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Report

on

Ground Geophysical Surveys

Ellgring Property

Mulligan Twp, Ontario

Wendigo Project (#182)

for

Sudbury Contact Mines Ltd

Toronto, Ont.

by

Dual. 2.279.

Jerry Roth

STRATAGEX LTD

Toronto, Ont. **May, 1994**

Report
on
Ground Geophysical Surveys
Ellgring Property
Wendigo Project (#182)
Mulligan Twp, Northern Ontario

Table of Contents

STRATAGEX

List of Figures

List of Tables

List of Maps
(in rear pockets)
(NB: With Interpretation)

Ellgring Grid: 1:5000

Map ELL-1	Magnetic Profiles
Map ELL-2	Contoured Magnetics
Map ELL-3	VLF Profiles (NAA & NSS)
Map ELL-4	Fraser Filtered VLF: NSS
Map ELL-5	MaxMin, a=100m; f=440 Hz
Map ELL-6	MaxMin, a=100m: f=1760 Hz
Map ELL-7	MaxMin, a=100m, f=7060 Hz

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on
Ground Geophysical Surveys
Ellgring Property
Wendigo Project (#182)
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1.0 Introduction

This report presents and discusses the results of ground geophysical surveys conducted by TechTerrex Inc. on a small grid on the Ellgring property in Mulligan Township in northern Ontario (see Fig. 1) on behalf of Sudbury Contact Mines Ltd.

These surveys form part of an on-going exploration effort by Sudbury Contact (designated the Wendigo Project) for diamonds, gold and base metal deposits in this and adjacent townships south of Kirkland Lake and Larder Lake, under the general management of W.A. Hubacheck Consultants Ltd.

2.0 Property, Location & Access

The property covered by these surveys consists of two unpatented claim blocks (1200397 and 1200398) in central Mulligan Township approximately 20 km south of Larder Lake, as seen in Fig. 2.

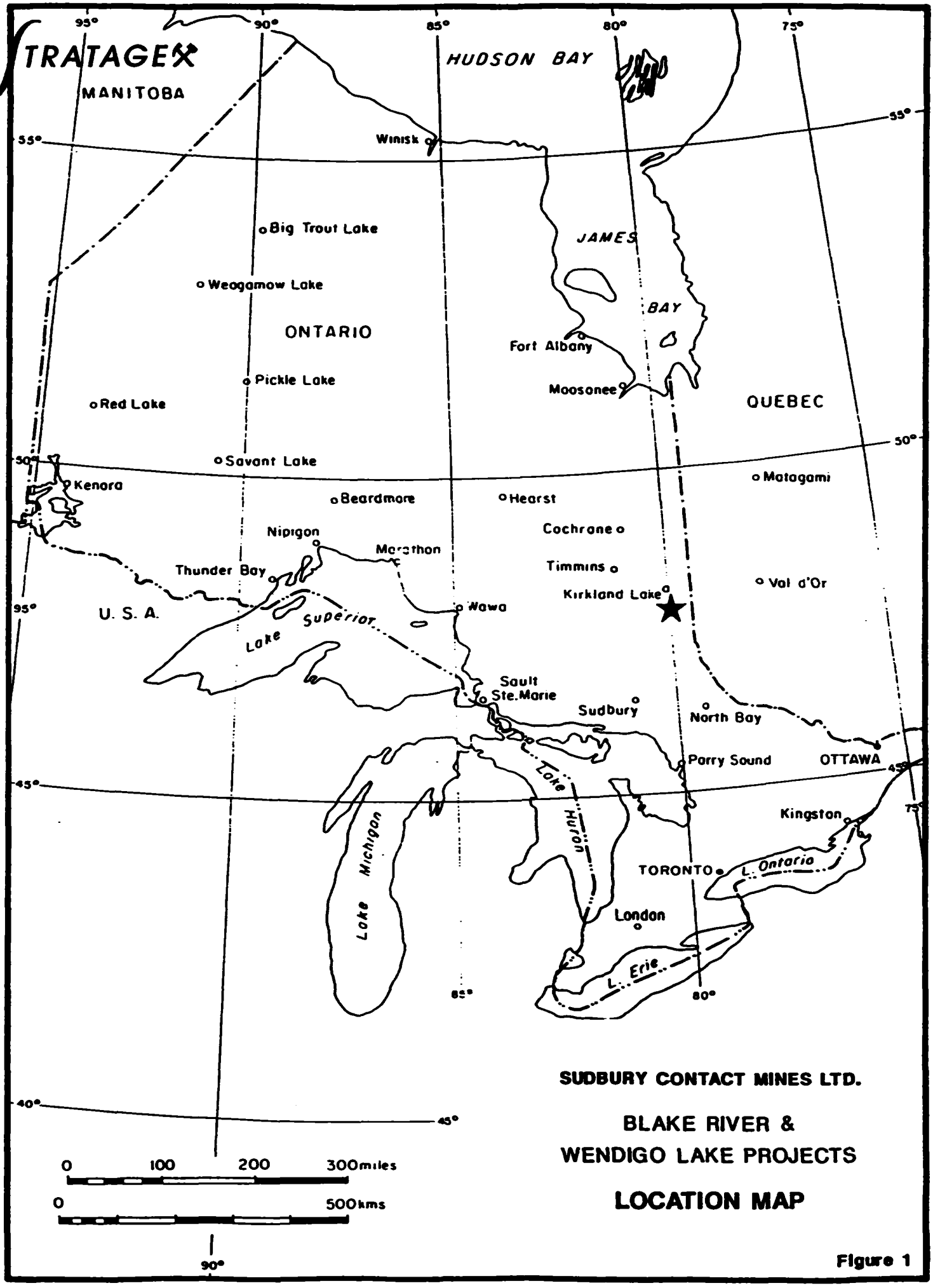
These claims were staked by Fred Ellgring of New Liskeard, Ontario in 1992, restaked in 1993 and subsequently optioned to Sudbury Contact in 1993.

The property can be accessed from Englehart via provincial Highway #569 eastward for 9.5 km, and thence northwest 16 km by a series of concession and logging roads. At this point an old logging road leads to the grid one kilometre to the southeast.

3.0 Background

Most of Mulligan Township has received comparatively little exploration since the discovery of gold in the nearby Kirkland Lake and Larder Lake camps early in the present century.

This neglect is a reflection of the fact that geologic mapping by government and exploration geologists has established that a substantial part of Mulligan Township is



SUDBURY CONTACT MINES LTD.

BLAKE RIVER &
WENDIGO LAKE PROJECTS

LOCATION MAP

Figure 1

Location
ELLGRING PROPERTY
Mulligan Twp

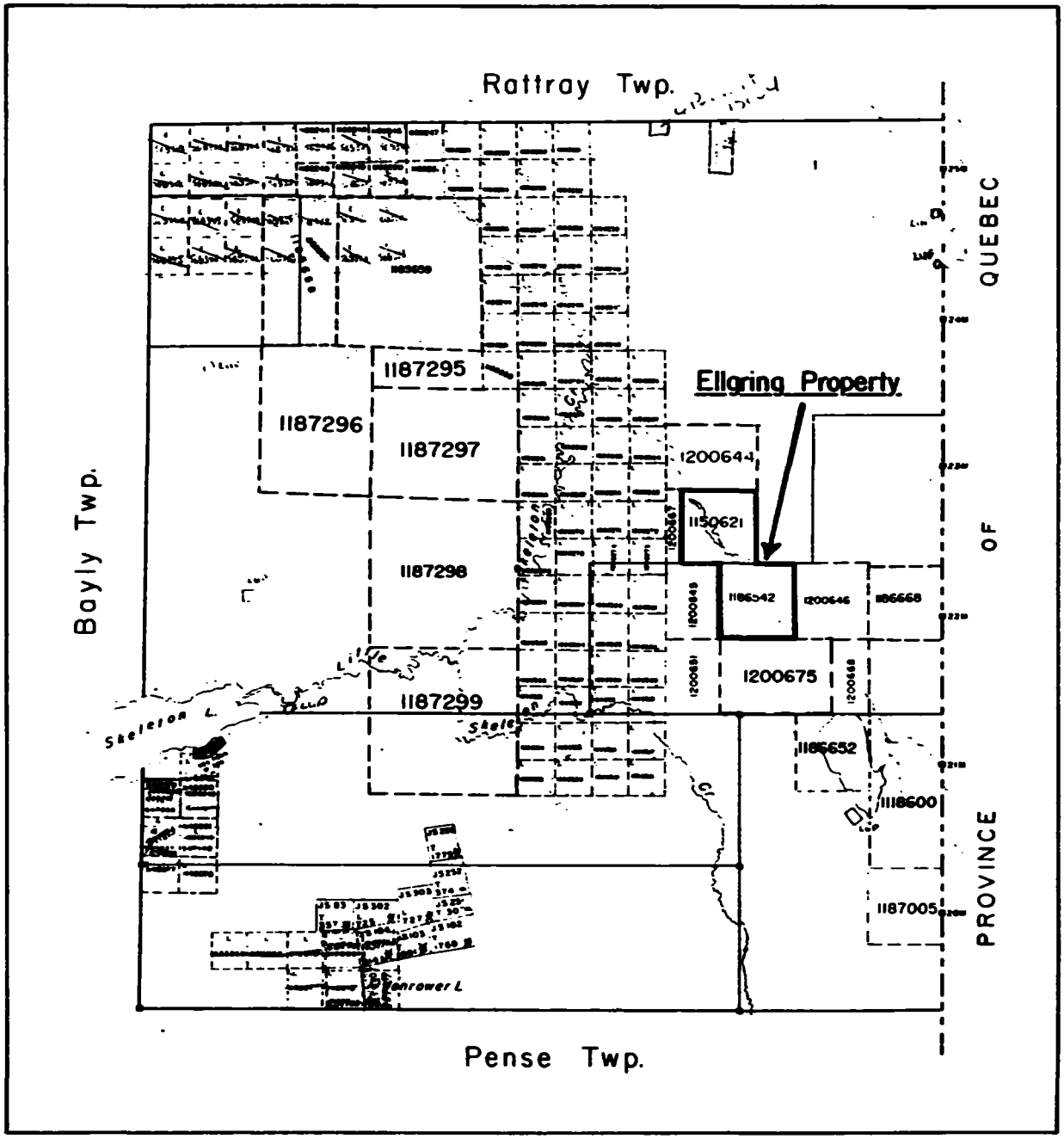


Figure No. 2

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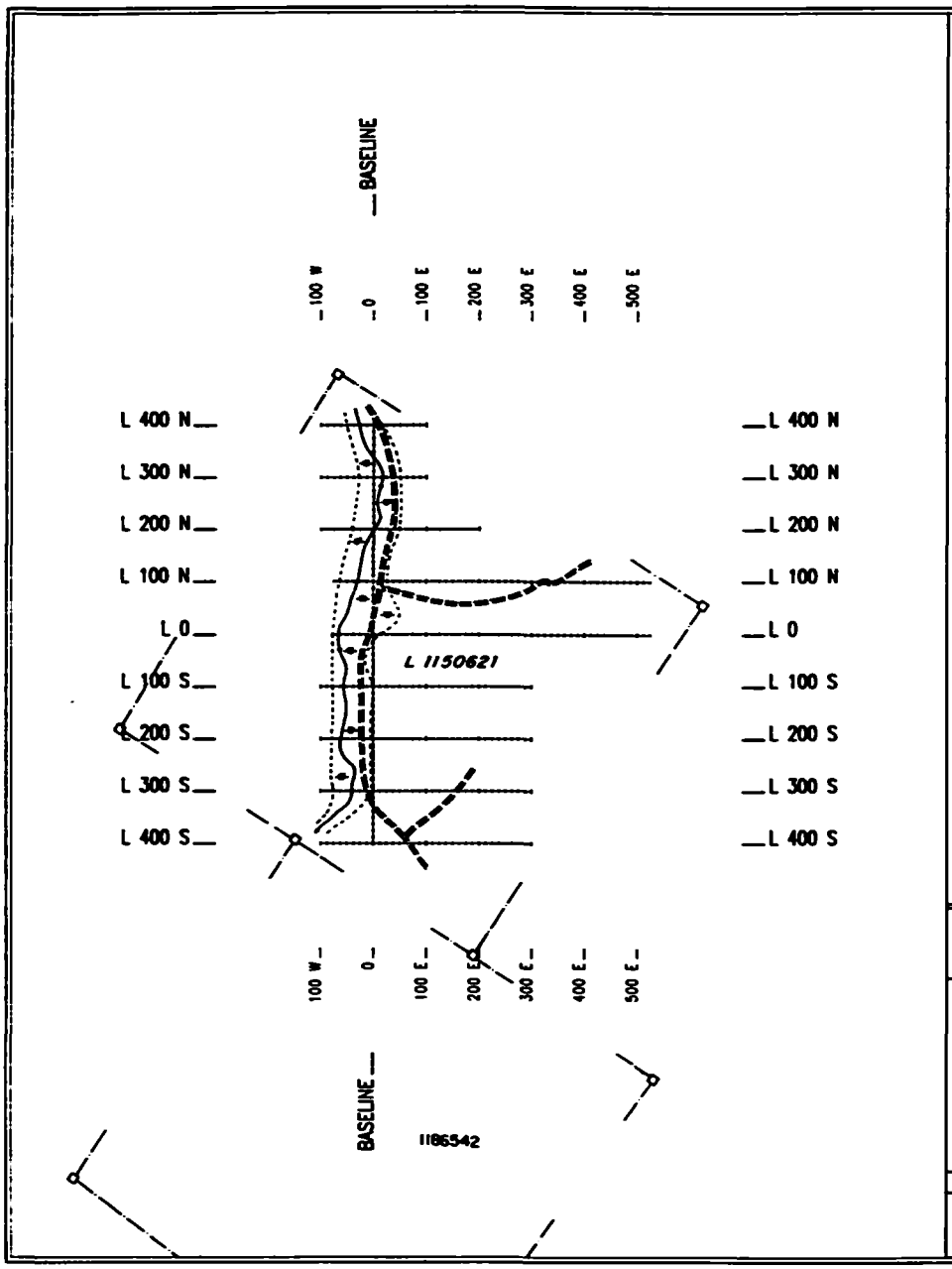

SUDBURY CONTACT MINES LTD.
Blake River & Wendigo Lake Projects

Ellgring Property
BASE & GRID LOCATION
Mulligan Township
Larder Lake Mining Division
Ontario

NTS: 31M/13

Figure No. 3

underlain by Archean Pontiac gneisses locally concealed by a thin layer of flat-lying Huronian sediments. The potential for base and precious metal exploration in these units has traditionally been regarded as low. Nipissing diabase dikes locally intrude both lithologic units.

Sudbury Contact initiated the Wendigo project in 1985, with an initial focus on gold mineralization, and has carried out exploration programs in Mulligan and adjacent townships since 1989. With the recognition of the diamondiferous kimberlites at Lac de Gras, additional attention was directed at the kimberlite potential of this region, in light of the kimberlites discovered by Monopros and Lac at Diamond Lake.

As part of this program, a substantial area was covered by a combined INPUT/aeromagnetic survey flown by Geoterrex in 1990 with E-W lines at a spacing of 200m. The author recently re-evaluated the results of this survey for Sudbury Contact.

The present property, one of a number of properties acquired based on the indicated AEM and/or aeromagnetic anomalies, covers part of a linear aeromagnetic feature, with an associated weak INPUT anomaly. The magnetic source trends NW and (if not distorted by remanence) dips to the NE. It is readily interpreted as a diabase dike intruding the gneisses and overlying Huronian sediments.

Prior to staking by Ellgring, no exploration is recorded on the present claim blocks, which are partially underlain by a thin layer of Huronian resting on granitic gneiss which outcrops in the southern part of the claims.

Exploration carried out by Ellgring consisted primarily of prospecting and sampling in 1992-93, which revealed several narrow, sporadic occurrences containing pyrite and chalcopyrite along a narrow, NW-striking valley incised into the Huronian.. One encouraging gold assay of 0.088 oz/ton was obtained from a trench.

Ellgring also completed partial vertical loop EM and magnetic surveys on an imperial grid aligned NW-SE; these surveys incompletely delineated the main magnetic feature of interest and suggested several weak but persistent conductors, including one with apparent magnetic coincidence.

Since optioning the property, Sudbury Contact has briefly examined bedrock exposures and sampled the bedrock partially

exposed in the sand-filled trench, located near line 10N, 250E. Susceptibility measurements were also taken in the course of this reconnaissance. The examination suggested that the high gold values may derive from a rusty sand layer in the trench, and additional samples of till were also taken. Only minor pyrite veinlets were observed in the Huronian sediments outcropping on the ridges adjacent to the valley.

4.0 Survey Description

The ground geophysical program on the Ellgring grid consisted of total field magnetics, VLF-EM and MaxMin HLEM surveys. Data acquisition was carried out during February and early March, 1994, by personnel of TechTerrex Inc. of Oakville, Ontario, under the direction of Mike Wilson, President, assisted by Brad Poulsen of New Liskeard, with input by the author in terms of survey design and supervision.

4.1 Survey Grid

The surveys were carried out on a small grid established by Norman McBride Linecutting Services between January 24 and February 16, 1994 under the direction of Peter Hubacheck of W.A. Hubacheck Consultants on behalf of Sudbury Contact Mines.

As seen in Figure 3, the grid extends N35^{o}W along an incised valley. It consists of nine NE-SW lines at 100m spacing which extend 100m southwest and generally 300-500m northeast of the baseline. Including the baseline, a total of 4.3 km of grid was established.

4.2 Magnetometer & VLF Surveys

The total field magnetometer and VLF-EM data were collected simultaneously using the digitally recording Scintrex/EDA Omni Plus instrument, with readings at 12.5m along all the grid lines (4.3 km).

The magnetic survey employed a digitally recording EDA base station magnetometer to monitor and record diurnal variations.

The VLF-EM survey recorded the in-phase (dip-angle) and quadrature components for the NSS (Annapolis) VLF transmitter at 24.0 kHz on the cross lines, and NAA (Cutler) at 21.4 kHz on the baseline. These are suitably aligned for NW- and NE-striking conductors, respectively.

Specifications for the Omni Plus instrument can be found in Appendix I.

4.3 MaxMin HLEM Survey

The horizontal loop EM survey was performed with the MaxMin I instrument manufactured by Apex Parametrics of Uxbridge, Ontario. Measurements were taken on the cross lines at 25m intervals of the in-phase and quadrature components at 444, 1760 and 7060 Hz, using a coil separation of 100m. All readings were recorded digitally for subsequent plotting, using an Apex MMC data logger. Where necessary, inclinometer readings were also taken to provide a first-order correction to in-phase readings for short cable effects. Note that the two very short lines at the NW end of the grid were not surveyed with MaxMin due to their very limited length; the lines actually surveyed totalled 3.1 km.

The complete specifications of the Apex MaxMin instrument can be found in Appendix I.

5.0 Data Processing & Presentation

The various geophysical data collected on the Ellgring grid are displayed at a scale of 1:5000, together with claim locations and key topographic features (Maps ELL-1 thru 7).

The total field magnetic data, after removal of diurnal variations, are presented both as profiles with posted values and in contour form (Maps ELL-1 and 2). The interpreted magnetic sources, differentiated in terms of susceptibility, are outlined on these maps, along with the VLF and MaxMin conductors.

The VLF-EM readings are presented as profiles of in-phase and quadrature values at a profile scale of 1 cm = 10% (Map ELL-3), which portrays both the NSS data for NE-SW cross lines and the NAA data for the NW-SE baseline. In addition, a Fraser filter version of the NSS in-phase readings has been calculated and plotted separately (Map ELL-4). The interpreted VLF conductors are indicated on each of these maps.

The MaxMin data are presented as in-phase and quadrature profiles for each frequency, at a profile scale of 1 cm = 10% (Maps ELL-5, 6 and 7). The interpreted HLEM conductors are shown on each map, differentiated as to bedrock and overburden sources.

6.0 Survey Results

6.1 Magnetic Results

On the Ellgring grid, the total field magnetic survey data primarily outline a persistent, moderately magnetic, linear anomaly which extends NW-SE across the entire grid (from line 400S near 100W to at least line 300N near 100E), and undoubtedly continues further to the NW and SE beyond the present survey limits (Map ELL-1).

Like its corresponding aeromagnetic anomaly, the source defined by the ground magnetic data is readily attributed to a diabase dike. It exhibits a variable depth, ranging from approximately 30m at the northern end of the grid to as much as 50m at the southern limit of survey coverage, most likely reflecting a variable thickness of overlying Huronian . Although the anomaly is not completely resolved on the short lines, a northeast dip is supported consistent with that inferred from the aeromagnetic data.

A separate moderately strong, narrow, shallow, linear magnetic anomaly is defined on lines 300N and 400N near 40E, striking sub-parallel to the main magnetic source. A possible subordinate dike is inferred.

Additionally, a broad apron of weakly magnetic rocks flanks the main anomaly to the NE on lines 100S to 400S, suggestive of weakly hornfelsed sediments. There are also incompletely resolved anomalies detected on the NE portions of lines 00 to 200N.

6.2 MaxMin HLEM Results

The MaxMin HLEM results on the Ellgring grid, obtained at three frequencies with a 100m coil separation, display high data quality, with only a few erratic in-phase readings and small residual in-phase effects due to uncorrected second-order coil misalignment arising from the topography.

The results disclosed a number of weakly conductive features characterized by predominantly quadrature anomalies at low and intermediate frequencies, as seen in Maps ELL-5, 6 and 7. The four conductors of potential interest are designated zones A thru D (discussed further below) and are generally best resolved in the 1760 Hz data (Map ELL-6). They mainly lie within the narrow valley and strike northwest to north.

Zone A consists of weak, broad, mainly quadrature MaxMin anomalies detected on lines 200S thru 400S near 40E, aligned northwest. It is rated a possible bedrock conductor. The conductor likely extends further to the SSW beyond the

present survey coverage. Although outside the standard HLEM nomograms, zone A is clearly shallow (probably less than 25m), with a conductance of less than 2 siemens.

