

Helicopter - Borne Magnetic and VLF Survey on the Indata Property, B.C.

Omineca Mining Division

NTS: 93N/6W

Latitude: 55 degrees 23 Longitude: 125 degrees 19

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Eastfield Resources Ltd.

May 1991

GEOLOGICAL BRANCH ASSESSMENT REPORT

21,397

TABLE OF CONTENTS	PAGE NO.
Introduction	1
Claim Status	1
Location and Access	1
History	2
Geology	2
Discussion and Conclusions	2
Appendix A - Statement of Qualifications	
Appendix B - Expenditure Statement	
Appendix C - Aerodat Report - Anthony E. Valentini	
LIST OF MAPS	MAP NO.
Claim Map	1
Regional Geology Map	2
Total Field Magnetic Contours (North half)	3-1
Total Field Magnetic Contours (South half)	3-2
Calculated Vertical Magnetic Gradient (North half)	4-1
Calculated Vertical Magnetic Gradient (South half)	4-2
VLF-EM Total Field Contours (North half)	5-1
VIE-FW Total Field Contours (South half)	5-2

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INTRODUCTION

Aerodat Limited of Mississauga, Ontario was contracted by Eastfield Resources Ltd. to undertake a helicopter borne magnetic and VLF-EM survey over the Indata property. The flying was carried out during July, 1990. Data was then compiled and a report delivered August 9, 1990. Approximately 595 line kilometres of survey were flown on lines spaced 100 meters apart. A report by Anthony Valentini of Aerodat is included in Appendix C of this report.

The data indicates several positive features that are interpreted to be caused by intrusive bodies. A number of linear features that trend northwesterly or northerly are interpreted to be caused by dykes or serpentinite bodies which are localized in fault zones.

CLAIM STATUS

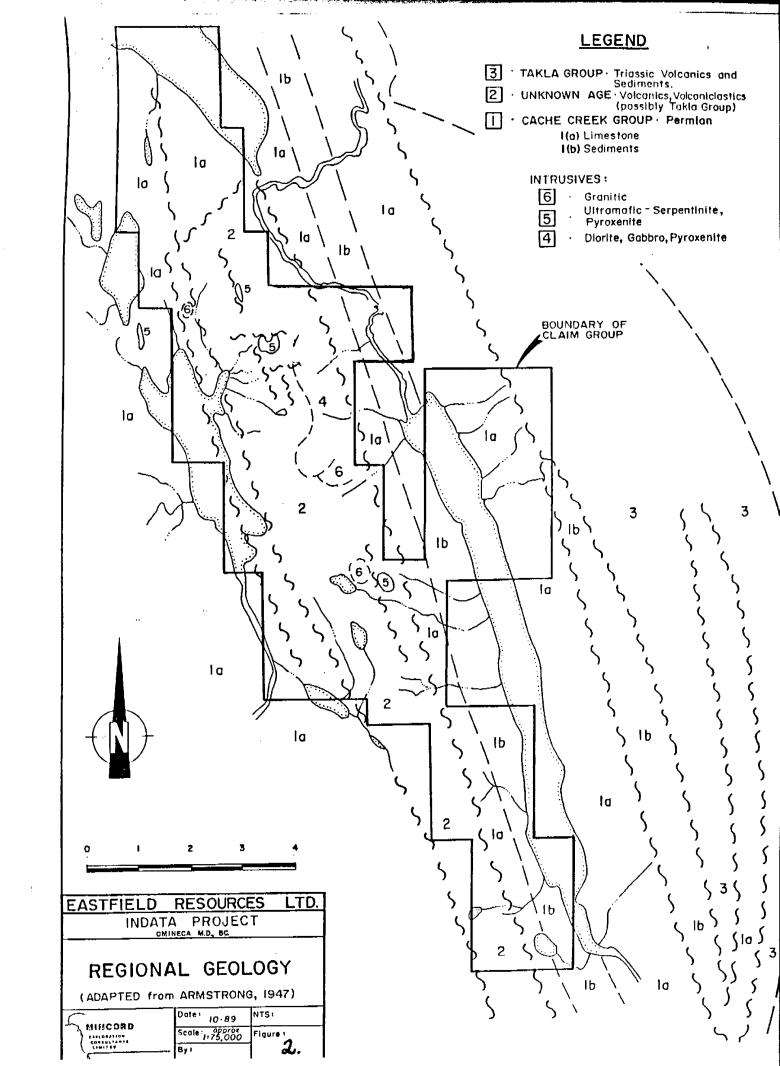
The Indata property comprises 15 claims totalling 249 units.

