<u>**A PRELIMINARY REPORT**</u>

ON

<u>**A HELIBORNE MAGNETIC SURVEY**</u>

Trident Property
Muncho Lake Area Area, B.C.
58° 34'N, 125° 30'W
N.T.S. 94K/5,6,11 & 12

<u>**Claims surveyed:**</u>

LR 1 – 29, 31-35, 39, HUNTER, LARA, LUCKY LADY, MEG, MISSY, CARMEN, ANGEL, SARA, TAYA, KEY Y, NUC01, PEAK, PEAK SOUTH, 510255

<u>**Survey Dates:**</u> **May 18th – June 14th, 2006**

FOR

BRADFORD MINERAL EXPLORATIONS LTD.

Vancouver, B.C.

By

PETER E. WALCOTT & ASSOCIATES LIMITED

Vancouver, B.C.

OCTOBER 2006

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INTRODUCTION.

Between May 18th and June 14th, 2006, McPhar Geosurveys Ltd. carried out a heliborne magnetic survey for Bradford Mineral Explorations Ltd. over parts of their Trident property, located in the Muncho Lake area of northern British Columbia.

The survey was flown at a nominal terrain clearance of 30 metres for the magnetic bird on east-west flight lines spaced 100 metres apart using an AS 350B2 helicopter with north-south tie lines at a spacing of 1000 metres.

The survey was flown in two blocks as shown in the accompanying maps with the block in between slated for both magnetic and electromagnetic coverage.

The results of the survey are presented in contour form on plan maps of the areas that accompany this report at a scale of at a scale of 1:25,000.

PROPERTY, LOCATION & ACCESS.

The property, known ad the Trident property, is located in the Liard Mining Division of British Columbia and consists of the following claims:

Claim Name	Tenure Number	Anniversary
Lana	501321	2006/JUL/11
Angel	501416	2006/JUL/11
Meg	501446	2006/JUL/11
Sox	501462	2006/JUL/11
Hunter	501482	2006/JUL/11
Taya	501497	2006/JUL/11
Sara	501523	2006/JUL/11
Missy	501534	2006/JUL/11
	510008	2006/JUL/11
	510255	2006/JUL/11
KEY1	510739	2006/JUL/11
KEY2	510740	2006/JUL/11
KEY3	510741	2006/JUL/11
KEY X	510808	2006/JUL/11
KEY Y	510809	2006/JUL/11
NUCO 1	510810	2006/JUL/11
KEY	519544	2006/JUL/11
KEY 1	519545	2006/JUL/11
KEY 3	519546	2006/JUL/11
Lucky Lady	504049	2006/JUL/11
Peak	504060	2006/JUL/11
Peak South	504064	2006/JUL/11
Carmen	504085	2006/JUL/11
Talus	504054	2006/JUL/11
LR1	517875	2006/JUL/11
TR1	517876	2006/JUL/11
LR2	517877	2006/JUL/11
LR3	517878	2006/JUL/11

PROPERTY, LOCATION & ACCESS cont'd

LR4	517879	2006/JUL/11
TR2	517880	2006/JUL/11
TR3	517881	2006/JUL/11
LR6	517882	2006/JUL/11
LR7	517885	2006/JUL/11
LR8	517886	2006/JUL/11
LR9	517888	2006/JUL/11
LR10	517890	2006/JUL/11
LR11	517891	2006/JUL/11
LR12	517892	2006/JUL/11
LR5	517893	2006/JUL/11
LR13	517894	2006/JUL/11
LR14	517895	2006/JUL/11
LR15	517898	2006/JUL/11
LR16	517899	2006/JUL/11
LR18	517901	2006/JUL/11
LR19	517902	2006/JUL/11
LR20	517903	2006/JUL/11
LR21	517904	2006/JUL/11
LR22	517905	2006/JUL/11
LR23	517906	2006/JUL/11
LR24	517907	2006/JUL/11
LR25	517908	2006/JUL/11
LR26	517909	2006/JUL/11
LR27	517910	2006/JUL/11
LR28	517911	2006/JUL/11
LR29	517912	2006/JUL/11
LR30	517913	2006/JUL/11
LR31	517914	2006/JUL/11
LR32	517915	2006/JUL/11
LR33	517916	2006/JUL/11
LR34	517917	2006/JUL/11
LR35	517918	2006/JUL/11
LR36	517919	2006/JUL/11
LR37	517920	2006/JUL/11
LR38	517921	2006/JUL/11
LR39	517922	2006/JUL/11

PROPERTY, LOCATION & ACCESS cont'd

LR40	517923	2006/JUL/11
LR41	517924	2006/JUL/11
LR42	517925	2006/JUL/11
LR43	517926	2006/JUL/11
R44	517927	2006/JUL/11
LR45	517928	2006/JUL/11
LR46	517929	2006/JUL/11
LR49	517930	2006/JUL/11
LR47	517931	2006/JUL/11
LR48	517932	2006/JUL/11
Goat	509544	2006/JUL/11
Y01	519444	2006/JUL/11
Y02	519445	2006/JUL/11
Y03	519446	2006/JUL/11
Y04	519447	2006/JUL/11
Y05	519448	2006/JUL/11
Y06	519449	2006/JUL/11
Y07	519450	2006/JUL/11
Y08	519451	2006/JUL/11
Y09	519452	2006/JUL/11
Y10	519453	2006/JUL/11
Y11	519454	2006/JUL/11
Y12	519455	2006/JUL/11
Y13	519456	2006/JUL/11
Y14	519457	2006/JUL/11
Y15	519458	2006/JUL/11
LR17	517900	2006/JUL/11
Lana	501321	2012/SEP 30
Angel	501416	2012/SEP 30
Meg	501446	2012/SEP 30
Sox	501462	2012/SEP 30
Hunter	501482	2012/SEP 30
Taya	501497	2012/SEP 30
Sara	501523	2012/SEP 30
Missy	501534	2012/SEP 30
	510008	2012/SEP 30
	510255	2012/SEP 30

PROPERTY, LOCATION & ACCESS cont'd

KEY1	510739	2012/SEP 30
KEY2	510740	2012/SEP 30
KEY3	510741	2012/SEP 30
KEY X	510808	2012/SEP 30
KEY Y	510809	2012/SEP 30
NUCO 1	510810	2012/SEP 30
KEY	519544	2012/SEP 30
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Lucky Lady	504049	2012/SEP 30
Peak	504060	2012/SEP 30
Peak South	504064	2012/SEP 30
Carmen	504085	2012/SEP 30

It is situated within the Muskwa Mountain Ranges some 160 kilometres west southwest of the town of Fort Nelson, British Columbia.

Access is by means of helicopter from either Muncho Lake – mile 462 – or Toad River – mile 422 – on the Alaska Highway – Hwy 97 – that runs to the north of the property.

PREVIOUS WORK.

Previous work on the property consisted of prospecting, trenching, drifting, diamond drilling and feasibility studies mostly in the 1960's and 70's.

For a more detailed description the reader is referred to the 43-101 report on the property by E.D. Harrington, P.Geo.

GEOLOGY.

The property lies within the eastern edge of the Rocky Mountains in an area of rugged topography. Here the Muskwa Assemblage – middle Proterozoic sediments – are cut by grabbroic dykes and unconformable overlain by Cambrian – Ata group – and Ordivician – Kechika group – rocks.

The property itself is mostly underlain by the calcerous and dolomitic mudstone, siltstone and minor sandstone of the Aida formation overlain by Gataga Formation, and underlain by Tuchodi Formation, all of Helikian Age.

Some outcroppings of early Phanerozoic early Cambrian rocks of the Ata Group – conglomerate, sandstone, shale and minor limestone are observed locally.

Copper mineralization occurs in quartz carbonate veins closely associated with mafic dykes both spatially and timewise.

Fur further detail the reader is referred to the aforementioned report by E.D. Harrington, P.Geo.

PURPOSE.

The purpose of the survey was to try to map the mafic dykes associated with the copper mineralization – generally striking northeastwards – and to search for larger northwest trending structures that could be the plumbing sources for the mineralizing fluids on the property.

SURVEY SPECIFICATIONS.

The magnetic survey was carried out using an optically pumped cesium vapour magnetometer, manufactured by Geometrics Ltd. of San Jose, California, housed in a towed bird.

The survey was conducted on pre-programmed flight lines flown at an azimuth of 92 degrees and at a mean terrain bird clearance of 30 metres.

Navigation and flight path recovery were obtained using a Novatel Millenium 24 channel dual frequency GPS unit with post processing to a similar GPS unit to ensure accuracies of better than 2 metres.

For a complete description the reader is referred to the McPhar report bound in Appendix II.

In all some 2633 line kilometers were flown.

SUMMARY & RECOMMENDATIONS.

Between May 18th and June 14st, 2006, at the request of Bradford Mineral Explorations Ltd., McPhar Geosurveys Ltd. flew a towed bird heliborne magnetic survey over parts of the Trident property, located in the Muncho Lake area of northern British Columbia.

After the data was corrected and processed colour contour plots of the total magnetic field intensity were generated.

These should be appended to the infill block of magnetic and electromagnetic data when completed, and studied in conjunction with the known geology to generate possible targets for investigation by diamond drilling later this season.

Respectfully submitted,

PETER E. WALCOTT & ASSOCIATES LTD.

Peter E. Walcott, P.Eng.
Geophysicist

Vancouver, B.C.
October 2006

APPENDIX I

COST OF SURVEY

McPhar Geosurveys undertook the contract on a kilometre basis. Mobilization costs were extra so that the total cost of services by McPhar was $205,161.00.

Peter E. Walcott undertook the Q.C. and management of the surveys with a geophysicist on site during the flying. Reporting costs were extra so that the cost of services provided was $25,775.54.

PERSONNEL EMPLOYED ON SURVEY

Name	Occupation	Address	Dates
Peter E. Walcott	Geophysicist	Peter E. Walcott & Assoc. 1529 W. 6th Ave. Vancouver, B.C. V6J 1R1	May 12th, 13th June 24th, Sept. 2-8th, Oct 10th, 2006
Alexander Walcott	"	"	Oct. 10th – 11th, 06
J. Kieley	"	"	June 10th – 15th, 06
A. Cochrane	"	"	June 4th – 12th, 06
A. Barrett	Operator	McPhar Geosurveys Newmarket, Ontario	May 18th – June 14th, 2006
D. Antill	"	"	June 2nd – 4th, 06
Tonja Boykova	Geophysicist	"	July 24th – 28th, Sept. 10th – 20th, 06
S. Shaw	Pilot	Trans North Whitehorse, Y.T.	May 18th – June 14th, 2006
J. Walcott	Report Prep.	Peter E. Walcott & Assoc.	Oct. 11th, 2006

CERTIFICATION.

1. I am a Graduate of the University of Toronto in 1962 with a B.A.Sc. in Engineering Physics, Geophysics Option.

2. I have been practicing my profession for the last forty four years.

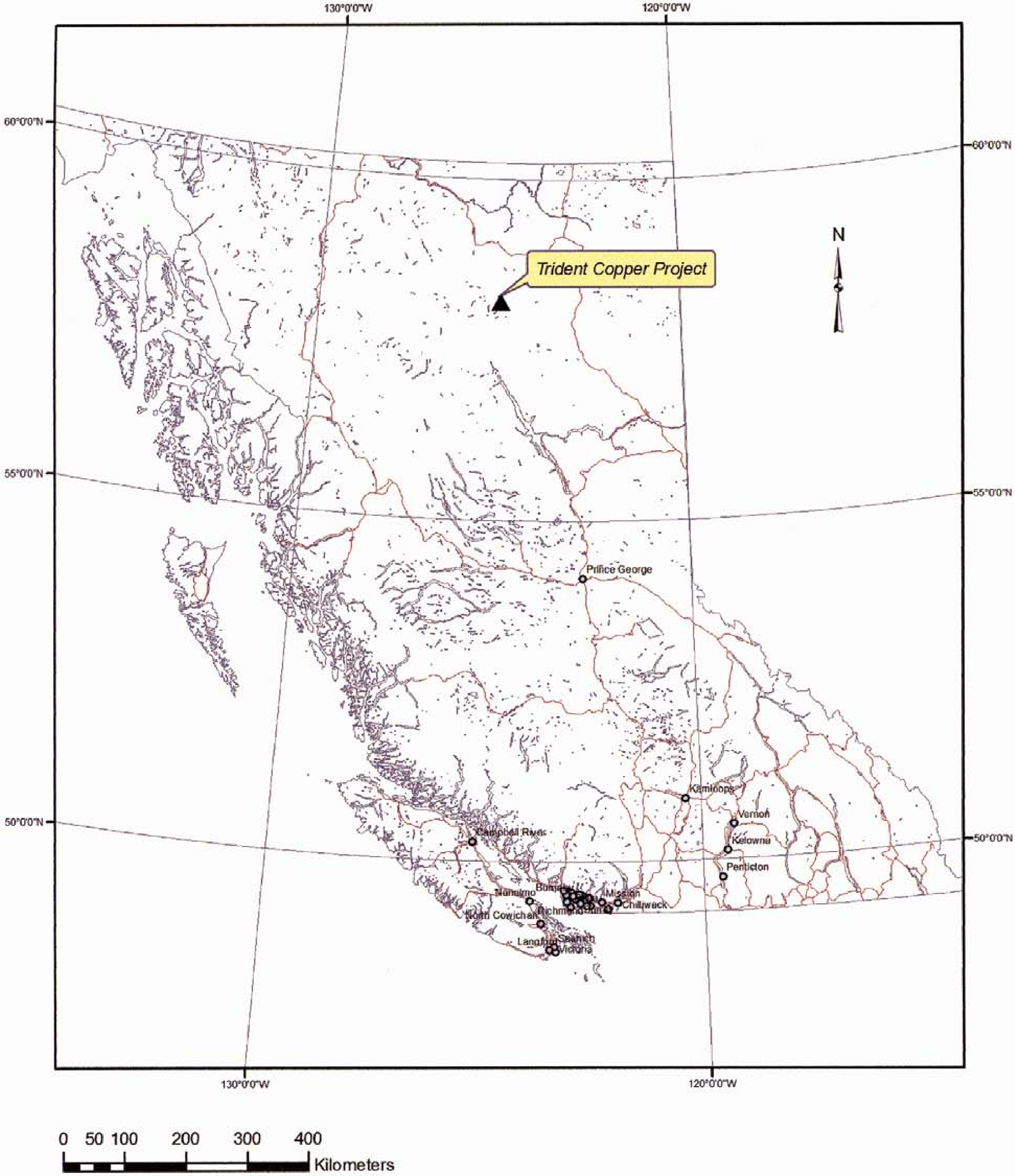
3. I am a member of the Association of Professional Engineers of British Columbia and Ontario.

