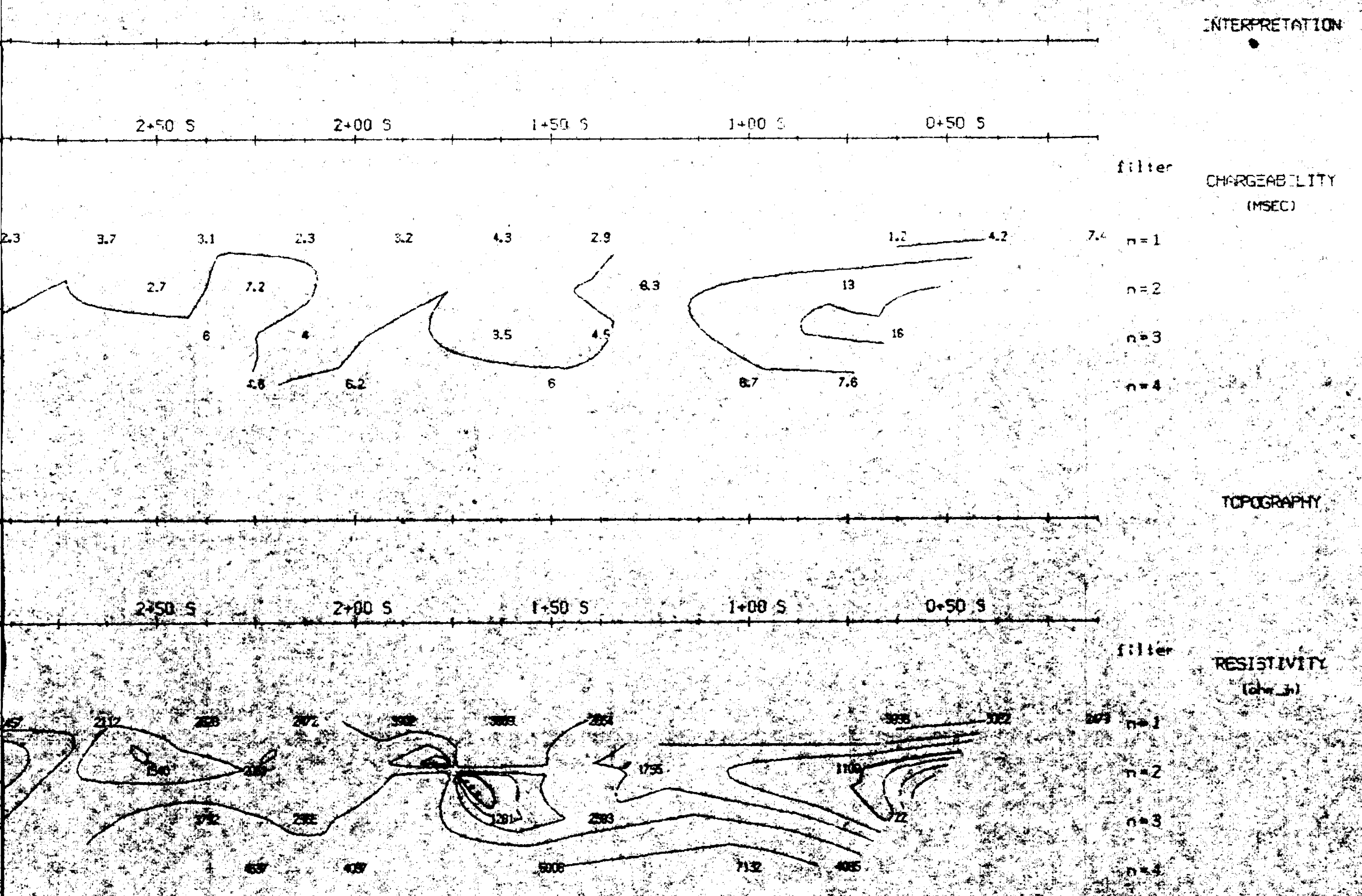
Title Time Domain
INDUCED POLARIZATION SURVEY
Matheson Grid 2
Bowman Twp. Ont.

Date: September 24, 1985 | Scale: 1 : 1250

Interp. by: | Job #

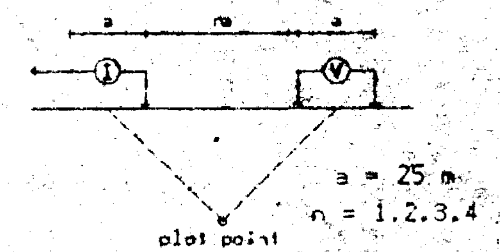


Geosoft (tm) Software for the Earth Sciences, Toronto, Canada



6+00E

Pole-Dipole Array



Filtered Profiles

Resistivity

Chargeability

Metal Factor

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

Instrument: Scintrex IPR-11

Transmitter: Scintrex TSQ-3

Operator: B. Malpage

I.P. ANOMALIES

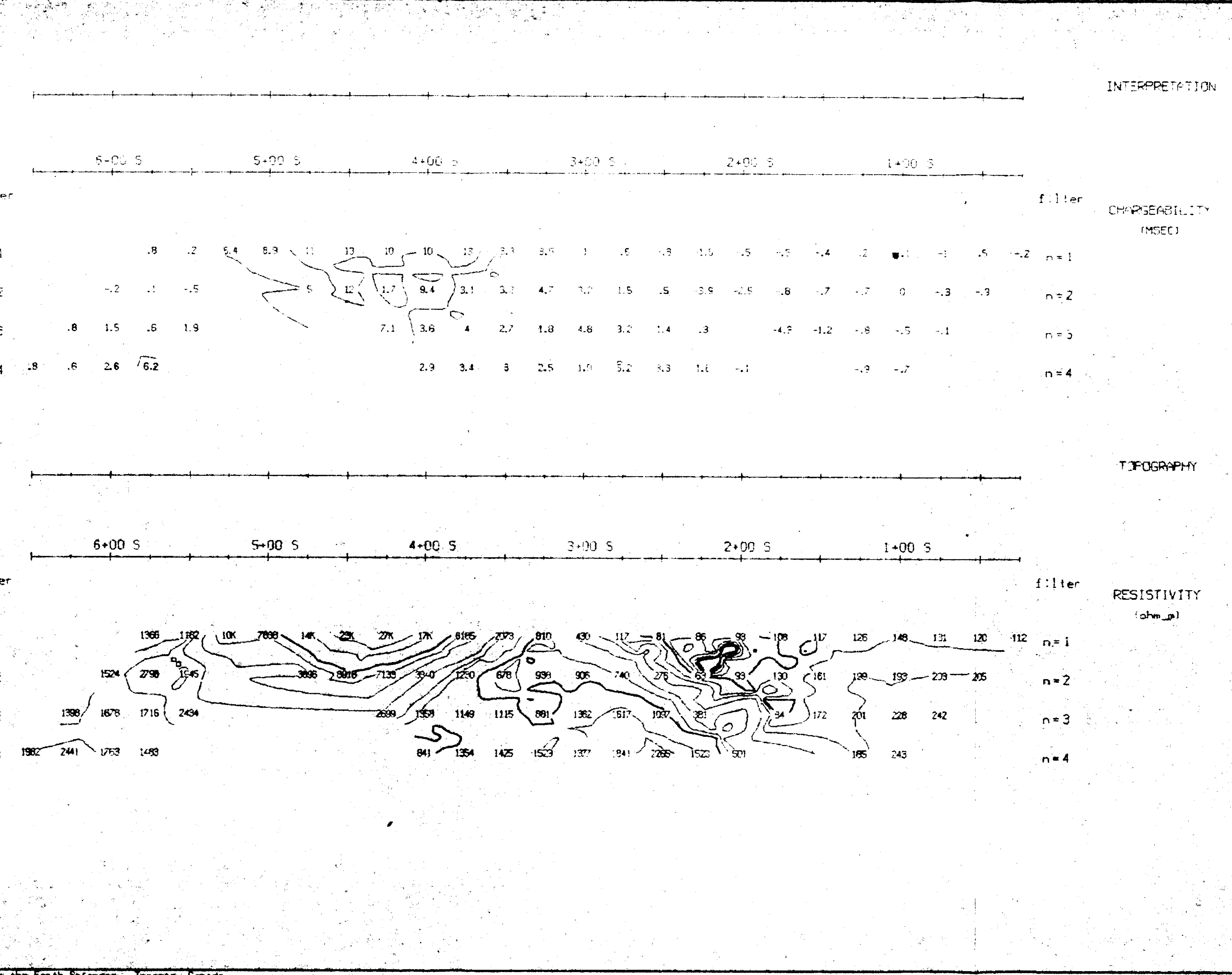
ROBERT S. MIDDLETON EXPLORATION SERVICES INC.

for CROSS LAKE MINERALS LTD.

Title Time Domain INDUCED POLARIZATION SURVEY Matheson Grid 2 Bowman Twp. (Ont.)

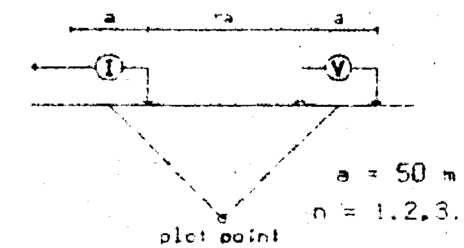
Date September 24, 1989 | Scale 1

Interp. by R.M. | Job #



1+00E

Pole-Dipole Array



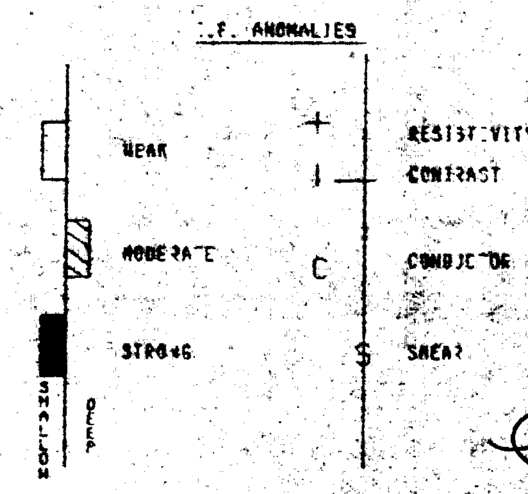
a = 50 m
n = 1,2,3,4

Filtered Profiles

Resistivity ———
Chargeability ———
Metal Factor ———

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

Instrument: Scintrex IPR-11
Transmitter: Scintrex TSQ-3
Operator: D. Ball

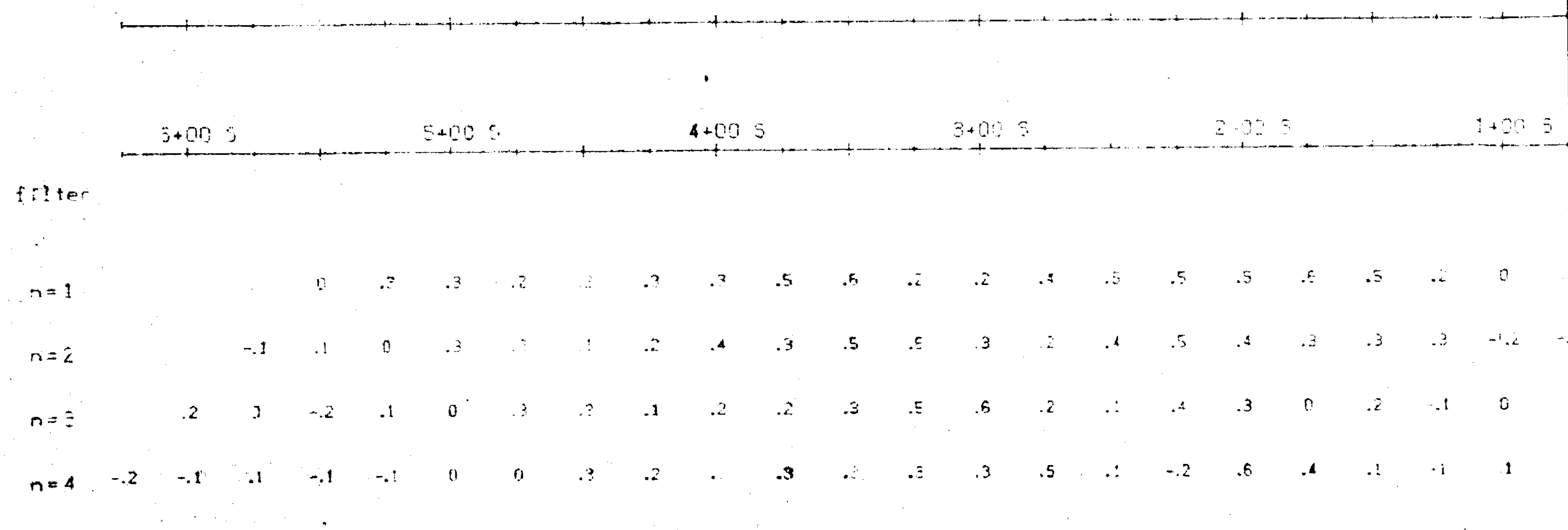


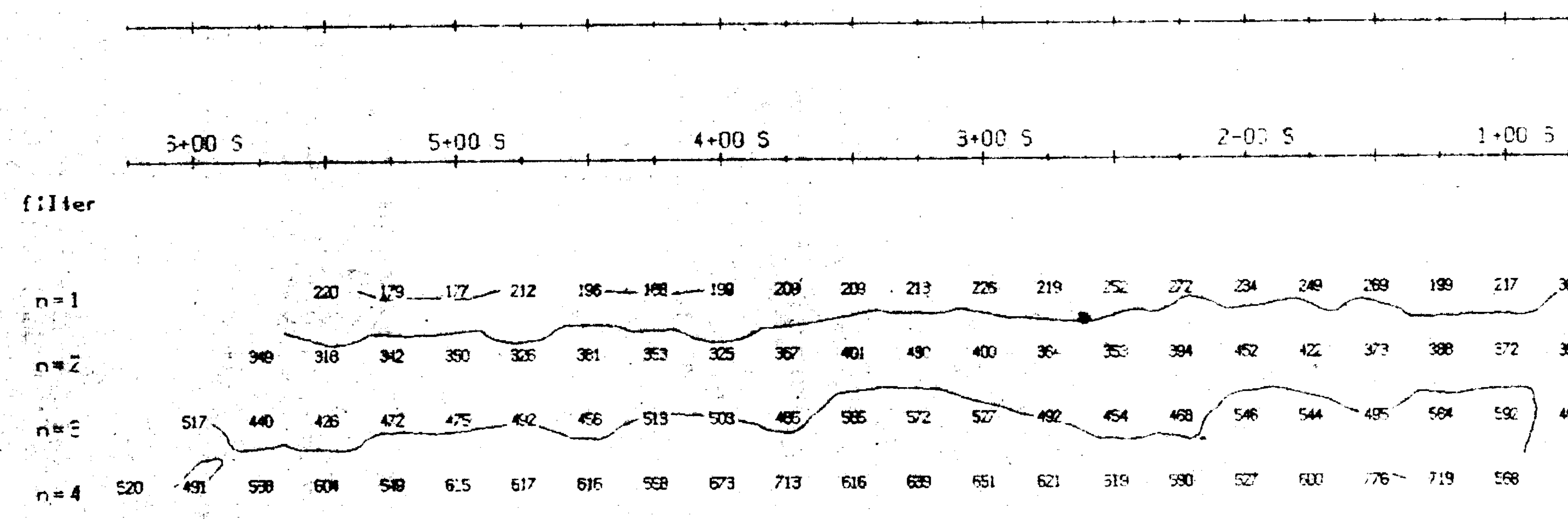
ROBERT S. MIDDLETON EXPLORATION SERVICES INC.

for **CROSS LAKE MINERALS LTD.**

Title **Time Domain INDUCED POLARIZATION SURVEY**
Matheson Grid 4
Bowman Twp. Ont. Fig 6c.

