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2004 GEOPHYSICAL ASSESSMENT REPORT ON THE RAMS HORN PROPERTY

Quartz Claims RAM 1-60 (YC26622-26681)
and RAM 65-88 (YC26686-26709)
Whitehorse Mining District
Yukon Territory

094670

NTS 105D1 and 105D2
60° 04' North Latitude
134° 30' West Longitude

Owned and Operated by
Ordorado Resources Corp.
1450-789 West Pender Street
Vancouver, B.C. V6C 1H2

Work Performed by
McPhar Geosurveys Ltd.

Report Prepared by
Ronald C. R. Robertson, P. Geol.

August31, 2005

Costs associated with this report have been approved in the amount of $ 16,900.00 for assessment credit under Certificate of Work No. QW07769

Mining Recorder
Whitehorse Mining District

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1.0 INTRODUCTION

The Ram 1-60 Quartz mineral claims (grant numbers YC26622-26681) and RAM 65-88 claims (grant numbers YC26686-26709) in the Whitehorse Mining District were recorded in March 2004 and subsequently optioned to Ordorado Resources Corp. In August 2004, Ordorado contracted McPhar Geosurveys Ltd. of Ontario to carry out helicopter-borne geophysical surveys over two large grids on the Rams Horn property. These surveys were flown between September 1st and 5th 2004. One grid (Grid "A") covers parts of the RAM 1-30 and RAM 87-88 claims, as well as some of Ordorado's contiguous claims across the border in British Columbia. Grid "B" is entirely within the Yukon, in the area of the RAM 49-60 and RAM 65-80 claims. Ordorado received McPhar's final report in May 2005; the McPhar report is included as Appendix IV to the present report, which has been prepared as a brief covering report to outline the work and associated costs relevant to the Yukon portion of the property.

Approximately 1303 hectares of Ordorado's RAM claims in the Yukon were covered by 138 line-kilometres of helicopter-borne magnetometer and electromagnetic surveys. In addition, Grid "B" was also covered by a radiometric survey.

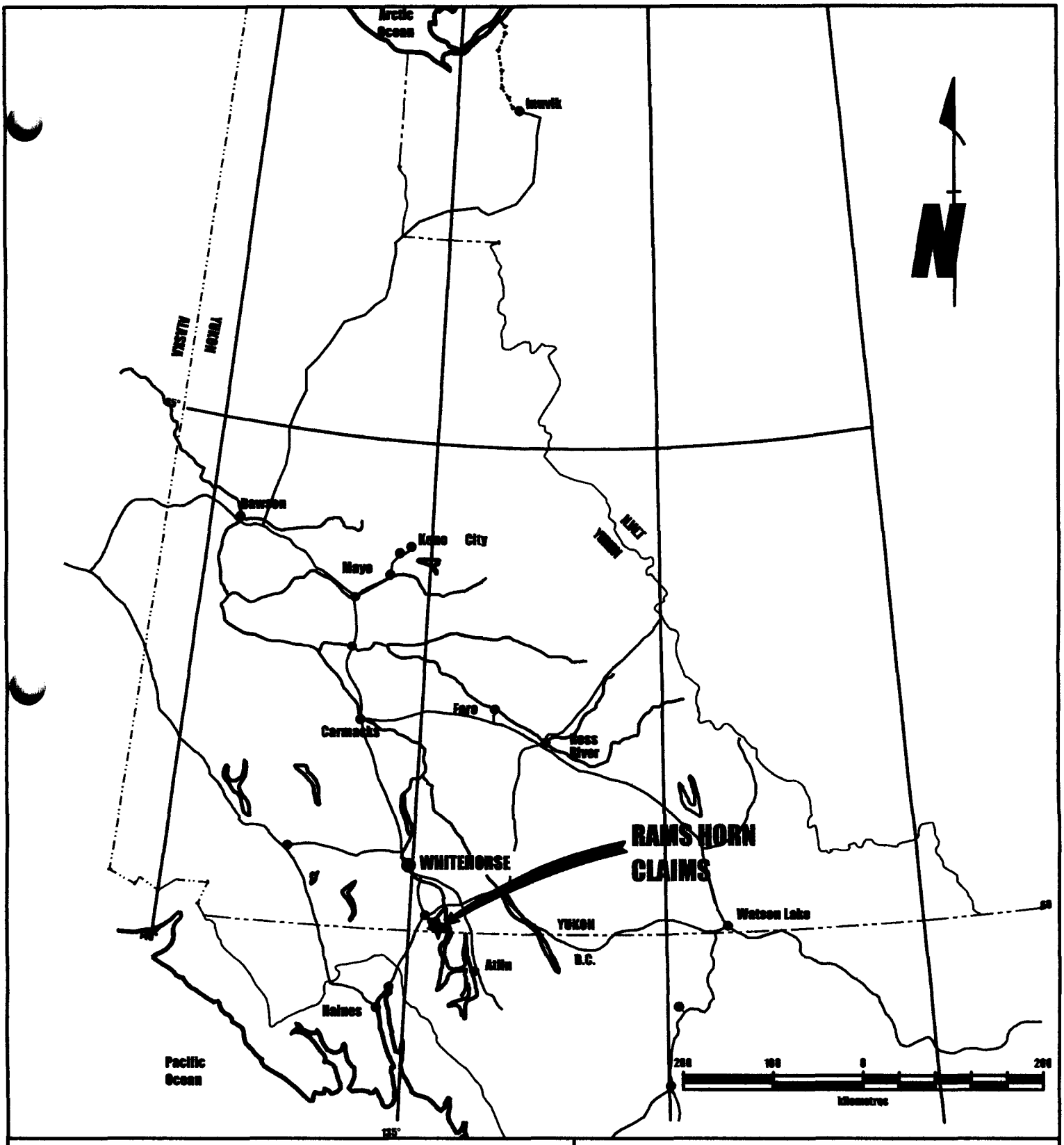
2.0 LOCATION, ACCESS & PHYSIOGRAPHY

The Rams Horn property is located 20 km south of Carcross on the British Columbia – Yukon border, on the east side of Windy Arm of Tagish Lake (Figure 1). The property includes claims in both British Columbia and Yukon. The Yukon sector of the property is located within the Whitehorse Mining District and centred approximately at latitude 60° 04' N and longitude 134° 30' W, on NTS map sheets 105D/01 and 105D/02.

The city of Whitehorse, located 80 km to the north, is the nearest major supply centre. Access to the Yukon portion of the property is presently by helicopter. The South Klondike Highway, connecting Whitehorse, Yukon, to Skagway, Alaska, runs along the west side of Windy Arm.

The Rams Horn property is located in the Tagish Lake area on the western side of the Coast Mountains in a northern interior climate zone. The weather is influenced by proximity to the Pacific Ocean. Generally summers are cool and dry while winter temperatures are highly variable and snowpack averages 2 to 3 m. The exploration season normally extends from late May to late September although cool rainy conditions and occasional snowfall can occur in late August and September.

Physiographically, the area is characteristic of the northern Coast Mountains. Elevations range from 655 m (2150 ft) at the lakeshore to 1830 m (over 6000 ft) at the peak of White Mountain. Relief is generally moderate except for the steep, rugged western slopes of Escarpment Mountain and Mount Conrad along the east side of Windy Arm. Slopes are tree covered to approximately 1370 m (4500 ft) with low scrub and alpine grasses above. South-



ORDORADO RESOURCES CORP.

RAMS HORN PROPERTY LOCATION MAP

MINING DISTRICTS – WHITEHORSE, YUKON/ATLIN, BC

NTS – 105D 1/2 & 104M 97/98 SCALE: 1:6,000,000

Fig. 1

facing slopes commonly have open alder groves separated by grassy areas while west-facing slopes are more heavily vegetated with spruce and buck brush. Pine trees are locally common in drier areas.

3.0 LAND TENURE

The Rams Horn property straddles the British Columbia – Yukon border and consists of 84 Yukon Quartz claims and several BC mineral claims. The Yukon claims were acquired by B. Harris, G. Davidson and A. Jenn in March 2004 and subsequently optioned to Ordorado Resources Corp. The claims are located in the Whitehorse Mining District in NTS map sheets 105D01 and 105D02, as shown in Figure 2. Work was carried out on the claims listed in the table below.

Table 1: Claims Worked On

Claim Name	*Grant Number*		*Claim Name*	*Grant Number*
RAM 1	YC26622		RAM 52	YC26673
RAM 2	YC26623		RAM 53	YC26674
RAM 3	YC26624		RAM 54	YC26675
RAM 4	YC26625		RAM 55	YC26676
RAM 5	YC26626		RAM 56	YC26677
RAM 6	YC26627		RAM 57	YC26678
RAM 7	YC26628		RAM 58	YC26679
RAM 8	YC26629		RAM 59	YC26680
RAM 9	YC26630		RAM 60	YC26681
RAM 10	YC26631		RAM 65	YC26686
RAM 11	YC26632		RAM 66	YC26687
RAM 12	YC26633		RAM 67	YC26688
RAM 13	YC26634		RAM 68	YC26689
RAM 14	YC26635		RAM 69	YC26690
RAM 15	YC26636		RAM 70	YC26691
RAM 16	YC26637		RAM 71	YC26692
RAM 17	YC26638		RAM 72	YC26693
RAM 18	YC26639		RAM 73	YC26694
RAM 19	YC26640		RAM 74	YC26695
RAM 20	YC26641		RAM 75	YC26696
RAM 21	YC26642		RAM 76	YC26697
RAM 22	YC26643		RAM 77	YC26698
RAM 23	YC26644		RAM 78	YC26699
RAM 24	YC26645		RAM 79	YC26700
RAM 49	YC26670		RAM 80	YC26701
RAM 50	YC26671		RAM 87	YC26708
RAM 51	YC26672		RAM 88	YC26709

The table below updates the claim status following this work being applied.

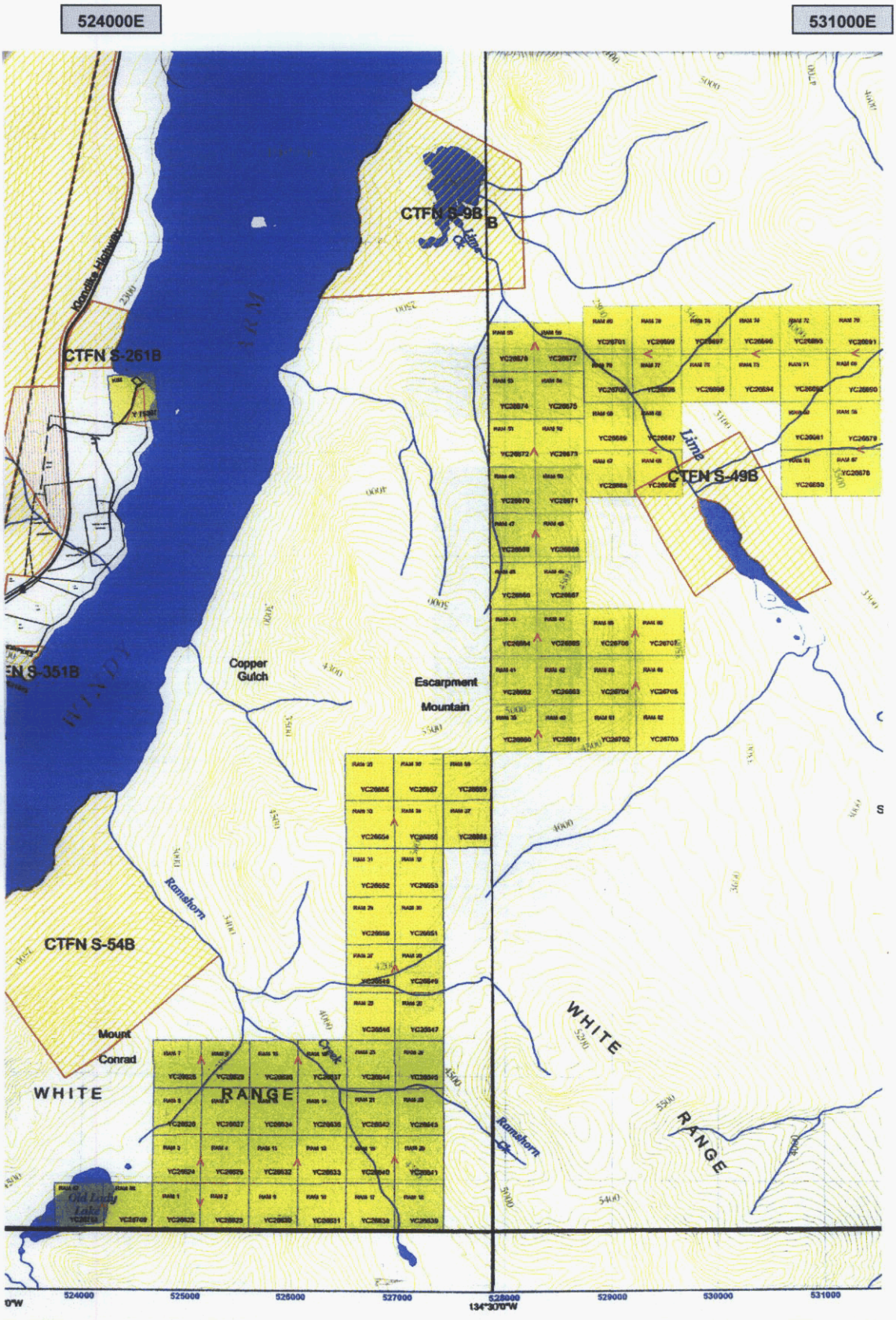
Table 2: Claim Status following this Filing

Claim Name	*Grant No.*	*Expiry Date*	*New Expiry Date**
RAM 1	YC26622	11 March 2005	11 March 2007
RAM 2	YC26623	11 March 2005	11 March 2007
RAM 3	YC26624	11 March 2005	11 March 2007
RAM 4	YC26625	11 March 2005	11 March 2007
RAM 5	YC26626	11 March 2005	11 March 2007
RAM 6	YC26627	11 March 2005	11 March 2007
RAM 7	YC26628	11 March 2005	11 March 2007
RAM 8	YC26629	11 March 2005	11 March 2007
RAM 9	YC26630	11 March 2005	11 March 2007
RAM 10	YC26631	11 March 2005	11 March 2007
RAM 11	YC26632	11 March 2005	11 March 2007
RAM 12	YC26633	11 March 2005	11 March 2007
RAM 13	YC26634	11 March 2005	11 March 2007
RAM 14	YC26635	11 March 2005	11 March 2007
RAM 15	YC26636	11 March 2005	11 March 2007
RAM 16	YC26637	11 March 2005	11 March 2007
RAM 17	YC26638	11 March 2005	11 March 2007
RAM 18	YC26639	11 March 2005	11 March 2007
RAM 19	YC26640	11 March 2005	11 March 2007
RAM 20	YC26641	11 March 2005	11 March 2007
RAM 21	YC26642	11 March 2005	11 March 2007
RAM 22	YC26643	11 March 2005	11 March 2007
RAM 23	YC26644	11 March 2005	11 March 2007
RAM 24	YC26645	11 March 2005	11 March 2007
RAM 25	YC26646	11 March 2005	11 March 2007
RAM 26	YC26647	11 March 2005	11 March 2007
RAM 27	YC26648	11 March 2005	11 March 2007
RAM 28	YC26649	11 March 2005	11 March 2007
RAM 29	YC26650	11 March 2005	11 March 2007
RAM 30	YC26651	11 March 2005	11 March 2007
RAM 31	YC26652	11 March 2005	11 March 2007
RAM 32	YC26653	11 March 2005	11 March 2007
RAM 33	YC26654	11 March 2005	11 March 2007
RAM 34	YC26655	11 March 2005	11 March 2007
RAM 35	YC26656	11 March 2005	11 March 2007
RAM 36	YC26657	11 March 2005	11 March 2007
RAM 37	YC26658	11 March 2005	11 March 2007
RAM 38	YC26659	11 March 2005	11 March 2007
RAM 39	YC26660	11 March 2005	11 March 2007
RAM 40	YC26661	11 March 2005	11 March 2007
RAM 41	YC26662	11 March 2005	11 March 2007

Claim Name	*Grant No.*	*Expiry Date*	*New Expiry Date**
RAM 42	YC26663	11 March 2005	11 March 2007
RAM 43	YC26664	11 March 2005	11 March 2007
RAM 44	YC26665	11 March 2005	11 March 2007
RAM 45	YC26666	11 March 2005	11 March 2007
RAM 46	YC26667	11 March 2005	11 March 2007
RAM 47	YC26668	11 March 2005	11 March 2007
RAM 48	YC26669	11 March 2005	11 March 2007
RAM 49	YC26670	11 March 2005	11 March 2007
RAM 50	YC26671	11 March 2005	11 March 2007
RAM 51	YC26672	11 March 2005	11 March 2007
RAM 52	YC26673	11 March 2005	11 March 2007
RAM 53	YC26674	11 March 2005	11 March 2007
RAM 54	YC26675	11 March 2005	11 March 2007
RAM 55	YC26676	11 March 2005	11 March 2007
RAM 56	YC26677	11 March 2005	11 March 2007
RAM 57	YC26678	11 March 2005	11 March 2007
RAM 58	YC26679	11 March 2005	11 March 2007
RAM 59	YC26680	11 March 2005	11 March 2007
RAM 60	YC26681	11 March 2005	11 March 2007
RAM 65	YC26686	11 March 2005	11 March 2007
RAM 66	YC26687	11 March 2005	11 March 2007
RAM 67	YC26688	11 March 2005	11 March 2007
RAM 68	YC26689	11 March 2005	11 March 2007
RAM 69	YC26690	11 March 2005	11 March 2007
RAM 70	YC26691	11 March 2005	11 March 2007
RAM 71	YC26692	11 March 2005	11 March 2007
RAM 72	YC26693	11 March 2005	11 March 2007
RAM 73	YC26694	11 March 2005	11 March 2007
RAM 74	YC26695	11 March 2005	11 March 2007
RAM 75	YC26696	11 March 2005	11 March 2007
RAM 76	YC26697	11 March 2005	11 March 2007
RAM 77	YC26698	11 March 2005	11 March 2007
RAM 78	YC26699	11 March 2005	11 March 2007
RAM 79	YC26700	11 March 2005	11 March 2007
RAM 80	YC26701	11 March 2005	11 March 2007
RAM 81	YC26702	11 March 2005	11 March 2007
RAM 82	YC26703	11 March 2005	11 March 2007
RAM 83	YC26704	11 March 2005	11 March 2007
RAM 84	YC26705	11 March 2005	11 March 2007
RAM 85	YC26706	11 March 2005	11 March 2007
RAM 86	YC26707	11 March 2005	11 March 2007
RAM 87	YC26708	11 March 2005	11 March 2007
RAM 88	YC26709	11 March 2005	11 March 2007

* following approval of filing

Rams Horn Property Claim Location Map
Figure 2
NTS 105 D/01 & D/02



One kilometre

4.0 REGIONAL GEOLOGY

The Rams Horn property is located close to the boundary between the Coast Crystalline Belt to the west and the Intermontane Belt (Whitehorse Trough) to the east (Hart, 2002). The Coast Plutonic Complex is composed of granitic and granodioritic intrusive rocks of Cretaceous age while the Whitehorse Trough is represented by sedimentary and volcanic rocks of the Upper Triassic Lewes River Group and the Lower Jurassic Laberge Group. Most of the Yukon portion of the Rams Horn property is underlain by Carboniferous and Permian rocks of the Cache Creek Group. Within this area units of the Nakina (dark, massive metbasite, hornblende diorite and thin chert and carbonate bands), Kedahda (bedded cherts with lesser sandstones, siltstones and limestones) and Horsefeed Formations(massive spilitized basalt sills, dykes and pillow lavas, and massive to poorly bedded limestones) have been mapped (Hart and Pelletier, 1989; Hart and Radlof, 1990). Numerous steep northwest trending faults have been mapped in this area. The small Lime Creek Granite intrudes and hornfelses sedimentary and volcanic rocks of the Cache Creek Group; the granite can probably be correlated with the Carcross Pluton which is probably of Late Cretaceous to Paleocene age (Hart and Radlof, 1990) and hosts several molybdenite occurrences. Cretaceous Montana Mountain Volcanic Complex intermediate to felsic pyroclastic and volcanic rocks occupy much of the western part of the British Columbia sector of the property, separated from Laberge Group sedimentary units farther west by the northwest-trending Nahlin Fault.

5.0 EXPLORATION HISTORY

The Windy Arm - Montana Mountain district has been explored for precious metals in the past. Initial prospecting probably dates from the time of the Klondike Gold Rush. Several discoveries of vein-hosted gold-silver mineralization were made in the 1880-1920 period, some of which had limited production (Venus, Arctic-Big Thing, Montana). Aerial tramways were constructed on the west side of Windy Arm (across the lake from the Rams Horn property) to veins on Montana Mountain and a mill was constructed below the Venus vein to process high grade ores. Prospectors and miners lived in the settlements of Conrad and Wynton on the west side of Windy Arm. Interest in the area waned in the 1920s but there was a short period of renewed activity in the late 1960s when the Arctic and Venus veins were worked again. Higher gold prices and the discovery of the Mount Skukum gold deposit in the early 1980s focussed renewed exploration interest in the district. United Keno Hill Mines Ltd. redeveloped the Venus Mine and constructed a 100 ton/day mill at the south end of Windy Arm, although the operation was closed before entering production.

The **Cirque Zone** (Yukon Minfile 105D 002: "Lulu") is located on the north slopes of Mount Patterson, in a small cirque east of Old Lady Lake, in the area of the RAM 1-4 claims. Cairnes (1908) reported that:

> "Some work was done this summer on the Rams Horn on the east side of Windy Arm, and a very good looking quartz ore carrying galena, zinc blende, chalcopyrite

and arsenopyrite were seen there, but the veins examined were too narrow to be profitably worked".

Davidson (1992) described the occurrences as follows:

> "Two adits were collared on steeply dipping quartz veins on the face of Mount Patterson. The uppermost adit is 10 m in length. The lower adit is larger and a short decline suggests that some high grade ore may have been mined. Higher on the slope four blast pits uncover mineralized quartz veins and massive pyrrhotite ... The adits have been staked numerous times since the 1950s. Premier Mining Corporation acquired the claims in 1968 and performed mag and soil sampling surveys ... Quartz veins and sulphide mineralization occur as lenses along shears in dioritic rocks. The quartz veins range from 10-90 cm in width and contain bands of arsenopyrite. Lenses of sulphides consist of variable amounts of galena, sphalerite, arsenopyrite, pyrrhotite, chalcopyrite and pyrite ... The adits were collared on two separate veins. The lower adit follows a 20-75 cm wide quartz and sulphide lense which strikes 060° and dips 25° north. The lense pinches and swells along strike and terminates at a fault. Sulphide mineralization consists of arsenopyrite, galena, sphalerite and chalcopyrite as coarse crystalline masses or in fine-grained bands. The upper adit is 10 m long and cuts a 25-50 cm wide quartz-arsenopyrite vein that strikes 055° and dips 62° north ... A third quartz-sulphide lense located 75 m above the upper adit is exposed in three old pits. The mineralization appears to be a stratiform lense approximately 70 m long and up to 2 m thick that strikes 035° and dips 45° southeast. It consists of pyrrhotite, sphalerite, galena, chalcopyrite, arsenopyrite and quartz or rusty greenstone. A 15 cm wide quartz-arsenopyrite vein cuts the lense ... Above the old camp another quartz-sulphide lense (North Vein) is exposed in an old cut".

The writer visited these occurrences in August, 2005. Large float blocks in the floor of the cirque are very similar to rocks shown in Figure 4 of Hart and Pelletier, (1989). These are fine grained, grey-green metavolcanics or tuffs with networks of albite (?) veinlets, often filling tension gashes. Mineralization seen in several of the old cuts and adits seems to follow low angle thrust faults in dioritic or gabbroic rocks. These may be either the Conrad or Nares members of the Nakina Formation of Mississippian to Pennsylvanian age.

Davidson (1992) also reported that chalcopyrite was found in float over a wide area east of the STR claims. One sample of dioritic rock with approximately 2% chalcopyrite contained >10,000 ppm copper. Davidson recommended that prospecting should be carried out east of the STR claims to check for potential porphyry copper style mineralization. This is in the approximate area of the present RAM 11 claim.

The **Copper Gulch Zone** (Yukon Minfile 105D 003: "Millet") is located on the eastern side of Windy Arm, high on the slopes above Copper Gulch, in the approximate area of the present RAM 33 and 36 claims.

This mineral occurrence was originally staked prior to April 1903, and restaked again in 1905. Hand trenching was carried out in 1953. Very little exploration has been carried out since then. Early Geological Survey summary reports mentioned the presence of native copper in basaltic flows of the Cache Creek Group. The best mineralization is said to be confined to a zone 18.3 metres in width and to consist of narrow, erratic veinlets in chloritic shears. The overall grade is very low (Minfile 2004).

The **Lime Creek Zone** (Yukon Minfile 105D 004: "Lime") is a molybdenite occurrence within a small biotite-quartz monzonite intrusion, located approximately in the RAM 65-68 and RAM 73-80 area. The original showings were initially staked in 1958. Most exploration of the zone was completed between 1966 – 1971 and 1979-1980. Six short Y-ray size holes were drilled in 1966 (about 152m) (Minfile 2004).The 1968-69 program included line cutting, soil sampling, geological mapping and sampling of 31 small blast pits (Hilker, 1970). Additional mapping and soil sampling were carried out in 1971 (Vincent, 1972). Placer Development Ltd. drilled three BQ size holes in 1980 (approx. 457 m).

This work has outlined molybdenite showings associated with quartz veining in a discontinuous zone approximately 600 m long and 120 m wide, striking near east-west. In addition, several large areas of anomalous molybdenum in soil samples were identified and several other zones with molybdenite veining in float were located.

The small Lime Creek Granite intrudes and hornfelses sedimentary and volcanic rocks of the Cache Creek Group. The granite can probably be correlated with the Carcross Pluton which is Late Cretaceous to Paleocene in age (Hart and Radlof, 1990) and hosts several molybdenite occurrences. Hart and Radlof (1990) reported two new molybdenite occurrences found during mapping of the 105D2 sheet. In both cases the host rock is the Carcross granite pluton.

The Cirque Zone and the Lime Creek Zone were surveyed during the 2004 airborne geophysics program. Magnetic and electromagnetic systems were flown over all areas; in addition, a radiometric system was flown over the Lime Creek Zone (Grid B).

6.0 GEOPHYSICS

In August 2004, Ordorado Resources Corp. contracted McPhar Geosurveys Ltd. of Newmarket, Ontario, to conduct helicopter-borne geophysical surveys over two sectors of Ordorado's Rams Horn property. These surveys were carried out between September 1st and 5th, 2004, from a base near Carcross, Yukon.

The larger of the two grids ("Grid A") straddles the British Columbia – Yukon border; magnetic and electromagnetic surveys were flown over this grid. The second grid ("Grid B") is entirely within the Yukon portion of the property; magnetic, electromagnetic and radiometric surveys were flown over this grid.

The location of the area covered by the 2004 airborne geophysical survey in relation to the Yukon mineral claims is shown in Figure 3. The total area covered by the Yukon portion of the survey is 1303 hectares (part of Grid A and all of Grid B of the McPhar Report), whereas the total area of the RAM mineral claims is approximately 1755 hectares.

Full details of the geophysical survey, including contract specifications, instrumentation, calibrations and corrections, terrain clearance, personnel and their qualifications are found in the McPhar report (which is included as Appendix IV of the present report). Appendix 6 of the McPhar report, consisting of page-size versions of geophysical maps reduced from the original 1:20,000 scale, has been omitted as the original maps have been included here as Figures 4 through 17.

Ordorado Resources Corp. has contracted with Aurora Geosciences Ltd. of Whitehorse to provide a detailed interpretation of the McPhar geophysical surveys over the Rams Horn property and recommend a follow-up program.

Respectfully Submitted,

Ronald C. R. Robertson, P. Geol.

Windy Arm
Lime Creek
Cooper Gulch
Escarpment Mountain
North Canyon
Pooh Canyon
Ramshorn Creek
White Range
Old Dan Lake
GRID "A"
GRID "B"
OUTLINE OF RAM CLAIMS

LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" NaI sensor
And 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Scale 1:20000
250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

McPHAR

Ordorado Resources
Flight Path Map, GRIDS AND CLAIMS
FIGURE 3
Mcphar Geosurveys Limited

APPENDIX I

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APPENDIX II

STATEMENT OF EXPENDITURES

AIRBORNE GEOPHYSICAL SURVEY

The Ordorado Resources Corp. contract with McPhar Geosurveys Ltd. was based on a minimum survey of 280 line-kilometres (including mobilization, demobilization, data processing and reporting) at a fixed price of $33,750.00 (plus GST). Additional line-kilometres flown were charged at $135.00 per line-km. There is no price difference in the contract for the Grid A area, which was flown with magnetic and electromagnetic systems, and the Grid B area, flown with magnetic, electromagnetic and radiometric systems. Schedule A of the contract (attached) shows the contract pricing.

The McPhar Final Report (included here as Appendix IV) details the 281.0 line-kilometres flown under the contract as follows:

Geophysical Grids

Area	Approx. Area (has.)	Total line-km.
Grid A	21,800	239.2
Grid B	3,600	42.8
Total	25,400	281.0

Approximately 40% of Grid A lies within the Yukon portion of the Rams Horn property. The line-kilometre distance flown over the Yukon sector of Grid A is estimated (scaled from the flight line index map, Figure 3) at 95.2 line-kilometres. All of Grid B is in the Yukon. Thus, the total distance flown over the Yukon part of the Rams Horn property is 138 line-kilometres.

Cost Allocation

McPhar total contract price per invoices (attached)	$40,879.35
Less, overpayment refunded	$4,333.50
Net cost	$36,545.85
Total line-km flown = 281.0 line-km	
Line-km flown over the Yukon portion of the property = 138.0 line-km	
Airborne geophysical survey costs allocated to the Yukon mineral claims	
RAM 1-60 and 65-88 is (138/281) x $36,545.85	**$17,947.78**

REPORT PREPARATION

R. Robertson, P. Geol. – report preparation	$2140.00
Expenses, including, map reproduction, photocopies	$913.67
	$3053.67
Total Expenditures	**$21,001.45**

SCHEDULE A
PRICING AND PAYMENTS

A1. Prices **CAD $**

1. Lump Sum price for the Mobilization & Demobilization of the Helicopter, Equipment and Personnel to and from Carcross, Yukon including the Data Acquisition/Data Processing, for a minimum of 280 line-km of data — $33,750.00

6. Price per line-km for additional flying in the general area of the survey — $135.00/line-km

A2. Payments

The minimum price for the survey under this agreement is $33,750.00 (thirty three thousand seven hundred and fifty dollars). Subject to this amount, the survey charge referred to in paragraph A1 will be adjusted at the indicated per line-km rate if the amount of surveying in the Survey Area is greater than as stated in paragraph A1.

The invoices shall be payable as follows:

First Payment: Payment of Fifty Percent (50%) of the Lump Sum Price, plus GST, amounting to $18,056.25 (eighteen thousand and fifty six dollars and twenty five cents) is payable on the signing of the contract.

Second Payment: Payment of Forty Percent (40%) of the Lump Sum Price, plus GST, amounting to $14,445.00 (fourteen thousand, four hundred and forty five dollars) is payable on completion of the Data Acquisition.

Final Payment: Payment of the Balance due, plus GST) is payable upon completion of the Data Processing and delivery of the Final Products.

A4. Terms of Payments

All prices in this contract are given in Canadian dollars (CAD$). McPhar will issue invoices for payment as required, as per Section A2. above. These invoices will be due for payment upon their receipt by the Client.

Payments should be made by telegraphic bank transfer to McPhar's bank, at the address provided below:

McPhar Geosurveys Ltd.
Bank of Montreal
1111 Davis Drive
Newmarket, Ontario
Canada, L3Y 2R9
Tel: 1-905-853-2744
CD$ Account # 39562-001-1027-762
SWIFT CODE: BOFMCAM2

McPhar Geosurveys Ltd.
1256B Kennisdale Blvd., Newmarket
Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
Web Site: www.mgssurveys.com

To: Ordorado Resources Suite 122, 141-757 West Hastings St. Vancouver, B.C. V6B 3H1 Attention: Adam Jenn	**Invoice** Number: MCP0421.01 Date: August 25, 2004

Quantity	Description	Unit Price	Qty.	Amount CDN$
	Helicopter-borne Geophysical Survey White Horse, Yukon First payment of Fifty Percent (50%) is due upon signing of the Contract.			
	As per schedule A, A2. payments	$16,875.00		$16,875.00
			GST	$1,181.25
			TOTAL DUE	$18,056.25

* INVOICE PAID IN FULL AUGUST 23, 2004 VIA WIRE TRANSFER

S. Hall Recd.

Please make payment by Telegraphic Bank Transfer to:
McPhar Geosurveys Ltd.
Bank of Montreal
1111 Davis Drive
Newmarket, Ontario
Canada L3Y 2R9
Tel: 1.905.853.2744
CDN$ Account # 39562.001.1027.762
SWIFT CODE: BOFMCAM2

PAID
AUG 23 2004
BY: WT

S. Hall
Susanne Hall
Office Manger

McPhar Geosurveys Ltd.
1256B Kennisdale Blvd., Newmarket
Ontario, Canada L3Y 8Z9
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
Web Site: www.mgssurveys.com

To: Ordorado Resources Suite 122, 141-757 West Hastings St. Vancouver, B.C. V6B 3H1 Attention: Adam Jenn	**Invoice** Number: MCP0421.02 Date: September 14, 2004

Quantity	Description	Unit Price	Qty.	Amount CDN$
	Helicopter-borne Geophysical Survey White Horse, Yukon			
	Second payment of (40%) is due upon completion of the Data Acquisition			
	As per schedule A, A2. payments			$13,500.00
			GST	$ 945.00
			TOTAL DUE	$14,445.00

Please make payment by Telegraphic Bank Transfer to:
McPhar Geosurveys Ltd.
Bank of Montreal
1111 Davis Drive
Newmarket, Ontario
Canada L3Y 2R9
Tel: 1.905.853.2744
CDN$ Account # 39562.001.1027.762
SWIFT CODE: BOFMCAM2

PAID
SEP [illegible] 2004
BY: WT

Susanne Hall
Office Manger

McPhar Geosurveys Ltd.
1258B Kennisdale Blvd., Newmarket
Ontario, Canada L3Y 8Z9
Tel: (905) 830-6880, Fax: (905) 898-0338
E-Mail: info@mgssurveys.com
Web Site: www.mgssurveys.com

To: Ordorado Resources Suite 122, 141-757 West Hastings St. Vancouver, B.C. V6B 3H1 Attention: Adam Jenn	**Invoice** Number: MCP0421.03 Date: February 18, 2005

Quantity	Description	Unit Price	Qty.	Amount CDN$
	Helicopter-borne Geophysical Survey White Horse, Yukon			
	Third/final payment of (10%) is due upon completion of the Data Processing			
	As per schedule A, A2. payments			$3,375.00
	Additional charges for extra 33 line-km @$135.00 Contract for 250 actual flown 283 as per final report			+ gst. $4,455.00
			GST	$ 548.10
			TOTAL DUE	$8,378.10

236.2

RECEIVED
MAR 14 2005
BY: 29

CLIENT TO ADVISE SHIPPING OF FINAL REPORTS

3.611 25

Please make payment by Telegraphic Bank Transfer to:
McPhar Geosurveys Ltd.
Bank of Montreal
1111 Davis Drive
Newmarket, Ontario
Canada L3Y 2R9
Tel: 1.905.853.2744
CDN$ Account # 39562.001.1027.762
SWIFT CODE: BOFMCAM2

RECEIVED
APR 22 2005
BY: 35

4,766.85
(including $311.85 GST)

S. Hall
Susanne Hall
Office Manger

completely paid
Y.H.