4. I hold no interest, direct or indirect, in Bradford Mineral Explorations Ltd., nor do I expect to receive any.

Peter E. Walcott, P.Eng.

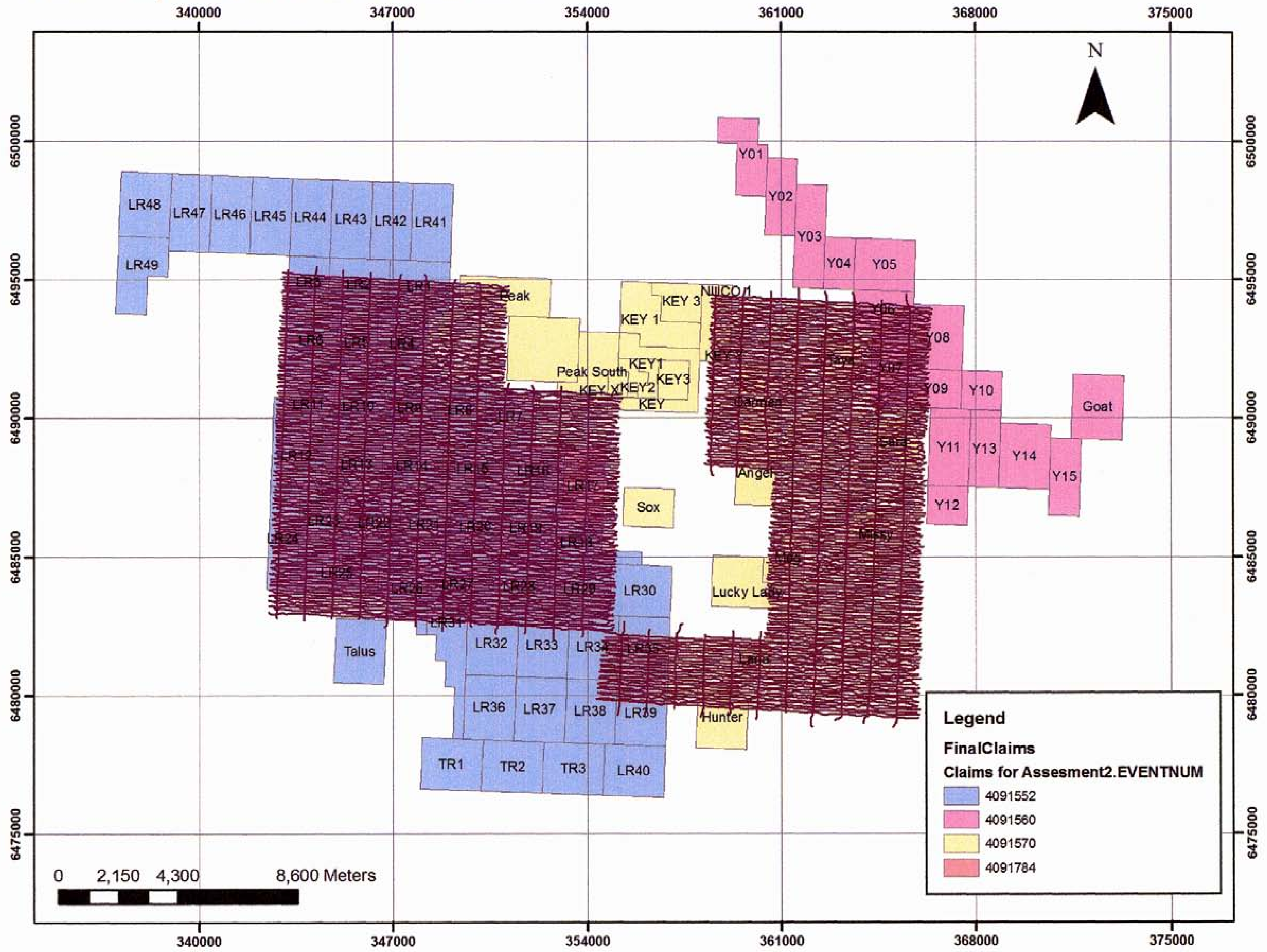
Vancouver, B.C.
October 2006

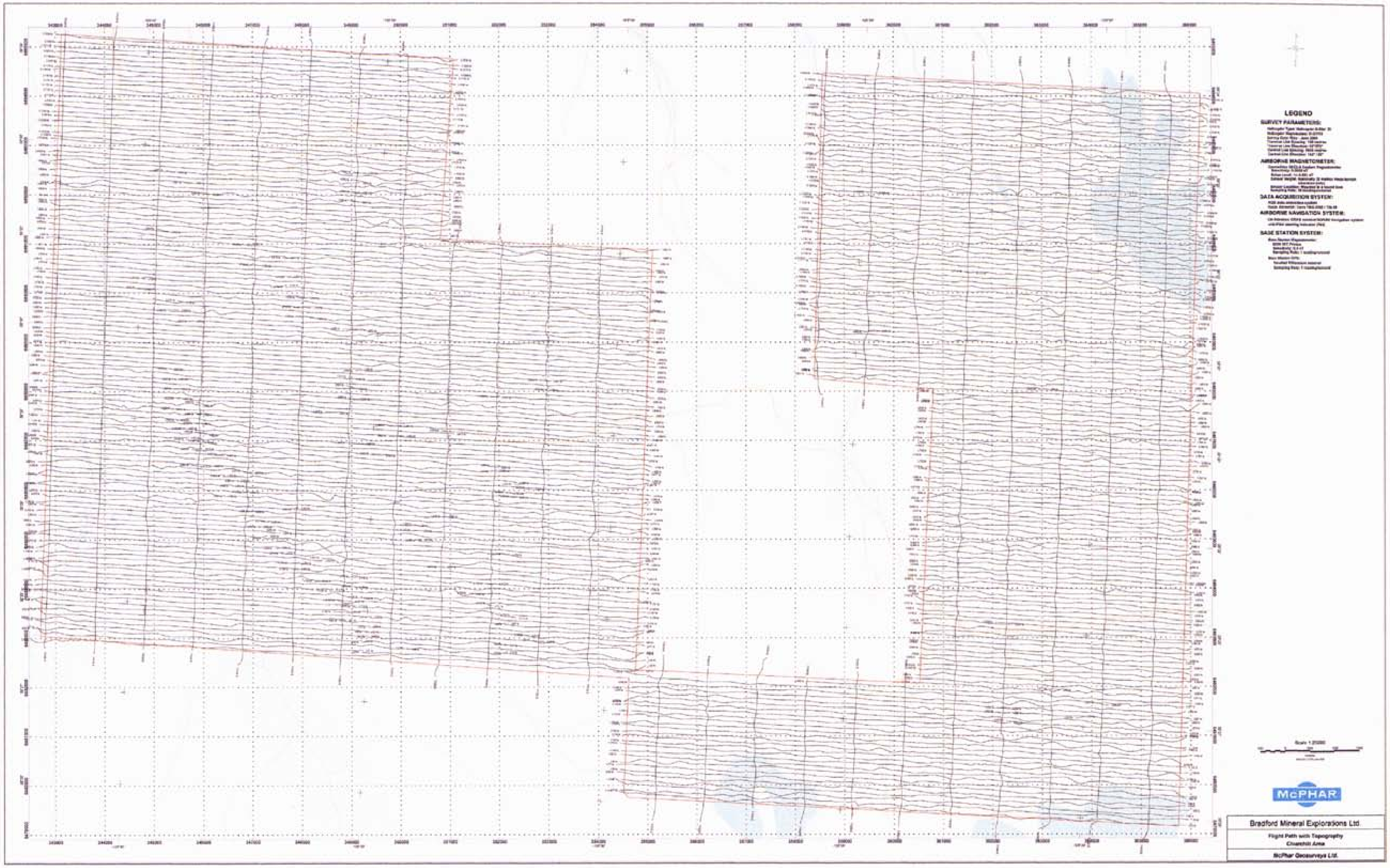
APPENDIX II



BRADFORD MINERAL EXPLORATIONS LTD.
TRIDENT COPPER PROJECT
FIGURE 1

Claim Map with MTO Event Numbers

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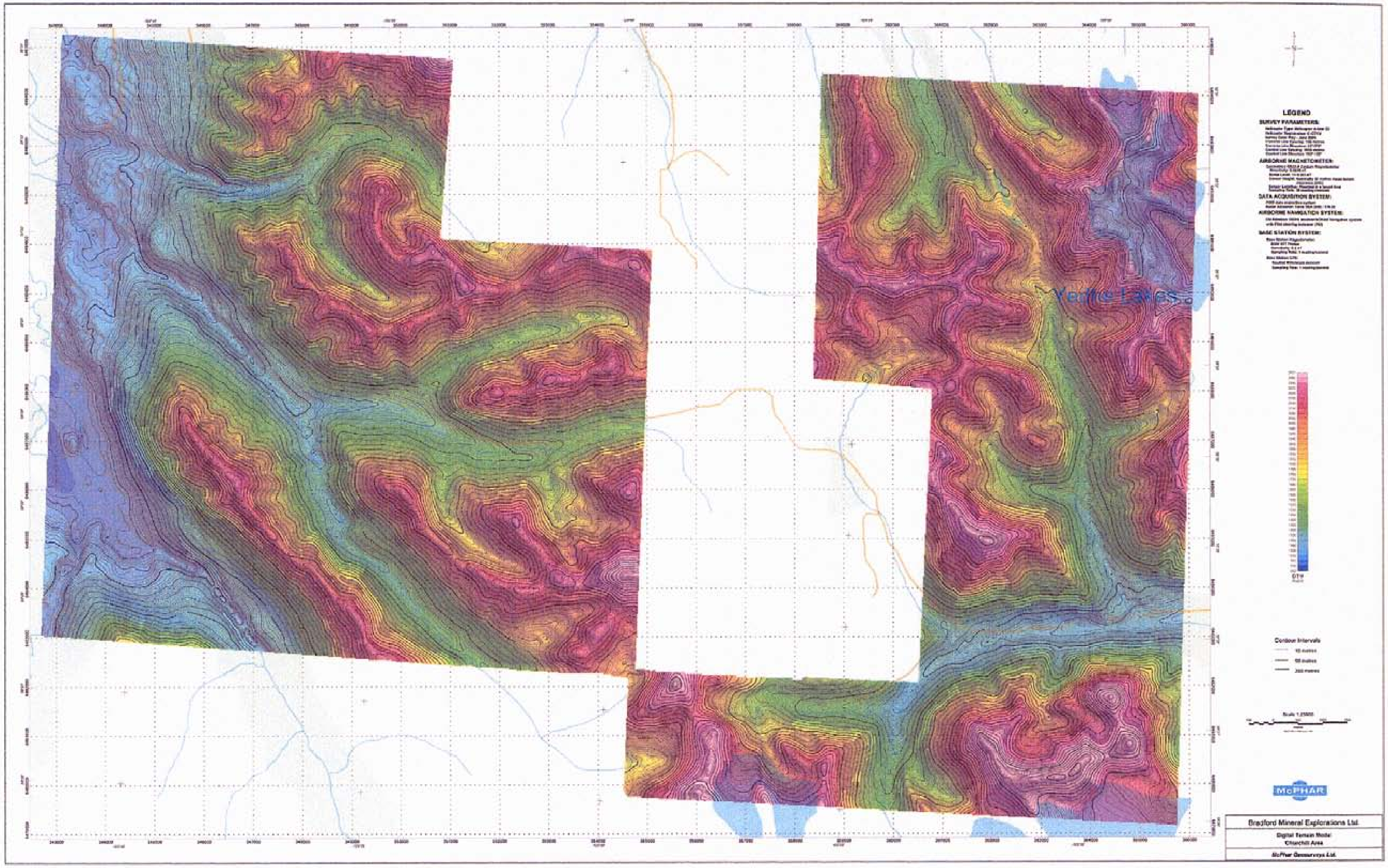
AIRBORNE MAGNETOMETER:
DATA ACQUISITION SYSTEM:
AIRBORNE NAVIGATION SYSTEM:
BASE STATION SYSTEM:
McPHAR
Bradford Mineral Explorations Ltd
Flight Path with Topography
Churchill Area
McPhar Geosurveys Ltd.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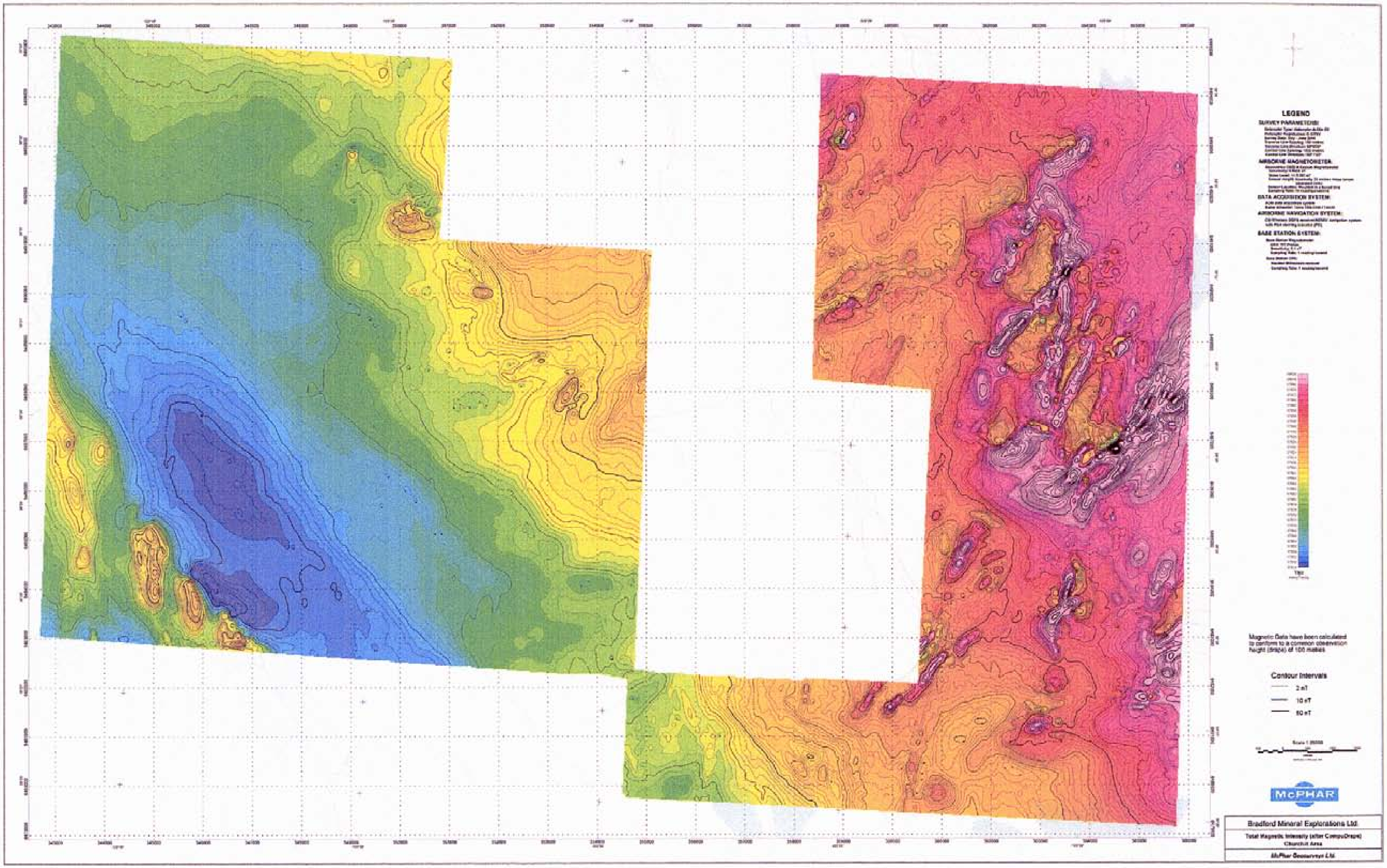
DATA ACQUISITION SYSTEM:
AIRBORNE NAVIGATION SYSTEM:
BASE STATION SYSTEM:
Contour Intervals
McPHAR
Bradford Mineral Explorations Ltd.
Digital Terrain Model
Churchill Area
McPhar Geosurveys Ltd.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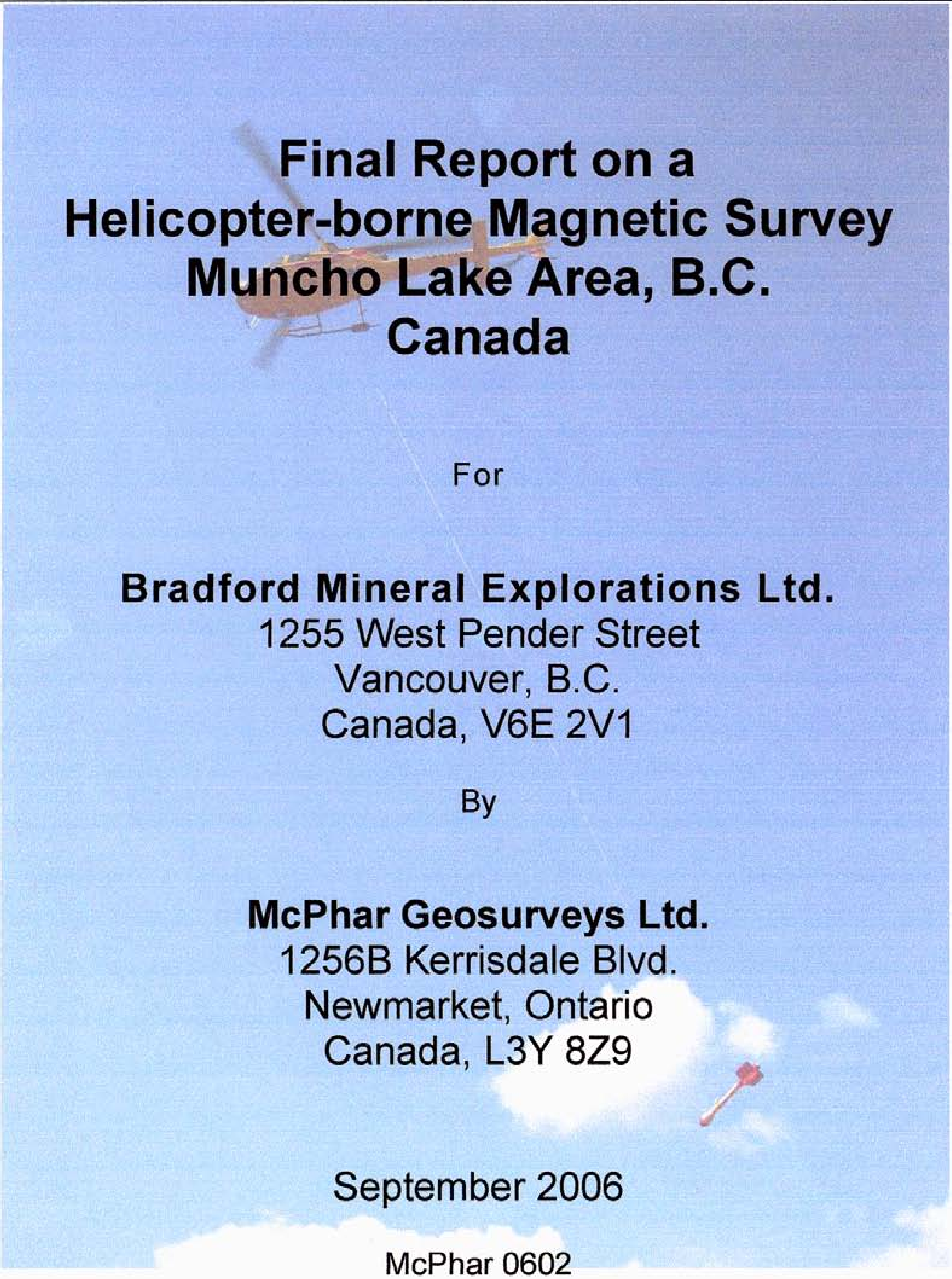
SURVEY PARAMETER(S):
AIRBORNE MAGNETOMETER:
DATA ACQUISITION SYSTEM:
AIRBORNE NAVIGATION SYSTEM:
BASE STATION SYSTEM:
Magnetic Data have been calculated to conform to a common observation height (drape) of 100 metres
Contour Intervals
2 nT
10 nT
50 nT
McPHAR
Bradford Mineral Explorations Ltd.
Total Magnetic Intensity (after CompuDrape)
Churchill Area
McPhar Geosurveys Ltd.



