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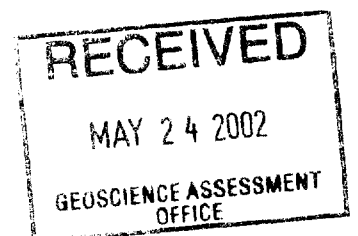
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# KIRKWOOD PROJECT

PROSPECTING, SAMPLING, AIRBORNE  
GEOPHYSICAL SURVEYS AND DRILLING

CANABRAVA DIAMOND CORPORATION

George Read  
Nigel Luckman  
May 23, 2002



41010NW2007 2.23520

TOOMS

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## 1.0 INTRODUCTION

This report describes the prospecting, sampling, a helicopter-borne geophysical surveys and drilling on a contiguous group of 34 claims in Tooms Township in the Porcupine Mining district of Ontario and held by Elizabeth Kirkwood of Toronto, ON and optioned to Canabrava Diamond Corporation by agreement dated September 13, 2001. The details of the 34 claims are as follows:

	<b>Twp</b>	<b>Claim #</b>	<b>Recording Date</b>	<b>Claim Due Date Status</b>	<b>Work Required</b>	<b>Total Applied</b>	<b>Total Reserve</b>
1	TOOMS	P 1151590	16 Jul 90	16 Jul 02	400	4000	0
2	TOOMS	P 1154700	16 Jul 90	16 Jul 02	400	4000	0
3	TOOMS	P 1154863	24 May 90	24 May 02	400	4400	0
4	TOOMS	P 1154864	24 May 90	24 May 02	400	4400	0
5	TOOMS	P 1154865	24 May 90	24 May 02	400	4400	0
6	TOOMS	P 1154866	24 May 90	24 May 02	400	4400	8
7	TOOMS	P 1154941	24 May 90	24 May 02	400	4400	0
8	TOOMS	P 1154942	24 May 90	24 May 02	400	4400	0
9	TOOMS	P 1154943	24 May 90	24 May 02	400	4400	0
10	TOOMS	P 1154944	24 May 90	24 May 02	400	4400	0
11	TOOMS	P 1154945	24 May 90	24 May 02	400	4400	0
12	TOOMS	P 1154946	24 May 90	24 May 02	400	4400	0
13	TOOMS	P 1154947	24 May 90	24 May 02	400	4400	0
14	TOOMS	P 1154948	24 May 90	24 May 02	400	4400	0
15	TOOMS	P 1154949	24 May 90	24 May 02	400	4400	0
16	TOOMS	P 1154950	24 May 90	24 May 02	400	4400	0
17	TOOMS	P 1155570	16 Jul 90	16 Jul 02	400	4000	0
18	TOOMS	P 1155571	16 Jul 90	16 Jul 02	400	4400	15286
19	TOOMS	P 1155572	16 Jul 90	16 Jul 02	400	4000	0
20	TOOMS	P 1155573	16 Jul 90	16 Jul 02	400	4000	0
21	TOOMS	P 1155574	16 Jul 90	16 Jul 02	400	4000	0
22	TOOMS	P 1155575	16 Jul 90	16 Jul 02	400	4000	0
23	TOOMS	P 1155576	16 Jul 90	16 Jul 02	400	4000	0
24	TOOMS	P 1155577	16 Jul 90	16 Jul 02	400	4000	0
25	TOOMS	P 1155578	16 Jul 90	16 Jul 02	400	4000	0
26	TOOMS	P 1155579	16 Jul 90	16 Jul 02	400	4000	0
27	TOOMS	P 1155580	16 Jul 90	16 Jul 02	400	4000	0
28	TOOMS	P 1155593	16 Jul 90	16 Jul 02	400	4000	0
29	TOOMS	P 1158171	16 Jul 90	16 Jul 02	400	4000	0
30	TOOMS	P 1189130	11 Dec 91	11 Dec 02	800	7200	0
31	TOOMS	P 1189131	11 Dec 91	11 Dec 02	400	3600	0
32	TOOMS	P 1189132	11 Dec 91	11 Dec 02	4800	43200	0
33	TOOMS	P 1189133	11 Dec 91	11 Dec 02	3600	32400	0
34	TOOMS	P 1189134	11 Dec 91	11 Dec 02	4800	43200	0
				<b>Total</b>	<b>\$26000</b>	<b>\$251600</b>	<b>\$15294</b>

The location of claims is shown in Figure 1.

The aim of the prospecting exercise was to review the Quaternary geology in order to locate basal tills for kimberlitic indicator mineral sampling. In addition, all outcrop and float were examined in an attempt to locate kimberlite or related rock. Road access to the area was

investigated as many new roads have been developed as part of current logging activities in the area.

The purpose of the helicopter-borne geophysical survey was to acquire high resolution, high sensitivity magnetic data over target Ch01-38, identified from a fixed-wing survey and located in the north central part of claim # P1189132 in Tooms Township. This high resolution, helicopter-borne geophysical survey is required to accurately locate the geophysical target for drilling.

## **2.0 PROSPECTING AND SAMPLING**

John Fleishman and Martin Zaleski prospected this block of claims in Tooms Township at various stages between June 30 and September 26, 2001. They examined the Quaternary geology and searched for visible outcrop. The aim of this prospecting exercise was to locate kimberlite or related rock outcrops or associated float. Prospecting in De Gaulle Township, to the southwest, had led to the discovery of kimberlite float from which diamonds had been recovered.

The area is predominantly forested and outcrop is limited to small exposures of granite-gneiss and rare deformed volcanics. One subangular boulder of lamprophyre float was found in a gravel pit adjacent to a road. Prospecting on foot in the immediate vicinity of the boulder did not lead to any additional lamprophyre float recoveries and the source of this lamprophyre boulder could not be determined.

The Quaternary sediments were specifically examined to locate basal tills for sampling, with the aim of recovering kimberlitic heavy minerals that may be proximal to source. Studies of striations suggest dominant transport by glacial ice from north to south through the area. Recently developed forestry roads were mapped.

One float rock sample (# CNB0101) was collected from a gravel pit at E359090 and N5286257 (UTM Zone 17 NAD83) on claim # P1155573 in Tooms Township. This sample was identified in the field as an ultramafic lamprophyre. Petrographic work carried out on similar samples classified them as para-kimberlites / ultramafic lamprophyres.