Zone A displays a degree of magnetic correlation in that it lies within the broad, weakly magnetic envelope bordering the main magnetic feature to the northeast; however, there is no clearly defined correlation between the two parameters. A poorly conductive shear zone, possibly with stringer sulphides, could account for the conductor.

Zone B, which also strikes NW, is a possible bedrock conductor partially outlined at the western limit of lines 100S thru 100N. Because of the incomplete coverage, the conductor cannot be properly analyzed, but it is indicated to have a low conductance and is probably less than 35m deep. The conductor lies 20-25m west of the main magnetic feature, and hence could reflect sulphides formed or remobilized by the dike, or a stratigraphic horizon (graphitic sediments?) exposed on the steep southwest side of the valley.

Zone C, a weak subsidiary HLEM conductor located 100m east of zone B, is suggested on lines 00 thru 200N by minor quadrature anomalies, and hence it is considered of questionable bedrock origin. The conductor appears to be coincident with part of the main magnetic feature on line 200N, imparting a degree of interest, although this correlation may be apparent rather than actual.

Zone D, located east of the baseline, is composed of weak, broad quadrature anomalies detected on lines 100S to 100N. These appear to define a NNE-trending conductor (i.e., oblique to the prevailing NW trends). It has no consistent magnetic association. Conductive overburden or a poorly conductive fault or horizon in the gently dipping Huronian sediments are all plausible sources for this conductor.

At the low frequency (444 Hz), the main MaxMin conductors remain recognizable but only as weak quadrature anomalies. At the high frequency (7040 Hz), the discrete MaxMin conductors now exhibit significant in-phase responses, but are partly obscured by the high background conductivity (probably from the Huronian sediments).

6.3 VLF-EM Results

The VLF-EM results on the Ellgring grid, obtained primarily with NSS (Annapolis) on the NE-SW lines, outline a number of strong conductors, as indicated on Maps ELL-3 and 4. The principal conductive zones, designated A-D, are largely consistent with the previously described MaxMin conductors, although the axes are in places slightly offset where VLF reflects the edge rather than the centre of the conductor.

Zone A consists of strong but broad VLF anomalies on lines 200S thru 400S near 100E in good agreement with the MaxMin anomalies. The VLF results suggests that this conductor bends to the NNE; this probable continuation, observed on lines 00 and 100S, is designated zone A'.

Zone B is the strongest and most persistent VLF conductor on the Ellgring grid. It extends from line 100S to 400N near the baseline, in excellent agreement with the equivalent MaxMin conductor.

Zone C is a moderately strong VLF conductor, defined on lines 100N and 200N near 50E. It corresponds closely to the equivalent MaxMin conductor, and exhibits a similar partial correlation with the main magnetic anomaly.

VLF zone D consists moderate anomalies detected on line 00 near 300E and 100N near 400E, with an inferred NNE strike. in partial agreement with the equivalent oblique MaxMin conductor.

All of the preceding VLF conductors are shallow, confirming the shallow estimated depths for the equivalent MaxMin conductors.

7.0 Conclusions & Recommendations

The combined magnetometer, VLF-EM and MaxMin HLEM surveys on the Ellgring grid in Mulligan Township successfully delineated the aeromagnetic and AEM features which occasioned acquisition of these claims.

The magnetic survey defined part of a shallow, NW-trending linear anomaly which is readily attributed to a diabase dike penetrating the Pontiac gneisses and part of the overlying section of gently dipping Huronian sediments. There is a suggestion that the enclosing sediments and gneisses have been weakly hornfelsed by the dike.

The HLEM and VLF-EM surveys outlined four shallow, weakly conductive zones; the better defined portions strike NW-SE. Although their potential for polymetallic VMS deposits is judged to be small, they may merit further investigation for stratigraphically or structurally controlled gold mineralization, possibly accompanied by base metals, or for vein mineralization influenced or controlled by the Nipissing diabase. From this perspective, zones A and B judged to be the more interesting.

Depending on the results of initial drill testing, expansion of the present magnetic and EM survey coverage may be warranted. IP surveying may also merit consideration if disseminated gold-sulphide deposits are identified as the primary target.

Respectfully submitted,

Jerry Roth, M.A.

Senior Consulting Geophysicist

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TABLE I

Magnetic Target Characteristics

Ellgring Grid

Loc: BLine	Linear, at least 700m and prob. 2 km+ long; sporadically conductive; shallow Nipissing diabase

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Statement of Qualifications

I, Jerry Roth, of STRATAGEX Ltd. of Toronto, Ontario, make the following statement of qualifications:

I am an independent consulting geophysicist with offices at 75 King St. East, Suite 300, Toronto, Ontario

I hold a B.A. degree in Mathematics and a M.A. degree in Geophysics from Harvard University, Cambridge, Mass.

I have practiced my profession continuously since 1966, and have been an independent consultant since 1984.

I have based the interpretations and conclusions contained in the preceding geophysical report on my general professional expertise and on my particular knowledge of the geophysical surveys and the exploration project of which they form an integral part;

I neither hold nor expect to receive any interest in the property discussed nor in Sudbury Contact Mines Ltd, other than normal consulting fees.

Jerry Roth, M.A.
Sr. Consulting Geophysicist

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Appendix I

Equipment Specifications

Omni Plus

MaxMin I

SCINTREX

EDA Omni Geophysical System

Brief Description

When you require more flexible geophysical techniques in order to find the increasingly more elusive anomalous targets, Scintrex offers you the EDA Omni System. This system enables you to design your own unique instrument whether it is for complete Magnetic surveys, VLF Electromagnetic surveys or a combination of these techniques.

At the heart of the Omni System is the Omni System Control Console which is common to all Omni System applications. This customized approach gives you the ability to select the following options for your instrument:

- Portable Field and Base Station Magnetometer
- True Simultaneous Gradiometer
- Portable Field and Base Station VLF Electromagnetic Receiver
- Two Probe, VLF Resistivity
- Non-Orientation, VLF Resistivity

Applications

Since the Omni System capabilities are so versatile, the data collected and recorded by the instrument can be applied to a variety of earth sciences including:

- mineral exploration
- geological mapping
- groundwater exploration
- groundwater contamination
- civil engineering
- geotechnical studies
- archaeology

Features

Omni System Features

Each Omni System incorporates the following features:

Flexibility of the Omni System

You can select your own options to customize your unit to suit your specific geophysical needs.

Microprocessor Controlled

Gives you a choice of three fully protected data storage modes:

- spot record, for readings without grid co-ordinates (random samples)
- multi-record, for multiple readings at one station
- auto-record, for automatic update of station position

Complete Data Protection

The internal lithium battery assures you of complete data protection for up to 5 years.

Measures and Records in Memory

Measurement and recording in memory of the following magnetic field data for each reading:

- total field magnitude
- true gradient of the total field
- applied base station value
- statistical error
- signal strength
- decay rate

Measurement and recording in memory of the following VLF data for each field reading:

- vertical in-phase
- vertical quadrature (out-of-phase)
- total field strength
- total dip angle
- primary field direction
- apparent resistivity
- phase angle
- signal-to-noise ratio
- operator quality

The OMNI system configured as a MAG/VLF simplifies geophysical surveys by combining Magnetic and VLF EM techniques.

Records Survey Data

Records the following survey data for each magnetic and/or VLF reading:

- time of measurement and date
- grid co-ordinates
- direction of travel along grid lines
- natural and cultural features

Measures up to 3 VLF Transmitting Stations

The Omni System can measure up to 3 VLF transmitting stations and provides more complete coverage of an anomaly regardless of the orientation of the transmitter with respect to the survey grid or the anomaly itself.

Electronic Notebook

The internal Electronic Notebook enables you to record natural and cultural features that are unique to each grid location. This feature eliminates the need for a field notebook and provides additional information that can assist in interpreting recorded data.

Automatic Correction Using The Omni System's Unique "Tie-Line" Technique

The "Tie-Line" algorithm used exclusively by the Omni System allows for the self correction of atmospheric magnetic variations and variations in the primary field from the VLF transmitter(s). The instrument is able to store 'looping' or 'tie line' data in a separate memory at the beginning of each survey and then subsequently stores total field readings in a second memory along with the field readings of the tie point(s). At the end of each survey day the Omni System will then merge these two memories to automatically correct the total field data for diurnal variations.

The Omni System in the "Tie-Line" mode can:

- Store looping or tie line data, 3 ways:
  1. Using one looping base point
  2. Using one "Tie-Line" comprising a number of tie points, or
  3. Using multiple tie lines.
- Store up to 100 tie points in one survey area or divide these points into extensions of survey areas as needed.
- Store tie points or tie lines for the duration of the survey.
- Calculate the drift between established tie points, to readily see variations in the Earth's magnetic field.

Omni System Benefits

Only One Instrument Needed for Magnetometer, Gradiometer, VLF and VLF Resistivity Surveying

The Omni incorporates the capabilities of a "Tie-Line" magnetometer and simultaneous Gradiometer system with the ability to measure VLF magnetic and electric fields.

Only one complete Omni System is needed to record all of the following geophysical parameters:

1. The total magnetic field
2. The simultaneous gradient of the total magnetic field.
3. The VLF magnetic field including:
   - the vertical in-phase
   - the vertical quadrature
   - the total field strength
   - the total dip
4. The VLF electric field, including:
   - the phase angle
   - apparent resistivity

A complete Omni System can, at each location, calculate and record in less than 8 seconds, four VLF magnetic field parameters from three different transmitters, a magnetic total field reading and a simultaneous magnetic gradient reading. In addition, it can also measure and record two VLF electric field parameters from three different transmitters.

Upgrade your Unit at any Time

Since the Omni System is based on a modular design, you can upgrade your system at any time. This built-in flexibility allows you to purchase an Omni System with only the surveying equipment that you need for now but does not limit you to one application. When your surveying needs grow, so can your Omni System.

Saves you Time

The Omni System with the unique 3-coil VLF Sensor does not require orientation of the VLF Sensor head toward the transmitter station. This simplifies VLF field procedures and saves considerable survey time. The operator does not need to orient the sensor head toward the first, selected transmitting station and then re-orient towards the second or third transmitting station.

The non-orientation technique is the first of its kind, and this provides the Omni System with many additional benefits. These benefits include:

- When you use the Omni System as both a magnetometer and VLF base station, you only need one instrument instead of three, to record data automatically from 3 VLF transmitting stations.

- When you use the Omni System with the Non-orientation VLF-Resistivity option, you can record automatically from 3 different stations the phase angle and apparent resistivity without having to re-orient any of the three electrodes. You can also use the Omni System with the conventional, two electrode method.

The Omni System quickly responds with a one-key operation. For example, if you must complete a magnetometer/gradiometer and three frequency VLF survey using the Omni System, you automatically measure the magnetometer, simultaneous gradiometer and three VLF frequency data by pressing only one key. Using another combined system, up to 5 different steps may be required. Such as, the operator would have to take one magnetic reading; then another sequential magnetic reading to calculate the gradient; orient the VLF sensor to the first VLF transmitter and then take a reading; orient the VLF sensor to the second transmitter, take a new reading and then repeat the same procedure for the third frequency. The Omni System one-key operation takes less than 8 seconds; a significantly shorter time period than the 5 step operation of other combined systems.

Since the Omni System saves all of the field data in memory and has many output capabilities, the elimination of the field notebook and also the transciption errors that can occur saves you a considerable amount of time.

Diurnal corrections, using the time saving "tie-line" method, can be done automatically by the Omni System eliminating hours of manual and tedious calculations. You can then directly transfer the corrected data to a computer for further data processing.

Higher Productivity System

Combined Magnetometer/VLF systems are inherently faster than conventional methods whereby two different operators collected magnetometer and VLF data from separate instruments.

Because of its unique user-friendly design, the Omni System provides higher field productivity for the user. The increased productivity originates from its two-microprocessor approach which significantly reduces calculation time and also from the non-orientation VLF technique.

Sensitive to Weak VLF Signals

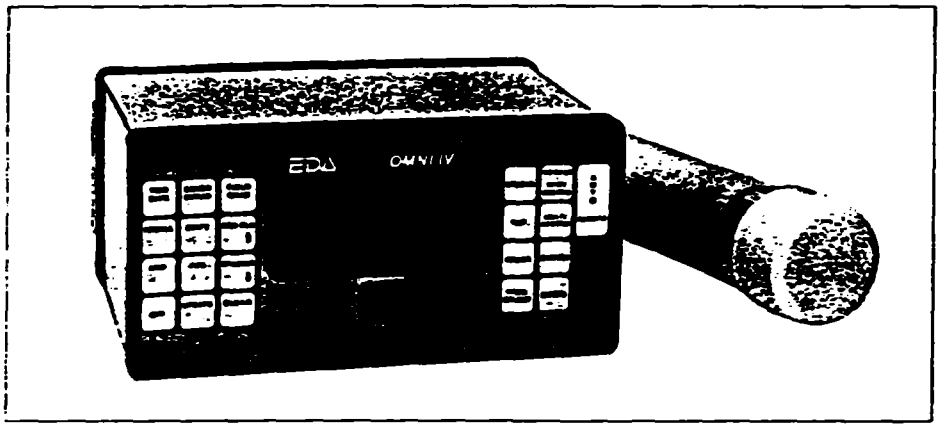
The Omni System's ability to obtain repeatable readings from weak signals offers a number of benefits:

- It extends the use of VLF on to countries where its use was previously marginal.
- It enables you to increase the number of frequencies with which you can operate.
- It reduces your need for portable VLF transmitters
- It improves the quality of your readings in rugged terrains, such as the deep valleys of the North American Rockies.

The Omni System's digital signal processing removes the modulation in the received signals. This technique helps stabilize too weak signals much greater than the conventional phase-locked loop method.

Ability to receive weaker signals (20nA/m) and a background noise reduction algorithm are among the reasons why the Omni System can obtain repeatable readings from signals which had previously been too weak to record.

.ne Omni System as a Portable Field Magnetometer



OMNI MAG electronics console with total field magnetic sensor

Simplifies Fieldwork

The Omni makes surveys easier to conduct because:

- the electronic notepad eliminates the need to write down field data. The Omni simultaneously stores time, field measurements, grid co-ordinates when you press any one of the three record keys.
- you are able to clear the unwanted last reading.
- the Omni automatically calculates the difference between the current reading and previous one.
- you can remove the coarse magnetic field value or data from the field data to simplify plotting of the field results.
- the Omni automatically calculates diurnal corrections.

The flexibility of the Omni System offers the following choices:

- if you use the Omni as a field magnetometer or as a gradiometer, the total field data can be corrected using the unique "Tie-Line" or "Looping" method.
- if you use one Omni as a base station, it will correct the total field magnetic data in:
  - an Omni set-up as a field magnetometer
  - an Omni set-up as a gradiometer

Unparalled Repeatability of Data

The Omni provides you with unparallelled data repeatability. This is a result of four leading edge design features that eliminates the need for taking multiple readings:

- Signal Processing Technique
- Constant Energy Polarization that maintains equal energy to the sensor
- Processing sensitivity to ± 0.02 gamma
- Automatic Fine Tuning which uses the previous reading as the base for the next

Saves You Time

The error analysis feature is a great time saver as the calculation of the statistical error of each reading lets you make an on-the-spot decision whether or not you should store the reading.

The Omni System also saves you time-consuming steps as it can:

- automatically assign a record number which you can also use to identify readings measured off of the grid.
- take more than one reading at one point without updating the current station number.
- according to the programmed station interval, automatically update your station position without having to program each station coordinate. The Omni magnetometer also provides a decimal digit for intermediate station intervals of 12.5 metres.
- rapidly recall readings either by record number or in sequence.

Tolerates Higher Gradients

The ability to tolerate local higher gradients of up to 6000 gammas per metre (field proven), is possible due to a sophisticated signal processing method and to a miniature sensor design using a highly optimized sensor geometry.

A Variety of Power Supply Options

You can choose from the following power supply options:

- non-magnetic rechargeable sealed lead-acid battery or belt
- heavy duty rechargeable battery
- alkaline battery belt
- 12V DC power source

The Omni System as a Base Station Magnetometer

The Omni Base Station Magnetometer effectively measures and stores in its memory the daily fluctuations of the Earth's magnetic field. The Omni can automatically correct total field data of other Omni units in just a few minutes.

Records Magnetic Field Activity

The magnetic field activity is recorded in the following format:

- time of measurement
- magnitude of total field
- difference from the reference field value
- difference from the previous reading
- sequential record number

Automatically Corrects Data

The Omni in the base station mode can automatically correct magnetic field data for both diurnal variations and reference field values. It can also correct total field data stored in:

- another Omni System used as a field magnetometer
- another Omni System used as a field gradiometer

This is ideal when you want to remove diurnal errors sufficiently to make use of the full 0.1 gamma resolution of the Omni System.

Automatic Drift Calculations

The Omni automatically calculates the difference between each reading and its programmed reference field. If at the end of the survey day you find that the reference field is incorrect, you can re-select a new one and the Omni System can instantly re-calculate the drift. The drift calculation can be presented in either digital and/or profile plot format. It can also be simultaneously output to a compatible printer so you can visually verify the activity of the field.

Calculates Differential Field Variations

The Omni calculates the difference between the current reading and the previous one to a resolution of 0.1 gamma. This features assists you in ascertaining the degree of activity that is occurring such as a magnetic storm or active conditions.

Stores Approximately 55 Hours Of Continuous Unattended Monitoring

The Base Station mode enables you to store up to 20,000 sets of readings which is the equivalent to approximately 55 hours of unattended monitoring at a 10 second sampling interval. You can program the cycling time at any interval between 5 seconds and 60 minutes in 1 second increments.

Outputs and Stores Data At the Same Time

The Omni can simultaneously output data in digital or ASCII format to your choice of data collection units at the same time it stores the data in memory.

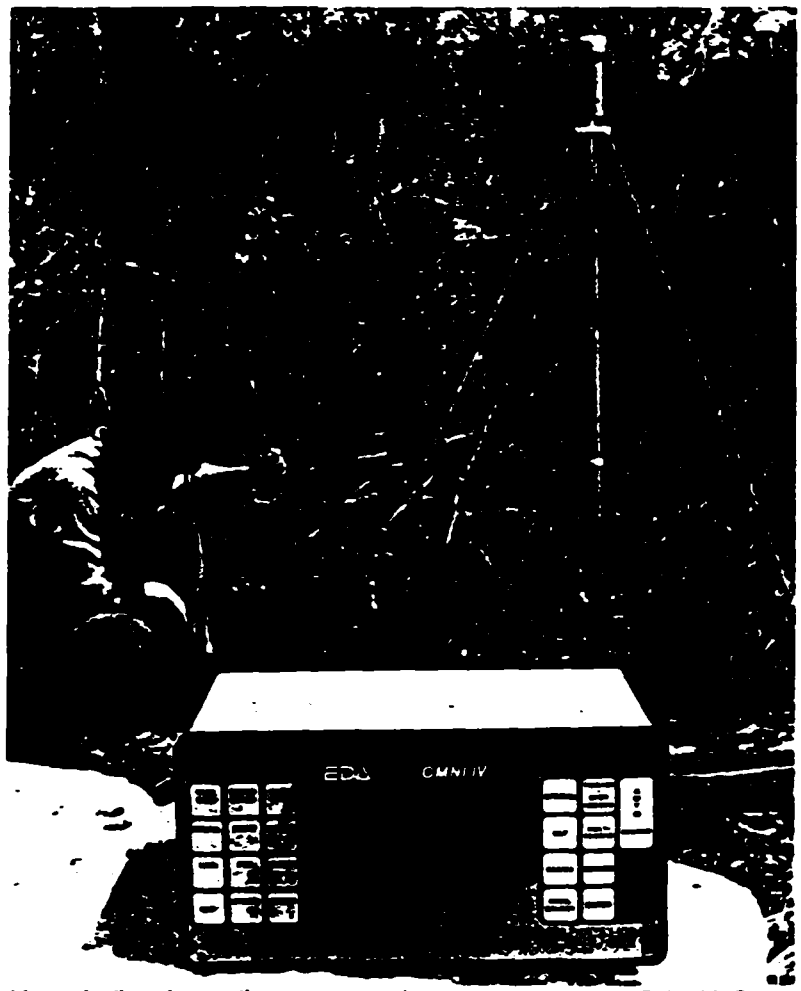
Synchronize Real Time Clocks

The Omni System real time clocks can be synchronized to the nearest second.

Magnetic Base Station Accessories Kit

Sensor Extension Cable - This 30 metre cable enables you to place the Omni in a sheltered environment such as a tent, and position the magnetic sensor up to 30 meters away. This capability aids in eliminating possible cultural interference.

Rope Joiner - The rope joiner enables the sensor staff to be supported by ropes when it is being used as a base station sensor.



Magnetic diurnal corrections are automatically made by using an OMNI MAG as a base station magnetometer

The Omni System as a Portable VLF Unit

The Omni VLF unit allows you to do all of your surveying completely hands free and provides you with the ability to measure and record in a fully protected memory for each field reading the following information:

- vertical in-phase
- vertical quadrature (out-of-phase)
- total field strength
- dip angle
- primary field direction
- apparent resistivity
- phase angle
- time
- grid co-ordinates
- direction of travel along grid lines
- natural and cultural features

The field data is compensated for 180 degree difference in direction of travel up and down survey lines.

Requires No Orientation

The Omni does not require you to orient the VLF sensor head toward the VLF transmitter station. This simplifies field procedures as well as saves you considerable survey time. When you measure three VLF transmitters, the benefits of this time-saving feature automatically triple. You do not have to orient yourself and the sensor head toward the first selected transmitting station and then re-orient towards the second or third transmitting station.

The ability to obtain data from as many as three VLF transmitting stations provides complete coverage of an anomaly regardless of the orientation of the survey grid or of the anomaly itself.