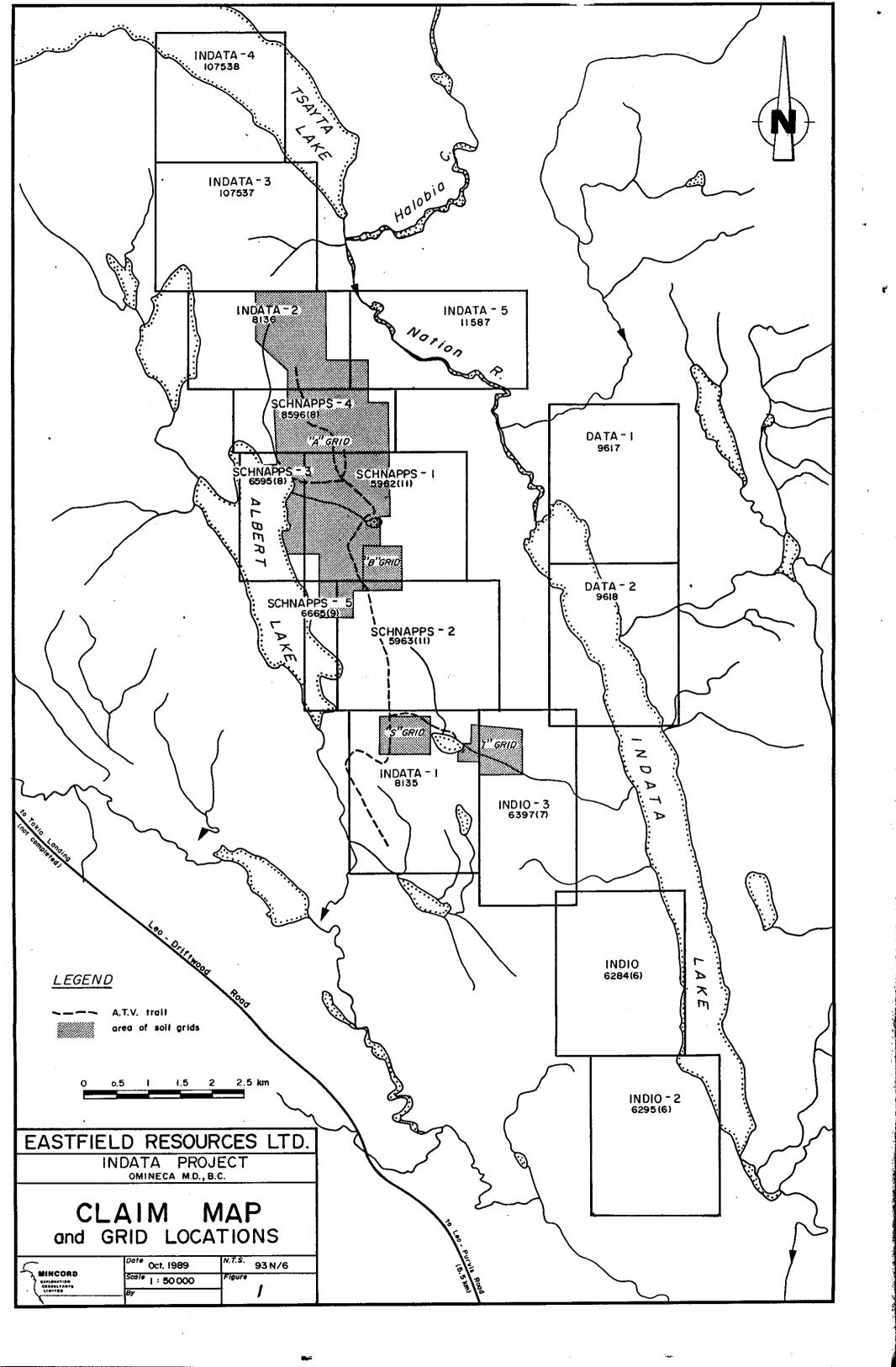
Claim Name	Record No.	Units	Expiry Date
Data 1	9617	20	July 22, 1992
Data 2	9618	20	July 22, 1992
Schnapps 1	5962	20	Nov 14, 1995
Schnapps 2	5963	20	Nov 14, 1995
Schnapps 3	6595	8	Aug 20, 1995
Schnapps 4	6596	10	Aug 20, 1995
Schnapps 5	6665	4	Sept 13, 1995
Indio	6294	20	June 22, 1993
Indio 2	9619	20	July 22, 1993
Indio 3	6397	18	July 17, 1993
Indata 1	8135	20	Feb 3, 1995
Indata 2	8136	15	Feb 3, 1995
Indata 3	9960	20	Oct 22, 199 5
Indata 4	9961	16	Oct 22, 1995
Indata 5	111932	18	April 4, 1994