Date: September 25, 1989	Scale: 1 : 1250
Interp. by: R.C.	Job # M-288





GEOSOFT (tm) Software for the Earth Sciences, Toronto, Canada

INTERPRETATION

3+00 S   2+00 S   1+00 S

CHARGEABILITY (MSEC)

filter

.6	.2	.2	.4	.5	.5	.5	.6	.5	.2	0	.6	.5	.4	n = 1
.5	.5	.3	.2	.4	.5	.4	.3	.3	.3	-1.2	-.8	.1		n = 2
.3	.5	.6	.2	.1	.4	.3	0	.2	-.1	0	.3			n = 3
[illegible]	.3	.3	.5	.1	-.2	.6	.4	.1	-.1	1				n = 4

TOPOGRAPHY

3+00 S   2+00 S   1+00 S

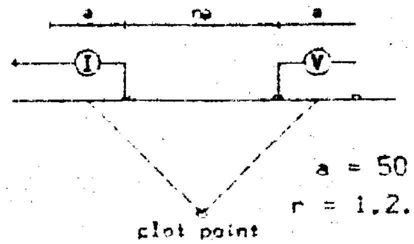
RESISTIVITY (ohm_m)

filter

209	213	226	219	252	272	234	249	289	199	217	309	236	198	n = 1
401	490	400	364	353	394	452	422	373	388	372	391	428		n = 2
585	572	527	492	454	468	546	544	495	564	592	403			n = 3
616	689	651	621	519	590	527	600	776	719	568				n = 4

5+00E

Pole-Dipole Array



Filtered Profiles

Resistivity ------
Chargeability ______
Metal Factor --------

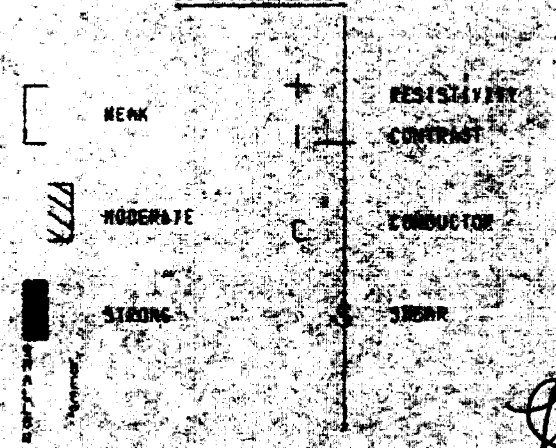
Logarithmic Contours 1, 1.5, 2, 3, 5, 7.5, 10, ...

Instrument: Scintrex IPR-11

Transmitter: Scintrex TSQ-3

Operator: D. Ball

I.P. ANOMALIES



ROBERT S. MIDDLETON EXPLORATION SERVICES INC.

for CROSS LAKE MINERALS LTD.

Title: Time Domain INDUCED POLARIZATION SURVEY Matheson Grid 4 Bowman Twp. Ont.

Date: September 25, 1989 | Scale 1 : 1250

Interp. by: R.L. | Job # M-288

Ministry of Northern Development and Mines
Ontario

DOCUMENT No. W8908-346

42A09SW0300 2.12842 BOWMAN

900

Mining Act

Report of Work
(Geophysical, Geological and Geochemical Su

Type of Survey(s)	Mining Division	Township or Area
MAGNETOMETER	LARDER LAKE	BOWMAN

Recorded Holder(s): CROSS LAKE MINERALS LTD., GORDON YOUNG 2.12842
Prospector's Licence No.: T5039, M21261
Address: c/o P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8
Telephone No.: (705) 264-4246
Survey Company: R.S. MIDDLETON EXPLORATION SERVICES
Name and Address of Author (of Geo-Technical Report): R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT. P4N 7W8
Date of Survey (from & to): 22 09 89 (Day Mo. Yr.) 25 10 89 (Day Mo. Yr.)

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	- Electromagnetic	
	- Magnetometer	40
For each additional survey: using the same grid: Enter 20 days (for each)	- Other	
	Geological	
	Geochemical	
Man Days		**Days per Claim**
Complete reverse side and enter total(s) here	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- Other	
	Geological	
	Geochemical	
Airborne Credits		**Days per Claim**
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Other	

Total miles flown over claim(s).

Date: Oct. 30/89 Recorded Holder or Agent (Signature): [signature]

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Prefix	Number	Prefix	Number
L	937761		988428		1030856
	937762		988429		1117071
	937763		1001815		1117072
	937764		1001816		
	988408		1001817		
	988409		1001818		
	988412		1001819		
	988413		1001820		
	988414		1030657		
	988415		1030658		
	988416		1030659		
	988417		1030660		
	988418		1030853		
	988419		1030854		
	988420		1030855		
	988421				

RECEIVED
NOV 16 1989
MINING LANDS SECTION

Total number of mining claims covered by this report of work. 34

Certification Verifying Report of Work

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

Name and Address of Person Certifying: R. LACHAPELLE, P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8

Telephone No.: (705) 264-4246 Date: Oct 30/89 Certified By (Signature): [signature]

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
1360	Oct 31/89	M.A. Dearren
	Date Approved as Recorded	**Provincial Manager, Mining Lands**
	See revised	work statement

Received Stamp: LARDER LAKE MINING DIVISION RECEIVED OCT 31 1989 9.40am

1362 (89/06)

Ministry of Northern Development and Mines
Ontario

DOCUMENT No. W8908·347

M L

Report of Work 212842
Mining Act
(Geophysical, Geological and Geochemical Surveys)

Instructions
- Please type or print.
- Refer to Section 77, the Mining Act for assessment work requirements and maximum credits allowed per survey type.
- If number of mining claims traversed exceeds space on this form, attach a list.
- Technical Reports and maps in duplicate should be submitted to Mining Lands Section, Mineral Development and Lands Branch:

Type of Survey(s)	Mining Division	Township or Area
ELECTROMAGNETIC	LARDER LAKE	BOWMAN

Recorded Holder(s)	Prospector's Licence No.
CROSS LAKE MINERALS LTD., GORDON YOUNG	T5039, M21261
Address	**Telephone No.**
c/o P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8	(705) 264-4246

Survey Company: R.S. MIDDLETON EXPLORATION SERVICES

Name and Address of Author (of Geo-Technical Report): R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT. P4N 7W8

Date of Survey (from & to): 19 09 89 | 26 10 89 (Day Mo. Yr. | Day Mo. Yr.)

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	- Electromagnetic	20
For each additional survey: using the same grid:	- Magnetometer	
Enter 20 days (for each)	- Other	
	Geological	
	Geochemical	
Man Days		**Days per Claim**
Complete reverse side and enter total(s) here	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- Other	
	Geological	
	Geochemical	
Airborne Credits		**Days per Claim**
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Other	

Total miles flown over claim(s).

Date: Oct 30/89 — Recorded Holder or Agent (Signature): [signature]

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Prefix	Number	Prefix	Number
L	988408		1001817		
	988409		1001818		
	988412		1001819		
	988413		1001820		
	988414		1030657		
	988415		1030658		
	988416		1030659		
	988417		1030660		
	988418		1117071		
	988419		1117072		
	988420				
	988421				
	988428				
	988429				
	1001815				
	1001816				

RECEIVED
NOV 16 1989
MINING LANDS SECTION

Total number of mining claims covered by this report of work: 26

Certification Verifying Report of Work

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

Name and Address of Person Certifying: R. LACHAPELLE P.O. BOX 1637, TIMMINS, ONT. P4N 7W8

Telephone No.: (705) 264-4246 | Date: Oct 30/89 | Certified By (Signature): [signature]

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
520	Oct 31/89	M.G. Wenner
1P.	**Date Approved as Recorded**	**Provincial Manager, Mining Lands**
	See revised	work statement

Received Stamp: RECEIVED OCT 31 1989 9.40am

1362 (89/06)

Ministry of Northern Development and Mines

Mining Act

DOCUMENT No. W8908·351

2.12842

Report of Work
(Geophysical, Geological and Geochemical Surveys)

M.L.

Instructions
- Please type or print.
- Refer to Section 77, the Mining Act for assessment work requirements and maximum credits allowed per survey type.
- If number of mining claims traversed exceeds space on this form, attach a list.
- Technical Reports and maps in duplicate should be submitted to Mining Lands Section, Mineral Development and Lands Branch:

Type of Survey(s)	Mining Division	Township or Area
INDUCED POLARIZATION	LARDER LAKE	BOWMAN

Recorded Holder(s)	Prospector's Licence No.
CROSS LAKE MINERALS LTD.	T5039

Address	Telephone No.
P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8	(705) 264-4246

Survey Company: R.S. MIDDLETON EXPLORATION SERVICES

Name and Address of Author (of Geo-Technical Report)	Date of Survey (from & to)
R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT P4N 7W8	24 09 89 (Day Mo. Yr.) – 25 09 89 (Day Mo. Yr.)

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	- Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Other	
	Geological	
	Geochemical	

Man Days		Days per Claim
Complete reverse side and enter total(s) here	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- Other (I.P.)	7.0
	Geological	
	Geochemical	

Airborne Credits		Days per Claim
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Other	

Total miles flown over claim(s).

Date	Recorded Holder or Agent (Signature)
Oct 30/89	[signature]

Mining Claims Traversed (List in numerical sequence)

Mining Claim Prefix	Mining Claim Number	Mining Claim Prefix	Mining Claim Number	Mining Claim Prefix	Mining Claim Number
L	937761				
	937762				
	937763				
	937764				
	1030853				
	1030854				
	1030855				
	1030856				

RECEIVED
NOV 16 1989
MINING LANDS SECTION

Total number of mining claims covered by this report of work. **8**

Certification Verifying Report of Work

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

Name and Address of Person Certifying: R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT P4N 7W8 [signature]

Telephone No.	Date	Certified By (Signature)
(705) 264-4246	Oct 30/89	[signature]

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
56	Nov. 8/89	[signature]
	Date Approved as Recorded	Provincial Manager, Mining Lands
	2 Feb 90	[signature]

Received Stamp:
LARDER LAKE MINING DIVISION
RECEIVED
NOV 8 1989
10:30 am

Ministry of Natural Resources

Ontario

File ____________

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) INDUCED POLARIZATION

Township or Area BOWMAN

Claim Holder(s) CROSS LAKE MINERALS LTD.
121-300 RICHMOND ST. WEST TORONTO

Survey Company R.S. MIDDLETON EXPL. SERV. INC

Author of Report RICHARD LACHAPELLE

Address of Author 136 CEDAR ST. SOUTH, TIMMINS

Covering Dates of Survey SEPT 19 – OCT 26 / 1989 (linecutting to office)

Total Miles of Line Cut 60 Km

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	
–Magnetometer	
–Radiometric	
–Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer ______ Electromagnetic ______ Radiometric ______ (enter days per claim)

DATE: OCT 30/1989 SIGNATURE: [signature] Author of Report or Agent

Res. Geol. ____________ Qualifications ____________

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

L937761, L937762, L937763
(prefix) (number)
L937764, L1030853, L1030854
L1030855, L103856

If space insufficient, attach list

TOTAL CLAIMS 8

837 (5/79)

File

Ontario

Ministry of Natural Resources

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) MAGNETIC (TOTAL FIELD)
Township or Area BOWMAN
Claim Holder(s) CROSS LAKE MINERALS LTD.
121-300 RICHMOND ST. WEST, TORONTO
Survey Company R.S. MIDDLETON EXPL. SERV. INC
Author of Report RICHARD LACHAPELLE
Address of Author 136 CEDAR ST SOUTH, TIMMINS
Covering Dates of Survey SEPT 19 - OCT 26 /1989
(linecutting to office)
Total Miles of Line Cut 60 Km

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	
–Magnetometer	
–Radiometric	
–Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer ______ Electromagnetic ______ Radiometric ______
(enter days per claim)

DATE: OCT 30/1989 SIGNATURE: [signature]
Author of Report or Agent

Res. Geol. ______ Qualifications ______

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix) (number)

L937761, L937762, L937763
L937764, L988408, L988409,
L988412, L988413, L988414
L988415, L988416, L988417,
L988418, L988419, L988420,
L988421, L988428, L988429,
L1001815, L1001816, L1001817,
L1001818, L1001819, L1001820,
L1030657, L1030658, L1030659,
L1030660, L1030853, L1030854
L1030855, L1030856, L1107071
L1107072

If space insufficient, attach list

TOTAL CLAIMS 34

837 (5/79)

File ______

Ministry of Natural Resources

Ontario

GEOPHYSICAL – GEOLOGICAL – GEOCHEMICAL TECHNICAL DATA STATEMENT

TO BE ATTACHED AS AN APPENDIX TO TECHNICAL REPORT
FACTS SHOWN HERE NEED NOT BE REPEATED IN REPORT
TECHNICAL REPORT MUST CONTAIN INTERPRETATION, CONCLUSIONS ETC.