APPENDIX III

STATEMENT OF QUALIFICATIONS

I, Ronald C. R. Robertson, certify that:

I am a self-employed consulting geologist with office address at 56 Dalroy Crescent NW, Calgary, Alberta, T3A 1G3.

I obtained a Bachelor of Science degree with First Class honours in Geology from the University of Aberdeen, Scotland, in 1970 and subsequently carried out graduate studies in economic geology at Queen's University, Kingston, Ontario.

I am registered as a Professional Geologist (number M54692) by the Association of Professional Engineers, Geologists & Geophysicists of Alberta.

I have been engaged in mineral exploration and development on a full-time basis for over 30 years, of which twelve have been spent on programs in the Yukon Territory, northern British Columbia and Alaska. I visited the Rams Horn property of Ordorado Resources Corp. in October 2004 and supervised a field exploration program on the property in August, 2005.

SIGNED at Whitehorse, Yukon, on August 31, 2005



Ronald C. R. Robertson, P. Geol.

APPENDIX IV

MCPHAR GEOSURVEYS LTD.

**"Final Report on a Helicopter-borne Geophysical Survey,
Rams Horn Property, North-western British Columbia
and South-central Yukon Territory"**

Final Report on a Helicopter-borne Geophysical Survey Ram's Horn Property North-western British Columbia And South-central Yukon Territory

For

Ordorado Resources
Suite 122, 141-757 West Hastings Street
Vancouver, British Columbia
Canada, V6B 3H1

By

McPhar Geosurveys Ltd.
1256B Kerrisdale Blvd.
Newmarket, Ontario
Canada, L3Y 8Z9

January 2005

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- Tim Bodger
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- Henrik T. Anderson
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- Asif Mirza

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Covering Ram's Horn Block A and Ram's Horn Block B:

- Digital Terrain Model (DTM)
- Total Magnetic Intensity IGRF Removed
- Total Magnetic Intensity Pole Reduced (RTP)
- Calculated First Vertical Derivative (1VD) of the Total Magnetic Intensity
- Calculated Second Vertical Derivative (2VD) of the Total Magnetic Intensity
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- Offset Profiles of the In-phase and Quadrature for the Vertical Coaxial Coil at 980 Hz and the Horizontal Coplanar Coil at 880 Hz

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Covering Ram's Horn Block B only:

- Total Count
- Potassium
- Uranium
- Thorium
- Thorium / Potassium

SUMMARY

An airborne geophysical survey program was completed on the Ram's Horn Property situated approximately 75 km northwest of Atlin, B.C. and 30 km south of Carcross, Y.T. straddling the border between the Yukon Territory and the Province of British Columbia, under contract to Ordorado Resources, signed August 2004. The program consisted of a high-resolution helicopter magnetic, electromagnetic (HEM) and radiometric survey.

First tests and calibration flights were completed on 1 September 2004 with data acquisition initiated on the same date. The final survey flight was completed on 5 September 2004. The survey area was flown in two blocks: Block A to the east of Windy Arm of Tagish Lake and straddling the B.C. Yukon border and Block B, located in the Lime Creek drainage basin, east of the Windy Arm of Tagish Lake, Yukon. Block A was flown as a magnetic and helicopter electromagnetic (HEM) survey. Block B was flown as a magnetic, HEM and radiometric survey.

During the course of the project, the Operations Base was located the Spirit Lake Lodge and Wilderness Resort, 8 kilometres north of Carcross, Y.T.

A total of 281 line-kilometres of geophysical data were acquired, covering an area of approximately 25.4 square kilometres.

1. INTRODUCTION

This report describes the high-resolution helicopter-borne magnetic, electromagnetic and radiometric surveys completed during the period of 1 September 2004 to 5 September 2004 on behalf of Ordorado Resource, hereinafter referred to as "OR", by McPhar Geosurveys Ltd, hereinafter referred to as "McPhar", over the survey area approximately 30 kilometres southeast of Carcross, Yukon Territory, and 75 kilometres northwest of Atlin, British Columbia in the Atlin Mining District, British Columbia and Whitehorse Mining District of the Yukon Territory.

The purpose of the survey was to acquire high-resolution geophysical data to map the geophysical characteristics of the geology and structure in an effort to provide an insight into geologic and geophysical settings conducive to economic (Au) mineralisation.

Table 1: Ordorado Resources Ram's Horn Property Survey Description

AREA NAME	APPROX AREA KM²	LINE /T.L. SPACING	FLIGHT LINE LINE-KM	TIE LINE LINE-KM	TOTAL LINE-KM	PRIMARY FLIGHT DIRECTION
Block A	21.8	100 m x 1,000 m	217.4	21.8	239.2	150° / 330°
Block B (Lime Creek)	3.6	100 m x 1,000 m	37.7	5.1	42.8	045° / 225°
Totals	**25.4**		**255.1**	**26.9**	**281.0**	

The data acquisition involved the use of precision differential GPS positioning, a high sensitivity magnetometer system incorporated into the *HUMMINGBIRD*™ five (5) frequency helicopter electromagnetic (HEM) system towed beneath a helicopter and a Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer system mounted in the cabin of the aircraft.

Mobilization of the helicopter, equipment and personnel was originally completed to the Spirit Lake Lodge and Wilderness Resort, Yukon Territory on 1 September 2004. Production flights commenced on 1 September 2004 and were completed on 5 September 2004. Rain, low cloud cover and high, gusting wind conditions precluded flights during the period of 3 September to 4 September 2004.

2. SURVEY AREA

The survey consisted of two areas identified by OR as Block A and Block B. Both survey areas were located between the Windy Arm and the Taku Arm of Tagish Lake in the White Range of the Yukon Plateau. The Klondike Highway that runs from Skagway, Alaska to Carcross, Yukon Territory runs along the west shore of the Windy Arm, Tagish Lake, opposite from the survey areas.

The Block A survey area encompasses Mount Conrad, Mount Patterson, Old Lady Lake and the southern approaches to Escarpment Mountain along Ram's Horn Creek. Elevations varied from 648 metres at the shoreline of Windy Arm, Taglish Lake to over 1900 metres at Mount Patterson. The survey block straddled the border between the Province of British Columbia and the Yukon Territory. The survey methods employed included magnetic and electromagnetic measurements.

The Block B survey area was located to the east of Windy Arm, Tagish Lake, in the Lime Creek drainage between Escarpment Mountain to the southwest, the ridge of Base Mountain to the northeast and north of a small lake (Lime Lake?). Elevation varied from approximately 800 metres to 1500 metres. The survey methods employed included magnetic, electromagnetic and radiometric measurements.

The primary objective of the survey was to acquire geophysical data in support of exploration for gold and sulphidic base metal mineralisation.



Figure 1: Location of the Ram's Horn Survey Blocks A & B.

The survey block corner coordinates were provided by OR in NAD27, Zone 8N UTM easting and northing. Final maps were required in NAD27, Zone 8N UTM easting and northing. The following tables contain the survey block corner coordinates in NAD27.

Table 2: Ordorado Resources Ram's Horn Block A Survey Area Boundary Coordinates

Ram's Horn Block A Survey Area		
Corner	UTM Easting	UTM Northing
1	521000	6651300
2	523235	6651300
3	524500	6653000
4	526500	6653000
5	526500	6655000
6	527855	6655000
7	527855	6651300
8	527000	6651300
9	527000	6649450
10	523600	6649450
11	523600	6649000
12	521000	6649000

Table 3: Ordorado Resources Ram's Horn Block B Survey Area Boundary Coordinates

Ram's Horn Block B Survey Area		
Corner	UTM Easting	UTM Northing
1	527855	6659310
2	529500	6660590
3	530620	6659340
4	529000	6658000

The high-resolution magnetic survey lines for Ram's Horn Block A were flown at 150°/330° azimuthal direction with a flight-line spacing of 100 metres. The tie lines were flown perpendicular to the main survey lines at 60°/240° azimuthal direction with a line spacing of 1,000 metres.

The high-resolution magnetic survey lines for Ram's Horn Block B were flown at 045°/225° azimuthal direction with a flight-line spacing of 100 metres. The tie lines were flown perpendicular to the main survey lines at 135°/315° azimuthal direction with a line spacing of 1,000 metres.

The Ram's Horn Block A Survey Area covered a total of approximately 22 km^2.

The Ram's Horn Block A Survey Area spanned the border between the Province of British Columbia and the Yukon Territory included all or part of the following 37 claims and small portions of Crown Land:

In British Columbia:

RAMS HORN 1 - 408751
RAMS HORN 2 - 408752
RAMS HORN 3 – 408753

In Yukon:

RAM 1 to RAM 32 – YC26622 to YC26653 inclusive
RAM 87 – YC26708
RAM 88 – YC26709

The Ram's Horn Block B Survey Area covered a total of approximately 3.6 km^2.

The Ram's Horn Block B Survey Area was entirely in the Yukon Territory and included all or part of the following 18 claims and adjacent Crown Land:

RAM 50 to RAM 56 – YC26671 to YC26678 inclusive
RAM 65 to RAM 68 – YC26686 to YC26689 inclusive
RAM 74 to RAM 80 – YC26695 to YC26701 inclusive.

Previous geophysical airborne surveying in the area has included magnetic surveys completed by the Geological Survey of Canada.

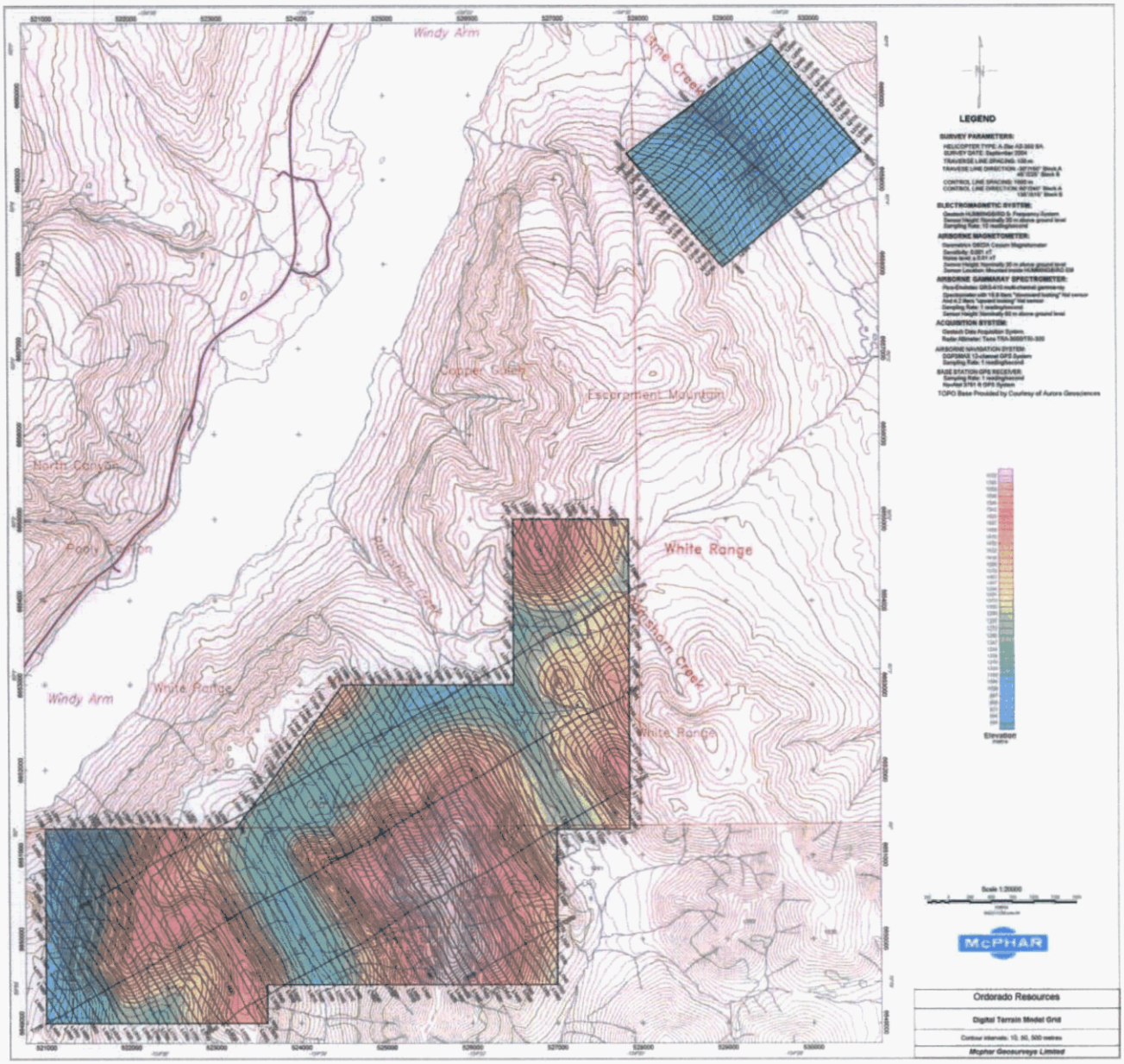


Figure 2: Flight path map of Ram's Horn Blocks A and B with topography

3. SURVEY OPERATIONS

3.1 Operations Base

Survey operations for the period of 1 September 2004 to 5 September 2004 were based out of the Spirit Lake Wilderness Camp located 6 km north of Carcross, Yukon Territory. Permission was obtained to operate the helicopter and to park it overnight at the Spirit Lake Wilderness Camp. The magnetometer base station and the GPS base station were operated from the Spirit Lake Wilderness Camp during the course of the survey.

Quality Control and preliminary data processing was undertaken by the crew at the temporary field office established at the Spirit Lake Wilderness Camp.

3.2 Survey Conditions

Weather conditions during the survey were highly variable. Generally the temperatures were in the range of 0° to 10° Celsius. High winds, morning ground fog, low cloud, snow and rain were major obstacles in the completion of the survey. High winds, particularly over ridge tops, with accompanying updrafts and downdrafts were a challenge for both helicopter and system. The result was several instances aborted survey lines.

Sunspot activity, and hence diurnal geomagnetic activity, was moderately active in the mornings and relatively quiet in the afternoons during the data acquisition period. No data were lost due to the geomagnetic activity being out of contract specification. The infield magnetic base station data was supplemented with diurnal magnetic data obtained from the Sitka, Alaska observatory of the USGS and the Pacific Geoscience Centre Observatory of the GSC in Victoria, British Columbia.

3.3 Navigation

The nominal data acquisition speed was approximately 110 kilometres per hour. Scan rates for magnetic and electromagnetic data acquisition was 0.1 second, 1.0 second for the spectrometer, radar and barometric altimeters, and 1.0 second for the GPS navigation/positioning system. Therefore, a magnetic/electromagnetic value was recorded approximately every 3.0 meters and a position fix recorded every 30 meters along the flight track.

Navigation was assisted by a GPS receiver system that reports GPS co-ordinates as WGS-84 latitude and longitude and directs the pilot over the pre-programmed two-dimensional (2-D) survey grid. The x-y position of the aircraft as reported by the GPS system is recorded together with the terrain clearance as reported by the radar altimeter.

Vertical navigation along flight lines was established using the radar altimeter. The optimum terrain clearance during normal survey flying was 60 m for the helicopter, 30 m for the towed-bird magnetometer. However, due to rugged terrain in the survey areas, and the pilot's judgment of safe flying conditions in these areas, these terrain clearances were not possible 100% of the time.

The final vertical and horizontal survey positions were differentially corrected post flight, computed using the data from the onboard GPS receiver and the GPS base station receiver, to a precision of approximately +/- 1.5m.

3.4 Field Processing & Quality Control

The survey data was transferred to portable magnetic media on a flight-by-flight basis, and then copied to the field data processing workstation. In-field data processing included reduction of the data to GEOSOFT GDB database format and inspection of the magnetometer data for adherence to contract specifications. Survey lines that exhibited excessive deviation after differential correction, or that were considered to be of inferior quality, were flagged and reflown.

3.5 Survey Statistics and Project Diary

The survey entailed a total of five (5) flights; all of which were production flights. The first production flight was Flt#17 on 1 September 2004, with the last production flight, Flt#21 on 5 September 2004. These flights also included ferry, test and/or calibration segments.

Table 4: Project Diary

Date	Flt #	Hours Flown	Line-Km Accepted	Comments
1 Sept.	17	1:12	41.8	Ground fog in morning; winds increasing in strength through afternoon. Flying aborted due to high winds over ridges. Block B completed.
2 Sept.	18	2:04	57.0	Production flight. Further flying aborted due to high winds and low cloud.
3 Sept.				No flights due to poor weather
4 Sept.				No flights due to poor weather, low cloud, high winds.
5 Sept.	19 20 21	2:15 2:53 0:38	184.8	29 lines in Block A. 35 lines in Block A. 4 lines, Block A completed
Totals		**9:02**	**283.6***	

*Final line totals for billing are based on the actual windowed line length with respect to the survey polygon boundaries and may vary from this number.

Reflights were required on six (6) survey lines and were completed during the course of the survey.

The following personnel were the onsite crew for the OR project:

Table 5: Field Personnel

Title	Name	Days Onsite
Data Processor/QC Geophysicist	Dr. Andy Anderson	5
Technician/Operator	Barry Levy	5
Operator	Daniel McKinnon	5
Helicopter Pilot	Ken Knight	5
AME	Trevor Moore	5
Client QC (Aurora Geosciences)	Mike Power	5
Ordorado Resources Representative	Bill Harris	5

McPhar Geosurveys Ltd. of Newmarket, Ontario, Canada, was responsible for the field operations, all geophysical matters and the overall coordination and management of the survey.

.

4. HELICOPTER AND EQUIPMENT

4.1 The Helicopter

The survey was flown using a Eurocopter AS350BA A-Star helicopter, with Canadian registration C-GPWK provided by Pacific Western Helicopters of Dease Lake, British Columbia. This helicopter featured up to 2.5 hours flight duration with the geophysical system and a crew of 2 persons onboard.

The installation of the geophysical and ancillary equipment was carried out by McPhar personnel prior to the equipment arriving at Spirit Lake Lodge Base Camp, with final adjustments, calibration and testing completed prior to production survey flights.

Aircraft Registration:	-	Canadian, C-GPWK
Engine:	-	Turbomeca Arriel 1B
Empty weight:	-	2,550 lbs
Gross weight:	-	4,630 lbs
Max cruise:	-	123 knots
HIGE:	-	8,500 ft
HOGE:	-	6,000 ft
Service ceiling:	-	15,000 ft
Standard fuel:	-	143 gal
Survey duration:	-	4.55 hours

4.2 The Survey Instrumentation

4.2.1 Survey System Overview

The instrumentation installed in the helicopter included:

- A Geometrics G822A high-sensitivity Cesium magnetometer mounted in the HUMMINGBIRD™ towed-bird airfoil, 0.001 nT / 20 Hz resolution
- A Geotech HUMMINGBIRD™ five (5) frequency electromagnetic system in a towed-bird airfoil.
- A Pico-Envirotec GRS-410 self-stabilizing multi-channel gamma-ray spectrometer with 16.8 litres "downward looking" NaI sensor and 4.2 litres "upward looking" NaI sensor.
- A DGPS Navigation System, comprising a CSIRadio DGPSMAX 12-channel GPS system, and a GEONAV GPS computer and pilot steering indicator (PSI)
- A Geotech Data Acquisition System
- A Terra TRA-3000/TRI-300 Radar Altimeter
- A DevTech Geo-iMAGe-Lite Colour Digital Imaging System for capturing images of the flight path during the survey.

The processing and base stations comprised:

- A Field Workstation, comprising a Pentium PC, printer and full data processing software
- A Magnetometer / GPS Base Station, comprising a Gem Systems GSM-19 Overhauser base station magnetometer and NovAtel 3751R GPS system.

A complement of spare parts and test equipment were maintained at the survey site.

4.2.2 The Helicopter-borne *HUMMINGBIRD™* Digital Electromagnetic System

The Geotech *HUMMINGBIRD™* multi-frequency, multi-coil electromagnetic system (HEM), that measures the in-phase and quadrature responses from a number of coil-pairs installed in a tubular bird, towed beneath a helicopter. The *HUMMINGBIRD™* features horizontal coplanar coil sets operating at frequencies of 880 Hz, 6.6 kHz, and 34 kHz and vertical coaxial coil sets operating at frequencies of 7 kHz and 34 kHz. The in-phase and quadrature signals were measured simultaneously for the five (5) frequencies with a time constant of 0.1 seconds. The HEM bird is towed on a long-line 30 m below the helicopter.

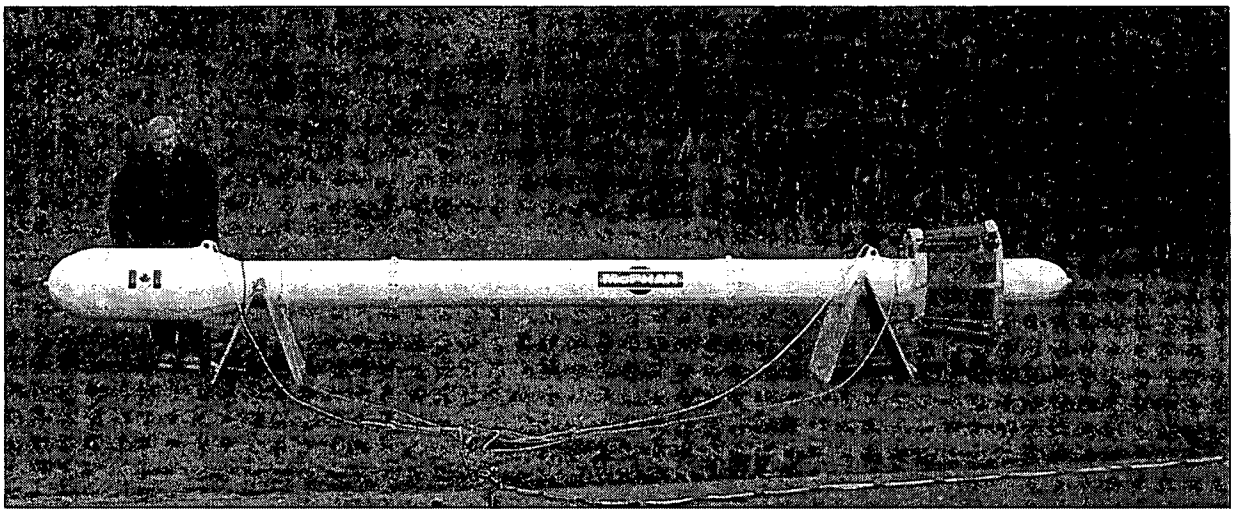


Figure 3: HUMMINGBIRD™ electromagnetic sensor

The system noise of the EM sensor is less than 2 ppm of the transmitted field, under ideal conditions. A total of ten (10) EM channels of information are sampled at 0.025-second intervals (40 Hz) or approximately every 0.75 metres along the survey line (at survey airspeed of approximately 110 kph), with a time constant of 0.1 second.

The EM system was calibrated with an external coil at the start and end of each survey and with an internal coil approximately three times per hour during survey flights. The phasing of the EM system was checked with an external ferrite rod before each survey flight.

Sferic activity can be reduced by post-survey processing to less than 2.0 ppm.

The electromagnetic system and ancillary equipment were operated for a sufficient time period prior to survey flying to allow for warm-up and thermal stabilization of the equipment. Nulling, ferrite and external Q-coil calibration for the EM system were performed after the system had stabilized following the-warm-up period. All of these ground calibrations were completed before commencement of each flight. Internal calibrations were performed frequently throughout the survey flight.

The table below lists the arrangement of the coils inside the bird:

Table 6: HUMMINGBIRD™ Coil Configuration

COIL FREQUENCY	COIL ORIENTATION	COIL SEPARATION	CHANNELS (I In-Phase, Q Quadrature)
880 Hz	Coplanar	6.025 meters (20 ft)	I, Q
980 Hz	Coaxial	6.025 meters (20 ft)	I, Q
6630 Hz	Coplanar	6.300 meters (21 ft)	I, Q
7001 Hz	Coaxial	6.300 meters (21 ft)	I, Q
34133 Hz	Coplanar	4.875 meters (16 ft)	I, Q

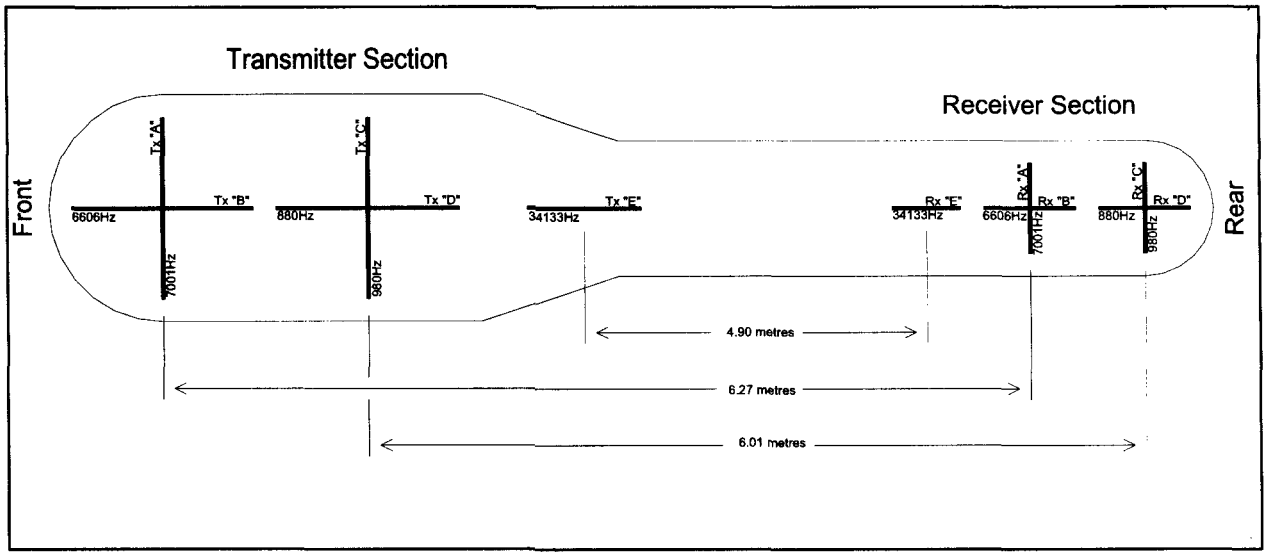


Figure 4: HUMMINGBIRD™ electromagnetic sensor coil configuration

4.2.3 Airborne Magnetometer

A Geometrics G822A cesium split-beam total-field magnetometer was employed, installed in the *HUMMINGBIRD*™ airfoil. Sampling rate was ten times per second with an in-flight sensitivity of 0.01 nT. Aerodynamic magnetometer noise was 0.25 nT or less. The sensitivity of the magnetometer is documented at 0.001 nT when operated at a sampling rate of 0.1-second.

The Geometrics G822A magnetometer is described in Appendix 3.

4.2.4 Gamma-ray Spectrometer System

A Pico-Envirotec GRS-410 multi-channel gamma-ray spectrometer with 16.8 litres "downward looking" NaI sensor and 4.2 litres "upward looking" NaI sensor sampling at one sample per second. The thermally isolated NaI crystal sensors were installed in the cabin of the helicopter.

The GRS-410 is a 512 channel, self-stabilizing spectrometer that tracks and corrects for the spectral drift of the system by following a Thorium spectral peak. The standard regions of interest for Total Count (TC), Potassium (K), Uranium (U), Thorium (Th) and cosmic radiation were recorded for post survey processing. The standard regions of interest recorded with window limits in MeV are provided in following table:

Table 8: Standard Gamma-ray Spectrometer Data Acquisition Windows

Standard Gamma-ray Spectrometer Data Acquisition Windows		
Element	Lower Boundary (MeV)	Upper Boundary (MeV)
Total Count	0.41	2.81
Potassium	1.37	1.57
Uranium	1.66	1.86
Thorium	2.41	2.81
Cosmic	3.00	∞
Upward-looking Uranium	1.66	1.86

The spectrometer was calibrated on a daily basis using standard calibration sources for Thorium (Th), Cesium (Cs) and Uranium (U).

The recommendations in the International Atomic Energy Agency – IAEA – TECDOC-1363 – *Guidelines for radioelement mapping using gamma ray spectrometry* were followed throughout the survey.

4.2.5 The Towed-Bird Airfoil and Tow-Cable

The Towed-Bird Airfoil is basically a hollow Kevlar tube, 6.6 meters long, with a bulbous nose into which the electromagnetic system components and electronics are installed along with the magnetometer Cesium sensor mounted in a 3D hand-aligned gimbal. A skirt is used at the tail of the airfoil to stabilize the bird in flight.

The Tow Cable is constructed of coaxial cables complete with a strain member. The length of this tow cable is nominally 30 metres. The tow cable is attached to the helicopter by means of a weak link assembly. The on-board section of the tow cable consists of coaxial cable, the length customized to suit the helicopter.

4.2.6 The Base Station Magnetometer

The magnetometer base station used was comprised of a GEM Systems GSM-19 Overhauser magnetometer to monitor and record diurnal variations of the Earth's magnetic field. The base station

magnetometer was set up at Johnson's Crossing in an open field. Every effort was made to ensure that the magnetometer sensor was placed in a location with a low magnetic gradient and sited away from electric transmission lines, and moving ferrous objects, such as motor vehicles and aircraft, without compromising safety and airport operations.

The base-station magnetometer, with digital recording, was operated continuously throughout the airborne data acquisition work with a sensitivity of 0.01 nT. The ground and airborne system clocks were synchronised using GPS time, to an accuracy of 1 second or better. The sample rate was once per second. A continuously updated profile plot of the base station values was presented on the base station screen. At the end of the day, the digital data was transferred from the base station's data-logger to the fieldwork station.

Specifications are included in Appendix 3.

4.2.7 Altimeter

A Terra TRA-3000/TRI-30 radar altimeter was used to record terrain clearance to an accuracy of about 1 ft (30 cm), over a range of 12 metres to 762 metres. The antenna was mounted beneath the bubble of the helicopter cockpit. The recorded value of terrain clearance was adjusted to give bird height above ground. This was possible given the fixed tow cable length of 30 metres.

A Setra Model 276 Barometric Pressure altimeter measured the elevation above sea level, and is calibrated in units of height (metres). This altimeter has a published accuracy of ± 0.02% and a resolution of 0.5 metres.

The altimeters are interfaced to the data acquisition system with an output repetition rate of 0.1 second, and are digitally recorded.

The altimeters are further described in Appendix 3.

4.2.8 The GPS Satellite Navigation System

A CSIRadio DGPS-Max real-time OmniSTAR GPS navigation system with navigation computer and pilot steering indicator (PSI) provided in-flight navigation control. This navigation system operated on 12-channels. A pilot steering indicator (PSI) installed on top of the cockpit dashboard, in front of the pilot provided steering and cross-track guidance to the pilot. The pilot was therefore provided with GPS, and altimeter data to aid in the flying of the helicopter.

This navigation system yields a real-time positional accuracy of better than ± 2 m.

Survey co-ordinates are set-up prior to survey and the information is fed into the airborne navigation system. The co-ordinate system employed in the survey design and digital recording is WGS-84 latitude and longitude. The GPS positional data is recorded at one-second intervals and used with the base station data to calculate differentially corrected locations.

The GPS receiver is fully described in Appendix 3.

4.2.9 Data Acquisition/Recording System

A Geotech *HUMMINGBIRD™* data acquisition system recorded the digital survey data on an internal hard disk drive. Data is displayed on an LCD screen as traces to allow the operator to monitor the integrity of the system. Sampling rates are as indicated in Table 3.

