EQUITY ENGINEERING LTD.

TOTAL MAGNETIC FIELD AND VLF-EM SURVEYS AT THE RDN PROPERTY, LIARD MINING DIVISION

M.A. Power
AMEROK GEOSCIENCES LTD.

CLAIMS

RDN1 - 18

Location: 58° 45'N, 133° 15'W
NTS: 104 G / 2 (East)
Mining Division: Liard, B.C.
Date: August 4, 1999

SUMMARY

Total magnetic field and VLF-EM surveys were conducted on the RDN Claims, Liard Mining Division to locate a contact between argillite and dacite at which volcanogenic massive sulphide mineralization may be localized. A total of 7.4 line-km were surveyed over 2.5 days in locally rough terrain. The VLF transmitter at Jim Creek (Seattle) Wa. (NLK - 24.8 KHz) was used as the sole source along lines oriented at 90^0. The total magnetic field survey detected magnetic field highs associated with the dacite unit and a very high intensity positive anomaly on the extreme western portion of the grid. The VLF-EM survey detected a very weak, primarily contact-type anomaly consisting of a change in quadrature base level with a subsiduary peak at the base level inflection. This anomaly follows the argillite / dacite contact where known from mapping and drill hole information. The in-phase response consisted of a generally increasing field from west to east across the grid, probably caused by topography. There were no significant anomalies which appear to be caused by thin, moderate to steeply dipping bedrock conductors.

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1.0 INTRODUCTION

Amerok Geosciences Ltd. was retained by Equity Engineering Ltd. to conduct ground total magnetic field and very low frequency electromagnetic (VLF-EM) surveys on the RDN Claims . A total of 7.4 line-km were surveyed on a soil grid between July 17-19, 1999 to locate auriferous sulphide mineralization on the claims. This report describes the surveys performed, data, results and an interpretation.

2.0 SURVEY GRID

The geophysical surveys were conducted on a flagged grid consisting of 7.4 line-km flagged at a 25 m station spacing. Survey lines were turned from a base line oriented at 360° and slope-corrected.

3.0 PERSONNEL AND EQUIPMENT

The surveys were conducted by Dan Hall (Technician). He was equipped with the following instruments and equipment:

Field unit: Scintrex EDA Omni Plus proton precession magnetometer and VLF-EM receiver.

Base magnetometer: EDA Omni IV proton precession magnetometer. Gem GSM-19T proton precession magnetometer

Data processing: 486 laptop and HP340C colour printer. Data processing with Geopak software and proprietary data conversion software.

The crew spent a total of 3 man-days on the property. The geophysical survey log is attached as Appendix B.

4.0 SURVEY SPECIFICATIONS

The magnetometer and VLF-EM surveys were conducted according to the following specifications:

Station spacing: 12.5m

Base station magnetometer: installed on the survey grid and cycled at maximum 15 s throughout the survey.

VLF Survey: Transmitting station NLK (24.8KHz) at Jim Creek, WA was used as the primary (azimuth approximately 160°).

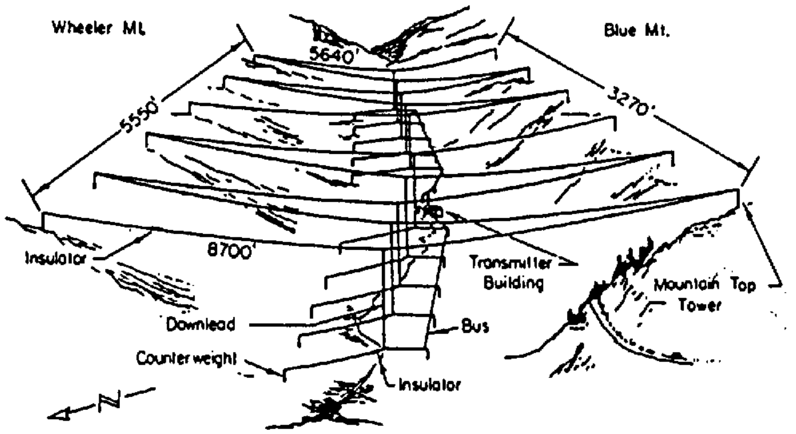
5.0 VLF-EM AND MAGNETIC FIELD THEORY

The VLF-EM method is well described in standard texts (eg. Telford *et. al.* 1990) and by McNeill and Labson (1990). Modulated radio waves in the range of 15.0 to 25.0 KHz are used to communicate with submerged submarines and are useful in mineral exploration. The antennas from which the signals are radiated are vertical wires, commonly located in valleys or craters to permit longer wire length (Figure VLF-1(a)). This antenna configuration generates a wave with a vertical electrical field and a horizontal magnetic field propagating away from the source. The wave propagates between the ionosphere and the earth's surface, reflecting off both at a shallow angle (Figure VLF-1(b)). At a great distance, the radius of curvature is so large that it is effectively a plane wave.