Final Report on a Helicopter-borne Magnetic Survey Muncho Lake Area, B.C. Canada

For

Bradford Mineral Explorations Ltd.
1255 West Pender Street
Vancouver, B.C.
Canada, V6E 2V1

By

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

September 2006

McPhar 0602

SUMMARY

An airborne magnetic survey program was completed on the Churchill property, Muncho Lake area, Province of British Columbia situated approximately 50 km south of Muncho Lake, B.C., under contract to Bradford Mineral Explorations Ltd., signed February 2006. The program consisted of a high-resolution helicopter magnetic survey.

The McPhar crew was mobilised and arrived in the survey area on 18 May 2006. First tests and calibration flights were completed on 19 May 2006 with data acquisition initiated on 2 June 2006 and completed on 14 June 2006. A total of 2633 line-kilometres of data were acquired, covering an area of approximately 238 square kilometres. The survey area was flown in two blocks with a nominal mean terrain clearance of 30 metres for the magnetic bird on traverse lines oriented east-west ($92^0/272^0$) at a spacing of 100 metres and tie lines oriented north-south at a spacing of 1000 metres.

1. INTRODUCTION

A detailed high-resolution helicopter-borne magnetic survey was carried out during the period of 18 May 2006 to 14 June 2006 on behalf of Bradford Mineral Explorations Ltd., hereinafter referred to as "Bradford", by McPhar Geosurveys Ltd, hereinafter referred to as "McPhar", over the survey area approximately 50 kilometres south of Muncho Lake, B.C.

The purpose of the survey was to acquire high-resolution magnetic data to map the geophysical and geological characteristics of the local lithology.

Table 1: Survey Area Description

AREA NAME	APPROX AREA KM^2	LINE /T.L. SPACING	FLIGHT LINE-KM	TIE LINE-KM	TOTAL LINE-KM	PRIMARY FLIGHT DIRECTION
Churchill Mag	238	100 m x 1000 m	2,387	246	2,633	92° / 272°
Totals	**238**		2,387	246	2,633	

The data acquisition involved the use of precision differential corrected GPS positioning and a high sensitivity magnetometer system towed beneath a helicopter.

Mobilization of the helicopter, equipment and personnel was completed on 18 May 2006. Installation of the survey equipment into the helicopter and pre-survey test and calibration flights were completed on 19 May 2006. The final survey flight was completed on 14 June 2006.

2. SURVEY AREA

The survey consisted of two adjacent blocks identified by Bradford as the Churchill Mag Project, located approximately 50 kilometres to the south of Muncho Lake, B.C.

The topography of the survey area was extremely rugged, consisting of sharp mountain ridges and peaks. The elevation ranged from approximately 800 metres to over 2800 metres above sea level. Weather conditions during the survey were variable.

Figure 1: View of the survey area topography.

The high-resolution magnetic survey lines were flown in a 92° / 272° direction with flight-line spacing of 100 metres with tie lines flown perpendicular to the main survey lines at line spacing of 1,000 metres.
The Churchill Magnetic Project Area covered a total of approximately 238 km².

The survey block corner coordinates were provided by Bradford in WGS84, UTM Zone 10N easting and northing. Final maps were required in WGS84, UTM Zone 10N easting and northing.

The following table contains the survey block corner coordinates.

Table 2: Survey Area Coordinates

Churchill Area		
Corner	UTM Easting (m)	UTM Northing (m)
1	366200	6494000
2	365700	6479200
3	354550	6479750
4	354550	6482250
5	342700	6483000
6	343200	6495200
7	351000	6494750
8	350800	6491000
9	355050	6490850
10	354750	6482251
11	360550	6482050
12	360850	6488100
13	358400	6488200
14	358635	6494400

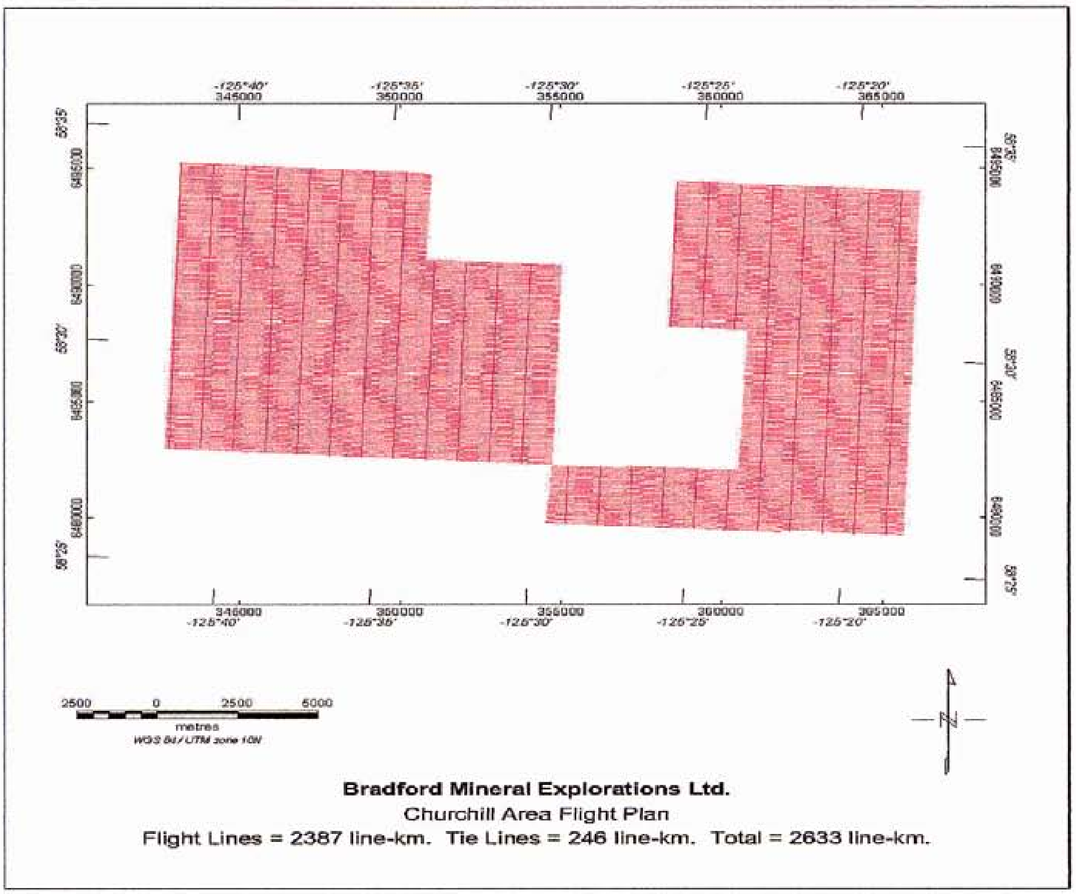


Figure 2: Churchill survey area flight plan

3. SURVEY OPERATIONS

3.1 Operations Base

Survey operations were based out of the Northern Rockies Lodge, Muncho Lake; B.C. located approximately 50 kilometres north of the survey area. Permission was obtained to operate the helicopter, park and to locate and operate the GPS and Magnetic base station from the Northern Rockies Lodge.

Quality Control and preliminary data processing was undertaken remotely by McPhar from the Newmarket, Ontario, office.

3.2 Survey Conditions

Weather conditions during the survey varied from rain/fog to clear skies. Generally the temperature was 10 to 20° Celsius.

Sunspot activity, and hence diurnal geomagnetic activity, was quiet during the entire data acquisition period. No data were lost due to the geomagnetic activity.

3.3 Navigation

The nominal data acquisition speed was approximately 110 kilometres per hour. Scan rates for magnetic data acquisition was 0.1 second, and 1.0 second for the GPS navigation/positioning system. Therefore, a magnetic value was recorded approximately every 3.0 meters and a position fix each 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 metres for the helicopter, 30 metres for the towed-bird magnetometer. However, due to rugged terrain in some 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 corrected in real time to a precision of approximately +/- 1.5 metre.

3.4 Field Processing & Quality Control

The survey data was transferred to portable magnetic media on a flight-by-flight basis, and then emailed to the McPhar data processing facility in Newmarket, Ontario. 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 marked to be reflown.

3.5 Survey Statistics and Project Diary

The survey entailed a total of 43 production flights.