Table 9: Sampling Rates of Digital data

SYSTEM and No. of CHANNELS	SAMPLING RATE (second)
Total Field Magnetometer (1 channel)	0.1
E.M. - 880 Hz (2 channels) Coplanar	0.1
E.M. – 980 Hz (2 channels) Coaxial	0.1
E.M. – 6.6 kHz (2 channels) Coplanar	0.1
E.M. – 7 kHz (2 channels) Coaxial	0.1
E.M. – 34 kHz (2 channels) Coplanar	0.1
Gamma-ray Spectrometer (512 channels plus U, Th, K, TC and cosmic)	1.0
Radar Altimeter (1 channel)	1.0
DGPS Navigation	1.0

All data collection routines, checking, buffering, recording and verification are software controlled for maximum flexibility. The recorded data is monitored on a colour LCD display as pseudo-analog traces to verify quality and functionality of the system.

4.2.10 Colour Digital Video Imaging System

A record of the flight path was acquired using a DevTech Geo-iMAGe-Lite Colour Digital Imaging System, comprised of the following:

- Stand alone rack mountable mini-computer system, Pentium III 1.0 GHz clock speed c/w 256 MB RAM memory, 20 GB HDD, LCD TFT screen, keyboard and mouse.
- Windows 2000 Professional Operating System software.
- Custom software to enable acquisition of .JPG video frames at a resolution of up to 800 x 600 pixel x 256 colours.
- Frame acquisition rate controlled by 1 PPS signal from GPS receiver - 1 frame per second.
- User-selectable video formats including NTSC.
- Sony digital colour video camera with 1/3 inch CCD video element.
- 2.8- to 4-mm focal length auto-iris lens for low-level video acquisition (47° to 96° viewing angle).

A set of digital images of the ground was taken. The video frames are stored on a large capacity hard disk. A naming convention for each frame has been developed utilizing GPS time as the reference. The frames are numbered in the format SSSSSSS.DDD where SSSSSSS represents the GPS seconds of the day past midnight and DDD represents the Julian day of the year. In the interests of maximum

compatibility with other computer processing systems the frame naming system has been kept within the "DOS" naming convention. The system includes a CD-RW writer and appropriate software to allow storage of the imagery on CD-ROM media for long-term archival purposes.

4.2.11 Field Computer Workstations

A Data Processing Field Workstation (FWS) comprised of a dedicated PC- based notebook computer for use at the technical base in the field, was used on this project. The FWS is designed for use with Geosoft OASIS/Montaj Data Processing Software. The FWS has a data replot capability, and may be used to produce pseudo-analogue charts from the recorded digital data within less than 12 hours after the completion of a survey flight, if this is necessary. It is also capable of processing and imaging all the geophysical and navigation data acquired during the survey, producing semi-final, preliminary-levelled maps.

The FWS was used to accomplish the following:

- **Quality Control/Digital Data Verification** - flight data quality and completeness were assured by both statistical and graphical means on a daily basis
- **Flight Path Plots** - flight path plots were generated from the GPS satellite data to verify the completeness and accuracy of each day's flying
- **Preliminary Maps** - the Geosoft software system permitted preliminary maps to be quickly and efficiently created for noise and coherency checks.

The FWS is fully described in Appendix 3.

The Montaj software is designed for airborne data editing, compilation, processing and plotting. The software reads the portable data media from the airborne system, checks them for gaps, spikes or other defects and permits the data to be edited where necessary. The base station GPS/magnetometer data is checked, edited, processed and then merged with the airborne data. GPS flight path plots are created and plotted for both flight planning and flight path verification.

4.2.12 Spares

A normal compliment of spare parts, tools, back-up software, and necessary test instrumentation was available in the office at the airport.

5. INSTRUMENT CHECKS AND CALIBRATIONS

5.1 Airborne Magnetic System Tests and Calibrations

5.1.1 Magnetic Heading Effect

The magnetic heading effect was determined by flying a cloverleaf pattern oriented in the same direction as the survey lines and tie lines. Two passes in each direction were flown over a recognizable feature on the ground in order to obtain sufficient statistical information to estimate the heading error. The heading error was determined from a test completed on a subsequent survey completed in September in the same area of the Yukon Territory.

5.1.2 Lag Tests

A Lag Test was performed on a subsequent survey in September to ascertain the time difference between the magnetometer readings and the operation of the GPS System. The lag test is included in Appendix 2.

5.2 Airborne Electromagnetic System Tests and Calibrations

The *HUMMINGBIRD*^{TM} EM system was:

- calibrated at the start of the survey day, on the ground, using a ferrite rod and calibration coil;
- at the beginning of each flight internal Q-coil calibrations were performed by the onboard technician;
- at the beginning of each flight, the helicopter climbed to 500 m (1500 ft) AGL to allow the onboard technician to perform background and drift checks.

5.3 Airborne Gamma-ray Spectrometer System Tests and Calibrations

5.3.1 Test Line

A test line was flown and recorded at the start and end of each survey flight to test the repeatability of the gamma-ray spectrometer system. The minimum, maximum and average deviation for each of the four windows (TC, U, Th and K) shall be calculated and stored in a database for future reference and use.

5.3.2 Altitude Attenuation Coefficient

The altitude attenuation coefficient was derived prior to the survey. This was be done by flying a test line at various altitudes from 100' (30 m) up to 1,000' (305 m) above the test line. The coefficients used are included in Appendix 2.

5.3.3 Cosmic Window Calibrations

Cosmic window calibrations or Background Attenuation Coefficients were measured and calculated for the detector crystal packs prior to the survey. The coefficients were calculated from a sequence of passes flown at various altitudes over a large body of water (from 250 ft up to 5,000 ft at intervals of 1,000 ft), with each altitude flown for a minimum of 2 minutes.

The average values of the counts measured in each of the 4 windows (TC, U, Th and K) are compared against the average counts for the cosmic window at each of the altitudes flown. The results of this calibration are presented in Appendix 2.

5.3.4 Spectral Resolution Test

The resolution of the spectrometer was determined before and after each survey flight, using the 662 keV gamma rays from a Cs^{137} source. The pre flight measurements were to be completed after any detector gain adjustments had been applied. The post flight measurement was to be completed without any gain adjustment being made. Unfortunately the field crew did not record these tests digitally and the results cannot be reported.

5.3.5 Daily Source Checks

The spectrometer was calibrated before the first survey flight of the day and after the last survey flight of the day using standard calibration sources, comprised of Cesium (Cs137), Uranium (Bi214) and Thorium (Th208). A background measurement was to be recorded, then each of the sources recorded, followed by a background measurement. Each measurement was to have a duration of 60 seconds. The sources were placed in exactly the same position relative to the gamma-ray sensors each time the source check were completed. Unfortunately the field crew did not complete the final background measurement and the results of this test could not be tabulated and presented.

5.4 Altimeter Calibration Checks

Checks of the radar altimeter calibration were undertaken during a subsequent survey in September. Calibrations were determined by comparing the radar altitude with a suitable reading from the GPS system during a radar "stack" over a suitable feature.

A vertical calibration test of the radar altimeter was repeated each day of operation immediately upon take-off and prior to landing.

5.5 GPS Static Test

In addition to carefully selecting a magnetically suitable area for the positioning of the magnetometer base station, care was taken to ensure that the exact position of the base station is known. The GPS system itself was used, over a period of time, to calculate the coordinates of the base station. Care was taken to ensure that the base station GPS had a maximum field-of-view to the NAVSTAR satellites.

6. QC AND DATA PROCESSING

Daily quality control, initial processing and archiving of the data were completed on-site at the base of operations at the Spirit Lake Wilderness Camp, Carcross, YT using Geosoft MONTAJ software and a notebook PC computer. All data were verified upon receipt, and checked against the operator's flight logs.

The pre-processing or infield processing sequence included the following quality control measures:

a) Examination and checking of all incoming data to ensure completeness of data sets.
b) The production of preliminary flight path maps, speed checks, terrain clearance checks.
c) Full profile quality control of all acquired traces for noise levels, data completeness, spike editing, and adherence to contract specifications.

The final data processing, map generation and report was completed by McPhar at the Newmarket, Ontario office.

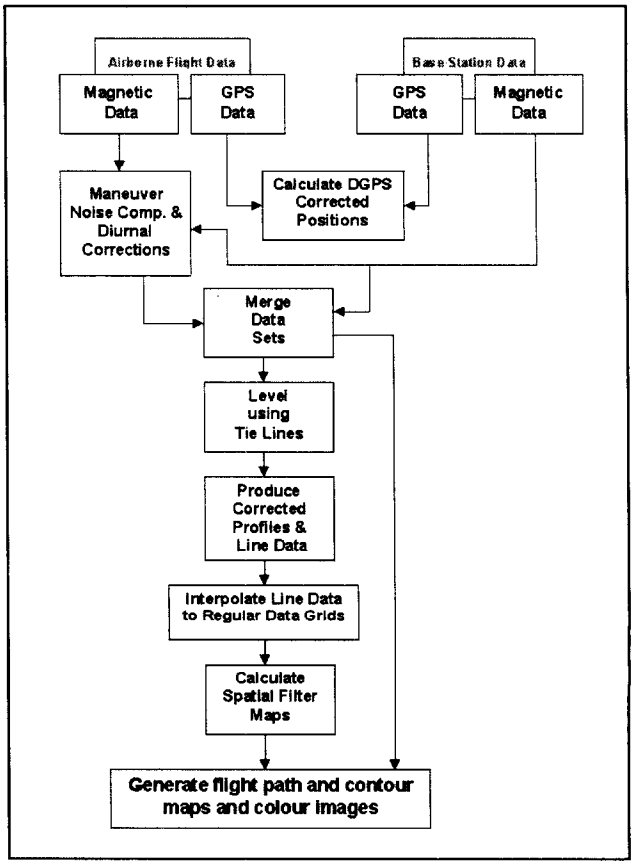


Figure 6: Data processing flow chart for magnetic data

6.1 Flight Path Compilation

The flight path was derived from differentially corrected GPS positions using the real-time airborne GPS data. A position was calculated each 1.0 second (approx. each 30 meters along the flight path) to an accuracy of better than +/- 1.5 meter. These position data were merged into magnetic and ancillary data in the Geosoft GDB database.

6.2 Base Station Magnetic Data

The base station magnetometer data was edited, plotted and merged into the GDB database on a daily basis.

6.3 Corrections to the Magnetic Data

The processing of the data involved the application of the following corrections:

- Correction for diurnal variation using the digitally recorded ground base station magnetic values
- Adjustment of the data for the time lag between the GPS position and the position of the magnetic sensor
- Correction for the heading effect and
- Network adjustment using the flight line and tie line information to level the survey data set.

The corrected data was then used to generate the Total Magnetic Intensity grid.

6.3.1 Additional Corrections Applied to Profile Data

After applying the above corrections to the profile data residual line-direction-related noise was removed through application of microlevelling. The microlevelling technique consists of applying directional and high pass filters to produce a grid containing noise-only in the line direction. In order to differentiate between the two of them, the grid is extracted to the profile database, and an amplitude limit and a filter length are determined, so that the final error channel reflects only noise present on the grid without removing or changing geological signal. This error channel is then subtracted from the initial data channel in order to obtain the final microlevelled channel. The resulting grid is free of line direction noise.

6.3.2 Gridding

The corrected magnetic line data was interpolated between survey lines using a random point minimum curvature gridding algorithm to yield x-y grid values for a standard grid cell size of $1/5^{th}$ of the line spacing (30 metres). For final map production at the required scale of 1:20,000, the grids were regridded to a grid cell size of 15 metres for presentation purposes.

6.3.3 Filter Derivatives

The Total Magnetic Intensity (TMI) data were subjected to:

- IGRF removal
- Reduction-to-the-pole
- Calculation of the First Vertical Derivative (1VD)
- Calculation of the Second Vertical Derivative (2VD)
- Calculation of the Analytic Signal

Colour/contour images were produced for all the above listed magnetic products.

All of these spatial filtering techniques were completed using the Oasis Montaj Magmap and IGRF modules for filtering in the 2D FFT domain.

6.3.3.1 IGRF Removal

The International Geomagnetic Reference Field (IGRF) is a long-wavelength regional magnetic field calculated from permanent magnetic observatory data collected around the world. The IGRF is updated and determined by an international committee of geophysicists every 5 years. Secular variations in the Earth's magnetic field are incorporated into the determination of the IGRF.

Through the removal of the IGRF from the observed Total Magnetic Intensity (TMI), the resulting residual magnetic intensity allows for more valid modelling of individual near surface anomalies. Additionally, the data can be more easily incorporated into databases of magnetic data acquired in the past or to be acquired in the future.

6.3.3.2 Reduction-to-the-Pole

To compensate for the shift of the true anomaly position over the causative source, due to the magnetic inclination and declination, the magnetic data was recomputed so that magnetic anomalies will appear as they would if located at the north magnetic pole. The result of this operation is that in theory, the magnetic anomaly is located directly overtop of the causative source. The computation is referred to as "reduction-to-the-pole" (RTP). The reduction-to-the-pole is computed using a FFT (Fast Fourier Transform) operator.

The RTP not only shifts the anomalies to their correct position with respect to the causative magnetic bodies, but assists in the direct correlation and comparison of magnetic anomalies, trends, structural axis, and discontinuities with mapped geologic surface expression.

The RTP was calculated using the following parameters for the survey area:

Geomagnetic Inclination:	75.8° N
Geomagnetic Declination:	24.6° E

6.3.3.3 Calculation of the First Vertical Derivative (1VD)

Vertical derivatives compute the rate of change of the field as it drops off when measured vertically over the same point (upward continuation). Potential field data obeys Laplace's equation, which allows for the computation, through the FFT package, to take advantage of this symmetry and solve for the vertical or "z" component of the field. The First Vertical Derivative (1VD) has the effect of sharpening anomalies, which allows for better spatial location of source axes and boundaries

6.3.3.4 Calculation of the Second Vertical Derivative (2VD)

To enhance local anomalies and to outline the edges of anomalous bodies within the data, a Second Vertical Derivative (2VD) is computed. The 2VD is a powerful interpretive tool and that is used to assist in the delineation of causative bodies and to accurately locate changes in the magnetic field gradients. Better definition of discontinuities and their relationship to geology can be gained from the use of this tool. A 2VD will show steep gradients over faults and positive closures over the "up thrown" blocks.

6.3.3.5 Calculation of the Analytic Signal

The analytic signal is the square root of the sum of the squares of the derivatives in the x, y, and z directions:

$$Asig = sqrt\ (dx*dx + dy*dy + dz*dz)$$

where: asig is the Analytic Signal
sqrt is the square root of
dx is the horizontal gradient in the x direction
dy is the horizontal gradient in the y direction
dz is the vertical gradient in the z direction

The analytic signal is useful in locating the edges of magnetic source bodies, particularly where remanence and/or low magnetic latitude complicates interpretation.

6.4 Corrections to Electromagnetic Data

A two stage digital filtering process was used to reject major sferic events and to reduce system noise.

Local sferic activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major sferic events. The filter used was a non-linear filter. The signal-to-noise ratio was further improved by the application of a low-pass linear digital filter. This filter has zero phase shift that prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than about 0.3 seconds or approximately 30 metres.

EM channels were filtered with the following specification:

Table 10: EM Filtering Specifications

EM CHANNEL (Ip# - In-phase, recording channel) (Q# - Quadrature, recording channel)	APPLIED FILTERS	
Ip1, Q1 (7 kHz coaxial)	Non-linear 0.5 s	Low-pass 4.0 s
Ip2, Q2 (6 kHz coplanar)	Non-linear 0.5 s	Low-pass 4.0 s
Ip3, Q3 (980 Hz coaxial)	Non-linear 0.5 s	Low-pass 4.0 s
Ip4, Q4 (880 Hz coplanar)	Non-linear 0.5 s	Low-pass 4.0 s
Ip5, Q5 (34 kHz coaxial)	Non-linear 0.5 s	Low-pass 4.0 s

Following the filtering process, a base level correction was made using EM zero levels determined during the high altitude calibration sequences. The correction applied is a linear function of time that ensures the corrected amplitude of the various in-phase and quadrature components is zero when no

conductive or permeable source is present. The filtered and levelled data were used in the determination of apparent resistivity and anomaly picking. Manually picked zero-levels were used during the intervening period between high-level calibrations.

6.4.1 Apparent Conductivity

The apparent conductivity is calculated by assuming a uniform resistive half-space model. The computer program determines the conductivity that would be consistent with the recorded in-phase and quadrature response amplitudes at the selected frequency. The conductivity channel values were calculated in Log (base10).

6.4.2 EM Anomaly Selection and Analysis

The main purpose of EM anomaly selection is to identify possible near-vertical or dipping thin sheet bedrock conductors. If the source conductance is not large, such anomalies may not register on the apparent resistivity maps as a distinctive resistivity low.

The response type expected from a vertical thin sheet conductor is a positive anomaly in the coaxial EM channels with a coincident low in the coplanar channels.

In some cases a negative in-phase anomaly will be accompanied by a positive quadrature response that suggests a source that is both conductive and magnetic (or conductors and magnetic sources which are in close proximity to each other). In rare instances, the coaxial in-phase trace will exhibit a small positive peak superimposed on a larger negative response in both coaxial and coplanar channels. Such anomalies are often of special exploration interest.

EM anomalies were automatically picked from the offset profiles using Geosoft HEM software. Most anomalies have a response in the 980 Hz coaxial channel. The coaxial channels are more sensitive to vertical thin conductors typified by sulphide mineralisation.

6.4.3 Line Profiles

After levelling the EM channels, stacked profile maps were prepared with the following specifications:

- For 880 Hz coplanar and 980 Hz coaxial frequencies the in-phase and quadrature profiles utilized a vertical scale of 5 ppm/mm;
- For 6600 Hz coplanar and 7000 Hz coaxial frequencies the in-phase and quadrature profiles utilized a vertical scale of 5 ppm/mm;
- For the 34 kHz coplanar frequency, the in-phase and quadrature profiles utilized a vertical scale of 5 ppm/mm.

6.4.4 Gridding

The corrected conductivity line data was interpolated between survey lines using a random point minimum curvature gridding algorithm to yield x-y grid values for a standard grid cell size of $1/5^{th}$ of the line spacing (30 metres).

6.5 Corrections to Radiometric Data

Radiometric data was collected over the Ram's Horn Block B only.

6.5.1 Background to Corrections and Processing

Gamma-ray spectrometer surveys are utilized for mapping the concentration and distribution of naturally occurring radioelements. The use of an airborne gamma-ray spectrometer allows for the in-situ analysis of radioelement concentrations of naturally occurring Potassium (K), Uranium (U) and Thorium (Th) in the field.

To the geologist, maps of the concentrations of K, U, and Th can prove diagnostic in the mapping of rocks and soils as an aid in geologic mapping and in the exploration for uranium, gold, tin and tungsten deposits where the primary mineralisation process is often related to K metasomatism.

Radioactivity measurements from an airborne platform are dependent upon the detection of gamma rays produced through radioactive decay of the nuclide to be detected. Only three radioactive elements emit sufficient gamma radiation to be measured by airborne methods. The three major sources are:

- Potassium-40 (^{40}K) which comprises 0.011% of all potassium
- Daughter products from the ^{238}U decay series,
- Daughter products from the ^{232}Th decay series.

High-energy cosmic rays of non-terrestrial origin can be detected by airborne gamma-ray spectrometer surveys. This cosmic radiation interacts with molecules in the atmosphere, the aircraft, and the NaI detectors resulting in the production of high-energy radiation. This radiation is detectable and increases exponentially with height above sea level and must be compensated for to obtain reliable and repeatable measurements and detection of terrestrial radiation sources.

The traditional energy windows used to detect gamma ray radiation from K, Th, and U sources have overlapping areas where the energy recorded for a given element contains some contribution from all three radioelements. A correction procedure, known as stripping, is applied to the data to compensate for this spectral overlapping.

The natural gamma ray spectrum over the range of 0 to approximately 3000 keV is resolved by the spectrometer used into 511 channels, each channel ranging from 5 to 6.5 KeV in width. A separate channel records all high-energy radiation above 3000 KeV, the cosmic radiation contribution. Within the defined radioelement windows, the counts recorded are summed over a given time period.

Care must be taken during the acquisition of gamma-ray spectrometer data as the contribution from radon gas and it's related decay products in the atmosphere can result in misleading count rates. Radon gas can also diffuse from the ground, but only one radon nuclide is the directly related to the Uranium decay series. In order to minimise the impact of radon "contamination", radiometric surveys are not completed during rain ("washes" radon from the air and increases ground concentrations) or fog conditions and for a period of not less than 2 hours after precipitation has finished in order to allow for dispersion of radon gas to normal background levels.

Radiometric surveys have limited depth penetration; most radioactive sources being within the upper 1.5 metres of the ground. Radiometric surveys are therefore not effective over water bodies or snow covered areas, the presence of water (in either liquid or solid state) effectively masking radiometric sources.

Spectrometer data are typically acquired in units measured in counts per second. The instrumentation used requires some time each second to process the incoming data – during this time period no counts are recorded. This time period is referred to as "*equipment down time or system dead-time*". A correction is applied to compensate for this time period.

6.5.2 Processing Applied Using Geosoft Radiometric Processing System

The reduction of radiometric data followed standard processing steps as outlined in the recommendations of IAEA-TECDOC-1363 - Guidelines for radioelement mapping using gamma ray spectrometry data.

The processing of radiometric data involved:

1. correction for system dead-time,
2. background removal,
3. Cosmic correction (Compton scattering correction)
4. Stripping ratios
5. effective height calculation (correct for pressure/temperature change),
6. conversion of count rates to ppm values

Note that the terrain clearance correction is limited to 250 metres to prevent unstable amplification of low counts.

As part of the processing step the digital elevation model (DEM) is calculated via the subtraction of the radar altimeter from the barometric altimeter. The barometric altimeter is levelled using the GPS altimeter. The DEM is calculated as a check on the barometers and to provide information on the topography for interpretation of the radiometric data.

Microlevelling of the radiometric data was completed to eliminate and/or reduce streaking on final gridded images of the individual channels.

7. DELIVERABLE PRODUCTS

The survey data are presented as colour/contour maps on paper, produced at a scale of 1:20,000. A set of report-sized colour/contour images, on paper, is included as Appendix 5. The basic co-ordinate system used is Universal Transverse Mercator, referenced to the longitude & latitude (NAD83). All digital data are also presented on CD-ROM in ASCII format.

The deliverable items of this survey are:

7.1 Maps

A single map sheet covering both Ram's Horn Block A and Ram's Horn Block B was prepared for displaying all magnetic and electromagnetic surveying completed. At the request of the client, a seperate set of radiometric maps for the Ram's Horn Block B were prepared at a scale of 10,000.

The following maps, at a scale of 1:20,000, were delivered as two (2) colour paper copies per product:

- Flight Path (on a topographic base)
- Digital Terrain Model (DTM)
- Total Magnetic Intensity IGRF Removed
- Total Magnetic Intensity Pole Reduced (RTP)
- Calculated First Vertical Derivative (1VD) of the Total Magnetic Intensity
- Calculated Second Vertical Derivative (2VD) of the Total Magnetic Intensity
- Calculated Analytic Signal of the Total Magnetic Intensity
- Offset Profiles of the In-phase and Quadrature for the Vertical Coaxial Coil at 980 Hz and the Horizontal Coplanar Coil at 880 Hz
- Offset Profiles of the In-phase and Quadrature for the Vertical Coaxial Coil at 7 kHz and the Horizontal Coplanar Coil at 6600 Hz
- Apparent Resistivity Calculated by Inversion of the In-phase and Quadrature components of the Horizontal Coplanar Coil at 6600 Hz

The following maps, at a scale of 1:10,000, were delivered as two (2) colour paper copies per product:

- Total Count
- Potassium
- Uranium
- Thorium
- Thorium / Potassium

All maps are included as page-size maps in Appendix 6.

7.2 Digital Data

The edited field and processed digital data are delivered in two (2) copies, in ASCII code, on CD-ROM. The final processed line and grid data, in GEOSOFT format, are also delivered in three (2) copies on CD-ROM. Full descriptions of the digital data formats are included in this final report (see below) and as text files on each CD-ROM. Each CD-ROM has a README.TXT file describing the contents and the file formats.

7.3 Report

Five (5) copies of the survey report were delivered, complete including final copies of all maps as page size maps. The report provides information about the acquisition, processing and presentation of the survey data.

Respectfully submitted,
McPhar Geosurveys Ltd.

Robert Hearst, M.Sc., P.Geoph. (NAPEG)
Consulting Geophysicist

APPENDICES

APPENDIX 1 **Statement of Qualifications**

APPENDIX 2 **Lag Test, Heading Table, Flight Logs, Daily Reports**

APPENDIX 3 **Equipment Documentation**

- Hummingbird HEM System Specifications
- Geometrics G-822A Cesium Magnetometer
- Pico-Envirotec GRS 410 Gamma Spectrometer
- DGPS Max
- Terra TRA-3000 / TRI-30 Radar Altimeter
- Setra Model 276 Pressure Transducer
- Geo-iMAGe Lite CDIS
- GSM-19 Overhauser Magnetometer
- NovAtel GPSCards
- Field Data Processing Workstations

APPENDIX 4 **Personnel Resumes**

- Tim Bodger
- Robert Hearst
- Henrik T. Anderson
- Barry Levy
- Daniel McKinnon
- Tonia Bojkova
- Asif Mirza

APPENDIX 5 **Digital Data Specifications**

- HEM Data File Description
- Spectrometer Data File Description
- HEM Anomaly Listing

APPENDIX 6 **Page Size Maps**

Covering Ram's Horn Block A and Ram's Horn Block B:

- Digital Terrain Model (DTM)
- Total Magnetic Intensity IGRF Removed
- Total Magnetic Intensity Pole Reduced (RTP)
- Calculated First Vertical Derivative (1VD) of the Total Magnetic Intensity
- Calculated Second Vertical Derivative (2VD) of the Total Magnetic Intensity
- Calculated Analytic Signal of the Total Magnetic Intensity
- Offset Profiles of the In-phase and Quadrature for the Vertical Coaxial Coil at 980 Hz and the Horizontal Coplanar Coil at 880 Hz
- Offset Profiles of the In-phase and Quadrature for the Vertical Coaxial Coil at 7 kHz and the Horizontal Coplanar Coil at 6600 Hz
- Apparent Resistivity Calculated by Inversion of the In-phase and Quadrature components of the Horizontal Coplanar Coil at 6600 Hz

Covering Ram's Horn Block B only:

- Total Count
- Potassium
- Uranium
- Thorium
- Thorium / Potassium

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Covering Ram's Horn Block B only:

- Total Count
- Potassium
- Uranium
- Thorium
- Thorium / Potassium

APPENDIX 1

Statement of Qualifications

Robert Bruce Hearst
19 Beethoven Court.
Toronto, ON, Canada, M2H 1W1
Telephone: 416-492-2271
Facsimile: 416-492-7132
E-mail: geofiz@sympatico.ca

Statement of Qualifications

I, Robert Bruce Hearst, P.Geoph. do hereby certify that:

1. I am currently employed as a Senior Geophysicist / Data Processing Manager by:

   McPhar Geosurveys Ltd.
   1256B Kerrisdale Blvd.
   Newmarket, Ontario
   Canada, L3Y 8Z9

2. I graduated with a degree in H.BSc. Geophysics, Geology and Geophysics option from the University of Western Ontario in 1983. In addition, I have obtained an M.Sc. Geology and Geophysics from McMaster University in 1996.

3. I am a member of the CIM (National and Toronto Branches), KEGS (Canadian Exploration Geophysical Society, Past President), SEG (Society of Exploration Geophysicists), EEGS (Environmental and Engineering Geophysicists Society), PDAC (Prospectors and Developers Association of Canada) and a Licensee of NAPEGG (Association of Professional Engineers, Geologists and Geophysicists of Nunavut and the Northwest Territories).

4. I have worked as a geophysicist for a total of 21 years since my graduation from the University of Western Ontario.

5. I have read the definition of "qualified person" set out in National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association (as defined by NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

6. I am responsible for the preparation of the *Final Report on a Helicopter-borne Geophysical Survey, Ram's Horn Property, North-western British Columbia and South-central Yukon Territory.* Dated January, 2005 (the "Technical Report") relating to the Ram's Horn Claims of Ordorado Resources. I have not visited the property.

7. I am not aware of any material fact or material change with respect to the subject matter of the Technical Report that is not reflected in the Technical Report, the omission to disclose which makes the Technical Report misleading.

8. I am independent of the issuer applying all of the tests in section 1.5 of National Instrument 43-101.

9. I have read National Instrument 43-101 and Form 43-101F1, and the Technical Report has been prepared in compliance with that instrument and form.

10. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 28th Day of January, 2005



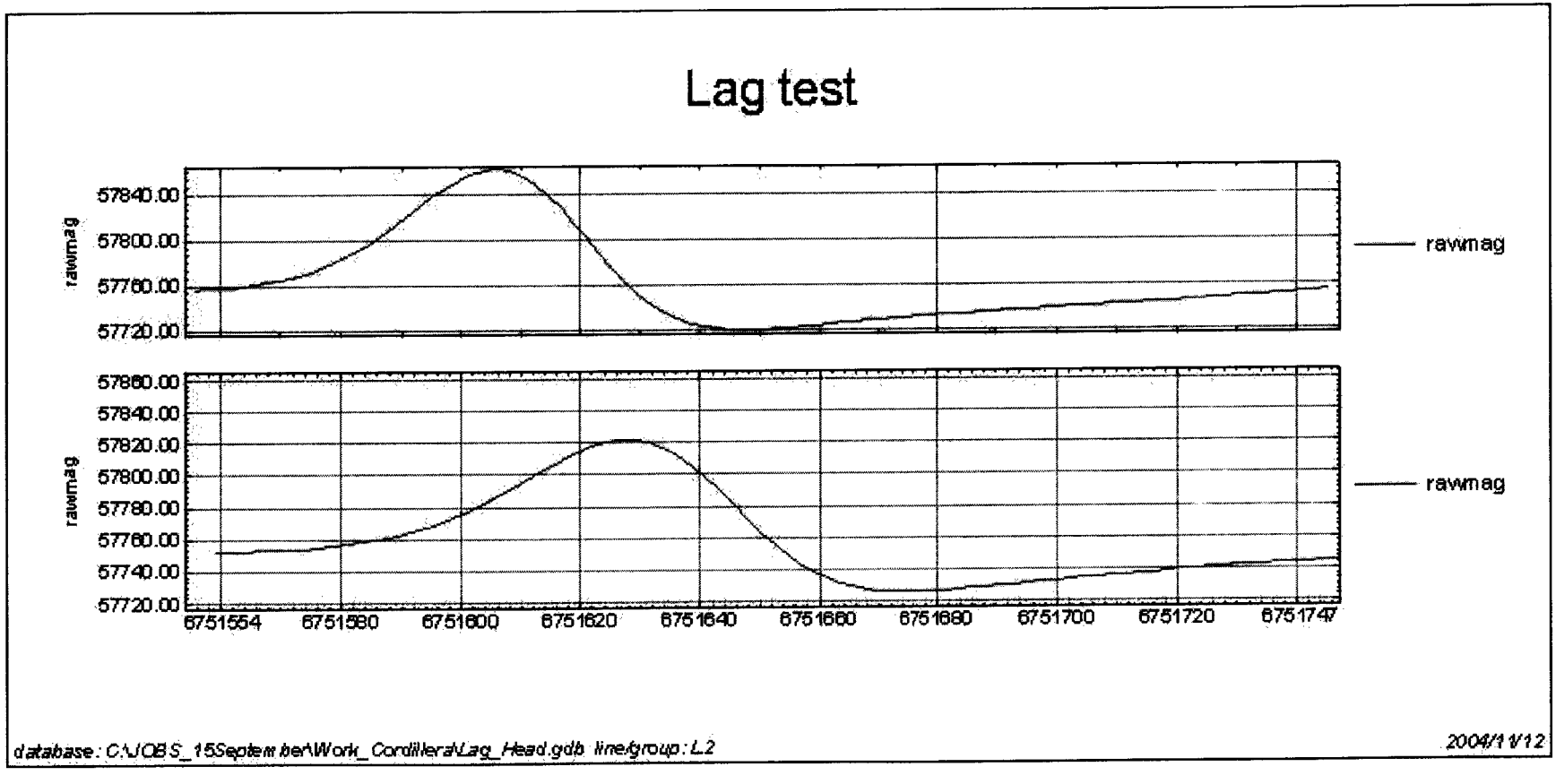
Signature of Qualified Person

Robert Bruce Hearst

Print name of Qualified Person

APPENDIX 2

Lag Test
Heading Table
Flight Logs
Daily Reports


Lag test
rawmag
57840.00
57800.00
57760.00
57720.00
rawmag
57860.00
57840.00
57820.00
57800.00
57780.00
57760.00
57740.00
57720.00
6751554
6751580
6751600
6751620
6751640
6751660
6751680
6751700
6751720
6751747
rawmag
rawmag
database: C:\JOBS_15September\Work_Cordillera\Lag_Head.gdb line/group: L2
2004/11/12

McPHAR

Geosoft Magnetic Heading Correction Table

Direction (real, °)	Correction (real, nT)
0°	-3.47
90°	-0.78
180°	+4.11
270°	+0.58
0°	-3.45

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK # : A	JOB: 421	PAGE 1 OF 2

FLT #: 17 DATE: 01/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 20:23 RETURN TIME: 21:35 TOTAL FLT TIME: 1:12

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
				Didn't start the new file
	6380	6450		I Cal All
8030	6689	6752		First T-line Time UTC st. 20:23
8020	6820	6075		EM is 2 minute behind
8010	6975	7033		
				20:29 end of tie line UTC
2200	7225	7248		
2190	7288	7340		
2180	7538	7600		315° Hd
2170	7635	7712		135° Hd Tie lines
2160	7732	7797		
2150	7836	7925		UTC st. south line
2140	8000	8070		
2130	8102	8207		
2120	8222	8295		45°
2110	8320	8025		225°
2100	8440	8506		
2090	8529	8617		
2080	8651	8720		Refly 2100
2070	8748	8890		Refly 2060
2060	8850	8920		Refly 2040
2050	8950	9025		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK # : A	JOB: 421	PAGE 2 OF 2

FLT #: 17 DATE: 01/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 20:23 RETURN TIME: 21:35 TOTAL FLT TIME: 1:12