Type of Survey(s) HORIZONTAL LOOP ELECTROMAGNETIC
Township or Area BOWMAN
Claim Holder(s) CROSS LAKE MINERALS LTD.
121-300 RICHMOND ST. WEST TORONTO
Survey Company R.S. MIDDLETON EXPL SERV. INC
Author of Report RICHARD LACHAPELLE
Address of Author 136 CEDAR ST. SOUTH, TIMMINS
Covering Dates of Survey SEPT 19 – OCT 26 / 1989
(linecutting to office)
Total Miles of Line Cut 60 Km

SPECIAL PROVISIONS CREDITS REQUESTED

ENTER 40 days (includes line cutting) for first survey.

ENTER 20 days for each additional survey using same grid.

	DAYS per claim
Geophysical	
–Electromagnetic	
–Magnetometer	
–Radiometric	
–Other	
Geological	
Geochemical	

AIRBORNE CREDITS (Special provision credits do not apply to airborne surveys)

Magnetometer ______ Electromagnetic ______ Radiometric ______
(enter days per claim)

DATE: OCT 30 / 1989 SIGNATURE: [signature]
Author of Report or Agent

Res. Geol. ______ Qualifications 2.11658

Previous Surveys

File No.	Type	Date	Claim Holder

MINING CLAIMS TRAVERSED
List numerically

(prefix) (number)

L988408, L988409, L988412
L988413, L988414, L988415,
L988416, L988417, L988418
L988419, L988420, L988421
L988428, L988429, L1001815
L1001816, L1001817, L1001818,
L1001819, L1001820, L1030657
L1030658, L1030659, L1030660
L1117071, L1117072

If space insufficient, attach list

TOTAL CLAIMS 26

837 (5/79)

GEOPHYSICAL TECHNICAL DATA

GROUND SURVEYS – If more than one survey, specify data for each type of survey

Number of Stations ______ Number of Readings ______
Station interval 25m Line spacing 100m
Profile scale FOR HORIZONTAL LOOP ELECTROMAGNETIC: 1cm = 10%
Contour interval FOR MAGNETIC : 20 or 50 GAMMAS

MAGNETIC

Instrument EDA INSTRUMENTS PPM 350 (FIELD), PPM 400 (BASE)
Accuracy – Scale constant 1nT
Diurnal correction method AUTOMATIC DURING DATA DUMP
Base Station check-in interval (hours) 30 sec
Base Station location and value VARIES ACCORDING TO GRID

ELECTROMAGNETIC

Instrument APEX PARAMETRICS MAX-MIN II
Coil configuration HORIZONTAL LOOP
Coil separation 150 m
Accuracy ± 0.1 %
Method: ☒ HORIZONTAL LOOP ☐ Fixed transmitter ☐ Shoot back ☐ In line ☐ Parallel line
Frequency 444, 1777, 3555 (specify V.L.F. station)
Parameters measured IN-PHASE OUT-OF-PHASE COMPONENTS OF SECONDARY FIELD

GRAVITY

Instrument ______
Scale constant ______
Corrections made ______
Base station value and location ______
Elevation accuracy ______

INDUCED POLARIZATION / RESISTIVITY

Instrument SCINTREX IPR-11
Method ☒ Time Domain ☐ Frequency Domain
Parameters – On time 2 sec. Frequency ______
– Off time 2 sec Range ______
– Delay time 30 msec
– Integration time 1.02 sec
Power 3 KW
Electrode array POLE - DIPOLE a = 25m FOR 937761 et al. a = 50m FOR 1030853 et al.
Electrode spacing n = 1, 2, 3, 4
Type of electrode STAINLESS

Assessment Work Breakdown

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

Type of Survey

Technical Days				Technical Days Credits		Line-cutting Days		Total Credits		No. of Claims		Days per Claim
8	X	7	=	56	+		=	56	+	8	=	7

Type of Survey

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

Type of Survey

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

Type of Survey

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

Ministry of Northern Development and Mines

Technical Assessment Work Credits

File
2.12842

Date	Mining Recorder's Report of Work No.
Feb 2, 1990	W8908.346

Recorded Holder
Cross Lake Minerals Ltd.
Township or Area
Bowman

Type of survey and number of Assessment days credit per claim	Mining Claims Assessed
Geophysical	
Electromagnetic ______ days	L-937761 to 764 incl.
Magnetometer 40 days	988408-09
Radiometric ______ days	988412 to 414 incl.
Induced polarization ______ days	988416 to 419 incl.
Other ______ days	988428 to 29
Section 77 (19) See "Mining Claims Assessed" column	1001815 to 817 incl.
Geological ______ days	
Geochemical ______ days	1001819-20
Man days ☐ Airborne ☐	1030657-58
Special provision ☐ Ground ☐	1030660
☐ Credits have been reduced because of partial coverage of claims.	1030853 to 856 incl.
☐ Credits have been reduced because of corrections to work dates and figures of applicant.	1117071-72

Special credits under section 77 (16) for the following mining claims

30 days credit magnetometer : L 988415, 988421,

20 days credit magnetometer : L 988420, 1001818, 1030659

No credits have been allowed for the following mining claims

☐ not sufficiently covered by the survey ☐ insufficient technical data filed

The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical - 80; Geologocal - 40; Geochemical - 40; Section 77(19) - 60.

828 (85/12)

Ministry of Northern Development and Mines
Ontario

Technical Assessment Work Credits

File
2.12842

Date	Mining Recorder's Report of Work No.
Feb 2, 1990	W8908.347

Recorded Holder: Cross Lake Minerals Ltd.

Township or Area: Bowman

Type of survey and number of Assessment days credit per claim	Mining Claims Assessed
Geophysical	
Electromagnetic 17.9 days	L-988408-09
Magnetometer ______ days	988412 to419 incl.
Radiometric ______ days	
Induced polarization ______ days	988421
Other ______ days	998428-29
Section 77 (19) See "Mining Claims Assessed" column	1001815 to 820 incl.
Geological ______ days	1030657 to 660 incl.
Geochemical ______ days	1117071-72
Man days ☐ Airborne ☐	
Special provision ☒ Ground ☐	
☒ Credits have been reduced because of partial coverage of claims.	
☐ Credits have been reduced because of corrections to work dates and figures of applicant.	

Special credits under section 77 (16) for the following mining claims

No credits have been allowed for the following mining claims

☒ not sufficiently covered by the survey ☐ insufficient technical data filed

L 988420

The Mining Recorder may reduce the above credits if necessary in order that the total number of approved assessment days recorded on each claim does not exceed the maximum allowed as follows: Geophysical - 80; Geologocal - 40; Geochemical - 40; Section 77(19) - 60.

828 (85/12)

Ontario

Ministry of
Northern Development
and Mines

Ministère du
Développement du Nord
et des Mines

Mining Lands Section
880 Bay Street, 3rd Floor
Toronto, Ontario
M5S 1Z8

Telephone: (416) 965-488

March 4, 1990

Your File: W8908.346,347
Our File: 2.12842

Mining Recorder
Ministry of Northern Development and Mines
4 Government Road East
Kirkland Lake, Ontario
P2N 1A2

Dear Sir:

Re: Notice of Intent dated February 2, 1990 for Geophysical survey submitted on Mining Claims L 988408 et al in Bowman Township.

The assessment work credits, as listed with the above-mentioned Notice Intent have been approved as of the above date.

Please inform the recorded holder of these mining claims and so indicate on your records.

Yours sincerely,

W.R. Cowan
Provincial Manager, Mining Lands
Mines & Minerals Division

LS/pt
Enclosure

cc: Mr. G.H. Ferguson
Mining and Lands Commissioner
Toronto, Ontario

Cross Lake Minerals Ltd.
Timmins, Ontario

R. Lachapelle
Timmins, Ontario

Resident Geologist
Kirkland Lake, Ontario

Ministry of Northern Development and Mines
Ontario

DOCUMENT No. W8908•346

Mining Act

Report of Work
(Geophysical, Geological and Geochemical Surveys)

Instructions
- Please type or print.
- Refer to Section 77, the Mining Act for assessment work requirements and maximum credits allowed per survey type.
- If number of mining claims traversed exceeds space on this form, attach a list.
- Technical Reports and maps in duplicate should be submitted to Mining Lands Section, Mineral Development and Lands Branch:

Type of Survey(s): MAGNETOMETER
Mining Division: LARDER LAKE
Township or Area: BOWMAN
Recorded Holder(s): CROSS LAKE MINERALS LTD., GORDON YOUNG 2.12842
Prospector's Licence No.: T5039, M21261
Address: c/o P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8
Telephone No.: (705) 264-4246
Survey Company: R.S. MIDDLETON EXPLORATION SERVICES
Name and Address of Author (of Geo-Technical Report): R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT. P4N 7W8
Date of Survey (from & to): 22 09 89 (Day Mo. Yr.) 25 10 89 (Day Mo. Yr.)

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	- Electromagnetic	
	- Magnetometer	40
For each additional survey: using the same grid: Enter 20 days (for each)	- Other	
	Geological	
	Geochemical	
Man Days		
Complete reverse side and enter total(s) here	Geophysical	
	- Electromagnetic	
	- Magnetometer	
	- Other	
	Geological	
	Geochemical	
Airborne Credits		
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Other	

Total miles flown over claim(s).

Date: Oct.30/89
Recorded Holder or Agent (Signature): [signature]

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Prefix	Number	Prefix	Number
L	937761 ✓		988428 ✓		1030856 ✓
	937762 ✓		988429 ¼ ✓		1117071 ✓
	937763 ✓		1001815 ✓		1117072 ✓
	937764 ✓		1001816 ✓		
	988408 ✓		1001817 ✓		
	988409 ✓		1001818 ½		
	988412 ✓		1001819 ✓		
	988413 ✓		1001820 ✓		
	988414 ✓		1030657 ✓		
	988415 ¼		1030658 ¼ ✓		
	988416 ¼ ✓		1030659 ½		
	988417 ✓		1030660 ✓		
	988418 ✓		1030853		
	988419 ½ ✓		1030854 ✓		
	988420 ✓ ½		1030855 ✓		
	988421 ¼				

RECEIVED NOV 16 1989 MINING LANDS SECTION

Total number of mining claims covered by this report of work. 34

Certification Verifying Report of Work

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

Name and Address of Person Certifying: R. LACHAPELLE, P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8
Telephone No.: (705) 264-4246
Date: Oct 30/89
Certified By (Signature): [signature]

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
1360	Oct 31/89	M.A. Warren [signature]
	Date Approved as Recorded	Provincial Manager, Mining Lands

Received Stamp: RECEIVED OCT 31 1989 9.40am

362 (89/06)

Ministry of Northern Development and Mines

DOCUMENT No. W8908·351

2.12842

Report of Work
(Geophysical, Geological and Geochemical Surveys)

Mining Act

Instructions
- Please type or print.
- Refer to Section 77, the Mining Act for assessment work requirements and maximum credits allowed per survey type.
- If number of mining claims traversed exceeds space on this form, attach a list.
- Technical Reports and maps in duplicate should be submitted to Mining Lands Section, Mineral Development and Lands Branch.

Type of Survey(s)	Mining Division	Township or Area
INDUCED POLARIZATION	LARDER LAKE	BOWMAN

Recorded Holder(s): CROSS LAKE MINERALS LTD.

Prospector's Licence No.: T5039

Address: P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8

Telephone No.: (705) 264-4246

Survey Company: R.S. MIDDLETON EXPLORATION SERVICES

Name and Address of Author (of Geo-Technical Report): R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT P4N 7W8

Date of Survey (from & to): 24 09 89 – 25 09 89 (Day Mo. Yr.)

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	- Electromagnetic	
	- Magnetometer	
For each additional survey: using the same grid:	- Other	
Enter 20 days (for each)	Geological	
	Geochemical	
Man Days	Geophysical	Days per Claim
Complete reverse side and enter total(s) here	- Electromagnetic	
	- Magnetometer	
	- Other (I.P.)	7.0
	Geological	
	Geochemical	
Airborne Credits		Days per Claim
Note: Special provisions credits do not apply to Airborne Surveys.	Electromagnetic	
	Magnetometer	
	Other	

Total miles flown over claim(s).

Date: Oct 30/89 — Recorded Holder or Agent (Signature): [signature]

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Prefix	Number	Prefix	Number
L	937761	✓			
	937762	✓			
	937763	✓			
	937764	✓			
	1030853	✓			
	1030854	✓			
	1030855	✓			
	1030856	✓			

RECEIVED NOV 16 1989 MINING LANDS SECTION

Total number of mining claims covered by this report of work: 8

Certification Verifying Report of Work

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

Name and Address of Person Certifying: R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT P4N 7W8

Telephone No.: (705) 264-4246 — Date: Oct 30/89 — Certified By (Signature): [signature]

For Office Use Only

Total Days Cr. Recorded	Date Recorded	Mining Recorder
56	Nov. 8/89	[signature]
	Date Approved as Recorded	Provincial Manager, Mining Lands

Received Stamp: LARDER LAKE MINING DIVISION RECEIVED NOV 8 1989 10:30 am

Ministry of Northern Development and Mines
Ontario

DOCUMENT No. W8908·347

Report of Work 212842

Mining Act

(Geophysical, Geological and Geochemical Surveys)

Instructions
- Please type or print.
- Refer to Section 77, the Mining Act for assessment work requirements and maximum credits allowed per survey type.
- If number of mining claims traversed exceeds space on this form, attach a list.
- Technical Reports and maps in duplicate should be submitted to Mining Lands Section, Mineral Development and Lands Branch:

Type of Survey(s): ELECTROMAGNETIC
Mining Division: LARDER LAKE
Township or Area: BOWMAN
Recorded Holder(s): CROSS LAKE MINERALS LTD., GORDON YOUNG
Prospector's Licence No.: T5039, M21261
Address: c/o P.O. BOX 1637, TIMMINS, ONTARIO P4N 7W8
Telephone No.: (705) 264-4246
Survey Company: R.S. MIDDLETON EXPLORATION SERVICES
Name and Address of Author (of Geo-Technical Report): R. LACHAPELLE P.O. BOX 1637 TIMMINS, ONT. P4N 7W8
Date of Survey (from & to): 19 09 89 26 10 89 (Day Mo. Yr. Day Mo. Yr.)