Table 3: Project Diary

Date	Flt #	Hours Flown	Line-Km Accepted	Comments
18 May				Crew mobilized with mag bird and other survey equipment to Northern Rockies Lodge, Mucho Lake B.C.
19 May	1,2	1.4		Test and calibration flights flown
20 May	3	1.3		Test and calibration flights flown
21 May				Poor weather – no survey flights flown
22 May				Poor weather – no survey flights flown
23 May				Poor weather – no survey flights flown
24 May				Poor weather – no survey flights flown
25 May	4	0.25		Poor weather – no survey flights flown – wx check flown
26 May	5	3	47.8	Survey attempted – aborted due to poor helicopter performance. Decided to change to more powerful helicopter.
27 May	6	1.5		Waiting for arrival of ASTAR helicopter from Whitehorse – established fuel cache in survey area.
28 May	7,8	3.6		Ferry to Watson Lake for more fuel drums
29 May				Jet Ranger helicopter released – waiting for ASTAR
30 May				Waiting arrival of ASTAR helicopter
31 May				Survey equipment driven to Whitehorse for install into ASTAR
1 June		2.6		Crew and ASTAR back at Northern Rockies Lodge
2 June	9,10	3.8	126.9	Survey production
3 June	11,12,13,14	8.2	614.9	Survey production
4 June	15,16,17	6.2	385	Survey production
5 June				Poor weather – no survey flights flown
6 June				Poor weather – no survey flights flown
7 June	18,19,20	6.3	295.7	Survey production
8 June	21,22,23	7.0	244.5	Survey production
9 June	24,25,26	6.7	264.3	Survey production
10 June	27,28,29	6.7	239.6	Survey production
11 June	30,31,32	7.4	258.1	Survey production
12 June	33,34,35,36	6.9	45.5	Survey production
13 June	37,38,39	6.5	110.7	Survey production
14 June	40,41,42,43,44	8.9	289	Survey production. Helimag project complete!
Totals		**88.3**	**2,922**	

- Totals are inclusive 289 line-kms of reflights

The following personnel were the crew on the project in Muncho Lake B.C.:

Table 4: Field Personnel

Title	Name	Days Onsite
Project Manager/QC	Dallas Antill	19
Operator & System Engineer	Adam Barrett	27
Helicopter Pilot	Ashley Weatherhead	11
Helicopter Pilot	Steve Shaw	14

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 an AS-350B2 helicopter, with Canadian registration C-GTNV, provided by Trans North Helicopters of Whitehorse, Yukon. This helicopter featured up to 3 hours flight duration with the geophysical system and a crew of 1 person onboard.

The installation of the geophysical and ancillary equipment was carried out by McPHAR personnel in Whitehorse, Yukon, with final adjustments and testing completed prior to mobilisation to the survey area.

Aircraft Registration:	-	Canadian, C-GTNV
Engine:	-	Turbomeca Arriel 1B
Empty weight:	-	2,550 lbs / 1,159 kg
Gross weight:	-	4,630 lbs / 2,105 kg
Max cruise:	-	123 knots / 226 kph
HIGE:	-	13,450 ft / 4,100 m
HOGE:	-	11,300 ft / 3,450 m
Service ceiling:	-	18,700 ft / 5,700 m
Standard fuel:	-	143 gal /540 litres
Survey duration:	-	3.0 hours

Figure 3: Helicopter C-GTNV with magnetic bird.

4.2 The Survey Instrumentation

4.2.1 Survey System Overview

The instrumentation installed in the helicopter included:

- A Geometrics G822-A high-sensitivity magnetometer mounted in a towed-bird airfoil, 0.001 nT / 10 Hz resolution
- A navigation system, comprising an CSI Wireless DGPS receiver and AGNAV GPS computer with pilot steering indicator (PSI)
- An AGIS Geophysics Data Acquisition System (DAS)
- A Terra TRA-3000/TRI-30 Radar Altimeter

The processing and base stations comprised:

- A Magnetometer / GPS Base Station, comprising a PC-based DAS base station magnetometer and GPS system.

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

4.2.2 Airborne Magnetometer

A Geometrics 822-A cesium split-beam total-field magnetometer was installed in the Kevlar airfoil. Sampling rate was ten (10) 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 interval of 0.1 second.

The Geometrics 822-A magnetometer is described in Appendix 2.

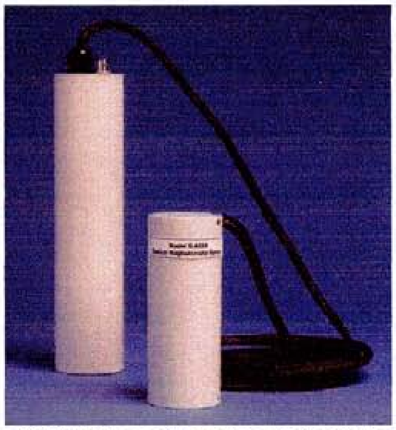


Figure 4: Geometrics G822-A cesium magnetometer

4.2.3 The Towed-Bird Airfoil and Tow-Cable

The towed-bird airfoil is essentially a hollow Kevlar tube, 2.0 meters long, with a bulbous nose into which the cesium magnetometer sensor is mounted in a 3D hand-aligned gimbal. Fins are 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 the tow cable is nominally 30 metres. The tow cable was 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.

Figure 5: Geometrics G822-A cesium magnetometer mounted in the towed-bird airfoil

4.2.4 The Base Station Magnetometer

The magnetometer base station used was comprised of a PC-based computer utilizing a GEM GSM – 19 magnetometer to monitor and record diurnal variations of the Earth's magnetic 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.

4.2.5 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.

Figure 6:Antenna mounted beneath the helicopter cockpit

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

The altimeter specifications are further described in Appendix 2.

4.2.6 The GPS Satellite Navigation System

A CSI Wireless DGPS receiver and AGNAV navigation system with pilot steering indicator (PSI) provided in-flight real-time navigation control. 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 provided with GPS, and altimeter data to aid in the flying of the helicopter.

This navigation system yielded a real-time positional accuracy of better than ± 2 metre.

Figure 7:Pilot steering indicator (PSI)

Survey co-ordinates were set-up prior to commencement of the survey, the information fed into the airborne navigation system. The co-ordinate system employed in the survey design and digital recording was WGS-84 latitude and longitude. The GPS positional data was 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 2.

4.2.7 Data Acquisition/Recording System

A PC-based AGIS data acquisition system (DAS) was used to record the geophysical and navigation 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. The DAS provides for the:

- System control and monitoring
- Data acquisition recording
- Real-time data processing
- Navigation processing, and
- Post flight data playback and analysis

All data collection routines, checking and verification, buffering, and recording are software controlled for maximum flexibility both during and after the survey flight.

4.2.8 Spares

A normal compliment of spare parts, tools, back-up software, and necessary test instrumentation was available at Northern Rockies Lodge.

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 19 May 2006 and after the survey completion on 14 June 2006.

5.1.2 Lag Tests

A Lag Test was performed to ascertain the time difference between the magnetometer readings and the operation of the GPS System. The test was flown over an identifiable magnetic anomaly by flying the same line in opposite directions at survey altitude. The lag test results indicated that a shift lag of 1.4 seconds was present in the system.

5.2 Altimeter Calibration Checks

The radar altimeter was calibrated by comparing the radar altitudes with a suitable reading from the GPS navigation system during radar "stack" flown over Muncho Lake, B.C. The ellipsoidal height at this location on was determined by GPS. The procedure employed involved having the helicopter fly for 30 seconds at various altitudes above the ground (200, 300, 400, 500, 600 feet) and recording the values of the radar altimeter and GPS altimeter, which were then plotted and compared. The altimeter calibrations were flown on 20 May 2006 and after the survey completion on 14 June 2006

5.3 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 GPS base station was determined. The base GPS system data was averaged over a period of time to calculate the location coordinates. The base station GPS had a maximum field-of-view at all times to the NAVSTAR satellites.

6. QC AND DATA PROCESSING

Daily quality control, initial processing and archiving of the data were completed off-site at the base of operations at the Newmarket office of McPhar 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.

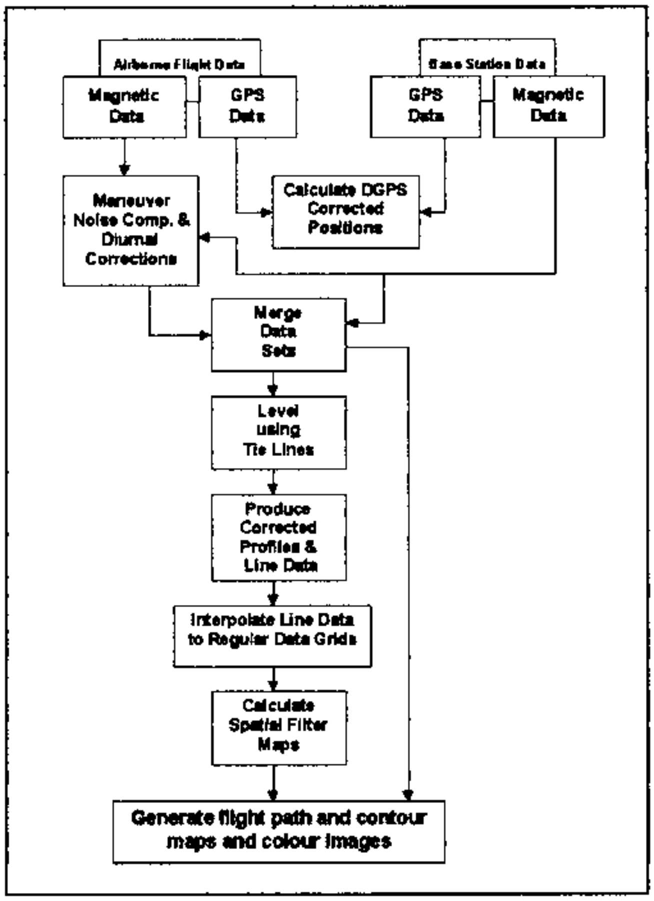


Figure 8: Data Processing Flow Chart

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.

As part of the QA/QC process, the following GPS parameters were checked on a daily basis:

- Number of satellites under observation (average of 6, minimum of 4 allowed)
- PDOP (position dilution of precision; maximum value of 3 allowed)
- Flight path deviation in X, Y and Z (maximum deviation in X and Y of 50% of line spacing over a linear distance of 1000 metres)

If the above specifications were not met, a reflight was necessary.

6.2 Base Station Magnetic Data

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

The QA/QC procedure to determine acceptable magnetic base station data involved:

- Despiking of the base station data resulting from cultural activities not associated with the performance of the survey.
- Determination of the maximum noise of the observed total magnetic intensity (TMI; 1 nT maximum allowable).
- Determination of the average 4th difference noise of the signal (maximum of 0.2 nT allowable)
- Determination of the rate of diurnal change (maximum gradient of 25 nT for a 5 minute chord).

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 CompuDrape Method

The application of CompuDrape involves computation through the use of upward and downward height continuation on aeromagnetic profile data to transform it from the original magnetic field on an arbitrary observation surface to the magnetic field on a new surface of specified height.

In areas with steep topography such as encountered in some areas of the Project, it was difficult for the

MCPHAR

survey helicopter to maintain a constant nominal height above the ground. The result was large variations in the distance between the magnetic sensor and the ground.

CompuDrape attempts to correct this variable terrain clearance effect by generating a magnetic grid that "simulates" the result that would have been obtained had the magnetic sensor been maintained a constant height above ground. In the case of this Project, a sensor height of 100 metres was used for the CompuDrape surface.

In this application, the leveled and micro leveled data was processed for multiple continuation surfaces using a 1D FFT transform to achieve maximum removal of the effects of the variation in terrain clearance from line-to-line and at traverse-tie line intersections.

The CompuDrape process was designed to perform a loose drape transformation. The elevation channel is the magnetic sensor elevation above sea level. The Topography channel is the topography (i.e., sensor terrain clearance above ground subtracted from sensor elevation above sea level). The new observation height value is the desired constant drape height above ground. The end result is for a more acceptable merging of the different data sets to produce a relatively contiguous TMI image for the entire area covered by the two surveys. Microlevelling was performed again to get rid of line direction noise.

6.3.4 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.

6.3.4 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.

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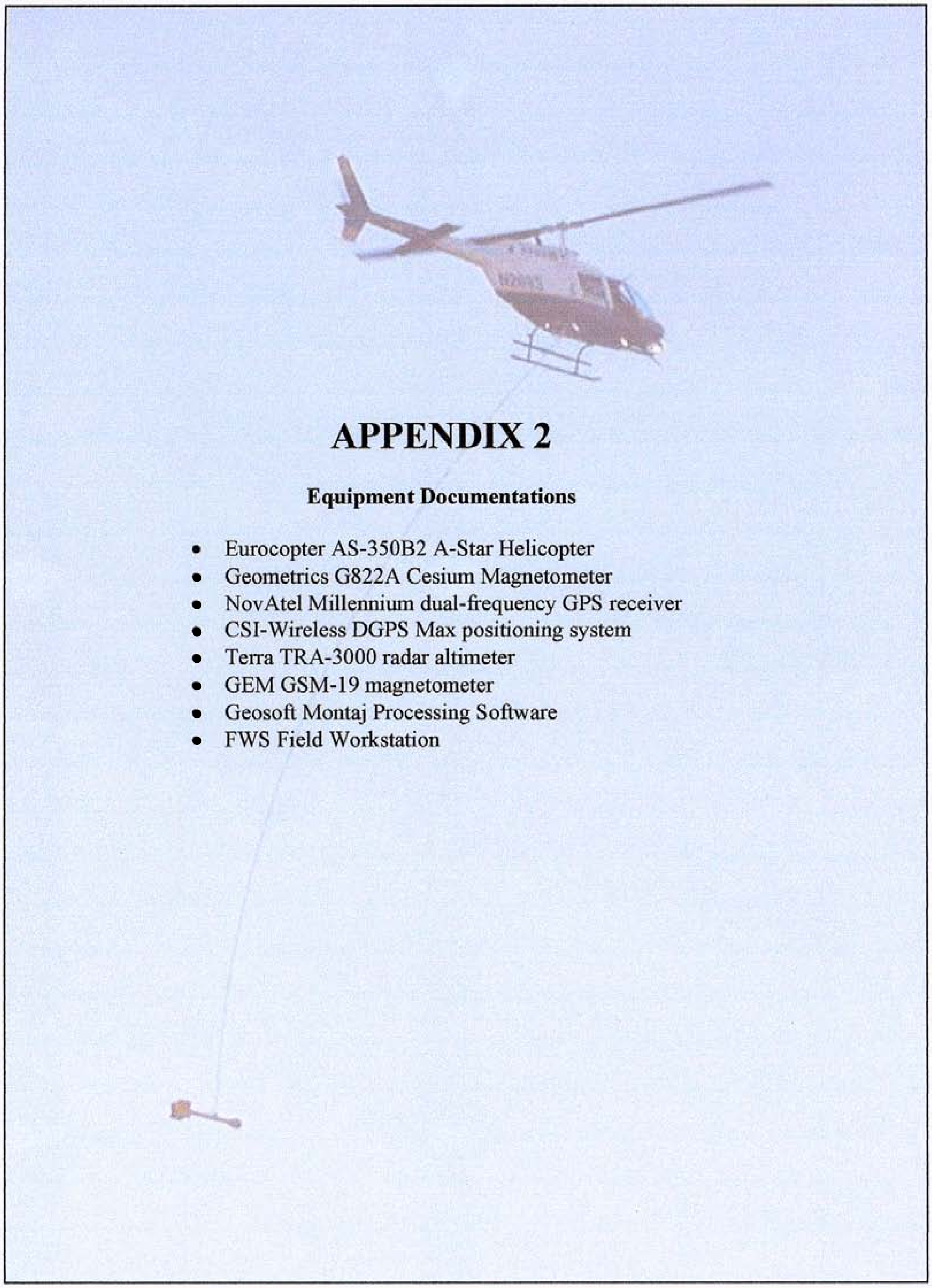