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
2040	9048	9123		
2030	9179	9234		
2020	9260	9296		
2010		9382		Outside survey area
2000				Outside survey area
2011	9440			
2041	8645	9728		
2061		9845		
2181	10958	11040		UTC 21:35:50 End of Block A

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK #: MBLA	JOB: 421	PAGE 1 OF 3

FLT #: 18 DATE: 02/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 17:36 RETURN TIME: 19:40 TOTAL FLT TIME: 2:04

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
	7980	9080		Phazing
				(a) 7k 15, 18 off 155, 17 on
				(c) 980, 111, 19 off -323, 9 on
				(b) 6k -240, 16 off -235, 16 on
				8110 phaze 6k
				(d) -78, 7 off -258, 5
				Cals on back
	1540	1590		I Cal All
9132	1595	1660		Null All
	1670	1725		Null E Channnel
	1730	1805		I Cal All
				check coordinate, # 1, # 12
1890	2295	2300		Start 18:01 UTC Time
1880	2371	2386		
1870	2446	2473		EM Time is 1 min behind
1860	2549	2579		
1850	2685	2725		
1840	2788	2845		Shift lines to go against wind
1780	2957	3132		1780
1790	3175	3298		
1800	3358	3500		
1810	3578	3660		
1820	3728	3542		
1830	8888	3955		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK #: MBLA	JOB: 421	PAGE 2 OF 3

FLT #: 18 DATE: 02/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / 7° A/C REG: C-GPWK

DEPART TIME: 17:36 RETURN TIME: 19:40 TOTAL FLT TIME: 2:04

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
1720	4049	4210		Shipping lines to go against wind
1730	4250	4375		
1740	4435	4585		
1750	4624	4748		
1760	4797	5000		
1770	5010	5160		
9134	5220	5334		I Cal
1620	5515	5596		Very Windy - scrubbed
1630		5740		25 km wind SSE
1640	5806	5890		
1650		6062		
1660	6135	6243		
1670	6310	6422		
1680	6488	6624		
1690	6710	6815		
1700	6890	7229		
1710				End due to wind,, end of line 1923:50

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK #: MBLA	JOB: 421	PAGE 3 OF 3

FLT #: 18 DATE: 02/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / A/C REG: C-GPWK

DEPART TIME: 17:36 RETURN TIME: 19:40 TOTAL FLT TIME: 2:04

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
	7270			1600 ft Calibrations
9136	7380	7465		I Cal All
				Null All
				I Cal All
				End Cals @ 19:27:30
				Go to base station camp.
				27 ln flown
	8770			Phazing on
				(a) 478, 353 294 351
				(c) 489, 51 65 50
				(b) 841, 3157 772 3157
				(d) 730, 350 678 350
				(e) 164 9245 143 9244
				Calibration
				On Off
				7k -601 479 475 355
				980 616 173 496 51
				880 794 411 734 351
				6k 908 3226 849 3163
		8931		34 k 189 9311 130 9248

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK # : MBLA	JOB: 421	PAGE 1 OF 2

FLT #: 19 DATE: 05/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / 3° A/C REG: C-GPWK

DEPART TIME: 15:30 RETURN TIME: 17:45 TOTAL FLT TIME: 2:15

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
	5061	5145		I Call All
	5150	5210		Null All
9142	5210	5278		I Call All
	5282	5335		Null All
	5340	5450		I Call All
1620	5489	5553		1606:25 start first Line
1610	5632	5706		
1600	5757	5816		
1590	5856	5924		
1580	5966	6025		
1570	6078	6152		150°
1560	61??	6242		330°
1550	6289	6356		
1540	6385	6470		snowing, low cloud cover and fog
1530	6500	6610		turning opposite way to avoid side of mountain
1520	6642	6775		
1510	69??	6925		
1500	6950	7185		hard to start the line
				Shift lines due to low cloud cover
1220	7497	7550		
1210	7620	????		
1200	8047	8127		I Call All
1190	818?	8251		Null All
1180	8282	8376		I Cal All

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK # : MBLA	JOB: 421	PAGE 2 OF 2

FLT #: 19 DATE: 05/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: /3° A/C REG: C-GPWK

DEPART TIME: 15:30 RETURN TIME: 17:45 TOTAL FLT TIME: 2:15

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1170	8430	8528		
1160	8549	8673		fog in morning
1150	8730	8830		
1140	8863	8990		
1130	9030	9143		
1120	9170	9305		
1020	10109	10130		
1010	10174	10182		
1030	10202	10311		
1040	10341	10365		
1051	10480	10514		Refly 1050 @ start
				17:32:00 end of survey line
	10716	10790		I Cal All
9144	10800	10860		
	10865	10930		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK #: MBL	JOB: 421	PAGE 1 OF 3

FLT #: 20 DATE: 05/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / 5° A/C REG: C-GPWK

DEPART TIME: 22:25 RETURN TIME: 1:18 TOTAL FLT TIME: 2:53

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
	320	420		I Cal All
9150	425	490		Null All
	495	580		I Cal All
1490	812			aborted
1240	1110	1184		22:42:56: start 1st line
1250	1245	1299		
1230	1348	1419		
1260	1484	1555		
1270	1623	1701		
1280	1745	1822		
1290	1876	1981		
1300	2060	2151		
1080	2474	2530		
1070	2562	2612		
1060	2723	2769		
1310	3095	3274		
1320	3370	3534		
1330	3572	3753		
1340	3797	3997		
1350	4045	4248		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK # : MBL	JOB: 421	PAGE 2 OF 3

FLT #: 20 DATE: 05/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / 5° A/C REG: C-GPWK

DEPART TIME: 22:25 RETURN TIME: 1:18 TOTAL FLT TIME: 2:53

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL		BINARY FILE NAME	COMMENTS
	START	END		
1360	4307	4521		
	4560	4630		I Cal All
9152	4640	4695		Null All
	4720	4790		I Cal All
1090	4924	4992		
1100	50??			Refly 1100
1101	5134	5229		
1110	5478	5605		
1111	5633	5650		this line capture corner/end of line
7010	6165	6232		Jump to tie line, waiting for fog to clear
7020	6322			Cannot descend due to fog @ 6550
				and end of line
1491	6900	7050		Back to survey lines
1480	7095	7225		
1470	7278	7468		
1460	7515	7672		
1450	7729	7905		
1440	8023	8222		

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK # : MBL	JOB: 421	PAGE 3 OF 3

FLT #: 20 DATE: 05/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: / 5° A/C REG: C-GPWK

DEPART TIME: 22:25 RETURN TIME: 1:18 TOTAL FLT TIME: 2:53

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
	8280	8375		I Cal
9154	8385	8450		Null All
	8460	8540		I Cal
1430	8656	8841		GPS signal cutting out often
1420	8896	9095		
1410	9158	9337		
1400	9398	9592		
1390	9630	9798		
1380	9859	10070		Go for fuel
9156	10080	10190		I Cal All

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

AIRBORNE GEOPHYSICAL FLIGHT LOG

CLIENT: Ordorado	BLOCK # : MBL	JOB: 421	PAGE 1 OF 1

FLT #: 21 DATE: 05/09/04 OPERATOR: Daniel

PILOT: Ken Knight O.A.T.: /5° A/C REG: C-GPWK

DEPART TIME: 1:29 RETURN TIME: 2:07 TOTAL FLT TIME: 2:07

SURVEY HEIGHT: 200 ft

LINE #	FIDUCAL START	FIDUCAL END	BINARY FILE NAME	COMMENTS
9160	11200	11275		I Cal All
1370	11399	11610		End of survey lines
7050	11760	11800		Tie lines
7040	11936	12116		
7030	12243	12448		
9062	12495	12590		I Cal All
				Calibrations
				Phazing
				(B) 1123 3256 1057 3258
				(d) 852 354 557 54
				(e) 6125 -1137 6126 -1144
				Out of Phase
				(a) 315 358 148 361
				(c) 474 56 34 56
				on off
				7 k 430 472 315 360
				980 614 184 486 57
				880 22 418 757 354
				6 k 1191 3328 1125 3249
				34 k 6195 -1115 6129 1179

ANY LINE REFLOWN SHOULD HAVE THE LINE NUMBER INCREMENTED BY 1 EACH TIME

Project #: 0421 Ram's Horn		Daily Field Production Report							
Report Date:	1-Sep-04	Aircraft:	A-Star AS-350BA		C-GPWK		SURVEY PERSONNEL		
Report Number:	1	Ops Base:	Spirit Lake Lodge, SW Yukon Territory.				Pilot		Ken Knight
Client:	Ordorado Resources	Country:	Canada	YT/BC			AME:		Trevor Moore
Survey Type:	Helicopter EM & Magnetic Survey								
Survey Areas:	Block B	Block A				Totals	Operator		Daniel McKinnon
Project Km:	41.8	241.8				283.6	Systems Engineer:		Barry Levy
Km flown today:	41.8					41.8	Field Data QC:		Andy Andersen
Accumulated km:	41.8					41.8			
Percent Completed:	100.0%					14.7%	Client QC (Aurora Geosciences)		Mike Power
Lines flown:	Block-A: 26 lines HEM/Mag						Ordorado Resources		Bill Harris
Flight #	Take off Time	First line start			Last line end	Land Time		Hours Flown	
survey Flt-17	20:23		*** strong gusty winds, end flight ***			21:35		1:12	
Weather: Early morning ground fog. Increasing winds in afternoon. No flts in afternoon due to winds over high ridges.						Hours Flown Today:		1:12	
Accum. Standby:	Accumulated Survey Days:	1				Accumulated Project Hours:			

COMMENTS

Some geomagnetic activity early in the day.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel			
General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)821-4337	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	SpiritLake Wilderness Resort	(867)821-4337	

McPhar Geosurveys Ltd.
1256B Kerrisdale Boulevard, Newmarket, Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336, E-mail: info@mgssurveys.com

*Please note that kilometres flown are estimates.

*Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0421 Ram's Horn		Daily Field Production Report							
Report Date:	2-Sep-04	Aircraft:	A-Star AS-350BA		C-GPWK		SURVEY PERSONNEL		
Report Number:	2	Ops Base:	Spirit Lake Lodge, SW Yukon Territory.				Pilot	Ken Knight	
Client:	Ordorado Resources	Country:	Canada	YT/BC			AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Block B	Block A			Totals	Operator	Daniel McKinnon	
Project Km:		41.8	241.8			283.6	Systems Engineer:	Barry Levy	
Km flown today:			57.0			57.0	Field Data QC:	Andy Andersen	
Accumulated km:		41.8	57.0			98.8			
Percent Completed:		100.0%	23.6%			34.8%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:		Block-A: 28 lines HEM/Mag					Ordorado Resources	Bill Harris	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
survey	Flt-18	17:36	18:01	27 lines	19:24	19:40		2:04

Weather: Increasingly strong winds during the day. Flights curtailed due to strong winds & gusts. Passing low cloud.			Hours Flown Today:		2:04
Accum. Standby:	Accumulated Survey Days:	2	Accumulated Project Hours:		

COMMENTS

Mild geomagnetic activity early in the day.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel			
General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)821-4337	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	SpiritLake Wilderness Resort	(867)821-4337	

McPhar Geosurveys Ltd.
1256B Kerrisdale Boulevard, Newmarket, Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336, E-mail: info@mgssurveys.com

*Please note that kilometres flown are estimates.

*Exact kilometres will be calculated upon completion of survey, and will be based on GPS measurements & contractual boundaries

Project #: 0421 Ram's Horn		Daily Field Production Report							
Report Date:	3-Sep-04	Aircraft:	A-Star AS-350BA		C-GPWK		SURVEY PERSONNEL		
Report Number:	3	Ops Base:	Spirit Lake Lodge, SW Yukon Territory.				Pilot	Ken Knight	
Client:	Ordorado Resources	Country:	Canada	YT/BC			AME:	Trevor Moore	
Survey Type:	Helicopter EM & Magnetic Survey								
Survey Areas:	Block B	Block A				Totals	Operator	Daniel McKinnon	
Project Km:	41.8	241.8				283.6	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:	41.8	57.0				98.8			
Percent Completed:	100.0%	23.6%				34.8%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:	Block-A:						Ordorado Resources	Bill Harris	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
				*** no flights due to poor weather ***				

Weather: Low clouds, rain & gusty winds.				Hours Flown Today:		
Accum. Standby:	1	Accumulated Survey Days:	2	Accumulated Project Hours:		

COMMENTS

Mild geomagnetic activity early in the day.

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel			
General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)821-4337	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
HSE Manager	Victor Oetke	(905)830-6880	vho@mgssurveys.com
Lodging	SpiritLake Wilderness Resort	(867)821-4337	

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Project #: 0421 Ram's Horn	Daily Field Production Report								
Report Date:	4-Sep-04	Aircraft:	A-Star AS-350BA		C-GPWK		SURVEY PERSONNEL		
Report Number:	4	Ops Base:	Spirit Lake Lodge, SW Yukon Territory.				Pilot	Ken Knight	
Client:	Ordorado Resources	Country:	Canada	YT/BC			AME:	Trevor Moore	
Survey Type:	Helicopter EM & Magnetic Survey								
Survey Areas:	Block B	Block A				Totals	Operator	Daniel McKinnon	
Project Km:	41.8	241.8				283.6	Systems Engineer:	Barry Levy	
Km flown today:							Field Data QC:	Andy Andersen	
Accumulated km:	41.8	57.0				98.8			
Percent Completed:	100.0%	23.6%				34.8%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:							Ordorado Resources	Bill Harris	

Flight #		Take off Time	First line start		Last line end	Land Time		Hours Flown
				*** no flights due to poor weather ***				

Weather: Low clouds & gusty winds.			Hours Flown Today:		
Accum. Standby:	2	Accumulated Survey Days: 2	Accumulated Project Hours:		

COMMENTS

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel			
General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
Project Manager:	H.T.(Andy)Andersen	(867)821-4337	htandersen@compuserve.com
Systems Engineer	Barry Levy	(416)277-5147	barry@mgssurveys.com
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Lodging	SpiritLake Wilderness Resort	(867)821-4337	

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Project #: 0421 Ram's Horn		Daily Field Production Report							
Report Date:	5-Sep-04	Aircraft:	A-Star AS-350BA	C-GPWK			SURVEY PERSONNEL		
Report Number:	5	Ops Base:	Spirit Lake Lodge, SW Yukon Territory.				Pilot	Ken Knight	
Client:	Ordorado Resources	Country:	Canada YT/BC				AME:	Trevor Moore	
Survey Type:		Helicopter EM & Magnetic Survey							
Survey Areas:		Block B	Block A			Totals	Operator	Daniel McKinnon	
Project Km:		41.8	241.8			283.6	Systems Engineer:	Barry Levy	
Km flown today:			184.8			184.8	Field Data QC:	Andy Andersen	
Accumulated km:		41.8	241.8			283.6			
Percent Completed:		100.0%	100.0%			100.0%	Client QC (Aurora Geosciences)	Mike Power	
Lines flown:		Block-A: complete rest of lines & ties					Ordorado Resources	Bill Harris	
Flight #		Take off Time	First line start			Last line end	Land Time		Hours Flown
survey	Flt-19	15:30		Blk-A: 29 lines			17:45		2:15
survey	Flt-20	22:25		Blk-A; 35 lines			1:18		2:53
survey	Flt-21	1:29		L1370, L7050, L7040 & L7030			2:07		0:38
Weather: Moving fog/low-cloud with patces of blowing snow. Visibility poor.							Hours Flown Today:		5:46
Accum. Standby:	2	Accumulated Survey Days:	3				Accumulated Project Hours:		

COMMENTS

*** this is the last field production report for the project ***

CONTROL	Flight # :		Flight date:	
POST FLIGHT	Accepted km	Rejected km	Reasons for Rejection	

REFLIGHTS		Observations	Lines Reflown
Rejected km			
Kms today			
Accumulated km			
Percent Completed			

Operations Personnel			
General Manager:	Phil Hembruff	(905)830-6880	phembruff@mgssurveys.com
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APPENDIX 3

Equipment Documentation

- Hummingbird HEM System Specifications
- Geometrics G-822A Cesium Magnetometer
- Pico-Envirotec GRS 410 Gamma Spectrometer
- DGPS Max
- Terra TRA-3000 / TRI-30 Radar Altimeter
- Setra Model 276 Pressure Transducer
- Geo-iMAGe Lite CDIS
- GSM-19 Overhauser Magnetometer
- NovAtel GPSCards
- Field Data Processing Workstations

The depth in the earth to which a single frequency can penetrate is a function of the frequency and the conductivity of the earth. [Skin Depth » 503 / (frequency x conductivity)$^{1/2}$] Lower frequencies penetrate deeper into the earth than higher frequencies. The higher frequencies are more sensitive to weakly conductive geology, and to subtle changes in the conductivity of the ground.

A HUMMINGBIRD system measures the in-phase "I" and quadrature "Q" (sometimes called out-of-phase) components of the total EM field. The amplitude of these components are always given as a value that is relative to the transmitted primary. The ratio of in-phase to quadrature (I/Q) depends mostly on the conductivity of the geology and the operating frequency; the amplitude depends mostly on the depth of the conductor below the sensor. (While this description of the relationship is only an approximation, it is a good start from which to understand changes in I and Q measurements.)



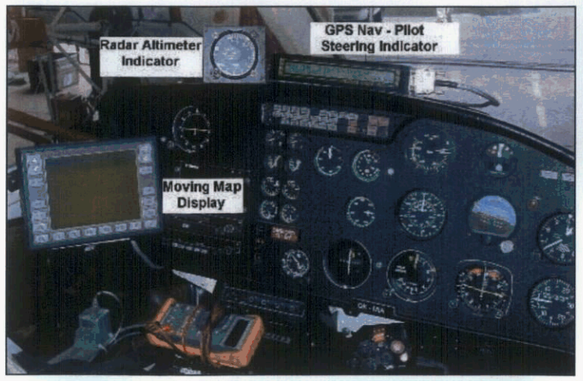
Two 5-frequency and a 4-frequency (in yellow) HUMMINGBIRD sensors undergoing preparations for the field at McPhar's offices in Newmarket, Ontario



Operator's screen/keyboard assembly – HUMMINGBIRD system

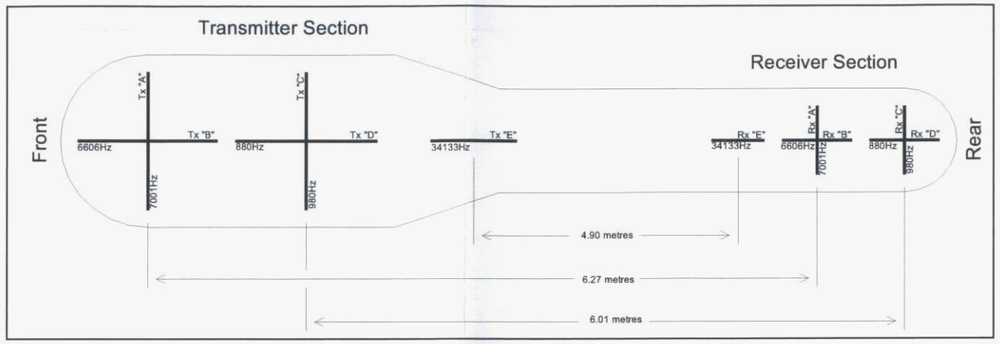
Typical system configuration is:

- 5-frequency HUMMINGBIRD EM sensor, 880 Hz, 980 Hz, 6.6 kHz, 7 kHz and 34 kHz frequencies
- high-sensitivity cesium magnetometer, 0.001 nT/10 Hz resolution
- 12-channel real-time differential GPS navigation system
- PC-based data acquisition system
- radar (*optional* laser) & barometric altimeters
- colour digital video imaging system
- *optional* gammaray spectrometer and 16.8/4.2 litres sensor

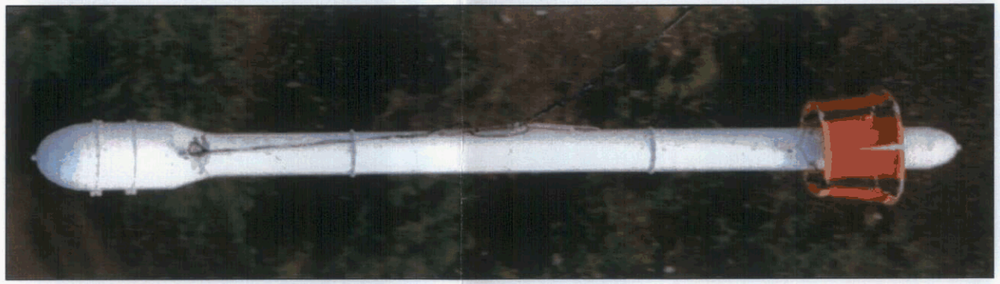


Cockpit displays for the pilot – HUMMINGBIRD system

COIL FREQUENCY	COIL ORIENTATION	COIL SEPARATION	CHANNELS
880 Hz	Coplanar	6.0 meters (19.5ft)	I, Q
980 Hz	Coaxial	6.0 meters (19.5ft)	I, Q
6.6 kHz	Coplanar	6.3 meters (20.5ft)	I, Q
7 kHz	Coaxial	6.3 meters (20.5ft)	I, Q
34 kHz	Coplanar	4.9 meters (16ft)	I, Q



Layout and dimensions of the transmitter and receiver coils in the HUMMINGBIRD



Vertical view of the 5-frequency HUMMINGBIRD sensor

SPECIFICATIONS

Frequency Range:	5 frequencies, 880 Hz, 980 Hz, 6.6 kHz, 7 kHz, 35 kHz
Coil Orientations:	Horizontal coplanar and vertical coaxial coil-sets
Output:	Inphase and Quadrature samples (ppm)
Sampling Rate:	10 Hz
Noise Levels:	2 –4 ppm under ideal conditions
Time Constant:	0.1 second
Filters:	50/60 Hz power line, spheric rejection, 4th order digital, 15Hz 2nd order analog and 5Hz Low Pass 6th order digital
Data Recording:	On removable PCMCIA hard disk or flash card
Data Acquisition:	Pentium-PC based
Display:	Sunlight visible colour TFT back-lit LCD
Power Requirements:	12-36 VDC, maximum 30 Amps
Temperature Range:	-40°C to +40°C
Bird/Cable Weight:	Approx. 180 kg (400 lb) including tow-cable
Bird Length:	7.5 meters (3 joined sections each of approx. 2.5 m)

Specifications may be subject to change without notice

DATA PROCESSING

McPhar is dedicated to processing geophysical data in the field.

For this purpose all our airborne systems are sent to the field with a geophysicist and a PC-based data processing system to support them. The Field Data Verification Workstation (FWS), as this system is known, can process airborne magnetic, radiometric and EM data, and produce plots and maps in full-color of the survey data, often within hours of the survey flight ending.

The FWS software, which is the core of this system, permits our field geophysicists to differentially correct the GPS navigation data; carry out flight path recovery; perform magnetic compensation and leveling; undertake radiometric corrections and preliminary processing; electromagnetic processing; and generally to perform filtering, gridding and contouring of data, imaging of selected data and plotting to any map scale and layout.

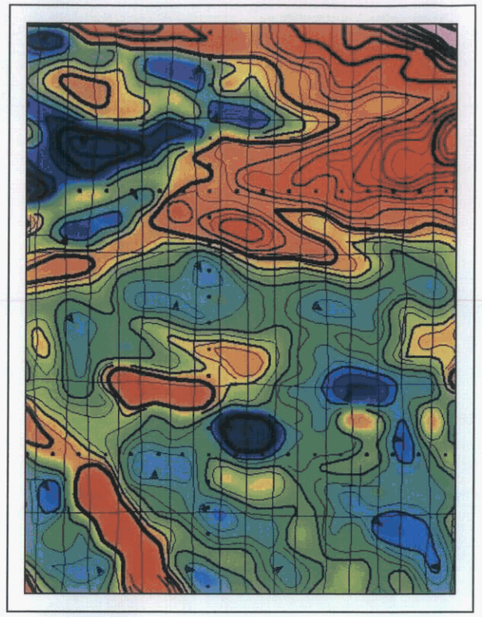
INTERPRETATION

The interpretation of geophysical results into meaningful geological parameters is the prime function of any of our interpreters.

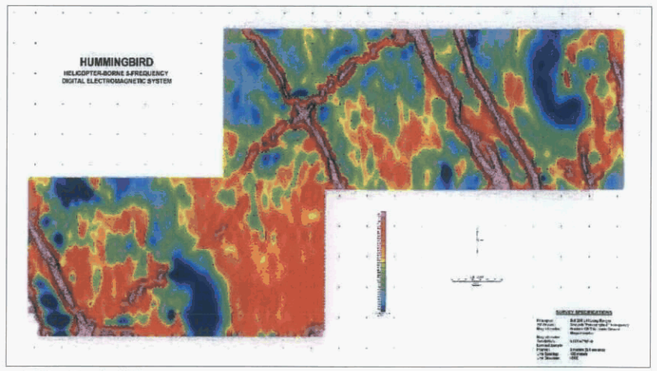
The many highly qualified geophysicists and technicians on our staff share a strong geological back-ground. The manipulation of geophysical data is only a means to an end, and the final product of the interpretation is the compilation of a series of maps showing interpreted geological parameters. The data processing routines and mathematical operators applied to the data are not the end product of the interpretation; they help delineate geologic and economic targets to be discussed in the final report.

We bring many techniques to bear on an interpretation project in order to determine depths to causative sources, to delineate discontinuities and boundaries, and to draw conclusions regarding geological structure beneath the survey.

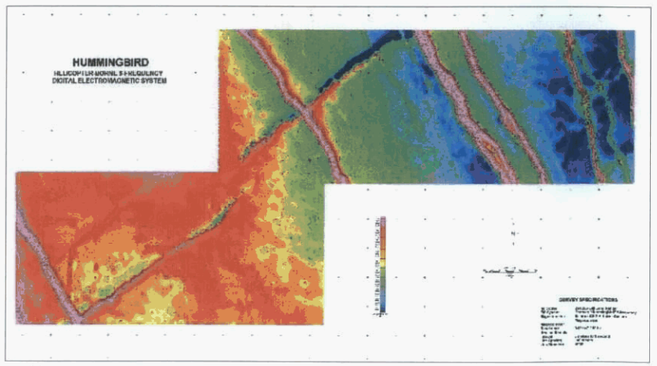
A wide variety of contour and interpretation maps, profiles, cross-sections and models, and a written report are the result of the interpretation.



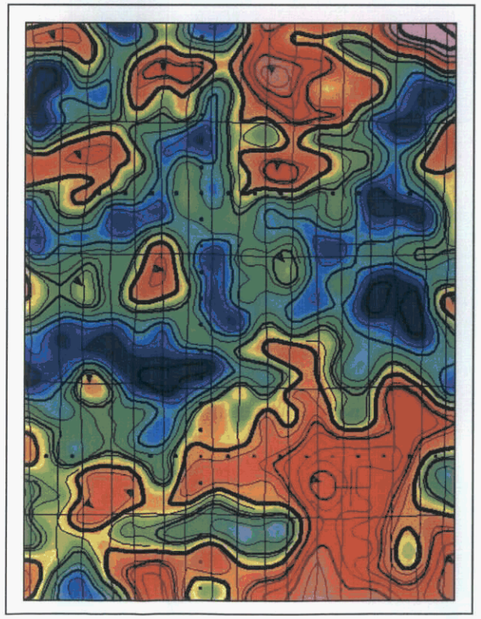
Magnetics



EM - Resistivity



Magnetics



EM – Resistivity3

HUMMINGBIRD

Helicopter-borne Digital Electromagnetic System

Undoubtedly, helicopter-borne electromagnetics (EM), combined with total field magnetics and often gamma-ray spectrometry, have been one of the most productive and useful of airborne system developments to date, and have accounted for the discovery of billions of dollars worth of mineral resources, tapped into numerous ground water reservoirs and provided immense volumes of data for environmental site evaluations. These systems are ideally suited for working in rugged, mountainous terrain, or over small claim block-sized properties.

Currently, electromagnetics (EM) combined with a high-sensitivity magnetometer are the techniques of choice for most mining companies worldwide, to locate and define diamondiferous kimberlite pipes and base and precious metal deposits.

McPhar's electromagnetic survey systems are integrated around the HUMMINGBIRD EM sensor, which are available in either 4- or 5-frequency configurations.

The HUMMINGBIRD EM sensor, which is the heart of this system, can be simply described as a multi-frequency, multi-coil electromagnetic system, which measures the inphase and quadrature responses from a number of coil-pairs installed in a tubular bird, towed beneath a helicopter.

All components of the HEM instrumentation are digitally controlled. The HUMMINGBIRD is currently the only operating HEM system that is 100% digital from front to back. All digital samples generated by the instrumentation are supplied as inphase and quadrature measurements.

Data is telemetered on a lightweight serial cable to the data acquisition console onboard the helicopter, where it is displayed on a LCD colour screen and recorded on a removable PCMCIA hard disk.

Pilot guidance and DGPS navigation systems are integrated into the package together with a gammaray spectrometer (optional). Other flight control instruments include radar or laser altimeters and a barometric altimeter and a digital colour video imaging system.



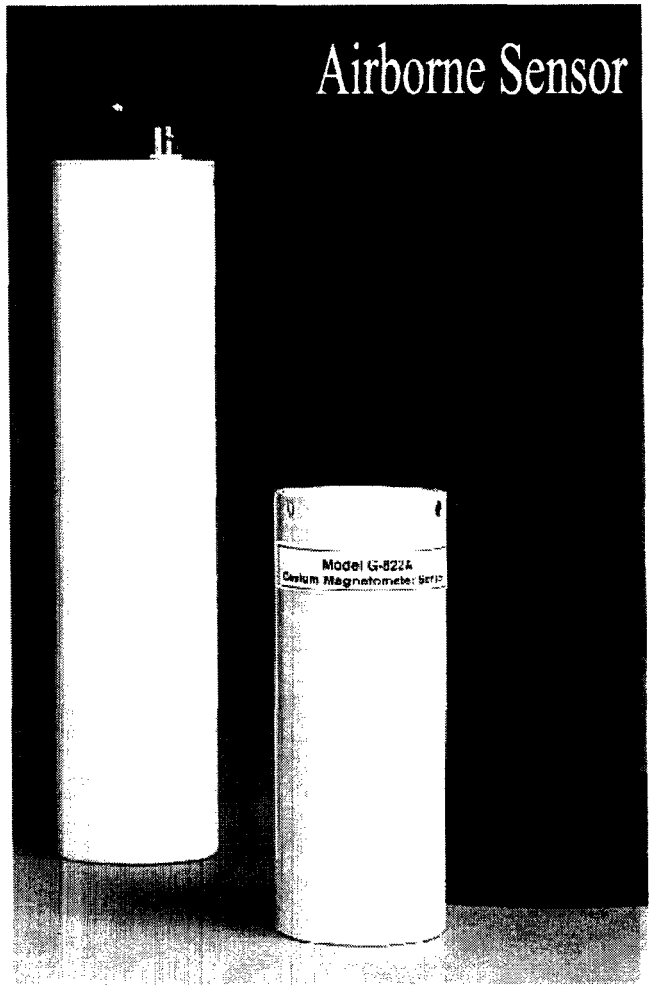
McPHAR

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WebSite: www.mgssurveys.com

GEOMETRICS

G-822A CESIUM MAGNETOMETER

- ***Airborne and Vehicle Applications with Multi-Sensor Array Capability***
- ***Automatic Hemisphere Switching***
- ***Highest Sensitivity – 0.0005 nT/√Hz RMS with the G-822A Super-Counter***
- ***Highest Versatility – Full Aircraft Compensation with RMS AADCII or Button-on Towed Bird system with CM-201 Internal Mini-Counter, with 6 Channel 12 bit A to D converters***
- ***Very low heading error – ±0.15nT over entire 360° Equatorial and Polar spins***
- ***Gradiometer arrays offering simultaneous operation of up to four separate sensors with the RMS Instruments AADCII , Geometrics' G-822A Super-Counter or CM-201 Internal Mini-counter (See 823A Data Sheet)***
- ***Geometrics offers complete turnkey systems including Birds, Stingers, Wingtip installation accessories as well as Digital Data Acquisition Systems, Flight Path Recovery, GPS Navigation, Gamma Ray Spectrometers, VLF EM , Post Acquisition Data Processing Software and Training***



The G-822A is designed for all airborne or mobile applications where the unique combination of high sensitivity and very rapid sampling of the earth's magnetic field are required. Applications include mapping geologic structure for mining, oil and gas exploration, and the detection and delineation of target bodies in environmental or military type surveys. The unit consists of a high performance low heading error cesium vapor sensor with its associated cables and driver electronics package.

The G-822A sensor uses a precise well-proven design, carefully selected and tested components to insure the very best specifications in sensitivity, noise, heading error and absolute accuracy. A proven record of stable and reliable operation over long periods is the hallmark of the industry standard G-822A. A single coaxial cable of up to 50 meters length supplies both 28 VDC power and Larmor signal transmission from the sensor driver electronics to the 822A Super-Counter or the RMS Instruments' AADCII Automatic Aeromagnetic Digital Compensator. Internal or external signal/power filter-decoupler assemblies are available to provide extremely low noise operation.

The interconnect cable from the driver/electronics to the sensor may be supplied in lengths of 82 and 136 inches. Tuning throughout the earth's field range is fully automatic, and includes automatic hemisphere switching for equatorial surveys.

The sensor/electronics package is watertight, temperature controlled, and delivers full performance under extreme operating conditions. Accessories include special mounting clamps and orientation platforms for installation into a variety of vehicle or aircraft mounting configurations, as well as Birds, Stingers and Wing Tip fairings.