A steeply-dipping conductor with a strike in the direction of the transmitter will be optimally coupled to the horizontal magnetic flux. This magnetic flux will induce a secondary field in the conductor (H_s) which opposes the primary or source field. This is generated by circulating eddy currents which tend to concentrate at the top of the conductor (Figure VLF-2(a)). The current distribution can be considered to be a linear source located at the top of the conductor and consequently, the anomaly shape is relatively insensitive to the dip of conductor. The current at the top of the conductor produces a cylindrical magnetic field centred on the current axis. The primary horizontal magnetic field and the secondary field induced in the conductor add vectorially to produce a resultant magnetic field whose attitude traces out a sine wave or cross-over as shown in Figure VLF-2(a). The Omni Plus VLF-EM receiver used in this survey records the signal so that a normal in-phase component cross-over consists of a positive to negative response moving from grid west to east or grid south to north. The wavelength of the response in a general sense is proportional to the depth of the target. Deep targets tend to produce longer wavelength anomalies while shallow anomalies have a shorter wavelength. Half the distance between the peak and trough of the response is roughly equal to the depth to the current source except where the depth to the top of the target is much less than the skin depth. In this situation, the separation tends to be in the order of the skin depth.

Using the horizontal component as a phase reference, it is possible to partition the secondary vertical field into in-phase and quadrature components. If the conductor is a poor to moderate conductor, the sign of the quadrature will follow that of the in-phase component. If the target conductance is high, the quadrature will display a sign opposite that of the in-phase component (Figure VLF-2(b)).

(a)



(b)

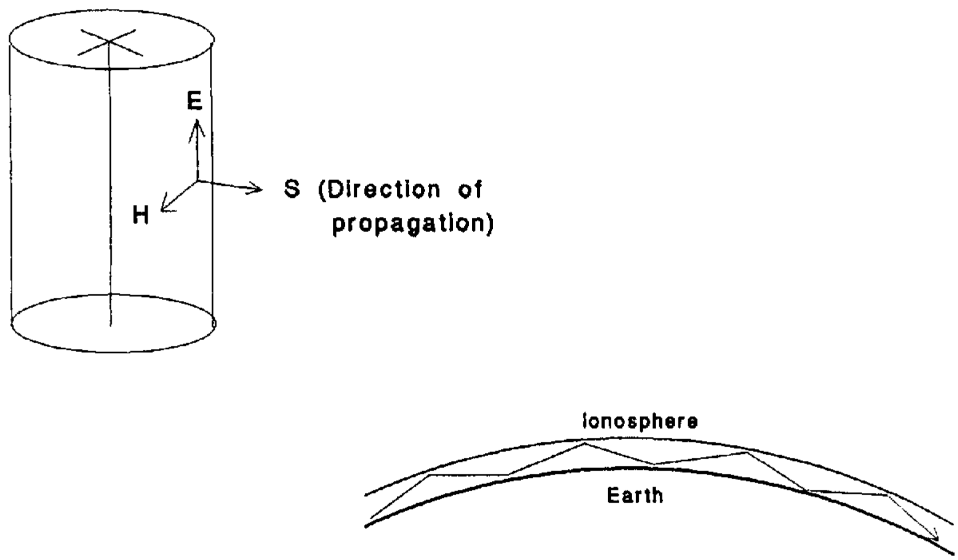


Figure VLF-1. VLF source fields and propagation. (a) Diagram showing Jim Creek, WA VLF transmitter (McNeill and Labson 1990). (b) Propagation of VLF field at a distance from the antenna. The VLF wave propagates between the earth's ionosphere and the surface with a vertical electrical field and horizontal magnetic field. At great distances the signal forms a plane wave.