APPENDIX 2

Equipment Documentations

- Eurocopter AS-350B2 A-Star Helicopter
- Geometrics G822A Cesium Magnetometer
- NovAtel Millennium dual-frequency GPS receiver
- CSI-Wireless DGPS Max positioning system
- Terra TRA-3000 radar altimeter
- GEM GSM-19 magnetometer
- Geosoft Montaj Processing Software
- FWS Field Workstation

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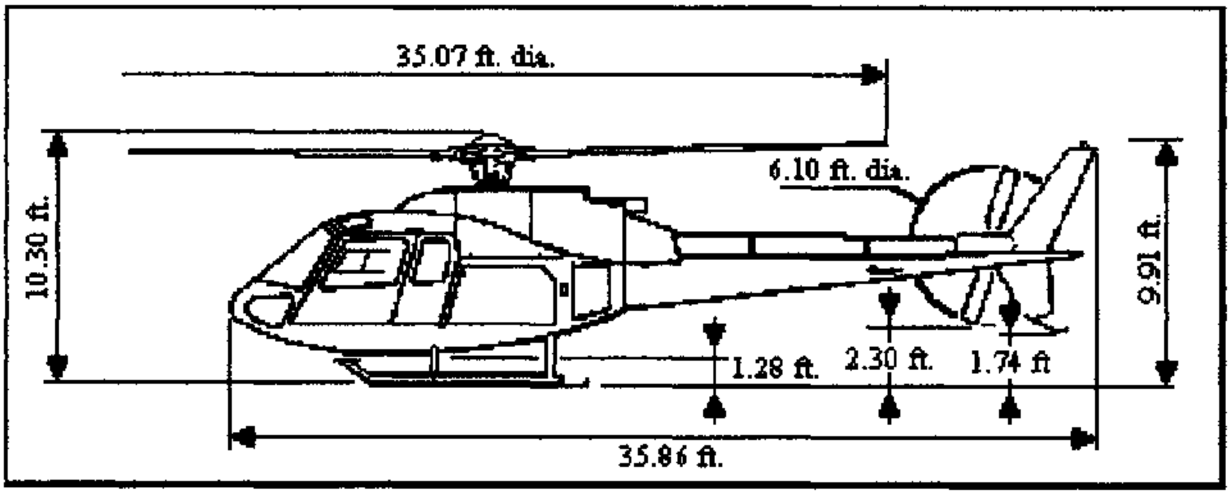
Ontario, Canada L3Y 8Z9
Tel: (905) 830-6880, Fax: (905) 898-0336
E-Mail: info@mgssurveys.com
WebSite: www.mgssurveys.com

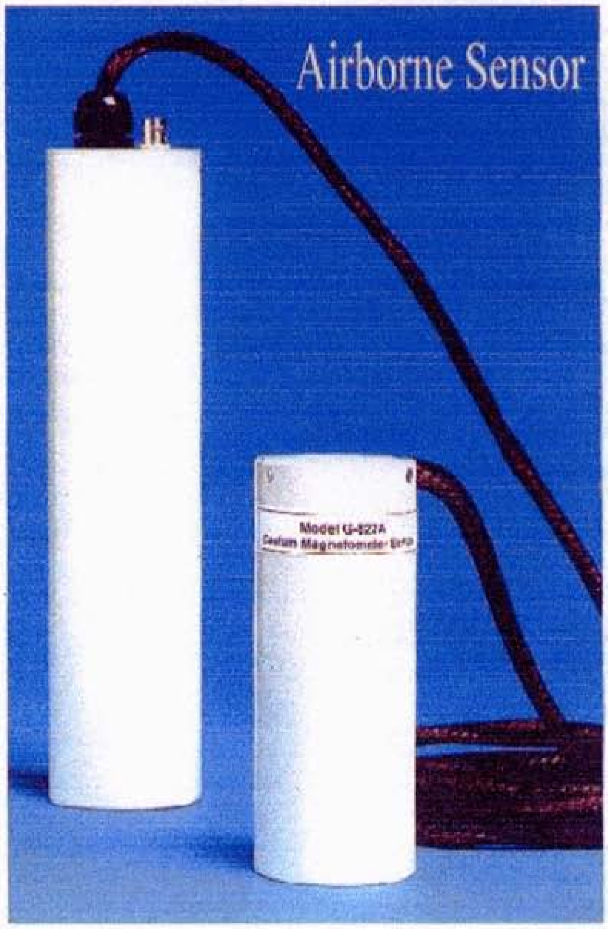
THE EUROCOPTER AS350B2 A-STAR HELICOPTER

Specification	Unit	Ac/Wt	Ac/Wt	Ac/Wt	MGW
Weight (standard aircraft 2,561 lbs.)	lb	3,530	3,970	4,410	4,991
VNE	kts	155	155	155	155
Cruising speed	kts	131	130	127	122
Fuel consumption at cruising speed	lb/nm	2.49	2.51	2.57	2.67
Rate of climb, oblique flight	ft/min	2,185	2,085	1,950	1,670
Range	nm	350	374	371	360
Endurance	hr	4.4	5.3	4.4	4.5
Hovering ceiling I.G.E. ISA	ft	20,000	16,580	13,450	9,850
Hovering ceiling I.G.E. ISA + 20 degrees	ft	17,900	14,450	11,000	7,050
Hovering ceiling O.G.E. ISA	ft	17,700	14,450	11,300	7,550
Hovering ceiling O.G.E. ISA + 20 degrees	ft	15,600	12,150	8,700	4,250
Service Ceiling	ft	20,000	>20,000	18,700	15,100



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***
- ***Superior resolution of the Cesium Larmor signal, tracking earth's field variation rates exceeding thousands of nT (γ) over 0.01second periods when using the G-822A Super-Counter***
- ***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 (90% of all readings falling within the P-P envelope) using 822A Supercounter, 0.02nT P-P for CM-201
Heading Error:	±0.25 nT (over entire 360° spin and tumble)
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 1/98

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

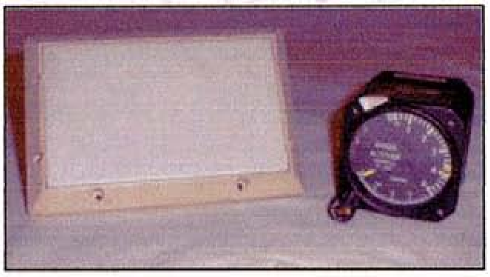
GEOMETRICS

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

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

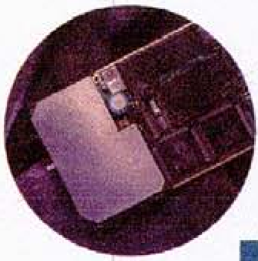
Type:	Single antenna, FMCW
Altitude Range:	40 to 2,500 ft
System Accuracy:	
• **40 to 100 ft**	+/- 5 ft
• **100 to 500 ft**	+/- 5%
• **500 to 2,500 ft**	+/- 7%
Frequency Range:	100 MHz sweep within 4,200 to 4,400 GHz range
Input Voltage:	Approx. 20 VDC from indicator
Input Current:	600 ma
Altitude Output:	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.

Look into NovAtel's MiLLenium®

It's a state of the art dual frequency GPS receiver that features pseudorange and full wavelength carrier phase measurements on both L1 and L2 frequencies.



ADVANTAGES

- 24 channel "all in view" parallel tracking
- L1-C/A code and L2-P-code measurements
- L1 and L2 full wave carrier measurements
- Narrow Correlator® technology
- P-code tracking through Antispoofing (AS)
- cm level real-time accuracy
- mm level post-processed accuracy
- High data output rates
- Low data latency
- High dynamics
- Ease of use
- OEM or standalone configurations
- Flexible integration
- Field-upgradable
- CMR compatible

MiLLenium

MiLLennium®

NovAtel's MiLLennium GPSCard provides unparalleled dual frequency GPS performance. Featuring Narrow Correlator and P-code Delayed Correlation technologies, the MiLLennium receiver outputs pseudorange and full wavelength carrier phase observations for both the L1 and L2 frequencies – even in the presence of Antispoofing (AS). High data output rates, low data latency, and fast signal acquisition algorithms round out the MiLLennium advantage and make it the ideal choice for your high dynamic, high precision GPS applications.

To address your integration requirements, MiLLennium's multiple hardware configurations provide you with the flexibility you need. Available modules include a single card OEM platform for embedded systems, and PowerPak™ II or ProPak® II enclosures for standalone applications. The MiLLennium hardware platform supports several different firmware models; offering a comprehensive and affordable upgrade path beyond that available on a single frequency-only hardware platform.

Features

- mm level post-processed accuracy
- L1-C/A code and carrier tracking
- L2-P-code and full wavelength carrier tracking
- 24 channel "all in view" parallel tracking
- Fast reacquisition
- Patented Narrow Correlator technology
- 5 or 10 MHz external oscillator input
- 10 Hz position output rate
- 10 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 2.01
- GPSolution™ – Windows® compatible graphical user interface
- RT-2 transmit
- Transmit CMR v 3.0
- Receive CMR v 1.0, 2.0 or 3.0 (except 3151 model)
- WAAS differential capability

Windows is a registered trademark of Microsoft Corporation

Specifications[1]

• position accuracy[2]	
standalone	
SA off	15 m CEP
SA on	40 m CEP
differential	
code (L1,C/A)[3]	0.75 m
• post-processed (MiLLennium STD & RT-2)	±5mm +1ppm
• time to first fix	
cold start	70 s (typical)
• reacquisition	
warm start	1 s L1, 10 s L2 (typical)
• data rates	
measurements	10 Hz
position	10 Hz
• time accuracy[4]	
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	10 cm RMS
L2 P code	40 cm RMS
L1 carrier phase	
single channel	3 mm RMS
differential channel	0.75 mm RMS
L2 carrier phase	
single channel	5 mm RMS
differential channel	4 mm RMS
• dynamics	
acceleration	6 g
velocity[5]	515 m/s max.

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 and multipath effects.
3. Requires use of choke ring with antenna
4. Time does not include biases due to antenna cables or RF delay
5. Export licensing restricts operation to 60,000 feet maximum and 1,000 nautical miles/hour maximum

OEMCard MiLLennium

• physical (Eurocard)	
size	17.9 cm x 10.0 cm x 1.8 cm
weight	175 g
• temperature	
operating	-40°C to +85°C
storage	-45°C to +95°C
• humidity	95% non-condensing
• interface	
dual RS232	300 to 115,200 bps
strobes I/O	5 signals, TTL level
external clock	5 or 10 MHz
• connector type	
edge	64 pin 0.1" DIN 41612 type B
antenna	SMB male
external clock	SMB male
• input voltage	+5 VDC
• power consumption (typical)	7 watts

PowerPak II MiLLennium

• physical	
size	21.0 cm x 11.1 cm x 4.7 cm
weight	980 g
• temperature	
operating	-40°C to +60°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
dual RS232	300 to 115,200 bps
strobes I/O	TTL level
external clock	5 or 10 MHz
• connector type	
communications	DE9P
strobes I/O	DE9S
antenna	TNC female
power	2.1 mm threaded plug
external clock input	SMB male
• input voltage	10-36 VDC
• power consumption	11 watts
• included accessories	
RS232 "Y" type null modem cable	
automotive power adaptor	
• optional accessories	
110/220 Volt AC adapter	

ProPak II MiLLennium

• physical	
size	25.1 cm x 13.0 cm x 6.2 cm
weight	1.3 kg
• temperature	
operating	-40°C to +55°C
storage	-40°C to +85°C
• humidity	95% non-condensing
• interface	
dual RS232	300 to 115,200 bps
strobes I/O	TTL level
• connector type	
communications	10 pin LEMO
strobes I/O	8 pin LEMO
antenna	TNC female
power	4 pin LEMO
• input voltage	10-36 VDC
• power consumption	12 watts
• included accessories	
RS232 null and straight modem cable	
automotive power adaptor	
• optional accessories	
110/220 Volt AC adapter	

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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