MODEL G-822A AIRBORNE CESIUM MAGNETOMETER SENSOR SPECIFICATIONS

OPERATING PRINCIPLE:	Self-oscillating split-beam Cesium Vapor (non-radioactive)
OPERATING RANGE:	20,000 to 100,000 nT
OPERATING ZONES:	The earth's field vector should be at an angle greater than 6 from the sensor's equator and greater than 6° away from the sensor's long axis. Automatic hemisphere switching.
SENSITIVITY:	<0.0005 nT/√Hz rms. Typically 0.003 nT P-P at a 0.1 second sample rate using 822A Supercounter, 0.02nT P-P for CM-201
HEADING ERROR:	±0.15 nT (over entire 360° polar and equatorial spin)
ABSOLUTE ACCURACY:	<3 nT throughout range
OUTPUT:	Cycle of Larmor frequency = 3.498572 Hz/nT, 2V P-P coupled through the sensor power input
MECHANICAL:	
Sensor:	2.375" (60.32 mm) dia., 6.25" (158.75 mm) long, 12 oz (339 g) - any orientation in 7" dia. stinger
Sensor Electronics:	2.5" (63.5 mm) dia., 11" (279.4 mm) long, 22 oz (623 g)
Cables:	
Sensor to electronics:	70" (1.78 m) or additional 40" (1.1 m) increments with quick disconnect on electronic end. Longer lengths available - Up to 19.5 ft (6.1m)
Sensor Electronics to Counter:	Up to 220 ft (70 m)
OPERATING TEMPERATURE:	-30°F to +122°F (-35°C to +50°C)
STORAGE TEMPERATURE:	-48°F to +158°F (-45°C to +70°C)
ALTITUDE:	Up to 30,000 ft (9,000 m)
WATER TIGHT:	Sealed for up to 2 ft (0.9 m) depth
POWER:	24 to 32 VDC, 0.75 amp at turn-on and 0.5 amp thereafter
ACCESSORIES:	
Standard:	Power/Larmor coaxial cable (electronics to counter), lengths to be specified, spare O rings, operation manual and carrying case
Optional:	
Signal/Power Decoupler:	Separates the Larmor signal from the power (28 V) to enable connection to RMS Instruments' AADCII Automatic Aeromagnetic Compensator or Customer supplied counter
Internal Decoupler:	P/N 27504 - up to two sensor installation
External Decoupler:	P/N 27560 - three and four sensor installation
Internal CM-201 Counter	See G-823 A Data Sheet
Stinger, Wingtip, Bird	Contact Factory for complete system integration information
Base Station Accessories	Non-magnetic Tripod, clamps cables

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE **2/04**

GEOMETRICS, INC. 2190 Fortune Drive, San Jose, California 95131
408-954-0522 • Fax 408-954-0902 • Internet: sales@mail.geomtrics.com

GEOMETRICS Europe Manor Farm Cottage, Galley Lane, Great Brickhill, Bucks,
England MK179AB • 44-1525-261874 • Fax 44-1525-261867

GEOMETRICS China Laurel Industrial Co. Inc. - Beijing Office, Room 2509-2511, Full Link Plaza
#18 Chaoyangmenwai Dajie, Chaoyang District, Beijing, China 100020
10-6588-1126 (1127..1130), 10-6588-1132 • Fax 010-6588-1162



GRS410 Intelligent Gamma Spectrometer

The GRS410 Gamma spectrometer is an advanced Spectrometer utilizing the NaI(Tl) detectors with the newest technology. It is hardware-software designed system, exhibiting simplicity, easy interfacing and substantial versatility. It is based on the experience with the individual detector signal processing reducing potential hazards (or complex circuitry) of "zero base shift" and practically eliminating the "dead time". It is achieved through a special design feature almost completely eliminating the decaying part of each detected and eliminating any internal DC coupling and completely digital peak detector unit.
New - natural peak detection algorithm provides safe and fast system stabilization without temperature stabilization of the detector housing and without implanted radioactive sources in the detector housing. No implanted sources (usually Cs137) for stabilization means no spectra pollution on low energies and therefore better sensitivity of the system for low energies - mostly for man-made sources.
When calibrated (with Th source about once a year) linearity of the each detector is measured and linearity correction coefficients are calculated. When operating in real time, collecting data, the linearity of each detector is mathematically corrected for each measurement.
Individual detector tracking (tuning) and linearity correction provides better fit of the individual spectra that are being summed and therefore sharper (better resolution) spectrum is obtained.
Optionally the GRS410 system can be controlled by the altitude of the aircraft and calculate absolute values of contamination by individual radionuclei related to the ground and provide the dose rate related to 1meter above the ground.
Interfacing via single RS232 communication channel makes the system very flexible.

Technical parameters:

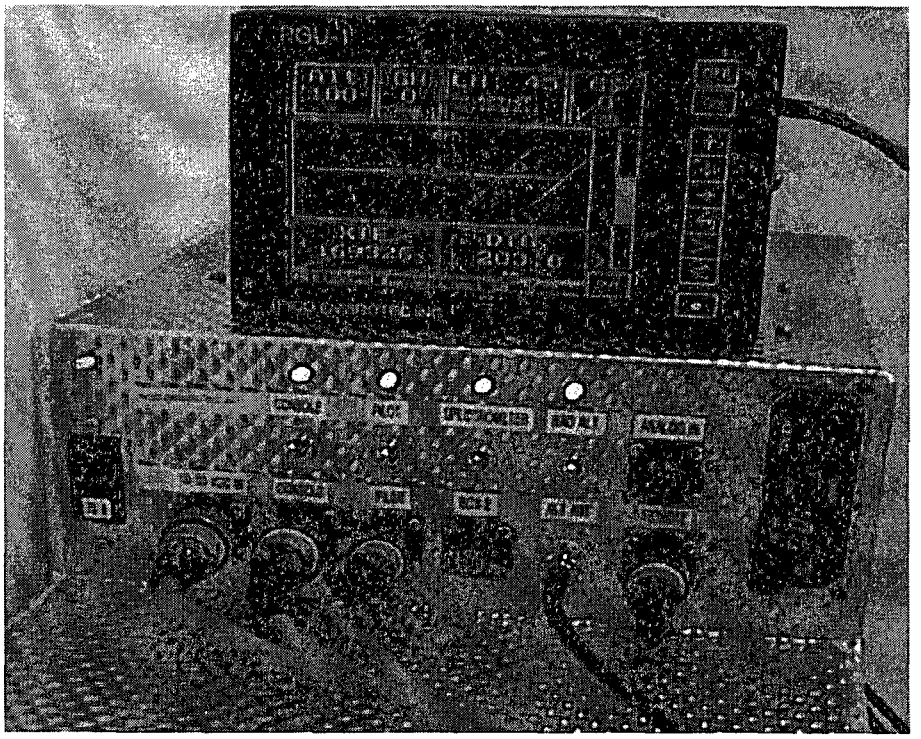
Spectra resolution:	256/512 channels Individual spectra recording in 256 or 512 channels
Data sampling:	1sec and longer, 0.5sec optional
Energy spectra:	50keV to 3MeV with threshold adjustable from 50keV 300keV. All energies above 3MeV are detected as Cosmic Rays.
Anticoincidence:	For improvement peak-valley ratio on lower energies, Coincidental pulses detected among neighboring

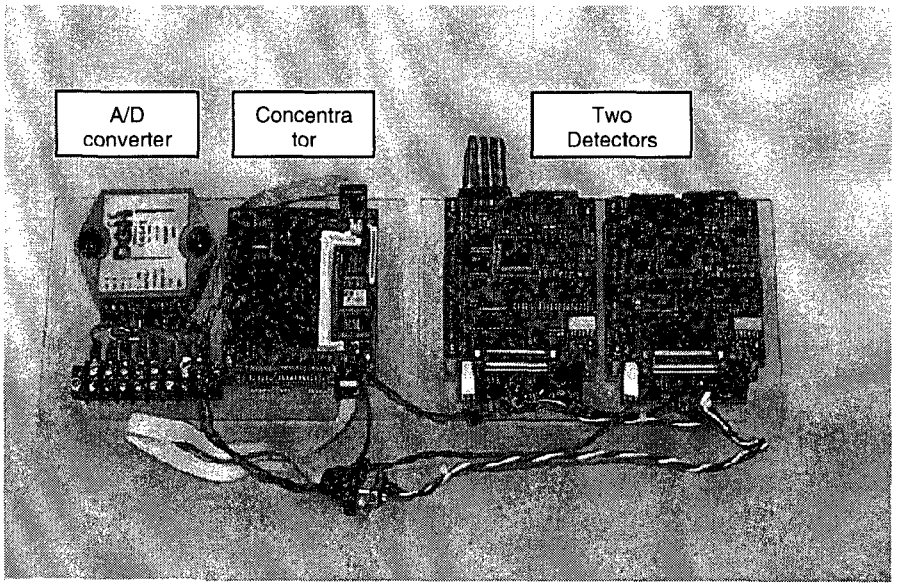
© Pico Envirotec Inc.

	detectors are removed and placed in a special channel.
Spectra tracking:	Individual detectors. with recorded status of tuning
Time to stabilization:	Automatic on natural radionuclei. Usually less than 30 sec on the ground and less than 2minutes in the air at 100 m altitude. In case of a system failure old tracking because of low counts, parameters (not more than 15 minutes) are used till new tracking is re-established.
Spectra linearization:	Automatic after system calibration. Calibration is required once a year or when a detector or electronics are replaced.
Windows (ROIs):	Additionally to the full spectra up to 22 special windows can be collected (4 are IAEA standard windows, 8 are optional activities altitude related).
Detector Box:	For logical distribution of detectors one detector box may contain up to six individual detectors served by one concentrator. Physically the detectors may be packaged differently.
Recommended Detectors:	4x4x16inch NaI(Tl);
Max. number of detectors	
With one Concentrator:	Ten (10)
With a Superconcentrator:	Four (4) Concentrators or Forty(40) detectors. Any of the detectors may used as down or up looking.
Signal sampling:	20 MHz by an internal 12bit A to D for each detector.
Peak detector:	Digital - time resolution 50nsec.
Dead time:	Negligible for up to 60000 pulses/sec/detector
Pulse rate per detector:	> 60000 pulses per second with negligible dead time.
Channel capacity:	65500 counts/sampling period.
Communication:	Serial among all units (Detector,Concentrator, Superconcentrator and Host).
Test programs:	Supplied with hardware
Interfacing:	Supplied with the hardware
Operating temperature:	-10 to 55 deg. C.

© Pico Envirotec Inc.

Two-detector GRS4 Gamma Spectrometer with IRIS (Integrated Radiation Information System).

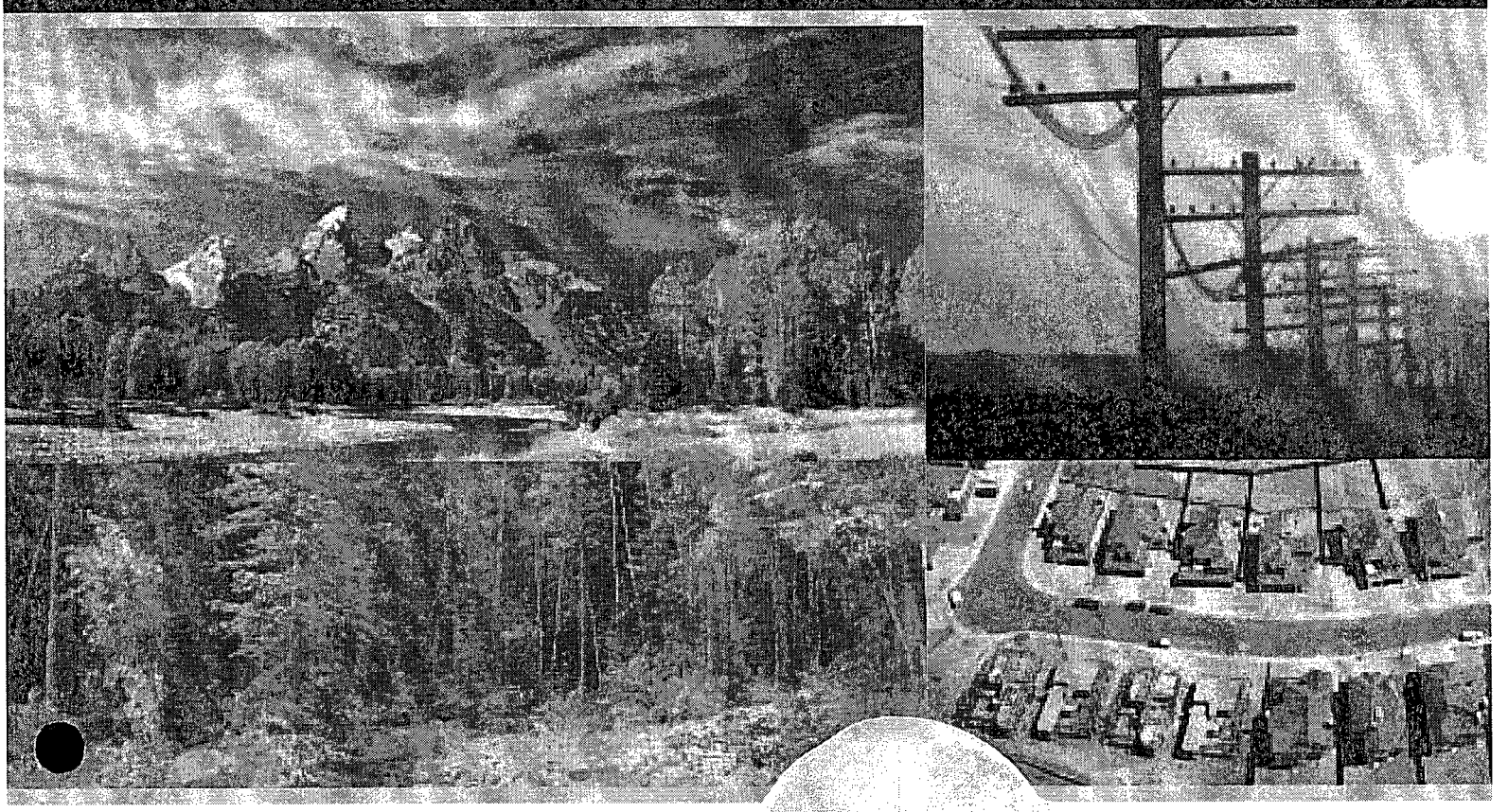




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DGPS MAX

Feature-packed sub-meter GPS positioning



DGPS MAX

- Receives GPS, SBAS, OmniSTAR, and beacon signals
- Automatic dual channel SBAS tracking for more reliable reception
- Sub-meter positioning at rates of up to 5 Hz
- Raw measurement data for post-processing applications
- COAST™ technology allows use of corrections for up to 40 minutes without significant performance loss
- Easy configuration using the Setup Wizard
- User-defined profiles save receiver configurations for later use



ESRI Technology
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csi wireless™
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DGPS MAX

Feature-packed sub-meter GPS positioning

GPS Sensor Specifications

Receiver Type:	L1, C/A code, with carrier phase smoothing
Channels:	12-channel, parallel tracking (10-channel when tracking WAAS)
WAAS Tracking:	2-channel, parallel tracking
Update Rate:	1 Hz default, 5 Hz max
Horizontal Accuracy:	<1 m 95% confidence (DGPS*) <5 m 95% confidence** (autonomous, no SA)
Cold Start:	1 min typical
Antenna Input Impedance:	50 Ω

L-band Sensor Specifications

Frequency Range:	1525 to 1559 MHz
Sensitivity:	-120 dBm for $<10^{-3}$ BER
Tuning Mode:	Manual or automatic
Adjacent Channel Rejection:	50 kHz spacing >25 dB, 1 MHz spacing >60 dB

Beacon Sensor Specifications

Channels:	2-channel, parallel tracking
Frequency Range:	283.5 to 325 kHz
Channel Spacing:	500 Hz
MSK Bit Rates:	50, 100, and 200 bps
Operating Modes:	Manual, automatic, semi-automatic
Cold Start Time:	< 1 minute typical
Reacquisition Time:	< 2 seconds typical
Demodulation:	Minimum shift keying (MSK)
Sensitivity:	2.5 µV/m for 6 dB SNR @ 200 bps
Dynamic Range:	100 dB
Frequency Offset:	± 8 Hz (~ 27 ppm)
Adjacent Channel Rejection:	61 dB ± 1 dB @ f_o ± 400 Hz

Communications

Serial ports:	1 full duplex, 1 RTCM input
Interface Level:	RS-232C
Baud Rates:	4800, 9600, 19200
CAN Bus:	CAN 2.0B
Correction Input / Output Protocol:	RTCM SC-104
Data Input / Output Protocol:	NMEA 0183
Raw Measurement Data:	Proprietary binary (RINEX utility available)
Timing Output:	1 PPS (HCMOS, active high, rising edge sync, 10 kΩ, 10 pF load)
Event Marker Input:	HCMOS, active low, falling edge sync, 10 kΩ, 10 pF load

Environmental

Operating Temperature:	-32°C to +74°C
Storage Temperature:	-40°C to +85°C
Humidity:	95% non-condensing
EMC:	FCC Part 15, Subpart B, Class B CISPR 22

Power

Input Voltage Range:	9.2 to 48 VDC
Reverse Polarity Protection:	Yes
Power Consumption:	< 4.8 W
Current Consumption:	< 400 mA @ 12 VDC
Load Dump Protection:	Up to 86 VDC
Antenna Voltage Output:	5 VDC
Antenna Short Circuit Protection:	Yes

Mechanical

Enclosure:	Powder-coated aluminum
Dimensions:	203 mm L x 125 mm W x 51 mm H (8.0" L x 4.9" W x 2.0" H)
Weight:	0.80 kg (1.76 lb)
Display:	2-line x 16-character LCD
Keypad:	3-button
Power Switch:	Push-button
Power Connector:	2-pin miniature
Data Connector:	DB9-socket
Antenna Connector:	TNC-socket

Pin-out

Main Port

Pin 2	Transmit data (TXD)
Pin 3	Receive data (RXD)
Pin 5	Signal ground

RTCM Input Port

Pin 2	Transmit data (TXD)
Pin 3	Receive data (RXD)
Pin 5	Signal ground
Pin 6	Event marker input
Pin 9	1 PPS

CDA-3 Antenna

GPS Freq. Range:	L1 (1575 MHz ± 20 MHz)
GPS LNA Gain:	27 dB
L-band Freq. Range:	1525 to 1585 MHz
L-band LNA Gain:	28 dB
Beacon Freq. Range:	283.5 to 325 kHz
Beacon LNA Gain:	34 dB
Dimensions:	141 mm dia x 127 mm H (5.57" dia 5.00" H)
Weight:	0.478 kg (1.1 lb)
Antenna Connector:	TNC-socket
Enclosure:	polycarbonate
Mounting Thread:	1-14-UNS-2B
Input Voltage:	5.0 to 15.0 VDC
Input Current:	50 to 60 mA
Operating Temp.:	-40°C to +85°C
Storage Temp.:	-40°C to +85°C
Relative Humidity:	100% condensing

* SVs > 5, HDOP < 2, RTCM SC-104 correction data from a dual frequency reference station, short baseline, and low multipath environment.

** Dependent upon ionospheric activity and multipath

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Warranty: Each CSI Wireless product is covered by a limited one-year warranty on parts and labor.

CSI Wireless Dealer

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Printed in Canada.

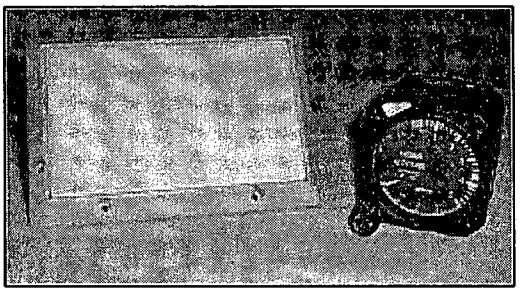
csi wireless™

4110 - 9th Street SE Calgary AB Canada T2G 3C4
Phone (403) 259•3311 Fax (403) 259•8866

McPhar Geosurveys Ltd.
1256B Kerrisdale Blvd., Newmarket
Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
WebSite: www.mgssurveys.com

TERRA TRA-3000 / TRI-30 Radar Altimeter

The Terra TRA-3000 Radar Altimeter unit provides AGL (Above Ground Level) altitude information from 40 feet (12.3 m) up to 2,500 feet (769 m). The system consists of a single TRA-3000 receiver/transmitter/antenna unit and a TRI-30 indicator.



SPECIFICATIONS

TRA-3000 Unit

Type:	Single antenna, FMCW
Altitude Range:	40 to 2,500 ft
System Accuracy:	
• **40 to 100 ft**	+/- 5 ft
• **100 to 500 ft**	+/- 5%
• **500 to 2,500 ft**	+/- 7%
Frequency Range:	100 MHz sweep within 4,200 to 4,400 GHz range
Input Voltage:	Approx. 20 VDC from indicator
Input Current:	600 ma
Altitude Output:	Digital
Self-Test:	Ground or flight, initiated at indicator
Transmitter/Receiver/Antenna:	All solid-state, microstrip antenna,
Physical:	Size - 1" H x 5" W x 7.625" L, Weight - 1.5 lb.
Environment:	-40° C to + 70° C
Unlock display:	Altitude – 45,000 ft

TRI-30 Indicator

Power Supply:	Input voltage – 27.5 VDC +/- 20%
Environment:	Power – 16 watts nominal (includes power to T/R/A unit
Physical:	Size – 3.25" H x 3.25" W x 4" L, Weight – 1 lb.
Mounting:	Front panel mounting; requires a 3" ATI mounting space
Altitude range:	40 ft. to 2,500 ft (linear); 40 – 500 ft (enlarged linear)
Analog display:	Servo; pointer and dial type Needle will go off scale on the high-end
Decision height:	Bug, continuous setting from 40 to 2,500 ft.
Display update rate:	continuous
Analog output:	2.5 mv/ft., 100 mv = 40 ft.
Display disable:	One strut switch input, ground to enable
Altitude accuracy:	
• **40 to 100 ft**	+/- 5 ft
• **100 to 500 ft**	+/- 5%
• **500 to 2,500 ft**	+/- 7%
Aural Decision Height alert:	1 KHz tone for 2 sec. (500 ohms) adjustable audio level
Self-test:	Indicates 40 ft., DH operates normally
Visual alert:	Amber lamp with automatic adjustable intensity; internal LED standard; external lamp operation available.

McPhar Geosurveys Ltd.
1256B Kerrisdale Blvd., Newmarket
Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
WebSite: www.mgssurveys.com

Setra Model 276
Pressure Transducer

Specifications:

Pressure Media: Clean dry non-conductive, non-corrosive gas

Accuracy:

☐ **accuracy**[1]	+/- 0.02% full scale at 70°F (21°C)
☐ **nonlinearity**	+/- 0.012% full scale (end point)
☐ **hysteresis**	0.010% full scale
☐ **non-repeatability**	+/- 0.010% full scale
☐ **thermal zero shift**[2]	+/- 0.002% FS/ °F (+/- 0.004% FS/ °C)
☐ **thermal span shift**[2]	+/- 0.001% FS/ °F (+/- 0.002% FS/ °C)
☐ **altitude resolution**	1 ft (30.5cm) - 4 ft (1.23 m) for 100 psi range
☐ **stability, 24 hours**	+/- 0.005% full scale
☐ **stability, 30 days**	+/- 0.02% full scale
☐ **stability, 1 year**	+/- 0.05% full scale

Output: Bidirectional RS-232 interface

Physical:

☐ **pressure fitting**	1/8th barbed male fitting
☐ **pressure port**	10-32 internal thread
☐ **height**	4 in (10 cm)
☐ **width**	3.5 in (8.9 cm)
☐ **depth**	5.25 in (13.3 cm)
☐ **weight**	2.4 lb (1.09 kg)

Power: 5 VDC +/1%, 70 mA; 17 mA w/200 Microampere sleep mode option

Notes:

1. Accuracy as RSS of non-Linearity, hysteresis and non-repeatability.
2. Unit calibrated at 70 °F. Maximum thermal error is computed from this datum.
3. Specifications are subject to change without notice.

DEV-TECH

Developing Technology Inc.
160 Denise Circle, Newmarket
Ontario, Canada, L3X 2J9
Tel: (905) 954-0618, Fax: (905) 954-0620
E-mail: Khall@devtec.ca
Web Site: www.devtec.ca

Geo-iMAGe Lite Colour Digital Imaging System

The airborne geophysical survey industry has traditionally acquired flight path imagery to document the position of the aircraft and sensor array with respect to the ground. The technology has progressed from 35 mm continuous-strip or frame film camera to videotape and VCR's, usually in the VHS - NTSC format. Current technology overlays the acquired video imagery with GPS position data as well as information from the geophysical data acquisition system, permitting correlation of the video imagery to the ground surface.

This technology has not progressed much since the early 1970's, and although digital camera systems have been available for some time, the industry has not utilized them for many reasons, mainly the inability to store the large volumes of video data in real time. Due to advances in the computer technology industry, this limitation has been overcome. Now that more versatile computer systems are available for use in the aircraft and the capacity to store large volumes of data quickly has become readily and affordably available, digital video has taken on a far more attractive role in airborne geophysics.

The older videotape systems generated imagery that was usually of poor quality, and there was no way to quickly find any given ground location on the tape without playing the entire tape. The video data was good for little more than proving that the aircraft had passed over a given point on a flight line. Certainly it was not of any use in creating any kind of map or photo-mosaic.

Today, however, we can acquire and record high-resolution video images in a format that can be read on any standard PC type computer. These images, combined with suitable information (GPS position, time, height above ground, height above sea level, pitch and roll axis tilt) will now permit the generation of digital 3D terrain models that can be integrated into the geophysical data set.

Most of the areas currently being explored for minerals or hydrocarbons have, at best, very poor topographical information. In many areas no useable information is available at all. Satellite imagery while available, is very costly and usually takes many months to acquire and process, and yields imagery with typically ten meters (or worse) pixel resolution.

Our goal is to provide simultaneously, with the acquisition of the geophysical data, medium to high resolution digital video frames (sub 3-meter pixels) with sufficient horizontal and vertical overlap to allow generation of video stereo pairs, and with the addition of the GPS and altimeter information to create a 3D terrain model.

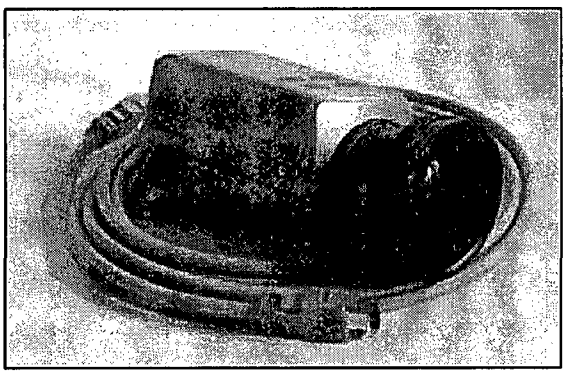


Figure 1: Sony Digital Colour Camera

The basic Geo-iMAGe Lite module comprises a stand-alone rack-mountable console that contains a powerful micro-computer, hard disk drive

comprises the following:

- Stand alone, 1 "U" high, rack mountable computer system, c/w Pentium III 1.0 GHz clock speed (or faster) processor, 256 MB RAM memory, 20 GB HDD, 2 RS-232 serial ports, 2 IEEE 1394 firewire ports, 2 LAN ports, and CD-RW drive
- Windows 2000 Professional Operating System software
- Proprietary video image and GPS data acquisition software to enable acquisition of JPEG, TIF, BMP or PNG format video frames with a resolutionof 640 x 480, 320 x 240 or 160 x 120 pixel resolutions, user selectable.
- User selectable video frame and GPS data acquisition rate - from 1 frame per second to 1 frame every 10 seconds – synchronized with GPS time
- Sony digital video camera with 1/3 inch CCD video element
- 5.64 to 64.8 mm focal length lens with wide angle adapter (0.6 X increase in view angle)

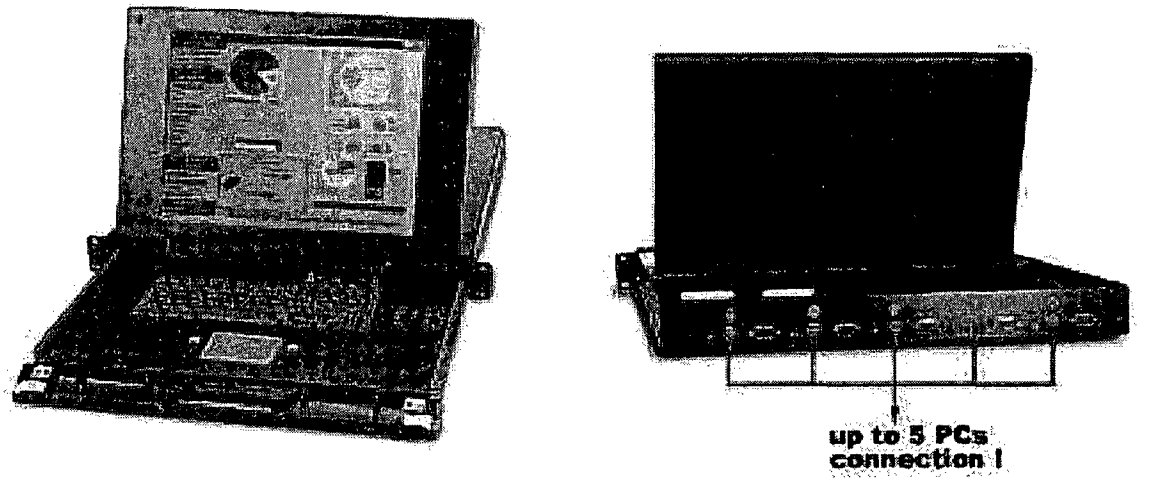
Optional modules for use with Geo-iMAGe Lite include:

Geo-iMAGe GPS module

- Comprises a NovAtel OEM-4 GPSCard receiver, 12-channel, L1 code, imbedded in the Geo-iMAGe console.
- Novatel 511 aircraft certified active GPS antenna or Novatel 521 land vehicle active antenna, and cabling

Geo-iMAGe Screen/Keyboard module

Comprises a 19", 1 "U" high, rack-mount drawer containing a folding 15" LCD TFT (1024 x 768 pixel resolution) screen, keyboard and touchpad "mouse" p ointing device. Permits as up to 5 different PC devices to be attached to the screen and keyboard, eliminating the need for multiple screens and keyboards in the system.



Figures 2 & 3: Geo-iMAGe Screen/Keyboard module comprising a 19", 1 "U" high, rack-mount drawer containing a folding 15" LCD TFT (1024 x 768 pixel resolution) screen, keyboard and touchpad "mouse" pointing device.

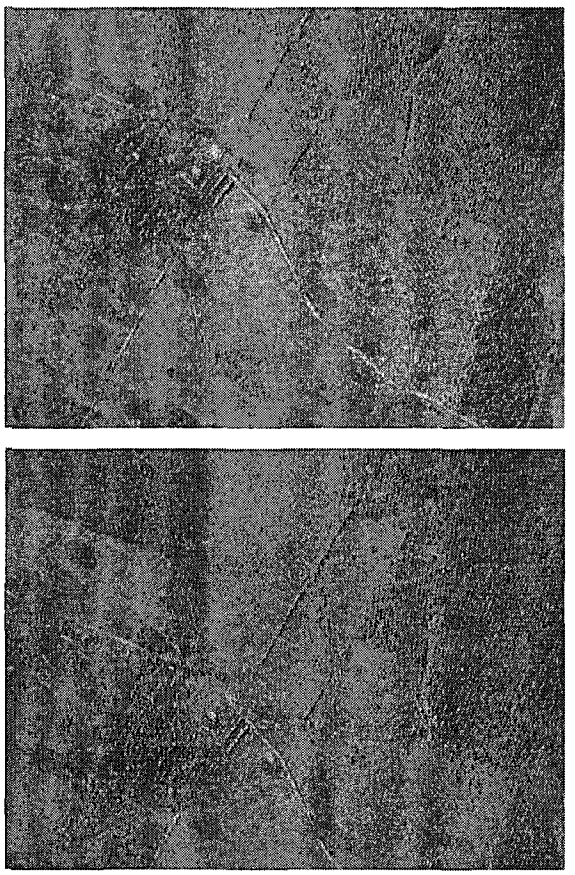
BASIC SYSTEM OVERVIEW

Typical video frame acquisition rate is in the order of 1 frame per second but may be user selected from a range of 1 frame/second to 1 frame every 10 seconds, in increments of 1.0 second. This will allow for variations in flight height above ground, aircraft ground speed and the viewing angle of the camera. Cameras typically used have 47° to 96° angle-of-view.

The system will import a serial data string from a GPS receiver (NEMA format GPGGA string). Rather than overlay the data string on the border of each image frame, a separate GPS data file is created with the same file name as the video frame but with the file extension GEO. The GPS data is available at rates of up to 10 HZ. The GPS receiver has several RS-232 serial ports available to transmit data strings to other equipment should the user so desire.

The video frames are stored on a large capacity hard disk. A naming convention for each frame has been developed utilizing GPS time as the reference. The frames are numbered in the format YYYYMMDDHHMMSSS.XXX where YYYY represents the year, MM the month, DD the day, HH the hour, MM, the minutes, SSS the seconds and decimal seconds of GPS time when the frame was captured. The system includes a CD-RW writer and appropriate software to allow storage of the imagery on CD media for long-term archival purposes.

The primary focus of this product is to replace the traditional "VCR" with a digital picture recording mechanism. Any standard image display software may be used to view the frame or frames of choice on a computer.