LOCATION AND ACCESS

The Indata property is located approximately 130 kilometres northwest of Fort St. James. Access to the property is via all weather forest access roads which extend to within 3 kilometres of the property (Leo-Driftwood Road).

The Indata property lies within a region of subdued relief in which elevations vary from 885 to 1,290 meters (2,900 to 4,230 feet). Vegetation is dominantly coniferous forest and the entire property occurs below tree line.





HISTORY

Schnapps 1 and 2 claims were staked in November Imperial Metals Corporation during a regional exploration program along the Pinchi Fault. Additional claims were staked in 1984 following the release of the government geochemical sheet for the area which indicated a highly anomalous silt sample from the In 1984, Imperial Metals completed a outflow of Radio Lake. preliminary geochemical soil survey and outlined a very strong soil copper anomaly north and east of Albert Lake as well as anomalous arsenic values on the eastern edges of their soil In 1985, Imperial Metals Corporation survey. additional geochemical soil sampling, preliminary geological mapping, 6 kilometres of induced polarization survey and 4 diamond drill holes totalling 231 meters. Eastfield acquired title to the Indata property in 1986 and in 1987 expanded the geochemical and geophysical grids before completing limited hand trenching and a 6 hole diamond drill program (306 meters). quartz sulphide zone varying from 5 to 7 meters in width was exposed in hand trenches and confirmed in 5 of 6 drill holes. completed additional Eastfield Resources 1989 geochemical and geophysical surveys and an additional 36 drill core holes (3,930 meters).

GEOLOGY

The Indata region is underlain by two major terrains, Quesnellia to the east and the Cache Creek Terrain to the west. The two terrains are separated by the Pinchi Fault Zone, a major structural feature which can be traced for over 300 kilometres along the western margin of Quesnellia. This fault zone is at least 4 kilometres wide in the vicinity of the Indata property and has profoundly affected it.

The region was initially mapped by Armstrong (1947) who considered that the terrane west of the Pinchi Fault was underlain entirely by metasedimentary rocks and carbonate of the Cache Creek Group, intruded by granodioritic plugs and stocks related to the Topley and Omineca intrusive suites. Recent work, however, has shown that while Permian Cache Creek limestone is the dominant lithology of the Indata region, mafic volcanic rocks underlie a considerable part of the claim group. Intrusive rocks including granodiorite, diorite and gabbro underlie much of the Indata property and are believed to be the cause of thermal metamorphism of the volcanic sequence.