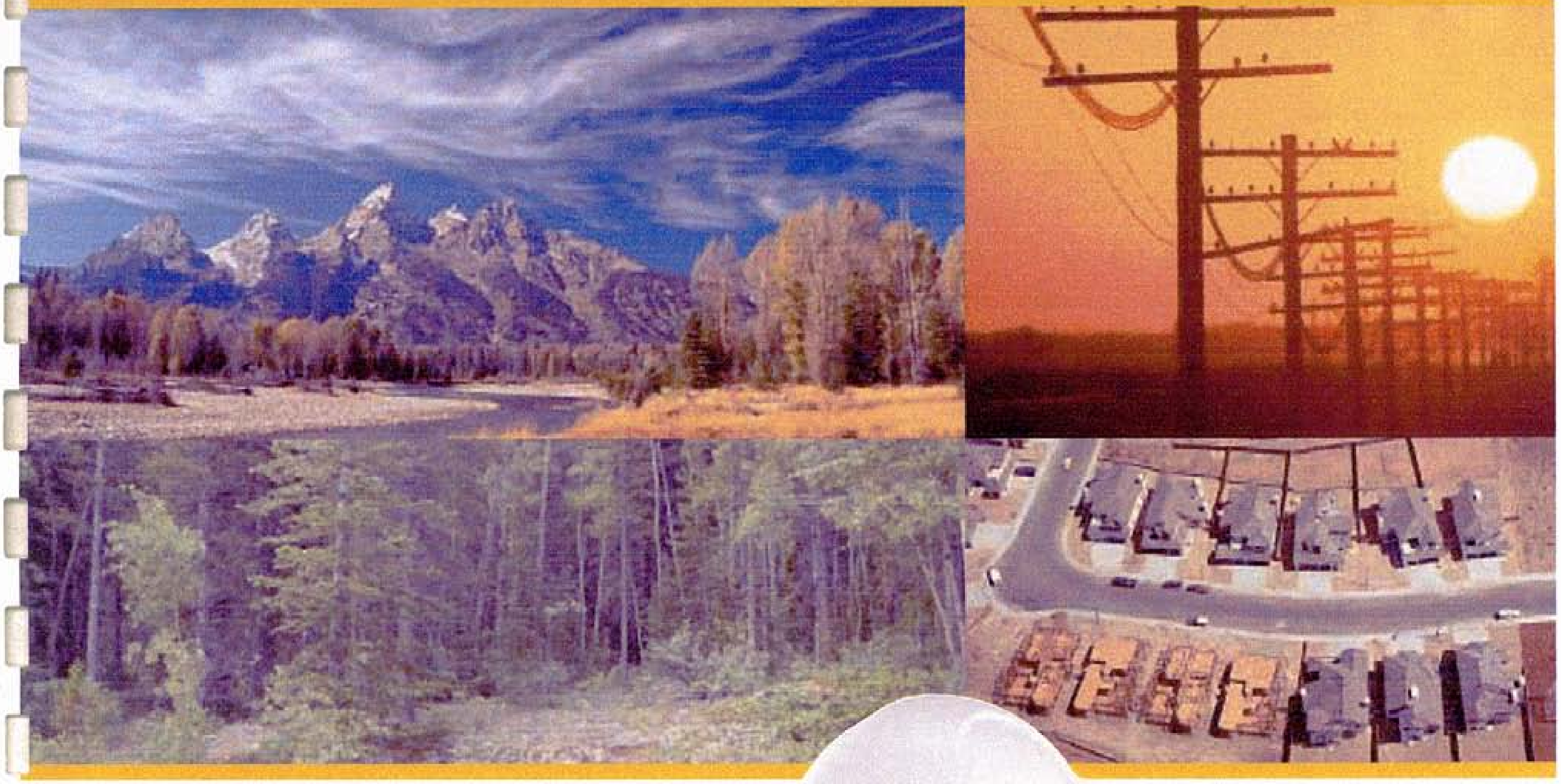
NovAtel Inc.
1120-68th Avenue NE
Calgary, Alberta, Canada, T2E 8S5

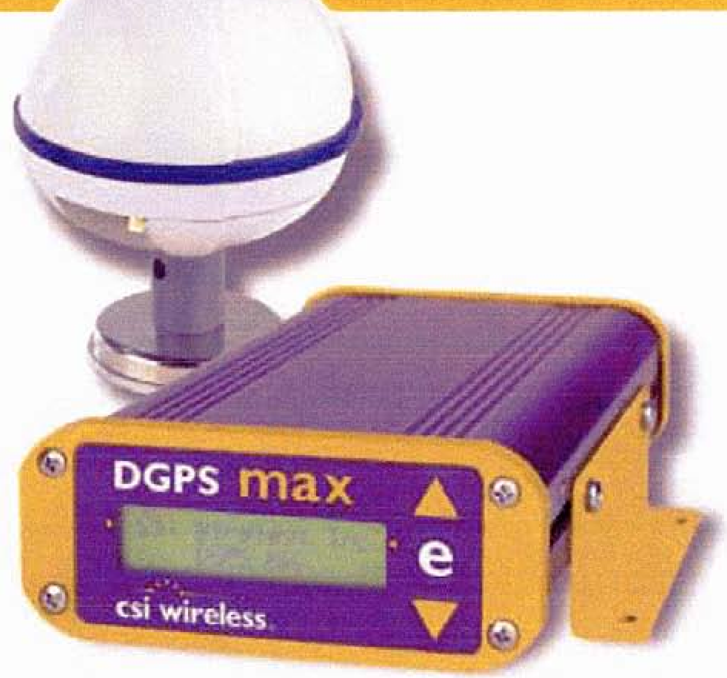
NovAtel

Now, what's tomorrow's challenge?

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
AUTHORIZED BUSINESS PARTNER

csi wireless™
www.csi-wireless.com

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.

** Dependant upon ionospheric activity and multipath

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Proton Precession

Magnetometer / Gradiometer / VLF (GSM-19 v6.0)

The new v6.0 system is the industry's latest innovation in proton precession design - with many new technologies that deliver significant benefits for geophysical applications.

Key technologies include:

Integrated GPS option (the only system with fully built-in GPS)

25% increase in sensitivity over GEM's v5.0 system

Enhanced memory (increased by 8 times to 4 Mbytes standard and expandable to 32 Mbytes)

Programmable base station (for scheduling base stations in one of three modes)

Optional DGPS real-time and post-time processing (for metre to sub-metre positioning accuracy)

Rapid data transfer (using the advanced GEMLinkW software)

Internet-based upgrades (from the office or field)

And all of these technologies come complete with the most attractive prices and warranty in the business!

QuickTracker (GSM-19T) console with sensor and cable. Can also be configured with additional sensor for gradiometer(simultaneous) readings.

For geophysical survey groups who require a complete solution for end-to-end magnetic data acquisition at an affordable price, the *QuickTracker™* (GSM-19T) proton precession family is the proven choice - for even the most challenging environments.

From robust field units to efficient survey modes to fast data downloading, *QuickTracker* is carefully designed to deliver the maximum value in a proton precession system.

The GSM-19T also provides numerous technologies that differentiate it from other systems. For example, it is the only proton precession system with ***integrated GPS*** (optional) for high-sensitivity, accurately-positioned ground surveys.

With other v6.0 upgrades, *QuickTracker* also leads in sensitivity, memory, base station technology, and other key areas.

Designed From the Ground Up

Leading the list of advances is GEM's rover unit which features a 25% increase in ***sensitivity*** -- reflecting new processing algorithms and implementation of the latest RISC microprocessors.

In addition, v6.0 ***standard memory*** is 4 Mbytes (expandable in 4 Mybte increments) which translates into 209,715 readings of line / station data or more than 600,000 readings for base station units.

The new memory capacity sets an industry standard, but more importantly, it means that operators can now handle even the largest surveys with ease.

Another important innovation is GEM's unique ***programmable base station*** which you can enable via either a field unit *or* a *Personal Computer* as follows:

Daily scheduling (define working hours and minutes each day). This mode provides economy of memory and battery usage on a daily basis.

Flexible scheduling (up to 30 on / off periods). Simply define a series of intervals and the base station will turn itself on as you need. This mode provides the greatest flexibility for longer surveys where leaving your base station running increases efficiency.

Immediate start. This mode is the traditional mode of starting a base station unit and leaving it until the operator can return to turn off the unit.

Survey Planning and Efficiency

One of the traditional challenges in ground magnetometer / gradiometer surveys is ensuring that surveys are designed and implemented as effectively as possible.

With the v6.0 proton precession system, GEM addresses this challenge through

standard GEM capabilities, such as the Walking Mag option that enables the operator to sample while walking. Though there is some increase in noise, many users find this is balanced by improved field productivity. Having nearly continous data on survey lines also helps increase the accuracy of interpretations.

Another innovation is GPS way ***point pre-programming***. Now you can define a complete survey in the office on your Personal Computer and download this information directly to a rover unit via RS-232. Then, the operator simply performs the survey using the points as their survey guide -- with a resulting decrease in errors and more rapid survey completion.

Survey Operations

QuickTracker also helps the operator on a daily basis while performing surveys. A key feature is the ***easy-to-read LCD*** data display in graphical (or text) format along with a signal quality indicator to determine when readings need to be repeated.

And, although GEM's proton precession unit is very tolerant to gradients, it also provides a warning indicator so that the operator can monitor data quality continuously. Other features operators appreciate include easy-to-use line and station incrementing -- as well as end-of-line indicators.

Fast Data Transfer

Another traditional area in which time is lost in surveys is in data transfer. In v6.0, GEM addressed this in several ways:

Data download is tripled to 115 KBaud (fastest rate possible with RS-232).

PC-based data reduction is now possible using an upgraded version of GEMLinkW, GEM's proprietary data transfer software.

GPS and Other Software

GEM Systems recently became the only manufacturer to provide a ***fully integrated*** GPS option for its line of proton precession products. Along with metre to sub-metre positioning options, the new processing functionality enables users to take advantage of the benefits of GPS.

Some of the capabilities include:

Pre-programming of way points.

Post-processing of GPS data. GEM's DGPS option enables transfer of GPS data for post-processing and merging via 3rd party software.

Precise ***time synchronization*** of field and base station units. This capability is particularly important for working in noisy magnetic conditions and provides the highest accuracy possible.

In addition to its own software, GEM is also pleased to offer a variety of data analysis and processing software from 3rd party developers.

Ongoing Maintenance and Support

As a potential user of a GSM-19T system -- the industry's end-to-end magnetometer / gradiometer solution -- you should also know that we stand by our technologies, products and services.

With a 22-year record of success and new innovations -- plus ***Internet-based upgrades*** that keep your system up-to-date and our ongoing support -- we believe that you will find that GEM offers the best solution in proton precession units today.

GEM Systems, Inc.
52 West Beaver Creek Road, 14
Richmond Hill, ON
Canada L4B 1L9
Email: info@gemsys.on.ca
Web: www.gemsys.ca

Specifications

Performance

Sensitivity:	< 0.1 nT
Resolution:	0.01 nT
Absolute Accuracy:	1 nT
Dynamic Range:	10,000 to 120,000 nT
Gradient Tolerance:	Over 7000 nT/m
Sampling Rate:	1 reading per 3 to 60 sec
Operating Temperature:	-40C to +60C

Operating Modes

Manual: Coordinates, time, date and reading stored automatically at minimum 3 second interval.

Base Station: Time, date and reading stored at 3 to 60 second intervals.

Remote Control: Optional remote control using RS-232 interface.

Input / Output: RS-232 or analog (optional) output using 6-pin weatherproof connector.

Storage - 4Mbytes (# of Readings)

Mobile:	209,715
Base Station:	699,050
Gradiometer:	174,762
Walking Mag:	299,593

Dimensions

Console:	223 x 69 x 240mm
Sensor:	170 x 71mm diameter cylinder

Weights

Console:	2.1 kg
Sensor and Staff Assembly:	2.2 kg

Standard Components

GSM-19T console, GEMLinkW software, batteries, harness, charger, sensor with cable, RS-232 cable, staff, instruction manual and shipping case.

Optional VLF

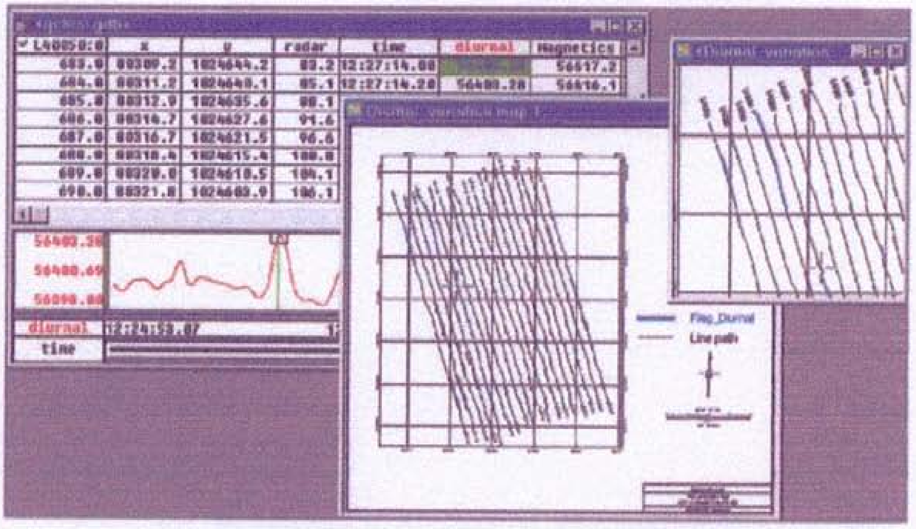
Frequency Range: Up to 3 stations between 15 to 30.0 kHz

Parameters: Vertical in-phase and out-of-phase components as % of total field. 2 relative components of the horizontal field.

Resolution: 0.1% of toal field

Airborne Quality Control Toolkit

product description

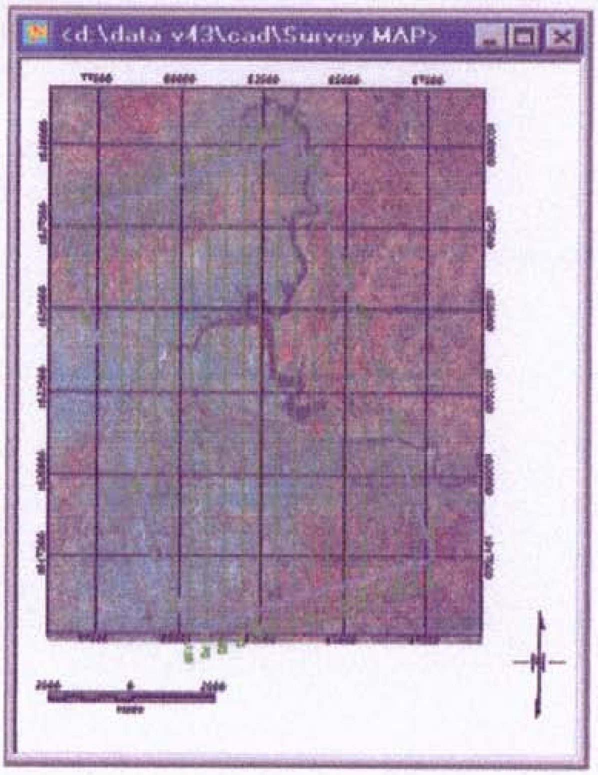


The Airborne Quality Control toolkit offers the productivity tools to plan an airborne survey, and meet basic tender specifications. This provides flight path planning tools, the ability to monitor the survey progress, and streamlined quality control (QC) tools. A built-in mapping wizard automatically displays QC results.

The Airborne Quality Control toolkit provides the tools to accomplish the tasks below:

- Generate flight path map of planned survey
- Display survey statistics
- Display survey line distance
- Perform altitude deviation QC test
- Perform flight path deviation QC test
- Perform flight line separation QC test
- Perform sample spacing QC test
- Perform diurnal drift QC test
- Perform magnetic noise QC test
- Map and print QC results

This tool can be added to any Geosoft application to offer you a more complete data processing and analysis solution. For more information about specialized data processing and analysis tools, please contact your local Geosoft representative.



product capabilities

This tool includes the following capabilities:

- Map Creation
- Importing
- Symbol plots
- Survey line plots
- Quality Control
- Grid Compression
- Database compression
- Coordinate Utilities and Warping

Aiborne Quality Control Toolkit capabilities

Map Creation

Map creation capabilities consist of the "Mapping Wizard" which simplifies the mapmaking process. The wizard uses a series of dialog boxes in which the user can define each specification for the map. The Mapping Wizard uses an existing grid or database to define the extent (area) and scale of the map. The first step in mapping data is to create a new map, which is a blank map with the size, scale and name defined. Once a blank map has been created, plot data, grids or other information can then be added. Map surrounds, north arrows, coordinates and titles can also be add to a map.