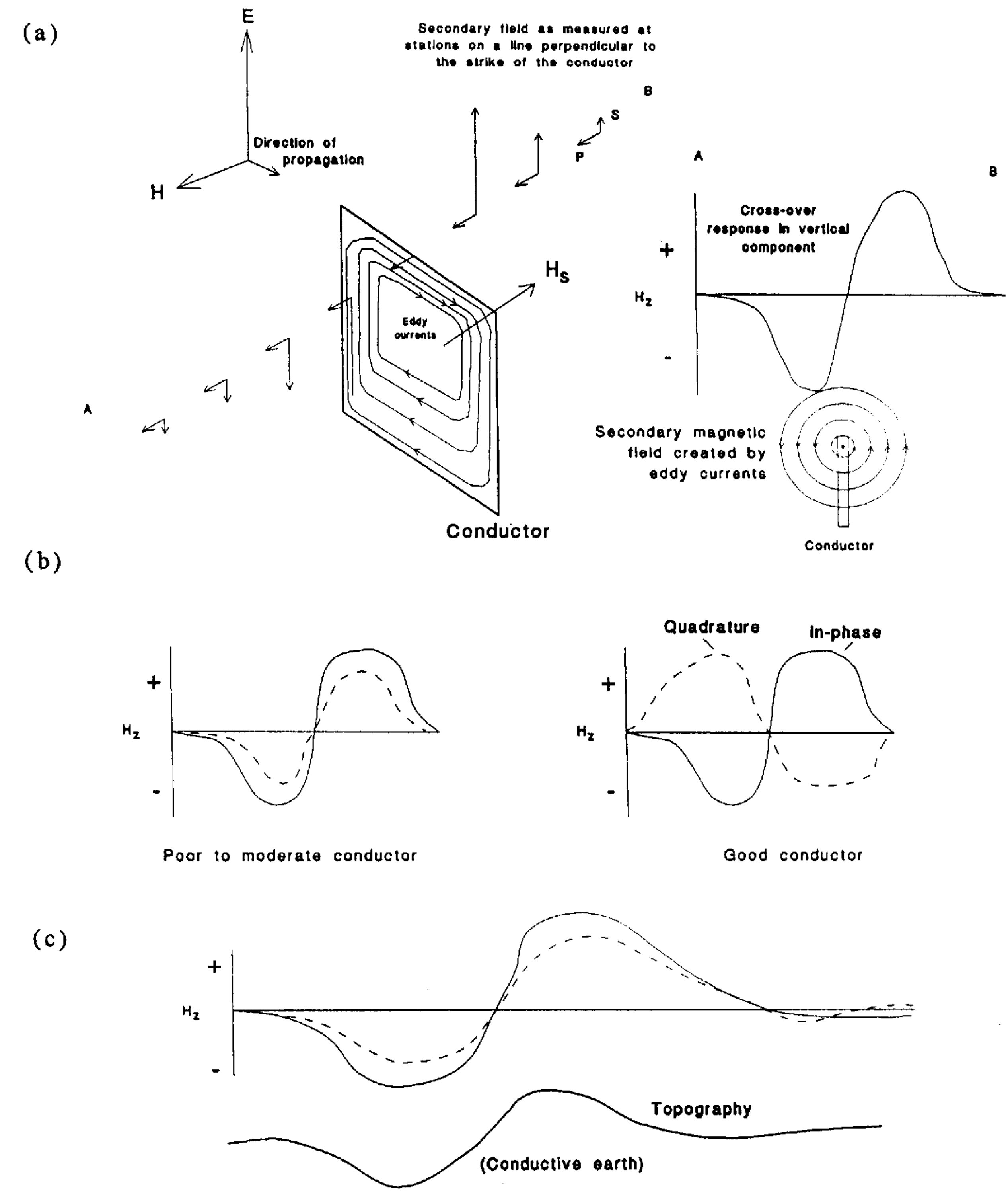


Figure VLF-2. VLF responses. (a) The horizontal magnetic flux from a VLF signal induces a secondary field in a conductor. This, together with the primary field, produces a cross-over response. (b) Quadrature sign can be determined by target conductance. (c) If the ground is conductive, topography can induce VLF responses similar to those expected from bedrock conductors.

Cross-over responses may also be induced by interfering responses from nearby conductors, sometimes producing false-crossovers with senses opposite to that normally occurring over a discrete conductor. In addition, topography can generate false cross-over responses. VLF-EM waves follow the surface topography to some extent with the degree of correlation determined by the conductivity of the local earth. In very conductive ground, the VLF wave follows topography quite closely and cross-over responses similar to those expected from a bedrock conductor can be generated by undulating topography with suitable spatial wavelengths (Figure VLF-2(c)). In poorly conductive ground, the wavelength of the topographic effect is much longer, reflecting the greater depth of penetration by the VLF-EM wave. In these situations, it is relatively easy to discriminate between bedrock conductors and topographic anomalies.

6.0 RESULTS

Digital data is appended to this report on disk. The magnetic field data is in the following format:

Line Station UTM_E UTM_N Corr_field

where Corr_field is the corrected magnetic field. The VLF-EM data is in the following format:

Line Station UTM_E UTM_N IP Q Slope

where IP and Q are the in-phase and quadrature component and slope is the terrain slope. IP, Q and Slope are recorded in percent.

The following plots at 1:4,000 are appended to this report in the back pockets:

Figure 1. Total magnetic field contour map

Figure 2. VLF-EM stacked profiles - Seattle

Figure 3. VLF-EM - contoured quadrature phase

The total magnetic field survey was affected by a base station failure on the first day. The lithium battery used to maintain the rail voltage in the memory chips failed and the data was lost during battery changing prior to dumping. As a result, the data from L9800N 7775E through L10600N 8000E (top third of the map) were not corrected for temporal geomagnetic variation. The data was levelled to the rest of the corrected data set over a limited overlap. The temporal geomagnetic variation over the next two days, as recorded on the replacement base station, was less than 30 nT over each survey period with no fluctuations. Geomagnetic forecasts for the period predicted quiet field conditions. In light of this, the levelled, uncorrected data was merged with the corrected data in the final plotting. The VLF field strength was acceptable throughout the survey and the apparent station azimuth based on an average of 193 records was 156$^{0.}$ The operator recorded terrain slope during the course of the VLF survey and the terrain slope is shown as a solid grey line in the stacked profiles.