The unique 3 coil design of the OMNI VLF allows reading of up to 3 separate frequencies without having to orient to each of the transmitting VLF stations

Saves You Time

The Omni can measure up to three VLF frequencies (transmitter stations) simultaneously, in as little as 8 seconds, or one VLF frequency in only 3 seconds, depending on the transmitter strength.

The Omni automatically tunes to the preprogrammed frequency(s) for each reading. Display descriptors indicating signal-to-noise ratio provide you with an immediate indication of how usable a frequency is. Using up to three frequencies optimizes conductor coupling, even in the most complex geologic environments.

Receives Very Weak or Too Strong Signals

Being able to select a transmitter station(s) best suited for the survey target and orientation is not always possible with conventional VLF systems. The ideal station(s) may be too weak or overwhelmed by the signal strength of a transmitter that is close in frequency proximity. Through digital signal processing, the Omni can receive signals as low as 20 nA/m from very weak stations, by removing the modulation in the received signal. Analog filtering of the Omni System offers an unparalleled 80 dB for a 600 Hz channel separation. In other words, the Omni can isolate and measure a 1000 times weaker signal from a distant station in lieu

.ne Omni System as a Portable VLF Unit

of the closer and subsequently more stronger station that is only 600 Hz apart *in frequency.*

Reduced Atmospheric Noise

Atmospherics such as thunderstorm activity, as well as the resultant interaction between the sun's rays and the ionosphere can drastically alter the wave guide in which the VLF wave travels from the transmitter station.

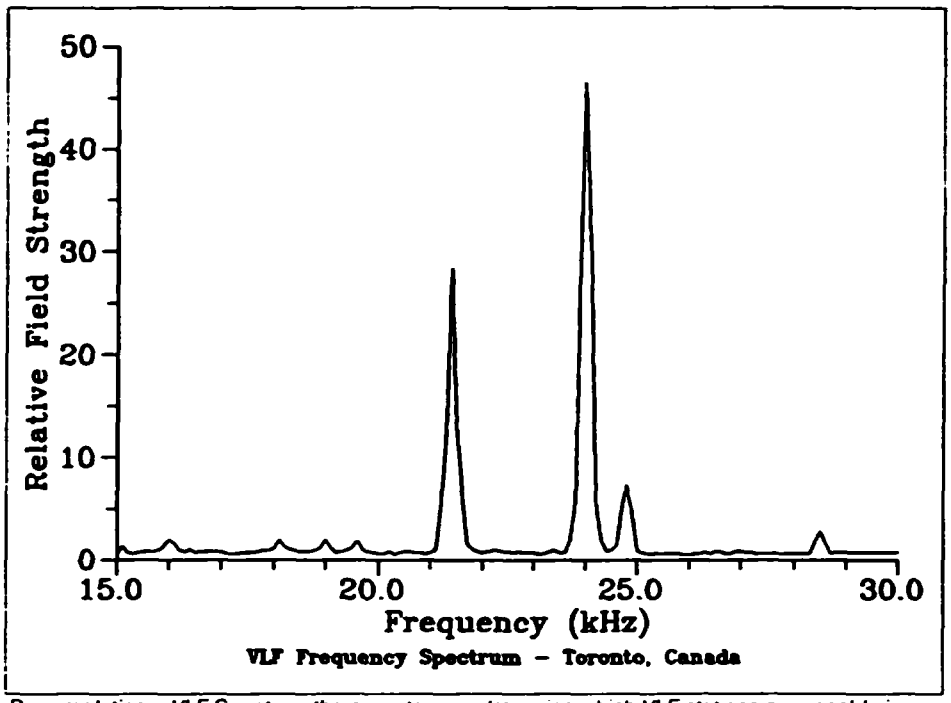
Through signal enhancement, the Omni is *able to suppress the effects of these* atmospheric and ionospheric phenomena, which are more predominant in the summer months, in order to pick up the weakest of transmitter stations. For example, Omni Systems used in Southern Africa have demonstrated the unparalleled ability to pick up 7 transmitter stations.

vides More Complete, 3-Dimensional escription of Survey Area

The Omni can measure the total tilt or dip of the polarization ellipse from the vertical axis. Unlike conventional systems, where only the tilt of the major axis of the polarization ellipse is measured, the Omni is most sensitive to the horizontal components perpendicular to the primary field which can detect anomalies off to the side. This provides a more complete, three dimensional description of the survey area that can lead to the detection of anomalies between grid lines. The Omni's *tilt transducers compensate for both tilt* and roll position of the VLF sensors.

Scan For The Most Usable Station

The Omni enables you to automatically scan the entire VLF spectrum for the most usable stations between 15.0 kHz to 30.0 kHz in increments of 100 Hz. This is most desirable if you do not know first hand what stations are readable or what stations are available from your location. *Unpublished or unknown stations now* ...ome accessible. You can then deter-...ie if a known station has changed frequency simply by the direction of transmission.



By completing a VLF Spectrum the operator can determine which VLF stations are useable in the survey area

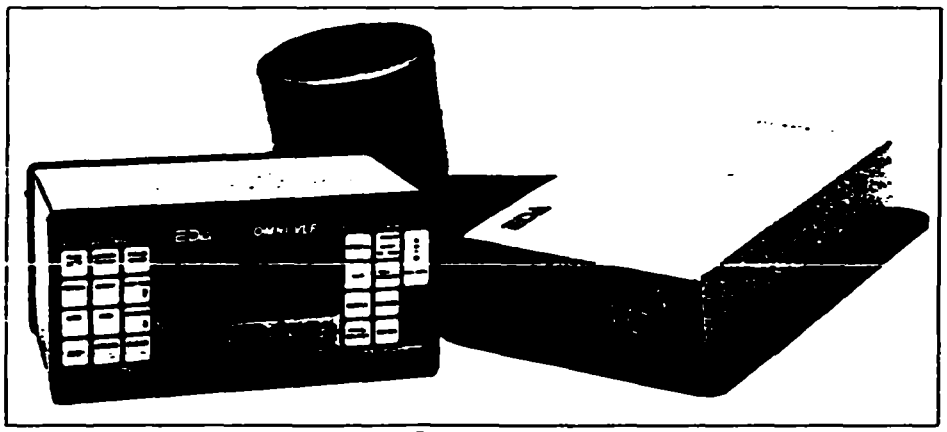
Automatically Calculates the Fraser Filter

The Omni automatically calculates the Fraser Filter from the dip angle data, regardless of the interval between the stations along the grid lines. You no longer have to manually perform this mathematical calculation thereby reducing the possibility of human error. The Fraser Filter algorithm follows established conventions.

The Fraser filtered data is output using both the 4 point and 5 point filter method. The latter method allows filtered data to be plotted easier, such as at the station interval instead of in-between stations.

Calculation of Ellipticity

As an option, the Omni can calculate the true ellipticity of the VLF magnetic field from the measurement of the in-phase and quadrature of all three components. The ellipticity provides more interpretive information about the anomaly than the dip angle and is less influenced by overburden shielding.



OMNI VLF electronics console with the VLF backpack assembly utilizing the unique 3 coil VLF sensor

Specifications

OMNI System Specifications

Operating Environment -40C to +55C; 0-100% relative humidity; weatherproof

Power Supply Non-magnetic rechargeable sealed lead-acid battery or belt; alkaline battery belt; or 12V DC power source option for base station operation.

Battery Life 1,700 to 5,000 readings, for sealed lead acid power supply, depending upon ambient temperature and rate of readings.

Weights and Dimensions

Instrument Console
3.8 kg, 122 x 246 x 210 mm

VLF Sensor Head
0.9 kg, 140 dia. x 130 mm

VLF Electronics Module
1.7 kg, 280 x 190 x 75 mm

Standard Rechargeable Battery
1.8 kg, 138 x 95 x 75 mm

Standard Rechargeable Battery Belt
1.8 kg, 540 x 100 x 40 mm

Heavy Duty Rechargeable Battery
2.0 kg, 138 x 115 x 75 mm

Alkaline Battery Belt
1.2 kg, 540 x 100 x 40 mm

Magnetometer Sensor
1.2 kg, 56mm dia. x 200mm

Gradient Sensor
(0.5m separation - standard)
2.1 kg, 56mm dia. x 790mm

Gradient Sensor
(1.0m separation - optional)
2.2 kg, 56mm dia. x 1300mm

Display
Custom designed, rugged liquid crystal display with an operating temperature range from -40C to +55C. The display contains six numeric digits, decimal point, battery status monitor, signal decay rate and signal amplitude monitor and function descriptors.

Magnetometer Component Specifications

Dynamic Range 18,000 to 110,000 gammas. Roll-over display feature suppresses first significant digit upon exceeding 100,000 gammas.

Tuning Method Tuning value is calculated accurately using a specially developed tuning algorithm.

Automatic Fine Tuning ±15% relative to ambient field strength of last stored value

Display Resolution 0.1 gamma

Statistical Error Resolution
0.01 gamma

Absolute Accuracy ± 1 gamma at 50,000 gammas at 23C • ±2 gamma over total temperature range

Memory Capacity

Standard Memory Capacity 1300 data blocks (48K) or 5200 data blocks (128K)

Total Field or Gradient 100 data blocks

Base Station 4000 data blocks (48K) or 16,000 data blocks (128K)

RS-232C Serial I/O Interface Variable baud rate from 300 to 9600 baud, 8 data bits, 2 stop bits, no parity

Gradient Tolerance 6,000 gammas per metre (field proven)

Test Mode A. Diagnostic testing (data and programmable memory)
B. Self Test (hardware)

Sensor Optimized miniature design. Magnetic cleanliness is consistent with the specified absolute accuracy.

Gradient Sensors 0.5 metre sensor separation (standard) normalized to gammas/metre. Optional 1.0 metre sensor separation available.

Sensor Cable Remains flexible in temperature range specified including strain relief connector

Cycling Time (Base Station)
Programmable from 5 seconds up to 60 minutes in 1 second increments.

VLF Component Specifications

Frequency Tuning Range 15 to 30 kHz in 100 Hz increments with bandwidth of 150 Hz; tuning range accommodates new Puerto Rico station at 28.5 kHz.

Transmitting Stations Up to 3 stations can be automatically measured at any given grid location within frequency tuning range.

Recorded VLF Magnetic Parameters
Vertical in-phase, vertical quadrature (out-of-phase), total field strength (or optional horizontal amplitude), dip angle

Channel Separation 80 dB at 600 Hz frequency separation

Standard Memory Capacity 1300 combined VLF magnetic and VLF electric measurements as well as gradiometer and magnetometer readings

SCINTREX

222 Snidercroft Road
Concord,Ontario,Canada
L4K 1B5

Telephone: (416) 669-2280
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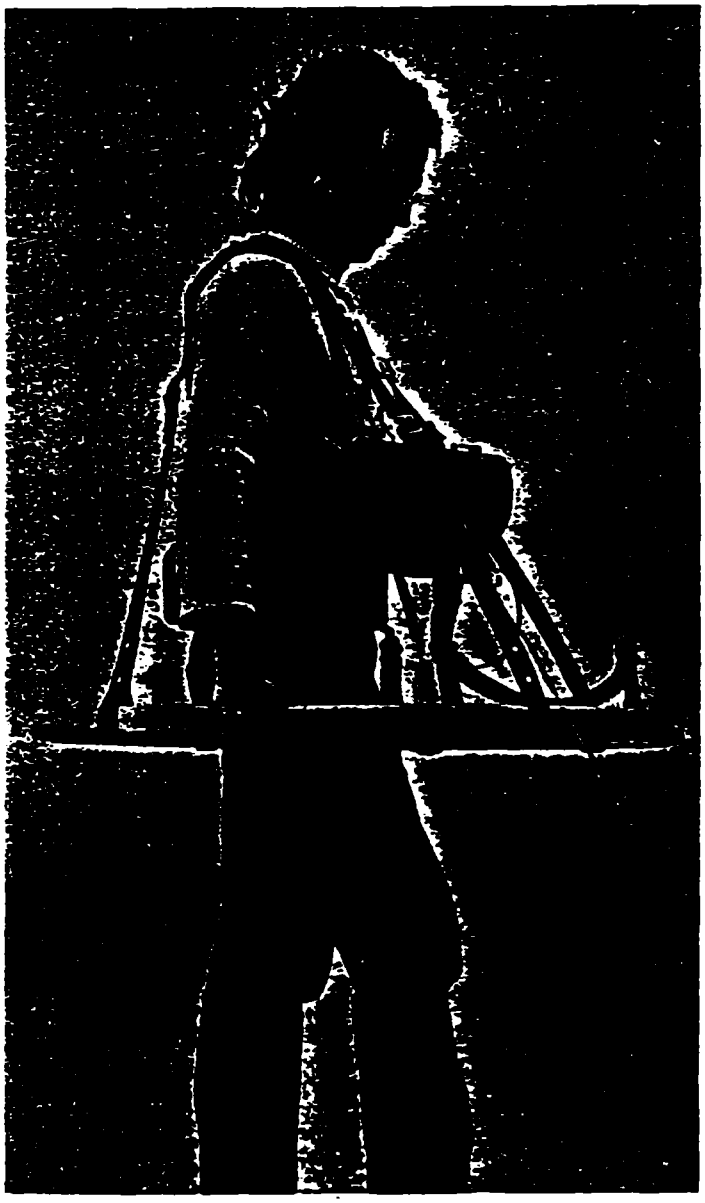
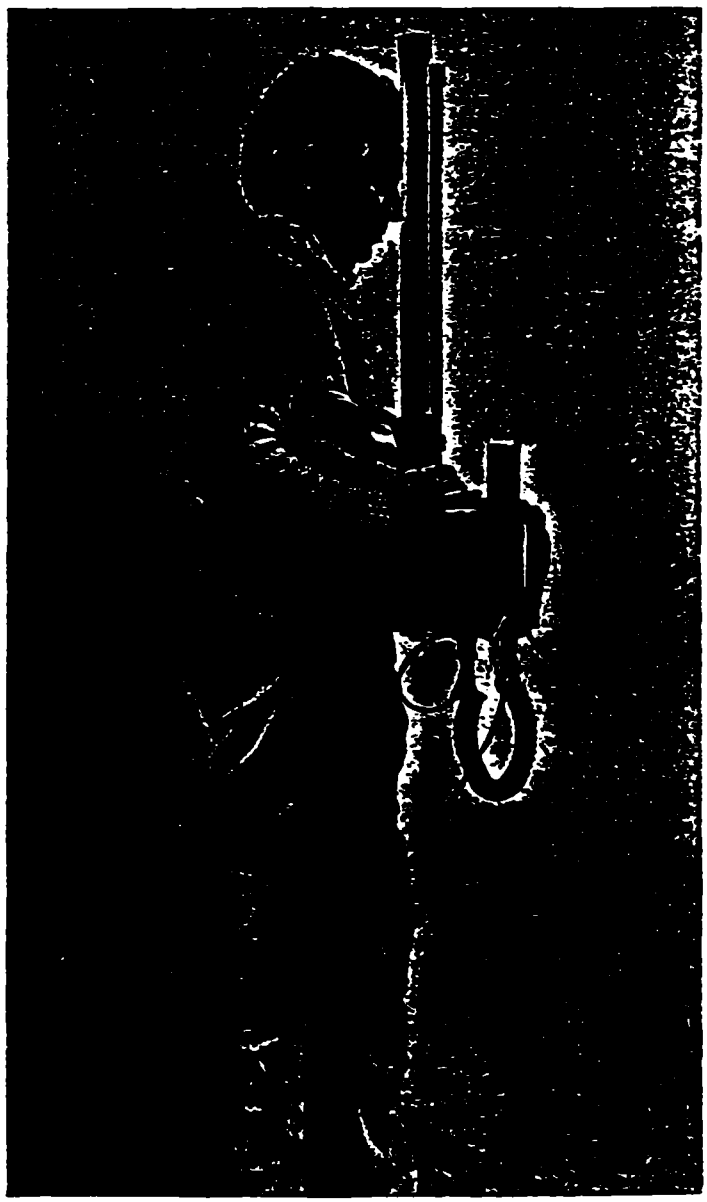
(416) 669-5132

APEX MAXMIN I PORTABLE EM

The MaxMin I ground EM System is designed for mineral and water exploration and for geoengineering applications. It is an expansion of the highly popular MaxMin II and III EM System concepts. The frequency range is extended to seven octaves from four. The ranges and numbers of coil separations are increased and new operating modes are added. The receiver can also be used independently for measurements with powerline sources. The advanced spheric and powerline noise rejection is further improved, resulting in faster and more accurate surveys, particularly at larger coil separations. Several receivers may be operated along a single reference cable.

Mating plug in data acquisition computer and cassette unit are available for use with the MaxMin I for automatic digital data acquisition and processing. These units are covered in separate data sheet.





MAXMIN I SPECIFICATIONS:

Frequencies: 110, 220, 440, 880, 1760, 3520, 7040 and 14080 Hz, plus 50/60 Hz powerline frequency (receiver only).

Modes: MAX 1: Horizontal loop mode (Transmitter and receiver coil planes horizontal and coplanar).

MAX 2: Vertical coplanar loop mode (Transmitter and receiver coil planes vertical and coplanar).

MAX 3: Vertical coaxial loop mode (Transmitter and receiver coil planes vertical and coaxial).

MIN 1: Perpendicular loop mode 1 (Transmitter coil plane horizontal and receiver coil pane vertical).

MIN 2: Perpendicular loop mode 2 (Transmitter coil plane vertical and receiver coil pane horizontal).

Coil separations: 12.5, 25, 50, 75, 100, 125, 150, 200, 250, 300, & 400 metres (standard).

10, 20, 40, 60, 80, 100, 120, 160, 200, 240 & 320 metres (selected with grid switch insde of receiver).

50, 100, 200, 300, 400, 500, 600, 800, 1000, 1200 & 1600 feet (selected with grid switch inside of receiver).

Parameters measured: In-Phase and quadrature components of the secondary magnetic field, in % of primary (transmitted) field.

Field amplitude and/or tilt of 50/60 Hz powerline field.

Readouts: Analog direct readouts on edgewise panel meters for in-phase, quadrature and tilt, and for 50/60Hz amplitude. (Additional digital LED readouts when using the DAC, for which interfacing and controls are provided for plug-in).

Ranges of readouts: Analog in-phase and quadrature scales: 0±4%, 0±20%, 0±100%, switch activated. Analog tilt scale: 0±75% grade. (Digital in-phase and quad. 0±102.4%).

Readability: Analog in-phase and quadrature 0.05% to 0.5%, analog tilt 1% grade. (Digital in-phase and quadrature 0.1%).

Repeatability: ±0.05% to ±1% normally, depending on frequency, coil seperation & conditions.

Signal filtering: Powerline comb filter, continuous spherics noise clipping, autoadjusting time constant and other filtering.

Warning lights: Receiver signal and reference warning lights to indicate potential errors.

Survey depth: From surface down to 1.5 times coil separation used.

Transmitter dipole moments:

110 Hz: 220 Atm²	1760 Hz: 160 Atm²
220 Hz: 215 Atm²	3520 Hz: 80 Atm²
440 Hz: 210 Atm²	7040 Hz: 40 Atm²
880 Hz: 200 Atm²	14080 Hz: 20 Atm²

Reference cable: Light weight unshielded 4/2 conductor teflon cable for maximum temperature range and for minimum friction. Please specify cable lengths required.

Intercom: Voice communication link provided for operators via the reference cable.

Receiver power supply: Four standard 9V batteries (0.5Ah, alkaline). Life 30 hrs continuous duty, less in cold weather. Rechargeable battery and charger option available.

Transmitter power supply: Rechargeable sealed gel type lead acid 12V-13Ah batteries (4x6V-6½Ah) in canvas belt. Optional 12V-8Ah light duty belt pack available.

Transmitter battery charger: For 110-120/220-240VAC, 50/60/400 Hz and 12-15VDC supply operation, automatic float charge mode, three charge status indicator lights. Output 14.4V-1.25A nom.

Operating temp: -40 to +60 deg.C.

Receiver weight: 8 kg, including the two integral ferrite cored antennas (9 kg with data acq. comp.)

Transmitter weight: 16 kg with standard 12V-13Ah battery pack.
14 kg with light duty 12V-8Ah pack.

Shipping weight: 59 kg plus weight of reference cables at 2.5 kg per 100 metres plus other optional items if any.

Standard spares: One spare transmitter battery pack, one spare transmitter battery charger, two spare transmitter retractile connecting cords, one spare set receiver batteries.

Specifications subject to change without notification.

