	and the statistical data and the second statements
LOG NO: 11-23	RD.
ACTION:	
FILE NO:	

AIRBORNE GEOPHYSICAL REPORT

on the

NELL PROPERTY

for

EASTFIELD RESOURCES LTD.

by

MINCORD EXPLORATION CONSULTANTS LTD.

GEOLOGICAL BRANCH ASSESSMENT REPORT

20.512

Omineca Mining Division NTS: 93N/11 Latitude: 55 degrees 43'N Longitude: 125 degrees 16'W

G. L. Garratt, P. Geol., FGAC November, 1990

Table of Contents

Page No.

Introduction
Location and Access1
Claim Status1
History1
Ge ology
Airborne Magnetic and VLF-EM Survey - Discussion and Conclusions

Figures

- 1. Location Map (approx. 1:7.5 million)
- 2. Claim Location Map (1:50,000)
- 3. Regional Geology Map (1:125,000)

Appendices

- 1. Statement of Qualification
- 2. Statement of Expenditures
- 3. Aerodat Report on Combined Helicopter-Borne Magnetic and VLF Survey by M.B. Marshall.
- 4. References

Attachments

Base Maps

- 1. Orthophoto (1:10,000)
- 2. Topographic Contour Map (1:10,000)

Airborne Survey Maps

- 1, Flight Path Map (1:10,000)
- 2. Total Field Magnetic Contours (1:10,000)
- 3. Calculated Vertical Magnetic Gradient (1:10,000)
- 4. VLF-EM Total Field Contours (Line Channel) (1:10,000)



INTRODUCTION

Aerodat Limited, of Mississauga, Ontario, was contracted by Eastfield Resources Ltd., of Vancouver, B.C., to undertake an airborne geophysical survey over the Nell property. The survey was flown from July 16 to August 21, 1990 on lines bearing 090 degrees at a line spacing of 100 meters. The survey extended beyond the property to the northwest, comprising approximately twenty per cent of the survey area. Approximately 200 line kilometers of survey were completed. A report by M.B. Marshall, of Aerodat, may be found in appendix 4 and outlines the specifications of the survey.

The magnetometer survey results offer a complex pattern within which are some highs (>58,500 gammas) that may indicate intrusive bodies or magnetized volcanics. These maps will be used in future geologic mapping programs. The VLF-EM data suggests an area in the central and northern portion of the survey of distinct linear anomalously high zones. The nature of these features is unknown, due to preliminary levels of exploration on the property.

LOCATION AND ACCESS

The Nell property lies approximately 150 air kilometers north of Ft. St. James in N.T.S. map sheet 93N/11, at latitude 55 degrees 43'N and longitude 125 degrees 16'W. Access to the property is by helicopter which were available during the 1990 summer season from Tchentlo Lake, Chuchi Lake or Silver Creek helicopter bases. The property lies immediately south of the Omineca River and north of the headwaters of Twin Creek, in the Hogem Ranges of the Omineca Mountains. Two-wheel drive road access from Ft. St. James, along the Manson Creek and Takla Landing roads, gains access to within ten kilometers of the property.

CLAIM STATUS

The Nell claims, totalling 82 units, are 100% owned by Eastfield Resources Ltd. The pertinent claim data follows:

<u>Claim Name</u>	<u>No. of Units</u>	Record No	Expiry Date
Nell	20	11076	09/10/93
Nell 2	4	11588	04/03/93
Nell 3	18	11589	04/03/92
Nell 4	20	11590	04/03/92
Nell 5	20	11591	04/04/92

HISTORY

The Nell property was previously explored by Imperial Metals Corporation in 1986. The claims, known as the North Slope, were staked on the premise of copper-gold stream sediment geochemical anomalies outlined by a reconnaissance exploration program.



Imperial carried out reconnaissance level prospecting and rock sampling and emplacement of a soil grid resulting in the analyses of 445 soil and 48 rocks. This work outlined significant copper (>100 ppm) and gold (>50 ppb) in soil anomalies and returned rock grab sample values up to 1.68% Cu/0.003 oz/ton Au and 0.85% Cu/0.026 oz/ton Au.

The first reported work on the property was by North Star Explorations Ltd. on the Bob claims in 1966. The Bob claims were located along the ridge at the eastern boundary of the Nell claims. North Star undertook limited geologic mapping and rock sampling with sample results of 1 to 4% Cu and 0.02 oz/ton Au.