The total magnetic field survey recorded relief in the order of 120 nT over the entire grid. A region of positive magnetic response in the eastern portion of the grid area is coincident with the dacite unit. There are several isolated positive anomalies west of the dacite including a high amplitude response on the extreme western portion of the grid at L9800N 7450E.

The VLF-EM response is characterized by a sloped in-phase component, increasing in slope from west to east and by a quadrature component showing a base level shift in the centre of the grid. Overall relief in the in-phase is in the order of 75% and the quadrature variation is roughly 25%. The in-phase component generally follows topography across the grid and is on the whole rather smooth. The quadrature component displays a shift in base level from negative values on the west to positive values on the east across an axis extending from L9900N 7700E to L8800N 7900E. There are small short wavelength quadrature peaks with wavelengths of 25 - 50 m at the inflection in quadrature. The quadrature anomalies have no associated in-phase peaks or, at best, very weak associated in-phase peaks. These responses are those expected at a contact between large, electrically resistive rock units showing only a small contrast in electrical resistivity. The quadrature inflection, shown in contour format in Figure 3, follows the inferred contact or fault separating dacite on the east from argillite on the west. The 1% quadrature line appears to indicate the contact most accurately.

The character of the geophysical response strongly suggests that the contact between the two rock units is stratigraphic and not structural. Faults usually produce discrete conductor responses consisting of an inflection in the in-phase and quadrature; there is no trace of this type of response at the contact in this data set.

West of the boundary is an enigmatic response extending from L9700N 7525E - 7700E to L9800N 7500E-7725E. The anomaly consists of a negative in-phase response superimposed on the larger overall regional anomaly and a strong positive response. The VLF-EM anomaly is in a second order magnetic field low, expressed as an embayment in the generally increasing field in this area. The response is difficult to interpret and does not resemble that expected of a moderately dipping bedrock conductor. This response is tentatively ascribed to conductive overburden or possibly to a flat to very gently dipping, shallow conductive rock unit.

7.0 CONCLUSIONS

The results of the magnetometer and VLF-EM surveys conducted on the RDN Claims suggest the following conclusions:

a. The contact between the dacite and argillite units is expressed as an inflection in the quadrature component, locally with a short wavelength positive inflection in the quadrature (± in-phase). This anomaly is that expected at the contact between rock units with contrasting and generally high electrical resistivity.

b. The anomaly at the contact strongly suggests that the dacite and argillite are in stratigraphic rather than fault contact. There is no indication of a discrete conductor response which, in this setting, would be an inflection from positive to negative (W to E) in either VLF-EM component.

c. An unusual VLF-EM anomaly consisting of a positive quadrature, negative in-phase response with no inflection in either component occurs on L9700N and L9800N. This is tentatively ascribed to conductive overburden or, less likely, to a flat to very shallow dipping bedrock conductor.

8.0 RECOMMENDATIONS

The following recommendations are made based on the conclusions of this work:

a. Induced polarization should be considered to identify drill targets along the argillite-dacite contact. The VLF survey suggests that the bedrock is relatively non-conductive and the style of mineralization expected in this setting may be non-conductive by virtue of its mineralogy and mineral habit. Deposits rich in sphalerite, galena, arsenopyrite and tetrahedrite are relatively non-conductive and this property may be exacerbated by electrical isolation of disseminated mineralization during deposition in an exhalite environment. The mineralization should respond to the IP method however although sphalerite can be a difficult target in conductive rocks. An IP survey would only be warranted if soil geochemistry fails to definitively locate a prospective target along the argillite - dacite contact.

Respectfully submitted,
AMEROK GEOSCIENCES LTD.

REGISTERED PROFESSIONAL GEOPHYSICIST
M. A. POWER
04 Aug 99
LICENSEE
N.W.T.

Michael A. Power, M.Sc. P.Geo.
Geophysicist

REFERENCES CITED

McNeill, J.D. and V.F. Labson (1990) Geological Mapping Using VLF Radio Fields. in: Nabighian, M.N. (ed.) Investigations in Geophysics No. 3. Electromagnetic Methods in Applied Geophysics. Volume 2, Application , Part B. Tulsa: Society of Exploration Geophysics.

Telford, W.M., L.P. Geldart and R.E. Sheriff (1990) Applied Geophysics (2nd Edition) New York: Cambridge University Press.

APPENDIX A. CERTIFICATE

I, Michael Allan Power, with residence and business address in Whitehorse, Yukon Territory do hereby certify that:

1. I hold a B.Sc. (Honours) in Geology granted in 1986 and M.Sc. in Geophysics granted in 1988, both from the University of Alberta.