## **3.0 GEOPHYSICAL SURVEYS**

Initially this group of claims was covered by a 5,366-line kilometre fixed-wing survey carried out by Terraquest Ltd. The complete geophysical survey was carried out between August 22 and September 21, 2001. This fixed-wing survey identified a number of circular magnetic anomalies that had the potential to be kimberlites. One of these magnetic anomalies was Ch01-38, which occurs within claim # P1189132 in Tooms Township. In early 2002, Fugro Airborne Surveys was contracted by Canabrava Diamond Corporation to fly high-resolution helicopter-borne magnetic surveys over selected anomalies defined from the Terraquest

fixed-wing survey. The Fugro helicopter surveys were carried out between January 29 and February 1, 2002.

## **2.0 GEOPHYSICAL SURVEY AREAS**

The survey area is located in northwestern Ontario, some 40 kilometres east northeast of Chapleau. The geophysical companies based their survey crews in Chapleau and operated out of Chapleau Airport.

## **3.0 GEOPHYSICAL EQUIPMENT AND SURVEY SPECIFICATIONS**

The geophysical survey equipment and the survey specifications are described in the geophysical contractor survey reports, copies of which are attached as Appendix A (Report B-055 - Terraquest Ltd.) and Appendix B (Report #2094 - Fugro Airborne Surveys).

## **4.0 GEOPHYSICAL RESULTS**

The flight lines, tie line and contoured magnetic field readings (Total Magnetic Field) for the portion of the fixed wing survey covering claim # P1189132 in Tooms Township are shown on the attached map entitled: Chapleau Fixed Wing Aeromagnetic Survey - Total Magnetic Field.

The flight lines, tie lines and contoured magnetic field readings (Total Magnetic Field) for the helicopter geophysical survey over geophysical anomaly Ch01-38 (within claim # P1189132 in Tooms Township) identified from the fixed wing survey, are shown on the attached map entitled: Chapleau Helicopter-borne Magnetic Survey Total - Magnetic Field. Colour and black and white images of the magnetic response of Anomaly Ch01-38 are attached to this report.

## **5.0 GEOPHYSICAL SURVEY INTERPRETATION**

Martin Saint Pierre, geophysicist, was contracted by Canabrava Diamond Corporation to examine and interpret the results of the fixed wing and helicopter-borne geophysical surveys. The methods used by Saint Pierre are documented in Appendix C.

Geophysical anomaly Ch01-38 situated in claim # P1189132 in Tooms Township was selected as it is a discrete, well-constrained, almost circular magnetic high. St. Pierre assigned anomaly Ch01-38 a "Moderate to High" rating and the decision to fly the helicopter-borne survey was based on this rating.

On examination of the helicopter-borne survey results St Pierre concluded the following:

“The helicopter data has resolved anomaly CH01-38 nicely into an oblong mag low with an E-W trending long axis. Estimated source dimensions are 250 X 130 with a magnetic amplitude of 215 nT. The anomaly itself I rate as a "Moderate to High", but combined with its lake coincidence and favourable geochemistry, I would bump it up to a "High". Suggested vertical drill hole coordinates are 357499,5287036 Nad83, UTM Zone 17”.