Credits Requested per Each Claim in Columns at right

Special Provisions		Days per Claim
For first survey: Enter 40 days. (This includes line cutting)	Geophysical	
	- Electromagnetic	20
	- Magnetometer	
For each additional survey: using the same grid: Enter 20 days (for each)	- Other	
	Geological	
	Geochemical	
Man Days Complete reverse side and enter total(s) here	Geophysical	Days per Claim
	- Electromagnetic	
	- Magnetometer	
	- Other	
	Geological	
	Geochemical	
Airborne Credits Note: Special provisions credits do not apply to Airborne Surveys.		Days per Claim
	Electromagnetic	
	Magnetometer	
	Other	

Total miles flown over claim(s).

Date: Oct 30/89
Recorded Holder or Agent (Signature): [signature]

Mining Claims Traversed (List in numerical sequence)

Prefix	Number	Prefix	Number	Prefix	Number
L	988408 ✓		1001817	½	
	988409	½	1001818	½	
	988412	✓	1001819	¼	
	988413	✓	1001820	¼ ✓	
	988414	✓	1030657	✓	
	988415	¼	1030658	¼ ✓	
	988416	✓	1030659	½	
	988417	✓	1030660	✓	
	988418	✓	1117071	¼	
	988419	✓	1117072	✓	
	988420	0			
	988421	½			
	988428	✓			
	988429	✓			
	1001815 ✓				
	1001816 ✓				

RECEIVED
NOV 16 1989
MINING LANDS SECTION

Total number of mining claims covered by this report of work. 26

Certification Verifying Report of Work

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

Name and Address of Person Certifying: R. LACHAPELLE P.O. BOX 1637, TIMMINS, ONT. P4N 7W8
Telephone No.: (705) 264-4246
Date: Oct 30/89
Certified By (Signature): [signature]

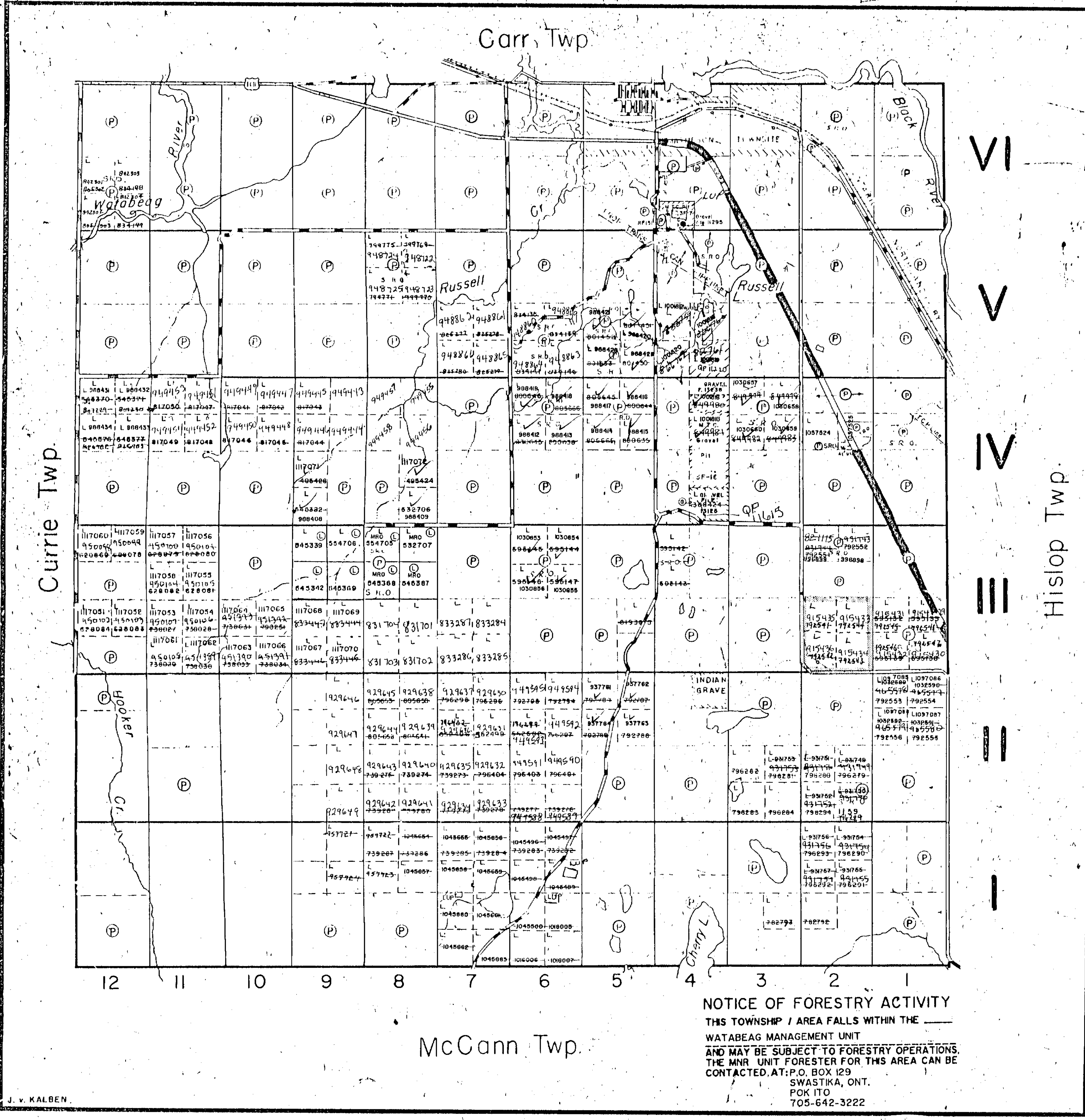
For Office Use Only

20 x 25 / 25 + 12/4

Total Days Cr. Recorded	Date Recorded	Mining Recorder
520	Oct 31/89	M.G. Wennen
	Date Approved as Recorded	Provincial Manager, Mining Lands

Received Stamp: RECEIVED OCT 31 1989 9.40am

1362 (89/06)



THE TOWNSHIP OF BOWMAN

DISTRICT OF COCHRANE

LARDER LAKE MINING DIVISION

SCALE: 1-INCH=40 CHAINS

LEGEND

PATENTED LAND	(P)
CROWN LAND SALE	(S) or C.S.
LEASES	(L)
LOCATED LAND	Loc.
LICENSE OF OCCUPATION	L.O.
MINING RIGHTS ONLY	M.R.O.
SURFACE RIGHTS ONLY	S.R.O.
ROADS	
IMPROVED ROADS	
KINGS HIGHWAYS	
RAILWAYS	
POWER LINES	
MARSH OR MUSKEG	
MINES	
GEODECTIC STATION	Δ

NOTES

400' SURFACE RIGHTS RESERVATION AROUND ALL LAKES AND RIVERS.

L O 8672 issued for flooding rights on Watabeag River.

GRAVEL AND SAND

QUARRY PERMIT

TOWNSHIP SUBJECT TO FORESTRY OPERATIONS

APPLICATION PENDING FOR SURFACE RIGHTS UNDER PUBLIC LANDS ACT

DATE OF ISSUE

AUG 25 1989

LARDER LAKE MINING RECORDER'S OFFICE

PLAN NO.- M-333

ONTARIO

MINISTRY OF NATURAL RESOURCES

SURVEYS AND MAPPING BRANCH

42A09SW0300 2.12842 BOWMAN

200

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

For CROSS LAKE MINERALS LTD.

Title
Total Field Magnetic Survey
Grid 1
Bowman Twp., Ont. Fig. 4a

Date: September 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288


MAX-MIN II HLEM LEGEND
Profile Scale: 1 cm. = 10 %
FREQUENCY : 444Hz
IN PHASE
QUADRATURE
COIL SEPARATION
150 m.
CONDUCTOR AXIS - WEAK
CONDUCTOR AXIS - STRONG
2.12342
SCALE 1 : 2 500
ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.
For CROSS LAKE MINERALS LTD.
Title Horizontal Loop EM Survey
Grid 1
Bowman Twp., Ont. Fig. 4b
Date: September 89
N.T.S.: 42 A/9
Operator: Cardinal
Job #: M-288

220


MAX-MIN II HLEM LEGEND
Profile Scale: 1 cm. = 10 %
FREQUENCY : 1777Hz
IN PHASE
QUADRATURE
COIL SEPARATION
150 m.
+10%
0
-10%
CONDUCTOR AXIS - WEAK
CONDUCTOR AXIS - STRONG
A1
B1
2.12842
SCALE 1 : 2 500
50 0 50 (metres) 100 150 200
ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.
For CROSS LAKE MINERALS LTD.
Title Horizontal Loop EM Survey
Grid 1
Bowman Twp., Ont. Fig. 4c
Date: September 89
N.T.S.: 42 A/9
Operator: Cardinal
Job #: M-288
L 1600 W
L 1500 W
L 1400 W
L 1300 W
L 1200 W
L 1100 W
L 1000 W
L 900 W
L 800 W
L 700 W
L 600 W
L 500 W
L 400 W
L 300 W
L 200 W
L 100 W
L 100 E
L 200 E
L 300 E
L 400 E
L 500 E
L 600 E
L 700 E
L 800 E
L 900 E
L 1000 E
L 1100 E
L 1200 E
L 1300 E
L 1400 E
L 1500 E
800 N
750 N
700 N
650 N
600 N
550 N
500 N
450 N
400 N
350 N
300 N
250 N
200 N
150 N
100 N
50 N
0
50 S
100 S
150 S
200 S
250 S
300 S
350 S
400 S
450 S
500 S
550 S
600 S
650 S
700 S

230

2.12842

SCALE 1 : 2 500

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

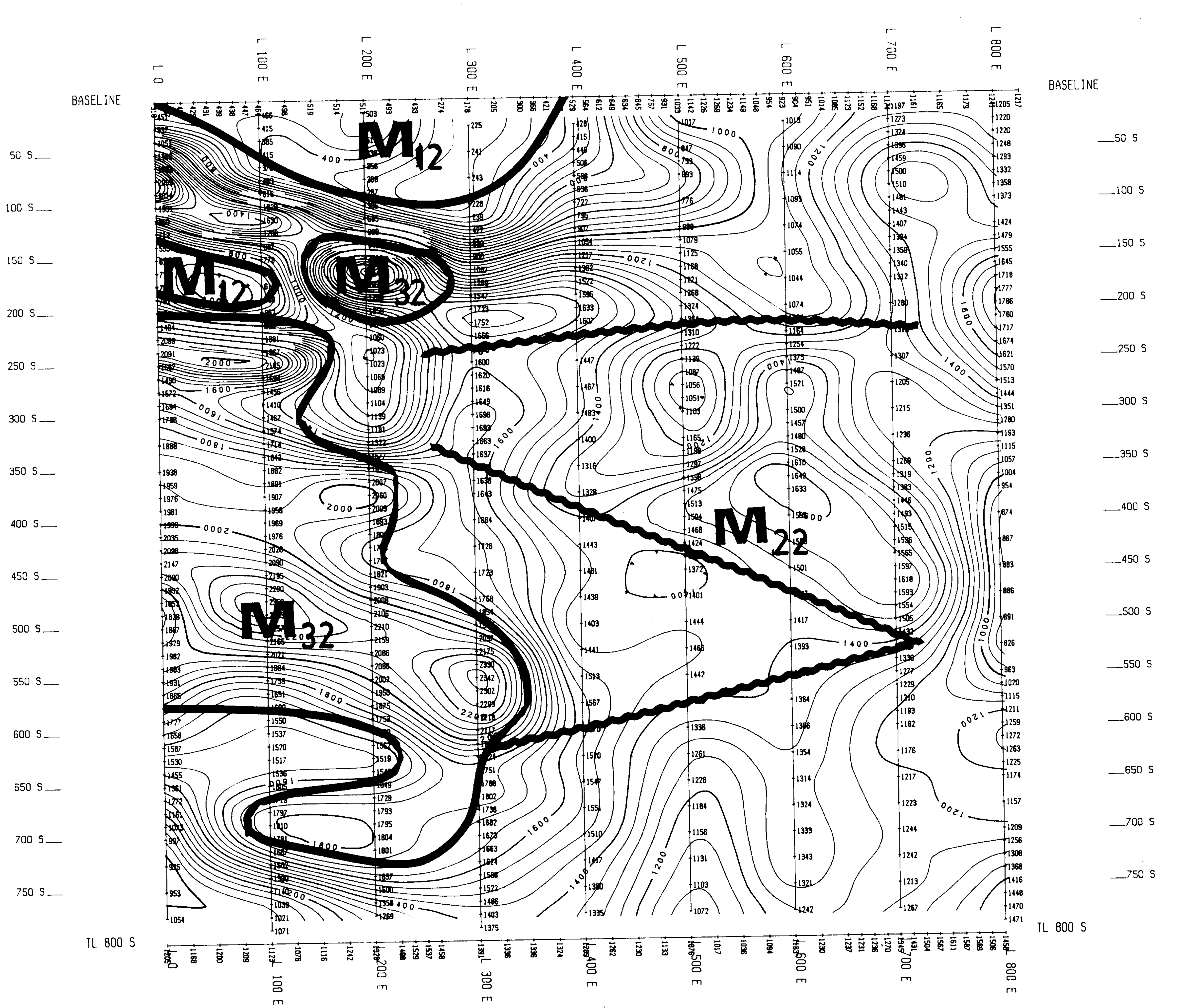
For: CROSS LAKE MINERALS LTD.