2. I have been actively involved in mineral exploration in the northern Cordillera and in the Northwest Territories since 1988. I am a professional geoscientist registered with the Association of Professional Engineers and Geoscientists of British Columbia (Registration number 21131) and am a professional geophysicist licenced by the Northwest Territories Association of Professional Engineers, Geologists and Geophysicists (Licence L942).

3. I supervised the geophysical surveys described in this report, interpreted the data collected and prepared this report.

4. I have no interest, direct or indirect, nor do I hope to receive any interest, direct or indirect, in Equity Engineering Ltd. or any of its properties.

5. I hereby authorize Equity Engineering Ltd. to use this report or extracts therefrom in connection with any filing submitted to the Vancouver Stock Exchange and the British Columbia Securities Commission.

Dated this 4th day of August in Whitehorse, Yukon Territory.

PROFESSIONAL GEOPHYSICIST
N.W.T.
04AUG99

Michael A. Power, M.Sc. P.Geo.
Geophysicist

APPENDIX B. SURVEY LOG

Dan Hall - Field Technician

Fri 16 JUL 99	Mob Whitehorse - Bob Quinn - RDN fly camp
Sat 17 JUL 99	Bear and cub on grid, near camp. Set-up basestation 50 m from camp. Mag and VLF - Seattle (24.8) only. Hawaii (23.4) was off-air. Surveyed North end of grid, East of creek. Very steep ground (70-80% typical, up to 150% in places), and thick bush. Broken dump cable pin - repaired. Production: Lines 9800N - 10600N, Stns 7700-8100E Total: 2.4 line-km
Sun 18 JUL 99	Mag/VLF survey. Surveyed West side of creek, Lines 9400N-9900N and all of Lines 8700N-9300N. Omni basestation battery failed mid-afternoon, suspect faulty cell. Gem operated as back-up basestation, allowing for software correction of diurnal mag fluctuations. Production: Lines 8700N-9300N, Stns 7675E-7950E Lines 9400N-9900N, Stns 7450E-7750E Total: 3.5 line-km
Mon 19 JUL 99	Mag/VLF survey. Completed grid on east side of creek. Extremely steep, wet ground with cliffs and thick bush limited production. Grizzly and cub on the grid all day. Bear in camp again. Playing with her cub, for the crew's entertainment 70 m East of camp this evening. Production: Lines 9400N-9700N, Stns 7750E-8300E Total: 1.8 line-km
Tue 20 JUL 99	Demob to Whitehorse.

Production Totals: 7.7 line-km Mag/VLF

APPENDIX C. INSTRUMENT SPECIFICATIONS

OMNI PLUS VLF/Magnetometer System

EDA

Specifications*

Frequency Tuning Range	15 to 30 kHz, with bandwidth of 150 Hz; tuning range accommodates new Puerto Rico station at 28.5 kHz
Transmitting Stations Measured	Up to 3 stations can be automatically measured at any given grid location within frequency tuning range
Recorded VLF Magnetic Parameters	Total field strength, total dip, vertical quadrature (or alternately, horizontal amplitude)
Standard Memory Capacity	800 combined VLF magnetic and VLF electric measurements as well as gradiometer and magnetometer readings
Display	Custom designed, ruggedized liquid crystal display with built-in heater and an operating temperature range from −40°C to +55°C. The display contains six numeric digits, decimal point, battery status monitor, signal strength status monitor and function descriptors.
RS232C Serial I/O Interface	2400 baud rate, 8 data bits, 2 stop bits, no parity
Test Mode	A. Diagnostic Testing (data and programmable memory) B. Self Test (hardware)
Sensor Head	Contains 3 orthogonally mounted coils with automatic tilt compensation
Operating Environmental Range	−40°C to +55°C; 0 – 100% relative humidity; Weatherproof
Power Supply	Non-magnetic rechargeable sealed lead-acid 18V DC battery cartridge or belt; 18V DC disposable battery belt; 12V DC external power source for base station operation only.
Weights and Dimensions	
Instrument Console	2.8 kg, 128 x 150 x 250 mm
Sensor Head	2.1 kg, 130 dia. x 130 mm
VLF Electronics Module	1.1 kg, 40 x 150 x 250 mm
Lead Acid Battery Cartridge	1.8 kg, 235 x 105 x 90 mm
Lead Acid Battery Belt	1.8 kg, 540 x 100 x 40 mm
Disposable Battery Belt	1.2 kg, 540 x 100 x 40 mm