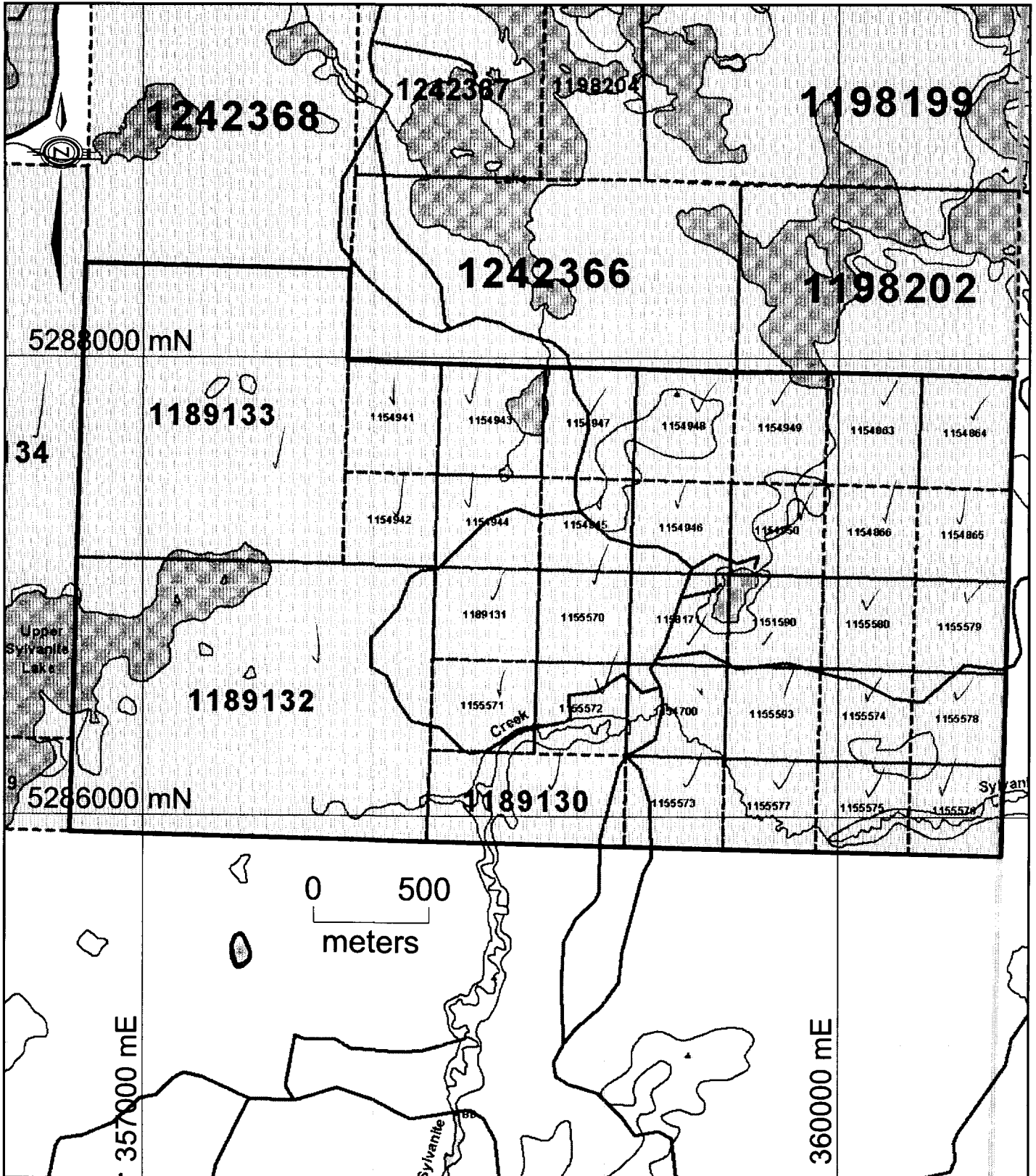
## **6.0 DRILLING**

Based on the “High” rating of the geophysical anomaly it was decided to drill test this target in an attempt to determine the lithology of the rock responsible for the geophysical anomaly (Ch01-38). The shape of the anomaly strongly suggested that the cause of the anomaly might be a kimberlite.

The drilling took place between the 22<sup>nd</sup> and 27<sup>th</sup> of March 2002 and was supervised by contract geologists William Jarvis (of Belleville, Michigan) and Henry Hutteri (of Timmins, Ontario). The borehole log is attached as Appendix D. The cause of anomaly Ch01-38 is not a kimberlite.

## **7.0 SUMMARY AND CONCLUSIONS**

Prospecting and sampling were carried out on a contiguous group of claims in Tooms Township. This claims were covered by a larger fixed wing magnetic survey, the results of which confirmed a discrete geophysical anomaly within claim # P1189132 in Tooms Township. This anomaly was designated Ch01-38 and it was surveyed with a high-resolution helicopter-borne survey in preparation for drilling. The helicopter-borne survey has confirmed the shape and amplitude of this magnetic anomaly. This target was drilled in March 2002. The geophysical anomaly is not caused by a kimberlite but by a mafic to ultramafic unrelated rock.



**CANABRAVA DIAMOND CORPORATION**

**KIRKWOOD PROJECT  
CLAIM LOCATION MAP  
TOOMS TOWNSHIP, ONTARIO**

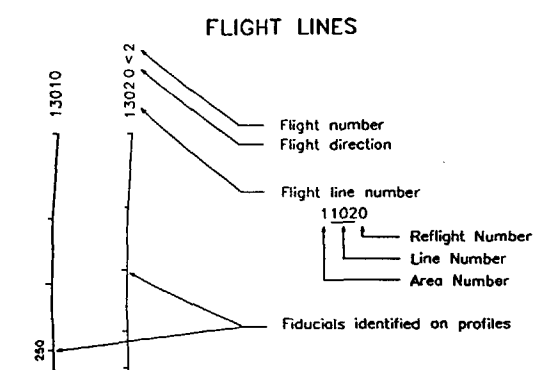
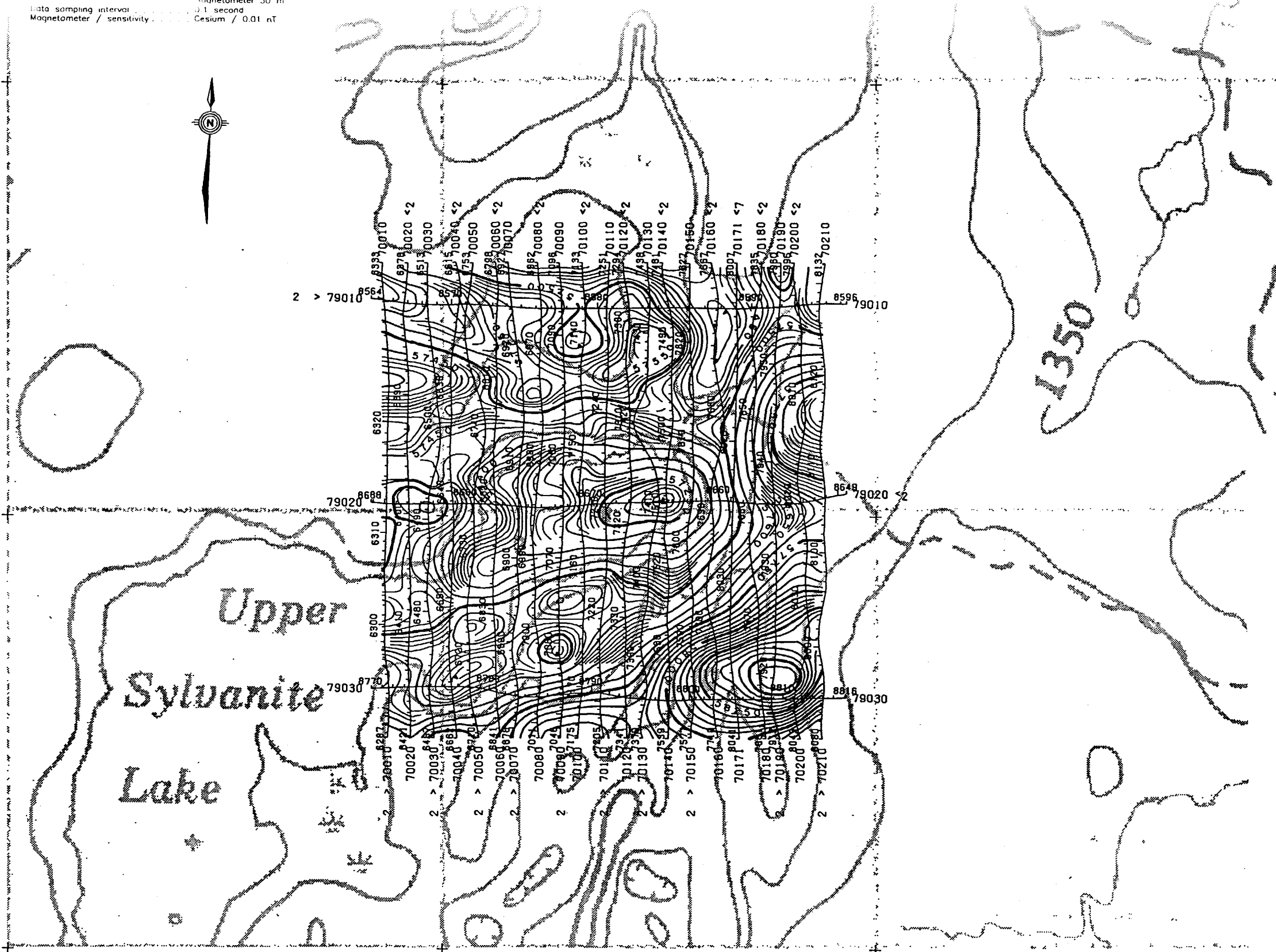
DATE: May, 2002