APEX PARAMETRICS LIMITED

P.O. Box 818, Uxbridge
Ontario, Canada L0C 1K0

Telephones: 416-640-6102
416-852-5875

Cables: APEXPARA TORONTO

Telex: 06-966625 APEXPARA UXB

020

2.15548

OPERATION REPORT ON A TOTAL FIELD MAGNETIC, VLF-EM AND HORIZONTAL LOOP EM SURVEY LARDER LAKE MINING DIVISION ONTARIO

FOR

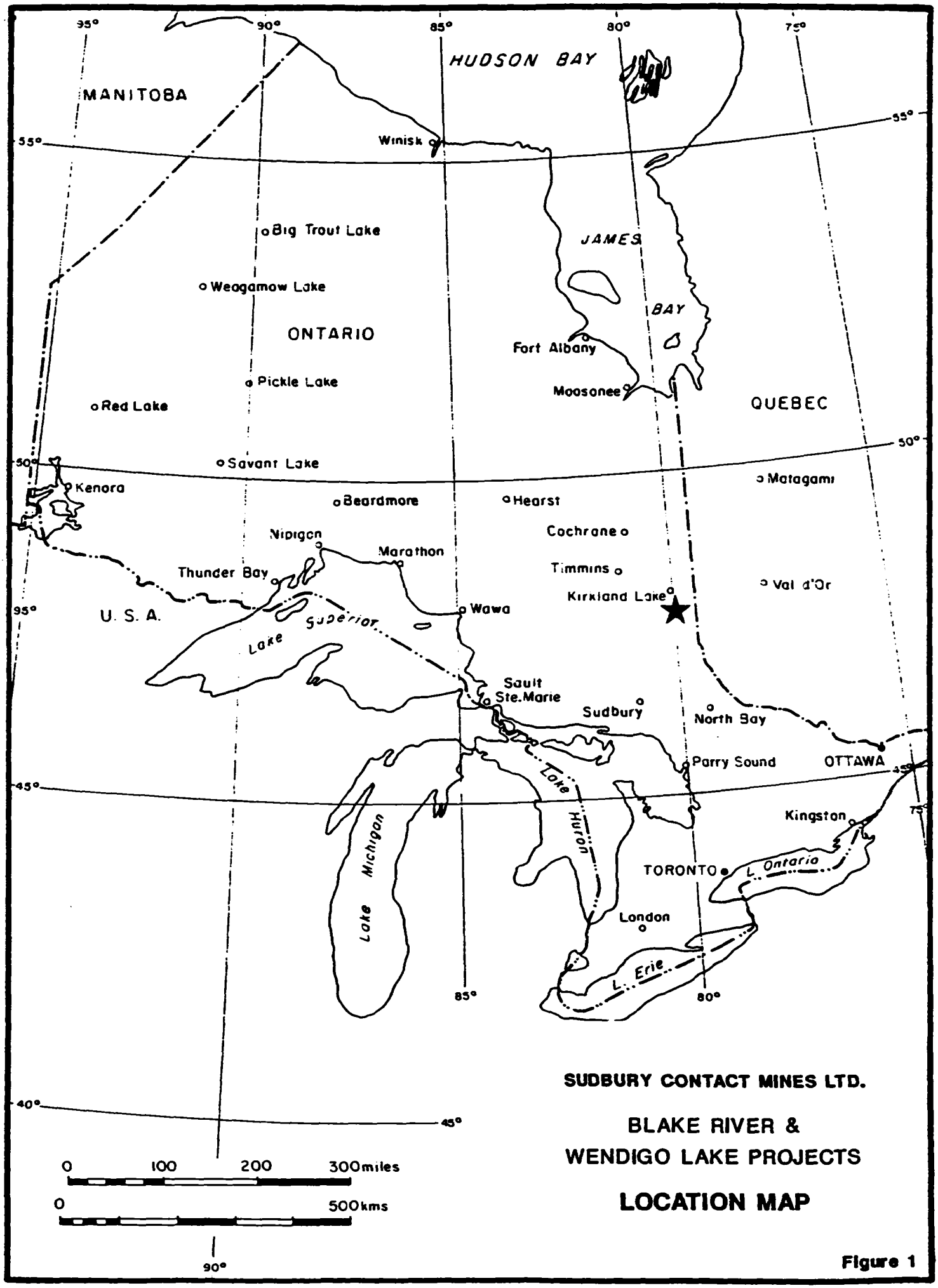
SUDBURY CONTACT MINES LTD.

TECHTERREX INCORPORATED
Oakville, Ontario
March 29, 1994

TABLE OF CONTENTS

1.0 Introduction

During the period of February 2, 1994 through to March 2, 1994 TechTerrex Inc. performed ground magnetometer and VLF-EM surveys over mining claims held by or under option to Sudbury Contact Mines Ltd. The surveys were intended to map the magnetic properties of the underlying rocks, and also to locate and define the structural settings of the various geological units. On selective grids, Horizontal Loop EM surveys were initiated to trace any possible conductive zones within these geological units. These exploration efforts were concentrated towards the search for both gold and diamond bearing rock formations.



SUDBURY CONTACT MINES LTD.

BLAKE RIVER & WENDIGO LAKE PROJECTS

LOCATION MAP

Figure 1

2.0 Property Location and Access

The mining claims reported herein are located in Skead, Hearst, McGarry, Mulligan and Argyle Townships in the Larder Lake Mining Division of Ontario. Refer to Table I for a listing of the claim numbers. Figure 1 illustrates the regional location of the property areas. Property location and access for each of the properties is described as follows:

St. Anthony Lake Grid: Located in Skead Township on the southern portion of St. Anthony Lake, the property can be accessed from provincial Hwy. #624 at approximately 15 kilometers south of the village of Larder Lake, Ontario. A seasonal bush road leads southeast from Hwy. #624 for a distance of approximately 2 kilometers to the north shore of St. Anthony Lake.

Kokotow Property: Located in Hearst Township on Fitzpatrick Bay on the Southwest Arm of Larder Lake, the western edge of the property is accessible at a point approximately 4 kilometers south of the village of Larder Lake along provincial Hwy #624.

Ellgring Property: Located in Mulligan Township, the property can be accessed eastward from Englehart, Ontario along Hwy. #569 for a distance of approximately 9.5 kilometers; at which point a series

of concession and logging roads lead northwest for a distance of approximately 16 kilometers. From this point, an old logging road heads southeast for a distance of 1 kilometer to the grid.

Whelan Property: Located in Argyle Township, the property lies approximately 17 kilometers northwest of the village of Matachewan, Ontario. Access is via Hwy. #566 to the Loon Lake Lodge road, then northeast along a series of old logging roads.

Wright Property: Located in McGarry Township, the property lies at a point approximately 1 kilometer east of Kearns, Ontario and approximately 2 kilometers south of provincial Hwy. #66. Access from Hwy. #66 is southward along the Raven Mountain forest access road for a distance of approximately 2 kilometers (Raven Mountain Ski Hill). From there, cross-country ski trails lead southwest towards the property. Additionally, the property can be reached from the east shore of the Northeast Arm of Larder Lake.

Flanagan Grid: Located in Skead Township, the property is accessable from the village of Larder Lake, south along provincial Hwy #624 for a distance of approximately 9 kilometers. At which point a series of forest access roads lead southeast for a distance of approximately 7-8 kilometers.

3.0 Grid Description

The grids were prepared by Norman McBride Linecutting Services between January 24, 1994 and February 16, 1994. The grids consist of a baseline whose orientation is listed below. Perpendicular to the baselines, crosslines have been established at 100 metre intervals, and in some instances at 50 metre intervals. A declination of 14 degrees west was used to turn off all base and crosslines. The base line direction and crosslines were turned off through the use of a transit (land portion only).

Picket intervals along all crosslines and baselines are at a nominal 25 metre separation. A total of approximately 83 kilometers of grid lines were established over 6 grids, a summary of which is listed below:.

GRID/PROPERTY	TOTAL LINE KM.	BASE LINE AZ.
St. Anthony	17.2	360
Kokotow	22.7	040
Ellgring	4.3	330
Whelan	5.1	360
Wright	30.6	220
Flanagan Creek	3.2	360

4.0 Ground Magnetic/VLF-EM Survey

4.1 Survey Instrumentation and Description

The VLF-EM and total field magnetic measurements were collected simutaneously using the EDA Omni Plus magnetometer/VLF-EM receiver manufactured by Scintrex Ltd. of Concord, Ontario. These measurements were recorded at 12.5 metre intervals along all base and crosslines.

The magnetic survey also employed an EDA Omni Plus magnetometer as a base station to monitor and record the diurnal fluctuations to the earth's magnetic field. All measurements have been corrected for the diurnal magnetic drift.

The VLF-EM survey, conducted on all base and crosslines made use of the transmiter facility at Annapolis, Maryland which transmits at 21.4 kHz., and at Cutler, Maine having a transmitter frequency of 24.0 kHz. Both the in-phase and quadrature components of the electromagnetic field were recorded. Appendix I documents the specifications for the Scintrex EDA Omni Plus instruments.

5.0 Horizontal Loop EM Survey

5.1 Survey Instrumentation and Description

The Horizontal Loop EM Survey employed the Apex Parametrics MaxMin I electromagnetic system manufactured by Apex Parametrics Ltd. of Uxbridge, Ontario. Measurements using the 7040 Hz., 1760 Hz. and 440 Hz. frequencies were recorded at 25 metre intervals along the the grid crosslines. Both the in-phase and quadrature components of the electromagnetic field were measured. These measurements were stored into the Apex MMC data logger as the survey progressed. Coil separations of 100 metres and 150 metres were used selectively. In-phase measurements have been corrected for short cable effects due to topography. Appendix II outlines the specifications for the MaxMin I EM system.

6.0 Data Presentation

The results of the surveys are presented at a scale of either 1:2500 or 1:5000 as noted on the accompanying map sheets.

The total field magnetic data is presented in plan as postings and profiles and as contours for each of the grids .

The VLF-EM measurements, i.e., in-phase and quadrature are presented as a series of posting and profile maps. A Fraser filter has been applied to the in-phase data in order to transform the cross-overs over possible conductors into positive peak anomalies. These are presented in contour form. Profile scales and contour intervals, vary depending upon the amplitude of the readings, are noted on the individual map sheets

The horizontal loop EM measurements for the grids surveyed are presented as a series of in-phase and quadrature posting and profile maps. Profile scale ranges from 1 centimetre = 10 percent to 1 centimetre = 20%.

Table II lists the various map presentations which accompany this report.

Respectfully submitted,
TechTerrex Inc.

M.C. Wilson

Michael C. Wilson,
President.

TABLE I

The following mining claims are covered by the surveys mentioned in this report.

St. Anthony Lake Grid, Skead Township

L1200397
L1200398

Kokotow Property, Hearst Township

L24421	L33040
L26792	L33041
L26844	L36363
L30351	L36586
L30352	L39675
L30693	L39676
L33039	L39679

Ellgring Property, Mulligan Township

L1150621

Whelan Property, Argyle Township

L1186650

Wright Property, McGarry Township

L1180047	L1180056	L 1180677
L1180050	L1180057	
L1180052	L1180058	
L1180053	L1180059	

Flanagan Creek Grid, Skead Township

L1200397

TABLE II

MAP PRESENTATIONS

St. Anthony Lake Grid:

Map No.	BWP-01	Total Field Magnetic Postings and Profiles
	BWP-02	Total Field Magnetic Contours
	BWP-03	VLF-EM Postings and Profiles
	BWP-04	Fraser Filter VLF-EM Contours
	BWP-05	HLEM Postings and Profiles of 440 Hz.
	BWP-06	HLEM Postings and Profiles of 1760 Hz.
	BWP-07	HLEM Postings and Profiles of 7040 Hz.
	BWP-08	Plan of Topography
	BWP-09	Plan of Interpretation

Ellgring Property:

Map No.	BWP-10	Total Field Magnetic Postings and Profiles
	BWP-11	Total field Magnetic Contours
	BWP-12	VLF-EM Postings and Profiles
	BWP-13	Fraser Filter VLF-EM Contours
	BWP-14	HLEM Postings and Profiles of 440 Hz.
	BWP-15	HLEM Postings and Profiles of 1760 Hz.
	BWP-16	HLEM Postings and Profiles of 7040 Hz.
	BWP-17	Plan of Topography
	BWP-18	Plan of Interpretation

Whelan Property:

Map No.	BWP-19	Total Field Magnetic Postings and Profiles
	BWP-20	Total Field Magnetic Contours
	BWP-21	VLF-EM Postings and Profiles
	BWP-22	Fraser Filter VLF-EM Contours
	BWP-23	Plan of Topography
	BWP-24	Plan of Interpretation

Kokotow Property:

Map No.	BWP-25	Total Field Magnetic Postings and Profiles
	BWP-26	Total Field Magnetic Contours
	BWP-27	VLF-EM Postings and Profiles
	BWP-28	Fraser Filter VLF-EM Contours
	BWP-29	HLEM Postings and Profiles of 440 Hz.
	BWP-30	HLEM Postings and Profiles of 1760 Hz.
	BWP-31	HLEM Postings and Profiles of 7040 Hz.
	BWP-32	Plan of Topography
	BWP-33	Plan of Interpretation

TABLE II (cont'd)

Wright Property:

Map No.	BWP-34	Total Field Magnetic Postings and Profiles
	BWP-35	Total Field Magnetic Contours
	BWP-36	VLF-EM Postings and Profiles
	BWP-37	Fraser Filter VLF-EM Contours
	BWP-38	HLEM Postings and Profiles of 440 Hz.
	BWP-39	HLEM Postings and Profiles of 1760 Hz.
	BWP-40	HLEM Postings and Profiles of 7040 Hz.
	BWP-41	Plan of Topography
	BWP-42	Plan of Interpretation

Flanagan Creek Grid:

Map No.	BWP-43	Total Field Magnetic Postings and Profiles
	BWP-44	Total Field Magnetic Contours
	BWP-45	VLF-EM Postings and Profiles
	BWP-46	Fraser Filter VLF-EM contours
	BWP-50	Plan of Topography
	BWP-51	Plan of Interpretation

Note: Interpretation Maps to accompany a report by J. Roth, Stratagex Ltd.

APPENDIX I

SURVEY INSTRUMENT SPECIFICATIONS

FOR

THE SCINTREX EDA OMNI PLUS

SCINTREX

EDA Omni Geophysical System

Brief Description

When you require more flexible geophysical techniques in order to find the increasingly more elusive anomalous targets, Scintrex offers you the EDA Omni System. This system enables you to design your own unique instrument whether it is for complete Magnetic surveys, VLF Electromagnetic surveys or a combination of these techniques.

At the heart of the Omni System is the Omni System Control Console which is common to all Omni System applications. This customized aproach gives you the ability to select the following options for your instrument:

- Portable Field and Base Station Magnetometer
- True Simultaneous Gradiometer
- Portable Field and Base Station VLF Electromagnetic Receiver
- Two Probe, VLF Resistivity
- Non-Orientation, VLF Resistivity

Applications

Since the Omni System capabilities are so versatile, the data collected and recorded by the instrument can be applied to a variety of earth sciences including:

- mineral exploration
- geological mapping
- groundwater exploration
- groundwater contamination
- civil engineering
- geotechnical studies
- archaeology

Features

Omni System Features

Each Omni System incorporates the following features:

Flexibility of the Omni System

You can select your own options to customize your unit to suit your specific geophysical needs.

Microprocessor Controlled

Gives you a choice of three fully protected data storage modes:

- spot record, for readings without grid co-ordinates (random samples)
- multi-record, for multiple readings at one station
- auto-record, for automatic update of station position

Complete Data Protection

The internal lithium battery assures you of complete data protection for up to 5 years.

Measures and Records in Memory

Measurement and recording in memory of the following magnetic field data for each reading:

- total field magnitude
- true gradient of the total field
- applied base station value
- statistical error
- signal strength
- decay rate

Measurement and recording in memory of the following VLF data for each field reading:

- vertical in-phase
- vertical quadrature (out-of-phase)
- total field strength
- total dip angle
- primary field direction
- apparent resistivity
- phase angle
- signal-to-noise ratio
- operator quality

The OMNI system configured as a MAG/VLF simplifies geophysical surveys by combining Magnetic and VLF EM techniques.

Records Survey Data

Records the following survey data for each magnetic and/or VLF reading:

- time of measurement and date
- grid co-ordinates
- direction of travel along grid lines
- natural and cultural features

Measures up to 3 VLF Transmitting Stations

The Omni System can measure up to 3 VLF transmitting stations and provides more complete coverage of an anomaly regardless of the orientation of the transmitter with respect to the survey grid or the anomaly itself.

Electronic Notebook

The internal Electronic Notebook enables you to record natural and cultural features that are unique to each grid location. This feature eliminates the need for a field notebook and provides additional information that can assist in interpreting recorded data.

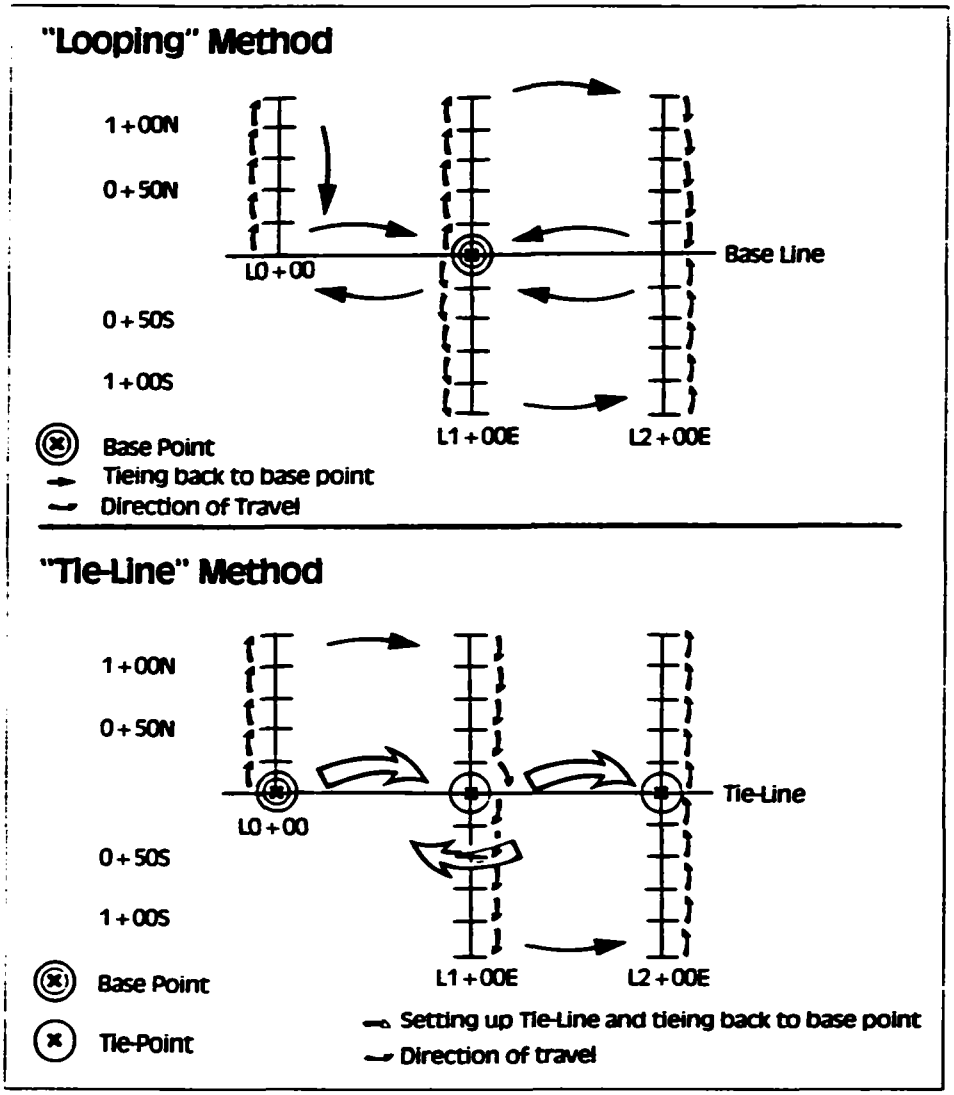
Automatic Correction Using The Omni System's Unique "Tie-Line" Technique

The "Tie-Line" algorithm used exclusively by the Omni System allows for the self correction of atmospheric magnetic variations and variations in the primary field from the VLF transmitter(s). The instrument is able to store 'looping' or 'tie line' data in a separate memory at the beginning of each survey and then subsequently stores total field readings in a second memory along with the field readings of the tie point(s). At the end of each survey day the Omni System will then merge these two memories to automatically correct the total field data for diurnal variations.

The Omni System in the "Tie-Line" mode can:

- Store looping or tie line data, 3 ways:
  1. Using one looping base point
  2. Using one "Tie-Line" comprising a number of tie points, or
  3. Using multiple tie lines.
- Store up to 100 tie points in one survey area or divide these points into extensions of survey areas as needed.
- Store tie points or tie lines for the duration of the survey.
- Calculate the drift between established tie points, to readily see variations in the Earth's magnetic field.

Features



The "Tie-Line" feature available in all OMNI configurations provides a significant cost savings by allowing diurnal corrections to be made internally by one instrument without the need of a dedicated base station instrument

Rapid Data Recall

With a few keystrokes, you can instantly recall data from memory to the digital display by record number or in sequence. Scanning through the memory of a particular parameter is also possible.

Wide Range of Data Output Capabilities

The ability to efficiently transfer and present data in an interpretable format is important to the success of any survey or project.

The Omni System accomodates a wide selection of data output options, from simple listings of data and profile plots on a printer, to integrated software programs for computer plotting and modelling. The Omni System can transfer uncorrected, corrected or filtered magnetic and VLF data to most computers and printers with a RS-232C serial port.

Two Types of Formats available - data can be output from the Omni System in two format types. For ready to use data, the columnarized data dump format is the most suitable for direct hard copy printer outputs. For data which is to be further used with computer plotting or analysis software packages, you can select the fixed ASCII CPU dump format.

Profile Plot Outputs - Since VLF as well as magnetic data is often easier to interpret as a profile plot, data that the Omni System collects, can be presented in this analog format at a vertical scale best suited for data presentation. You can selectively output in analog and/or digital format the following:

- the magnetic total field strength
- the magnetic vertical gradient
- the VLF in-phase
- the VLF out-of-phase (quadrature)
- the VLF total field strength

Data Presentation - The grid co-ordinates under which the Omni System collects the data can be output in the standard Cartesian format (using positive and negative signs) or with the more familiar N,S,E,W compass descriptors.

Editing Capabilities - Prior to data transfer, you can program your Omni System to transfer a designated block of data, denoted by start and end points. Data can be separated into files that are best suited for survey or plotting conditions.

Pause Feature - You may stop the transfer of data at any time and resume where it left off, when it is more convenient. The Omni System will continue to pause until you press any one of keys on the keypad.

Choice of Data Outputs - The Omni System outputs data in a choice of formats, depending on the operating mode:

- corrected magnetic total field data
- uncorrected magnetic total field data
- magnetic base station data
- magnetic gradient field data
- corrected VLF field strength data
- uncorrected VLF field strength data
- VLF base station data
- corrected "Tie-Line" data
- uncorrected "Tie-Line" data

The Omni System can also transfer VLF data from all 3 VLF frequencies simultaneously or sequentially.