*Preliminary

EDA Instruments Inc.,
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Toronto, Ontario
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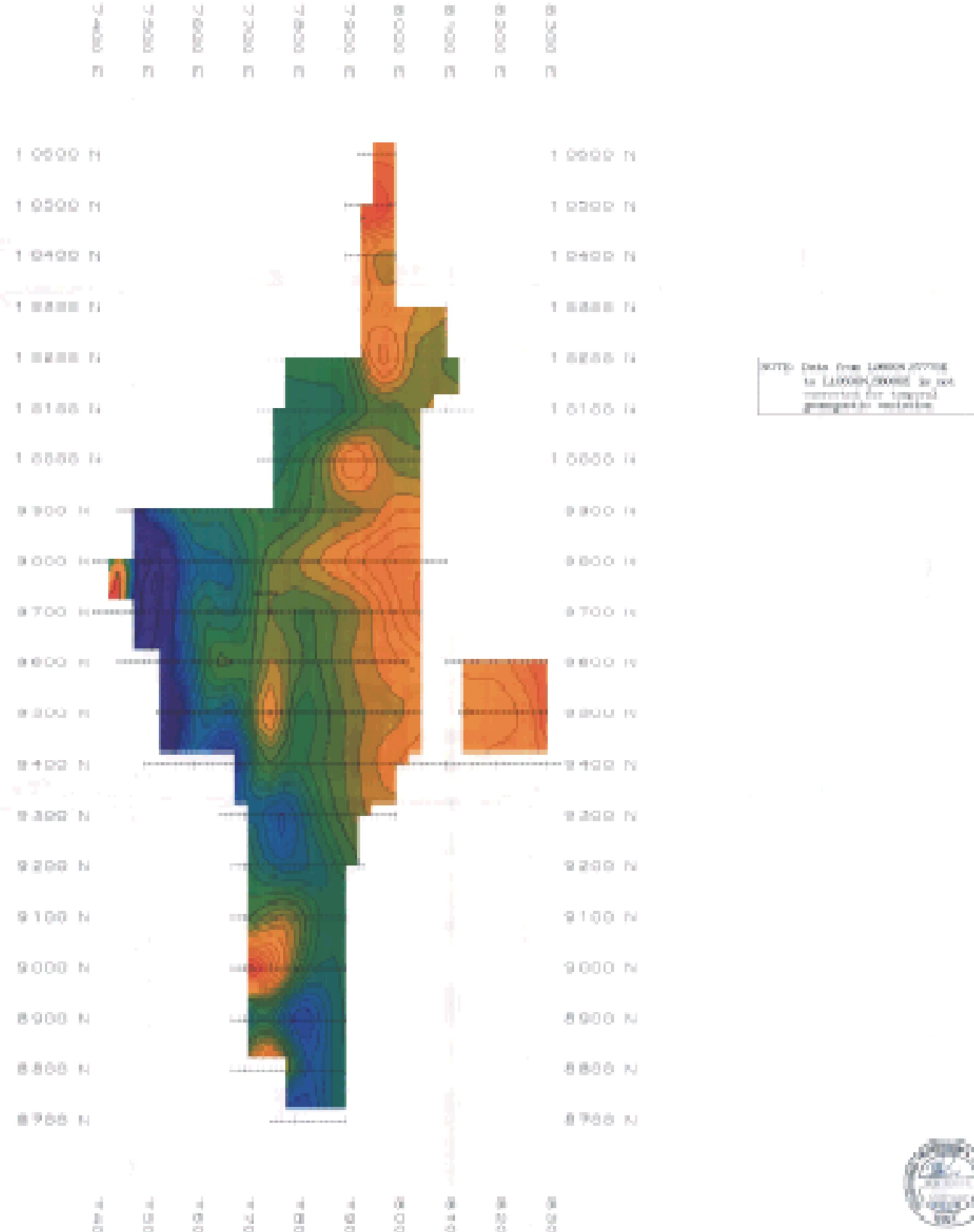
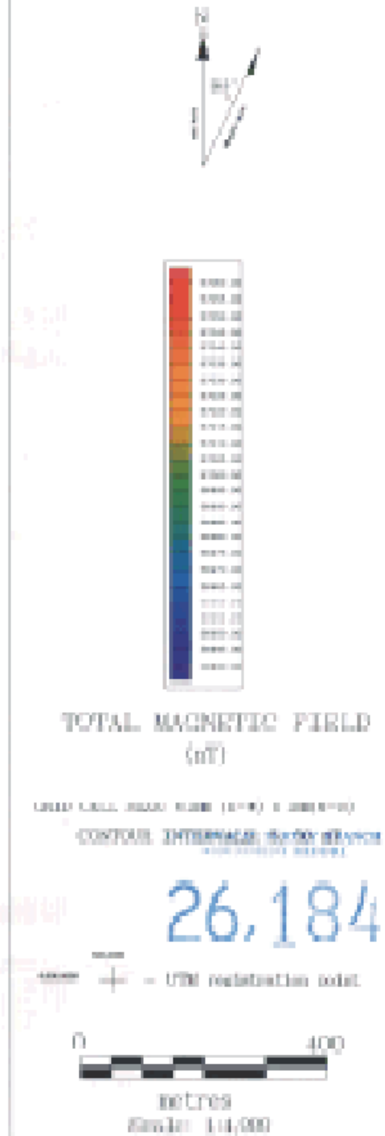
(303) 422-9112