DISCUSSION AND CONCLUSIONS

A prominent linear feature trends due north for approximately 3.5 kilometres from grid station 12+00 North 2+00 East. This feature is known to be partially caused by serpentinite bodies which are believed to define the location of a fault zone. The discovery vein is likewise north-south trending and although not clearly

defined by the survey has been exposed in a trench as far north as grid location 6+00 North 3+75 East. It is suspected the linear is a continuation of this mineralized geophysical structure. A major east-west (080 degrees) break intersects the base line at approximately 22+00 North. An arcuate linear obvious for approximately 7 kilometres and partially covered by Albert Lake is believed to reflect a major western bounding structure. A positive magnetic feature approximately 500 meters in diameter is centered at grid location 4+00 North 4+00 West where strong copper mineralization occurs in altered mafic Numerous other linear or positive or negative the survey and require field indicated in features are evaluation.

APPENDIX A STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

- I, James William Morton, of 771 Morgan Road, North Vancouver, British Columbia, do hereby certify:
- 1. I graduated from Carleton University, Ottawa, in 1971 with a Bachelor of Science in Geology.
- I graduated from the University of British Columbia, Vancouver, in 1976 with a Master of Science in Soil Science.
- 3. I am a fellow of the Geological Association of Canada.
- 4. I supervised the work described in this report.

J. W. Morton, M.Sc., F.G.A.C.

Dated at Vancouver, British Columbia, this 29th day of May, 1991.

APPENDIX B
EXPENDITURE STATEMENT

Appendix B

EXPENDITURE STATEMENT

Sub Contractor Geophysical

Aerodat

\$ 25,895.00

TOTAL

\$ 25,895.00

APPENDIX C
AERODAT REPORT

REPORT ON COMBINED HELICOPTER-BORNE MAGNETIC AND VLF SURVEY INDATA LAKE BRITISH COLUMBIA

FOR
EASTFIELD RESOURCES LIMITED
BY
AERODAT
August 9, 1990

Anthony E. Valentini Geophysicist

TABLE OF CONTENTS

			Page No.
1.	INTI	RODUCTION	1-1
2.	SUR	VEY AREA LOCATION	2-1
3.	AIRO	CRAFT AND EQUIPMENT	
	3.1	Aircraft	3-1
	3.2	Equipment	3-1
		3.2.1 VLF-EM System	3-1
		3.2.2 Magnetometer System	3-1
		3.2.3 Magnetic Base Station	3-2
		3.2.4 Altimeter System	3-2
		3.2.5 Tracking Camera	3-2
		3.2.6 Analog Recorder	3-3
		3.2.7 Digital Recorder	3-3
		3.2.8 Radar Positioning System	3-4
4.	DAT	A PRESENTATION	
	4.1	Base Map	4-1
	4.2	Flight Path	4-1
	4.3	Magnetics	4-1
		Total Field	4-1
		Vertical Gradient	4-2
	4.4	VLF-EM Total Field	4-3

APPENDIX I - Personnel

APPENDIX II - General Interpretive Considerations

<u>List of Maps</u> (Scale 1:10,000)

Basic Maps: (As described under Appendix B of the Contract)

- 1. ORTHO-PHOTOMOSAIC BASE MAP;
 Prepared from available air photos and photographically enlarged to 1:10,000 scale.
- 2. FLIGHT LINE MAP;
 Showing all flight lines and fiducials with the base map.
- 3. TOTAL FIELD MAGNETIC CONTOURS;
 Showing magnetic values corrected of all diurnal variation with flight lines, fiducials, and base map.
- 4. VERTICAL MAGNETIC GRADIENT CONTOURS;
 Showing magnetic gradient values calculated from the total field magnetics with flight lines, fiducials and base map.
- 5. VLF-EM TOTAL FIELD CONTOURS;
 Showing VLF total field response from the line transmitter with flight lines, fiducials, and base map.

1. INTRODUCTION

This report describes an airborne geophysical survey carried out on behalf of Eastfield Resources Ltd. by Aerodat Limited. Equipment operated during the survey included a high sensitivity cesium vapour magnetometer, a two frequency VLF-EM system, a video tracking camera, radar altimeter, and an electronic positioning system. Magnetic and altimeter data were recorded both in digital and analog forms. Positioning data was stored in digital form, encoded on VHS format video tape and recorded at regular intervals in local UTM coordinates, as well as being marked on the flight path mosaic by the operator while in flight.

