ERICKSON GOLD MINING CORP.

TECHNICAL DESCRIPTION OF A GRADIENT ARRAY INDUCED POLARIZATION AND RESISTIVITY SURVEY

KATHERINE EAST, KATHERINE SOUTHEAST AND PETE GRIDS
CASSIAR, B.C.

LIARD MINING DIVISION
NTS 104P/4
LATITUDE: 59°37'N LONGITUDE: 129°14'W

AUTHOR: Dennis V. Woods, Ph.D., P.Eng.

DATE OF WORK: June and August 1990
DATE OF REPORT: December 1990

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FIGURE 4 PETE GRID

  a) Apparent Resistivity

  b) Total Chargeability

  c) Spontaneous Potential

  d) Apparent Conductivity

INTRODUCTION:

During the period 19 to 26 June, 10 July, and 22, 23 and 26 to 31 August 1990, a gradient array induced polarization and resistivity survey was carried out on the Katherine East, Katherine Southeast and Pete grids in the vicinity of the Erickson gold mine. A total of approximately 37 kilometers of cut line were surveyed. The purpose of the survey was to: 1) explore of any apparent resistivity or chargeability expression of gold mineralized quartz vein systems in the area, and 2) map certain geologic features such as the contact between volcanics and argillites, and cross-cutting fault and dyke structures.

The results of the survey are presented in this report along with a technical description of the methodology, field procedures and data processing. The report also contains a brief discussion of the data in general terms. A complete and detailed interpretation of the results is not included in this report. Such discussion is better left to those who have a more in-depth understanding of the geology of the area.

METHODOLOGY:

Resistivity

The resistivity method is conceptually one of the most straight forward of all geophysical procedures. Electrical current is apply to the earth, either on surface or in boreholes, using two grounded electrodes, a powerful electrical generator and wire cables. At some location within the generated current field, the electrical potential (i.e. voltage) is measured between two other grounded electrodes using a sensitive voltmeter. Knowing the positions of all electrodes and the intensity of current driven into the ground, it is possible to calculate the apparent resistivity of the earth from the measured potential. The apparent resistivity is the effective resistivity of a uniform earth which would give rise to the same measured potential.

There is a wide variety of arrangements of electrodes (i.e. arrays) for different exploration purposes. To determine how apparent resistivity varies with depth, a spreading type of array is used in which the distance between electrodes is increased in some orderly fashion and measurements are repeated. To determine how apparent resistivity varies with position, and hence map the spatial apparent resistivity variation, the electrode separation remains (relatively) fixed and the array is moved with repeated measurements. Some arrays can operate in both modes simultaneously, thus forming a three-dimensional picture of the earth.

The Wenner array is a spreading type array in which all four electrodes are equally spaced along a line with the current electrodes outside the potential electrodes. The Schlumberger array has all electrodes along a line with the current electrodes outside the potential electrodes, but the potential electrode separation is fixed while the current electrodes are symmetrically separated. In the dipole-dipole array the current electrode separation is set to the same separation as the potential electrodes, and the two dipoles are moved apart.

The dipole-dipole array is also used in a moving mode, but since all four electrodes must be moved with each station, other less cumbersome arrays have been developed. The gradient array is similar to the Schlumberger array except that the current electrodes are fixed at some large separation and the potential electrode pair is moved about the region between them. The pole-pole array is essentially half a Wenner array: one of the potential electrodes and one of the current electrodes are at "infinity" (i.e. fixed at a very large distance from the survey area so that their relative location has no effect on the measurements), while the other potential and current electrodes are moved about. The pole-dipole array is similar to the dipole-dipole array except that one of the current electrodes is at infinity.

Induced Polarization

The induced polarization (IP) geophysical method utilizes the overvoltage phenomena of electrical reactance between metals or metallic minerals (e.g. most sulphides, graphite, some oxides) and an electrolyte (i.e. ionic groundwater), referred to as "electrode polarization". Electrical current generated in the earth by applying a high voltage to a pair of grounded electrodes, will result in electrochemical reactions on the surfaces of metallic mineral grains in contact with groundwater. The net effect is a build up of voltages on the mineral grains (i.e. overvoltage), which can be observed by rapidly terminating the current and then measuring the slow overvoltage decay with an integrating voltmeter connected to a pair of measurement electrodes. This is referred to as "time-domain" IP and the integrated voltage measurement is called "chargeability".

IP overvoltage can also be observed by noting its effect on an alternating current generated in the earth. At low frequency (less than 0.1 cps), the ratio of measured voltage to current will be approximately the same as that obtained by DC resistivity. At higher frequencies (greater than 1.0 cps) the measured voltage will be slightly lower due to the opposing effect of overvoltage. This is referred to as the "frequency effect" and the methodology is called "frequency-domain" IP.

In addition to the overvoltage phenomena on metallic mineral grains, some other minerals (most notably clay minerals) can exhibit a weaker induced polarization response referred to as "membrane polarization". This is due to a displacement of the concentration of positive ions in the electrolyte next to mineral grains with net negative surface charge. The effect is much smaller than electrode polarization but can be dominant in certain situations such as argillic alteration zones.

The arrangement of electrodes for induced polarization surveys are primarily the moving and combined moving-spreading type arrays. The most commonly used arrays are the dipole-dipole, pole-dipole, pole-pole and gradient. Each has specific advantages and disadvantages.

The dipole-dipole array has very good spatial resolution, good depth information and produces symmetric anomalies; however it has poor penetration depth, low current density, low voltage measurement and is relatively slow and expensive. The pole-dipole array has good spatial resolution and depth information, along with higher current density and voltage measurement, and better penetration depth; but it produces non-symmetric anomalies which are more difficult to interpret. Survey rates and costs are marginally better than dipole-dipole array.

The pole-pole array has good current density, high voltage measurement and very good penetration depth; however the spatial and depth resolution is poor. The gradient array has very good current density, good spatial resolution and good penetration depth; but it has little depth information and low voltage measurement (except for large potential dipoles which have lower resolution). Greater survey rates and lower costs can be obtained with both the pole-pole and gradient arrays.

Spontaneous Potential

Most IP/resistivity surveys automatically obtain spontaneous potential (SP) measurements along with apparent resistivity and chargeability. Often these data are ignored since for most arrays they are not easily collated into an interpretable map form. In addition, SP cannot be definitively interpreted in terms of specific geologic features since, in many situations, the SP response can be due to a variety of causes.

Large electrical potentials can be created by the electrochemical reaction between conductive mineralization (e.g. most sulphides, graphite, some oxides) and ionic groundwater. These "mineralization potentials" can be as great as 1.5 volts, given the correct combination of oxidation and reduction environments surrounding the mineral body, but anything over 150 millivolts would be considered anomalous. These potentials are always negative relative to background.

Other natural potentials can arise from the capillary flow of groundwater through a porous medium, or from variation of ionic concentration in groundwaters, or even from biological processes in root systems. These potentials can be anomalously negative or positive, but they are rarely greater than 150 millivolts.

SURVEY PROCEDURES:

The gradient array IP/resistivity surveys on the Katherine East, Katherine Southeast and Pete grids were carried out in separate blocks ranging in size from 300x300 metres to 375x400 metres (2.1 to 3.4 line-kilometers per block) with one line and/or two stations of overlap between blocks. Current electrodes were placed about 300 metres from each survey block along, or extending from, one of the central lines of the block. Potential electrode separation was fixed at 12.5 metres for all surveys and stations were taken every 12.5 metres along the lines. This survey arrangement provides the best combination of high spatial resolution (12.5 metres), good penetration depth (100 to 150 metres), and sufficient signal strength (primary voltage > 1.0 millivolt) for reliable measurements.

As a test, one block of lines on the Katherine East grid was re-surveyed with current electrodes twice as far apart as for the standard survey, while potential electrode separation remained fixed at 12.5 metres. This arrangement should give effectively twice the depth of penetration, however measured potentials will only be about one quarter of the standard survey.

The surveys were carried out using an Androtex TDR-6 six channel time domain IP receiver and a Huntec 7.5 kW IP transmitter (see Instrument Specification). The receiver was connected to a series of seven copper sulphate porous pots (light-weight plastic cups with asbestos fibre bottoms) via a multi-conductor cable with precise 12.5 metre take-outs, laid out behind the receiver/operator along the survey line. The receiver simultaneously recorded the primary, secondary and SP voltages from the six dipoles formed by the series of seven potential electrodes. Hence, with each instrument/cable set-up, six 12.5 metre stations were measured. The entire set-up was then moved 75 metres down the line by picking up the porous pots and instrument, dragging the cable, and then re-installing the pots at the new locations. Two assistants were required to move pots and properly install them in moist soil beneath the humus layer in a timely fashion.

The transmitter and gasoline motor generator were permanently set up at a convenient location near the centre of each survey area. Light, 16 gauge wire was laid along available roads and survey lines to the different current electrode locations of the various survey blocks. The positioning of the wire was dictated by the arrangement of the survey blocks and the need to simplify the layout and pickup procedures. An additional consideration was the recurring problem of breaks in the wire due to animal chews, particularly at lower elevations.

The current electrodes consisted of a combination of stainless steel and copper rods, and buried sheets of aluminum foil. Usually, 3 or 4 rods hammered 2 to 3 feet into the ground and well soaked with a saturated solution of salt and detergent, provided adequate ground contact. However, it was sometimes necessary to reposition the electrodes to some wetter nearby location, or to increase the number of rods, or to bury a sheet of aluminum foil, to increase the current output. Transmitter current varied from 1 to 8 Amps depending on soil and bedrock conditions at the electrode sites.

The Androtex TDR-6 receiver was well suited for this particular IP survey because to its high sensitivity. In areas where highly conductive argillites are close to surface, the primary voltages were often less than a millivolt (1.0 mV). Most IP equipment cannot reliably operate at such low input voltages, necessitating either an increase in the voltage dipole length with an equivalent decrease of the spatial resolution, or a reduction of the current electrode separation and corresponding reduction of penetration depth and survey efficiency. The TDR-6 can obtain stable readings to 0.1 mV primary voltage after 4 or 5 stacks (repeat measurements with successive cycles of the current pulse), and relatively stable values of the secondary voltages and integrated chargeability after 10 or more stacks given fairly quiet noise conditions.

Secondary voltages and chargeabilities were much less consistent when noise conditions worsened. This tended to occur in the afternoon when low level cumulus cloud cover built up, particularly later in the summer during hot, humid weather. Survey work had to be carried out in the early morning and ceased in mid afternoon during these high noise periods.

The major difficulty with the TDR-6 was its inability to synchronize to the current waveform, and hence commence the measurement sequence, on primary voltages of less than 1.0 mV. It was therefore necessary in the argillite terrane to search through the six channels for a reading greater than 1.0 mV with which to synchronize. If all channels had low input voltages, one of the dipoles (usually the one closest to the operator) was doubled or tripled in length by moving a porous pot 12.5 or 25 metres away using a separate wire carried for this purpose. The modified location of this electrode was later edited during the data processing procedures.

An additional problem occurred with synchronization during high noise periods. Large amplitude noise spikes could disrupt a low-voltage (i.e. 1.0 to 1.5 mV) synchronization signal thus terminating the measurement sequence. This was particularly troublesome when multiple stacking (i.e. greater than 10) was being used in an attempt reduce the noise effects in the secondary voltages. When the measurement sequence self-aborts, all readings are lost and the measurement must be started over again from scratch.