Printed in Canada





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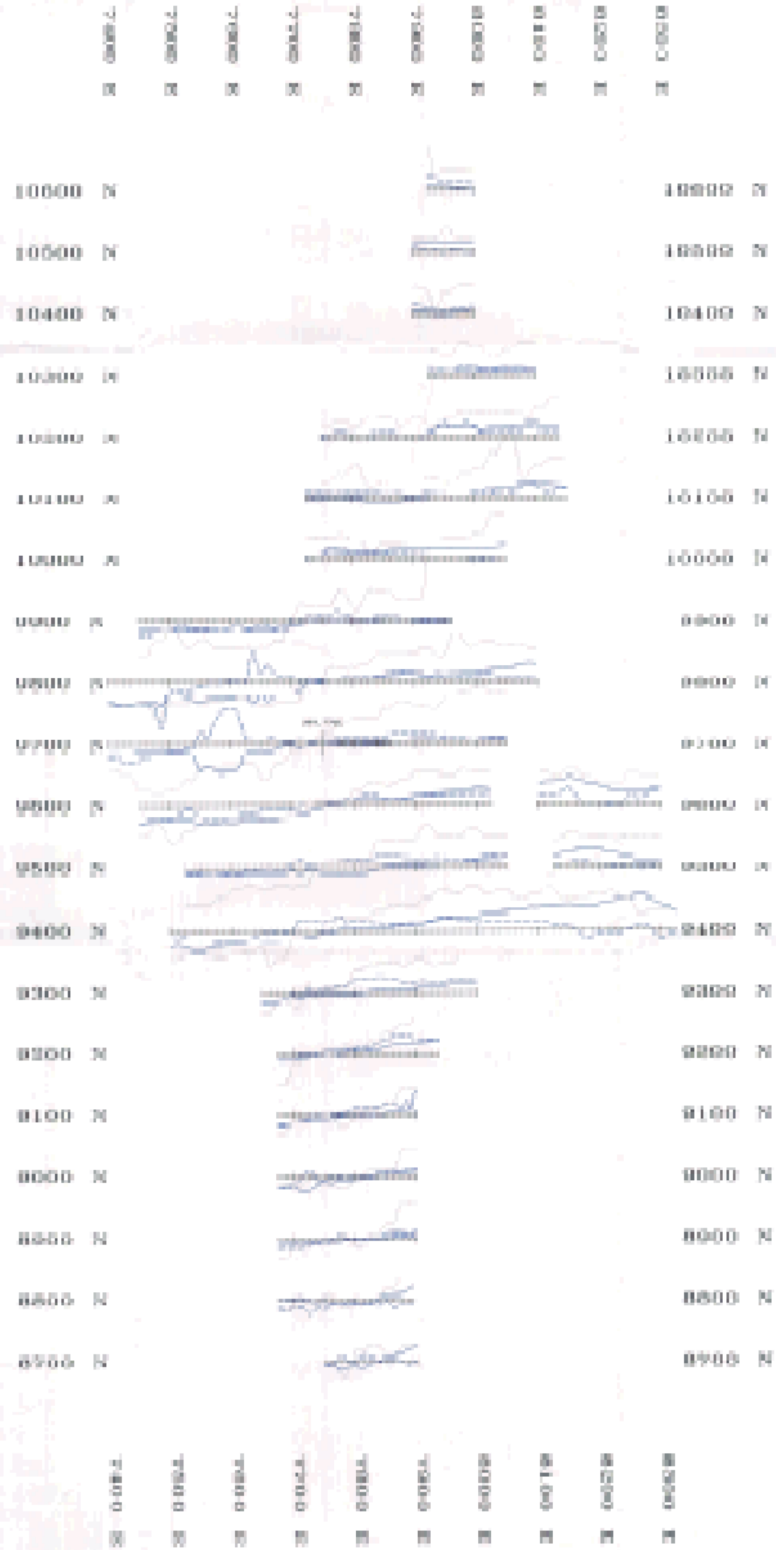
RDN 1-18

TOTAL MAGNETIC FIELD
COLOUR CONTOUR MAP
FIGURE 1

NTS: 104 G/ 2	Datum: NAD 83
Mining District: Liard Mining Division	
Job: 98-15	[illegible]

AMERUK GEOSCIENCES LTD.



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RDN 1-18

VLF-EM SURVEY
STACKED PROFILES
FIGURE 2.