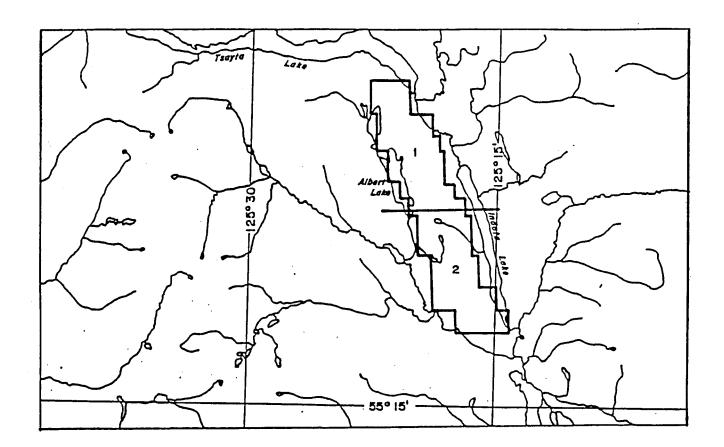
The survey area is located in the Chuchi Lake/Germansen Lake areas approximately 150 kilometres north of Fort Fraser, British Columbia. The Indata claims were flown July 6-7 and 14-16, 1990. Data from thirteen flights were used to compile the survey results. The flight lines were oriented at an angle of 90 degrees, with a nominal line spacing of 100 metres (according to Appendix "A" of the contract). Geophysical information is provided in the form of maps at 1:10,000. Coverage and data quality were considered to be well within the specifications described in the service contract.

The purpose of the survey was to record airborne geophysical data over ground that is of interest to Eastfield Resources Ltd.

A total of 595 line kilometres of the recorded data were compiled in a map form. The maps are presented as part of this report according to specifications laid out by Eastfield Resources Ltd.

2. SURVEY AREA LOCATION

The survey areas are depicted on the index maps shown below. The survey area is centred at approximate geographic latitude 55 degrees 22 minutes North, longitude 125 degrees 18 minutes West.



3. AIRCRAFT AND EQUIPMENT

3.1 Aircrast

An Aerospatiale A-Star 350 B helicopter, (C-GNNH), piloted by R. Mitchinson owned and operated by Peace Helicopters Limited, was used for the survey. Peter Moore and Lori Moore of Aerodat acted as navigator and equipment operator. Installation of the geophysical and ancillary equipment was carried out by Aerodat. The survey equipment was flown at a mean terrain clearance of 60 metres.

3.2 Equipment

3.2.1 <u>VLF-EM System</u>

The VLF-EM System was a Herz Totem 2 A. This instrument measures the total field and quadrature component of the selected frequency. The sensor was towed in a bird 30 metres below the helicopter.

3.2.2 <u>Magnetometer System</u>

The magnetometer employed a Scintrex Model VIW 2321 H8 cesium, optically pumped magnetometer sensor. The sensitivity of this instrument was 0.1 nanoTeslas. The sensor was towed in a bird 30 metres below the helicopter.

3.2.3 Magnetic Base Station

An IFG proton precession magnetometer was operated at the base of operations to record diurnal variations of the earth's magnetic field. The clock of the base station was synchronized with that of the airborne system to facilitate later correlation.

3.2.4 Altimeter System

A King KRA 10 radar altimeter was used to record terrain clearance. The output from the instrument is a linear function of altitude for maximum accuracy.

3.2.5 Tracking Camera

A Panasonic video flight path recording system was used to record the flight path on standard VHS format video tapes. The system was operated in continuous mode and the flight number, real time and manual fiducials were registered on the picture frame for cross-reference to the analog and digital data.