GEOLOGY

The Nell property is underlain by volcanic rocks of the Triassic Takla Group and intrusive rocks of the Triassic-Jurassic Hogem Batholith. According to Taylor and Gorc (1986), the volcanic rocks are andesites to basalts ranging from fine grained to hornblende and feldspar phyric and are dominantly flows. Alteration in the volcanics was reported as propylitic with local areas displaying up to 60% epidote. Small veinlets of potassium feldspar have been observed locally. Intrusives of the Hogem Batholith observed locally on the property are reported as granodiorite, granite and quartz-feldspar porphyry by Taylor and Gorc (1986), as quartz monzonite by Dirom (1966) and as symboliorite and granodiorite by Armstrong (1949). Dirom (1966) reports that fine grained volcanic rocks locally resemble microdiorite. Small occurrences of quartzcarbonate veins in shear zones were reported to occur along a ridge at the eastern boundary of the Nell claim and copper mineralization has been noted in the volcanics as fracture fillings and wall rock disseminations.

AIRBORNE MAGNETIC AND VLF-EM SURVEYS -DISCUSSION AND CONCLUSIONS

The airborne geophysical survey was implemented over the Nell property in preparation for future geological mapping and detailed exploration. This survey is viewed as the first stage in ongoing property exploration and, therefore, interpretation of this data is premature and speculative. It can be stated that magnetic highs (>58,500 gammas) appear to exist and should be followed up by geological mapping to determine their source. While magnetite is known to occur in the volcanics it is generally observed in the region that magnetic highs often relate to intrusive phases of the Hogem Batholith and are useful in delimiting their extent through overburden or volcanic cover.



APPENDIX 1

STATEMENT OF QUALIFICATION

Appendix 1

STATEMENT OF QUALIFICATIONS

I. Glen L. Garratt, of 110 - 325 Howe Street, in the City of Vancouver, British Columbia do hereby state that:

- 1. I am a practising geologist and have been since 1972 after completing the requirements for a B.Sc. (Geology) at the University of British Columbia.
- 2. I am a member in good standing of the Association of Professional Engineers, Geologists and Geophysicists of Alberta and a Fellow of the Geological Association of Canada.
- 3. The work reported herein was carried out under my direction; the conclusions and discussions of the data are the author's, and are preliminary in nature due to the early stage of exploration on the property.
- 4. I consent to the use of this report by Eastfield Resources Ltd. to fulfill the requirements of regulatory agencies. Excerpts or quotations or summaries from this report may only be used with my consent.

G. L. GARRATT F.G.A.C. HOW

Dated at Vancouver, British Columbia, this 15th day of November, 1990.

APPENDIX 2

STATEMENT OF EXPENDITURES

Appendix 2

STATEMENT OF EXPENDITURES

Sub Contractors: Aerodat - airborne survey 200 km @ \$47.15/km \$ 9,430.00 Reproduction: Base map preparation, topographic and orthophoto 2,540.00 TOTAL \$11,970.00

APPENDIX 3

AERODAT REPORT ON COMBINED HELICOPTER-BORNE

MAGNETIC AND VLF SURVEY

bу

M.B. MARSHALL

REPORT ON COMBINED HELICOPTER-BORNE MAGNETIC AND VLF SURVEY FORT FRASER BRITISH COLUMBIA

FOR EASTFIELD RESOURCES LTD. BY AERODAT October 23, 1990

> M.B.Marshall Geologist

J9037

TABLE OF CONTENTS

			Page No.
	LIST	Г OF MAPS	i
1.	INTRODUCTION		1-1
2.	SURVEY AREA LOCATION		2-1
3.	AIR	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
I .	DAT	A PRESENTATION	
	4.1	Base Map	4-1
	4.2	Flight Path	4-1
	4.3	Magnetics	4-1
		4.3.1 Total Field	4-1
		4.3.2 Vertical Gradient	4-2
	4.4	VLF-EM Total Field	4-3

APPENDIX I - Personnei

İ

ļ

Į

APPENDIX II - General Interpretive Considerations

(i)

List of Maps (Scale 1:10,000)

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

1. TOPOGRAPHIC BASE MAP; Prepared from provided photo mosaic maps.

2. FLIGHT LINE MAP;

and the second se

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 with flight lines, fiducials and base map.

5. VLF-EM TOTAL FIELD CONTOURS;

Showing VLF total field response from the in-line transmitter with flight lines, fiducials, and base map.