Figures 6 & 7: Digital images acquired over farmland in South America



Figures 8 & 9: Digital images acquired over desert village in North Africa

System Specifications:

OPERATING SYSTEM & DEDICATED SOFTWARE

Operating System:	Microsoft Windows 2000 PRO or ME
Video Acquisition Software:	GEOIMAGE LITE

POWER REQUIREMENTS:

24 –32 Volts DC at 50 watts power consumption
12 VDC or 115 / 230 VAC optionally available

GEO-iMAGe LITE:

Frame capture rate:	frame / second to 1 frame every 60 seconds, software selectable
Video format:	JPG, TIF, BMP, PNG, user selectable (JPG recommended)
GPS data:	internal dedicated GPS receiver, Novatel OEM-4, 12 channel L1 - NMEA 0183 GPGGA data string GPS data collected at same rate as video frame data User selectable baud rate for GPS data
File naming:	
Video file:	YYYYMMDDHHMMSSS.XXX, where: YYYY= Year MM= Month DD= Day HH= Hour MM= Minute SSS= seconds,tenths of seconds XXX= video extension, JPG, BMP, PNG etc (automatic)
GPS data:	same as above except file extension automatically selected as GEO

Digital Camera:

Model:	Sony DFW-V500 or equivalent
Interface Format:	IEEE 1394
Data format:	640x480 YUV (4.2.2) 640x480 YUV(4.1.1) 320x240 YUV(4.2.2) 160x120 YUV(4.4.4) all formats user selectable
Image Device:	CCD
White Balance:	Automatic or Manual
Hue:	variable
Saturation:	variable
Lens focal length:	5.64 to 64.8 mm, F:1.18
Wide angle adapter:	VCL-0637H (0.6 X increase in view angle)
Zoom:	12X range, manual, user selectable
Focus:	manual, user selectable
CCD Iris:	ON/OFF selectable
Shutter Speed:	1/30 to 1/100000 sec
Gain:	Automatic or manual
Power:	8-30 VDC (supplied through 1394 cable)
Power Consumption:	4 watts
Operating Temp:	-20 to +50 DEG C
Dimensions:	60 x 61 x 118 mm (w/h/d)
Mass:	335 grams

LCD display and keyboard

Full keyboard function
SynapticsTouchpad
Microsoft Mouse compatible with PS/2 mouse interface
15.1" high brightness TFT LCD display

Resolution :	1024 x 768 (36-bit colors)
Brightness :	200 cd/m2
LCD MTBF :	50,000 hrs
On Screen Display:	built-in OSD for user adjustment, including H/V position, Color, size, etc.
Power Supply :	Built-in universal AC input adapter (LKM-926x / 9265x) -48VDC (LKM-926xT / 9265xT)
Operating Temp:	0° ~ 50°C

Up to five VGA / Keyboard / Mouse / Audio inputs (5 PCs)
Built-in Manual or Auto Scan function

CPU Processor and Peripherals:

CPU :	Socket-370 base support CeleronTM / Pentium® III up to 1.33GHz FSB
System Memory :	One 168-pin DIMM socket up to 512MB SDRAM / VCM
System Chipset :	SiS 630
Video Controller :	up to 1600 x 1200, 16 bits colors, resolution 1394: Fully supports provisions of IEEE 1394-1995 standard for high performance serial bus and the P1394a supplement. Two P1394a fully compliant cable ports at 100/200/400 Mbps
Super I/O :	3 x RS-232 and one RS-232/422/485 (auto-direction RS-485) One parallel port Floppy Disk Controller
USB Ports :	Two ports meets USB ver.1 standard by pin header
Digital I/O :	4 DI and 4 DO
Ethernet :	Dual 10/100Mbps LANS with one integrated in Support ATX function PC/104 expansion by LPC to ISA controller Support one PCI slot
SSD :	Support CompactFlash Type II socket
IDE :	ATA66 interface by one 40-pin connector
Power:	6.5A/5V, 170mA/12V (PIII-933MHz and 256MB SDRAM)
Operating temp:	0 ~ 60°C (CPU needs cooler)

CD-WRITER:	HP 8200 CD-RW
MEDIA:	20 GB, 2.5 INCH DRIVE Optional 250 MB IOMEGA ZIP DRIVE

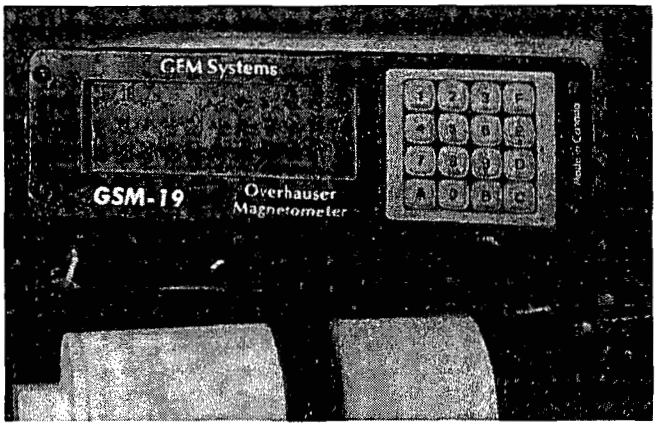
NovAtel OEM-4 GPSCard:

position accuracy - single point	
SA off:	11 m CEP 3
SA on:	48 m CEP 4
DGPS:	(L1, C/A)5 0.45 m CEP
measurement precision	
L1 C/A code:	6 cm RMS
L1 carrier phase:	0.75 mm RMS (differential channel)
data rates	
measurements:	10 Hz
position:	10 Hz
time to first fix - cold start:	60 seconds (typical)
signal re-acquisition:	0.5 s (typical)
time accuracy:	
SA off:	102 ns RMS 3
SA on:	173 ns RMS
Size:	85 mm x 125 mm x 16 mm
Weight:	120 g
Input Voltage:	6.0 -18.0 VDC
Power Consumption:	2.7 W typical, 3.2 W max

GSM-19 Overhauser Magnetometer

Features of the magnetometer

- **Sensitivity = 0.02 nT**
- **Absolute Accuracy = 0.2 nT**
- **Sample Rates up to 5 Hz**
- **Low Power Consumption**



General

"Overhauser" Once you experience it, you'll never go back to proton. Overhauser technology brings you sensitivities one to two orders of magnitude better than proton, yet in a light weight package. This is because the overhauser magnetometer consumes an order of magnitude less power than proton magnetometer, allowing a lighter weight for batteries.

What is the Overhauser technique? The Overhauser sensor contains the electrons' fluid that has been added to a hydrogen rich in the form of "free radial". The resulting mixture yields a sensor with 5000 times gain in proton polarization. Since the Overhauser polarization effect does not require static magnetic fields, but uses radio frequency fields transparent to protons, measurement can be done concurrently with polarization. The result is a sensor with much greater sensitivity, that can be sampled much more rapidly than the standard proton sensor.

Overhauser magnetometer systems therefore maximize resolution while minimizing power consumption. Even with Walking Gradiometer systems, sampling at rates of once per second or betterare posible; Even in cold temperatures of minus 40 zero degrees Celsius and greater, the internal rechargeable battery can still be relied on for a 10 hour day, or longer.

The GSM-19 Overhauser magnetometer is thus truly a State-of-the-Art Magnetometer / VLF system. The GSM-19 offers the data quality, reliability, and extensive list of capabilities, and options, that allow it to meet a very wide spectrum of applications.

Standard Features of the magnetometer

The GSM-19 magnetometer console features a real time graphic display of the current profile. In addition digital display of the current reading, current position, and warning messages are provided. The console design, with internal rechargeable battery pack, allows the unit to be completely sealed against the elements. With the built in heater for the display the GSM-19 magnetometer is ready to go wherever your surveys may take you.

Tuning is automatic worldwide, with provision for manual override. In high gradient conditions the GSM-19 magnetometer monitors the signal decay rate and displays a warning message when the gradient becomes too great. Filters for rejection of 50 or 60 Hz noise are provided.

Diurnal corrections may be done in traditional fashion with one magnetometer unit as a base station and a second unit used as the mobile field unit. At the end of the survey the two units are connected and the field unit creates a corrected data file (which still includes the raw data file) based on the temporal drift recorded by the base station.

As a standard feature GSM-19 magnetometer also offer the capability of making tie point measurements for automatic diurnal corrections. To use this feature the operator records a base value and then loops back to this point periodically during the survey to record another measurement, and thus build a file of the drift. In this way a single instrument may be used to make diurnal corrections.

The RS-232 port on the GSM-19 magnetometer will output data as it is collected. This allows interface to GPS loggers that will accept RS232 data. The standard GSM-19 magnetometer may be operated in a remote mode via computer. Memory storage is 512 K in the standard unit, and may be upgraded to 2 MB.

Grid coordinates are stored with either numeric or compass designations. A seven digit number may be used to designate lines and positions. Line and position spacing is entered so that with every reading the position may be automatically updated. An End of Line feature allows the next line to be quickly selected, plus changes the sign on the position spacing. If the previous line had been adding positions as the operator moved, then on the next line, positions will be subtracted as the operator moves. The operator may also easily manually enter his grid position for cases where gaps in the line are necessary.

SPECIFICATIONS

Performance

	Overhauser	Proton
Resolution:	0.01 nT	0.01 nT
Relative Sensitivity:	0.02 nT	0.2 nT
Absolute Accuracy:	0.2 nT	1 nT
Range:	20,000 to 120,000 nT	20,000 to 120,000 nT
Gradient Tolerance:	Over 10,000 nT/m	Over 7,000 nT/m

Storage Capacity (readings)

	Overhauser	Proton
Std. Magnetometer:	32,000 to 131,000	16,000 to 32,000
With 3 VLF stations:	12,000 to 58,000	6,000 to 12,000
Base Station:	170,000 to 700,000	84,000 to 170,000
Gradiometer:	25,000 to 110,000	12,000 to 25,000
With 3 VLF stations:	12,000 to 46,000	6,000 to 12,000

Operating Modes

Manual:	Coordinates, time, date and reading stored automatically at a minimum 3 second interval.
Base Station:	Time, date and reading stored at 3 to 60 second interval (higher speeds available).
Walking:	Time, date and reading stored at coordinates of fiducial with 0.5, 1 or 2 second cycle time.
Hip Chain:	Equidistant coordinates, time, date and reading stored automatically. Distance interval of readings is programmable.
Remote Control:	Optional remote control using RS-232 interface.
Input/Output:	RS-232 or analog (optional) output using 6 pin weatherproof connector.

Operating Parameters

Power Consumption:	Only 2 Ws per reading for Overhauser, and 12 Ws per reading for Proton magnetometer. Will operate continuously for 45 hours on standby.
Power Source:	12V 2.6 Ah sealed lead acid battery standard, other batteries available.
Operating Temperature:	Overhauser: -50°C to +60°C. Proton: -40°C to +60°C.

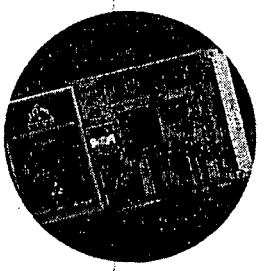
Dimensions and Weight

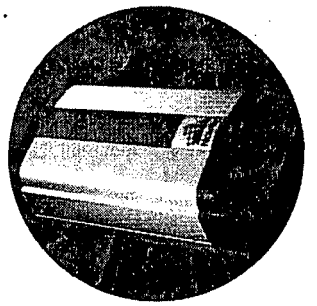
Dimensions:	• Console 223 x 69 x 240 mm. • Sensor 170 x 71 mm diameter cylinder. Omnidirectional sensor 180 x 80mm.
Weight:	• Console 2.1 kg. • Sensor and staff assembly 2.0 kg.

A Standard package includes a console with batteries, harness, battery charger, case, sensor with 2m cable, and staff.

Look into NovAtel's Performance Series

They're a range of advanced technology, high performance L1 GPSCards featuring NovAtel's patented Narrow Correlator® technology and providing sub-meter differential accuracy in real-time. High data output rates, fast signal reacquisition, and superior multipath mitigation techniques support even the most demanding GPS applications.





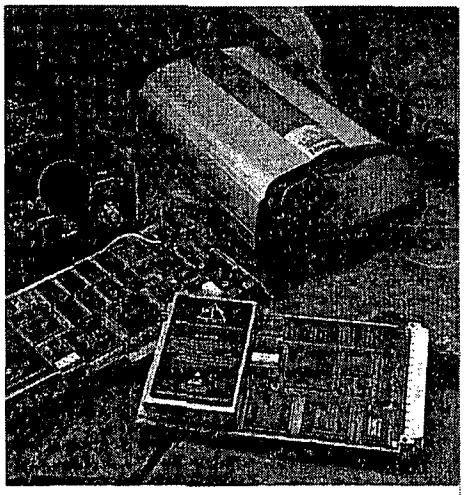
ADVANTAGES

- 12 channel "all in view" parallel tracking
- L1-C/A code and carrier measurements
- Narrow Correlator technology
- Multipath Elimination Technology (MET®)
- Sub-meter real-time DGPS accuracy
- High data output rates
- Low data latency
- High dynamics
- Ease of use
- OEM, PC Card, or standalone configurations
- Flexible integration
- Upgradable

NovAtel



Performance Series



Performance Series

NovAtel's PC Performance 3900 Series features a 2/3 length personal computer card designed for installation in PC compatible computers. This series offers a choice of two full DGPS Card models – the 12 channel 3911R, providing core functionality common to all GPSCard™ models, and the full data model 3951R.

NovAtel's OEM Performance 3100 Series features a Eurocard form-factor designed for standalone and embedded applications. This series offers a selection of [redacted]ard models ranging from the 12 [redacted]nel 3111R, providing core functionality, to the advanced full data model 3151R. All OEM Performance Series receivers are DGPS capable and are rated for use at -40°C to +85°C temperatures. Available as a software option is NovAtel's Multipath Elimination Technology (MET) which reduces pseudorange multipath error by a further 25% to 50% over NovAtel's existing multipath resistant Narrow Correlator.

NovAtel's PowerPak™ Performance 3100 Series provides GPS integrators with an effective, self-contained system. Each PowerPak includes an OEM Performance Series GPSCard and a power supply.

NovAtel ProPak® Performance 3100 Series provides a rugged water, shock and vibration resistant housing for outdoor applications which provides all the same functionality of PowerPak.

Features

- 0.75 meter real-time differential accuracy
- L1-C/A code and carrier tracking
- 12 channel "all in view" parallel tracking
- Fast reacquisition
- Patented Narrow Correlator technology
- Op[redacted]ultipath Elimination Technology (MET)
- 10 H[redacted]osition output rate
- 20 Hz raw data output rate
- 1 PPS output
- Event marker
- RTCM SC104 v 2.1/2.2
- RTCA SC159
- RINEX v 2.0
- NMEA 0183 v 2.0
- GPSolution™ – Windows® compatible graphical user interface

Specifications[1]

• position accuracy[2]	
standalone	
SA off	15 m CEP
SA on	40 m CEP
differential	0.75 m CEP
• post-processed (3151RE/3951R models only)[2]	±5mm +2ppm
	±5mm +1ppm (horizontal)
	±10mm +1ppm (vertical)
• time to first fix	
cold start	70 s (typical)
• reacquisition	
warm start	1 s (typical)
• data rates	
raw measurements	20 Hz
computed position	10 Hz
• time accuracy	
SA off	50 ns RMS
SA on	250 ns RMS
• velocity accuracy	
standalone	0.20 m/s RMS
differential	0.03 m/s RMS
• measurement precision	
C/A code phase	10 cm RMS
carrier phase	
single channel	3 mm RMS
differential channel	0.75 mm RMS
• dynamics (OEM Card Series only)	
acceleration	4 g
velocity[3]	515 m/s

1. Performance specifications are subject to GPS system characteristics & U.S. DOD operational degradation.
2. Accuracy is dependent upon ionospheric and tropospheric conditions, satellite geometry, baseline length, occupation time, number of SVs tracked and multipath effects.
3. Export licensing restricts operation to 60,000 feet maximum and 1,000 knots maximum.

PC Card 3900 Series

• physical	
size	21.6 cm x 10.7 cm x 1.9 cm
weight	220 g
• temperature	
operating	0°C to +70°C
storage	-40°C to +85°C
• interface	
PC ISA bus	8 bit/8 MHz
dual RS232 ports	
connectors	DB-9 male
baud rates	300 to 115,200 bps
TTL Strobes I/O	DB-9 female
RF input	SMA female
• power consumption	6 watts

OEM Card 3100 Series

• physical (Eurocard)	
size	16.7 cm x 10.0 cm x 1.5 cm
weight	175 g
• temperature	
operating	-40°C to +85°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
types	RS232/RS422/NMEA
baud rates	300 to 115,200 bps
strobe I/O	TTL level
• connector type	
edge	64 pin 0.1" DIN 41612 type B
antenna	SMB male
• input voltage	5 VDC, ±12 VDC
• power consumption	5 watts

PowerPak 3100 Series

• physical	
size	20.8 cm x 11.1 cm x 4.7 cm
weight	1 Kg
• temperature	
operating	-40°C to +65°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
communications	RS232/RS422/NMEA
baud rate	300 to 115,200 bps
strobe I/O	TTL level
• connector type	
communications	2 x DB9P
strobes I/O	DB9S
antenna	TNC female
power	2.1 mm threaded plug (center +)
• input voltage range	10-36 VDC
• power consumption	8 watts
• accessories include	
RS232 "Y" type null modem cable	
automotive power cable	
• optional accessories	
110/220 Volt AC adaptor	

ProPak 3100 Series

• physical	
size	24.5 cm x 13.0 cm x 6.2 cm
weight	1.2 Kg
• temperature	
operating	-40°C to +65°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
communications	RS232
baud rates	300 to 115,200 bps
strobes I/O	TTL level
• connector type	
communications	2 x 10 pin LEMO
strobes I/O	8 pin LEMO
antenna	TNC female
power	4 pin LEMO
• input voltage range	10-36 VDC
• power consumption	8 watts
• accessories include	
RS232 null modem and straight cable	
strobe I/O cable	
automotive power cable	
• optional accessories	
110/220 Volt AC adaptor	

Version 980225 • Printed in Canada

For detailed product technical specifications, please call:

1-800-NovAtel

in U.S. or Canada or +1-403-295-4900
email: sales@novatel.ca
internet: www.novatel.ca

NovAtel Inc.
1120-68th Avenue NE
Calgary, Alberta, Canada, T2E 8S5

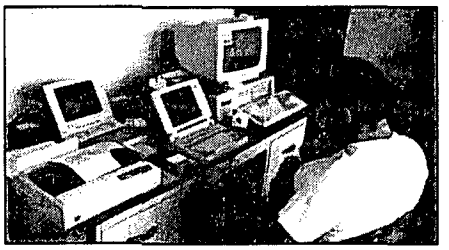
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McPhar Geosurveys Ltd.
1256B Kerrisdale Blvd., Newmarket
Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
WebSite: www.mgssurveys.com

FIELD DATA PROCESSING WORKSTATIONS

Our Field Data Processing Workstations (FWS) are dedicated PC-based microcomputer systems for use at the technical base in the field. The workstations are designed for use with Geosoft OASIS, MPS and MONTAJ, ENCOM, and other data processing software, as well as in-house developed software and utilities.

The FWS has a data replot capability, and may be used to produce pseudo analog charts from the recorded digital data within less than 12 hours after the completion of a survey flight, if this is necessary. It is also capable of processing and imaging all the geophysical and navigation data acquired during the survey, producing semi-final, preliminary-levelled maps in either black-line contours on Mylar or full colour contours on paper.



FWS FEATURES

- **Portability** - the workstations can be packaged and transported to the field with a minimum of effort
- **Digital Data Verification** - flight data quality and completeness can be assured by both statistical and graphical means
- **Flight Path Plots** - flight path plots can be quickly generated from the GPS satellite data to verify the completeness and accuracy of a day's flying
- **Versatility** - the FWS can be used in both the field and the office. Data pre-processed in the field can be up-loaded to the computers at the Data Processing Centre to speed data turnaround.
- **QC and Preliminary Maps** - the software will permit preliminary maps of the magnetic and gamma-ray spectrometer data to be quickly and efficiently created in the field, providing a quick and efficient method to undertake QC Verification of newly acquired data.

THE HARDWARE



The workstations are PC-compatible PENTIUM microcomputers with a 2GHz or faster processor, 512 MB of memory, a large capacity hard disk drive, an extended VGA graphics card with VGA monitor and a colour inkjet plotter for generating maps and/or profiles, and ZIP, JAZZ and writeable CD-ROM drives to backup data.

THE SOFTWARE

The FWS software enables the user to read the FLASH cards, ZIP cartridges or PCMCIA removable hard disks from the airborne system, check the data for gaps, spikes or other defects and permits editing where necessary.

The base station GPS/magnetometer data is checked and edited, and where necessary merged with the airborne data. Post-survey differential GPS corrections are made using either C^{3}NAV and/or WAYPOINT software. GPS flight path plots may be created and plotted. Multi-channel stacked profiles of the recorded and edited data may be produced on the dot-matrix printer.

The Software includes:

- Geosoft OASIS/Montaj Airborne Processing Software
- PC-based airborne data compilation and binary database system for in-field processing and compilation of large volumes of time or fiducial based airborne data
- Proprietary data for processing HEM data
- GrafNAV GPS processing/differential GPS correction software
- McPhar's proprietary software and utilities
- General Utility software (WINDOWS 200 PRO, Norton Utilities, Norton Anti-virus, Xtree Gold, LapLink, etc.)



APPENDIX 4

Personnel Resumes

- Tim Bodger
- Robert Hearst
- Henrik T. Anderson
- Barry Levy
- Tonia Bojkova
- Asif Mirza

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Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
WebSite: www.mgssurveys.com

RÉSUMÉ

Name: Timothy R. Bodger

Profession: Manager, Administrator, Sales and Marketing

RELEVANT EMPLOYMENT HISTORY:

2003 – present **McPhar Geosurveys Ltd., Newmarket, Ontario, Canada – General Manager** - responsible for the day-to-day administration, operations and sales and marketing activities of the company.

1998 – 2002 **EDCON Aero Surveys, Inc., Denver, USA - Vice President, Sales & Marketing** - a joint venture company between Aero Surveys Inc. and EDCON Inc., responsible for sales and marketing activities of the company.

1996 – 2002 **Aero Surveys Inc., Uxbridge, Canada - Vice President, Sales & Marketing** - In August 1996, Aero Surveys was acquired by GeoeXperT Geosciences C.A., and at that time, Bodger became the Vice President responsible for sales and marketing activities of the company. In 1997, was instrumental in introducing Aero Surveys to Airborne Gravity surveys, and assisted in the creation of the EDCON Aero Surveys joint venture to undertake Airborne Gravity Surveys.

1995 - 1996 **Aero Surveys Inc., Richmond Hill, Canada - Founder, Director and Vice-President** - Joined the newly formed company as President, responsible for the day-to-day management of the company, determining the company's future business plans, sales and marketing of its services and products, supervising a staff of 12 plus employees, and maintaining budgets and cash-flow.

1994 - 1995: **Scintrex Limited, Toronto, Canada - Promoted to General Manager, Systems & Surveys Division**, a new division of Scintrex created to provide contract airborne and ground geophysical surveys. Responsible for budgets, sales and marketing of the division, project costs and profits, supervising staff of 30 persons, including a Joint Venture Company in Cuba (Scintrex-Caribe).

1992 - 1994: **Scintrex Limited, Toronto, Canada - Promoted to Director of Sales**, responsible for the sales and marketing of all Scintrex Products and Services, including contract airborne and ground geophysical surveys. Supervised a staff of 16 persons, and a network of 74 agents and representatives, worldwide.

1989 - 1991: **Scintrex Limited, Toronto, Canada - Promoted to General Sales Manager, Earth Science Products**, responsible for the sales and marketing of all products and services of the Earth Science Division. Supervised sales and marketing staff of 9 persons.

1985 - 1989: **Scintrex Limited, Toronto, Canada - Airborne Instrumentation Sales Manager,** responsible for the sales and marketing of Scintrex' airborne geophysical instrumentation and services.

1982 - 1985: **Questor Surveys Ltd., Mississauga - Projects Manager** of 210,000 km aeromagnetic survey of the Philippines from 1982 to 1984, and various small projects around Canada/USA in 1984/85.

1981 - 1982: **Geosurvey International, Kenya - Assistant Project Manager**, assisted in managing a large nation-wide regional survey in Guinea, West Africa, responsible for the operations of 3 aircraft and a crew of 25 persons.

1977 - 1980: **Questor Surveys Ltd., Mississauga, Canada - Data Compilation Manager,** responsible for supervising Datamen in field on INPUT (TDEM) surveys, as well as for the compilation of all INPUT survey data into maps and other products. Worked primarily in Canada, USA and South Africa.

1974 - 1977: **Northway Survey Ltd., Toronto, Canada - Dataman and Crew Chief** on various airborne projects in Canada, Niger, Nigeria, Venezuela, Dominican Republic, Lesotho, South Africa, Senegal and USA.

1973 - 1974: **Geometrics Inc., California, USA - Dataman** on various airborne projects in USA, Alaska, Zambia and Australia.

1971 - 1973: **Aero Service Corporation, Philadelphia, USA - Dataman** on large airborne regional survey of Algeria.

PROFESSIONAL AFFILIATIONS:

- Past President, Currently Member, Canadian Exploration Geophysical Society (KEGS)
- Member, Society of Exploration Geophysicists (SEG)
- Member, Prospectors & Developers Association of Canada (PDAC)

TECHNICAL PAPERS/PUBLICATIONS:

Between 1994 and 1998, has written and/or published eight technical papers on airborne geophysical surveying topics.

LANGUAGES:

English and French

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1256B Kerrisdale Blvd., Newmarket
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WebSite: www.mgssurveys.com

RÉSUMÉ

NAME: **Robert Hearst**

PROFESSION: Geophysicist

EDUCATION:

1996 M.Sc., Geophysics and Geology, McMaster University
1983 B.Sc. (Honours), Geophysics and Geology, University of Western Ontario

WORK EXPERIENCE:

2004 - present **McPhar Geosurveys Ltd., Senior Geophysicist/Data Processing Manager** – Responsible for supervising McPhar's Data Processing Dept., responsible for processing data acquired by ground and airborne (installed in either rotary- or fixed-wing aircraft) electromagnetic, magnetic, radiometric, or other geophysical survey systems at the company's Data Processing Centre in Newmarket, using OASIS, MONTAJ, INTREPID and other software; quality control (QC) of acquired geophysical data; geophysical interpretations; operational logistics

2002 – 2004 **Consulting Geophysicist, Toronto** - servicing various international and local clients. Quality Control / Quality Assurance for Saudi Aramco on the World's largest multiple gradient airborne magnetic survey (approx. 1.7 million line-kms of data acquisition). Supervision and field quality control of data acquired by multiple aircraft on a daily basis including the acceptability and necessary re-flights / modifications required to meet contract specifications. Evaluation and specification of all final deliverable products including acceptability of final products and processing steps. Design, Quality Control / Quality Assurance and Interpretation of several smaller airborne and ground geophysical surveys completed in Canada and Venezuela for several Junior Mining Companies.

1997 - 2002 **Stratagex Ltd., Geophysical Consulting, Toronto, Senior Geophysicist** - Survey design, management, interpretation and client liaison for numerous mining companies involved in geophysical exploration for diamonds, gold and base metals in Canada, Central America, South America and Africa. Including the selection of contractor(s), writing of survey specifications, review of contracts, quality control (QC)/quality assurance (QA) activities for ground and airborne data sets and interaction with project geologists.

1995 - 1997 **Guaniamo Mining Company Limited, C/O Toco Mining Company Limited, Fort Lauderdale, Florida, USA, Chief Geophysicist and Project Manager -** Design and management of an integrated geological and geophysical grassroots exploration program for hard rock and alluvial gold and diamonds in the Guyana Shield of Venezuela. Responsibilities included the assembly of a balanced geological and geophysical exploration team; selection of contractors and consultants (international and local); planning and execution of ground follow-up areas for geological, geochemical and geophysical surveying; analysis of results; selection of drill sites, selection of bulk

sampling sites; selection of possible alluvial plant sites; preparation of exploration budgets. Selection of appropriate geological and geophysical methodologies for the follow-up of high resolution aeromagnetic and radiometric surveys on the concessions. Analysis of country-wide and concession-scale aeromagnetic, radiometric, and satellite databases with selection of prospective areas for gold and diamond potential.

1983 – 1995 **Paterson, Grant & Watson Limited, Consulting Geophysicists, Toronto - Senior Staff Geophysicist (1987-1995) Staff Geophysicist (1983-1987) -** Development of new client base; responsible for the design, implementation, acquisition, compilation, processing, interpretation and presentation of geophysical and geological exploration and development surveys for precious metals, diamonds, base metals and petroleum. Management of government contracts. Assembly and coordination of field work crews (worldwide) and data processing teams. Geophysical data processing and interpretation; organization, supervision, coordination and participation in geophysical data processing projects conducted by teams of three to four individuals. Responsible for scheduling assigned projects, team selection, quality control of the product and presentation and delivery of final products to the clients.

ACADEMIC AWARDS:

- McMaster University Department of Geology Graduate Scholarship 1991 - 1992, 1992 - 1993.
- Canadian Society of Exploration Geophysicists Trust Fund Scholarship, donated by Chevron Standard Limited, 1982.

PROFESSIONAL AFFILIATIONS:

- Society of Exploration Geophysicists (SEG).
- Past President, Canadian Exploration Geophysicists Society (KEGS).
- Environmental and Engineering Geophysicists Society (EEGS)
- Canadian Institute of Mining and Metallurgy (CIM) (National and Toronto Branch).
- Prospectors and Developers Association of Canada (PDAC).
- Registered Professional Geophysicist, NAPEGG.

PROFESSIONAL EXPERIENCE:

- 22 years of continuous experience in the geophysical survey industry
- Good management skills
- Extensive international experience
- Extensive experience processing and interpreting airborne magnetic and/or magnetics/ radiometric data
- Excellent computer skills, experienced programmer

TECHNICAL PUBLICATIONS:

More than 15 technical publications between 1983 and 2003, list available on request.

LANGUAGES:

English, working knowledge of French and Spanish

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RÉSUMÉ

NAME: **HENRIK TOFT ANDERSEN**

PROFESSION: Geophysicist

EDUCATION:

1987	Ph.D. Geophysics, Colorado School of Mines, Golden, Colorado.
1978	M.S. Geophysics, Colorado School of Mines, Golden, Colorado.
1973	B.S.(hons) Geophysics, Bernard Price Inst. for Geoph. Research, University of the Witwatersrand, Johannesburg, South Africa.
1968	B.S. Geology, University of Pretoria, Pretoria, South Africa.

WORK EXPERIENCE:

2003 - **McPhar Geosurveys Ltd., Newmarket, Ontario, Canada - Consulting Chief Geophysicist** - supervising all geophysical activities of the company, including research and development of instrumentation and software; data processing, interpretation and reporting.

1996 - 2002 **Aero Surveys Inc., President and Chief Geophysicist** - responsible for the day-to-day management of the company; determining the company's future business plans; strategic planning; supervising a staff of 12 plus employees; maintaining budgets and cash-flow; supervising all geophysical activities of the company, including data processing, interpretation and reporting.

1998 - 2002 **EDCON Aero Surveys, Inc., Vice President and Chief Geophysicist** – a joint-venture company between Aero Surveys Inc. and EDCON Inc. Responsible for the day-to-day geophysical activities of the company, including data processing, interpretation and reporting.

1993 - 1996 **GeoeXperT C.A. and Digitus International, Ltd., Vice President.** Research Project: Imaging and Pattern recognition in the interpretation of Transient Electromagnetic data for Idaho National Engineering Labs. **Consultant to GeoeXperT, Venezuela**, on mineral exploration in tropical terranes, **Consultant to: (a) TerraSoft**, Sunnyvale, California, on interpretation of Electromagnetic Offset Logging, (b) **Sandia National Labs.**, Albuquerque, New Mexico, on application of electrical methods to

	map and characterize the disturbed rock zone around underground excavations and its associated fluid redistribution.
1990 - 1993	**Department of Geophysics, Colorado School of Mines, Assist. Research Professor.** Research Projects: (a) Imaging and Pattern recognition in the interpretation of Transient Electromagnetic data for Idaho National Engineering Labs, (b) Mapping of fluid redistribution in the Disturbed Rock Zone around underground excavations for Sandia National Lab. Vice President and consultant to GeoeXperT, Venezuela, on precious- and base metal exploration in tropical terranes.
1988 - 1990	**Department of Geophysics, Colorado School of Mines, Professional Research Assistant**. Research Projects: (a) Characterization of the Disturbed rock Zone around underground excavations for Sandia National Labs., test of exploration methods for oil and gas beneath the pre-Cambrian overthrust in upstate New York, (c) application of electrical exploration methods for oil and gas exploration in Venezuela. Consultant to MINDECO and The Nuclear Fuels and Reactor Corp. of Japan.
1987 - 1988:	**Department of Geophysics, Colorado School of Mines, Post Doctoral Fellow**. Research Projects: (a) Application of Electrical methods to Oil and Gas exploration in Venezuela, (b) Geothermal exploration in Iceland, and (c) Site characterization of the Waste Isolation Pilot Plant in SE New Mexico. Consultant to GeoPacific Resources for MINDECO on geothermal exploration in Japan.
1981- 1987	**Department of Geophysics, Colorado School of Mines, Teaching and Research Assistant.** (a) Teaching assistant for Electrical Exploration Methods during Summer Field Camp, (b) Research assist. on Electromagnetic and Gravity project over pre-Cambrian overthrust in New York, (b) Research assist. on the development of multi-component electromagnetic application and interpretation systems, and (c) Project Manager on Transient Electromagnetic studies of deep structural features below volcanic cover in the states of Washington and Colorado. Consultant to Newmont Overseas Exploration in Spain and Peru.
1970 - 1981	**Tsumeb Corporation Ltd. (Newmont Mining), Senior Exploration Geophysicist** for base metals in Namibia and Namaqualand. Commonly used methods on integrated surveys included ground- and airborne magnetics, radiometrics, IP/resistivity, frequency and transient electromagnetics and gravimetry.
1969 - 1970	**Falconbridge Exploration (South Africa); Field Geologist/ Geophysicist** on base metal exploration in Namibia and Zimbabwe.
1968 - 1969	**Kennecott Exploration (South Africa); Field Geologist** on base metal exploration in Namibia.