Datum: NAD83, UTM Zone 17

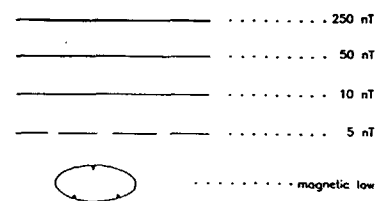
BY: NL

FIGURE No. 1

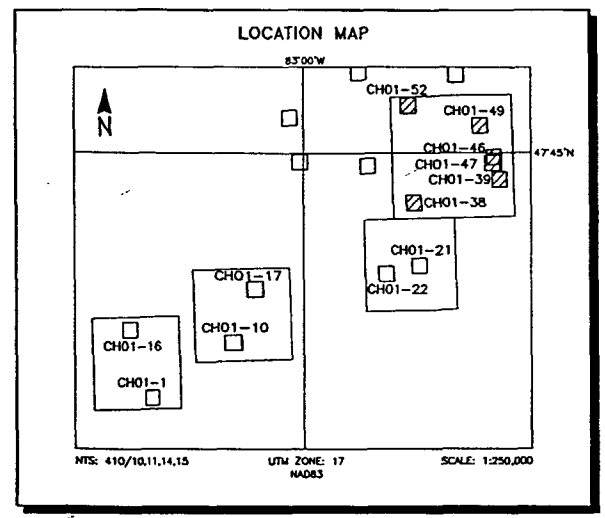
Elevation  
 10 reduction grid interval  
 100 metres  
 Helicopter 37 m  
 Magnetometer 30 m  
 Data sampling interval 0.1 second  
 Magnetometer / sensitivity Cesium / 0.01 nT



**TOTAL MAGNETIC FIELD CONTOURS**



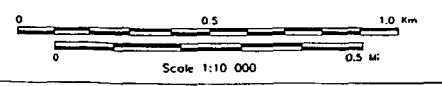
Magnetic inclination within the survey area: 74 degrees N  
 Magnetic declination within the survey area: 9 degrees W



**CANABRAVA DIAMOND CORPORATION**  
 CHAPLEAU CH01-38,39,46,47,49,52 AREAS, ONTARIO

**TOTAL MAGNETIC FIELD**

DIGHEM SURVEY	NTS: 410/10.15	GEOPHYSICIST:
DATE: FEBRUARY, 2002	JOB: 2094	SHEET: 1
Fugro Airborne Surveys		



5286000 N

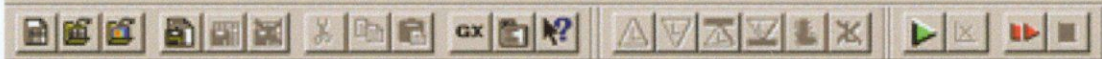
5287000 N

5288000 N

356000 E

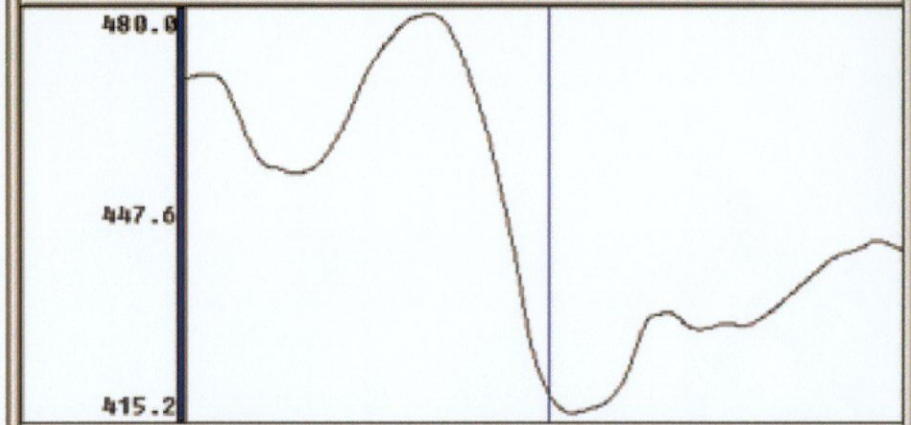
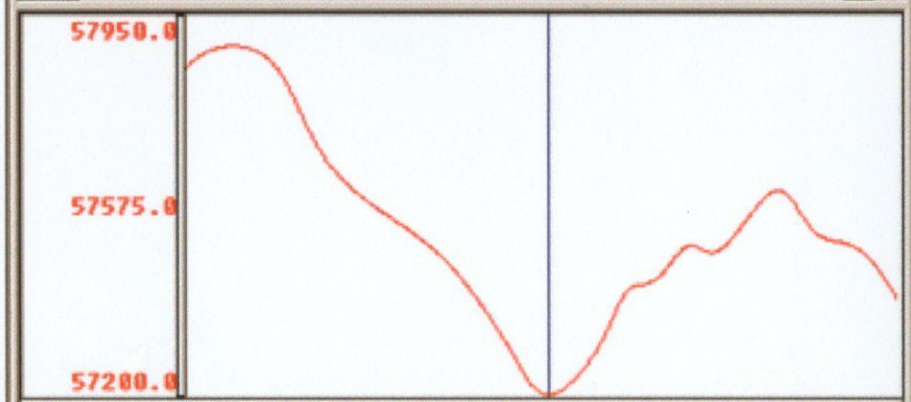
357000 E