DATA PROCESSING:

The TDR-6 automatically records the following information with each reading: station location, six primary voltages in millivolts, six SP voltages in millivolts, six sets of 10 secondary voltages normalized by the primary voltage in millivolts per volt (mV/V), six integrated normalized secondary voltages (i.e. chargeabilities) in milliseconds (msec), the transmitter current in amps, the number of stacks, and the time of the reading. The 10 normalized secondary voltages are the mean values in 10 user-specified, time-delay sample intervals. The instrument default time intervals were used in the present survey: #1 - 80 to 160 msec, #2 - 160 to 240 msec, #3 - 240 to 320 msec, #4 - 320 to 400 msec, #5 - 400 to 560 msec, #6 - 560 to 720 msec, #7 - 720 to 880 msec, #8 - 880 to 1200 msec, #9 - 1200 to 1520 msec, and #10 - 1520 to 1840 msec. The total integrated chargeability is the sum of each normalized secondary voltage multiplied by the length of its sample interval, divided by the total sample interval (i.e. 1.76 sec).

The data are stored with an associated header file which contains the common information for a collection of readings along a specific survey line. The positions of all electrodes for any given dipole at any reading location can be derived from this header information. The data and header files are stored separately using a file name which combines the line designation and a user (i.e. survey block) number. The filename extension is "HEA" for the header file and "IPD" for the data file.

The first step in the initial data processing procedure is to edit these data and header files using the "EDIT" software provided by Androtex. The purpose of this procedure is to correct any mistakes of the manual numeric entries in the field (e.g. incorrect station number, incorrect dipole spread orientation, incorrect current, etc.), and to delete any questionable noisy data. The latter procedure is subjective and is based primarily on the form of the secondary voltage decay: large negative secondary voltages and secondary voltages with irregular, non-uniform decays are eliminated by replacing the numbers with asterisks ("*").

The second step is to convert the IPD and HEA files into Geosoft format IP data files using the EDIT program. This procedure writes out the data along with the locations of all electrodes in the format used by Geosoft IP plotting software. The file created has the same name as the original with a "DAT" extension.

The final step of the initial data processing procedure is to convert the data from Geosoft format into a standard XYZ type format used by Geopak and Muir plotting software. A special program ("GIPCON") was written by the author to make the necessary calculations and conversions. The program: 1) defines the measurement location of each reading as the midpoint of the potential dipole, 2) calculates the apparent resistivity in ohm-m from the primary voltage, the current, and the electrode locations using standard formulation, 3) calculates an apparent conductivity in mmho/m as the reciprocal of the apparent resistivity, and 4) calculates the "metal factor" from the apparent resistivity and the normalized secondary voltage in the earliest sample interval using standard formulation.

The next stage of the processing procedure is to adjust the apparent resistivities of entire blocks of survey data so that the overlap stations between adjacent blocks are approximately the same (i.e. correct for three-dimensional effects). First, multiple blocks of apparent resistivity data are plotted as line profiles on a common map using different pen colours for each block. Discrepancies are immediately evident from such plots, and relative adjustments can be decided. Then, going back to the original IPD and HEA files, corresponding adjustments are made to either the transmitter current, to make a uniform linear change of the apparent resistivity over an entire block, or to the current electrode locations, to make a spatially variant change in the apparent resistivity over the block, or to both. Then the initial processing procedure is repeated and a new line profile plot is generated with (hopefully) an improved match between adjacent blocks.

The above procedure is repeated numerous times until all apparent resistivities over the entire survey area appear to be unaffected by the block boundaries. At this point it is also worthwhile to generate a contour map of apparent resistivity as a further check for block boundary discontinuities. Note that this procedure does not effect the IP or SP values. Once the final corrections are made, all duplicate stations along the block boundaries are deleted.

The final data processing procedure is to generate a mappable form of the spontaneous potential readings. This is carried out by:
1) sequential summing the gradient SP data along each survey line, after collation of individual survey blocks and re-sorting into consecutive station order, 2) reversing the sign of the SP voltage to facilitate plotting, and 3) adjusting the resultant fixed reference SP data on each line to correct for potential differences between lines and isolated sections of lines. This latter procedure is subjective and requires repeated iterations of adjustment and plotting to arrive at a reasonable final product.

DATA PRESENTATION:

The final, corrected versions of apparent resistivity, total integrated chargeability, spontaneous potential and apparent conductivity are presented as combined line profile and colour contour maps in Figures 1a-d, 2a-b, 3a-d and 4a-d. Apparent conductivity is included in the presentation to highlight conductive structures not particularly notable in the apparent resistivity contour patterns. Metal factor was not included in the presentation since it did not appear to significantly enhance the combined information available from separate apparent resistivity and total chargeability maps.

All maps of the same parameter from the different surveys on the Erickson properties have the same plotting convention. The line profile plotting scales are: apparent resistivity - 100 ohm-m per mm, total chargeability - 5 msec per mm (10 msec base level), spontaneous potential - 50 mV per mm, and apparent conductivity - 10 mmho/m per mm. The contour intervals and colours are also standardized for all surveys on the Erickson properties. Apparent resistivity: blue < 150 ohm-m, green = 150-500 ohm-m, yellow = 500-1000 ohm-m, red = 1000-2500 ohm-m, and purple > 2500 ohm-m. Total chargeability: blue < 20 msec, green = 20-30 msec, red = 30-50 msec, and purple > 50 msec. Spontaneous potential: blue < 50 mV, green = 50-150 mV, red = 150-500 mV, and purple > 500 mV. Apparent conductivity: blue < 10 mmho/m, green = 10-40 mmho/m, yellow = 40-80 mmho/m, red = 80-180 mmho/m, and purple > 180 mmho/m.

DISCUSSION:

The data plots shown in Figures 1a-d, 2a-b, 3a-d and 4a-d are directly interpretable in a qualitative manner. High apparent resistivities are due to resistive units at or very near surface. High apparent conductivities may be related to conductive structures near surface or at greater depth. Apparent resistivity is affected more from near-surface features and may, in some areas, be dominated by overburden conditions. Resistive features in areas of generally low apparent resistivity must be due to near-surface resistive structures which also extend to considerable depth (e.g. dykes).

Single-station chargeability highs should be viewed with some skepticism due to the noise problems encountered in areas of low apparent resistivity and low signal strength. Most chargeability highs are quite broad however, which suggests areas of widespread, low intensity mineralization and/or alteration. Spontaneous potentials of more than 150 mV are most likely due to metallic mineral concentrations. The large broad areas of SP high are probably due to graphite, whereas the smaller anomalies are more likely due to sulphides.

The deep gradient array test survey on the Katherine East grid resulted in apparent resistivity and total chargeability maps similar to the standard gradient array survey. The most significant differences were reduced apparent resistivities in the northern area of the test block, and greater chargeability noise due to the lower measurement voltages. The cause of the lower apparent resistivities may be related to deeper argillites in this area.

CONCLUSION AND RECOMMENDATIONS:

The gradient array IP/resistivity surveys were effective for the stated aims of mapping apparent resistivity and chargeability features on the Katherine East, Katherine Southeast and Pete grids. However, due to the low signal levels in areas of very low resistivity, the surveys only succeed due to the high instrument sensitivity of the Androtex TDR-6 receiver. Additional surveys should be carried out using similar instrumentation, or by increasing the potential dipole length, with a corresponding decrease in spatial resolution.

High noise conditions present additional difficulties for the gradient array survey. Any further surveys using the same methodology should be carried out in early spring or late autumn to avoid the high noise conditions.

Although increasing the array size will increase the efficiency of field operations, there does not appear to be a significant penetration depth advantage and the lower signal levels result in increased secondary voltage and chargeability noise.

The data plots should be interpreted by correlating the data with topographic maps and airphotos, and comparing the results with the known geology of the area. A numerical model study of the type of resistivity structures encountered, or thought to have been encountered, with the present survey should be undertaken to provide a definitive basis upon which to make more detailed interpretations and to refine the survey design for future surveys.

Respectfully submitted,

PROFESSIONAL
PROVINCE OF
D. V. WOODS
BRITISH COLUMBIA
ENGINEER

Dennis V. Woods, Ph.D., P.Eng.
Consulting Geophysicist

STATEMENT OF QUALIFICATIONS:

NAME:	WOODS, Dennis V.
PROFESSION:	Geophysical Engineer
EDUCATION:	B.Sc. Applied Geology, Queen's University, 1973 M.Sc. Applied Geophysics, Queen's University, 1975 Ph.D. Geophysics, Australian National University, 1979
PROFESSIONAL ASSOCIATIONS:	Registered Professional Engineer, #15745 Province of British Columbia Active Member, Society of Exploration Geophysicist Canadian Society of Exploration Geophysicist Australian Society of Exploration Geophysicist
EXPERIENCE:	1971-79 - Field geologist with St. Joe Mineral Corp. and Selco Mining Corp. (summers) - Research graduate student and teaching assistant at Queen's University and the Australian National University
	1979-86 - Assistant Professor of Applied Geophysics at Queen's University - Geophysical consultant with Paterson Grant & Watson Ltd., M.P.H. Consulting Ltd., James Neilson & Assoc. Ltd., and Foundex Geophysics Inc. - Visiting research scientist at Chervon Geosciences Ltd., Geological Survey of Canada, and the University of Washington
	1986-89 - Project Geophysicist with Inverse Theory & Applications (ITA) Inc. - Chief Geophysicist at White Geophysical Inc. - Chief Geophysicist at Premier Geophysics Inc
	1989- - President of Woods Geophysical Consulting

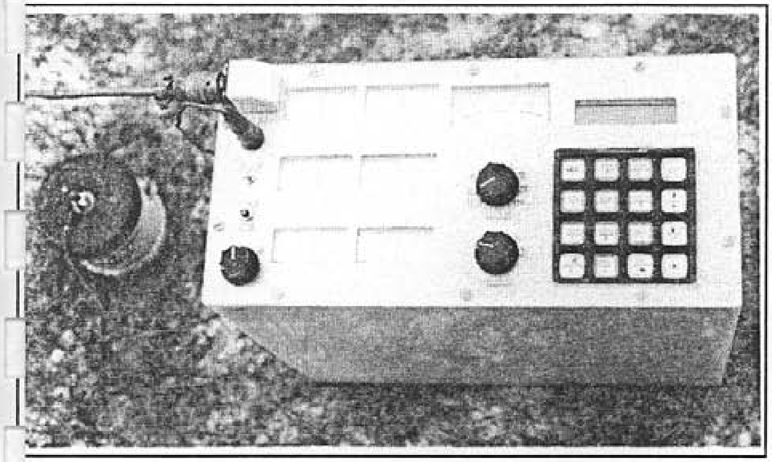
COST BREAKDOWN:

The cost of this survey has been calculated by proportioning the total costs of all geophysical surveys on the Erickson properties during the 1990 summer field season.