1 - 1 1. <u>INTRODUCTION</u>

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 Northeastern British Columbia, centred 150 kilometres north of Fort Fraser British Columbia. The survey was flown on July 16, 1990 to August 21, 1990. Data from sixteen 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.

17

A total of 624 line kilometres of the recorded data were compiled in map form. The maps are presented as part of this report according to specifications laid out by Eastfield Resources Ltd.

2 - 1

5

ĺ

Í

Í

Ï

Ì

ļ

.

Į

2. SURVEY AREA LOCATION

The survey area is depicted on the index map shown below. It is centred at approximate geographic latitude 55 degrees 40 minutes North, longitude 125 degrees 16 minutes West.



3 - 1

3. AIRCRAFT AND EQUIPMENT

3.1 <u>Aircraft</u>

l

An Aerospatiale A-Star 350 B helicopter, (C-GJIX), piloted by Ron Mitchenson owned and operated by Peace Helicopters Limited, was used for the survey. Peter Moore, P. Moissan and K. McCart of Aerodat acted as navigators and equipment operators. Installation of the geophysical and ancillary equipment was carried out by Aerodat. The survey equipment was flown at a mean terrain clearance of 90 metres.

3.2 Equipment

3.2.1 VLF-EM System

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

A Geometrics 826 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 Digital Recorder

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 - 1

4. DATA PRESENTATION

4.1 Base Map

A topographic base at a scale of 1:10,000 was provided by Golden Rule Resources Ltd.

4.2 Flight Path

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

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 2 nT interval.

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

4.3.2 Vertical Gradient

Ī

ľ

Ĩ

ľ

Î

l

ľ

The vertical magnetic gradient was calculated from the total field magnetic data. Contoured at a 0.02 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 2% interval.

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

The transmitting station used for flights 51-53, 81-83 was NPM Lualualei, Hawaii broadcasting at 23.4 kHz. for flights 54-56, 58-62 was NSS Annapolis Md., broadcasting at 21.4 kHz., and for flights 84-86 was NAA Cutler, Maine broadcasting at 24.0 kHz. The orthogonal VLF station used for flight 51-53, 81-83 was NSS Annapolis, Md., broadcasting at 21.4 kHz., for flights 54-56, 58-62 was NLK Seattle, Washington broadcasting at 24.8 kHz. The orthogonal stations were not utilized in the compilation.

Respectfully submitted,

M.B. Marshall Geologist

October 23, 1990

APPENDIX I

PERSONNEL

· .

FIELD

í.

Flown July 16, 1990 - August 21, 1990

Pilot

Ron Mitchenson

Operator P. Moore

D. Moissan

K. McCart

OFFICE

Processing	M.B. Marshall	
	G. McDonald	
Report	M.B. Marshall	

<u>APPENDIX II</u>

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.

- 2 -

Ī

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.

- 3 -

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.

APPENDIX 4

REFERENCES

 ${\boldsymbol{r}}$

References

Armstrong, J.E., 1949: Fort St. James Map Area, British Columbia, Map 907A, G.S.C. Memoir 252.

Dirom, G.A., 1966: Preliminary Geological Report, Bob Group of Claims; North Star Explorations Ltd.; A.R. 816.

Taylor, A.B., and Gorc, D., 1986: Geochemistry and Geology of the North Slope Claims; Imperial Metals Corporation; A.R. 15,652.





5	00		1000 Metres
	DATE:	JULY	1990
)	NTS' No :	93 N	
	MAR NO:	2	J9037 -







Average terrain clearance 60m Average line spacing 100m Vertical Gradient Cesium high sensitivity magnetometer. Sensor elevation 45m Map contours are multiples of those listed below 1.0.0 .2 nT 1.00 nT 5.00 nT 10.00 nT 50.00 nT Claim Boundary ----- Area Surveyed by Aerodat O 330 660 1320 12.2 AERODAT LIMITED NTS NO: 93 N





LEGEND Flight Path Navigation and recovery using a Motorola Mini-Ranger (MRS 111) navigation system. Average terrain clearance 60m Average line spacing 100m VLF-EM _____ VLF-EM Total Field Intensity in percent. Station: NSS Annapolis, Maryland 21.4 kHz Sensor elevation 45m Map contours are multiples of those listed below ----- 1 X ------ 5 x 25 x 100 x Claim Boundary ----- Area Surveyed by Aerodat 1 million - *----0 330 660 1320 100 - 200 AERODAT LIMITED NTS NO: 93 N