358000 E

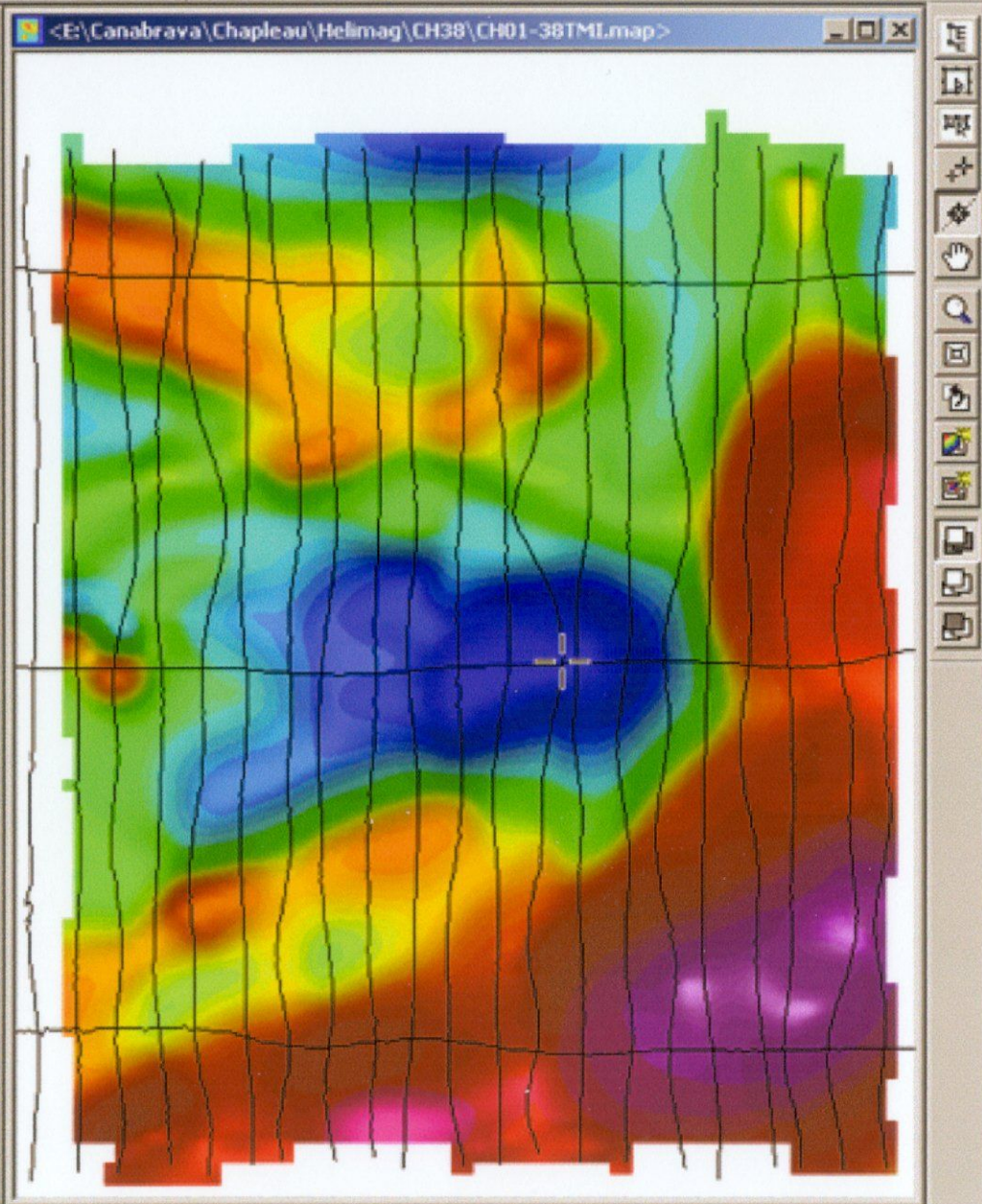


<E:\Canabrava\Chapleau\Helimag\CH38\CH01-38.gdb>

✓ L78138:2	X	Y	227BIRD	FID
7409.5	357498.6	5287026.5	420.8	7409.50
7409.6	357498.9	5287028.5	420.4	7409.60
7409.7	357499.0	5287030.5	420.0	7409.70
7409.8	357499.1	5287032.5	419.7	7409.80
7409.9	357499.1	5287034.0	419.4	7409.90
7410.0	357499.1	5287036.0	419.1	7410.00



227BIRD	5286459.5	5287026.7	5287593.8
Y			





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**APPENDIX A**  
**REPORT B-055 - TERRAQUEST LTD.**

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**OPERATIONS REPORT**

**HIGH SENSIVITY MAGNETIC  
AIRBORNE SURVEY**

**CHAPLEAU BLOCK**

**SUDBURY DISTRICT, ONTARIO**

for

**CANABRAVA DIAMOND CORPORATION**

by

**TERRAQUEST LTD.**

October 12, 2001

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## 1.0 INTRODUCTION

This report describes the specification and results of an airborne geophysical survey carried out for CANABRAVA DIAMOND CORPORATION, 1650 – 701 West Georgia Street, Vancouver, BC, V6C 1C6, attention Mr. George Read, Vice President Exploration, telephone 604-669-2525, fax 604-688-5175, email [info@canabrava.ca](mailto:info@canabrava.ca). The survey was performed by Terraquest Ltd., 1373 Queen Victoria Avenue, Mississauga, Ontario, Canada L5H 3H2, telephone 905-274-1795, fax 905-274-3936 and email [info@terraquest.ca](mailto:info@terraquest.ca).

The purpose of the survey of this type is to collect geophysical data that can be used to prospect directly for anomalous magnetic areas in the earth's crust which may be caused by or related to economic minerals. Secondly, the geophysical patterns may be used indirectly for exploration by mapping the geology in detail, including the faults, shear zones, folding, alteration zones and other structures.

To obtain this data, the area was systematically traversed by an aircraft carrying geophysical equipment along parallel flight lines spaced at even intervals and oriented so as to intersect the geology and structure in a way as to provide optimum contour patterns of the geophysical data.