Importing

Oasis montaj provides seamless access to both original spatial data and processed information (grids, images and plots).

Spatial data import formats include:

- ASCII data files
- Database table files (single or all tables)
- Geosoft XYZ data files
- Geosoft binary data files
- Flat archive data files
- Blocked binary data files
- ODBC data files
- RMS data files
- Picodas PDAS data files
- USGS data files

Processed data import formats include:

- Geosoft plot (PLT)
- AutoCAD DXF (DXF)
- MapInfo TAB files
- ArcView shape files

Database Compression

Oasis montaj (v4.3 or later) features a database compression option that can reduce file size and improve the performance of Geosoft database files (*.gdb). Processing speed is improved by compressing files because the computer takes less time to read and write to disk. Power users will especially benefit from using compressed databases.

Grid Compression

Oasis montaj (v4.3 or later) features a grid compression option that can reduce the file size and improve the performance of Geosoft grids files (*.grd). Processing speed is improved by compressing files because the computer takes less time to read and write to disk. Power users will especially benefit from using compressed grids.

Symbol Plots

The symbol plotting function can draw symbols on a map at all data points along all selected lines in a database. Symbol plotting methods include adding:

- Symbols
- Proportionally scaled symbols
- Zoned colored symbols (symbols can be a fixed size, or sized in proportion to data values)
- Range classified symbols

Survey Line Plots

The survey line path plots and labels survey line locations.

Quality Control (Airborne)

Airborne Quality Control includes three main functions:

- The Flight Path Planning creates a flight line plan tailored to the shape and size of the survey area. Boundary maps of the survey area can be imported from an AutoCAD DXF file or digitized as polygon files. Planning controls specify the direction, starting reference point, and distance between flight lines for the airborne survey area. The software plots both regular flight lines and tie lines. The flight planning utility produces a database and a map of the flight lines that can be viewed, printed or exported.
- Database Statistics extends the statistical reporting tools included in the basic **Oasis montaj** system. The QC statistical tool generates and prints a statistical report for specific channels or an entire database. The statistical report provides the number of dummies, minimum, maximum, mean and total distance flown for each channel and for the whole database. The survey line distance tool displays the total distance flown for a specific flight line.
- Airborne Quality Control Tool identifies line sections that do not meet survey specifications. Examples include evaluating the diurnal variation, altitude deviation, flight path deviation, and flight line separation of each point along the flight lines to ensure they are within specification. Points that do not meet specifications are identified by a coloured symbol using a colour that corresponds to the type of error. These results are plotted to a map so that the user can visualize the sections of the survey that must be re-flown.

Warping & Coordinate Utilities

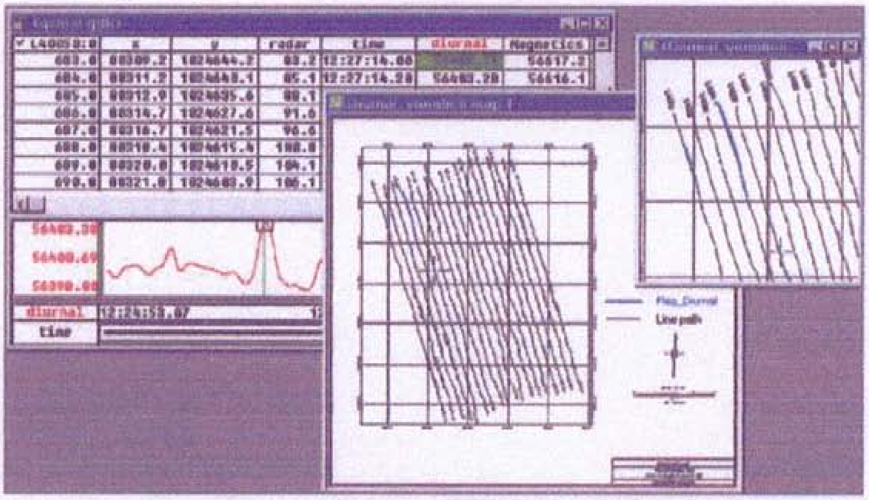
Warping is the process of re-projecting or moving data coordinates numerically, instead of using standard analytical methods for projecting to UTM, longitude/latitude and other coordinate systems. **Oasis montaj** warping defines a polygonal outline (either in a file or interactively) by defining a maximum of four control points. Then data can be warped (creating new X and Y channels) or an entire grid can be warped based on this polygonal outline.

Warping and coordinate utilities include capabilities to do the following:

- Change coordinates
- Backup current X, Y channels
- Restore backup X, Y channels
- Translate coordinates
- Rotate coordinates
- Interpolate X, Y channels
- Convert longitude, latitude to local X, Y
- Convert local X, Y to longitude, latitude
- Define a warp
- Apply a warp

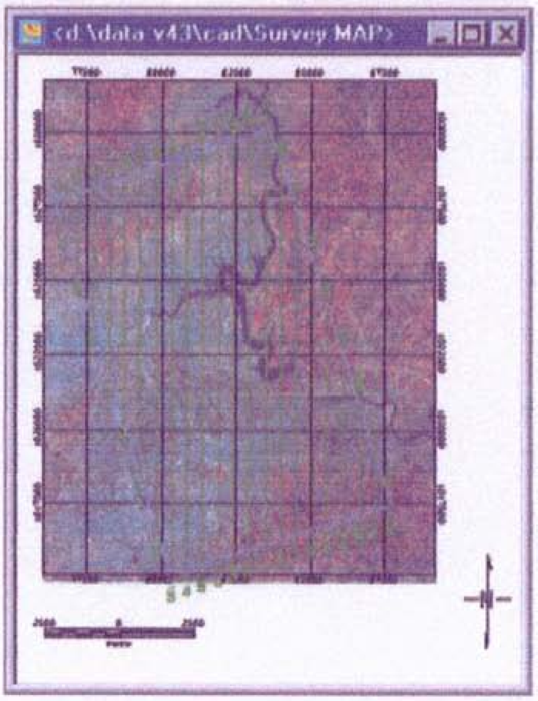
Airborne Geophysics

product description



Geosoft's **Airborne Geophysics** application for the **Oasis montaj**™ software platform provides field geophysicists with the ability to process, filter, grid, and map data from airborne geophysical surveys.

This application includes **Oasis montaj** the core software platform for working with large volume spatial data. The core software platform consists of an Interface and a Processing engine. For detailed information on the system and its capabilities, see the **Oasis montaj** Core software platform information page.



In addition to the features provided in the core platform, the **Airborne Geophysics** application provides a variety of gridding methods and 1-D filters for processing your data. Perform quality control tasks on airborne data including levelling survey lines and correcting IGRF, lag, heading, and base station errors. Several map-creation capabilities are also provided to present your processed data for interpretation.

product capabilities

The **Airborne Geophysics** application includes the following capabilities:

- Basic grid utilities
- Advanced grid utilities
- Basic 1-D Filters
- 1D Non-linear Filters
- Line levelling
- Line intersections
- Lag, heading, and base station corrections
- IGRF
- Picodas (PDAS) import
- C3NAV support
- Profile Plotting
- Symbol plotting
- Posting (label) plotting
- Contouring
- Line gridding (Bigrid)
- Minimum curvature gridding
- Tinning
- Target Picking
- Survey line plotting
- Quality Control
- Trend gridding (**GeoStrike**™ Tool)

Airborne Geophysics capabilities

Basic Grid Utilities

The following functions can be performed with the basic grid utilities:

- Display grid as a terenary image
- Display grids as two, three or four grid composites
- Grid windowing (create a grid from a window of a larger grid)
- Colour shaded grid (apply shading to create a quick shaded relief grid)
- Display statistics (display header and grid details on screen)
- Import ASCII grid
- Point grid value (the grid value at a selected location from up to four grid files)
- Grid outline (find edge points in a grid image and either save the edges in a polygon file or draw the edges on the current map)
- Sample a grid (sample a grid at specified X,Y locations and create a new channel that contains the sampled grid data)
- Grid profile (extract a data profile from a grid and place it in a new line of the current database)
- Transpose a grid by swapping the grid rows with the grid columns
- Save grid to database (import grid data into new or existing databases)
- Shaded relief grid (create a shaded relief image from a grid)

Advanced Grid Utilities

The following functions can be performed with advanced grid utilities:

- Trend enforcement (**GeoStrike**)
- Remove regional trends and gradients (remove a regional trend or gradient from a grid)
- Locate grid peaks
- Grid masking (insert placeholder values based on a polygonal area you specify in a file)
- Grid expansion and filling
- Grid volume (calculate the volume of space defined by a grid surface, above and below a base of reference)
- Grid peak (find peaks in a grid file)
- Apply a 3 X 3 convolution filter such as hanning, laplace, horizontal derivative (X direction), horizontal derivative (Y direction), horizontal derivative (45 degree direction)
- Apply a 5x5 symmetric convolution filter
- Apply a vertical derivative convolution filter
- Create and apply user defined filters
- Horizontal gradient (calculate the grid gradient amplitude in a specified direction)
- AGC (apply automatic gain compensation to a grid)
- Use Boolean operators to merge overlapping grids or display the parts of grids which overlap
- Expressions: mathematical operations such as remove base, multiply by factor, add grids, subtract grids, multiply grids, ratio grids and general expressions

Basic 1D Filters

Basic one dimensional filters are commonly used to smooth data, with or without non-linear filtering. The following are descriptions of the different 1D filters:

- High-pass filter applies a high-pass (sharpening) filter to a channel.
- Low-pass filter applies a low-pass (smoothing) filter to a channel.
- Bandpass filter applies a filter that removes features longer than the long wavelength cutoff and shorter than the short wavelength cutoff.
- Convolution filter applies space-domain averaging filter to a channel. The filter can be defined in a filter file or in a comma delimited string.
- Difference filter calculates differences between values in a channel. The common fourth difference can be calculated by specifying four differences, which is useful for identifying noise.
- Polynomial filter calculates n'th (maximum nine) order trend of a data channel by (least square) best-fit polynomial. The trend is then evaluated and placed in a new channel. An optional residual channel (input trend) may also be created.
- B-Spline filter calculates a B-spline interpolation of data in a channel. A B-spline allows you to control the smoothness of the spline and the tension applied to the ends of the spline.
- Linear Regression filter fits a least-square linear regression to a set of marked data in a channel and reports the slope and intercept.

1D Non-Linear Filters

The 1D Non-Linear Filter is ideal for removing very short wavelength, but high amplitude features from data. It is often thought of as a noise spike-rejection filter, but it can also be effective for removing short wavelength geological features, such as signal from surficial features.

The 1D Non-Linear Filter is used to locate and remove data that is recognized as noise. The algorithm is 'non- linear' because it looks at each data point and decides if that data is noise or a valid signal. If the

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point is noise, it is simply removed and replaced by an estimate based on surrounding data points. Parts of the data that are not considered noise are not modified at all.

Line Levelling

Statistical levelling corrects for intersection errors (miss ties) that follow a specific pattern or trend. The algorithm calculates a least-squares trend line through an error channel to derive a trend error curve, which is then added to the channel to be levelled.

The objective of full line levelling is to adjust the survey lines so that all lines match the trended tie lines exactly at each intersection that has been included in the process.

The line levelling system:

- Identifies potential errors in data sets
- Applies systematic corrections including magnetic base station, lag and heading corrections and select line direction
- Performs conventional levelling using simple (tie line and full levelling) and careful levelling methods

Line Intersections

The output intersection table file tabulates every intersection between tie lines and regular survey lines. It includes the exact ground location of the intersection point, the tie line and survey line numbers, the recorded value on each line, and the horizontal gradient of the data at that location. The line intersection system can find and edit intersection between any lines in a data set (lines can either be regular survey lines or tie lines).

Lag, Heading and Base Station Corrections

Correction routines include applying a:

- Lag correction to a channel of data by shifting the start fiducial by a specified lag amount
- Heading correction to data for a systematic shift (in the data) that is a function of the direction of travel for a survey line
- Magnetic base station correction to a magnetic channel

IGRF

The International Geomagnetic Reference Field IGRF or the Definitive International Geomagnetic Reference Field DGRF correction (field strength, inclination and declination) can be calculated from a geographic coordinate channel or a single geographic point.

Picodas import

Picodas is an airborne instrument data acquisition system that records multi-parameter airborne survey data. The system produces a set of files for each survey flight. The files include an ASCII header file and a number of binary data files that contain the data for each survey flight. The ASCII header file fully documents the contents of the binary data files and includes a list of the binary files for that flight.

C3NAV

C3Nav software corrects errors caused by the difference between recorded GPS location and the true ground loaction.

C3Nav matches the ground GPS and moving GPS readings at the same time, and uses the data only from the common set of satellites that both are observing at that time. C3Nav produces a listing file that contains the GPS time (seconds from the start of the week), and the differentially corrected location of the moving GPS receiver.

Profile Plots

The profile plotting capability features the ability to draw profiles of channel values for all selected lines in a database.

Posting Plots

Posting plots means the user can post the data values for a channel on a map.

Symbol Plots

The symbol plotting function can draw symbols on a map at all data points along all selected lines in a database. Symbol plotting methods include adding:

- Symbols
- Proportionally scaled symbols
- Zoned colored symbols (symbols can be a fixed size, or sized in proportion to data values)
- Range classified symbols

Contouring

Contouring is the capability to draw contours on a map using a specified grid.

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Airborne Geophysics capabilities

Line Gridding

Line gridding is the capability to create a new grid file (.GRD) using the bi-directional gridding method (BIGRID).

The BIGRID method uses a two step process:

1. Each line is interpolated along the original survey line to yield data values at the intersection of each required grid line with the observed value.
2. The intersected points from each line are then interpolated in the across-line direction to produce a value at each required grid node.

The BIGRID GX has the following capabilities:

- Unlimited line based data
- LP, HP filters
- Data presort options
- Enhanced trended gridding
- Output any grid size

Minimum Curvature Gridding

Minimum curvature gridding uses a minimum curvature gridding algorithm (RANGRID) to create a new grid file (.GRD).