Title: Horizontal Loop EM Survey
Grid 1
Bowman Twp., Ont. Fig. 4d

Date: September 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288

240

REVISIONS	ROBERT S. MIDDLETON EXPLORATION SERVICES INC.		
	for CROSS LAKE MINERALS LTD.		
	Title Interpretation Map Grid I Bowman Twp., ON Fig. 4e		
	Date: Sept. 89	Scale: 1:2500	N.T.S.: 42 A/9
	Drawn: AM,BM	Approved: RL	File: M 288



CONTOUR INTERVALS

50

200

1000

FIELD INSTRUMENT : EDA PPM 350

BASE LEVEL REMOVED: 58000 GAMMAS

NARROW MAGNETIC MODELS

WIDE MAGNETIC MODELS

INTERPRETED CONTACT

INTERPRETED FAULT

MAGNETIC DOMAIN M_{nk}

2.12842

SCALE 1 : 2 500

50 0 50 (metres) 100 150 200

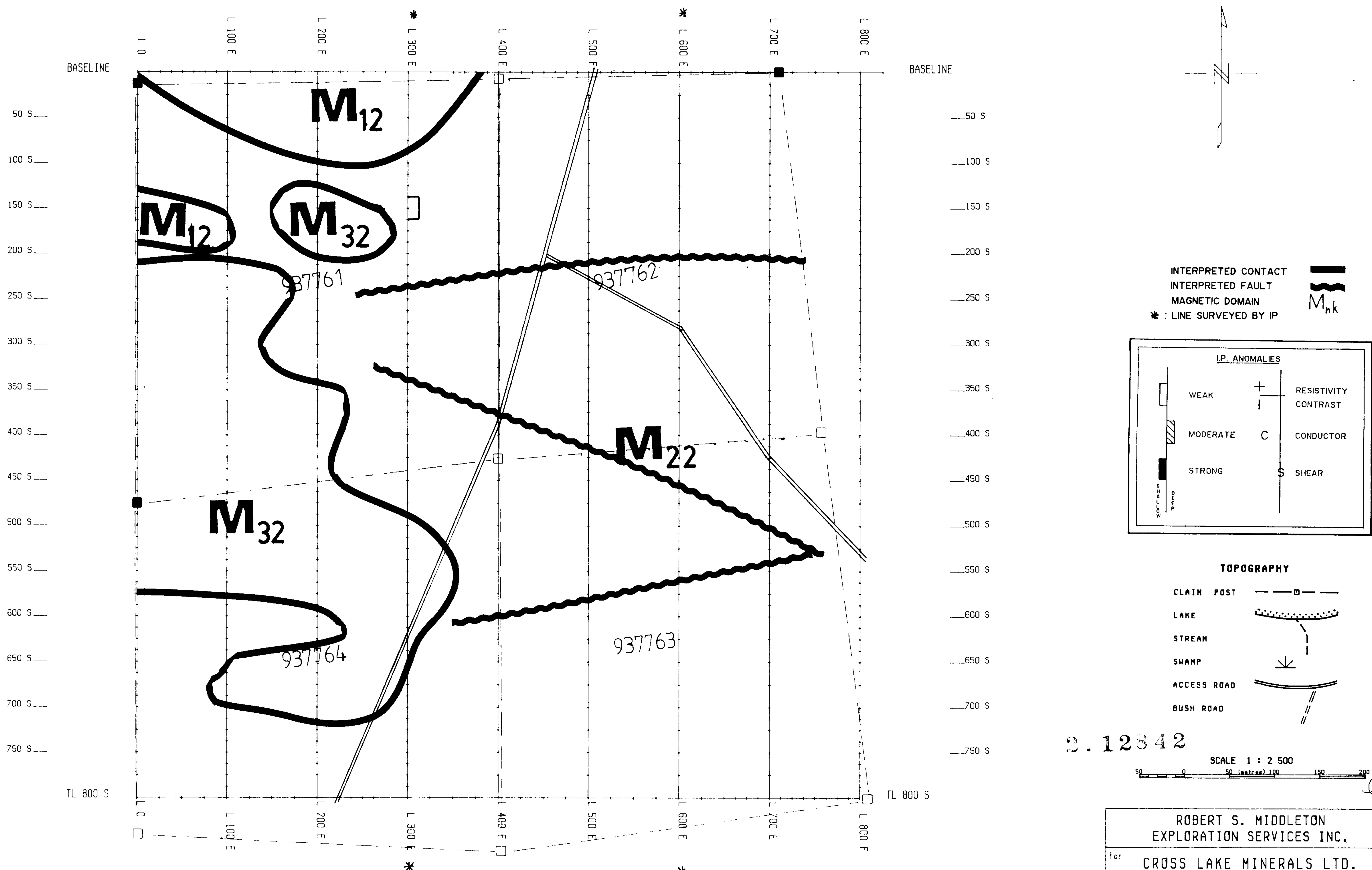
ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

For CROSS LAKE MINERALS LTD.

Title
Total Field Magnetic Survey
Grid 2

Bowman Twp., Ont. Fig. 5a

Date: September 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288



ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

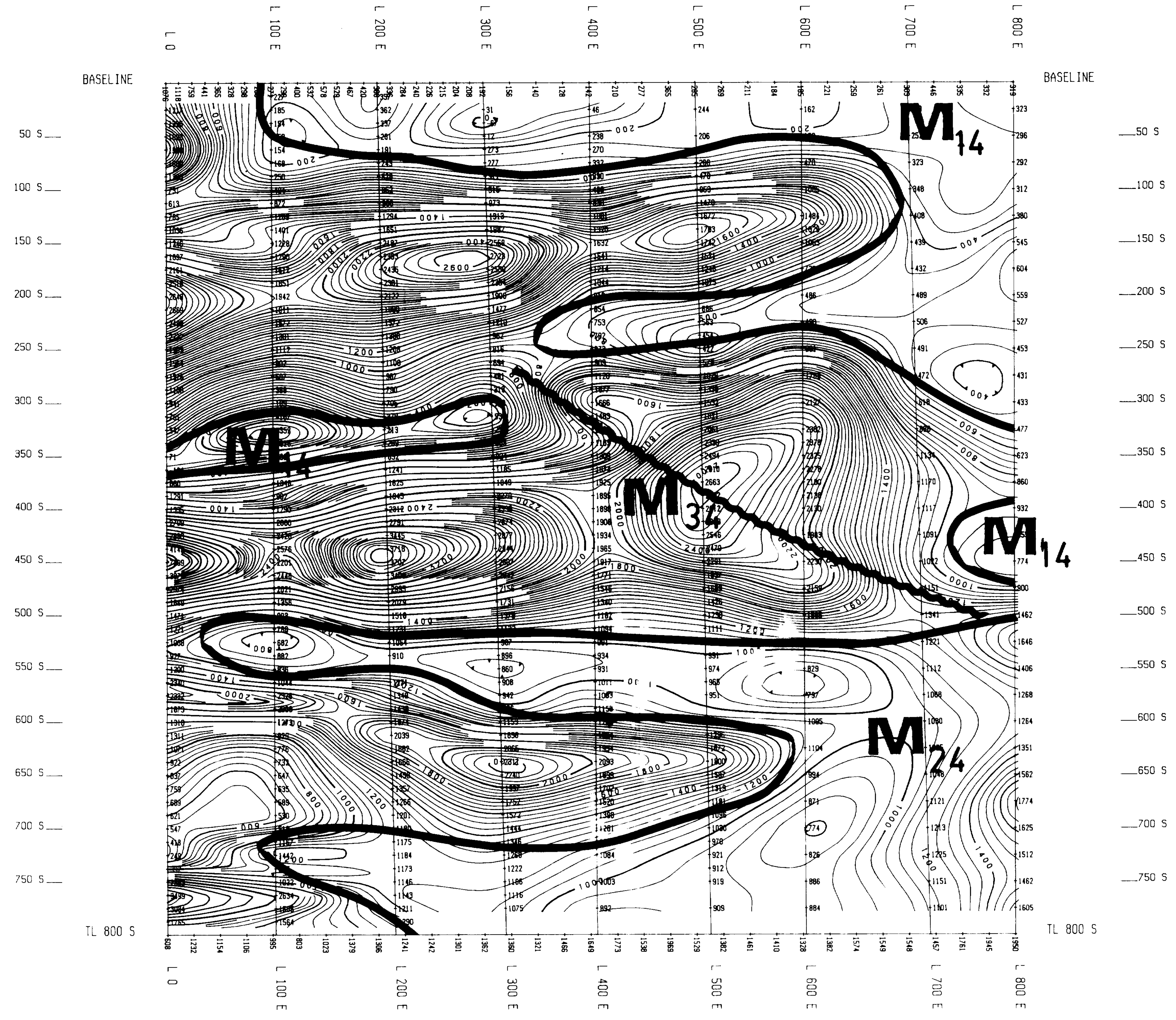
For CROSS LAKE MINERALS LTD.

Title
Interpretation Map
Grid 2
Bowman Twp., Ont. Fig. 5b

Date: September 89	N.T.S.: 42 A/9
Interp: R.L.	Job #: M-288

42A09SW0300 2.12842 BOWMAN

270



CONTOUR INTERVALS

50

200

1000

FIELD INSTRUMENT : EDA PPM 350

BASE LEVEL REMOVED: 58000 GAMMAS

NARROW MAGNETIC MODELS

WIDE MAGNETIC MODELS

INTERPRETED CONTACT

INTERPRETED FAULT

2.12842

SCALE 1 : 2 500

50 0 50 (metres) 100 150 200

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

For
CROSS LAKE MINERALS LTD.

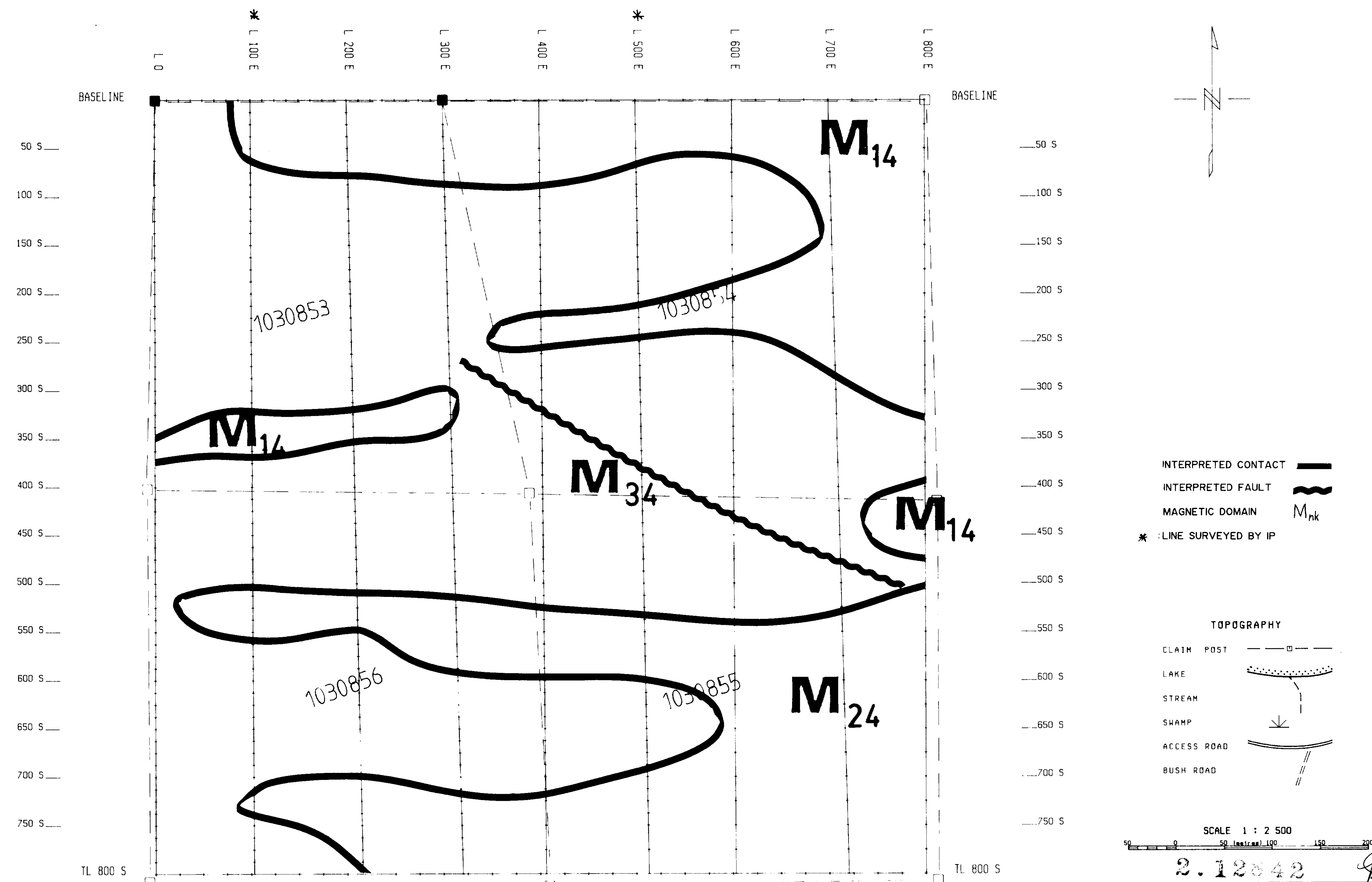
Title
Total Field Magnetic Survey
Grid 4

Bowman Twp., Ont. Fig. 7a

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288

42A09SW8300 2.12842 BOWMAN

280



2.12842

ROBERT S. MIDDLETON EXPLORATION SERVICES INC.