Mobilization and Demobilization	$1,223.10
Equipment Rental	8,759.16
Personnel	5,116.56
Supervision and Management	5,138.64
Miscellaneous Expenses	153.24
Report Preparation	475.00
Total	$20,865.70

ANDROTEX TDR - 6

SIX DIPOLE TIME DOMAIN IP RECEIVER



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

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

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

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

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

FEATURES

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

SPECIFICATIONS

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

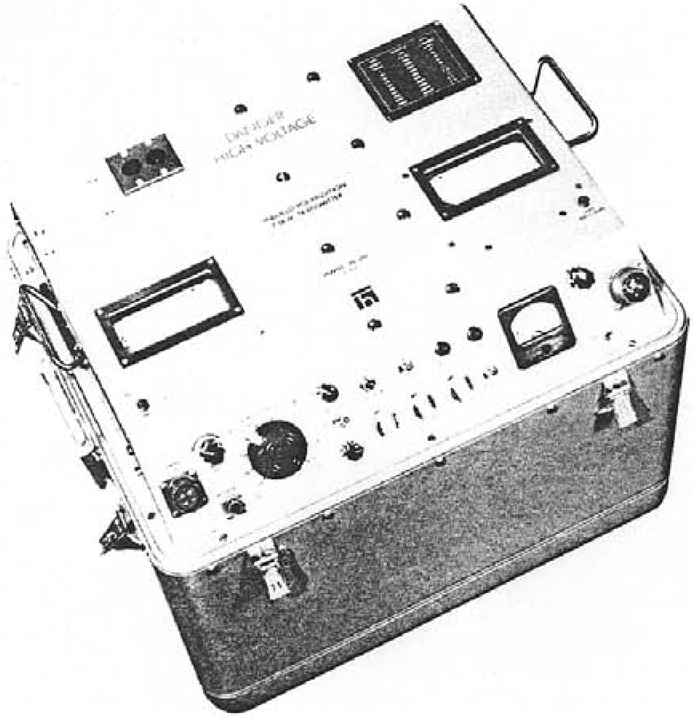
Androtex reserves the right to change specifications when it results in product improvement

ANDROTEX LIMITED
GEOPHYSICAL INSTRUMENTS

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

M-4 SERIES

Induced Polarization/ Resistivity 7.5 kW Transmitter



DESCRIPTION

The HUNTEC M-4 7.5 kW Induced Polarization transmitter is designed for time domain, frequency domain (PFE) and complex resistivity applications. The unit converts primary 400 Hz ac power from an engine-alternator set to a regulated dc output current, set by the operator. Current regulation eliminates output waveform distortion due to electrode polarization effects. It is achieved in the transmitter by varying the alternator field currents. The transmitter is equipped with dummy loads to smooth out generator load variations.

FEATURES

- Solid-state switching for long life and precise timing.
- Open circuit during the "off" time ensures no counter current flow.
- Resistance measurement for load matching.
- Precision crystal controlled timing.
- Failsafe operation protects against short-circuit and overvoltage.
- Automatic regulation of output current eliminates errors due to changing polarization potential and load resistance.

SPECIFICATIONS

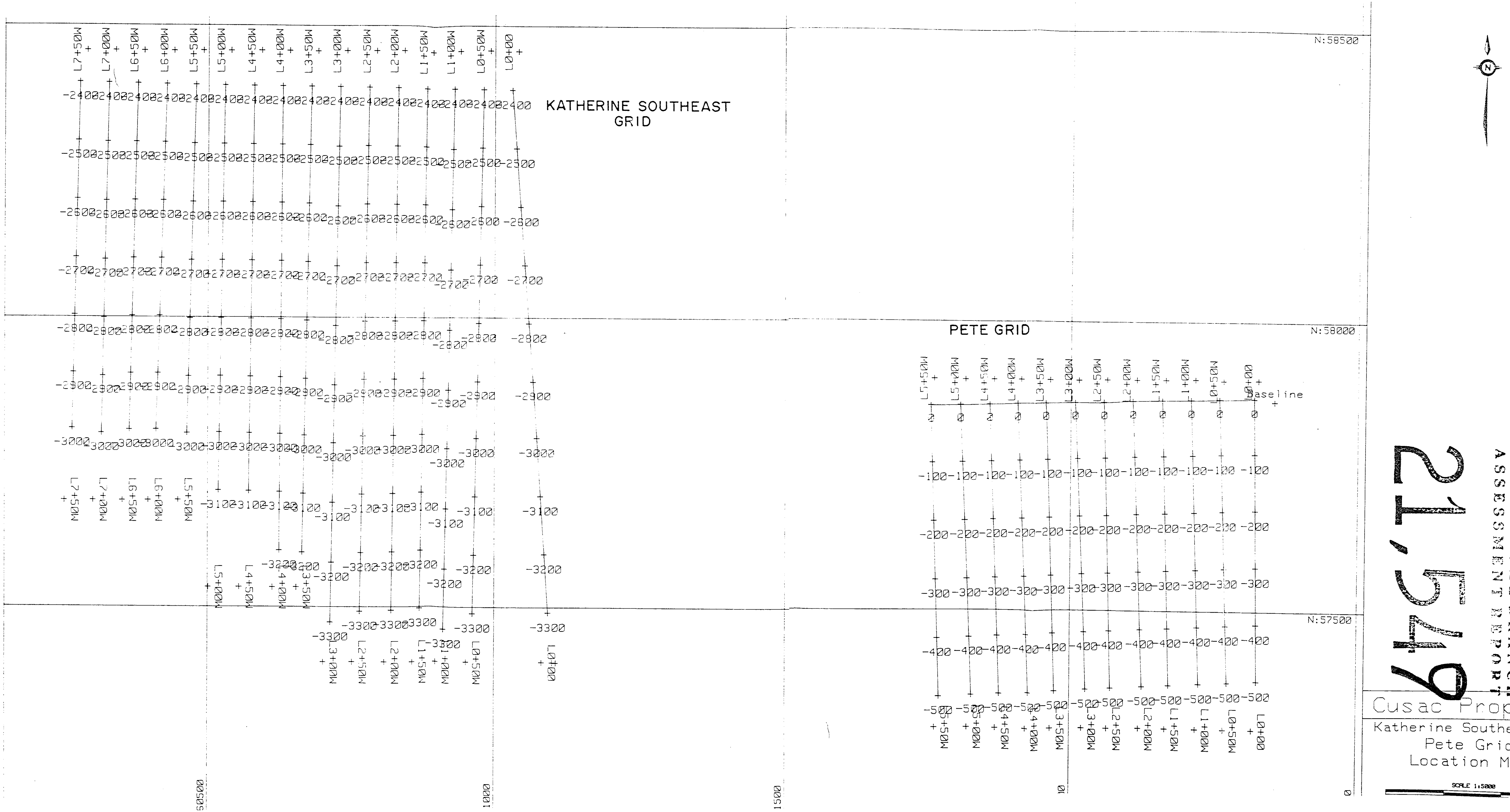
M-4 7.5 kW Transmitter

A) Power input:	**96 — 144 V line to neutral 3 phase, 400 Hz (from Huntec generator set)**
B) Output:	**Voltage: 100 — 3200 V dc in 10 steps** **Current: 0.4 — 16 A regulated****
C) Current regulation:	**Less than ±0.1% change for ±10% load change**
D) Output frequency:	**0.0625 Hz to 1 Hz (time domain, complex resistivity)** **0.0625 Hz to 4 Hz (frequency domain) selectable on front panel**
E) Frequency accuracy:	**±50 ppm − 30°C to + 60°C**
F) Output duty cycle: $T_{on}/(T_{on}+T_{off})$	**0.5 to 0.9375 in increments of 0.0625 (time domain)** **0.9375 (complex resistivity)** **0.75 (frequency domain)**
G) Output current meter:	**Two ranges: 0-10 A and 0-20 A**
H) Ground resistance meter:	**Two ranges: 0-10 kΩ, 0-100 kΩ**
I) Input voltage meter:	**0-150 V**
J) Dummy load:	**Two levels: 2 kW and 6 kW**
K) Temperature range:	**−34°C to + 50°C**
L) Size:	**53 cm x 43 cm x 43 cm**
M) Weight:	**50 kg**

****smaller currents are obtainable, but outside the current regulation range the transmitter voltage is regulated, not the current.**

huntec
('70) LIMITED

25 HOWDEN ROAD,
SCARBOROUGH,
ONTARIO, CANADA
M1R 5A6
PHONE (416) 751-8055
TELEX 06-963640
CABLE: HUNTOR, TORONTO



part 2 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

Cusac Property

Katherine Southeast and
Pete Grids
Location Map

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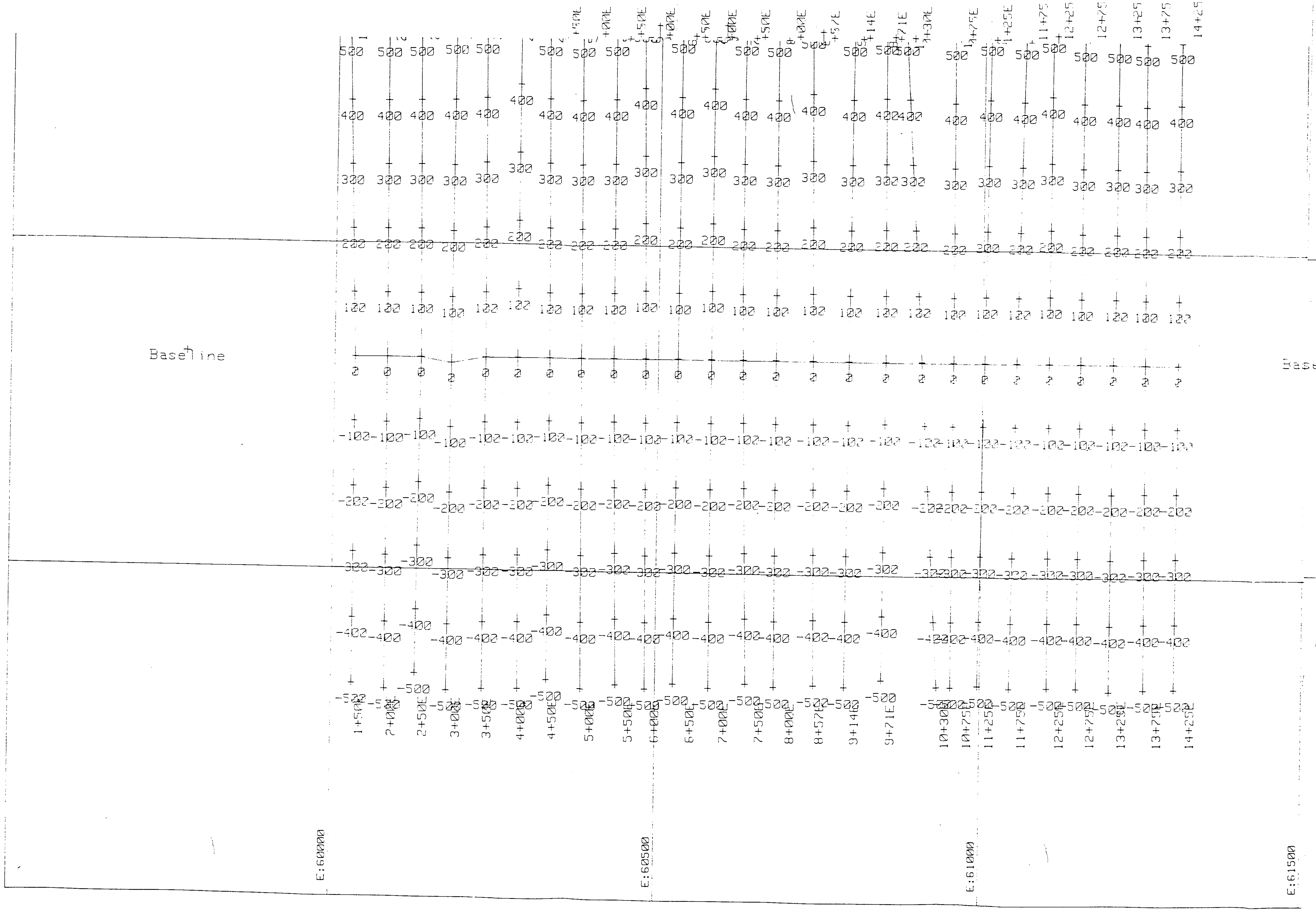