Features

```
OMNI-PLUS  Tie-line MAG/VLF R22K  Ser #428150
TOTAL FIELD DATA (uncorrected)
& GRADIENT

Reference  field: 56000.0
Datum subtracted:      0.0Date 13 DEC 88
Operator:  5000
Records:  10
Bat:  17.5 Volt     Lithium:  3.48 Volt
Last time update: 12/13  9:50:00
Start  of  print: 12/13 14:34:01

Line  0+00 E  Date 13 DEC 88          #2
POSITION   FIELD  ERR    DRIFT    TIME    DS CULT  GRADIENT
  0+80 N 56779.9 .04      0.0 11:38:55 88             1.1
  0+90 N 56769.6 .04      0.0 11:39:33 88             1.2
  1+00 N 56747.1 .05      0.0 11:40:10 88             2.1
  1+10 N 56627.4 .05      0.0 11:41:47 88             1.7
  1+20 N 56418.6 .08      0.0 11:42:30 88PIPE      -13.8
  1+30 N 56616.1 .07      0.0 11:43:36 88          -41.0
  1+40 N 56733.7 .05      0.0 11:44:28 88             6.2
  1+50 N 56765.6 .04      0.0 11:45:08 88             1.9
  1+60 N 56764.9 .05      0.0 11:45:47 88             1.1
  1+70 N 56767.2 .04      0.0 11:46:26 88             0.7
```

```
OMNI-PLUS  Tie-line MAG/VLF R22K  Ser #428150
VLF TOTAL FIELD DATA (uncorrected)

Date 13 DEC 88
Operator:  5000
Records:  10
Bat:  17.5 Volt     Lithium:  3.48 Volt

Last time update: 12/13  9:50:00
Start  of  print: 12/13 14:35:51

Line  0+00 E  Date 13 DEC 88  24.0     #2
POSITION     I/P  QUAD T.FLD  TILT   TIME    CULT S  DIR  4-FRA 5-FRA
  0+80 N    20.2  -5.4 71.14  61.0 11:38:55      55   7.0
  0+90 N    28.2  -7.6 73.45  67.6 11:39:33      44  11.7
  1+00 N    41.6 -10.2 78.82  79.3 11:40:10      43   0.6
  1+10 N    68.2 -13.7 98.68  85.3 11:41:47      43 -16.4 -36.0
  1+20 N    86.9  -6.8 202.4  84.3 11:42:30PIPE  52 -14.4 -22.7 -29.4
  1+30 N -101.3  12.2 202.0  84.3 11:43:36      59  -9.5  -4.0 -13.4
  1+40 N  -81.1  21.7 95.17  81.7 11:44:28      59 -14.2   3.6  -0.2
  1+50 N  -53.6  15.8 77.03  76.9 11:45:08      59 -22.2  10.0   6.8
  1+60 N  -40.7  13.4 68.07  74.7 11:45:47      49 -24.3  14.4  12.2
  1+70 N  -34.6  11.7 63.02  71.4 11:46:26      49 -16.9  12.5  13.4
```

Typical sample of data output from the OMNI system

ɜaled, User Friendly Keypad

Protects your Omni System from water and dust and allows for easy operation and reliability.

Digital Display

Distinctly shows data which can sometimes be unclear with analog or audio-nulled systems.

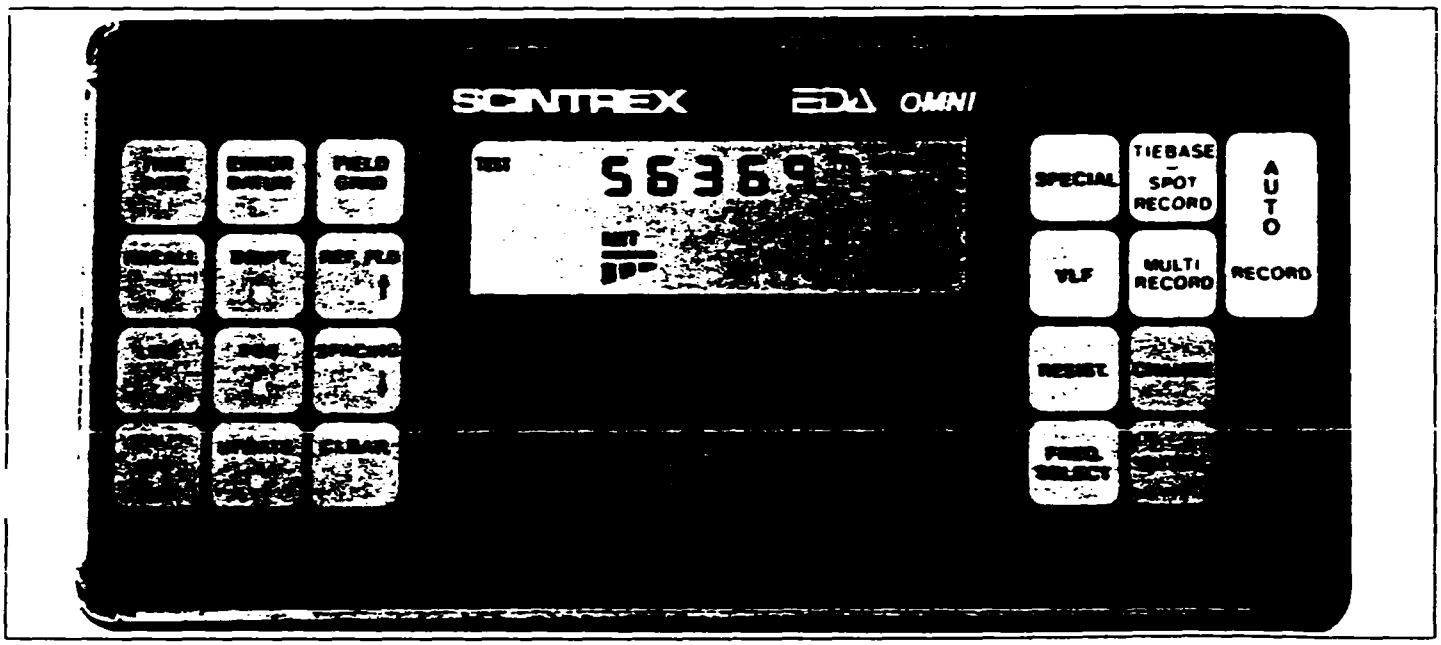
Display Descriptors

Monitor the signal strength and decay rate of the magnetic total field and/or the quality of all three VLF transmitter signals being measured.

Power Supply Options

You can choose from the following power supply options:

- Non-magnetic rechargeable sealed lead acid battery
- Non-magnetic rechargeable sealed lead acid battery belt
- Alkaline battery belt
- 12V DC power source for base station operation



Omni System Benefits

Only One Instrument Needed for Magnetometer, Gradiometer, VLF and VLF Resistivity Surveying

The Omni incorporates the capabilities of a "Tie-Line" magnetometer and simultaneous Gradiometer system with the ability to measure VLF magnetic and electric fields.

Only one complete Omni System is needed to record all of the following geophysical parameters:

1. The total magnetic field
2. The simultaneous gradient of the total magnetic field.
3. The VLF magnetic field including:
   - the vertical in-phase
   - the vertical quadrature
   - the total field strength
   - the total dip
4. The VLF electric field, including:
   - the phase angle
   - apparent resistivity

A complete Omni System can, at each location, calculate and record in less than 8 seconds, four VLF magnetic field parameters from three different transmitters, a magnetic total field reading and a simultaneous magnetic gradient reading. In addition, it can also measure and record two VLF electric field parameters from three different transmitters.

Upgrade your Unit at any Time

Since the Omni System is based on a modular design, you can upgrade your system at any time. This built-in flexibility allows you to purchase an Omni System with only the surveying equipment that you need for now but does not limit you to one application. When your surveying needs grow, so can your Omni System.

Saves you Time

The Omni System with the unique 3-coil VLF Sensor does not require orientation of the VLF Sensor head toward the transmitter station. This simplifies VLF field procedures and saves considerable survey time. The operator does not need to orient the sensor head toward the first, selected transmitting station and then re-orient towards the second or third transmitting station.

The non-orientation technique is the first of its kind, and this provides the Omni System with many additional benefits. These benefits include:

- When you use the Omni System as both a magnetometer and VLF base station, you only need one instrument instead of three, to record data automatically from 3 VLF transmitting stations.

- When you use the Omni System with the Non-orientation VLF-Resistivity option, you can record automatically from 3 different stations the phase angle and apparent resistivity without having to re-orient any of the three electrodes. You can also use the Omni System with the conventional, two electrode method.

The Omni System quickly responds with a one-key operation. For example, if you must complete a magnetometer/gradiometer and three frequency VLF survey using the Omni System, you automatically measure the magnetometer, simultaneous gradiometer and three VLF frequency data by pressing only one key. Using another combined system, up to 5 different steps may be required. Such as, the operator would have to take one magnetic reading; then another sequential magnetic reading to calculate the gradient; orient the VLF sensor to the first VLF transmitter and then take a reading; orient the VLF sensor to the second transmitter, take a new reading and then repeat the same procedure for the third frequency. The Omni System one-key operation takes less than 8 seconds; a significantly shorter time period than the 5 step operation of other combined systems.

Since the Omni System saves all of the field data in memory and has many output capabilities, the elimination of the field notebook and also the transciption errors that can occur saves you a considerable amount of time.

Diurnal corrections, using the time saving "tie-line" method, can be done automatically by the Omni System eliminating hours of manual and tedious calculations. You can then directly transfer the corrected data to a computer for further data processing.

Higher Productivity System

Combined Magnetometer/VLF systems are inherently faster than conventional methods whereby two different operators collected magnetometer and VLF data from separate instruments.

Because of its unique user-friendly design, the Omni System provides higher field productivity for the user. The increased productivity originates from its two-microprocessor approach which significantly reduces calculation time and also from the non-orientation VLF technique.

Sensitive to Weak VLF Signals

The Omni System's ability to obtain repeatable readings from weak signals offers a number of benefits:

- It extends the use of VLF on to countries where its use was previously marginal.
- It enables you to increase the number of frequencies with which you can operate.
- It reduces your need for portable VLF transmitters
- It improves the quality of your readings in rugged terrains, such as the deep valleys of the North American Rockies.

The Omni System's digital signal processing removes the modulation in the received signals. This technique helps stabilize too weak signals much greater than the conventional phase-locked loop method.

Ability to receive weaker signals (20nA/m) and a background noise reduction algorithm are among the reasons why the Omni System can obtain repeatable readings from signals which had previously been too weak to record.

Omni System Benefits

Excellent Data Quality and Repeatability

The Omni System provides users with unparalleled data quality and repeatability. The 3-orthogonal coil sensor that the Omni System uses improves the data reliability over the conventional two-coil method as it provides a more complete calculation of both the in-phase and out-of-phase parameters. This difference becomes even more important in measuring large anomalies.

The 3-coil sensor method provides consistently high data quality unrelated to the operator's ability to orient the sensor for optimum coupling with the transmitting station. The higher data quality that the Omni System obtains with weak signals is enhanced even further when signals are stronger. Additional features, such as greater channel selectivity, atmospheric noise reduction and better immunity to spikes, improve even more the Omni System's capability to obtain repeatable data.

No Need to Take Multiple Readings

The Omni System's magnetic component uses four leading-edge design features to eliminate the need to take multiple readings, these are:

- Signal Processing Technique
- Constant Energy Polarization that maintains equal energy to the sensor
- Processing Sensitivity to ± 0.02 gamma
- Automatic Fine Tuning which uses the previous reading as the base for the next reading.

The "Tie-Line" Advantage

Not only does the Omni System eliminate hours of manual correction of data, it also gives you the flexibility of choosing the most appropriate tie-line method best suited for the survey, depending on the size and character of the grid. You can choose from:

- a single base point,
- a single tie-line,
- multiple tie-lines, or
- a random scattering of tie-points.

The self-correcting "Tie-Line" feature can remove base station requirements from some surveys. The "Tie-Line" data can be recalled even if it was stored on different days.

You can program the Omni System to automatically remove a designated datum from field data and by removing this coarse, background value, plotting and interpreting the magnetic field data is made easier. The Omni System can also automatically calculate the desired diurnal drift measured between consecutive tie-point readings.

Environmentally sealed design of the OMNI permits use in all weather conditions

Operate Your Omni System in any Environment

The Omni System is completely water proof and dust proof. The fully sealed housing console ensures that you can perform your surveying needs during adverse weather conditions.

A Variety of Software Programs Available

Although the Omni System can transfer data directly to a serial printer, most computers require some initial handshaking prior to actual data transfer. Scintrex provides such handshaking programs for many computers including IBM PS-2/ IBM PC (AT and XT), Compaq, Macintosh and compatible systems.

In addition to handshaking software, we can provide you with plotting, profiling, contouring and modelling programs available from certain software houses. Packages for use with the Omni System include:

- Mapping systems that allow you to post and plot many of the geophysical parameters available, in a plan-profile or contoured format.

- Cartographic quality large-scale and real-location plan maps, complete with custom map surrounds, legends, scale bars, etc., that can be produced in a matter of minutes on most dot-matrix printers or small and larger-scale plotters. Standard graphics screen previewing is available prior to plotting.

- Software that allows you to present the data in 2 or 3-D perspective plots, through a full menu and/or command driven system interface in which you can select different colours, sizes, scales, angles etc. For example, you can create shaded relief maps and colour image plotting on common high resolution printers, including grey-scale support on laser printers.

- Interactive filtering and modelling programs that are used to determine the possible geometry and physical characteristics of the sources of magnetic anomalies, such as the MAGMOD program.

- Autocad and image-processing capabilities.

Through new software interface programs, you can use the Omni System as a field unit together with other integrated magnetometer/VLF systems (such as the Scintrex IGS-2) or with other microprocessor based base station magnetometers.

Omni System Benefits

More System Benefits

- Display descriptors monitor the status of the primary battery source used.
- Output of grid co-ordinates with the designated compass bearing, using N, S, E, W descriptors.
- Audio feedback to confirm every keystroke
- Decimal spacing of 12.5 (metres or feet) for intermediate station intervals
- The ability to clear any unwanted last reading
- Two keystrokes to record data in memory - the first verifies the grid co-ordinate; the second puts it into memory.

The Omni Magnetometer System measures and stores in memory the Earth's magnetic field at the touch of a key. This precision instrument is able to do the following:

- identify and store the location and the time of each measurement
- compute the statistical error of the reading
- store the decay and strength of the signal that you are measuring

Provides Data-Protected Readings

The Omni Magnetometer is packaged in a compact, lightweight and rugged housing and is able to measure and store the following set of information:

- total field magnitude
- time of measurement
- grid co-ordinates
- direction of travel
- statistical error of readings
- signal strength and rate of decay

Increases Productivity

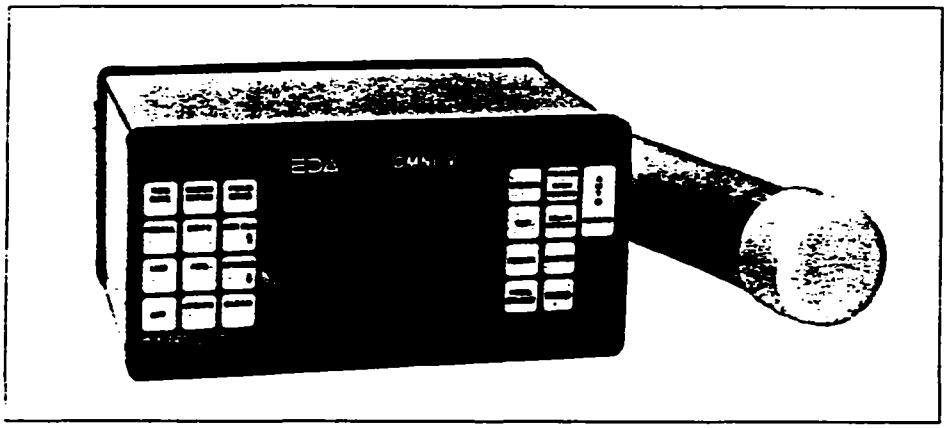
The Omni Magnetometer significantly increases survey productivity as:

- it can read and store a measurement in only 3 seconds.
- data is highly repeatable so a second measurement is usually not required.
- it calculates statistical error for each measurement which indicates whether an additional reading is required.

All of these benefits permit you to cover more ground and gather more data than would be otherwise possible.

OMNI MAG configuration used for measurement of total field magnetics

..ne Omni System as a Portable Field Magnetometer



OMNI MAG electronics console with total field magnetic sensor

Simplifies Fieldwork

The Omni makes surveys easier to conduct because:

- the electronic notepad eliminates the need to write down field data. The Omni simultaneously stores time, field measurements, grid co-ordinates when you press any one of the three record keys.
- you are able to clear the unwanted last reading.
- the Omni automatically calculates the difference between the current reading and previous one.
- you can remove the coarse magnetic field value or data from the field data to simplify plotting of the field results.
- the Omni automatically calculates diurnal corrections.

The flexibility of the Omni System offers the following choices:

- if you use the Omni as a field magnetometer or as a gradiometer, the total field data can be corrected using the unique "Tie-Line" or "Looping" method.
- if you use one Omni as a base station, it will correct the total field magnetic data in:
  - an Omni set-up as a field magnetometer
  - an Omni set-up as a gradiometer

Unparalled Repeatability of Data

The Omni provides you with unparalleled data repeatability. This is a result of four leading edge design features that eliminates the need for taking multiple readings:

- Signal Processing Technique
- Constant Energy Polarization that maintains equal energy to the sensor
- Processing sensitivity to ± 0.02 gamma
- Automatic Fine Tuning which uses the previous reading as the base for the next

Saves You Time

The error analysis feature is a great time saver as the calculation of the statistical error of each reading lets you make an on-the-spot decision whether or not you should store the reading.

The Omni System also saves you time-consuming steps as it can:

- automatically assign a record number which you can also use to identify readings measured off of the grid.
- take more than one reading at one point without updating the current station number.
- according to the programmed station interval, automatically update your station position without having to program each station coordinate. The Omni magnetometer also provides a decimal digit for intermediate station intervals of 12.5 metres.
- rapidly recall readings either by record number or in sequence.

Tolerates Higher Gradients

The ability to tolerate local higher gradients of up to 6000 gammas per metre (field proven), is possible due to a sophisticated signal processing method and to a miniature sensor design using a highly optimized sensor geometry.

A Variety of Power Supply Options

You can choose from the following power supply options:

- non-magnetic rechargeable sealed lead-acid battery or belt
- heavy duty rechargeable battery
- alkaline battery belt
- 12V DC power source

The Omni System as a Base Station Magnetometer

The Omni Base Station Magnetometer effectively measures and stores in its memory the daily fluctuations of the Earth's magnetic field. The Omni can automatically correct total field data of other Omni units in just a few minutes.

Records Magnetic Field Activity

The magnetic field activity is recorded in the following format:

- time of measurement
- magnitude of total field
- difference from the reference field value
- difference from the previous reading
- sequential record number

Automatically Corrects Data

The Omni in the base station mode can automatically correct magnetic field data for both diurnal variations and reference field values. It can also correct total field data stored in:

- another Omni System used as a field magnetometer
- another Omni System used as a field gradiometer

This is ideal when you want to remove diurnal errors sufficiently to make use of the full 0.1 gamma resolution of the Omni System.

Automatic Drift Calculations

The Omni automatically calculates the difference between each reading and its programmed reference field. If at the end of the survey day you find that the reference field is incorrect, you can re-select a new one and the Omni System can instantly re-calculate the drift. The drift calculation can be presented in either digital and/or profile plot format. It can also be simultaneously output to a compatible printer so you can visually verify the activity of the field.

Calculates Differential Field Variations

The Omni calculates the difference between the current reading and the previous one to a resolution of 0.1 gamma. This features assists you in ascertaining the degree of activity that is occurring such as a magnetic storm or active conditions.

Stores Approximately 55 Hours Of Continuous Unattended Monitoring

The Base Station mode enables you to store up to 20,000 sets of readings which is the equivalent to approximately 55 hours of unattended monitoring at a 10 second sampling interval. You can program the cycling time at any interval between 5 seconds and 60 minutes in 1 second increments.

Outputs and Stores Data At the Same Time

The Omni can simultaneously output data in digital or ASCII format to your choice of data collection units at the same time it stores the data in memory.

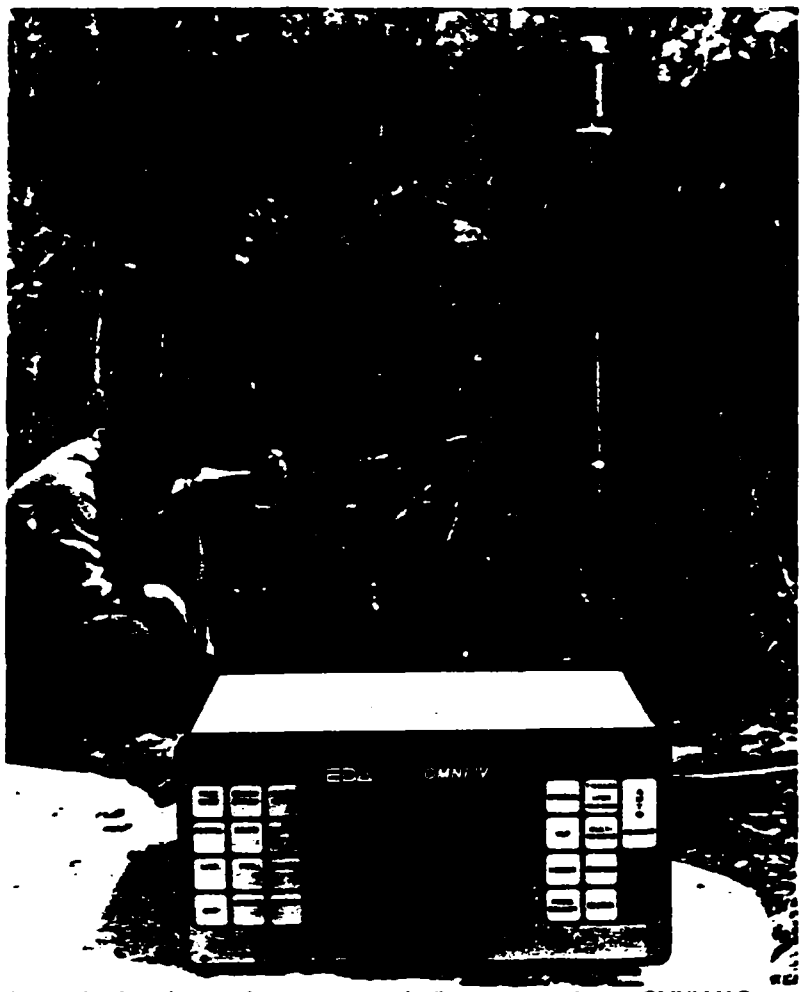
Synchronize Real Time Clocks

The Omni System real time clocks can be synchronized to the nearest second.