The RANGRID method fits a minimum curvature surface to the data points. A minimum curvature surface is the smoothest possible surface that will fit the given data values and settings.

The RANGRID GX also has the capability to:

- Access unlimited number of input observation points
- Adjust internal tension
- Apply de-aliasing filter
- Apply linear and logarithmic gridding
- Blank un-sampled areas
- Output grids up to any size

Tinning

The Triangular Irregular Network (TIN) method, utilizes the Sweepline algorithm implemented by Steven Fortune of Bell Laboratories. The Sweepline algorithm calculates the X,Y (Z-optional) values to create a binary (*.TIN) file.

When Z values are included in the (*.TIN) file, a TIN grid can be created using the TINGRID GX. The TINGRID GX applies the Natural Neighbour algorithm (Sambridge, Brown & McQueen 1995) to the Z values in the (*.TIN) file to create a grid.

Survey Line Plots

The survey line path plots and labels survey line locations.

Quality Control (Airborne)

Airborne Quality Control includes three main functions:

1 **The Flight Path Planning** which creates a flight line plan tailored to the shape and size of the survey area. Boundary maps of the survey area can be imported from an AutoCAD DXF file or digitized as polygon files.

- Planning controls specify the direction, starting reference point, and distance between flight lines for the airborne survey area.
- The software plots both regular flight lines and tie lines. The flight planning utility produces a database and a map of the flight lines that can be viewed, printed or exported.

2 **Database Statistics** extends the statistical reporting tools included in the basic **OASIS montaj™** system.

- The QC statistical tool generates and prints a statistical report for specific channels or an entire database. The statistical report provides the number of dummies, minimum, maximum, mean and total distance flown for each channel and for the whole database.
- The survey line distance tool displays the total distance flown for a specific flight line.

3 **Airborne Quality Control Tool** identifies line sections that do not meet survey specifications. Examples include evaluating the diurnal variation, altitude deviation, flight path deviation, flight line separation of each point along the flight lines to ensure they are within specification. Points that do not meet specifications are identified by a coloured symbol using a colour that corresponds to the type of error. These results are plotted to a map so that the user can visualize the sections of the survey that must be re-flown.

Trend Gridding (GeoStrike™)

Trend Gridding (GeoStrike™) alleviates the aliasing problem that results when there are more samples "along the lines" than across lines — a traditional problem in gridding geophysical data. This problem leads to undesirable effects including ellipsoids or ellipsoidal "beads" between lines in gridded data. The Trend Gridding (GeoStrike™) algorithm is designed to provide a solution that preserves the character of local trends while eliminating aliasing effects.

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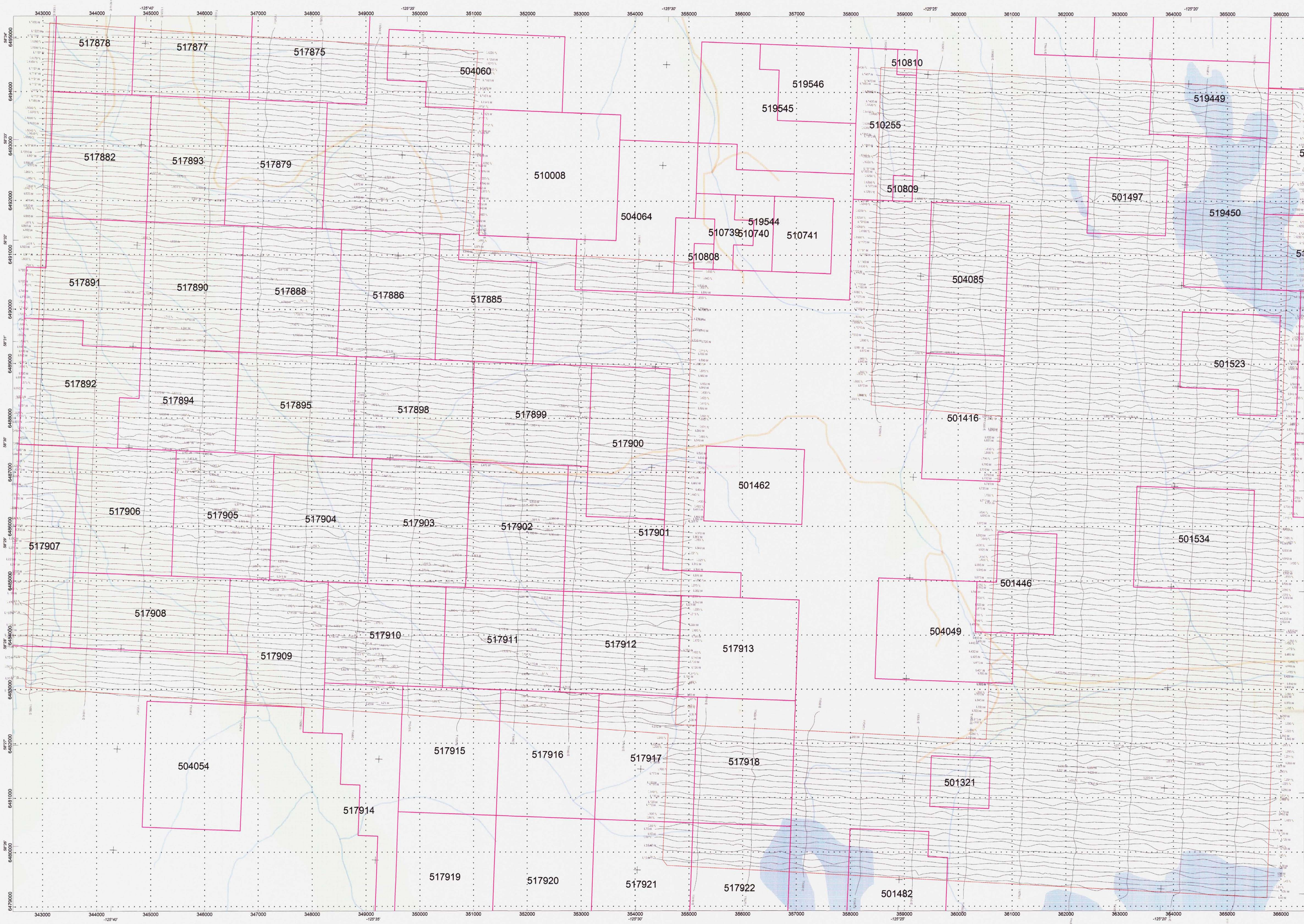
Target Picking

Two new target-picking capabilities have been added to the Geophysics application:

- The new Pick anomalies option, located on the X-Utility menu, enables the users to pick anomalies from one or multiple channels based on the channel(s) values and the amplitude of the troughs on either side of the anomaly in the channel(s) profile. The target results will be stored in a new "targets" line using the actual values of the input channel or with alphabetical or numerical numbering.
- The Select target option, located on the profile window popup menu, enables individual targets to be picked directly from the profile window. The selected targets are appended to the "targets" line and, optionally, can be plotted simultaneously to the current map using user-defined symbols.



LEGEND

SURVEY PARAMETERS:

Helicopter Type: Helicopter A-Star B2
Helicopter Registration: C-GTNV
Survey Date: May - June 2006
Traverse Line Spacing: 100 metres
Traverse Line Direction: 92°/272°
Control Line Spacing: 1000 metres
Control Line Direction: 182° / 02°

AIRBORNE MAGNETOMETER:

Geometrics G822-A Cesium Magnetometer
Sensitivity: 0.0005 nT
Noise Level: +/- 0.001 nT
Sensor Height: Nominally 30 metres mean terrain clearance (mtc)
Sensor Location: Mounted in a towed bird
Sampling Rate: 10 readings/second

DATA ACQUISITION SYSTEM:

AGIS data acqusition system
Radar Altimeter: Terra TRA-3000 / TRI-30

AIRBORNE NAVIGATION SYSTEM:

CSI-Wireless DGPS receiver/AGNAV Navigation system with Pilot steering indicator (PSI)

BASE STATION SYSTEM:

Base Station Magnetometer:
GSM 19T Proton
Sensitivity: 0.1 nT
Sampling Rate: 1 reading/second

Base Station GPS:
NovAtel Millennium receiver
Sampling Rate: 1 reading/second

Scale 1:25000
500 0 500 1000 1500
metres
WGS 84 / UTM zone 10N

McPHAR

Bradford Mineral Explorations Ltd.

Flight Path with Topography
Churchill Area

McPhar Geosurveys Ltd.

LEGEND

SURVEY PARAMETERS:

Helicopter Type: Helicopter A-Star B2
Helicopter Registration: C-GTNV
Survey Date: May - June 2006
Traverse Line Spacing: 100 metres
Traverse Line Direction: 92°/272°
Control Line Spacing: 1000 metres
Control Line Direction: 182° / 02°

AIRBORNE MAGNETOMETER:

Geometrics G822-A Cesium Magnetometer
Sensitivity: 0.0005 nT
Noise Level: +/- 0.001 nT
Sensor Height: Nominally 30 metres mean terrain clearance (mtc)
Sensor Location: Mounted in a towed bird
Sampling Rate: 10 readings/second

DATA ACQUISITION SYSTEM:

AGIS data acqusition system
Radar Altimeter: Terra TRA-3000 / TRI-30

AIRBORNE NAVIGATION SYSTEM:

CSI-Wireless DGPS receiver/AGNAV Navigation system with Pilot steering indicator (PSI)

BASE STATION SYSTEM:

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GSM 19T Proton
Sensitivity: 0.1 nT
Sampling Rate: 1 reading/second

Base Station GPS:
NovAtel Millennium receiver
Sampling Rate: 1 reading/second

Contour Intervals
10 metres
50 metres
250 metres

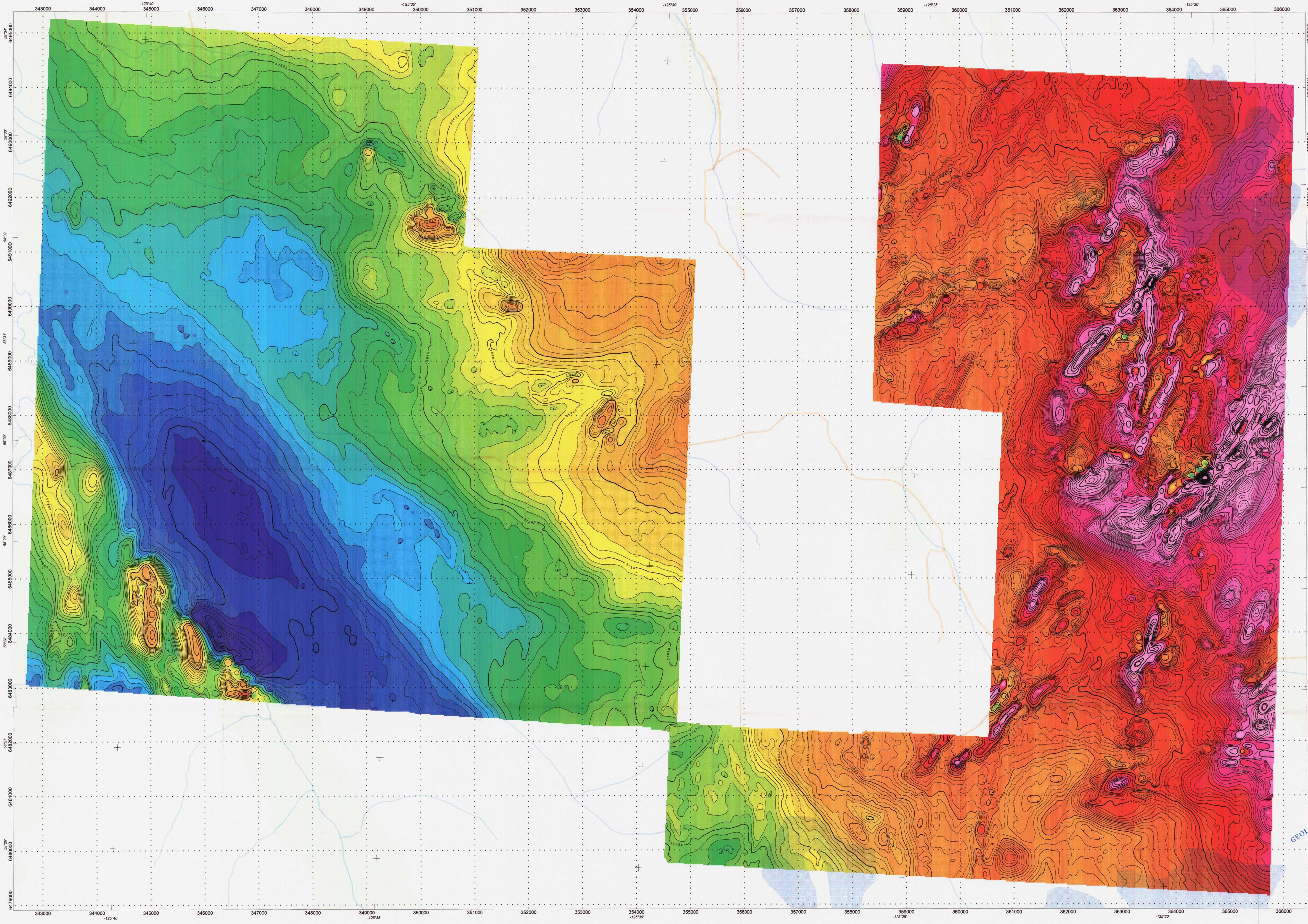
Scale 1:25000
500 0 500 1000 1500
metres
WGS 84 / UTM zone 10N

GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

28,573

McPHAR

Bradford Mineral Explorations Ltd.
Digital Terrain Model **Churchill Area**
McPhar Geosurveys Ltd.



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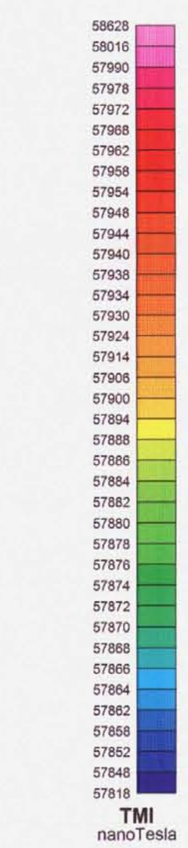
Sampling Rate: 1 reading/second



Magnetic Data have been calculated to conform to a common observation height (drape) of 100 metres.

Contour Intervals

2 nT

10 nT

50 nT

Scale 1:25000

500 0 500 1000 1500

metres

WGS 84 / UTM zone 10N

McPHAR

Bradford Mineral Explorations Ltd.

Total Magnetic Intensity (after CompuDrape)
Churchill Area

McPhar Geosurveys Ltd.