Part 2 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

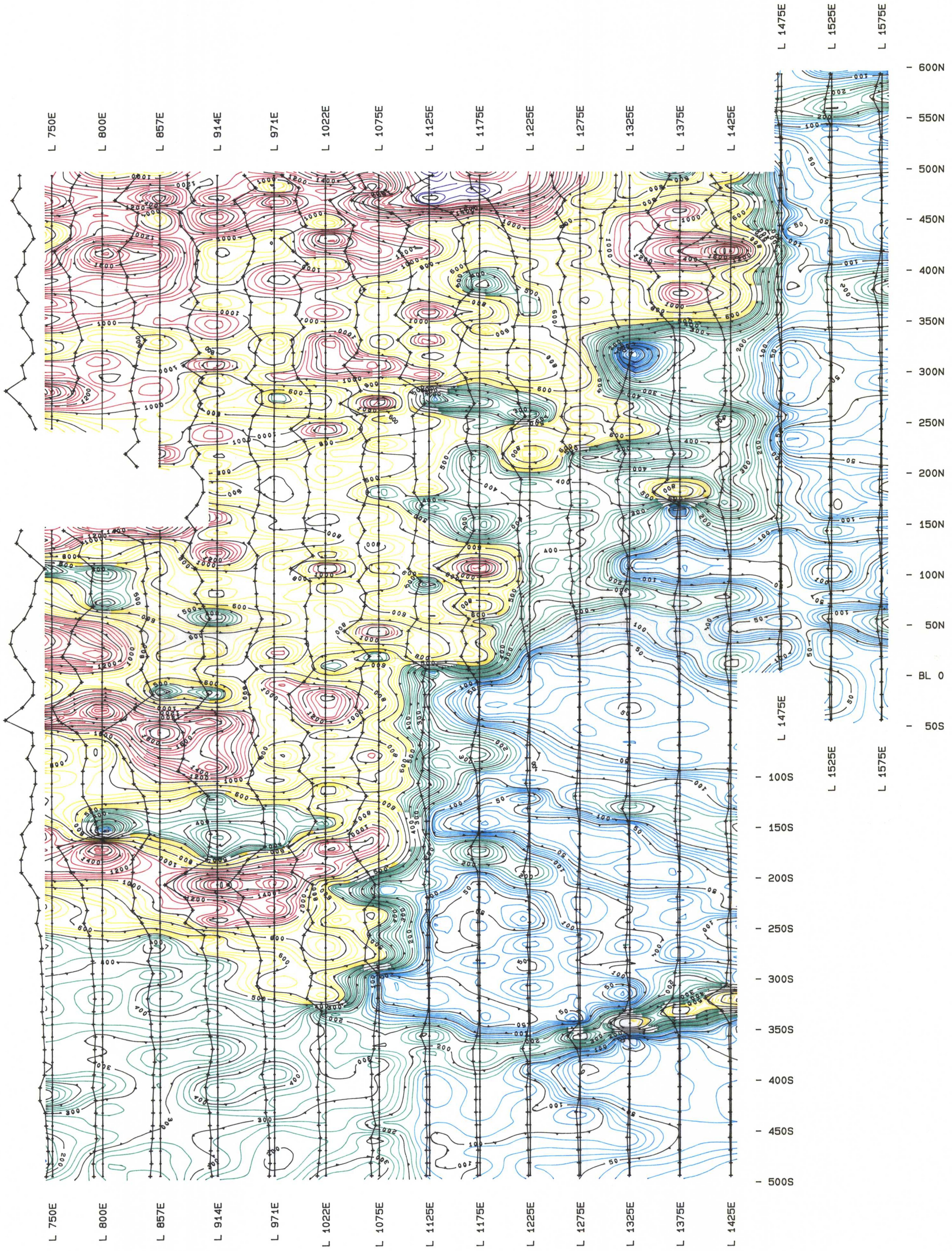
21,549

Cusac Property

Katherine - Bain Grid
Location Map

SCALE 1:5000
0 100 200 300 M

April, 1991 | Scale 1:5000 | Fi 4



PROFILE SCALE: 100 ohm-m per mm
BASE LEVEL: 0 ohm-m

ERICKSON GOLD MINING CORP.

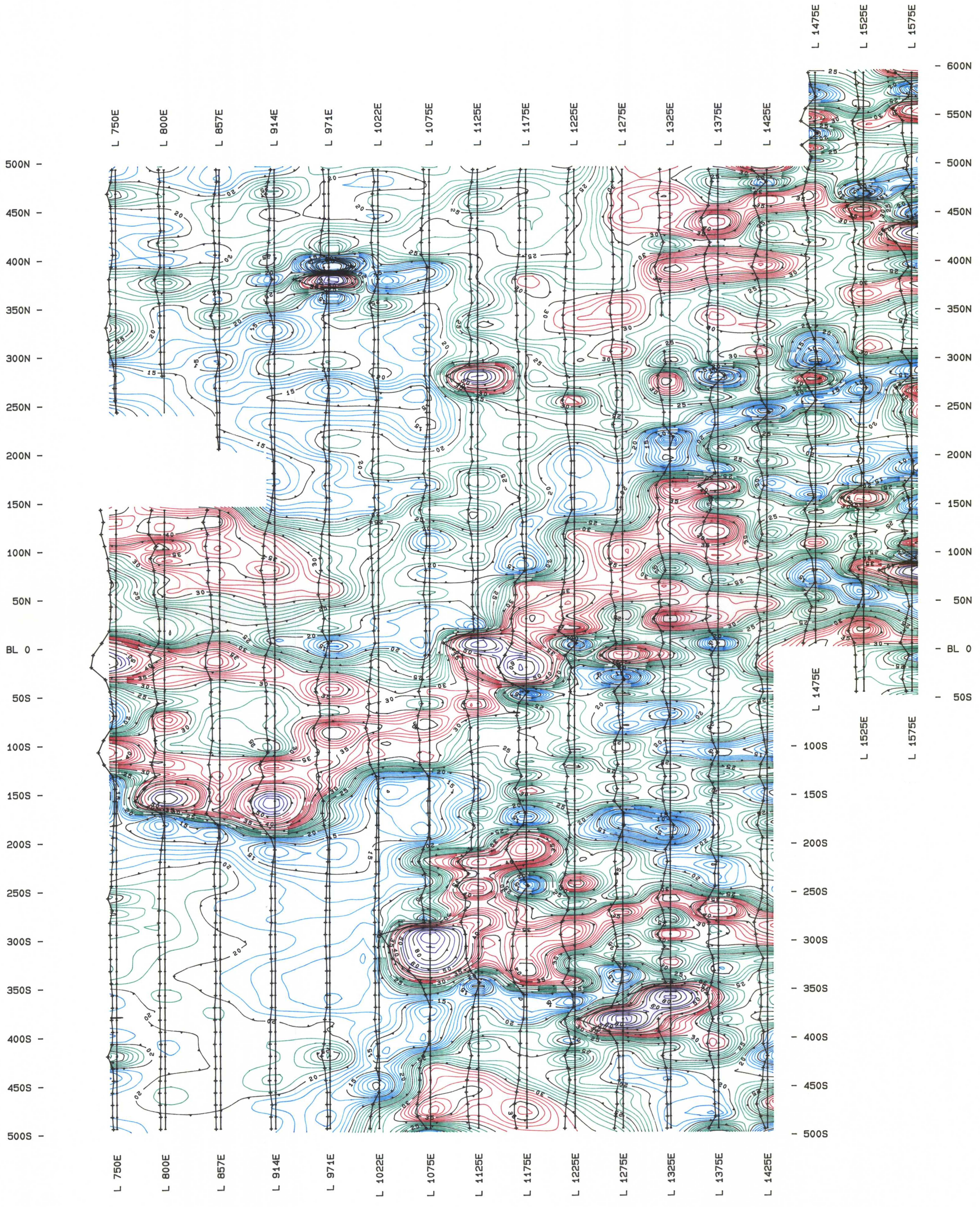
KATHERINE EAST GRID
GRADIENT ARRAY IP SURVEY
APPARENT RESISTIVITY

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Jun 1990	Figure: 1a

WOODS GEOPHYSICAL CONSULTING



GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

PROFILE SCALE: 5 msec per mm
BASE LEVEL: 10 msec

ERICKSON GOLD MINING CORP.

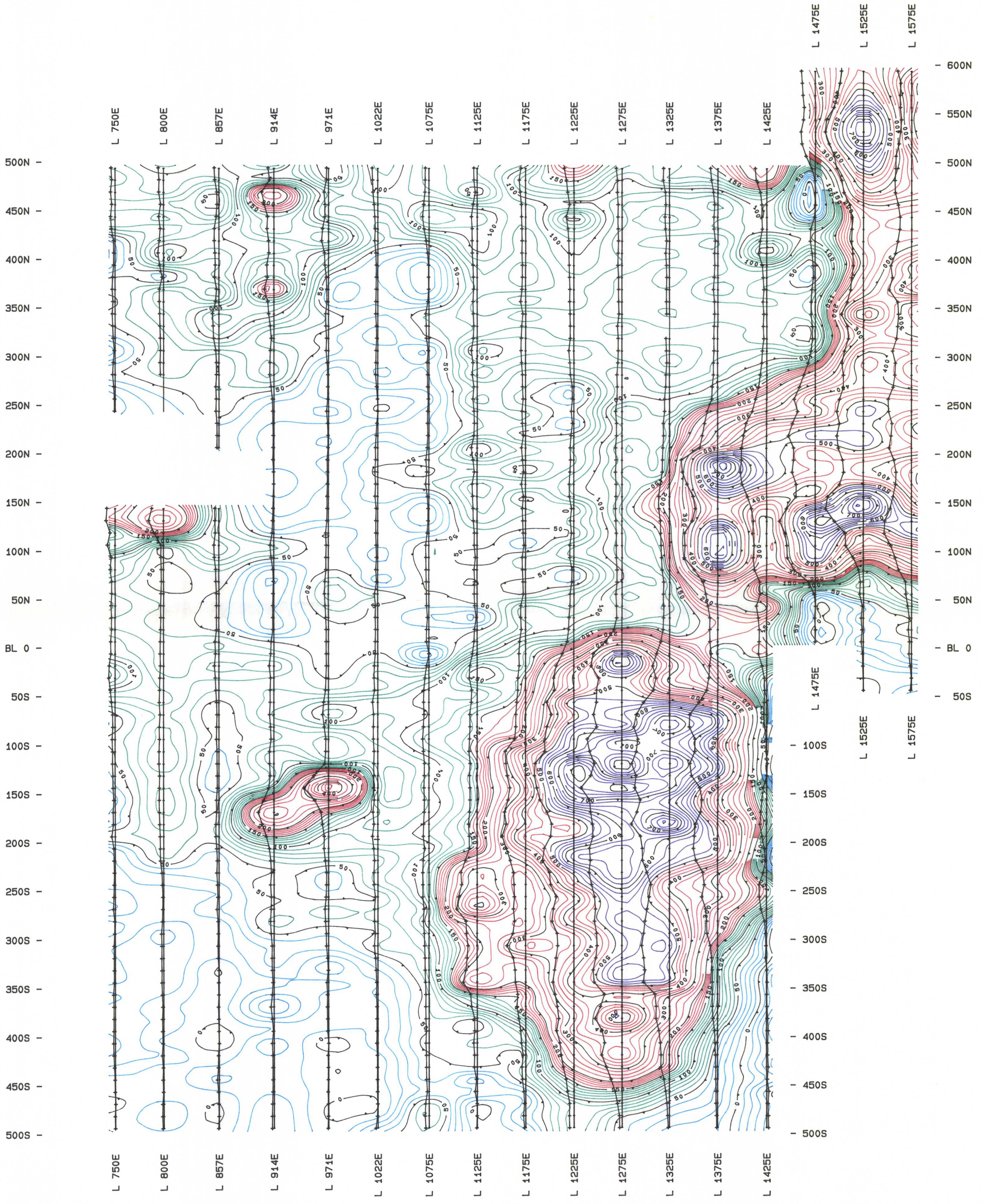
KATHERINE EAST GRID
GRADIENT ARRAY IP SURVEY
TOTAL CHARGEABILITY

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Jun 1990	Figure: 1b

WOODS GEOPHYSICAL CONSULTING



PROFILE SCALE: 50 mV per mm
BASE LEVEL: 0 mV

ERICKSON GOLD MINING CORP.