NTS: 104 G/12	Datum: NAD 83
Job: 99-15	

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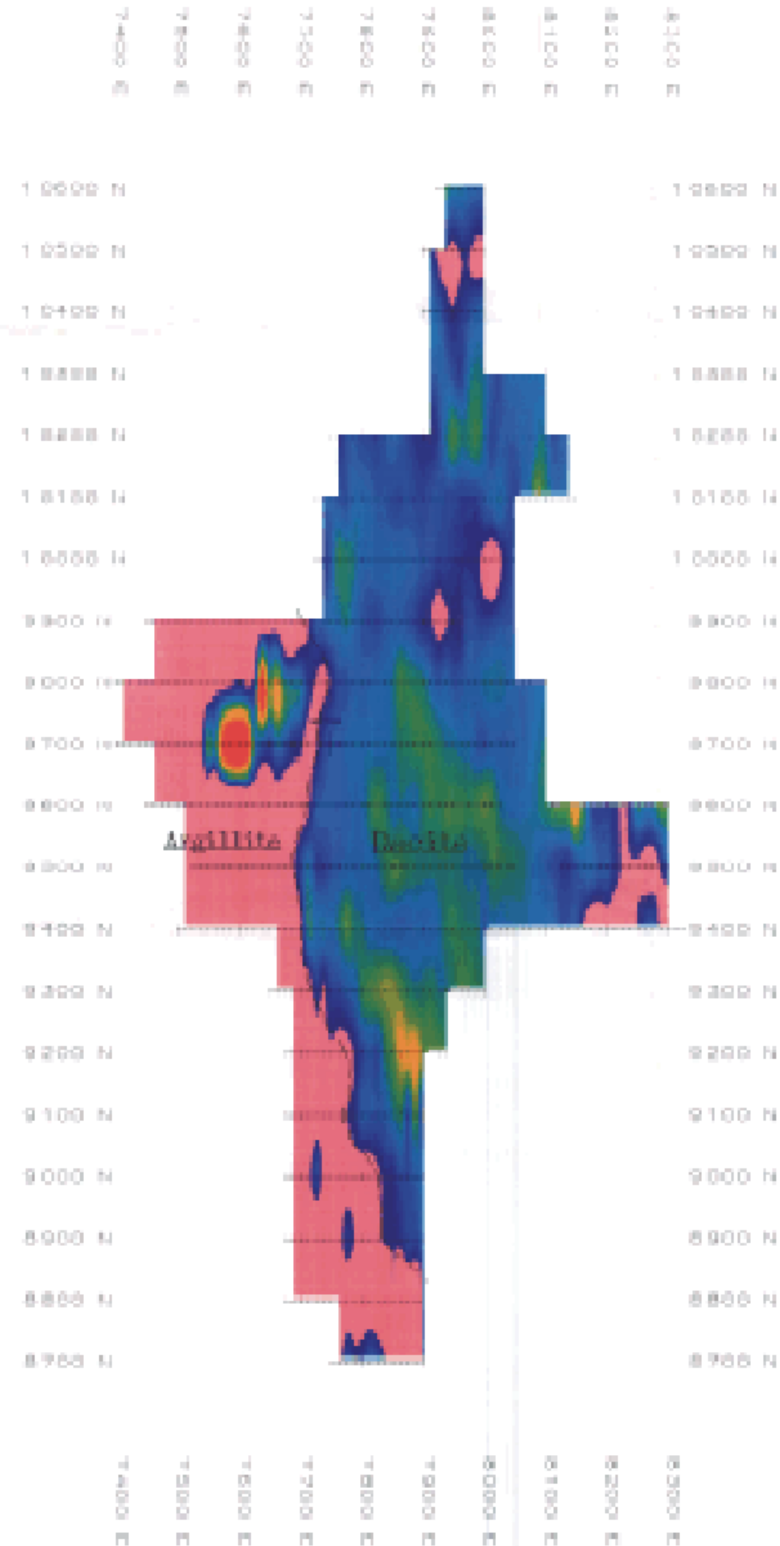

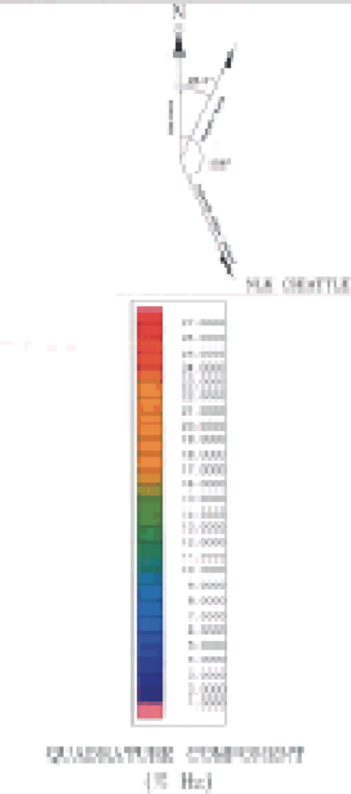

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metres
Scale: 1:4,000

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RDN 1-18

VLF-EM SURVEY
COLOUR CONTOUR MAP

NTS: 104 G/12	Datum: NAD 83
Mining District: Liard Mining Division	
Job: 99-15	

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