Magnetic Base Station Accessories Kit

Sensor Extension Cable - This 30 metre cable enables you to place the Omni in a sheltered environment such as a tent, and position the magnetic sensor up to 30 meters away. This capability aids in eliminating possible cultural interference.

Rope Joiner - The rope joiner enables the sensor staff to be supported by ropes when it is being used as a base station sensor.



Magnetic diurnal corrections are automatically made by using an OMNI MAG as a base station magnetometer

Omni System as a True Gradiometer

The Omni System provides you with an accurate means of measuring both the total field and the gradient of the total field. It reads and stores the measurements of both sensors simultaneously to calculate the true gradient measurement.

Displays and Stores Fully Protected Data

The Omni System provides the following information on screen and in memory:

- the gradient of the total magnetic field
- the total magnetic field magnitude of the upper sensor
- the time of measurement
- the grid co-ordinates where the measurement is taken
- the statistical error of total field reading of lower gradient sensor
- the signal strength and decay rate measurement of lower gradient sensor

Lost Survey Time

The Omni enables you to conduct gradient surveys during magnetic storms resulting in no lost survey time. This is another benefit of the simultaneous measurement of both sensors.

Cancels the Effects of Diurnal Magnetic Variations

The technique of simultaneously measuring the two sensors cancels the effects of diurnal magnetic variations. The total field measurement of the top sensor can be self-corrected by the Omni when you use the "Tie-Line" feature or with another Omni System in the base station mode.

Increases Resolution of Total Field Anomalies

The Omni in the gradient mode more sharply defines the magnetic responses determined by total field data. It individually delineates closely spaced anomalies rather than collectively identifying them under one broad magnetic response.

...ectly Delineates Vertical Contacts

The Omni is an ideal contact mapping tool especially in vertical to near-vertical contact or fault zones. These vertical contacts are expressed at the zero line of gradient contour or profile values. Vertical dyke-like bodies can also be mapped effectively.

Simultaneous vertical magnetic gradient measurements using the OMNI GRAD configuration

Provides On-The-Spot Approximate Depth of Anomalies

Shallow, near-surface sources (higher frequency anomalies) are emphasized relative to deeper responses (lower frequency anomalies). This can provide an on-the-spot approximation of the depth of the anomalous source.

Automatically Removes Regional Gradient

The gradient measurements ability to differentiate between higher and lower frequency responses effectively removes background regional gradients from anomalous residual responses.

Offers a Unique Alternative in the Interpretation of Magnetic Field Data

The Omni enhances data by simultaneously recording in memory both the gradient and total field measurements as well as the statistical error. Both types of data offer a unique alternative in interpreting the magnetic field data such as gradient vector diagrams, dip and strike length of body, etc.

Gradient-Base Station Operation

The Gradient Mode of the Omni System can cycle automatically every 5 seconds. This option can be used in stationary or mobile applications.

Emphasizes or Diminishes Near Surface Effects

The gradient sensor of the Omni is mounted onto a sectional aluminum staff in which you can add or subtract sections to achieve the desired height of sensors from the ground. This enables you to adapt the Omni to local ground noise conditions, terrain effects and survey logistics. In doing so, you can selectively emphasize or diminish near surface effects depending upon the survey target.

Choice of Sensor Separation

The choice of sensor separation provides unique interpretative information especially useful in near surface anomalous conditions such as determining if the field has curvature or if it is linear. You can choose the following sensor lengths and configurations:

- standard 0.5 metre sensor separation mounted on staff
- optional one metre sensor separation mounted on staff

The Omni System as a Portable VLF Unit

The Omni VLF unit allows you to do all of your surveying completely hands free and provides you with the ability to measure and record in a fully protected memory for each field reading the following information:

- vertical in-phase
- vertical quadrature (out-of-phase)
- total field strength
- dip angle
- primary field direction
- apparent resistivity
- phase angle
- time
- grid co-ordinates
- direction of travel along grid lines
- natural and cultural features

The field data is compensated for 180 degree difference in direction of travel up and down survey lines.

Requires No Orientation

The Omni does not require you to orient the VLF sensor head toward the VLF transmitter station. This simplifies field procedures as well as saves you considerable survey time. When you measure three VLF transmitters, the benefits of this time-saving feature automatically triple. You do not have to orient yourself and the sensor head toward the first selected transmitting station and then re-orient towards the second or third transmitting station.

The ability to obtain data from as many as three VLF transmitting stations provides complete coverage of an anomaly regardless of the orientation of the survey grid or of the anomaly itself.

The unique 3 coil design of the OMNI VLF allows reading of up to 3 separate frequencies without having to orient to each of the transmitting VLF stations

Saves You Time

The Omni can measure up to three VLF frequencies (transmitter stations) simultaneously, in as little as 8 seconds, or one VLF frequency in only 3 seconds, depending on the transmitter strength.

The Omni automatically tunes to the preprogrammed frequency(s) for each reading. Display descriptors indicating signal-to-noise ratio provide you with an immediate indication of how usable a frequency is. Using up to three frequencies optimizes conductor coupling, even in the most complex geologic environments.

Receives Very Weak or Too Strong Signals

Being able to select a transmitter station(s) best suited for the survey target and orientation is not always possible with conventional VLF systems. The ideal station(s) may be too weak or overwhelmed by the signal strength of a transmitter that is close in frequency proximity. Through digital signal processing, the Omni can receive signals as low as 20 nA/m from very weak stations, by removing the modulation in the received signal. Analog filtering of the Omni System offers an unparalleled 80 dB for a 600 Hz channel separation. In other words, the Omni can isolate and measure a 1000 times weaker signal from a distant station in lieu

.ne Omni System as a Portable VLF Unit

of the closer and subsequently more stronger station that is only 600 Hz apart in frequency.

Reduced Atmospheric Noise

Atmospherics such as thunderstorm activity, as well as the resultant interaction between the sun's rays and the ionosphere can drastically alter the wave guide in which the VLF wave travels from the transmitter station.

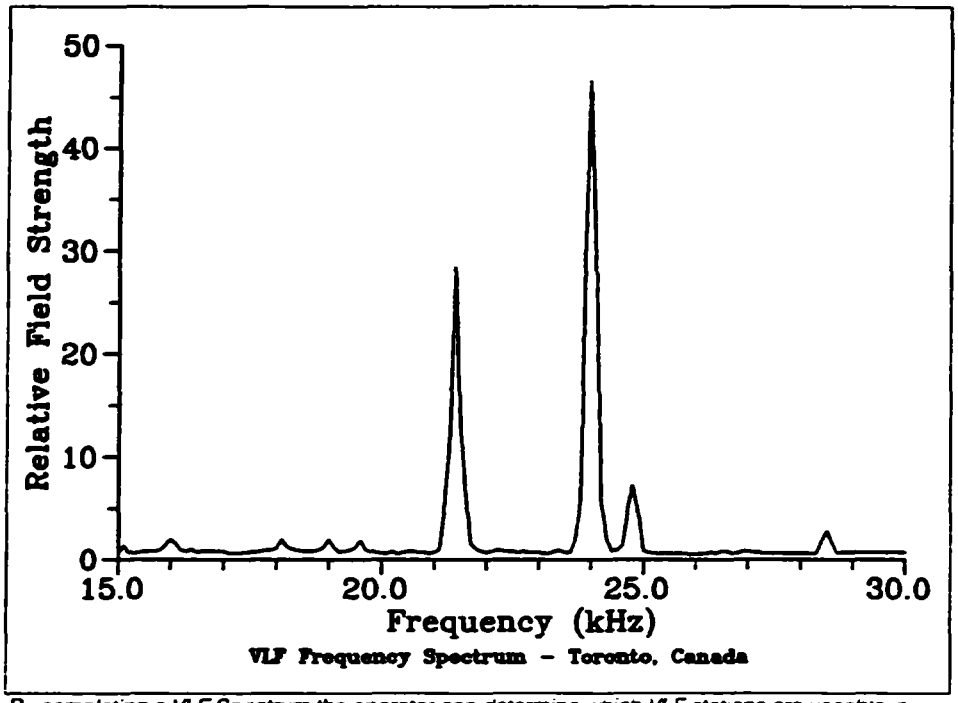
Through signal enhancement, the Omni is able to suppress the effects of these atmospheric and ionospheric phenomena, which are more predominant in the summer months, in order to pick up the weakest of transmitter stations. For example, Omni Systems used in Southern Africa have demonstrated the unparalleled ability to pick up 7 transmitter stations.

vides More Complete, 3-Dimensional escription of Survey Area

The Omni can measure the total tilt or dip of the polarization ellipse from the vertical axis. Unlike conventional systems, where only the tilt of the major axis of the polarization ellipse is measured, the Omni is most sensitive to the horizontal components perpendicular to the primary field which can detect anomalies off to the side. This provides a more complete, three dimensional description of the survey area that can lead to the detection of anomalies between grid lines. The Omni's tilt transducers compensate for both tilt and roll position of the VLF sensors.

Scan For The Most Usable Station

The Omni enables you to automatically scan the entire VLF spectrum for the most usable stations between 15.0 kHz to 30.0 kHz in increments of 100 Hz. This is most desirable if you do not know first hand what stations are readable or what stations are available from your location. Unpublished or unknown stations now ome accessible. You can then deter- ...e if a known station has changed frequency simply by the direction of transmission.



By completing a VLF Spectrum the operator can determine which VLF stations are useable in the survey area

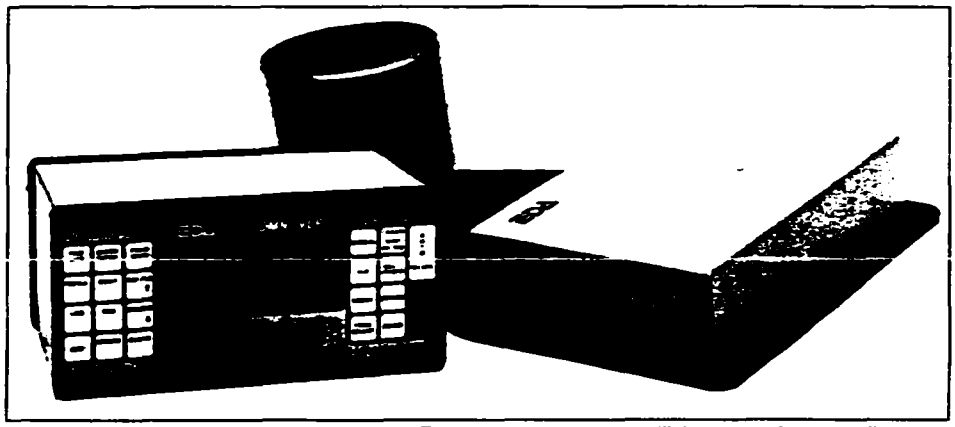
Automatically Calculates the Fraser Filter

The Omni automatically calculates the Fraser Filter from the dip angle data, regardless of the interval between the stations along the grid lines. You no longer have to manually perform this mathematical calculation thereby reducing the possibility of human error. The Fraser Filter algorithm follows established conventions.

The Fraser filtered data is output using both the 4 point and 5 point filter method. The latter method allows filtered data to be plotted easier, such as at the station interval instead of in-between stations.

Calculation of Ellipticity

As an option, the Omni can calculate the true ellipticity of the VLF magnetic field from the measurement of the in-phase and quadrature of all three components. The ellipticity provides more interpretive information about the anomaly than the dip angle and is less influenced by overburden shielding.



OMNI VLF electronics console with the VLF backpack assembly utilizing the unique 3 coil VLF sensor

The Omni System as a VLF Base Station

The Omni VLF Base Station monitors and records in protected memory, variations in the primary field strengths that can originate from the VLF transmitter itself or from atmospheric/ionospheric changes.

You Only Need One Omni System VLF Base Station for 3 Simultaneous Measurements

Like the Omni VLF Field unit, you only need one Omni VLF Base Station to simultaneously monitor up to 3 VLF transmitter stations, regardless of their field direction.

Conventional, "oriented" systems may require as many as 3 separate base stations for the same coverage offered by one Omni VLF Base Station.

In addition, the Omni Mag/VLF Base Station also monitors the Earth's magnetic field for diurnal variations, eliminating the need for a separate base station magnetometer.

The simultaneous measuring capability reduces the length of time the Omni System needs to be turned on. This, in turn, reduces the power consumption needed by the Omni System and lengthens the battery life. By being able to take three measurements in approximately the same amount of time as conventional sequential systems take one measurement, you can shorten the programmable sampling interval to attain better monitoring coverage of the field strengths from each of the VLF transmitters.

Both VLF and Magnetometer Base Stations in One Instrument

The Omni System eliminates the need to have two separate instruments to monitor the primary field strength of selected VLF transmitter(s) and the variations in magnitude of the Earth's magnetic field — one Omni Base Station does both. By combining both of these capabilities into one unit, it significantly reduces the cost of the survey. The Omni measures and stores these variations in protected memory.

Automatically Corrects VLF and Magnetic Field Data

The Omni base station can automatically correct the Omni System field units for the measured field strength variations from the VLF transmitter(s) and the Earth's magnetic field. Through linear interpolation, these corrections are applied at the time of data transfer. Unlike other integrated systems, the Omni does not alter the original field data during the correction process. The Omni base station correction and "Tie-Line" correction capabilities are applied at the time of each data transfer, therefore securing the integrity of the data collected during the survey.

Diurnal corrections for fluxuations of the VLF primary field are possible by using an OMNI VLF as a VLF base station

Obtain a Reading at the same time as the Base Station

The Omni has a unique countdown feature which can be activated in the field unit upon synchronization with the base station. The field unit then displays and decrements the remaining time, in seconds, until the base station is scheduled to take a measurement. You can obtain a field reading at exactly the same time as the base station. The simultaneous field and base station measurements significantly improves the accuracy of the automatic correction.

Synchronize the Real Time Clocks

Real time clocks among any number of Omni units can be synchronized to the second unit when using the Omni Base Station with another Omni portable field unit.

Monitor Rapid Variations of Primary Field

You can program your Omni base station to cycle at any interval, in one second increments, from 5 seconds to 60 minutes, to montior rapid variations of the primary field. The minimum cycling time for VLF Base Station use depends on the VLF Transmitter strength that the Omni receives.

Compatibility with Airborne Systems

The Omni is compatible with airborne VLF systems which also use 3 component sensors.

VLF Base Station Accessories Kit

VLF Sensor Extension Cable - This is a 10 metre cable which allows you to put the Omni console in a sheltered environment while placing the VLF sensor up to 10 meters away.

Rope Joiner - The rope joiner enables the sensor staff to be supported by ropes when it is being used as a base station sensor.

Mounting Bracket - This bracket is for mounting the VLF sensor to the staff.

.he Omni System as a Portable VLF Resistivity System

The Omni VLF Resistivity Unit can calculate and record the apparent resistivity and phase angle from the measurement of the VLF electric and magnetic fields.

Non-Orientation Resistivity Option

In addition to the standard resistivity option that uses 2 electrodes, the Omni also offers a non-orientation VLF resistivity option which includes a third electrode. This third electrode, with the standard resistivity unit, eliminates the need for you to orient toward the selected transmitter station(s).

This significantly improves survey production and reduces the time consuming logistics often associated with resistivity surveys.

Calculates the Vector Resistivity

The optional third electrode in the Omni VLF Resistivity unit offers not only a non-orientation capability of the VLF electric field, but also measures the elements of vector impedance necessary for the Omni to compute the two components of the apparent resistivity, or the vector resistivity.

This provides you with additional interpretive information of the survey target.

Select Your Own Type of Electrode

Survey conditions largely dictate the type of electrode you should use. The standard Omni resistivity electrode includes both capacitive plates and resistive probes so you can select the type of electrode that offers the best coupling capability for the survey conditions.

The unique threaded design permits you to easily exchange the choice of electrode in the field.

Flexible Probe Spacing

The Omni resistivity options offer a standard 10m cable assembly. However, you can program the console for a 5 or 10 metre separation.

The acquisition of VLF resistivity data using the 2 probe or the unique 3 Probe VLF resistivity option allows the operator to collect valuable additional information from the VLF method

Possible Configurations of the Omni Geophysical System

	Mag	Grad	VLF	Mag/VLF	Grad/VLF
System Control Console	*	*	*	*	*
Total Field and Base Station Mag Option	*	*		*	*
Magnetic Gradiometer Option		*			*
Magnetic Total Field Sensor	*	O		*	O
0.5m Magnetic Gradient Sensor		A			A
1.0m Magnetic Gradient Sensor		A			A
128K RAM extended Memory Option	O	O	(included in VLF configurations)		
VLF Electromagnetic Sensor Option			*	*	*
2 Probe VLF Resistivity Option			O	O	O
"Non-Orientation" VLF Resistivity Option			O	O	O
Non-Rechargeable Battery Belt	B	N/A	B	B	N/A
Rechargeable Battery Belt	B	B	B	B	B
Standard Rechargeable Battery Cartridge	B	B	B	B	B
Heavy Duty Rechargeable Batt. Cartridge	B	B	B	B	B
Battery Charger	C	C	C	C	C
RS-232C Kit	O	O	O	O	O
Mag Base Station Accessories Option	O	O		O	O
VLF Base Station Accessories Option			O	O	O
Transit Case (#1)	O	O	O	O	O
Transit Case (#2)	O	O	N/A	N/A	N/A
Transit Case (#3)	O	O	O	O	O
Magnetics Spare Parts Kit	O	O			
VLF Spare Parts Kit			O		
Magnetics/VLF Spare Parts Kit				O	O
Data Transfer Program	O	O	O	O	O

* Required in the configuration

A Selection of *one of* the A options required to complete configuration

B Selection of *one of* the B options required to complete configuration

C If a rechargeable battery option is required then the charger must also be included in the configuration

O Optional for configuration, see a sales representative for more details

N/A Not available for this configuration

Specifications

OMNI System Specifications

Operating Environment -40C to +55C; 0-100% relative humidity; weatherproof

Power Supply Non-magnetic rechargeable sealed lead-acid battery or belt; alkaline battery belt; or 12V DC power source option for base station operation.

Battery Life 1,700 to 5,000 readings, for sealed lead acid power supply, depending upon ambient temperature and rate of readings.

Weights and Dimensions

Instrument Console
3.8 kg, 122 x 246 x 210 mm

VLF Sensor Head
0.9 kg, 140 dia. x 130 mm

VLF Electronics Module
1.7 kg, 280 x 190 x 75 mm

Standard Rechargeable Battery
1.8 kg, 138 x 95 x 75 mm

Standard Rechargeable Battery Belt
1.8 kg, 540 x 100 x 40 mm

Heavy Duty Rechargeable Battery
2.0 kg, 138 x 115 x 75 mm

Alkaline Battery Belt
1.2 kg, 540 x 100 x 40 mm

Magnetometer Sensor
1.2 kg, 56mm dia. x 200mm

Gradient Sensor
(0.5m separation - standard)
2.1 kg, 56mm dia. x 790mm

Gradient Sensor
(1.0m separation - optional)
2.2 kg, 56mm dia. x 1300mm

Display
Custom designed, rugged liquid crystal display with an operating temperature range from -40C to +55C. The display contains six numeric digits, decimal point, battery status monitor, signal decay rate and signal amplitude monitor and function descriptors.

Magnetometer Component Specifications

Dynamic Range 18,000 to 110,000 gammas. Roll-over display feature suppresses first significant digit upon exceeding 100,000 gammas.

Tuning Method Tuning value is calculated accurately using a specially developed tuning algorithm.

Automatic Fine Tuning ±15% relative to ambient field strength of last stored value

Display Resolution 0.1 gamma

Statistical Error Resolution
0.01 gamma

Absolute Accuracy ± 1 gamma at 50,000 gammas at 23C • ±2 gamma over total temperature range

Memory Capacity

Standard Memory Capacity 1300 data blocks (48K) or 5200 data blocks (128K)

Total Field or Gradient 100 data blocks

Base Station 4000 data blocks (48K) or 16,000 data blocks (128K)

RS-232C Serial I/O Interface Variable baud rate from 300 to 9600 baud, 8 data bits, 2 stop bits, no parity

Gradient Tolerance 6,000 gammas per metre (field proven)

Test Mode A. Diagnostic testing (data and programmable memory)
B. Self Test (hardware)

Sensor Optimized miniature design. Magnetic cleanliness is consistent with the specified absolute accuracy.

Gradient Sensors 0.5 metre sensor separation (standard) normalized to gammas/metre. Optional 1.0 metre sensor separation available.

Sensor Cable Remains flexible in temperature range specified including strain relief connector

Cycling Time (Base Station)
Programmable from 5 seconds up to 60 minutes in 1 second increments.

VLF Component Specifications

Frequency Tuning Range 15 to 30 kHz in 100 Hz increments with bandwidth of 150 Hz; tuning range accommodates new Puerto Rico station at 28.5 kHz.

Transmitting Stations Up to 3 stations can be automatically measured at any given grid location within frequency tuning range.