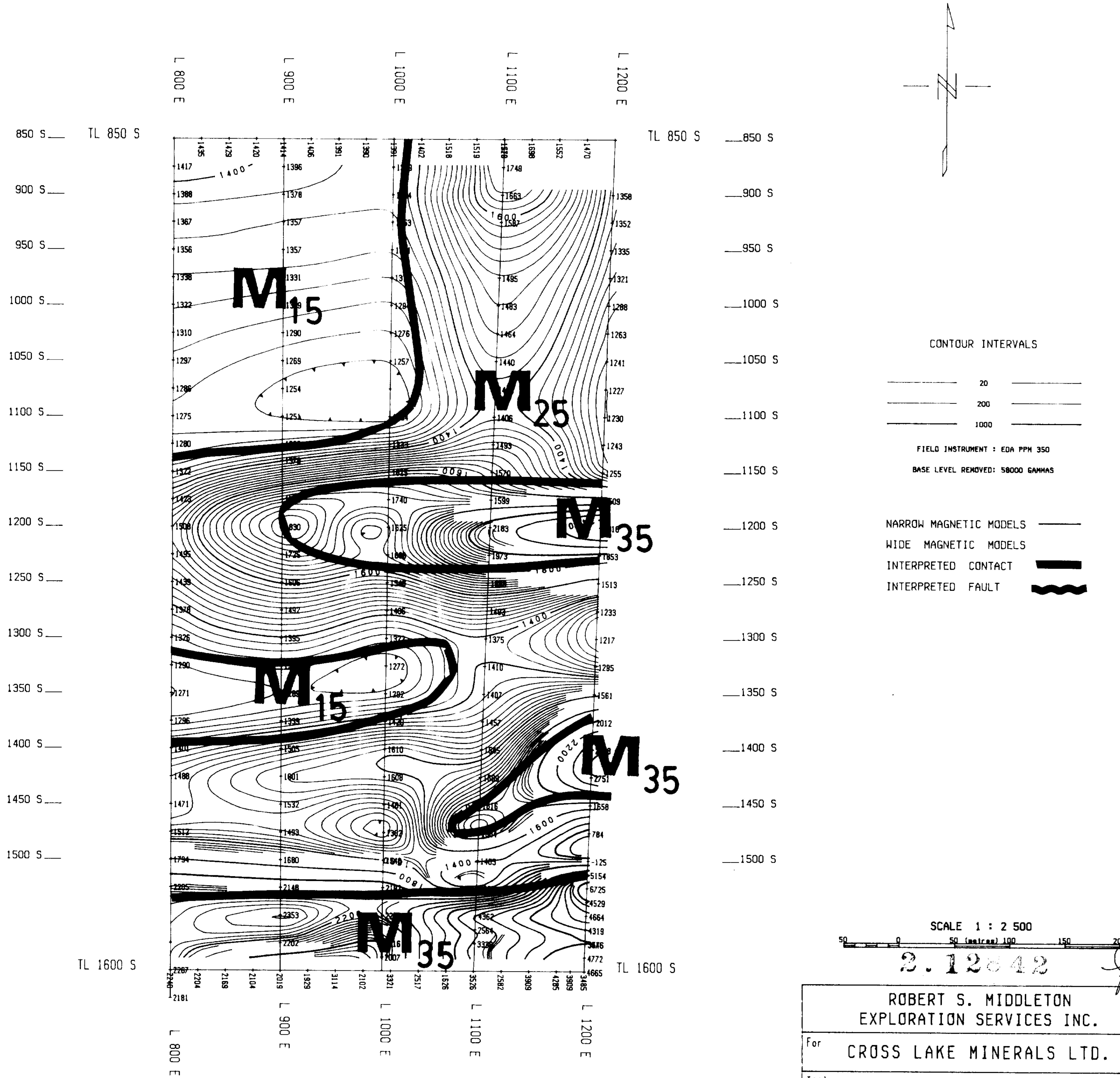
For CROSS LAKE MINERALS LTD.

Title Interpretation Map
Grid 4
Bowman Twp., Ont. Fig. 7b

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288

42A09SW0300 2.12842 BOWMAN

290



2.12842

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

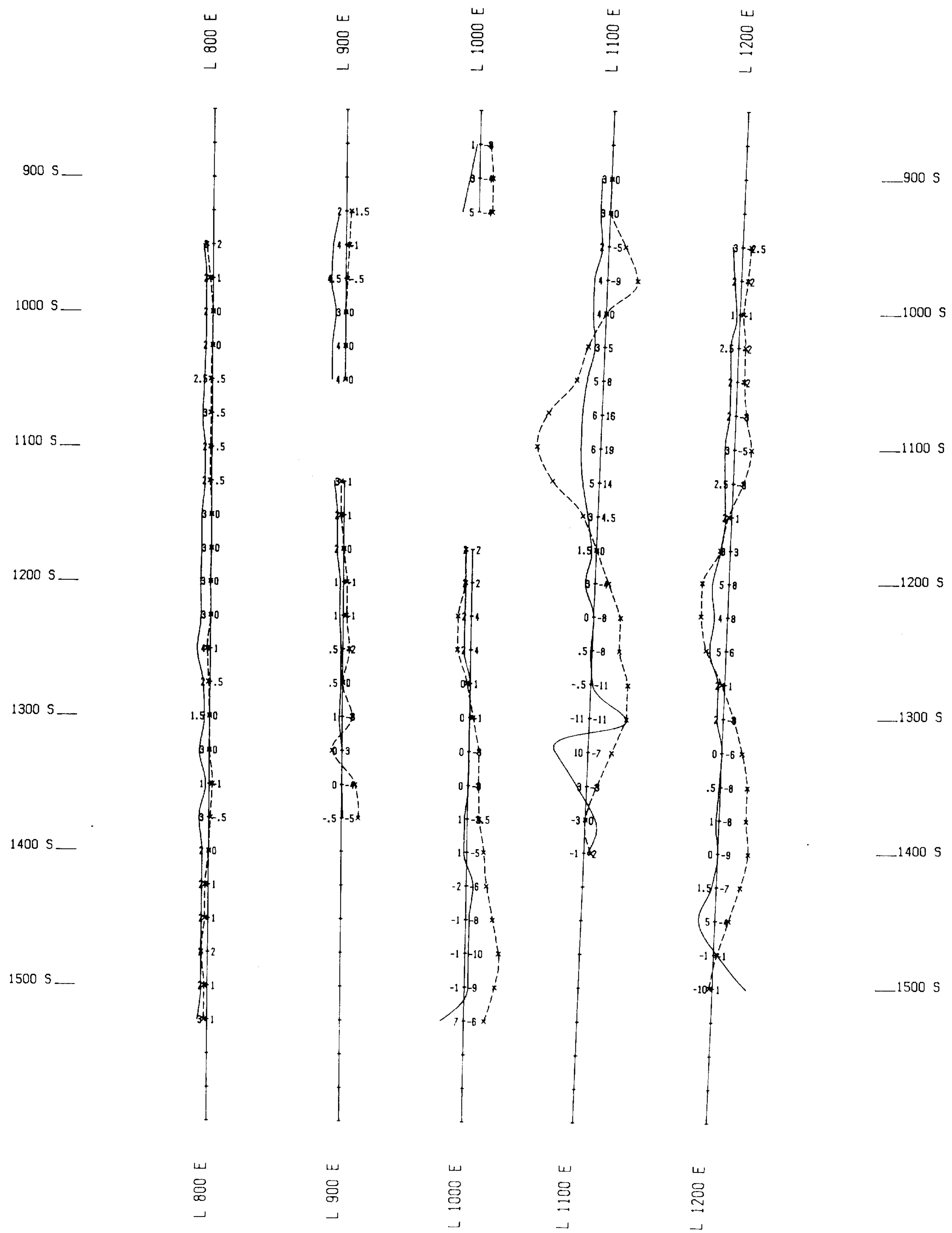
For CROSS LAKE MINERALS LTD.

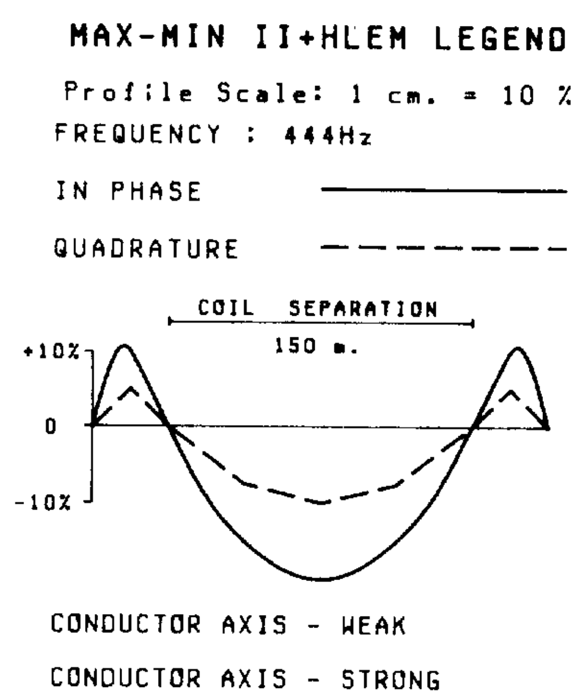
Title Total Field Magnetic Survey
Grid 5
Bowman Twp., Ont. Fig. 8a

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288

42A09SW0300 2.12842 BOWMAN

300





2.12842

SCALE 1 : 2 500

50 0 50 (metres) 100 150 200

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

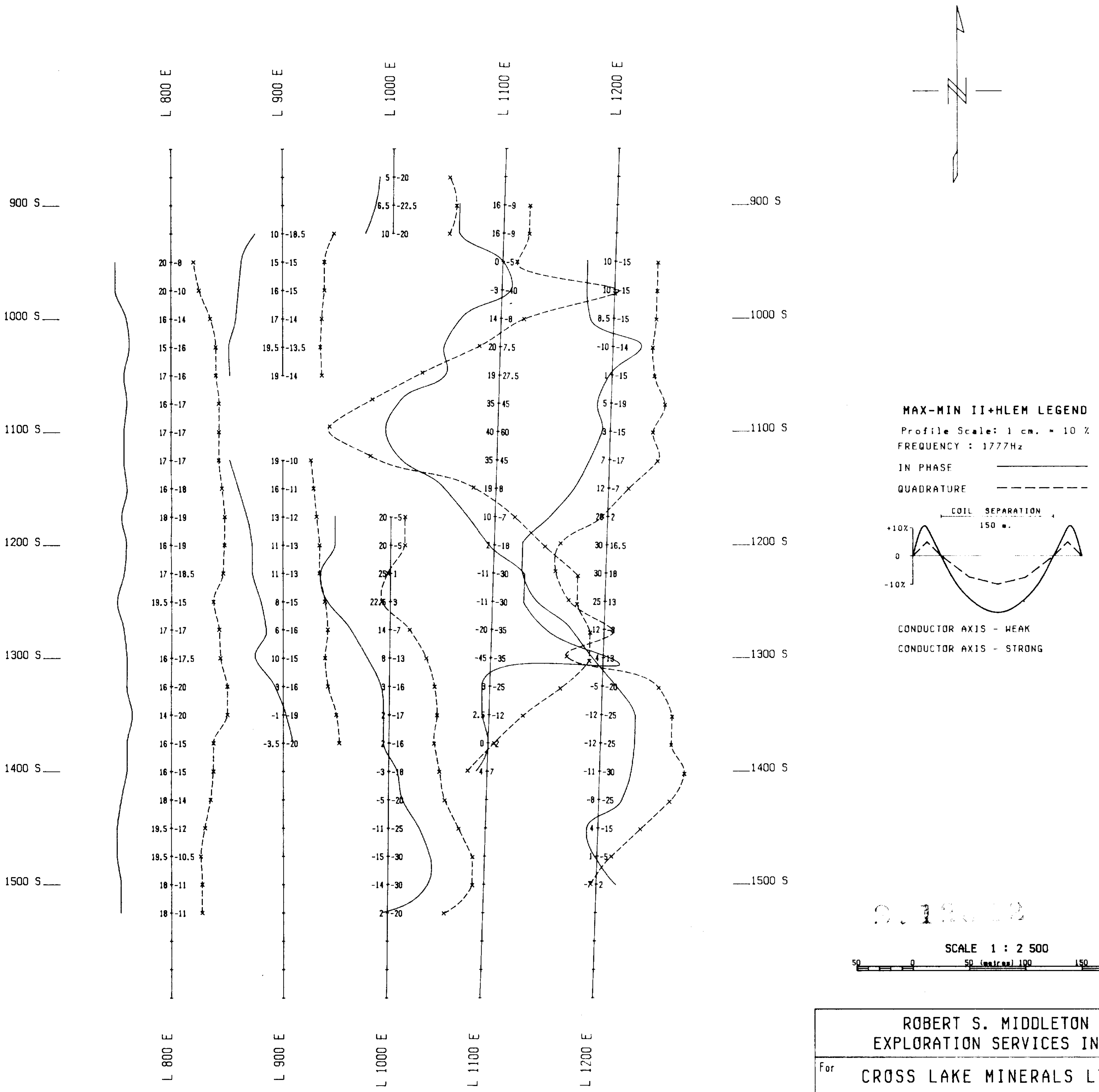
For CROSS LAKE MINERALS LTD.