1963 - 1968	**Geological Survey of South Africa; Geophysical Field Technician** on gravity surveying and electrical logging of shallow wells.
1962 - 1963	**Federal Vanadium Corp. (South Africa); Laboratory Technician** in chemical production control laboratory.

PUBLICATIONS:

Authored/co-Authored and published more than 20 technical papers. List available on request.

PROFESSIONAL EXPERIENCE:

- More than thirty years professional experience in the collection, processing and interpretation of ground and airborne geophysical data for a wide range of applications, including: oil and gas exploration; mineral exploration; ground water exploration; and environmental studies.
- Considerable management experience, supervising staff of up to 20 persons, as well as extensive experience as an in-field Project Manager and/or consultant.
- Extensive computer skills, experienced with AutoCAD, GEOSOFT OASIS/MPS/MONTAJ data processing software, and FORTRAN, C, and other programming languages.
- Experienced in the planning and design of geological and geophysical exploration programs for both oil and gas and minerals exploration.
- Extensive experience in teaching and training personnel to do data processing and in the application of geophysical surveying techniques.
- Considerable experience in designing and managing Research and Development programs.

PROFESSIONAL SOCIETIES:

- American Geophysical Union
- Geological Society of America
- Venezuelan Geophysical Society
- Sigma Xi
- Aircraft Owners and Pilots Association

LANGUAGES:

English, Danish, Afrikaans, some Spanish

McPHAR

RÉSUMÉ

NAME: Barry Levy

PROFESSION: Electronic Technologist

EDUCATION: Seneca College, Toronto
Carnegie Institute

LANGUAGES: English

WORK EXPERIENCE

2003 - **Contract / Consulting Electronics Technologist/Operator** - responsible for installing, maintaining and operating airborne geophysical systems in the field. Experienced in operating both helicopter-borne EM systems and fixed-wing magnetometer and multi-sensor systems, including aerogravity/magnetics and HEM/Magnetics/Radiometrics.

1995 - 2002 **Aero Surveys Inc., Uxbridge, Canada - Electronics Technologist/Operator** - responsible for maintaining and operating airborne geophysical systems in the field. Experienced in operating both helicopter-borne EM systems and fixed-wing magnetometer and multi-sensor systems, including aerogravity/magnetics. Has worked in Angola, Argentina, Bolivia, Botswana, Chile, Ecuador, Eritrea, Libya, Mexico, Oman, South Africa, Peru, USA.

1994 - 1995 **Independent Contractor/Consultant** - worked on several contracts providing services and consulting to clients in Canada, USA and England.

1993 - 1994 **Premier Telecom, West Sussex, England - Electronics Technologist** - responsible for the purchase, integration, testing and set-up of GSM telephones for clients in Hong Kong and England.

1990 - 1994 **NovAtel Communications Ltd., Ontario - Field Support Representative** - selected and set-up service centres for NovAtel Products and cellular systems. Conducted service seminars, approved warranty claims from dealers, assisted in setting-up variety of cellular networks with Northern Telecom, Ericsson and Cantel. Re-designed and re-installed a Rural Radiotelephone network in Republic of Rwanda under UN contract. Set-up Service Centre for NovAtel UK in Wiltshire, England.

1986 - 1990 **Canadian Marconi Company, Burlington Regional Office, Ontario - Service Manager** operated and serviced CMC's VHF and UHF RCC's in Mississauga.

1983 - 1986 **Motorola, Toronto - Field Tech. Rep.** - responsible for servicing Gulf and BP's Motorola Data Acquisition and Control Systems at bulk loading terminals in Toronto, Ottawa and Montreal.

1980 - 1983 **Scintrex Limited, Toronto - Shop Technician** - worked on the repair, calibration and testing of magnetometers and electromagnetic systems and small lasers. Built coils for electromagnetic systems, operated and tested airborne systems for delivery to clients.

1976 - 1980 **Motorola, Toronto - Special Products Service** - installed and service "Voice Privacy" Scrambler systems, Voting Receiver Systems, CCD camera systems, Image Intensifier and Low-Light Products.

PROFESSIONAL EXPERIENCE

- Seven years experience as a technologist/operator of airborne geophysical systems.
- More than twenty five years professional experience in the installation, repair and service of sophisticated electronic systems
- Eight years experience in the installation, repair and operation of geophysical systems
- Extensive experience working in Europe, Canada, Africa and South and Central America
- Good computer skills, familiar with DOS, WINDOWS, AutoCAD and a variety of other software.

McPhar Geosurveys Ltd.
1256B Kerrisdale Blvd., Newmarket
Ontario, Canada L3Y 7V1
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
WebSite: www.mgssurveys.com

RÉSUMÉ

NAME: **Tonia Bojkova**

PROFESSION: Geophysicist

EDUCATION:

2001	Geosoft Data Processing and Analysis Software, Guildford, United Kingdom
1998	GeoPak Data Processing Software, HSG Ltd., Toronto, Canada
1978 – 1980	M.Sc., Applied Mathematics, Technical University, Sofia, Bulgaria
1973 – 1978	M.Sc., Geophysics, University of Mining and Geology, Sofia, Bulgaria

WORK EXPERIENCE:

2004 - **McPhar Geosurveys Ltd., Geophysicist/Data Processor** - responsible for processing of airborne geophysical data; quality control (QC) of acquired geophysical data; geophysical interpretations; operational logistics

2000 – 2002 **Fugro Airborne Survey (FAS), United Kingdom – Office in Sofia, Bulgaria, Geophysicist** - Processed and analyzed radiometric and magnetic data, and produced corresponding maps in Bulgaria and in the UK (Guildford). Prepared final reports.

1992 - 2000 **Airborne Geophysical Survey (AGS) Ltd., Bulgaria** (a Joint Venture between the Government of Bulgaria and High-Sense Geophysics Ltd., Toronto, Canada), **Geophysicist** - Planned and managed airborne surveys; collected, processed, and analyzed airborne radiometric and magnetic data, produced the corresponding maps and prepared final reports; reprocessed archive data from Namibia, performed environment projects - gamma-ray monitoring of the Bulgarian NPP, Kozloduy using 2048-channel gamma-ray spectrum analyzer

1980 – 1992 **Airborne Geophysical Department of the Enterprise for Geophysical Explorations and Geological Mapping, Sofia, Bulgaria, Geophysicist** - collected, processed, and analyzed airborne radiometric and magnetic data; produced the corresponding maps and prepared final reports; performed gamma-ray monitoring of Bulgaria after Chernobyl NPP fallout

INTERNATIONAL EXPERIENCE:

Canada, Bulgaria, Macedonia, Congo, Zimbabwe, Zambia, Botswana

PROFESSIONAL EXPERIENCE:

- 24 years of continuous experience in the geophysical survey industry
- Extensive international experience
- Extensive experience processing and interpreting airborne magnetic and/or magnetics/ radiometric data
- Excellent computer skills, experienced programmer

LANGUAGES: Bulgarian, English

McPhar Geosurveys Ltd.
1256B Kennisdale Blvd., Newmarket
Ontario, Canada L3Y 8Z9
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
WebSite: www.mgssurveys.com

Name: **ASIF M. MIRZA**
Profession: **Geophysicist**

HIGHLIGHTS OF QUALIFICATION

- Experience as a field geophysicist
- Airborne geophysical data management and processing
- Seismic reflection data processing experience in Geophysical Investigations for the demarcation of overburden from the bedrock and concerning oil resources
- Extensive experience in 2-D seismic reflection data interpretation
- Experience in seismic data interpretation with the help of Seismic Straitigraphy, Borehole logging, Gravity and Resistivity methods
- Data acquisition with the help of different environmental instruments
- Research about new environmental issues
- Risk assessments and cost estimates related to environmental clean up
- Evaluation of groundwater potential along sea shoreline, environmental investigations, remedial activities
- Master's in Environmental Science, Master's in Geophysics and Bachelor of Applied Geology
- Knowledge and work experience of the software's, Geosoft Montaj, DOS, Windows XP/NT/2000, M.S.Office, Corel DRAW 9, Arc view GIS
- Well organized, self motivated, honest and goal oriented
- Excellent team player with proven communication and interpersonal skills

PROFESSIONAL EXPERIENCE

Geophysical Technician
McPhar Geosurveys Ltd, Newmarket, Ont, Canada 2004

- Airborne geophysical field data management and preliminary processing, of different projects, using Geosoft Oasis Montaj
- Quality control decisions of survey data within the specification laid down with clients and McPhar's standards
- Gridding, contouring and leveling of magnetic and electromagnetic geophysical data to produce profiles and contours maps
- Set up and operate ground base station system, comprising magnetometer and GPS system
- Producing of backup CD-ROM's of the processed data for forwarding clients via internet or company network site
- Making final reports of the processed geophysical data for clients

Field Geophysicist 2000-2001
SEFEC (Pvt.) Ltd, Karachi, Pakistan

- Seismic reflection data acquisition with the help of dynamite in Attock Area, Pakistan
- Seismic reflection data recorded in the field using well-defined field parameters, i.e. source and spread configuration
- Seismic spread and geophone arrays designed using walk away test and spectral analysis
- Performed field seismic data processing Attock Area, Pakistan

McPHAR

EDUCATION

- Master's in Applied Environmental Measurement Techniques, Chalmers University of Technology, Sweden
- Master's in Applied Geophysics Dept. of Earth Science, Quaid-I-Azam University, Islamabad, Pakistan
- Bachelor of Applied Geology, Institute of Geology, University of the Punjab, Lahore, Pakistan

GEOLOGICAL & ENVIRONMENTAL FIELD EXCURSIONS

- Fieldwork about the Local Human Stresses on three lakes in Molandal Area, Sweden.
- Field about Soil Farmation Analysing Aten Kapell, Vastergotland, Sweden.
- Field study of the Air Quality at Universeum and Chalmers, Gothenburg, Sweden.
- Geological & Geophysical Field Works in Northern Pakistan.

TRAINING

Internship:

- Seismic Data Processing, OGDCL, Islamabad, Pakistan

Technical Courses:

- Evaluation of Aggregates as constructional material, Course arranged by the Kent State University, Ohio, USA and Institute of Geology, University of the Punjab, Lahore, Pakistan
- Course on Geographical Information System (GIS), Course arranged by the National University of Science and Technology, Islamabad, Pakistan
- Course on Seismic Stratigraphy and Tectonics (Basin Analysis and Computer Modelling), Course arranged by Petroleum Geology Investigators ApS, Copenhagen, Denmark and the Dept. of Earth Sciences, Quaid-i-Azam University, Islamabad, Pakistan
- Well Logging interpretation, Course arranged by Petroleum Geology Investigators ApS, Copenhagen, Denmark and the Dept. of Earth Sciences, Quaid-i-Azam University, Islamabad, Pakistan

SCHOLASTIC ACHIEVEMENTS

- 2nd position in Fieldwork, B.Sc. Geology
- 4th position in B.Sc. Applied Geology

EXTRA CURRICULAR ACTIVITIES

- Member Quaid-I-Azam Blood Donor Society (QBDS)
- Member Dramatic Club QAU
- Member of the University Cricket Team
- Class representative during M.Sc. in University
- Certificate of 2nd position in Cricket, Annual Sports 95
- Certificate of service for National Cadet Corp. (NCC)

LANGUAGES

English, Urdu, Hindi and Punjabi

APPENDIX 5

Digital Data Specifications

- HEM Data File Description
- Spectrometer Data File Description
- HEM Anomaly Listing

EM and Magnetic Digital Data Description

Final EM and Magnetic database channel descriptions for Areas A & B:

X_ NAD27	NAD27, UTM zone 8N
Y_ NAD27	NAD27, UTM zone 8N
Line	Line number
Fltnum	Flight number
Date	Date
GPStimesec	Gpstime (sec)
Galt_m	GPS altimeter in metres
Ralt_m	Radar_altimeter in metres
DTM	Digital Terrain model (Galt_m-Ralt_m)
DTM_fin	Final processed (microlevelled) DTM
rawmag	Raw Magnetic data edited for spikes
bmag	Base station magnetic data
IGRF	IGRF Regional Field
Mag_lev	rawmag, lag corrected and tie line levelled
Mag_fin	Final Magnetic data, microlevelled
CX7KHz	Coaxial 7 kHZ
CP6600Hz	Coplanar 6600 Hz
CX980HZ	Coaxial 980 Hz
CP880HZ	Coplanar 880 Hz
CP 34K	Coplanar 34 kHZ
Res6600Hz	Apparent Resistivity calculated from the coplanar 6600 Hz coil
Res6600Hz_fin	Res6600Hz microlevelled

For all channels:

_IP	indicates In-phase
_q	indicates Quadrature
_IP_fin	indicates final levelled channel

Biljana Milicevic, M.Sc.
Senior Geophysicist Data Processor
McPhar Geosurveys Ltd.
1256B Kerrisdale Blvd.
Ontario, Canada L3Y 8Z9
Telephone, office: +1 905-830-6880 x 109
Fax: +1 905-898-0336

Spectrometer Data File Description

ORDORADO Spectrometry
FILE: AREAB_SPEC_FIN.gdb

Name of channel	Explanation
X	X coordinate-UTM zone 8N
Y	Y coordinate-UTM zone 8N
Line	Line number
Flight	Flight number
Date	Date of the flight
Lat_deg	Latitude
Long_deg	Longitude
Fid	Fiducial
Ralt_m	Radar altimeter in meter
Gpstm_sec	GPS Time in second
RALTSTP	Corrected radar altimeter data to Standard Temperature and Pressure
Cos_cps	Raw cosmic channel
K_cps	Raw Potassium channel
U_cps	Raw Uranium channel
Th_cps	Raw Thorium channel
TC_cps	Raw Total Count channel
Uru_cps	Raw Uranium upward looking channel
K_final	Corrected Potassium channel (%K)
U_final	Corrected Uranium channel (eU ppm)
TH_final	Corrected Thorium channel (eTh ppm)
TC_final	Corrected Total Count channel (cps)
Th_K	Calculated Th/K ratio

HEM Anomaly Listing - Ram' Horn Block A

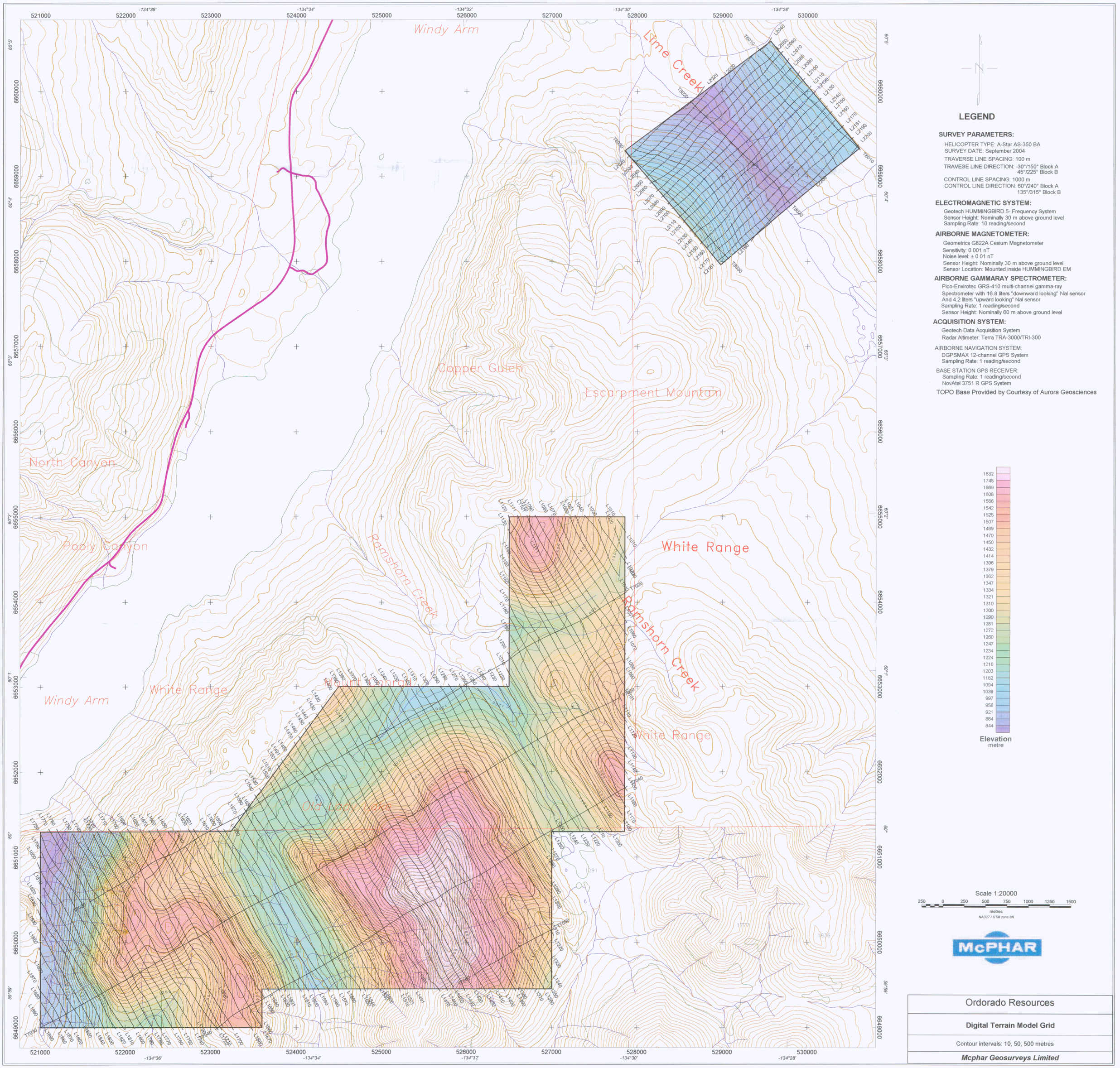
NAD27 UTM Easting (metres, Zone 8N)	NAD27 UTM Northing (metres, Zone 8N)	Flight Line	Flight Number	7000 Hz Anomaly Classification	7000 Hz Conductivity (seimens)	7000 Hz Anomaly Label	980 Hz Anomaly Classification	980 Hz Conductivity (seimens)
521099.009	6649314.231	1870	13	4	0.358360469	A		
524064.2418	6651550.754	1501	14	4	0.207901448	A		
521544.3694	6650351.352	1780	13				6	1.046191812
521938.9896	6649714.949	1780	13				6	1.416416883
521246.3835	6650468.794	1800	13				6	1.026239038
521767.6196	6651132.727	1720	13				6	1.353026271
521800.57	6651092.776	1720	13				5	0.707468212
522211.4736	6650387.22	1720	13				6	1.272712946
521980.5352	6650001.842	1760	13				6	1.068213224
522661.241	6650403.174	1680	13				6	1.363717794
523126.8736	6651040.072	1610	14				6	2.011983871
523006.3036	6651255.252	1610	14				6	2.005700827
523308.6361	6650968.898	1600	14				6	2.025308371
523773.9498	6650310.247	1590	14				6	1.691649079
523450.9446	6650860.724	1590	14				6	1.518678069
523921.201	6651426.95	1520	14	4	0.231871918	A		
524054.9667	6651212.185	1520	14				6	1.408964396
524337.1315	6650945.713	1510	14				6	1.385242105
526642.1858	6652711.909	1220	14				6	3.981198788
526970.8476	6652188.5	1220	14				6	1.836518168
527255.1427	6651858.902	1210	14				6	2.033851147
526500.4186	6653370.385	1200	14				6	4.834081173
526869.6731	6652730.57	1200	14				5	0.945710957
527479.9377	6651692.502	1200	14				6	3.176513672
527604.7232	6651478.688	1200	14				6	2.571720123
527514.691	6651810.192	1190	14				5	0.833388746
527407.0213	6652010.791	1190	14				6	2.255571604
526833.1955	6653000.463	1190	14				6	1.222979188
526786.4441	6653289.374	1180	14				6	2.921287537
526874.5794	6653121.199	1180	14				6	4.160324574
527314.2144	6652373.153	1180	14				6	2.615847588

NAD27 UTM Easting (metres, Zone 8N)	NAD27 UTM Northing (metres, Zone 8N)	Flight Line	Flight Number	7000 Hz Anomaly Classification	7000 Hz Conductivity (seimens)	7000 Hz Anomaly Label	980 Hz Anomaly Classification	980 Hz Conductivity (seimens)
527418.4715	6652182.62	1180	14				6	3.030898809
527552.889	6651964.145	1180	14				7	5.936412811
527672.1197	6651760.741	1180	14				6	1.099815011
527804.6647	6651529.671	1180	14				6	1.374681592
527777.9517	6651754.139	1170	14				6	1.688797116
527718.3779	6651893.455	1170	14				6	1.783612132
527628.3352	6652071.397	1170	14				6	1.446031809
527070.7263	6652959.428	1170	14				7	5.323602676
526633.3281	6653731.733	1170	14				6	4.200265408
526568.7031	6654103.174	1160	14				7	6.020220757
526674.8514	6653878.61	1160	14				4	0.208886579
527178.7935	6652978.766	1160	14				6	4.988006592
527242.2404	6652877.984	1160	14				7	10.37497711
526914.2807	6653729.239	1150	14	5	0.900427997	A		
526699.5073	6654035.752	1150	14				6	1.058432937
527534.7512	6652783.157	1140	14				6	3.23435235
526912.6544	6654098.116	1130	14				6	1.028980374
526498.2541	6654982.515	1120	14	6	1.716372252	A		
526671.544	6654672.086	1120	14				6	1.910581946
527792.5182	6654927.535	1010	14	5	0.581919551	A		
527815.0271	6654540.905	1030	14				6	1.433827639
527695.9294	6654717.654	1030	14	4	0.294497728	A		
527457.4641	6654938.086	1040	14	6	2.852548361	A		
527464.1974	6654930.574	1040	14				6	2.596544743
527648.1807	6654561.385	1040	14	5	0.75886929	B		
527368.198	6654800.313	1051	14	6	1.295745373	A		
527529.5888	6654528.204	1051	14	6	2.286063194	B		
527065.4614	6654781.073	1080	15	5	0.525414288	A		
527360.1733	6654215.137	1080	15	6	1.548779845	B		
527406.1091	6654380.129	1070	15	5	0.997322202	A		
527357.3687	6654449.158	1070	15				6	1.146631956
527205.9794	6654692.442	1070	15	6	1.40888381	B		
527144.0116	6654828.015	1070	15	6	1.128061414	C		

NAD27 UTM Easting (metres, Zone 8N)	NAD27 UTM Northing (metres, Zone 8N)	Flight Line	Flight Number	7000 Hz Anomaly Classification	7000 Hz Conductivity (seimens)	7000 Hz Anomaly Label	980 Hz Anomaly Classification	980 Hz Conductivity (seimens)
527310.7724	6654778.271	1060	15	5	0.970520377	B		
527305.8305	6654787.586	1060	15				6	1.18702817
527247.5979	6654910.034	1060	15	6	2.971535206	C		
526948.6003	6650188.135	1320	15				6	1.216825366
526427.6443	6650453.431	1350	15				6	1.405923605
526833.5791	6649786.516	1350	15				5	0.809171379
526737.386	6649754.267	1360	15				5	0.831477284
526510.4279	6650148.669	1360	15				6	1.475774288
525948.1861	6651188.364	1360	15				6	1.270151615
524214.9696	6651790.21	1480	15	4	0.379845381	A		
524325.6245	6651797.437	1470	15	4	0.391682357	A		
525378.9122	6649869.227	1470	15				5	0.967601001
525475.7617	6651327.202	1390	15	6	1.859015584	A	6	1.169990659
525424.1956	6651823.759	1370	15				6	1.440649152
522162.3423	6649441.032	1770	13				6	1.418749571
521989.459	6649802.505	1770	13				6	1.22735095

HEM Anomaly Listing - Ram' Horn Block B

NAD27 UTM Easting (metres, Zone 8N)	NAD27 UTM Northing (metres, Zone 8N)	Flight Line	Flight Number	7000 Hz Anomaly Classification	7000 Hz Conductivity (seimens)	7000 Hz Anomaly Label	980 Hz Anomaly Classification	980 Hz Conductivity (seimens)	980 Hz Anomaly Label
530377.9449	6659329.969	12	2190				7	8.070083618	A
529403.6244	6658327.939	12	2190				7	7.570250034	B
529363.5507	6658281.191	12	2190	5	0.593796849	A			
530299.1304	6659084.003	12	2200				7	8.817911148	A
530490.8291	6659241.767	12	2200				7	9.732812881	B
529551.7367	6658737.549	12	2170	6	1.520219564	A			
529027.3332	6658332.769	12	2160	6	1.186597466	A			
529241.2541	6658595.441	12	2160				7	5.126933098	A
530068.2491	6659647.964	12	2140				7	8.862677574	A
528616.6591	6658354.519	12	2130	5	0.87081027	A			
529990.6064	6660012.251	12	2110	5	0.875608325	A			
529745.0572	6660213.371	12	2080	6	1.35155046	A			
529699.2637	6660272.974	12	2070	6	2.040953398	A			
529696.9697	6660270.554	12	2070				7	9.043609619	A
529354.0499	6659967.504	12	2070				7	8.915699959	B
		12	2070	6	3.323536634	B			
		12	2070				7	11.08711433	D
		12	2060	6	2.2445333	A			
		12	2060				7	14.23670101	A
529616.4929	6660374.451	12	2060				7	10.97616673	B
529623.7229	6660381.77	12	2060	6	3.342195272	B			
529549.3635	6660380.181	12	2050	6	2.077750921	A	7	21.69674301	A
529294.5982	6660178.492	12	2050				7	16.37220955	B
529485.2689	6660512.813	12	2040				7	20.82279015	B
529486.6374	6660513.735	12	2040	6	4.626657963	A			
		12	2040				8	40.96526718	C
528696.3193	6659856.128	12	2030	6	1.218027473				
527942.6876	6659276.053	12	2020	6	1.512600422	A			
529317.6449	6658364.933	12	2181	5	0.855131507	A			



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

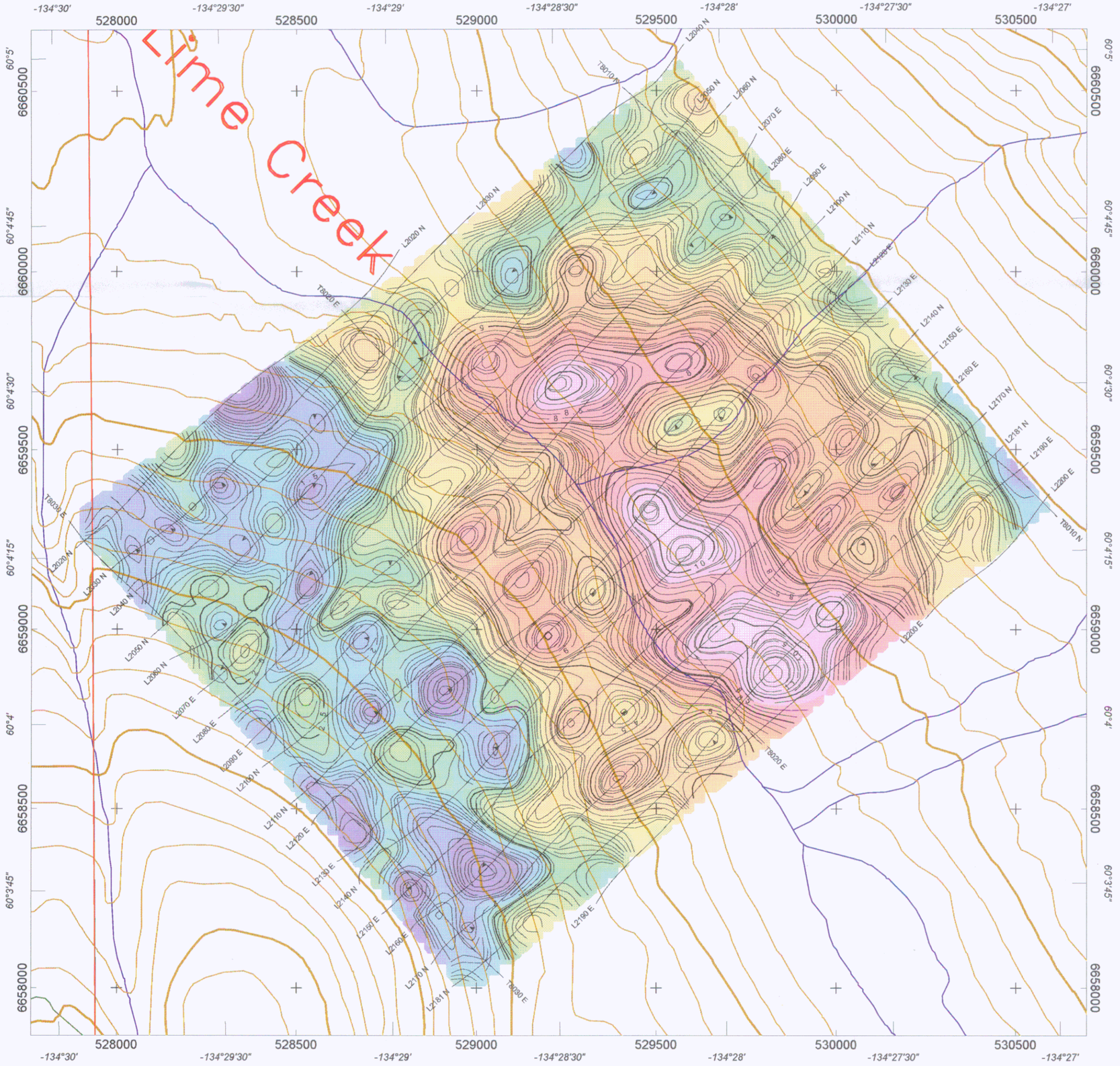
AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

McPHAR

Ordorado Resources
Digital Terrain Model Grid
Contour intervals: 10, 50, 500 metres
Mcphar Geosurveys Limited



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Scale 1:10000

100 0 100 200 300 400 500 600 700
metres
NAD27 / UTM zone 8N

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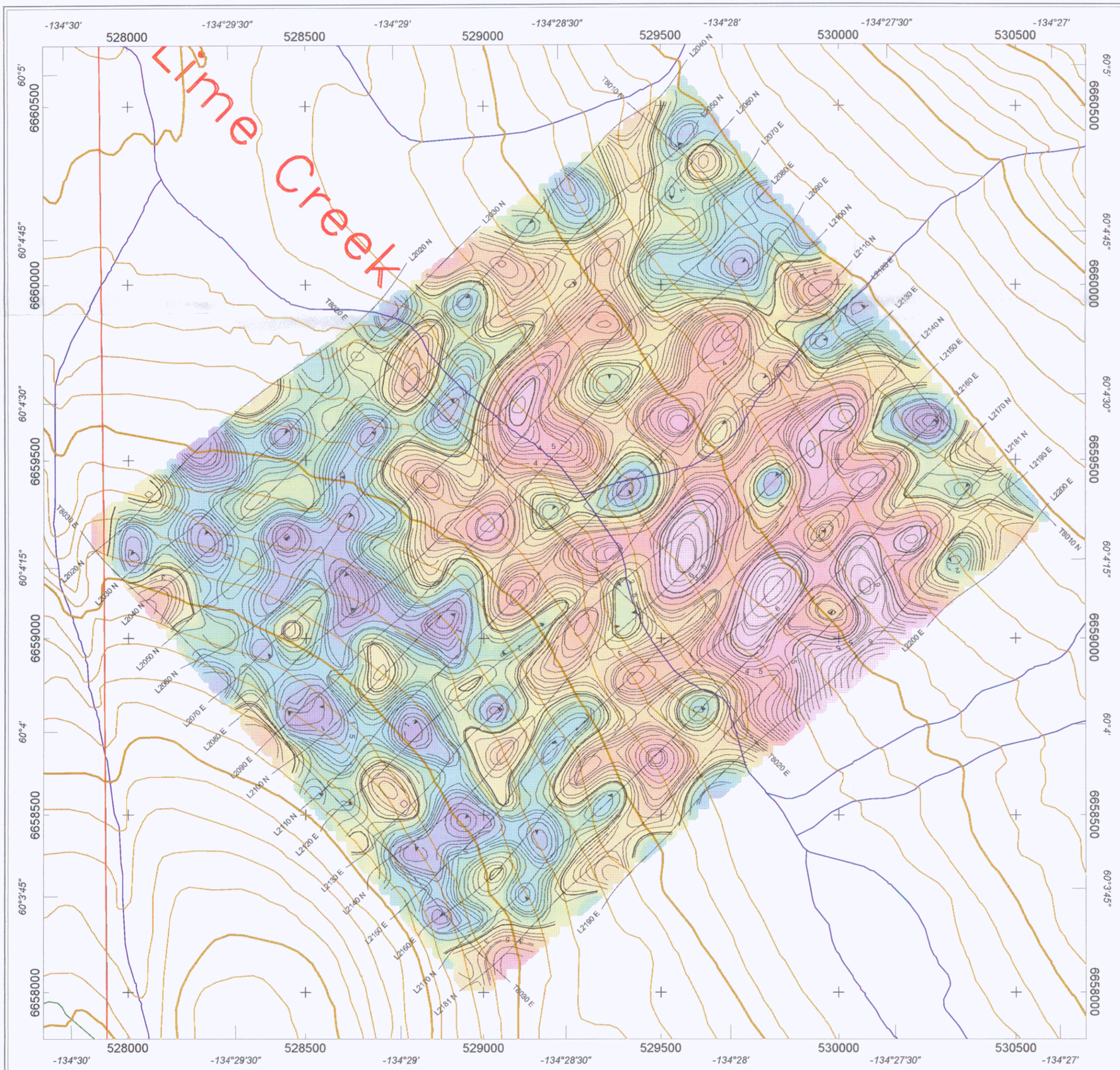
Thorium
ppm eTH
1.36 1.69 1.92 2.16 2.38 2.58 2.81 3.02 3.28 3.52 3.84 4.27 4.73 5.10 5.55 6.03 6.72 7.70 9.04