## 2.0 SURVEY AREA

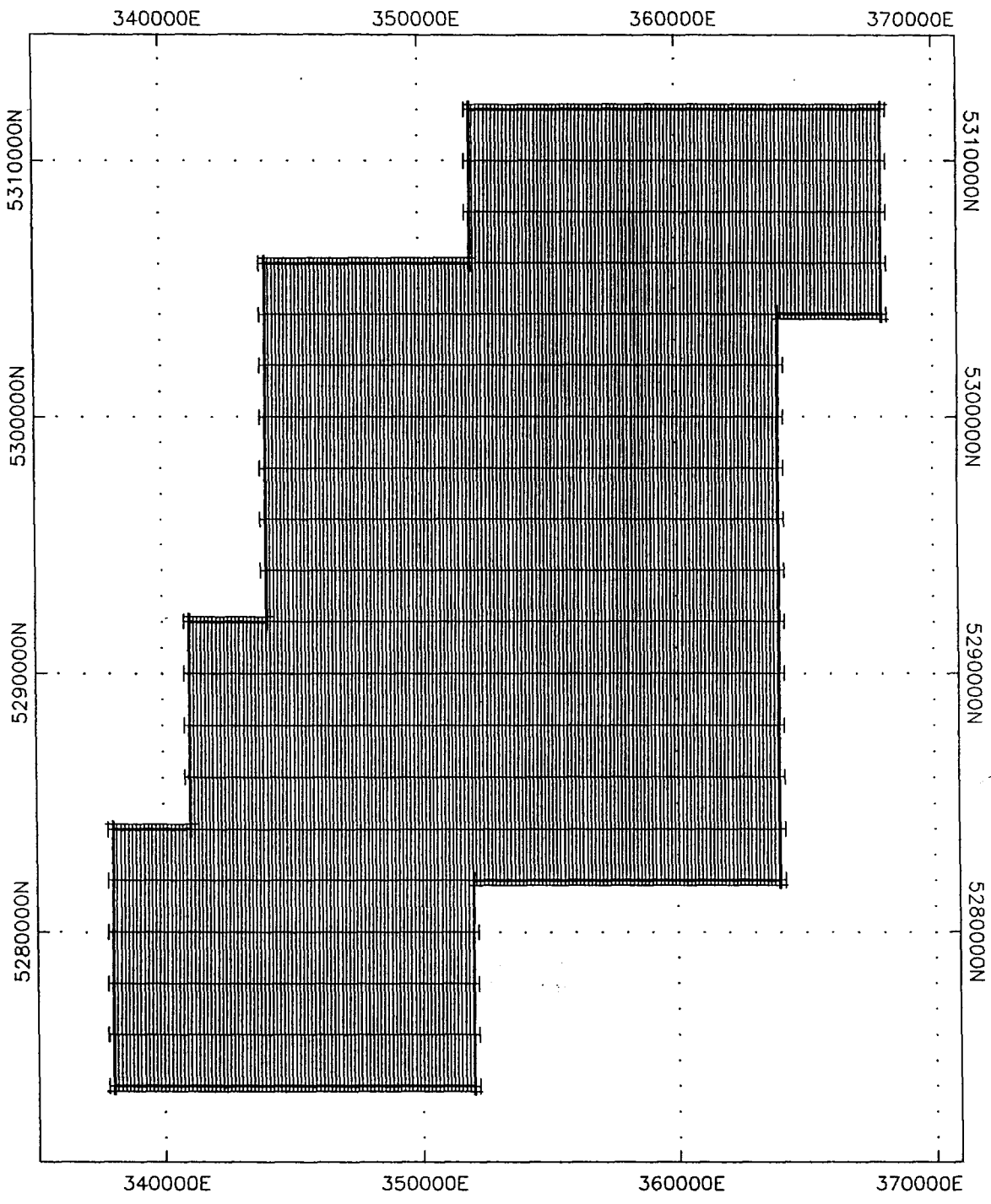
The survey area is in northern Ontario in the Sudbury District, approximately 130 kilometres east of the city Wawa, 130 kilometres southwest of Timmins, and 20 kilometres east of Chapleau. It covers all or parts of the following townships: Sandy, Hellyer, Gamey, Crocket, Raney, Lackner, Halcrow, Denyes, Halsey, Mountbatten, Tooms, Greenlaw, Nimitz and DeGaulle. Route #129 passes within a few kilometres of the southern boundary and Route #101 within a few kilometres of the northern boundary. The survey area can be accessed by numerous bush roads. The survey area is irregular in shape; the east west axis measures 30 kilometres and the north south axis measures 30.8 kilometres. The centre of the survey is approximately 48 degrees 50 minutes north and 82 degrees 55 minutes west. The survey coordinates in the NAD27 datum Zone 17 as supplied by the client are as follows:

338050.0	5274000.0	AREA CORNER 1
338050.0	5284000.0	AREA CORNER 2
341050.0	5284000.0	AREA CORNER 3
341050.0	5292000.0	AREA CORNER 4
344050.0	5292000.0	AREA CORNER 5
344050.0	5306000.0	AREA CORNER 6
352000.0	5306000.0	AREA CORNER 7
352000.0	5312000.0	AREA CORNER 8
368000.0	5312000.0	AREA CORNER 9
368000.0	5304000.0	AREA CORNER 10
364000.0	5304000.0	AREA CORNER 11
364000.0	5282000.0	AREA CORNER 12
352000.0	5282000.0	AREA CORNER 13
352000.0	5274000.0	AREA CORNER 14

## 3.0 EQUIPMENT SPECIFICATIONS

### 3.1 AIRCRAFT

The survey was carried using a single engine Cessna 206U aircraft registration C-GGLS, which carries three high sensitivity magnetometers. It is equipped with long range tanks, outboard tanks (total 9 hours range), tundra tires, cargo door and full avionics.



**CHAPLEAU BLOCK**  
Line+Tie=4963+403=5366 km  
Aug 01/01 TERRAQUEST LTD.



The aircraft has been extensively modified to support a tail stinger and two wing tip extensions. The transverse separation between the wing tip sensors is 13.5 metres and the longitudinal separation to the tail sensor is 7.2 metres. Considerable effort has been made to remove all ferruginous materials near the sensors and to ensure that the aircraft electrical system does not create any interference or noise. The figure of merit using Geological Survey of Canada standards is approximately 9 nT uncompensated and approximately 0.8 to 1.2 nT compensated depending on the latitude and geological environment..