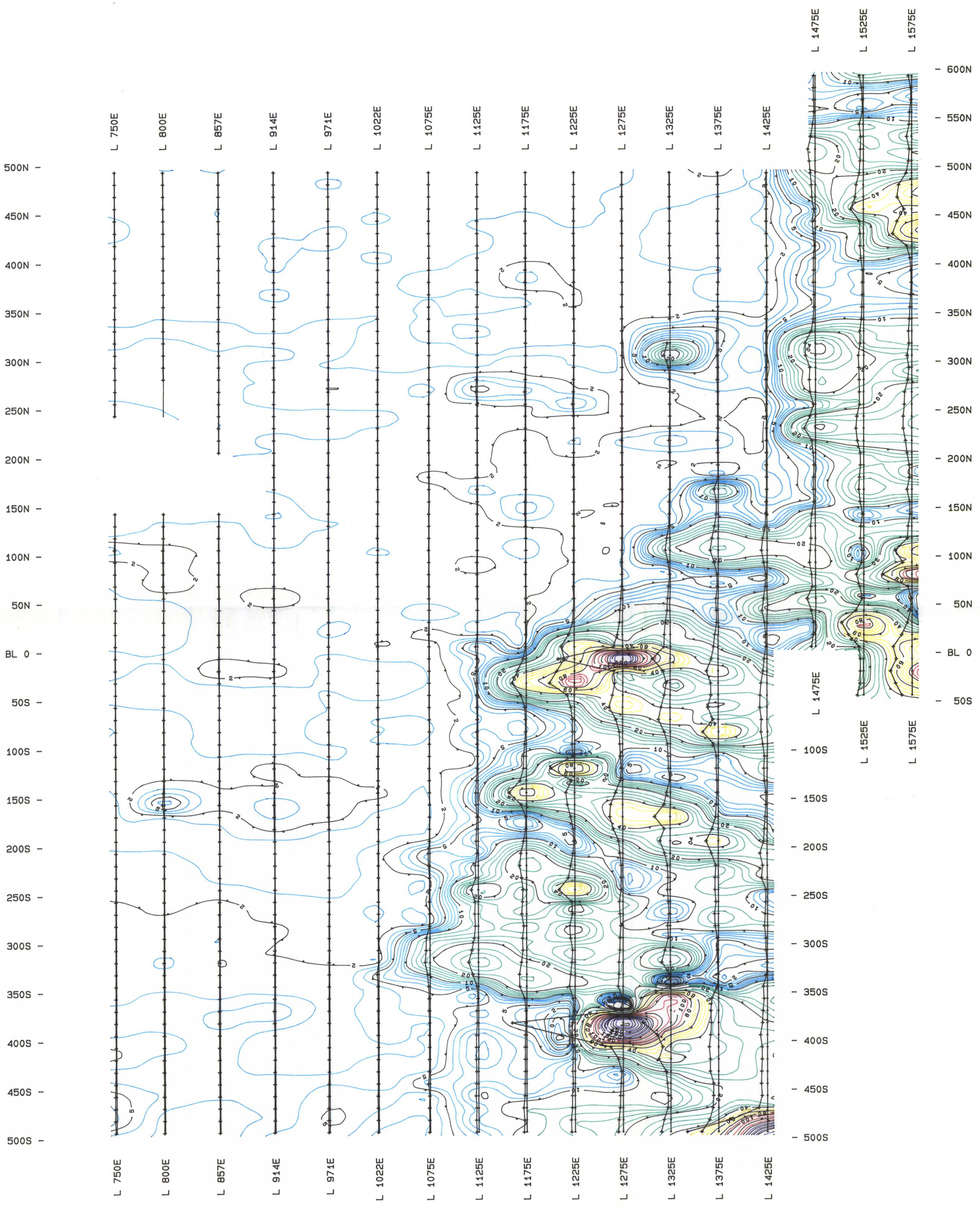
KATHERINE EAST GRID
GRADIENT ARRAY IP SURVEY
SPONTANEOUS POTENTIAL

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Jun 1990	Figure: 1c

WOODS GEOPHYSICAL CONSULTING



GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

PROFILE SCALE: 10 mmho/m per mm
BASE LEVEL: 0 mmho/m

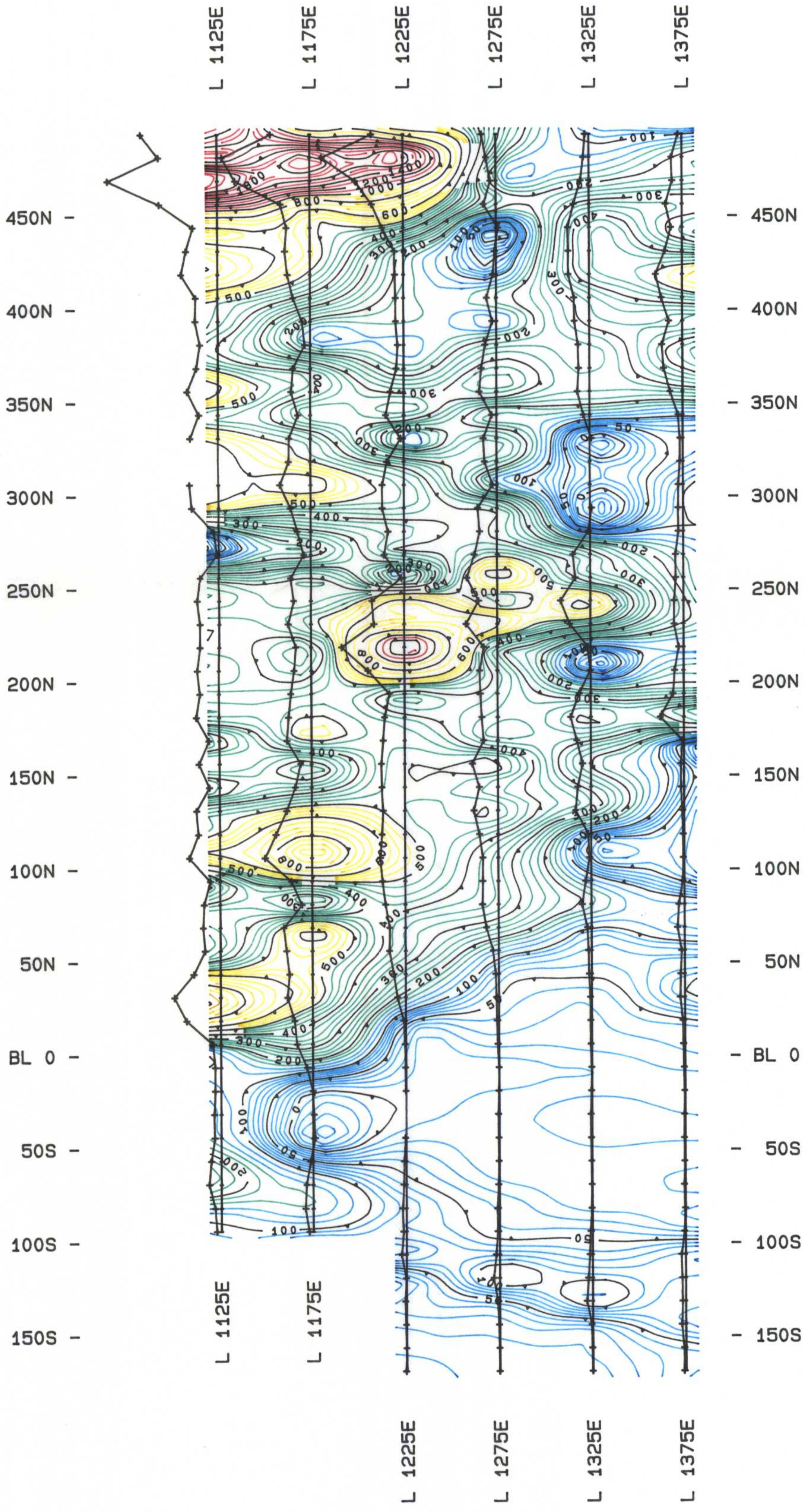
ERICKSON GOLD MINING CORP.

KATHERINE EAST GRID
GRADIENT ARRAY IP SURVEY
APPARENT CONDUCTIVITY
Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Jun 1990	Figure: 1d

WOODS GEOPHYSICAL CONSULTING



GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

PROFILE SCALE: 100 ohm-m per mm
BASE LEVEL: 0 ohm-m

ERICKSON GOLD MINING CORP.

KATHERINE EAST GRID

DEEP GRADIENT ARRAY IP SURVEY

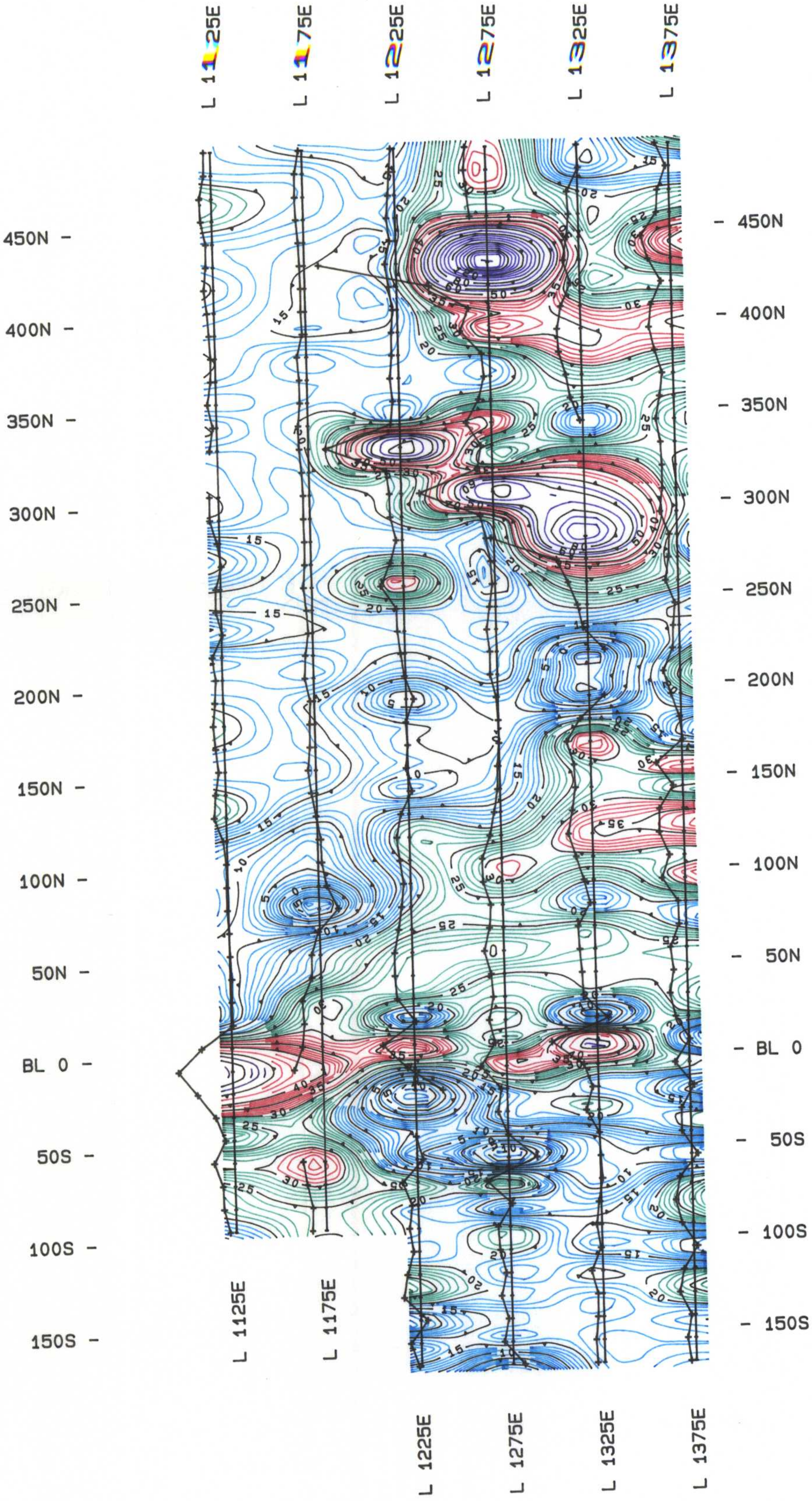
APPARENT RESISTIVITY

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Jun 1990	Figure: 2a

WOODS GEOPHYSICAL CONSULTING



PROFILE SCALE: 5 msec per mm
BASE LEVEL: 10 msec

ERICKSON GOLD MINING CORP.