Recorded VLF Magnetic Parameters
Vertical in-phase, vertical quadrature (out-of-phase), total field strength (or optional horizontal amplitude), dip angle

Channel Separation 80 dB at 600 Hz frequency separation

Standard Memory Capacity 1300 combined VLF magnetic and VLF electric measurements as well as gradiometer and magnetometer readings

SCINTREX

222 Snidercroft Road
Concord,Ontario,Canada
L4K 1B5

Telephone: (416) 669-2280
Telex: 06-964570
Telefax: (416) 669-6403
(416) 669-5132

APPENDIX II

SURVEY INSTRUMENT SPECIFICATIONS

FOR

THE APEX PARAMETRICS MAXMIN I

The following personnel provided data acquistion services for the duration of the surveys:

Michael C. Wilson

199 Sheraton Court

Oakville, Ontario

L6L 5N3

APPENDIX III

SURVEY PERSONNEL

MAXMIN I SPECIFICATIONS:

Frequencies:	110, 220, 440, 880, 1760, 3520, 7040 and 14080 Hz, plus 50/60 Hz powerline frequency (receiver only).
Modes:	MAX 1: Horizontal loop mode (Transmitter and receiver coil planes horizontal and coplanar). MAX 2: Vertical coplanar loop mode (Transmitter and receiver coil planes vertical and coplanar). MAX 3: Vertical coaxial loop mode (Transmitter and receiver coil planes vertical and coaxial). MIN 1: Perpendicular loop mode 1 (Transmitter coil plane horizontal and receiver coil plane vertical). MIN 2: Perpendicular loop mode 2 (Transmitter coil plane vertical and receiver coil plane horizontal).
Coil separations:	12.5, 25, 50, 75, 100, 125, 150, 200, 250, 300, & 400 metres (standard). 10, 20, 40, 60, 80, 100, 120, 160, 200, 240 & 320 metres (selected with grid switch inside of receiver). 50, 100, 200, 300, 400, 500, 600, 800, 1000, 1200 & 1600 feet (selected with grid switch inside of receiver).
Parameters measured:	In-Phase and quadrature components of the secondary magnetic field, in % of primary (transmitted) field. Field amplitude and/or tilt of 50/60 Hz powerline field.
Readouts:	Analog direct readouts on edgewise panel meters for in-phase, quadrature and tilt, and for 50/60Hz amplitude. (Additional digital LED readouts when using the DAC, for which interfacing and controls are provided for plug-in).
Ranges of readouts:	Analog in-phase and quadrature scales: 0±4%, 0±20%, 0±100%, switch activated. Analog tilt scale: 0±75% grade. (Digital in-phase and quad. 0±102.4%).
Readability:	Analog in-phase and quadrature 0.05% to 0.5%, analog tilt 1% grade. (Digital in-phase and quadrature 0.1%).
Repeatability:	±0.05% to ±1% normally, depending on frequency, coil separation & conditions.
Signal filtering:	Powerline comb filter, continuous spherics noise clipping, autoadjusting time constant and other filtering.
Warning lights:	Receiver signal and reference warning lights to indicate potential errors.
Survey depth:	From surface down to 1.5 times coil separation used.
Transmitter dipole moments:	110 Hz: 220 Atm² 1760 Hz: 160 Atm² 220 Hz: 215 Atm² 3520 Hz: 80 Atm² 440 Hz: 210 Atm² 7040 Hz: 40 Atm² 880 Hz: 200 Atm² 14080 Hz: 20 Atm²
Reference cable:	Light weight unshielded 4/2 conductor teflon cable for maximum temperature range and for minimum friction. Please specify cable lengths required.
Intercom:	Voice communication link provided for operators via the reference cable.
Receiver power supply:	Four standard 9V batteries (0.5Ah, alkaline). Life 30 hrs continuous duty, less in cold weather. Rechargeable battery and charger option available.
Transmitter power supply:	Rechargeable sealed gel type lead acid 12V-13Ah batteries (4x6V-6½Ah) in canvas belt. Optional 12V-8Ah light duty belt pack available.
Transmitter battery charger:	For 110-120/220-240VAC, 50/60/400 Hz and 12-15VDC supply operation, automatic float charge mode, three charge status indicator lights. Output 14.4V-1.25A nom.
Operating temp:	-40 to +60 deg.C.
Receiver weight:	8 kg, including the two integral ferrite cored antennas (9 kg with data acq. comp.)
Transmitter weight:	16 kg with standard 12V-13Ah battery pack. 14 kg with light duty 12V-8Ah pack.
Shipping weight:	59 kg plus weight of reference cables at 2.5 kg per 100 metres plus other optional items if any.
Standard spares:	One spare transmitter battery pack, one spare transmitter battery charger, two spare transmitter retractile connecting cords, one spare set receiver batteries.

Specifications subject to change without notification.

APEX PARAMETRICS LIMITED

P.O. Box 818, Uxbridge
Ontario, Canada L0C 1K0

Telephones: 416-640-6102
416-852-5875

Cables: APEXPARA TORONTO

Telex: 06-966625 APEXPARA UXB

APEX MAXMIN I PORTABLE EM

The MaxMin I ground EM System is designed for mineral and water exploration and for geoengineering applications. It is an expansion of the highly popular MaxMin II and III EM System concepts. The frequency range is extended to seven octaves from four. The ranges and numbers of coil separations are increased and new operating modes are added. The receiver can also be used independently for measurements with powerline sources. The advanced spheric and powerline noise rejection is further improved, resulting in faster and more accurate surveys, particularly at larger coil separations. Several receivers may be operated along a single reference cable.

Mating plug in data acquisition computer and cassette unit are available for use with the MaxMin I for automatic digital data acquisition and processing. These units are covered in separate data sheet.

Ministry of Northern Development and Mines
Ontario

Report of Work Conducted After Recording Claim

Mining Act

Transaction Number: W9480.00400

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

2.15548

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

31M13NE0008 2.15548 MULLINGAN

900

Recorded Holder(s): → Fred Ellgering - 17 N.vcn St. New Liskeard, Ont P0J 1P0

Client No. 129312

Agent → ~~Sudbury Contact Mines Ltd~~

Address: ~~2302 401 Bay St Toronto, Ontario~~

Telephone No.: 416-947-1212

Mining Division: Larder Lake

Township/Area: Mulligan

M or G Plan No.:

Dates Work Performed: From: January 29, 1994 To: March 2, 1994

Work Performed (Check One Work Group Only)

	Work Group	Type
	Geotechnical Survey	Operations Report and Ground Geophysics Survey Report
	Physical Work, Including Drilling	
	Rehabilitation	
	Other Authorized Work	
	Assays	
	Assignment from Reserve	

RECEIVED
AUG 9 1994
MINING LANDS BRANCH

cc PCH

Total Assessment Work Claimed on the Attached Statement of Costs $ 3660 ~~.00~~

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

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

Name	Address
Tech terrex Inc	Michael Wilson - 199 Sheraton Court, Oakville Ont
Stratagex Ltd	Terry Kotik - 75 King St. E Suite 300 Toronto

(attach a schedule if necessary)

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

I certify that at the time the work was performed, the claims covered in this work report were recorded in the current holder's name or held under a beneficial interest by the current recorded holder.	Date	Recorded Holder or Agent (Signature)
	Aug. 4/94	Peter C Hubacheck

Certification of Work Report

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

Work Report Number for Applying Reserve	Claim Number (see Note 2)	Number of Claim Units	Value of Assessment Work Done on this Claim	Value Applied to this Claim	Value Assigned from this Claim	Reserve: Work to be Claimed at a Future Date
	1150621	4	$3660.00	$1830.00	$1830.00	
	1186542	4	0.00	$1830.00		
			$3660.00	$3660.00	$1830.00	
	Total Number of Claims		Total Value Work Done	Total Value Work Applied	Total Assigned From	Total Reserve

1241 (03/91)

Ontario

Ministry of Northern Development and Mines

Mini du Développement du Nord et des mines

Statement of Costs for Assessment Credit

État des coûts aux fins du crédit d'évaluation

Mining Act/Loi sur les mines

Transaction No./N° de transaction

W9480.00400

2.15548

Personal information collected on this form is obtained under the authority of the **Mining Act**. This information will be used to maintain a record and ongoing status of the mining claim(s). Questions about this collection should be directed to the Provincial Manager, Minings Lands, Ministry of Northern Development and Mines, 4th Floor, 159 Cedar Street, Sudbury, Ontario P3E 6A5, telephone (705) 670-7264.

Les renseignements personnels contenus dans la présente formule sont recueillis en vertu de la Loi sur les mines et serviront à tenir à jour un registre des concessions minières. Adresser toute question sur la collecte de ces renseignements au chef provincial des terrains miniers, ministère du Développement du Nord et des Mines, 159, rue Cedar, 4e étage, Sudbury (Ontario) P3E 6A5, téléphone (705) 670-7264

1. Direct Costs/Coûts directs

Type	Description	Amount Montant	Totals Total global
Wages Salaires	Labour Main-d'oeuvre		
	Field Supervision Supervision sur le terrain		
Contractor's and Consultant's Fees Droits de l'entrepreneur et de l'expert-conseil	Type Operations Report	2040.00	
	Geophysical Report	1620.66	
			3660.66
Supplies Used Fournitures utilisées	Type		
Equipment Rental Location de matériel	Type		
			.00
	Total Direct Costs Total des coûts directs		3660.66

2. Indirect Costs/Coûts indirects

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

Type	Description	Amount Montant	Totals Total global
Transportation Transport	Type		
Food and Lodging Nourriture et hébergement			
Mobilization and Demobilization Mobilisation et démobilisation			
	Sub Total of Indirect Costs Total partiel des coûts indirects		200
	Amount Allowable (not greater than 20% of Direct Costs) Montant admissible (n'excédant pas 20 % des coûts directs)		.00
	Total Value of Assessment Credit (Total of Direct and Allowable Indirect costs) / **Valeur totale du crédit d'évaluation (Total des coûts directs et indirects admissibles)**		3860.66

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

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

Filing Discounts

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

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

Total Value of Assessment Credit	Total Assessment Claimed
× 0.50 =	

Remises pour dépôt

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

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

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

Ontario

Ministry of Northern Development and Mines

Ministère du Développement du Nord et des Mines

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

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

October 6, 1994

Our File: 2.15548
Transaction #: W9480.00400

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

Dear Roy Spooner:

RE: APPROVAL OF ASSESSMENT WORK ON MINING CLAIMS 1150621 ET AL. IN MULLIGAN TOWNSHIP.

The assessment credits for Geophysical Survey, Section 14 of the Mining Act Regulations, as listed on the original Report of Work, have been approved as of **October 4, 1994.**

Please indicate this approval on the claim record sheets.

If you have any questions concerning this submission please contact Michael Charette at (705) 670-5856.

ORIGINAL SIGNED BY:

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

MC/jl
Enclosures:

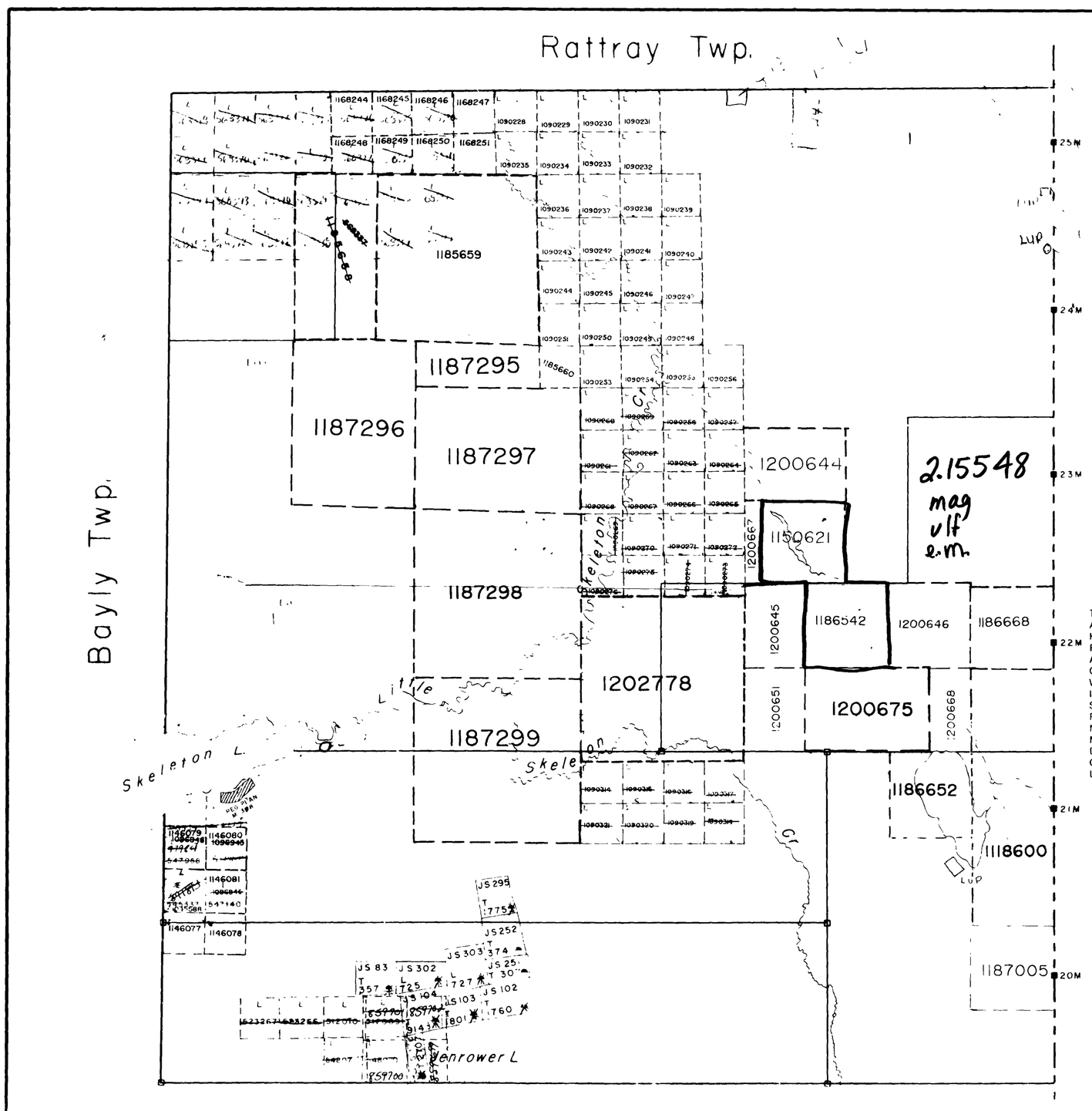
cc: Assessment Files Office
Sudbury, Ontario

Resident Geologist
Kirkland Lake, Ontario

M-373

MULLIGAN TP.

2



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

THE TOWNSHIP

OF 2.15548

MULLIGAN

DISTRICT OF TIMISKAMING

LARDER LAKE

MINING DIVISION

SCALE 1-INCH=40 CHAINS

LEGEND

PATENTED LAND	P
CROWN LAND SALE	C
LEASES	
LOCATED LAND	
LICENSE OF OCCUPATION	LO
ROADS	
IMPROVED ROADS	
RAILWAYS	
POWER LINES	
KING'S HIGHWAY	
MINES	
MARSH OR MUSKEG	
CANCELLED	C
PATENTED S.R.O.	

NOTES

400 Surface rights reservation around all lakes and rivers

PLAN NO. - M-373

INTERPRETATION

Declination 14° W

MAGNETIC SOURCES

- High susceptibility
- Medium susceptibility
- Low Susceptibility

HLEM CONDUCTORS

- Definite bedrock
- Probable bedrock
- Possible bedrock
- Probable overburden
- T — Residual terrain effect

CONTINUITY

- Definite
- Probable
- Possible

ZONES A, etc

FAULTS (from Magnetics)

Survey and Presentation
TechTerrex Inc., February, 1994.

Supervision and Interpretation
STRATAGEX Ltd., April, 1994

LEGEND

Scale 1:5000
Profile Scale 50 nT/cm
Profile Base Level 57 950 nT

SURVEY SPECIFICATIONS

Instruments EDA Omni Plus Base Magnetometer
EDA Omni Plus Field Magnetometer

Base Station Location 15m E, 400m N

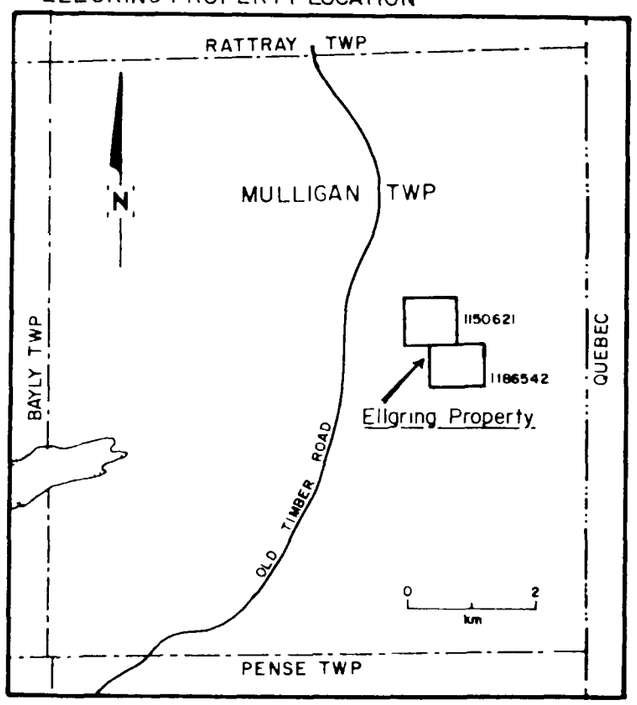
Base Station Value 57 900 nT

Base Station Sample Interval 15 sec

SCALE 1:5,000

60 0 100 150 200
(meters)

ELLGRING PROPERTY LOCATION



SUDBURY CONTACT MINES LTD.
Blake River & Wendigo Lake Projects

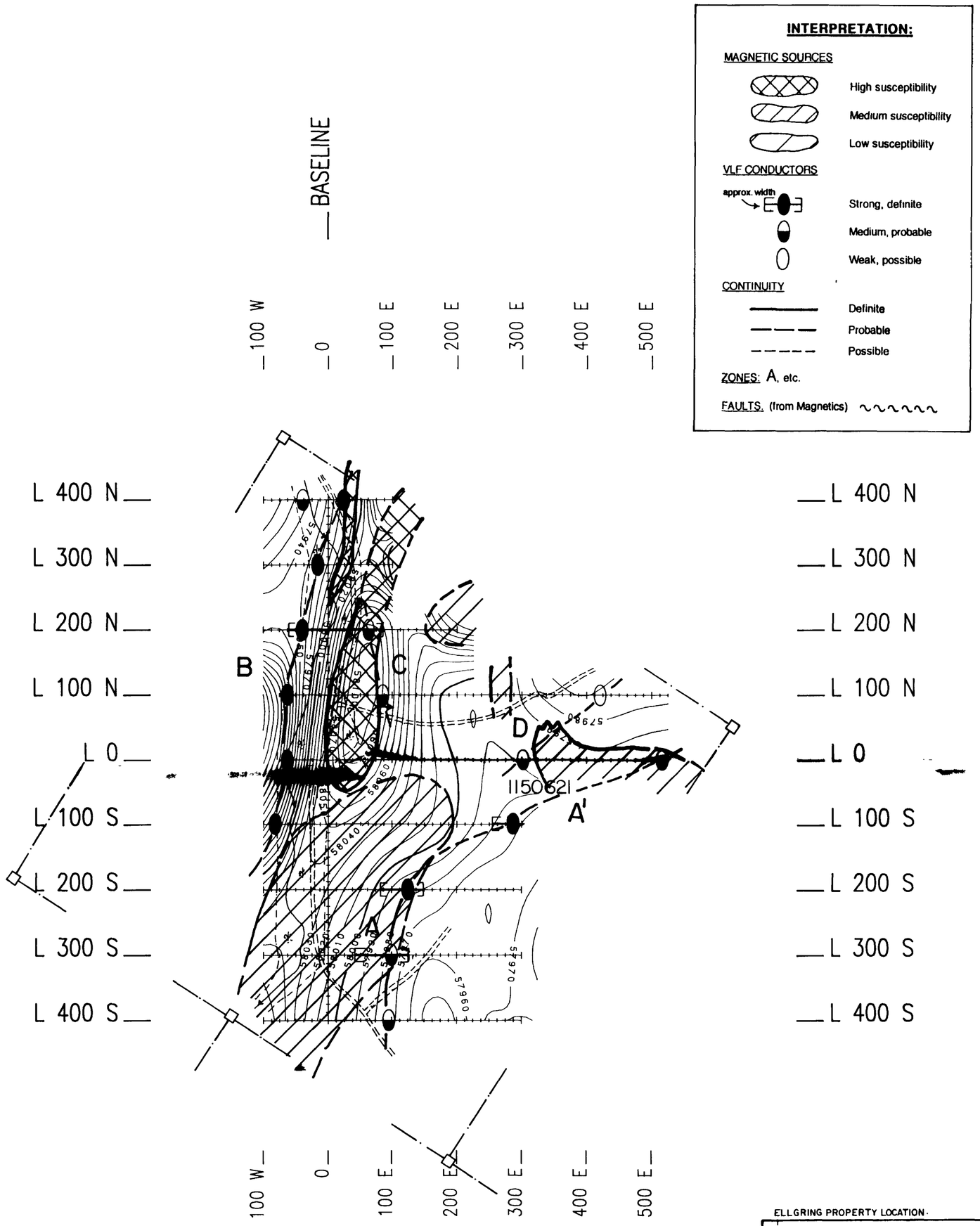
Ellgring Property

GROUND MAGNETOMETER SURVEY
Total Field Postings & Profiles

Mulligan Township
Larder Lake Mining Division
Ontario

NTS 31M/13 Project No 182

ELL-1



INTERPRETATION:

MAGNETIC SOURCES
- High susceptibility
- Medium susceptibility
- Low susceptibility

VLF CONDUCTORS (approx. width)
- Strong, definite
- Medium, probable
- Weak, possible

CONTINUITY
- Definite
- Probable
- Possible

ZONES: A, etc.