Title Horizontal Loop EM Survey
Grid 5

Bowman Twp., Ont. Fig. 8b

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Bolton	Job #: M-288

310

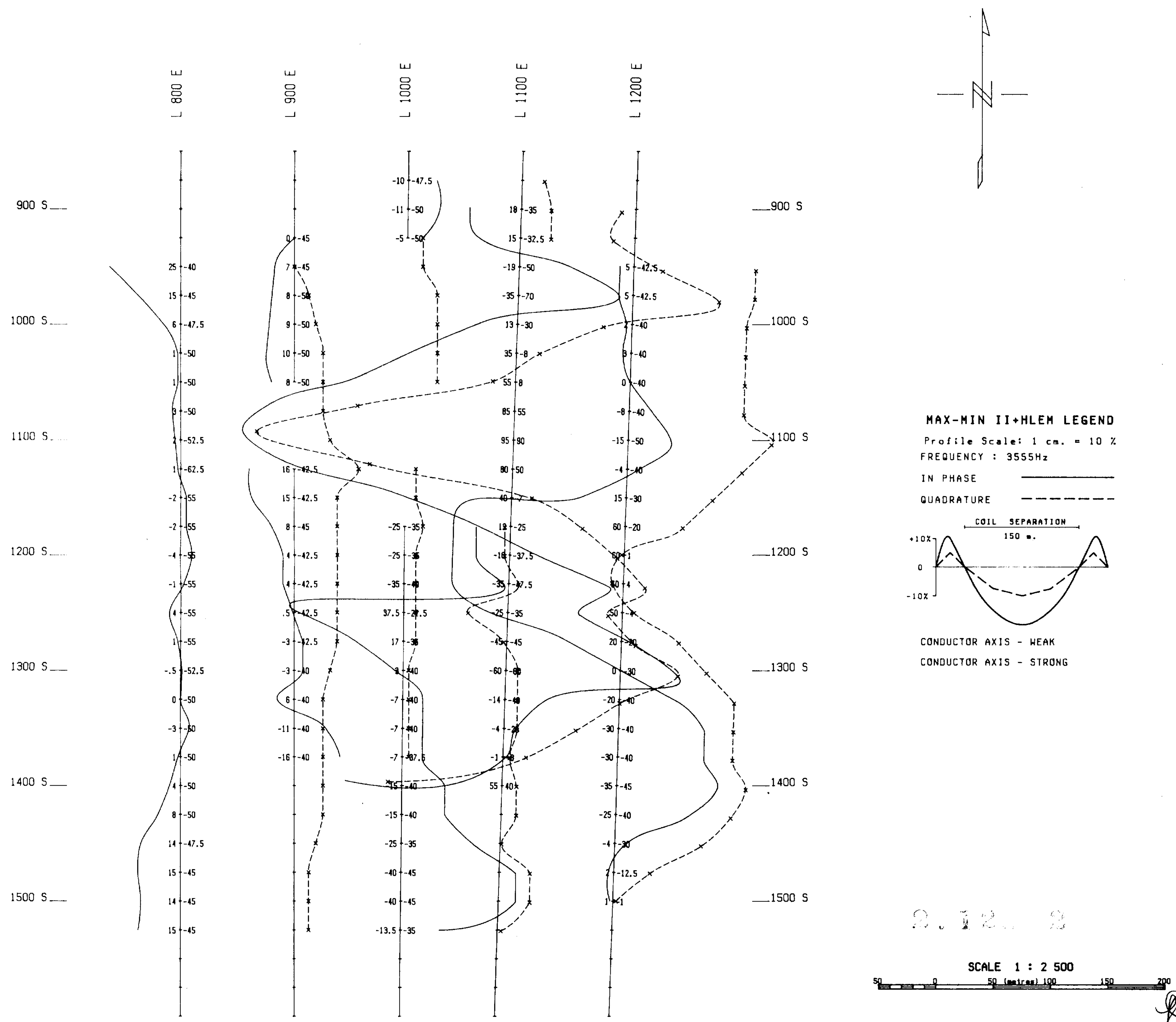


ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

For CROSS LAKE MINERALS LTD.

Title
Horizontal Loop EM Survey
Grid 5
Bowman Twp., Ont. Fig. 8c

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Bolton	Job #: M-288

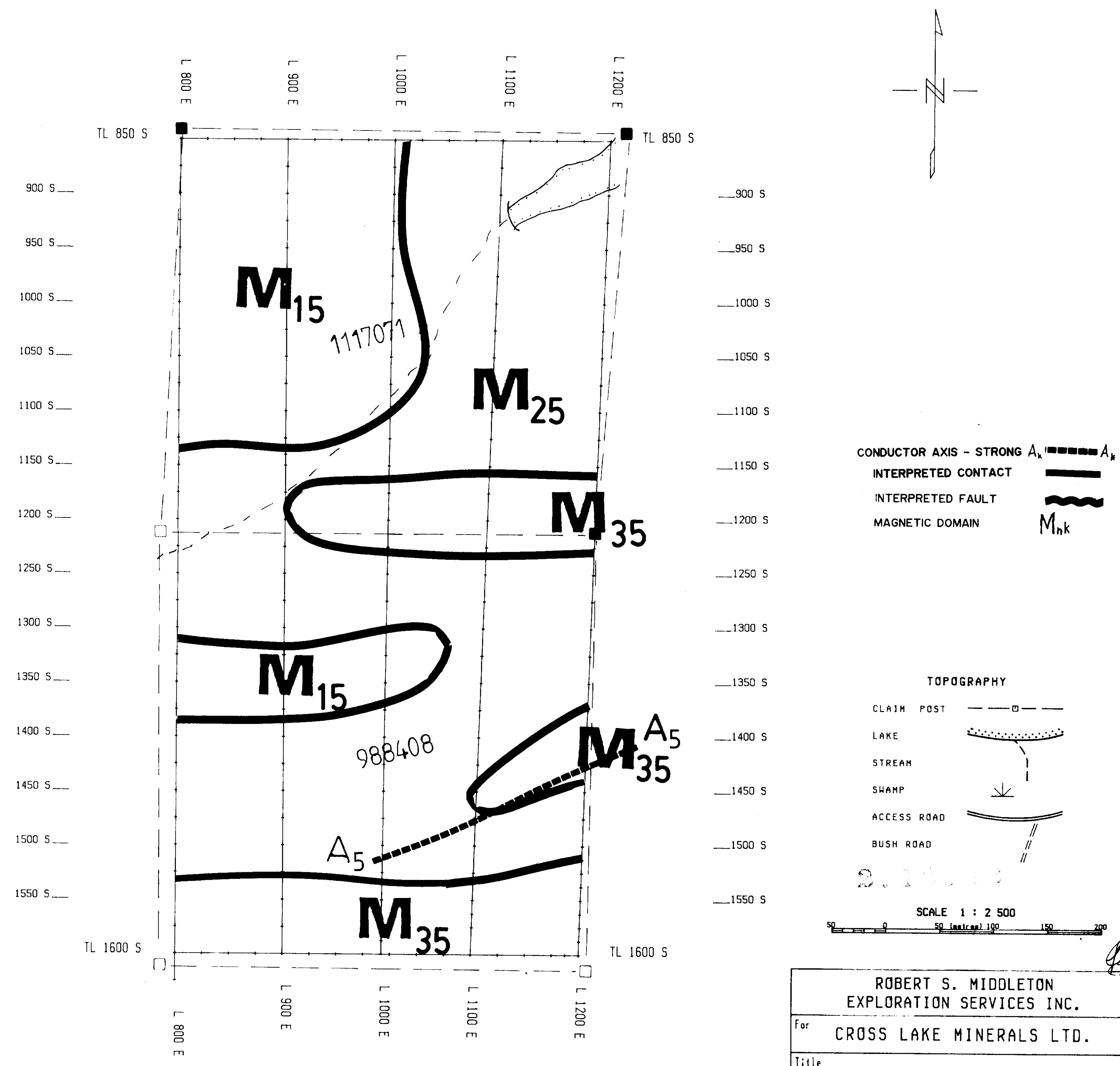


ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

For CROSS LAKE MINERALS LTD.

Title
Horizontal Loop EM Survey
Grid 5
Bowman Twp., Ont. Fig. 8d

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Bolton	Job #: M-288

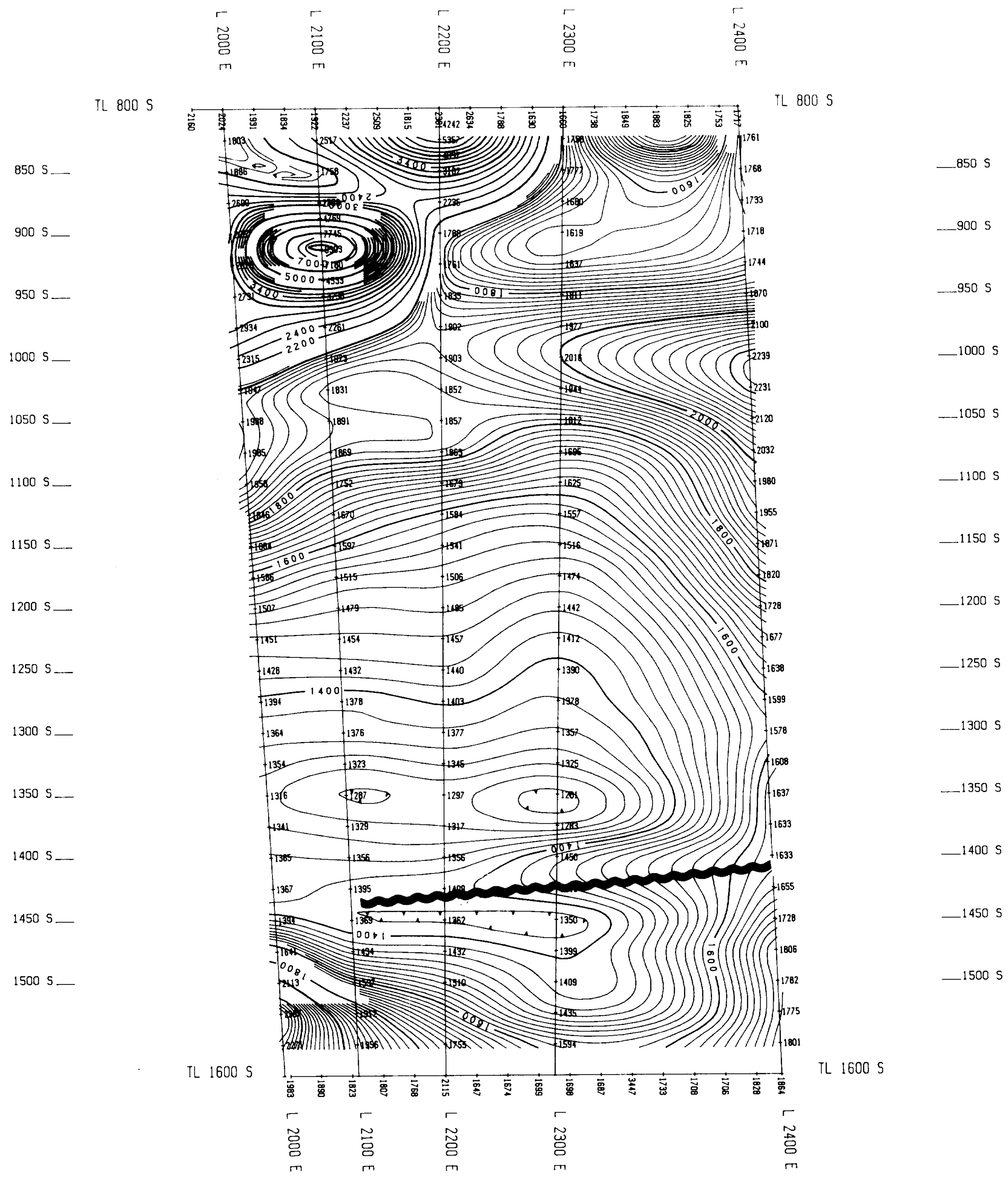


ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

For CROSS LAKE MINERALS LTD.

Title Interpretation Map
Grid 5
Bowman Twp., Ont. Fig. 8e

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288



CONTOUR INTERVALS

20

200

1000

FIELD INSTRUMENT : EDA PPM 350

BASE LEVEL REMOVED: 58000 GAMMAS

NARROW MAGNETIC MODELS

WIDE MAGNETIC MODELS

INTERPRETED CONTACT

INTERPRETED FAULT

2.12842

SCALE 1 : 2 500

50 0 50 (metres) 100 150 200

2.12842

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

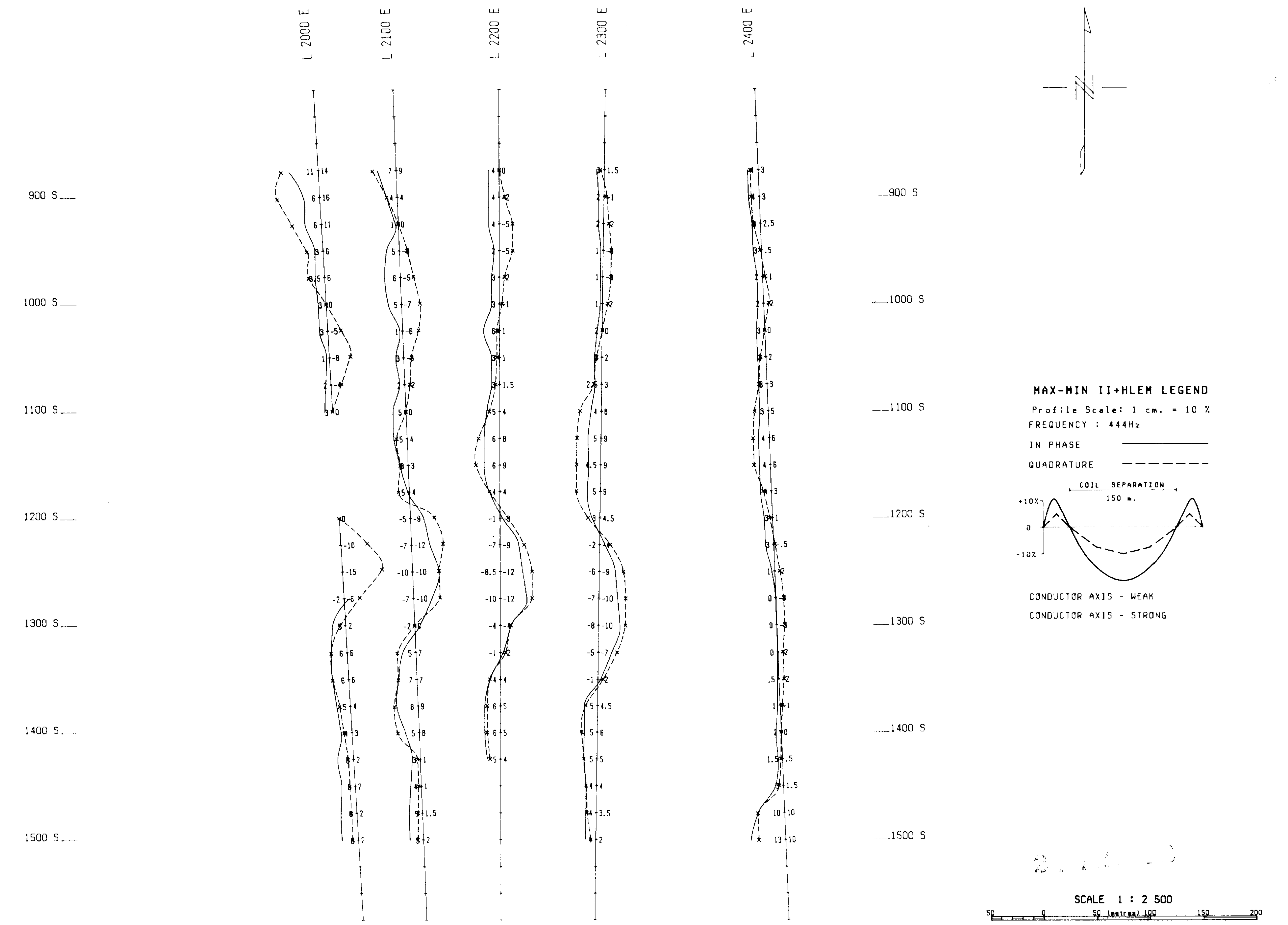
For CROSS LAKE MINERALS LTD.