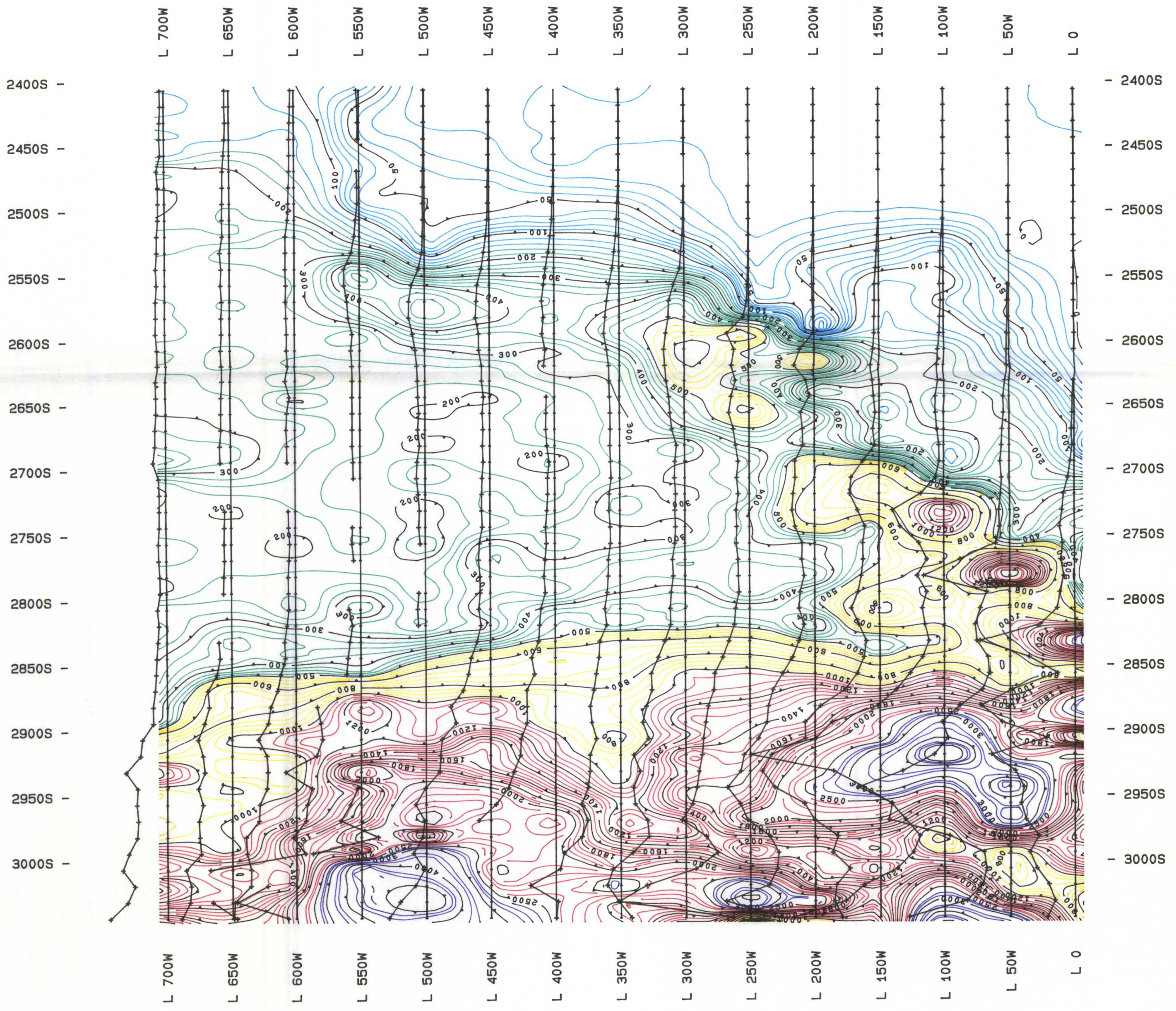
KATHERINE EAST GRID
DEEP GRADIENT ARRAY IP SURVEY
TOTAL CHARGEABILITY

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990
Survey: Jun 1990
Figure: 2b

WOODS GEOPHYSICAL CONSULTING



GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

PROFILE SCALE: 100 ohm-m per mm
BASE LEVEL: 0 ohm-m

ERICKSON GOLD MINING CORP.

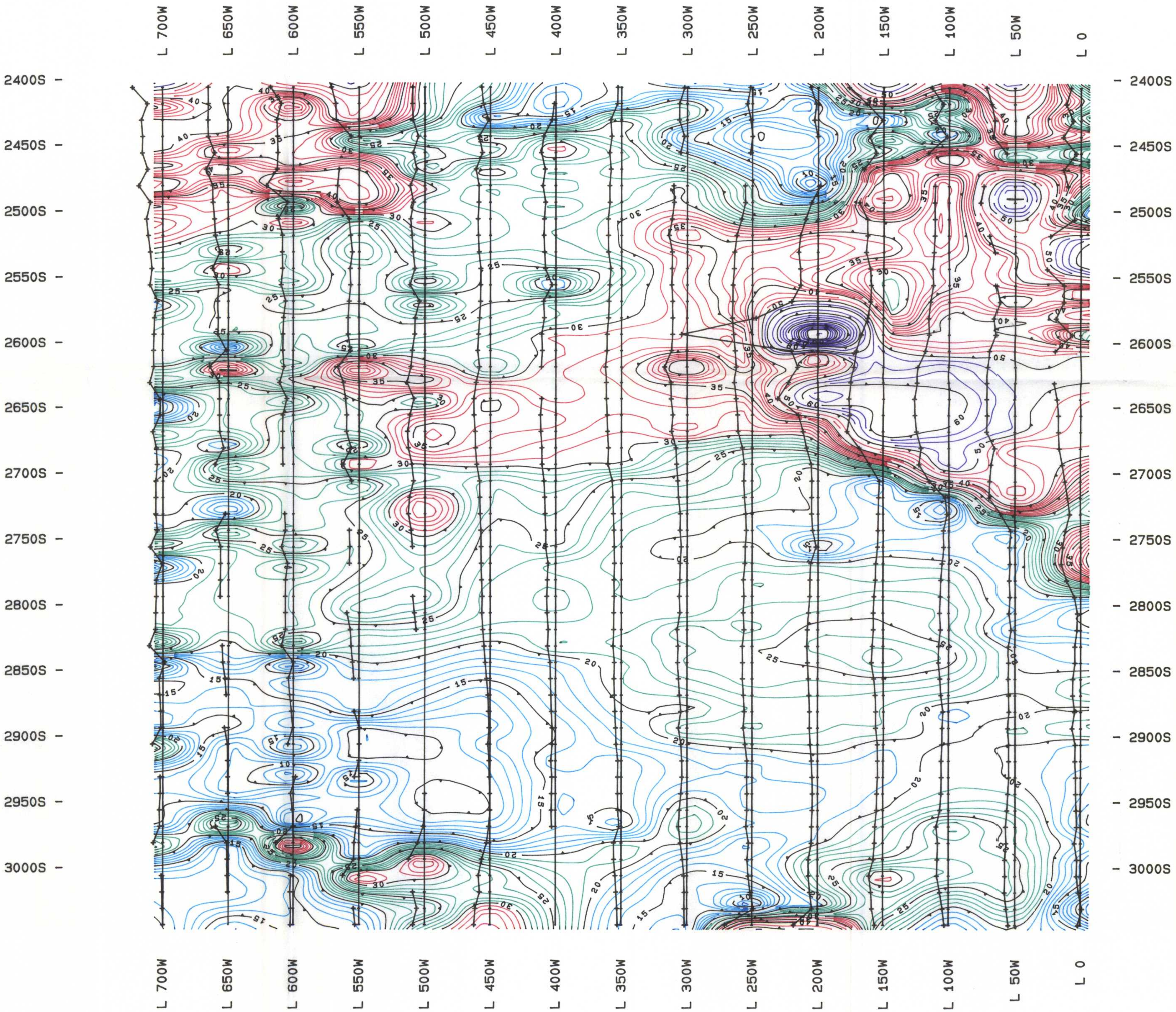
KATHERINE SOUTHEAST EXTENSION
GRADIENT ARRAY IP SURVEY
APPARENT RESISTIVITY

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990 Survey: Aug 1990 Figure: 3a

WOODS GEOPHYSICAL CONSULTING



PROFILE SCALE: 5 msec per mm
BASE LEVEL: 10 msec

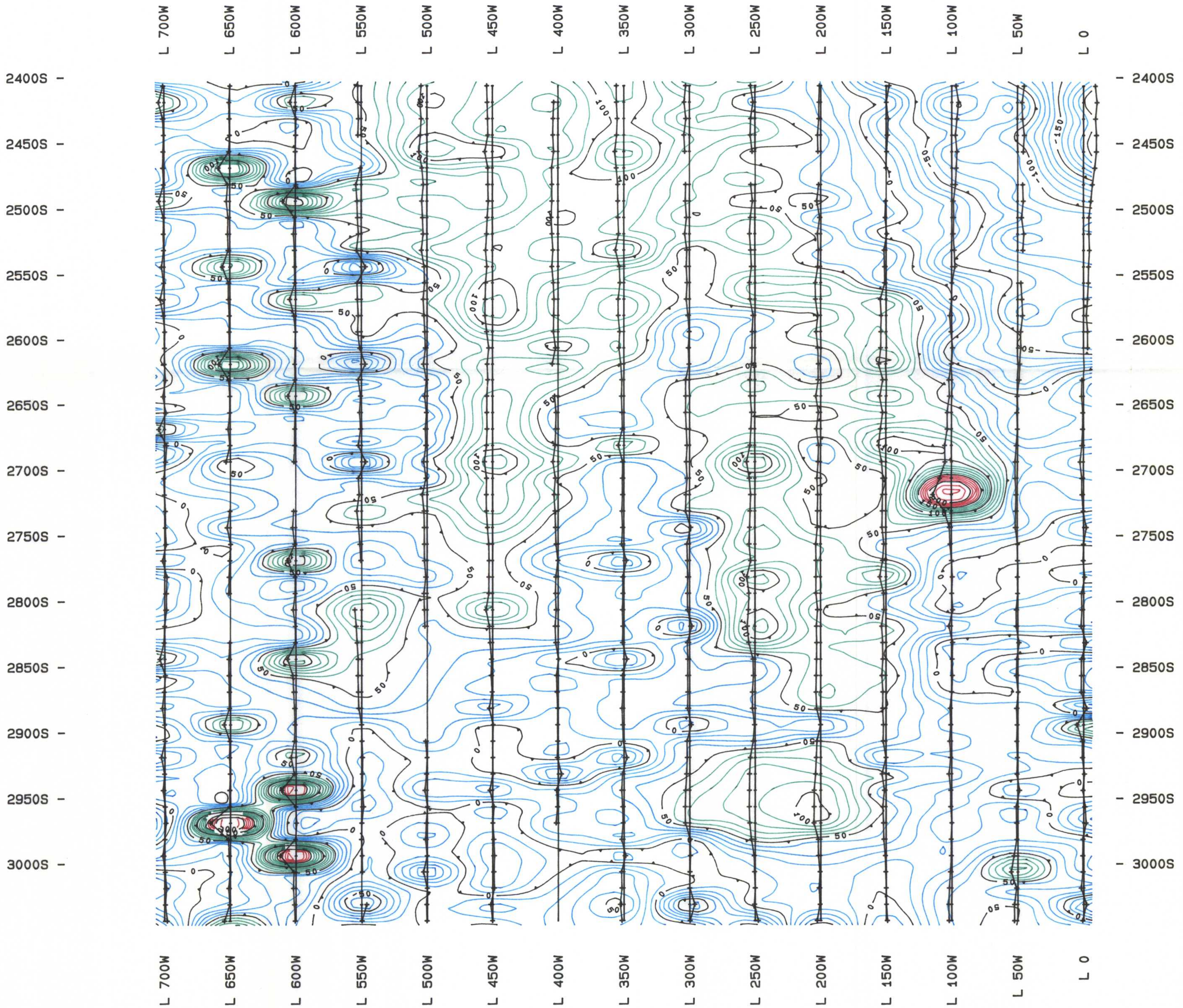
ERICKSON GOLD MINING CORP.