The aircraft is owned and operated by Terraquest Ltd. under full Canadian Ministry of Transport approval and certification for specialty flying including airborne geophysical surveys. The aircraft is maintained at base operations by a regulatory AMO facility, Leggat Aviation Inc. and when in the field, by a Terraquest Ltd. AME who is also in association with Leggat Aviation Inc.

### 3.2 AIRBORNE GEOPHYSICAL EQUIPMENT

The primary airborne geophysical equipment includes three high sensitivity cesium vapour magnetometers. Ancillary support equipment includes a tri-axial fluxgate magnetometer, video camera, video recorder, radar altimeter, barometric altimeter, GPS receiver, GPS receiver with a real-time correction service, and a navigation system. The navigation system comprises a left/right-up/down indicator for the pilot and a screen showing the survey area, planned flight lines, and the real time flight path. All data were collected and stored by the data acquisition system. The following provides detailed equipment specifications:

#### Cesium Vapour Magnetometer Sensor (mounted in tail stinger and wing tip extensions)

Model	CS-2
Manufacturer	Scintrex
Resolution	0.001 nT counting at 0.1 per second
Sensitivity	+/- 0.005 nT
Dynamic Range	15,000 to 100,000 nT
Fourth Difference	0.02 nT

#### Tri-Axial Fluxgate Magnetic Sensor (for compensation, mounted in midpart of tail stinger)

Model	MAG-03MC
Manufacturer	Bartington Instruments Ltd.
Input	24-34 VDC, >30 milliamps
Field Range	+/- 100,000 nanotesla
Internal noise	at 1Hz to 1 kHz: 0.6 nT rms.
Bandwidth	0 to 1 kHz maximally flat, -12 dB/octave roll off beyond 1 kHz
Freq. Response	1 to 100 Hz: +/-0.5%; 100 to 500 Hz: +/-1.5%; 0.5 to 1 kHz: +/-5.0%
Calibration Accuracy	+/-0.5%
Orthogonality	+/-0.5% worst case
Package alignment	+/-0.5% over full temperature range
Scaling Error	absolute: +/-0.5%; between axes: +/-0.5%

#### Video Camera (mounted in belly of aircraft)

Model	VDC-2982 (colour)
Manufacturer	Sanyo
Serial Number	698000-30
Specifications	½", 470hr, 1.3LX, 12 VDC, C/CS, EI/ES, backlite compensation
Lens	Rainbow 2/3", 4.7 mm, F1.8-360, auto iris

#### Video Recorder (mounted in rack)

Model	AG 2400 (commercial grade) 12 VDC
Manufacturer	Panasonic
Media	VHS cassette
Serial Number	C8TA00281

**Radar Altimeter**

Model	KRA-10A
Manufacturer	King
Serial Number	071-1114-00
Accuracy	5% up to 2,500 feet
Calibrate accuracy	1%
Output	Analog for pilot, converted to digital for data acquisition

**Barometric Altimeter**

Model	LX18001AN
Manufacturer	Sensym
Source	coupled to aircraft barometric system

**Navigation Interface (console mounted in rack with remote displays for pilot)**

Model	PNAV 2001
Manufacturer	Picodas Group Inc.
Data input	real time processing of GPS output data
Pilot readout	left/right and up/down pilot indicator
Operator readout	screen modes: map, survey and line
Data recording	all data recorded in real time by PDAS 1000

**Real-Time GPS Correction (connects to Novatel GPS receiver see below)**

Model	Landstar Mark III
Manufacturer	Racal
Antenna	post type
Operating temperature	0-50 °C
Broadcast Services	Service Satellite Link: American Satellite Corp. (AMSC) L band broadcast (1525 to 1559 MHz satellite band) Data update 2 seconds, Data latency 5-6 seconds Cold acquisition 12 seconds Reacquisition 7 seconds

**Power supplies:**

- 1) PC6B converter to convert 13.75 volt aircraft power to 27.5 volts DC.
- 2) Power distribution unit located in the instrument rack, manufactured by Picodas Group Inc., interfaces with the aircraft power and provides filtered and continuous power at 13.75 and 27.5 VDC to components.
- 3) The 1000A console manufactured by Picodas Group Inc. contains three 32 VDC switching power supply for the cesium vapour magnetometer sensors; console also provides switching power for fluxgate magnetometer (real time magnetic compensation), radar altimeter, barometric altimeter, and ancillary equipment.

**Data Acquisition System (mounted in rack)**

Model	PDAS 1000
Manufacturer	Picodas Group Inc.
Operating System	MSDOS
Microprocessor	80486dx-66 CPU
Coprocessor	Intel 80486dx
Memory	on board 8 MB, page interleaving, shadow RAM for BIOS, EMS 4.0
Clock	real time, hardware implementation of MC14618 in the integrated peripheral controller
I/O slots	5 AT and 3 PC compatible slots
Display	electroluminescent 640 x 400 pixels
Graphic display	scrolling analog chart with 5 windows operator selectable, freeze display capability to hold image for inspection

Recording media	standard hard drive with extra shock mounts, standard floppy drive and quarter inch tape backup (QIC format)
Sampling	selectable sampling for each input type: 1.0, 0.5, 0.25, 0.2, 0.1 seconds
Inputs	12 differential analog input with 16 bit resolution
Serial ports	2 RS-232C (expandable)
Parallel ports	10 definable 8 bit I/O; 2 definable 8 bit outputs

The PDAS 1000 contains several boards as described below:

**Magnetometer Board (three boards, one for each magnetometer sensor)**

Model	PCB
Manufacturer	Picodas Group Inc.
Input range	20,000 – 100,000 nT
Sampling	1,000 per second
Bandwidth	selectable 0.7, 1.0 or 2.0 Hz
Resolution	0.0001 nT
Microprocessor	TMS 9995
Firmware	8 Kbit EPROM board resident
Internal crystal	18,432 kHz
Crystal accuracy	absolute <0.01%
Host interfacing	8 kByte dual port memory
Address selection	within 20 bit addressing in 8 kByte software selectable steps
Input signal	TTL, CMOS, open collectible compatible or sine wave with decoupler
Input impedance	TTL >1 kOhm

Magnetic compensation for aircraft and heading effects is done in real time. Raw magnetic values are also stored and thus compensation with different variable can be performed at a later date.