Title
Total Field Magnetic Survey
Grid 6
Bowman Twp., Ont. Fig. 9a

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288

42A09SW0300 2.12842 BOWMAN

350



ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

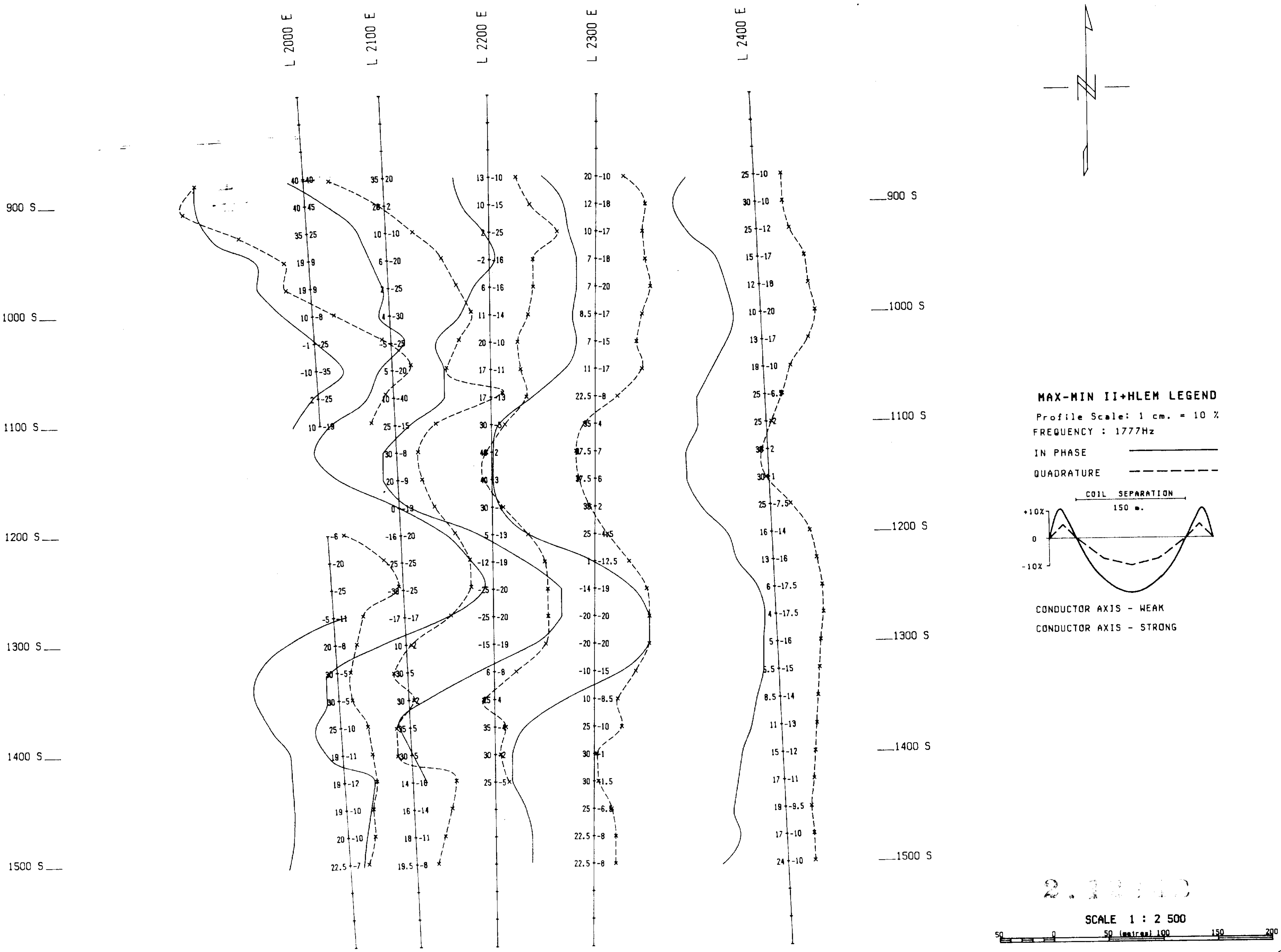
For CRØSS LAKE MINERALS LTD.

Title
Horizontal Loop EM Survey
Grid 6
Bowman Twp., Ont. Fig. 9b

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Bolton	Job #: M-288

42A09SW0300 2.12842 BOWMAN

360



ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

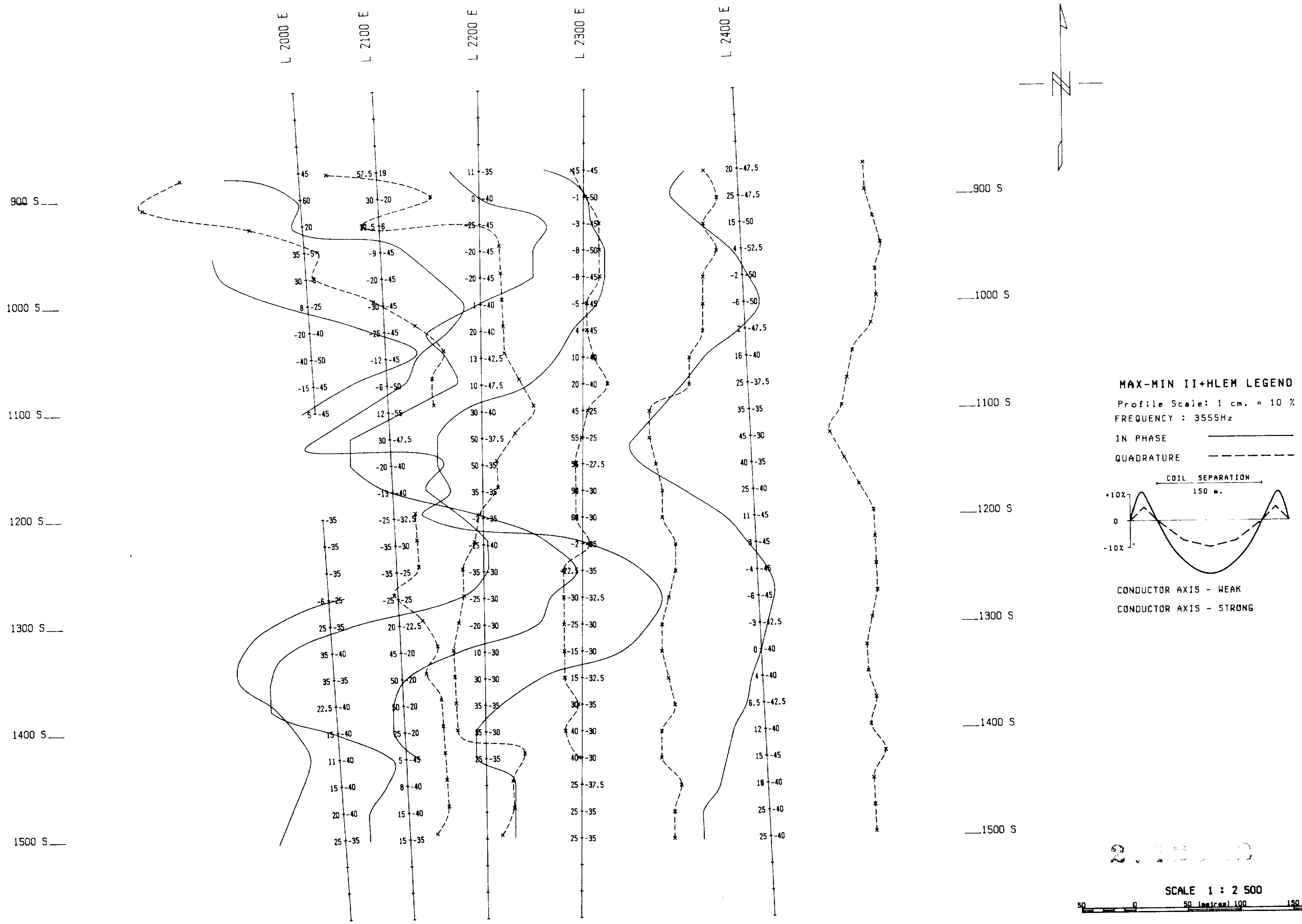
For CROSS LAKE MINERALS LTD.

Title Horizontal Loop EM Survey
Grid 6
Bowman Twp., Ont. Fig. 9c

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Bolton	Job #: M-288

42A09SW0300 2.12842 BOWMAN

370



SCALE 1 : 2 500

50 0 50 (metres) 100 150 200

ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

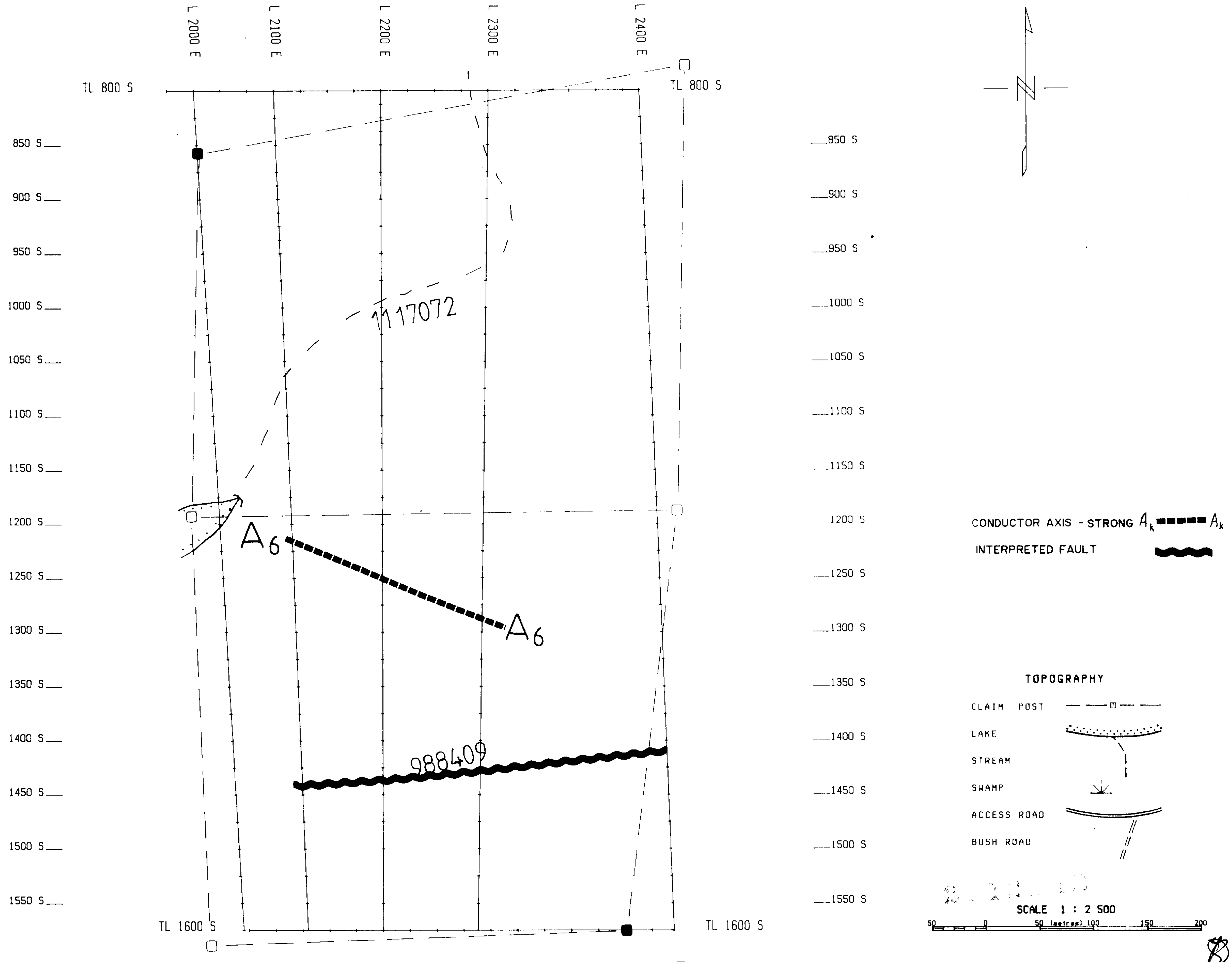
For CROSS LAKE MINERALS LTD.

Title Horizontal Loop EM Survey
Grid 6
Bowman Twp., Ont. Fig. 9d

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Bolton	Job #: M-288

42A09SW0300 2.12842 BOWMAN

380



ROBERT S. MIDDLETON
EXPLORATION SERVICES INC.

For CROSS LAKE MINERALS LTD.

Title
Interpretation Map
Grid 6
Bowman Twp., Ont. Fig. 9e

Date: Sept./Oct. 89	N.T.S.: 42 A/9
Operator: Cardinal	Job #: M-288