KATHERINE SOUTHEAST EXTENSION
GRADIENT ARRAY IP SURVEY
TOTAL CHARGEABILITY

Scale 1: 2500.0

Date: Dec 1990 | Survey: Aug 1990 | Figure: 3b

WOODS GEOPHYSICAL CONSULTING



GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

PROFILE SCALE: 50 mV per mm
BASE LEVEL: 0 mV

ERICKSON GOLD MINING CORP.

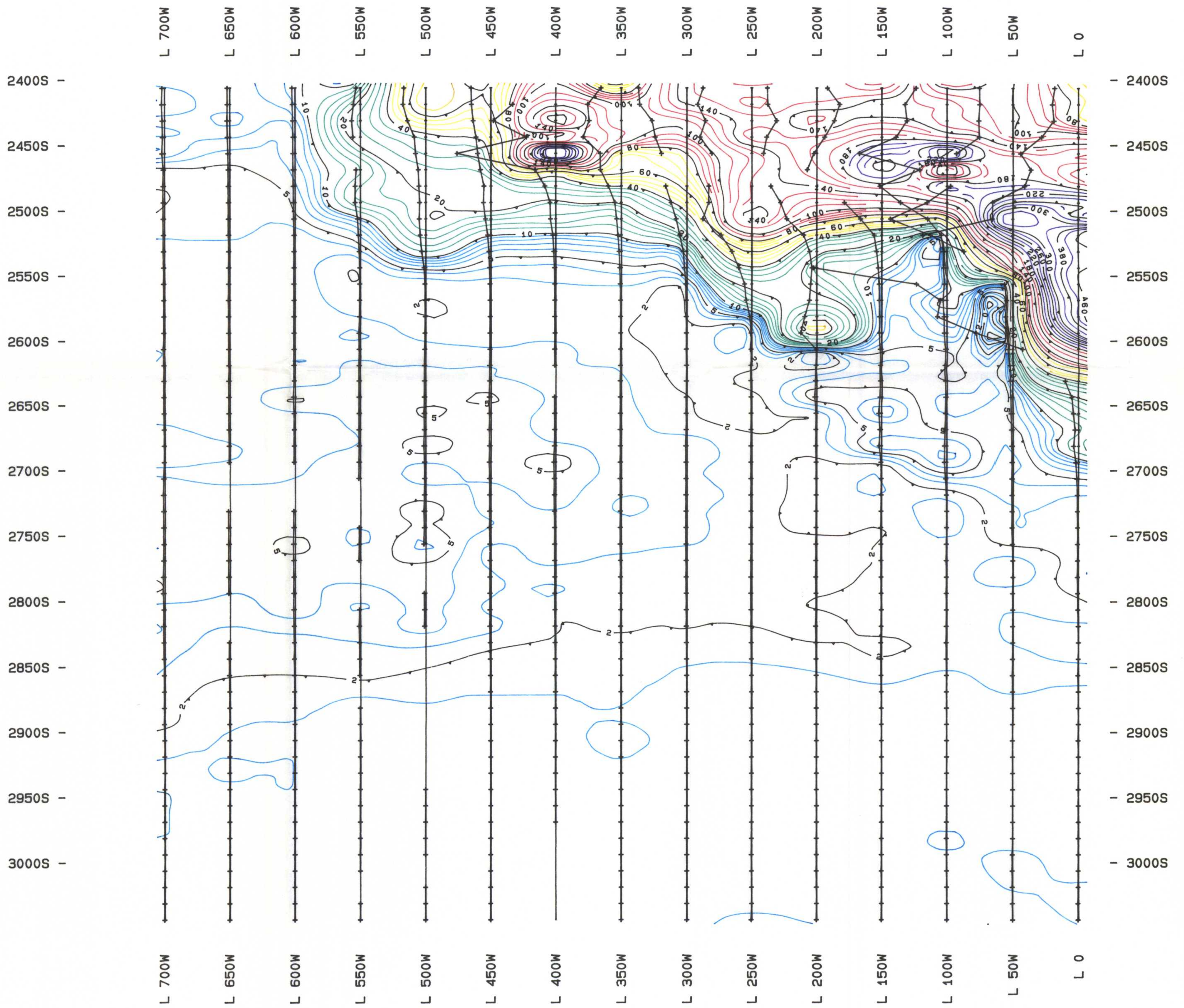
KATHERINE SOUTHEAST EXTENSION
GRADIENT ARRAY IP SURVEY
SPONTANEOUS POTENTIAL

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Aug 1990	Figure: 3c

WOODS GEOPHYSICAL CONSULTING



GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

PROFILE SCALE: 10 mmho/m per mm
BASE LEVEL: 0 mmho/m

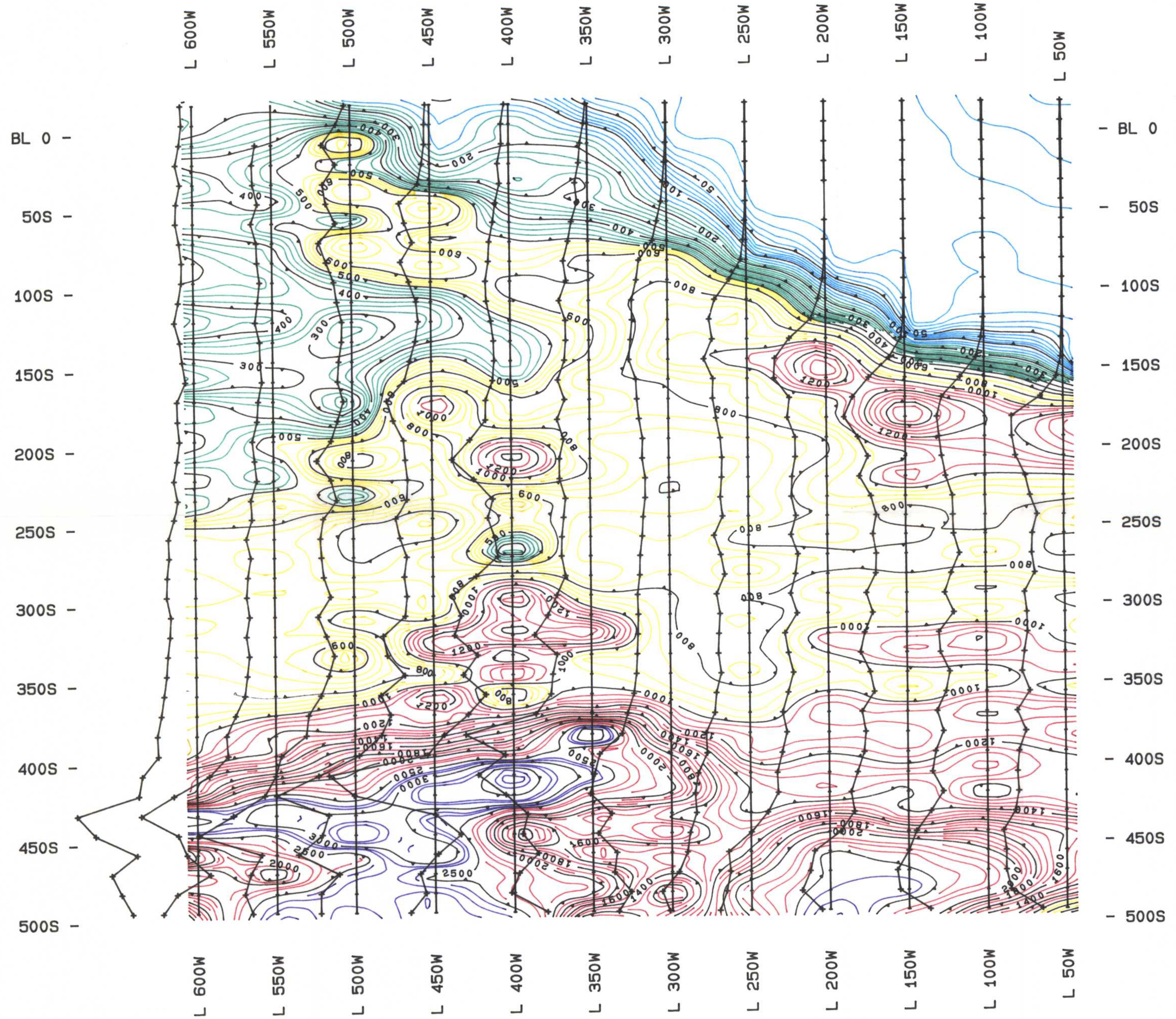
ERICKSON GOLD MINING CORP.