Ordorado Resources

Thorium Map

Contour intervals: 0.1, 0.5, 2.5 & 10 ppm eTH

Mcphar Geosurveys Limited



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Scale 1:10000

100 0 100 200 300 400 500 600 700
metres

NAD27 / UTM zone 8N

McPHAR

Uranium
ppm eU

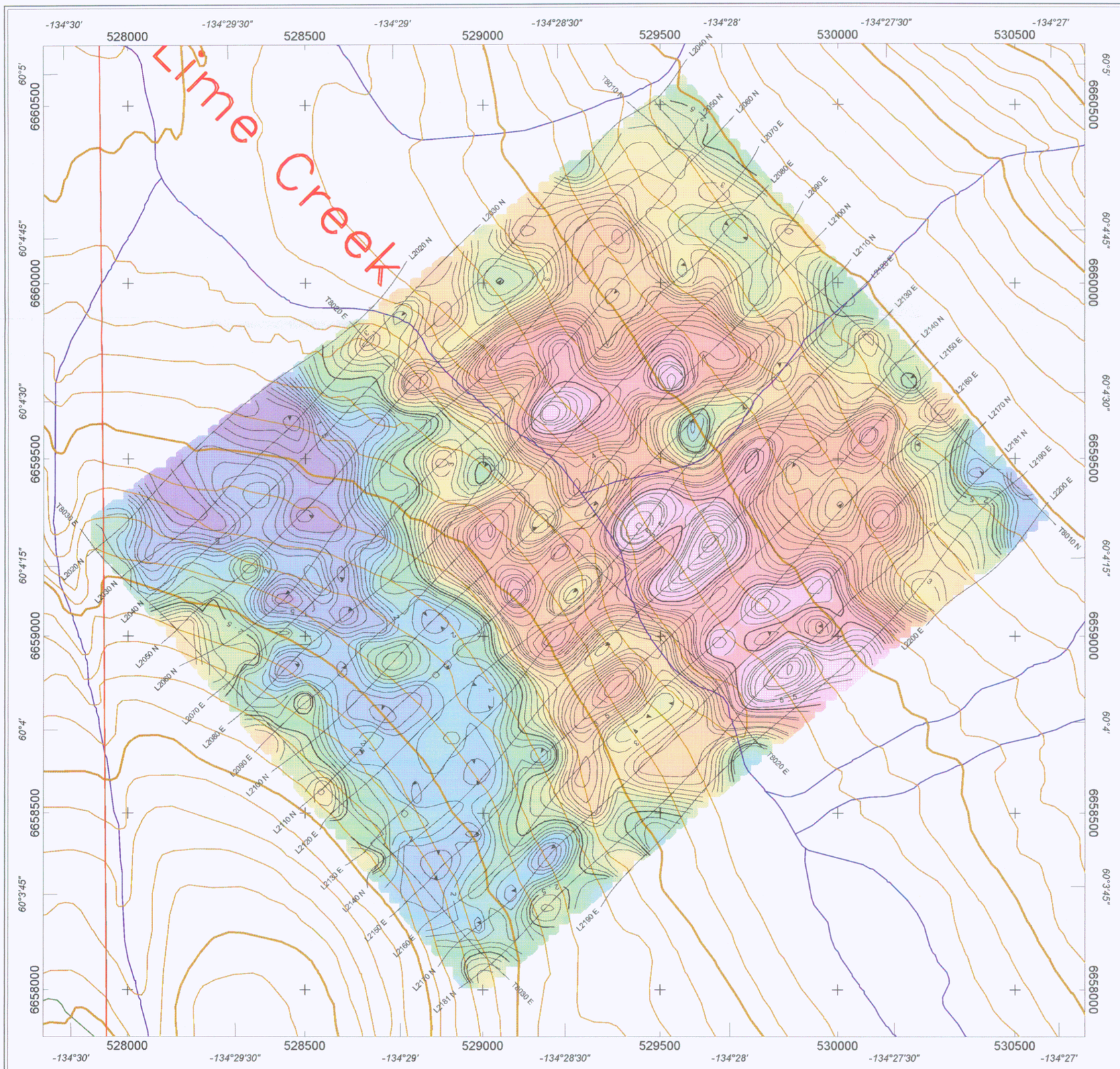
0.97 1.28 1.48 1.64 1.79 1.93 2.07 2.20 2.34 2.50 2.69 2.88 3.07 3.27 3.50 3.73 4.02 4.41 5.02

Ordorado Resources

Uranium Map

Contour intervals: 0.1, 0.5, 2.5 & 10 ppm eU

Mcphar Geosurveys Limited



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Scale 1:10000

100 0 100 200 300 400 500 600 700
metres
NAD27 / UTM zone 8N

McPHAR

K - Potassium
% K

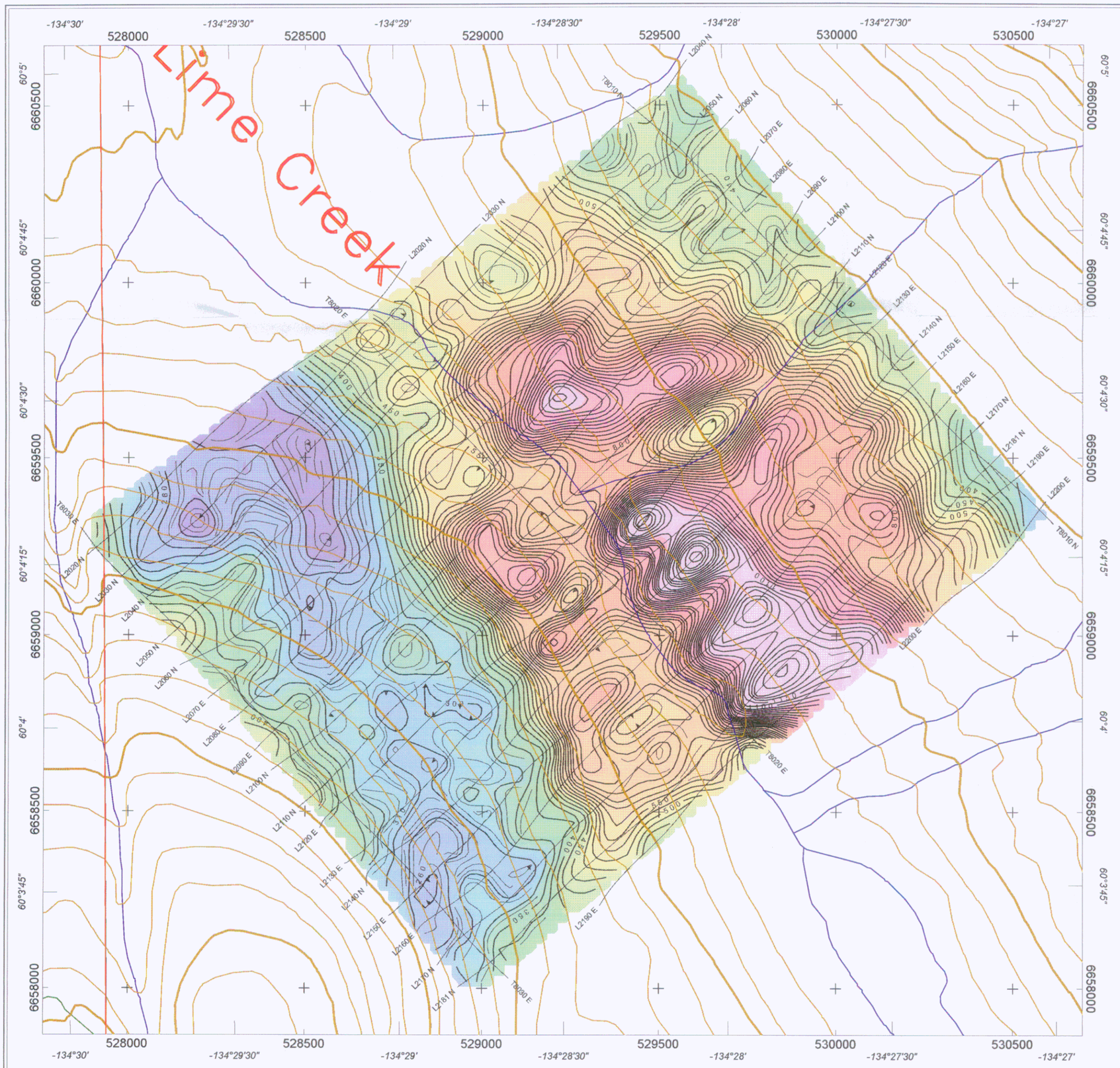
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Ordorado Resources

Potassium Map

Contour intervals: 0.1, 0.5, 2.5 & 10 %K

Mcphar Geosurveys Limited



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Scale 1:10000

100 0 100 200 300 400 500 600 700
metres

NAD27 / UTM zone 8N

Total Count
Counts per second

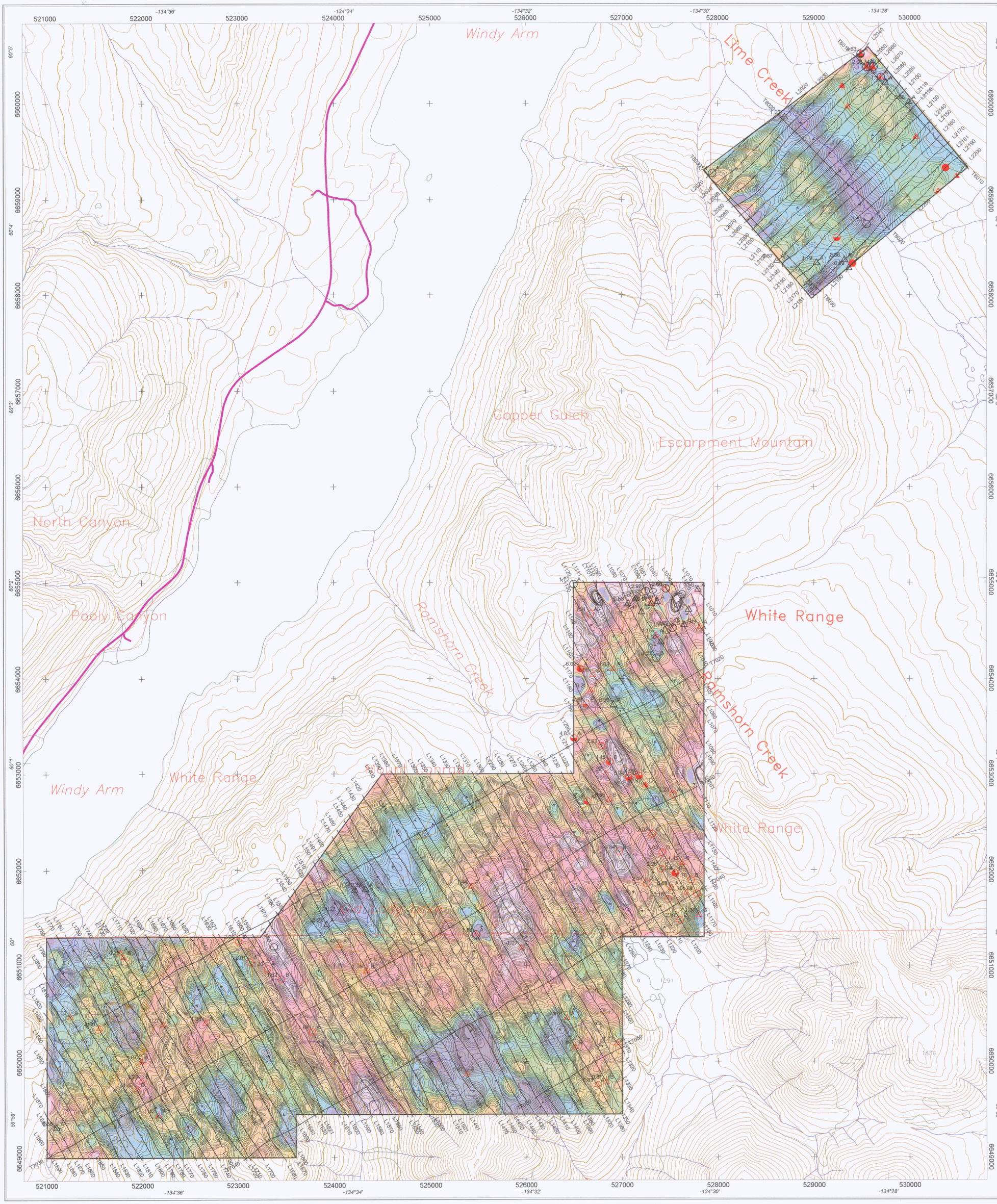
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Ordorado Resources

Total Count Map

Contour intervals: 1, 5, 25 & 100 Counts per second

Mcphar Geosurveys Limited



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" NaI sensor
And 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Symbols for the Coaxial 980 Hz coil anomalies
Classified according to Conductance values

- >40
- 30 - 40
- 20 - 30
- 15 - 20
- 10 - 15
- 8 - 10
- 5 - 8
- <5

cond_CX980Hz 2.08 A label_980HzIP

Symbols for the Coaxial7 KHz coil anomalies
Classified according to Conductance values

- >40
- 30 - 40
- 20 - 30
- 15 - 20
- 10 - 15
- 8 - 10
- 5 - 8
- <5

cond_CX7KHz 2.08 A label_7KHzIP

Apparent Resistivity
Ohm*metres
1920
1260
990
850
760
690
640
600
570
540
510
480
460
430
410
390
380
360
340
330
310
300
280
270
260
250
240
230
220
210
200
190
170
160
150
130
110
80

Scale 1:20000
250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

McPHAR

Ordorado Resources

Apparent Resistivity Calculated by Inversion of the Inphase and Quadrature components of the Horizontal Coplanar Coil at 6600 Hz

Contour intervals: 10, 100, 1000 & 5000 Ohm*metres
Anomalies Plotted
Classified according to conductance values

Mcphar Geosurveys Limited

Windy Arm
Lime Creek
Copper Gulch
Escarpment Mountain
North Canyon
Pooly Canyon
Ramshorn Creek
White Range
Windy Arm
White Range
Ramshorn Creek
White Range
Lily Lead Lake

LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Symbols for the Coaxial 980 Hz coil anomalies
Classified according to Conductance values

- >40
- 30 - 40
- 20 - 30
- 15 - 20
- 10 - 15
- 8 - 10
- 5 - 8
- <5

cond_CX980Hz 2.08 A label_980HzIP

Symbols for the Coaxial7 KHz coil anomalies
Classified according to Conductance values

- >40
- 30 - 40
- 20 - 30
- 15 - 20
- 10 - 15
- 8 - 10
- 5 - 8
- <5

cond_CX7KHz 2.08 A label_7KHzIP

PROFILE LEGEND

- CX 7 kHz Inphase 1 ppm/mm
- CX 7 kHz Quadrature 2 ppm/mm
- CP 6.6 kHz Inphase 2 ppm/mm
- CP 6.6 kHz Quadrature 4 ppm/mm

Scale 1:20000

250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

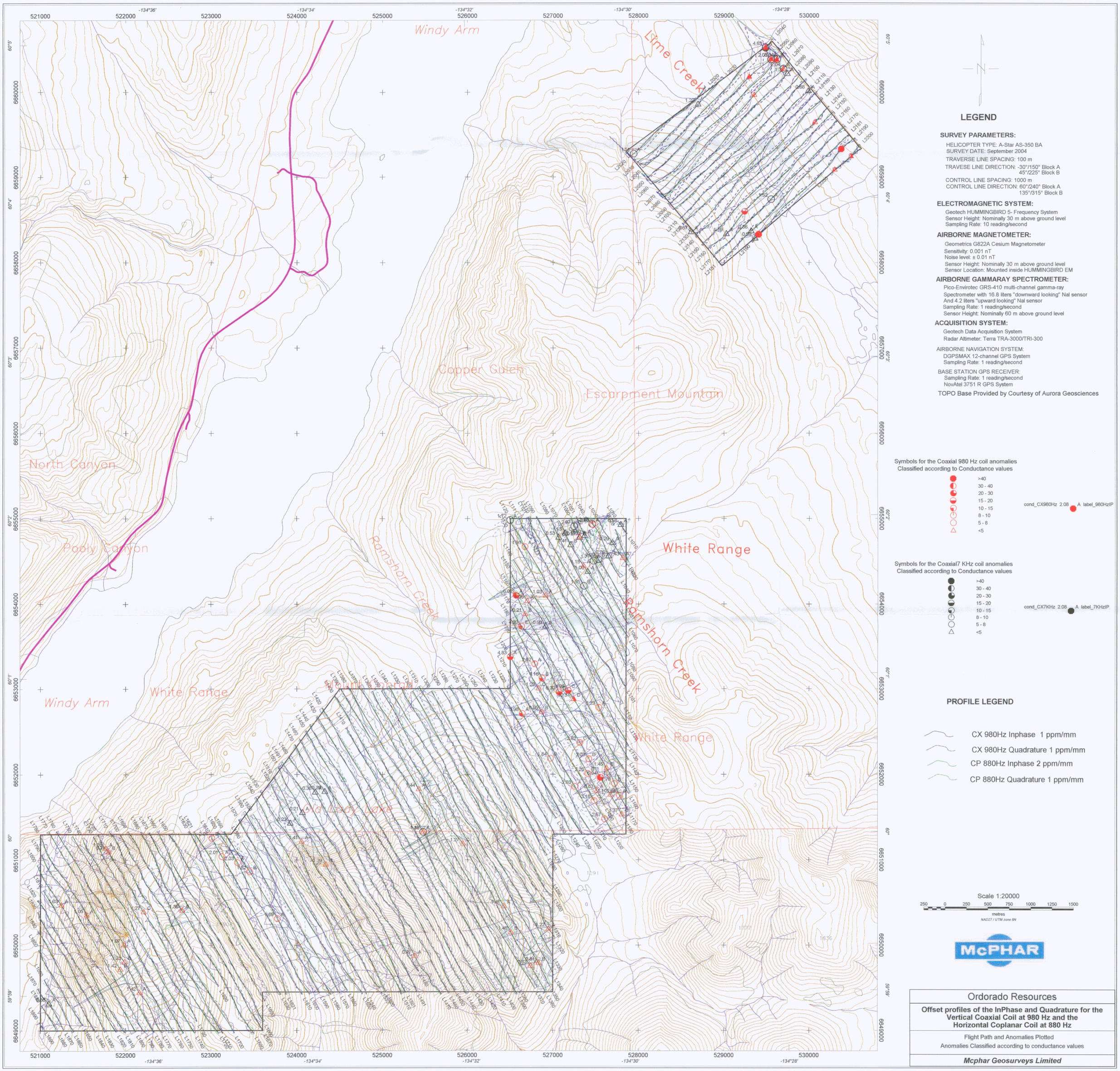
McPHAR

Ordorado Resources

Offset profiles of the InPhase and Quadrature for the Vertical Coaxial Coil at 7KHz and the Horizontal Coplanar Coil at 6600 Hz

Flight Path and Anomalies Plotted
Anomalies Classified according to conductance values

Mcphar Geosurveys Limited



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Symbols for the Coaxial 980 Hz coil anomalies
Classified according to Conductance values

- >40
- 30 - 40
- 20 - 30
- 15 - 20
- 10 - 15
- 8 - 10
- 5 - 8
- <5

cond_CX980Hz 2.08 A label_980HzIP

Symbols for the Coaxial7 KHz coil anomalies
Classified according to Conductance values

- >40
- 30 - 40
- 20 - 30
- 15 - 20
- 10 - 15
- 8 - 10
- 5 - 8
- <5

cond_CX7KHz 2.08 A label_7KHzIP

PROFILE LEGEND

- CX 980Hz Inphase 1 ppm/mm
- CX 980Hz Quadrature 1 ppm/mm
- CP 880Hz Inphase 2 ppm/mm
- CP 880Hz Quadrature 1 ppm/mm

Scale 1:20000

250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

McPHAR

Ordorado Resources

Offset profiles of the InPhase and Quadrature for the Vertical Coaxial Coil at 980 Hz and the Horizontal Coplanar Coil at 880 Hz

Flight Path and Anomalies Plotted
Anomalies Classified according to conductance values

Mcphar Geosurveys Limited

Windy Arm
Lime Creek
Copper Gulch
Escarpment Mountain
North Canyon
Pooly Canyon
White Range
Ramshorn Creek
Windy Arm
White Range
South Ridge
Ramshorn Creek
White Range
Mid Windy Line

LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" NaI sensor
And 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

11.01
2.73
1.78
1.27
0.94
0.76
0.63
0.55
0.48
0.44
0.40
0.37
0.35
0.33
0.31
0.29
0.28
0.26
0.25
0.24
0.23
0.22
0.21
0.20
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.01

Calculated Analytic Signal of the TMI
nanoTesla/m

Scale 1:20000
250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

McPHAR

Ordorado Resources

Calculated Analytic Signal of the Total Magnetic Intensity Grid

Contour intervals: 0.005, 0.025, 0.1 & 0.5 nanoTesla/metre

Mcphar Geosurveys Limited

Windy Arm
Lime Creek
Copper Gulch
Escarpment Mountain
North Canyon
Pooly Canyon
Ramshorn Creek
White Range
Windy Arm
White Range
Ramshorn Creek
White Range

LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

0.0200
0.0111
0.0074
0.0055
0.0043
0.0035
0.0028
0.0023
0.0019
0.0016
0.0013
0.0011
0.0008
0.0006
0.0004
0.0003
0.0001
-0.0001
-0.0002
-0.0004
-0.0005
-0.0007
-0.0009
-0.0010
-0.0012
-0.0014
-0.0016
-0.0019
-0.0022
-0.0025
-0.0029
-0.0033
-0.0039
-0.0046
-0.0056
-0.0073
-0.0106
-0.0200

Calculated 2VD of the TMI
nanoTesla/metre²

Scale 1:20000
250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

McPHAR

Ordorado Resources

Calculated Second Vertical Derivative of the Total Magnetic Intensity Grid

Contour intervals: 0.005, 0.025, 0.1 & 0.5 nanoTesla/metre²

Mcphar Geosurveys Limited

Windy Arm
Lime Creek
Copper Gulch
Escarpment Mountain
North Canyon
Pooly Canyon
Ramshorn Creek
White Range
Windy Arm
White Range
Ramshorn Creek
White Range

LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

11.16
1.20
0.63
0.43
0.32
0.26
0.21
0.17
0.14
0.11
0.09
0.07
0.06
0.04
0.03
0.02
0.00
-0.01
-0.02
-0.03
-0.04
-0.05
-0.06
-0.07
-0.09
-0.10
-0.11
-0.12
-0.14
-0.15
-0.17
-0.19
-0.21
-0.23
-0.27
-0.31
-0.38
-0.53
-1.03
-5.43

Calculated 1VD of the TMI
nanoTesla/metre

Scale 1:20000
250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

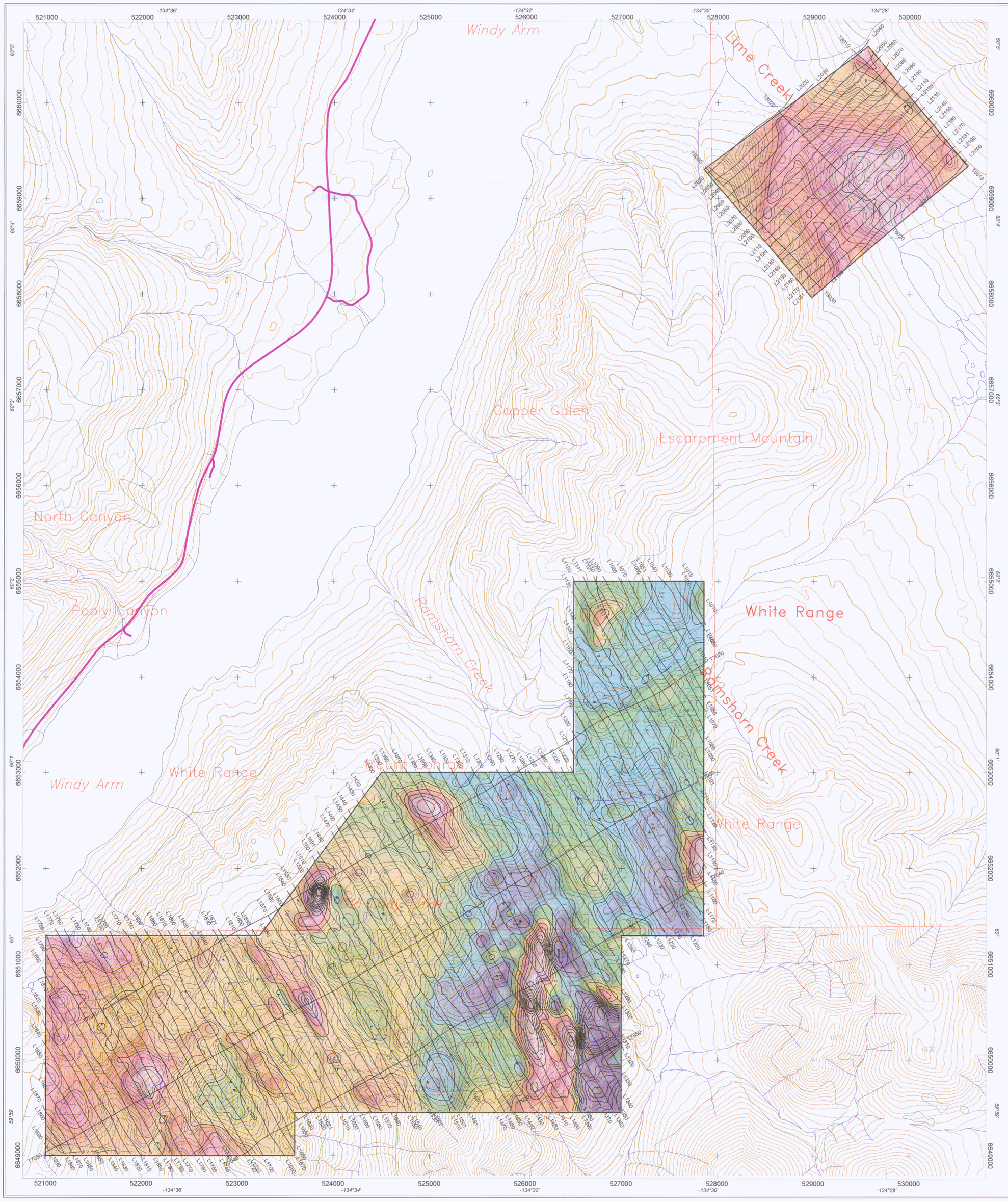
McPHAR

Ordorado Resources

Calculated First Vertical Derivative of the Total Magnetic Intensity Grid

Contour intervals: 0.02, 0.1, 0.5, 2.5 & 10 nanoTesla/metre

Mcphar Geosurveys Limited



LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

736
159
138
121
109
100
93
88
81
75
69
62
56
51
45
40
35
29
23
18
13
8
4
-1
-6
-14
-25
-31
-35
-40
-43
-46
-49
-53
-57
-63
-72
-85
-118
-562

Total Magnetic Intensity
Pole Reduced
nanoTesla

Scale 1:20000

250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

McPHAR

Ordorado Resources
Total Magnetic Intensity Grid **Pole Reduced**
Contour intervals: 2, 10, 50 & 200 nanoTesla
Mcphar Geosurveys Limited

Windy Arm
Lime Creek
Copper Gulch
Escarpment Mountain
North Canyon
Pooly Canyon
Ramshorn Creek
White Range
Windy Arm
White Range
Ramshorn Creek
White Range

LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" NaI sensor
And 4.2 liters "upward looking" NaI sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

708
155
135
120
109
102
94
87
81
74
68
62
55
48
44
39
34
28
22
16
11
6
2
-3
-8
-16
-25
-30
-34
-38
-41
-44
-47
-51
-56
-61
-68
-80
-117
-582

Total Magnetic Intensity
nanoTesla

Scale 1:20000
250 0 250 500 750 1000 1250 1500
metres
NAD27 / UTM zone 8N

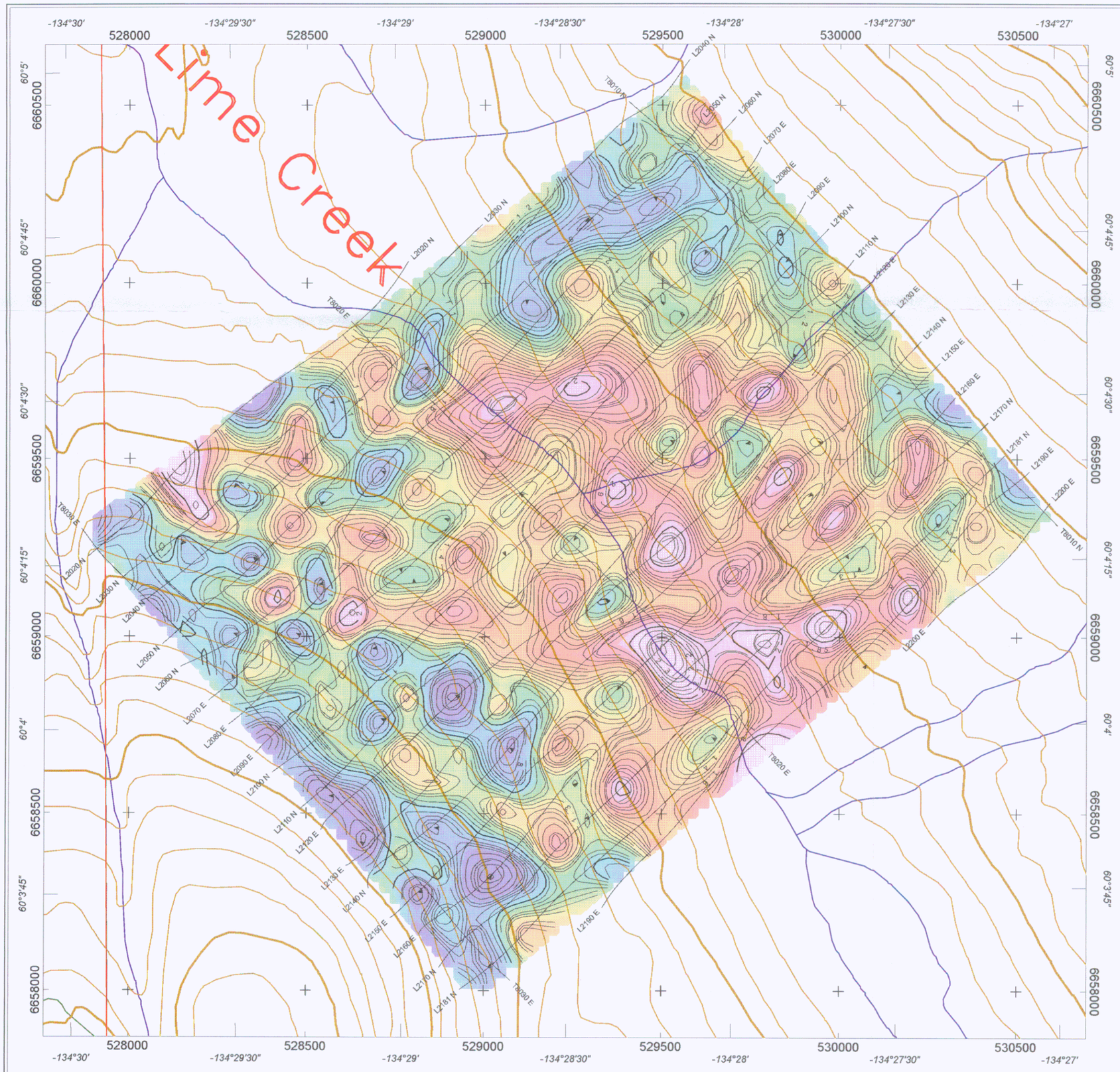
McPHAR

Ordorado Resources

Total Magnetic Intensity Grid
IGRF removed

Contour intervals: 2, 10, 50 & 200 nanoTesla

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LEGEND

SURVEY PARAMETERS:

HELICOPTER TYPE: A-Star AS-350 BA
SURVEY DATE: September 2004
TRAVERSE LINE SPACING: 100 m
TRAVESE LINE DIRECTION: -30°/150° Block A
45°/225° Block B
CONTROL LINE SPACING: 1000 m
CONTROL LINE DIRECTION: 60°/240° Block A
135°/315° Block B

ELECTROMAGNETIC SYSTEM:

Geotech HUMMINGBIRD 5- Frequency System
Sensor Height: Nominally 30 m above ground level
Sampling Rate: 10 reading/second

AIRBORNE MAGNETOMETER:

Geometrics G822A Cesium Magnetometer
Sensitivity: 0.001 nT
Noise level: ± 0.01 nT
Sensor Height: Nominally 30 m above ground level
Sensor Location: Mounted inside HUMMINGBIRD EM

AIRBORNE GAMMARAY SPECTROMETER:

Pico-Envirotec GRS-410 multi-channel gamma-ray
Spectrometer with 16.8 liters "downward looking" Nal sensor
And 4.2 liters "upward looking" Nal sensor
Sampling Rate: 1 reading/second
Sensor Height: Nominally 60 m above ground level

ACQUISITION SYSTEM:

Geotech Data Acquisition System
Radar Altimeter: Terra TRA-3000/TRI-300

AIRBORNE NAVIGATION SYSTEM:
DGPSMAX 12-channel GPS System
Sampling Rate: 1 reading/second

BASE STATION GPS RECEIVER:
Sampling Rate: 1 reading/second
NovAtel 3751 R GPS System

TOPO Base Provided by Courtesy of Aurora Geosciences

Scale 1:10000

100 0 100 200 300 400 500 600 700
metres
NAD27 / UTM zone 8N

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Thorium/Potassium
Ratio

0.66 0.82 0.91 0.99 1.06 1.12 1.17 1.22 1.26 1.31 1.36 1.42 1.47 1.53 1.59 1.66 1.73 1.83 1.94

Ordorado Resources

Thorium / Potassium Map

Contour intervals: 0.01, 0.05, 0.25 & 1 Th/K

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