3.2.6 Analog Recorder

An RMS dot-Matrix recorder was used to display the data during the survey. In addition to manual and time fiducials, the following data was recorded:

Channel	Input	Scale
VLT	VLF-EM Total Field, Line	25 %/cm
VLQ	VLF-EM Quadrature, Line	25 %/cm
VOT	VLF-EM Total Field, Ortho	25 %/cm
VOQ	VLF-EM Quadrature, Ortho	25 %/cm
RALT	Radar Altimeter	100 ft./cm
MAGF	Magnetometer, fine	25 nT/cm
MAGC	Magnetometer, coarse	250 nT/cm

3.2.7 <u>Digital Recorder</u>

A DGR 33:16 data system recorded the survey on magnetic tape. Information recorded was as follows:

<u>Equipment</u>	Recording Interval
VLF-EM	0.20 seconds
Magnetometer	0.20 seconds
Altimeter	0.20 seconds
Nav System	0.20 seconds

3.2.8 Radar Positioning System

A Mini-Ranger MRS-III radar navigation system was used for both navigation and flight path recovery. Transponders sited at fixed locations were interrogated several times per second and the ranges from these points to the helicopter were measured to a high degree of accuracy. A navigational computer triangulated the position of the helicopter and provided the pilot with navigation information. The range/range data was recorded on magnetic tape for subsequent flight path determination.

4. <u>DATA PRESENTATION</u>

4.1 Base Map

An ortho-photomosaic base at a scale of 1:10,000 was prepared from available air photos and enlarged to the required scale.

4.2 Flight Path Map

The flight path was derived from the Mini-Ranger radar positioning system. The distance from the helicopter to two established reference locations was measured several times per second and the position of the helicopter was calculated by triangulation. It is estimated that the flight path is generally accurate to about 10 metres with respect to the topographic detail on the base map.

The flight lines have the time, and the navigator's manual fiducials for cross reference to both analog and digital data.

4.3 Magnetics

4.3.1 Total Field Magnetic Contour Map

The magnetic data from the high sensitivity cesium magnetometer provided virtually a continuous magnetic reading when recording at 0.2 second intervals. The system is also noise free for all practical purposes.

A sensitivity of 0.1 nanoTesla (nT) allows for the mapping of very small inflections in the magnetic field, resulting in a contour map that is equal to or exceeds ground data in quality and accuracy.

The aeromagnetic data was corrected for diurnal variations by adjustment with the digitally recorded base station magnetic values. No correction for regional variation was applied. The corrected data was interpolated onto a regular grid at a 25 metre true scale interval using an Akima spline technique. This grid provided the basis for threading the presented contours at a 5 nT interval.

The contoured aeromagnetic data has been presented on a Cronaflex copy of the base map with flight lines.

4.3.2 <u>Vertical Gradient Contour Map</u>

The vertical magnetic gradient was calculated from the total field magnetic data. Contoured at a 0.5 nT/m interval, the data was presented on a cronaflex copy of the base map with flight lines.

4.4 <u>VLF-EM Total Field Contours</u>

The VLF data was interpolated onto a regular grid at a 25 metre true scale interval using an Akima spline technique. This grid provided the basis for threading the contours at a 1% interval.

The VLF-EM signal from the line transmitting station was compiled as contours in map form on cronaflex copies of the base map with flight lines.

The transmitting station used was NSS, Annapolis, Maryland, broadcasting at 21.4 kHz.

The orthogonal VLF station used was NLK, Seattle, Washington, broadcasting at 24.8 kHz.

Respectfully submitted,

Anthony E. Valentini Geophysicist

Mhong E. Vilenteni

August 9, 1990

APPENDIX I

PERSONNEL

FIELD

Flown

July, 1990

Pilot

R. Mitchinson

Operator

Peter Moore Lori Moore

OFFICE

Processing

A. E. Valentini

R. Steiner

G. McDonald

Report

A. E. Valentini

APPENDIX II

GENERAL INTERPRETIVE CONSIDERATIONS

Magnetics

A digital base station magnetometer was used to detect fluctuations in the magnetic field during flight times. The airborne magnetic data was levelled by removing these diurnal changes. The Total Field Magnetic map shows the levelled magnetic contours, uncorrected for regional variation.