KATHERINE SOUTHEAST EXTENSION
GRADIENT ARRAY IP SURVEY
APPARENT CONDUCTIVITY

Scale 1: 2500.0

Date: Dec 1990	Survey: Aug 1990	Figure: 3d

WOODS GEOPHYSICAL CONSULTING



GEOLOGICAL BRANCH
ASSESSMENT REPORT

21,549

PROFILE SCALE: 100 ohm-m per mm
BASE LEVEL: 0 ohm-m

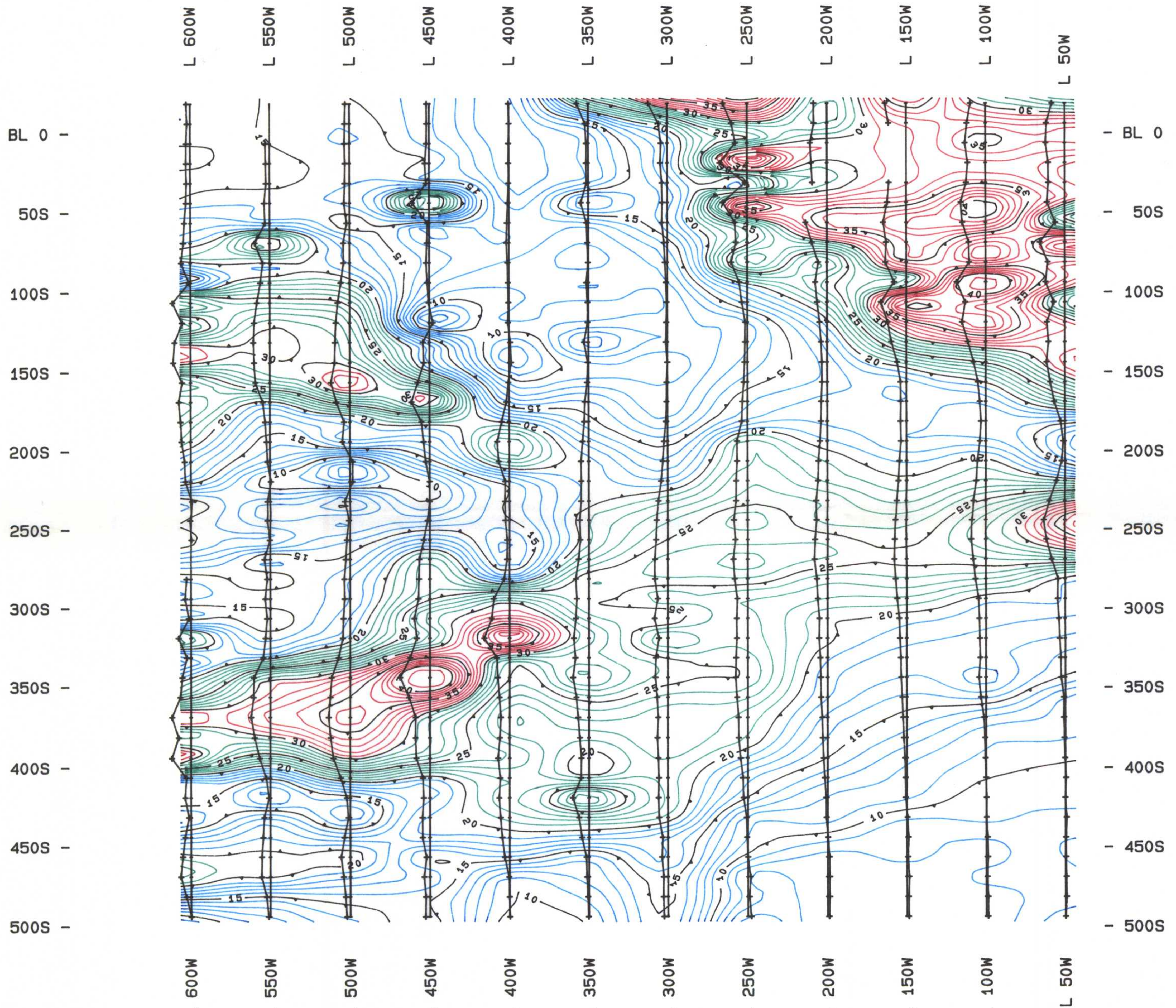
ERICKSON GOLD MINING CORP.

PETE GRID
GRADIENT ARRAY IP SURVEY
APPARENT RESISTIVITY
Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Aug 1990	Figure: 4a

WOODS GEOPHYSICAL CONSULTING



PROFILE SCALE: 5 msec per mm
BASE LEVEL: 10 msec

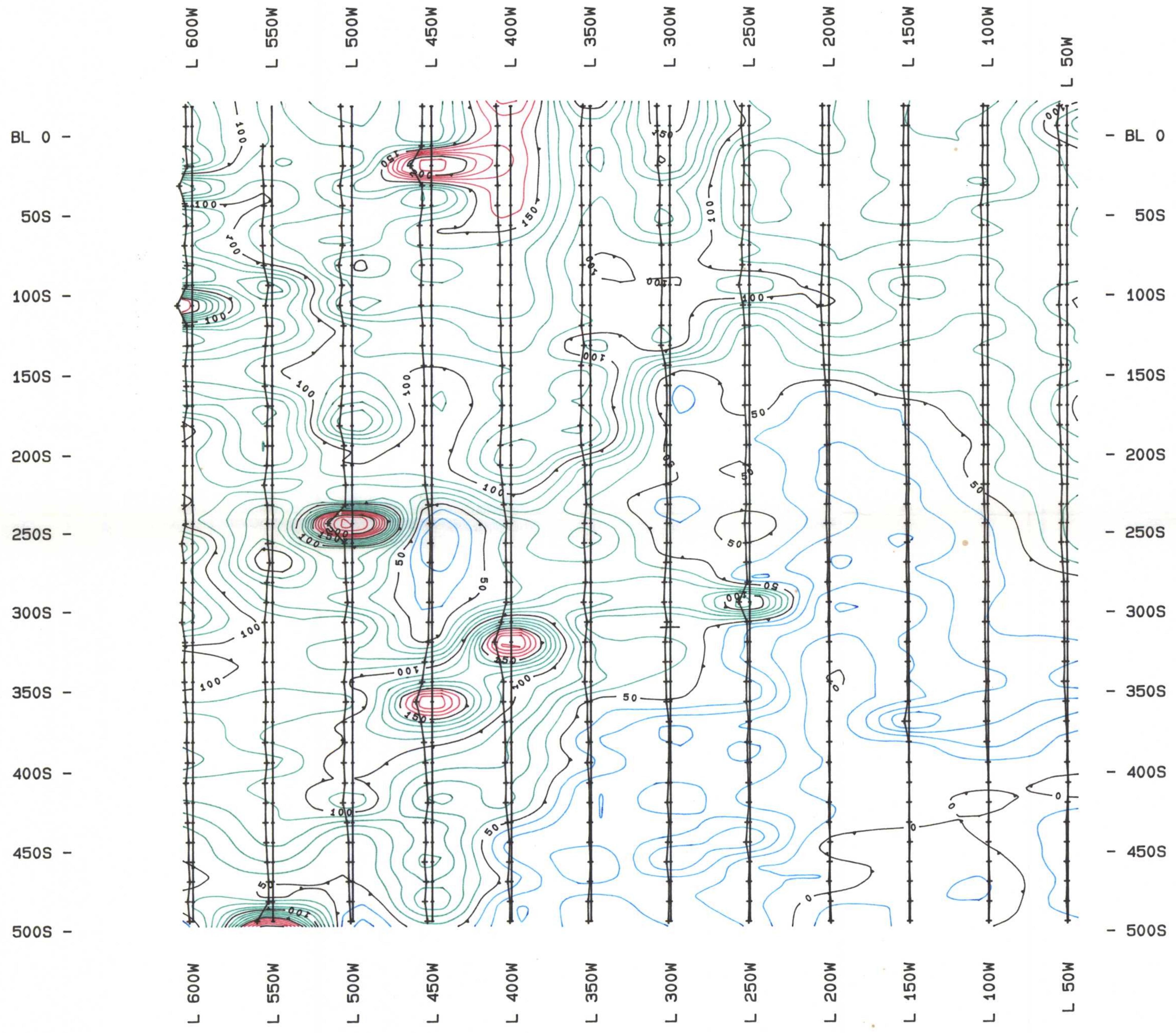
ERICKSON GOLD MINING CORP.

PETE GRID
GRADIENT ARRAY IP SURVEY
TOTAL CHARGEABILITY

Scale 1: 2500.0

Date: Dec 1990	Survey: Aug 1990	Figure: 4b

WOODS GEOPHYSICAL CONSULTING



PROFILE SCALE: 50 mV per mm
BASE LEVEL: 0 mV

ERICKSON GOLD MINING CORP.

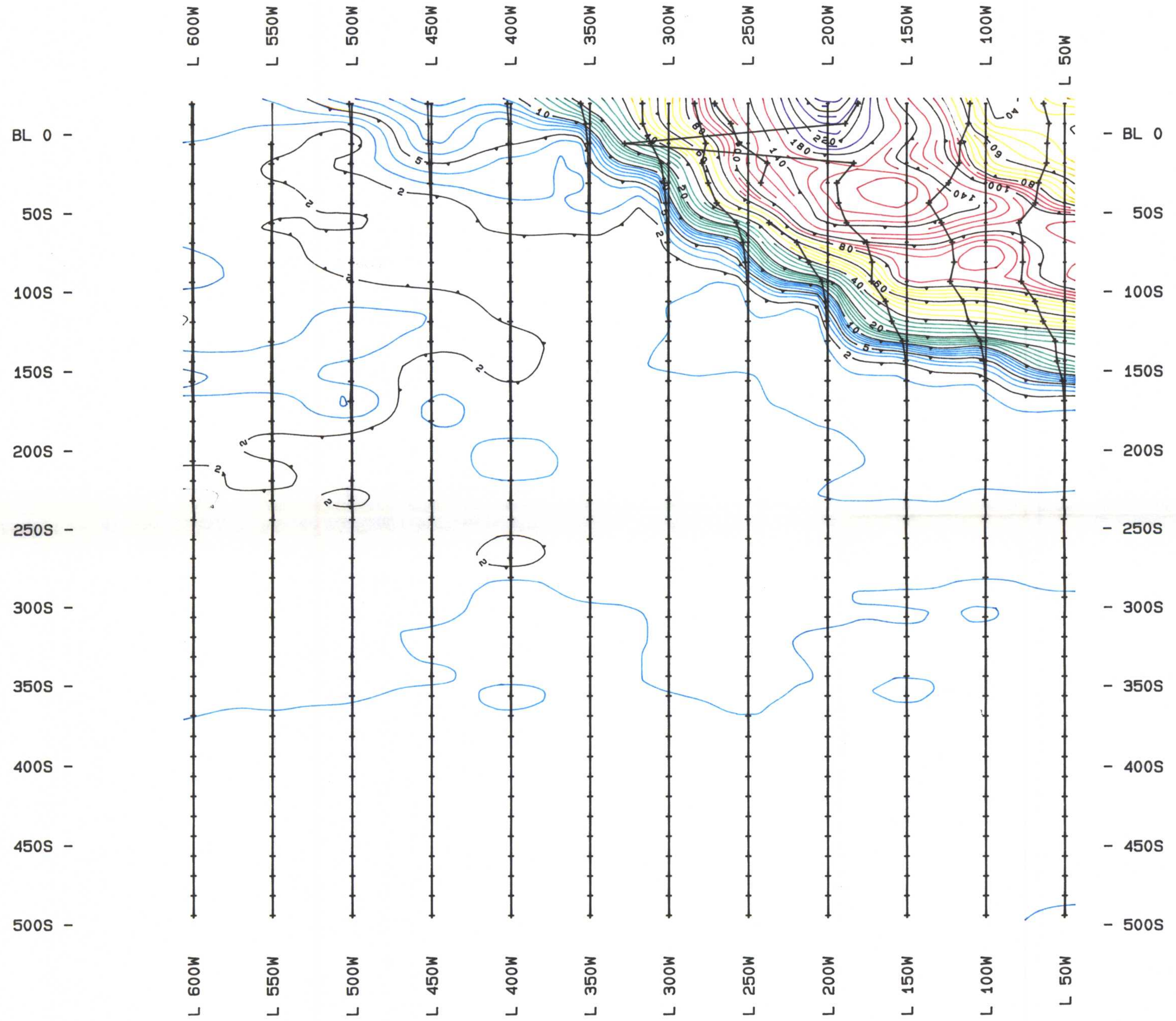
PETE GRID
GRADIENT ARRAY IP SURVEY
SPONTANEOUS POTENTIAL

Scale 1: 2500.0

0 50 100 150 200 250 M

Date: Dec 1990	Survey: Aug 1990	Figure: 4c

WOODS GEOPHYSICAL CONSULTING



PROFILE SCALE: 10 mmho/m per mm
BASE LEVEL: 0 mmho/m

ERICKSON GOLD MINING CORP.

PETE GRID
GRADIENT ARRAY IP SURVEY
APPARENT CONDUCTIVITY

Scale 1: 2500.0

Date: Dec 1990

Survey: Aug 1990

Figure: 4d

WOODS GEOPHYSICAL CONSULTING