FAULTS. (from Magnetics)

Declination: 14° W.

LEGEND

Scale: 1:5000

Contour Interval: 10 nT.
50 nT.
250 nT.

SURVEY SPECIFICATIONS

Instruments: EDA Omni Plus Base Magnetometer
EDA Omni Plus Field Magnetometer

Base Station Location: 15m E, 400m N

Base Station Value: 57,900 nT.

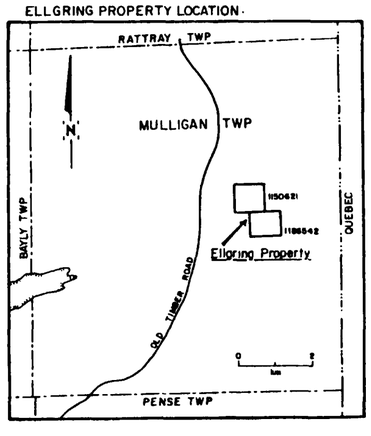
Base Station Sample Interval: 15 sec.

2.15548

Scale 1:5000

100 0 100 200 300
(meters)

ELLGRING PROPERTY LOCATION



SUDBURY CONTACT MINES LTD.
Blake River & Wendigo Lake Projects

Ellgring Property

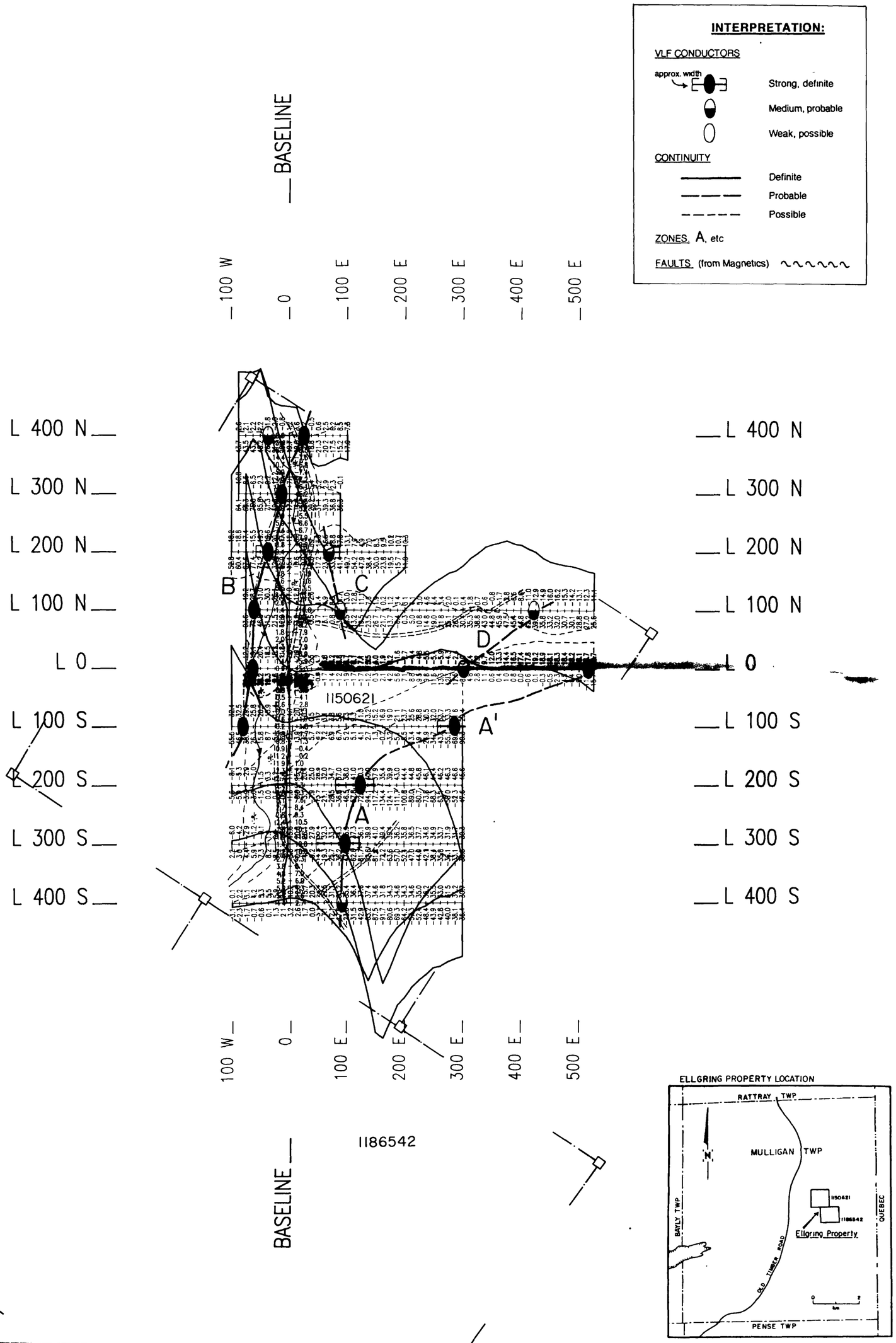
GROUND MAGNETOMETER SURVEY
Total Field Contours

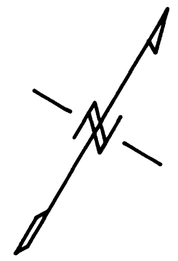
Mulligan Township
Larder Lake Mining Division
Ontario

NTS: 31M/13 Project No 182

Survey and Presentation:
TechTerrex Inc., February, 1994.

Supervision and Interpretation:
STRATAGEX Ltd., April, 1994.





Declination: 14° W.

LEGEND

Scale: 1:5000

Profile Scale: 1 cm. = 20 %

In-Phase Profile: ————————

Quadrature Profile: - - - - - - -

SURVEY SPECIFICATIONS

Instrument: Scintrex EDA Omni Plus Receiver

Transmitter Station: Annapolis, Maryland (NSS)

Frequency: 21.4 kHz.

Initialization Direction: Facing Northeast

NOTE: Base Line surveyed using Cutler, Maine (NAA)

Frequency: 24.0 kHz.

Initialization Direction: Facing Northwest

2.15518

Scale 1:5000

100 0 100 200 300

(meters)

ELLGRING PROPERTY LOCATION

SUDBURY CONTACT MINES LTD.

Blake River & Wendigo Lake Projects

Ellgring Property

VLF-EM SURVEY

Postings & Profiles of NSS

Mulligan Township
Larder Lake Mining Division
Ontario

NTS: 31M/13 Project No 182

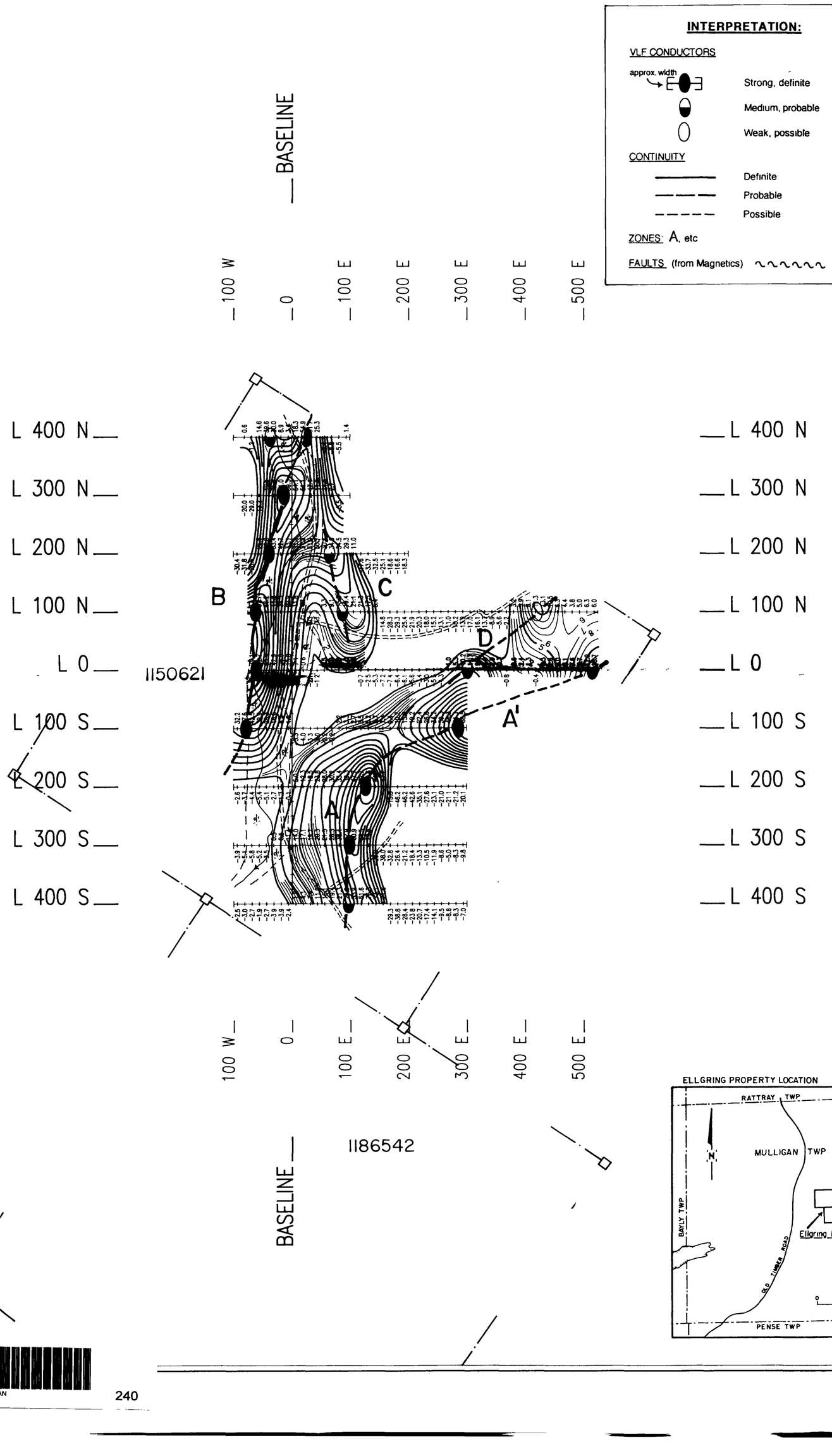
Survey and Presentation

TechTerrex Inc., February, 1994.

Supervision and Interpretation

STRATAGEX Ltd., April, 1994

ELL-3



INTERPRETATION:

VLF CONDUCTORS

approx. width

- Strong, definite
- Medium, probable
- Weak, possible

CONTINUITY

- Definite
- Probable
- Possible

ZONES: A, etc

FAULTS (from Magnetics)

Declination: 14° W.

LEGEND

Scale: 1:5000

Contour Interval: 1 nT. / 5 nT. / 20 nT.

SURVEY SPECIFICATIONS

Instrument: Scintrex EDA Omni Plus Receiver

Transmitter Station: Annapolis, Maryland (NSS)

Frequency: 21.4 kHz.

Initialization Direction: Facing Northeast

Scale 1:5000

100 0 100 200 300

(meters)

ELLGRING PROPERTY LOCATION

SUDBURY CONTACT MINES LTD.

Blake River & Wendigo Lake Projects

Ellgring Property

VLF-EM SURVEY

NSS Fraser Filter Postings & Contours

Mulligan Township
Larder Lake Mining Division
Ontario

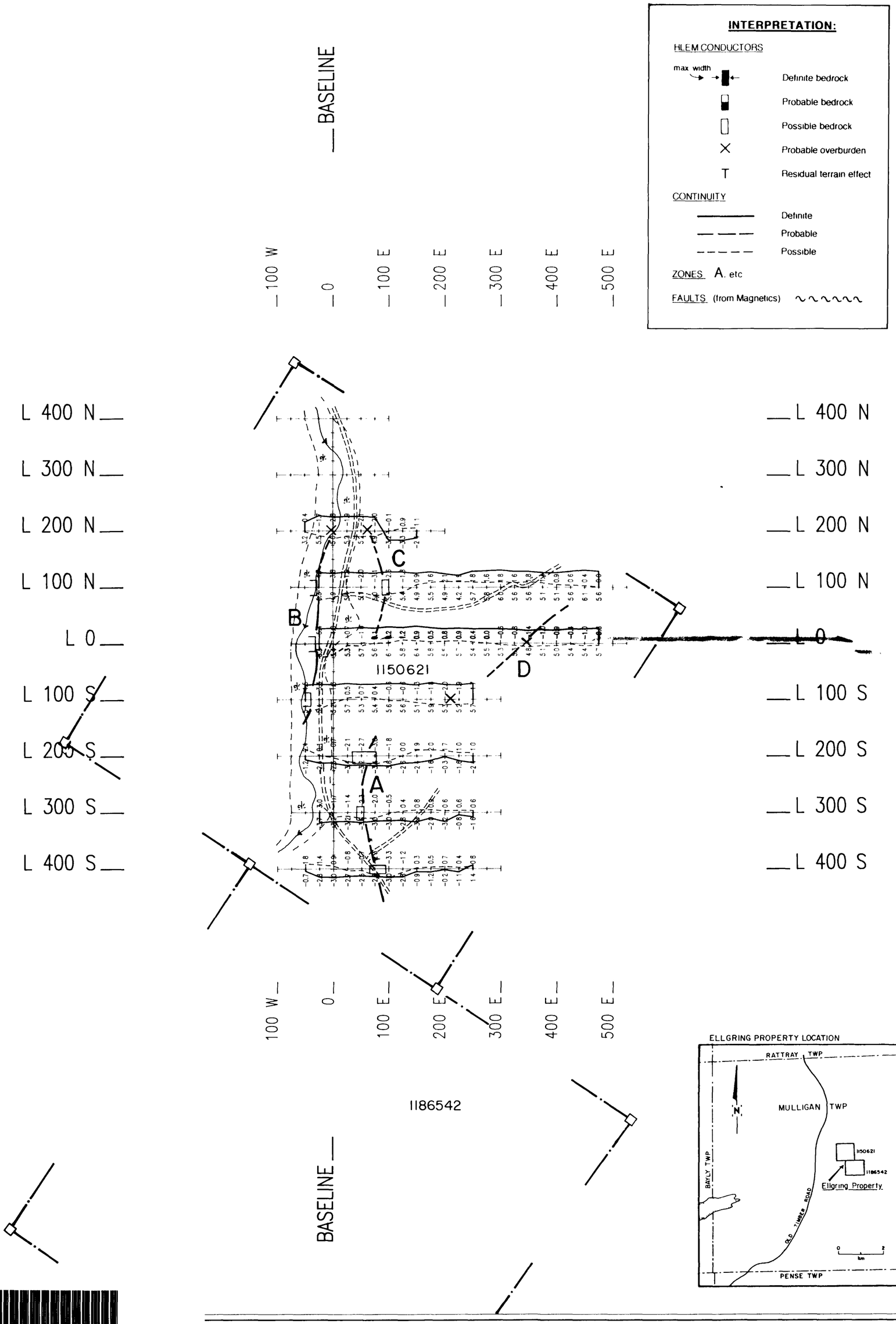
NTS: 31M/13 Project No. 182

Survey and Presentation

TechTerrex Inc., February, 1994.

Supervision and Interpretation

STRATAGEX Ltd., April, 1994.



Declination: 14° W.

LEGEND

Scale: 1:5000

Profile Scale: 1 cm. = 10 %

In-Phase Profile: ————————

Quadrature Profile: - - - - - - - -

SURVEY SPECIFICATIONS

Instruments: Apex Parametrics MaxMin I EM system
Apex Parametrics MMC Data Logger

Frequency: 440 Hz.

Coil Separation: 100 metres

2.15548

Scale 1:5000

100 0 100 200 300
(meters)

ELLGRING PROPERTY LOCATION

SUDBURY CONTACT MINES LTD.
Blake River & Wendigo Lake Projects

Ellgring Property

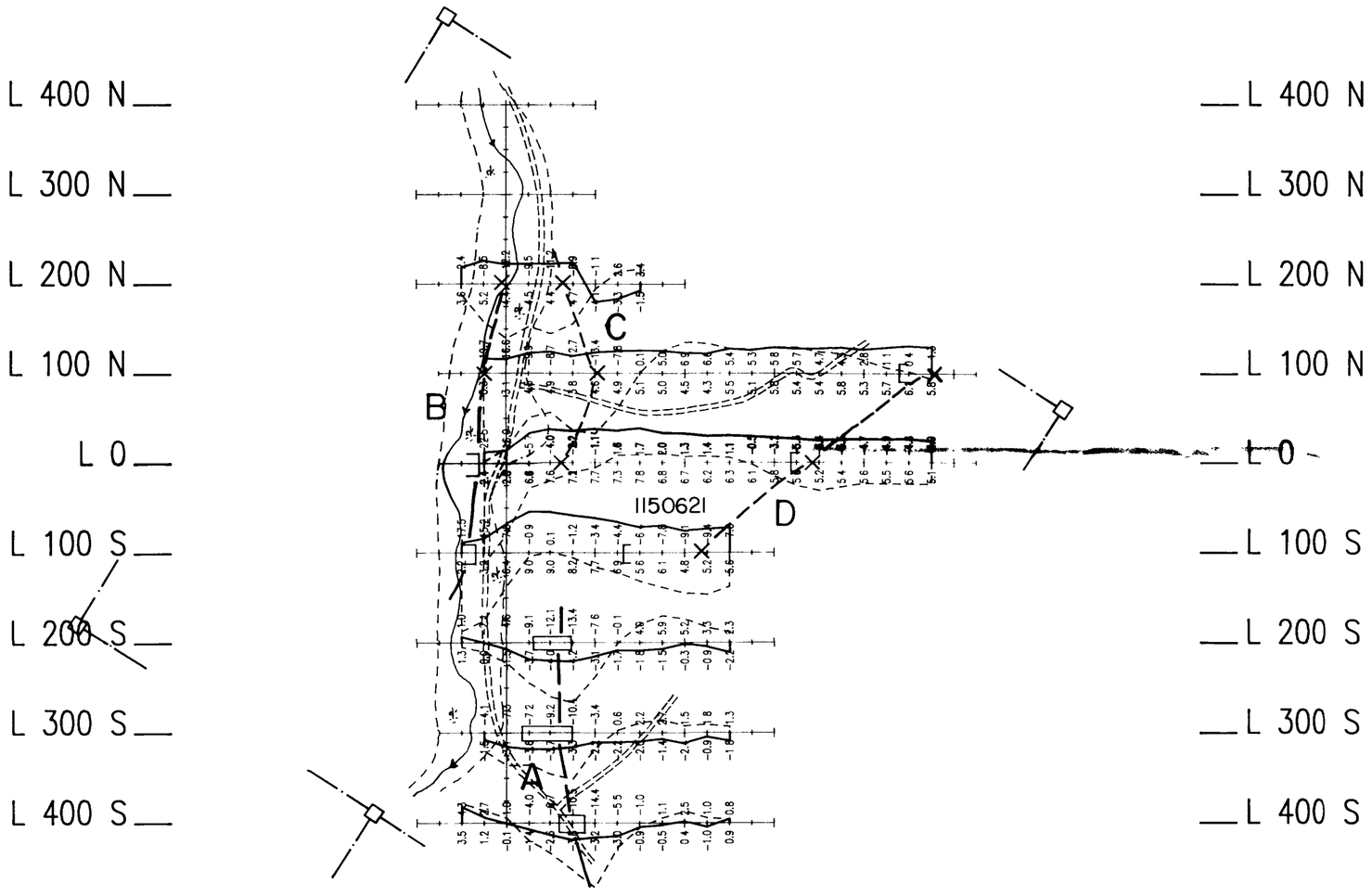
HORIZONTAL LOOP EM SURVEY
Postings & Profiles of 440 Hz.

Mulligan Township
Larder Lake Mining Division
Ontario

NTS: 31M/13 Project No 182

Survey and Presentation
TechTerrex Inc., February, 1994.

Supervision and Interpretation
STRATAGEX Ltd., April, 1994



INTERPRETATION:

HLEM CONDUCTORS

max width

- Definite bedrock
- Probable bedrock
- Possible bedrock
- Probable overburden
- T — Residual terrain effect

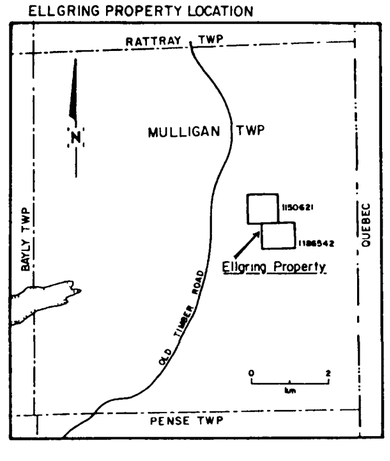
CONTINUITY

- Definite
- Probable
- Possible

ZONES A. etc

FAULTS (from Magnetics)

ELLGRING PROPERTY LOCATION



Declination: 14° W.

LEGEND

Scale: 1:5000

Profile Scale: 1 cm. = 10 %

In-Phase Profile: ———

Quadrature Profile: - - - - - - -

SURVEY SPECIFICATIONS

Instruments: Apex Parametrics MaxMin I EM system
Apex Parametrics MMC Data Logger

Frequency: 1760 Hz.

Coil Separation: 100 metres

2.15548

Scale 1:5000

100 0 100 200 300

(meters)

SUDBURY CONTACT MINES LTD.

Blake River & Wendigo Lake Projects

Ellgring Property

HORIZONTAL LOOP EM SURVEY

Postings & Profiles of 1760 Hz.

Mulligan Township
Larder Lake Mining Division
Ontario

NTS: 31M/13 Project No. 182

Survey and Presentation

TechTerrex Inc., February, 1994.

Supervision and Interpretation

STRATAGEX Ltd., April, 1994.