The Calculated Vertical Gradient map shows contours of the magnetic gradient as calculated from the total field magnetic data. The zero contour shows changes in the magnetic lithologies and will coincide closely with geologic contacts assuming a steeply dipping interface. Thus this data may be used as a pseudo-geologic map.

VLF Electromagnetics

The VLF-EM method employs the radiation from powerful military radio transmitters as the primary signals. The magnetic field associated with the primary field is elliptically polarized in the vicinity of electrical conductors. The Herz Totem uses three coils in the X, Y, Z configuration to measure the total field and vertical quadrature component of the polarization ellipse.

The relatively high frequency of VLF (15-25) kHz provides high response factors for bodies of low conductance. Relatively "disconnected" sulphide ores have been found to produce measurable VLF signals. For the same reason, poor conductors such as sheared

contacts, breccia zones, narrow faults, alteration zones and porous flow tops normally produce VLF anomalies. The method can therefore be used effectively for geological mapping. The only relative disadvantage of the method lies in its sensitivity to conductive overburden. In conductive ground to depth of exploration is severely limited.

The effect of strike direction is important in the sense of the relation of the conductor axis relative to the energizing electromagnetic field. A conductor aligned along a radius drawn from a transmitting station will be in a maximum coupled orientation and thereby produce a stronger response than a similar conductor at a different strike angle. Theoretically, it would be possible for a conductor, oriented tangentially to the transmitter to produce no signal. The most obvious effect of the strike angle consideration is that conductors favourably oriented with respect to the transmitter location and also near perpendicular to the flight direction are most clearly rendered and usually dominate the map presentation.

The total field response is an indicator of the existence and position of a conductivity anomaly. The response will be a maximum over the conductor, without any special filtering, and strongly favour the upper edge of the conductor even in the case of a relatively shallow dip.

The vertical quadrature component over steeply dipping sheet-like conductor will be a cross-over type response with the cross-over closely associated with the upper edge of the conductor.

The response is a cross-over type due to the fact that it is the vertical rather than total field quadrature component that is measured. The response shape is due largely to geometrical rather than conductivity considerations and the distance between the maximum and minimum on either side of the cross-over is related to target depth. For a given target geometry, the larger this distance the greater the depth.

The amplitude of the quadrature response, as opposed to shape is function of target conductance and depth as well as the conductivity of the overburden and host rock. As the primary field travels down to the conductor through conductive material it is both attenuated and phase shifted in a negative sense. The secondary field produced by thisaltered field at the target also has an associated phase shift. This phase shift is positive and is larger for relatively poor conductors. This secondary field is attenuated and phase shifted in a negative sense during return travel to the surface. The net effect of these 3 phase shifts determine the phase of the secondary field sensed at the receiver.

A relatively poor conductor in resistive ground will yield a net positive phase shift. A relatively good conductor in more conductive ground will yield a net negative phase shift. A combination is possible whereby the net phase shift is zero and the response is purely in-phase with no quadrature component.

A net positive phase shift combined with the geometrical cross-over shape will lead to a positive quadrature response on the side of approach and a negative on the side of departure. A net negative phase shift would produce the reverse. A further sign reversal occurs with a 180 degree change in instrument orientation as occurs on reciprocal line headings. During digital processing of the quadrature data for map presentation this is corrected for by normalizing the sign to one of the flight line headings.





Flight Path Navigation and recovery using a Motorola Mini-Ranger (MRS III) navigation system.

Average terrain clearance 60m Average line spacing 100m

Magnetics

Total Field Magnetic Intensity Contours in nT. Cesium high sensitivity magnetometer. Sensor elevation 45m

Map contours are multiples of those listed below

EASTFIELD RESOURCES LTD

TOTAL FIELD MAGNETIC CONTOURS

INDATA LAKE

AERODAT LIMITED NTS No: 93 N/6

MAP No: 3