**GPS Differential Receiver Board**

Model	GPS card 3951 R
Manufacturer	Novatel
Antenna	Model 511, low profile
Channels	12
Position update	0.2 second for navigation
Accuracy	position with SA implement 100 metres, with no SA 10 metres, velocity 0.1 knot time recovery 1pps, 100 nsec pulse width
Data recording	all raw GPS and positional data logged by PDAS1000

**Analog Processor Board**

Model	PCB
Manufacturer	Picodas Group Inc. Provides separate A/D converter for each analog input with no multiplexing; each channel is sampled at a rate of 1,000 samples per second with digital processing applied

### 3.3 BASE STATION EQUIPMENT

High sensitivity magnetic base station data was provided by a cesium vapour magnetometer logging onto a notebook and with time synchronization from the GPS base station receiver.

The magnetometer is the same as used in the aircraft, a CS-2 magnetometer manufactured by Scintrex. The processor is also the same as used in the aircraft but is housed in a portable box model MEP-710, manufactured by Picodas Group Inc. The logging software is written by Picodas Group Inc., BASEMAG version 5.02 for an IBM compatible PC (notebook) with RS232 input. It supports real time graphics,



automatic startup, compressed data storage, selectable start/stop times, plotting of data to screen or printer at user-selected scales, and fourth-digital difference and diurnal quality flags which are set by user in BASEPLOT. Time recorded is taken from the base GPS receiver.

The GPS base station data are provided by a GPS receiver, with logging onto a notebook. These data were used to perform post flight differential corrections using C3NAVs software to the flight path data.

Model	MX 4200D
Manufacturer	Magnavox
Serial number	5057
Type	continuous tracking, L1 frequency, C/A ode (SPS), 6-channel independent
Receiver sensitivity	-143 dBm Costas threshold
Logging rate	1 per second

## 4.0 SURVEY SPECIFICATIONS

### 4.1 LINES AND DATA

Survey lines	4963 km
Tie lines	403 km
Total Survey	5,366 km
Survey Line Interval	150 metres
Tie Line Interval	2 km
Survey Line Direction	000 degrees
Tie Line Direction	090 degrees
Terrain Clearance	80 metres (mean terrain clearance)
Average Ground Speed	60 metres/second
Data Point Interval	6 metres

### 4.2 TOLERANCES

**Line Spacing:** Reflights will take place if the final differentially corrected flight path deviates from the intended flight path by +/-25% of the line spacing over a distance greater than 1 kilometre.

**Terrain Clearance:** The aircraft terrain clearance will be smoothly maintained at 100 metres MTC in a drape mode. Reflights will take place if the final differentially corrected altitude deviates from the flight altitude by +/-35% over a distance of one kilometre or more.

**Diurnal Magnetic Variation:** The airborne survey will be confined to periods in which the diurnal activity is 10 nT or less over a chord of 2 minutes in length.

**GPS Data:** GPS data shall include at least four satellites for accurate navigation and flight path recovery. There shall be no significant gaps in any of the digital data including GPS and magnetic data.

### 4.3 NAVIGATION AND RECOVERY

The satellite navigation system was used to ferry to the survey sites and to survey along each line. The survey coordinates of each area outline was supplied by the client and was used to establish the survey boundaries and the flight lines. The Clark 1866 ellipsoid for Canada East was used with x-y-z delta shifts of 22, -160 and -190 respectively. The UTM zone is 17.

The flight path guidance accuracy is variable depending upon the number and condition (health) of the satellites employed. The selective availability normally imposed by the military was at a minimum during this period and consequently the accuracy was for the most part better than 10 metres. Real-time correction

using the Racal (receiver and broadcast services) improves the accuracy to about 3 metres or less. Post flight differential correction, which corrects for satellite range errors, using the base station data improves the accuracy of the recovered flight to less than 2-3 metres.

A video camera recorded the ground image along the flight path. A video display screen in the cockpit enabled the operator to monitor the flight path during the survey.

#### **4.4 OPERATIONAL LOGISTICS**

The base of operations was in Chapleau, Ontario. The base station (combined high sensitivity magnetic and GPS) was set up at the airport.

The crew mobilized to the area on August 21<sup>th</sup> and set up the base station on August 22<sup>nd</sup>. The survey was flown in 11 flights from G164 to G174 including survey, tie, boundaries, compensation, reflights, testing and Figure of Merit, from August 22<sup>nd</sup> to September 6<sup>th</sup> 2001.

#### **5.0 DATA PROCESSING**

The data were transmitted via an FTP site to Controlled Geophysics Inc. (CGI) processing laboratory in Thornhill, Ontario, Canada where it was reviewed thoroughly for quality control and tolerances on all channels. This included post flight differential GPS corrections to the flight path, making flight path plots, importing the base station data, creating a database on a flight by flight basis, and posting the data. All data were checked for continuity and integrity. Any errors or omission or data beyond tolerances were flagged for reflight and the crew was notified by return FTP transmission, ready for their flight in the morning.

The final processing involved tie line leveling in the standard manner by tying the survey lines to the tie lines using GEOSOFT software. The total field was gridded and microlevelled in the Fourier domain (generally less than 1 nT corrections) to reduce any linear noise along the flight path without degrading the geologic signal. The vertical magnetic gradient was calculated from the final processed total magnetic field gridded data. The final levelled datasets were gridded and were contoured.

The measured horizontal gradient was obtained as follows: a) the transverse gradient is the value from the left sensor minus the value from the right sensor divided by their separation, b) the longitudinal gradient is the difference between the tail sensor and the average of the left and right sensors, and divided by the longitudinal separation, c) the horizontal gradient is the vector sum of the transverse and longitudinal gradients. In addition every other line is flipped to accommodate the flight direction and a shift is applied to equalize the sensors.

The final processed magnetic data were not plotted as maps but rather supplied directly to the client as digital files of the gridded data. The horizontal gradient is files include plotted as vectors along the flight lines on the same plot as the calculated vertical gradient.

The final processed database and gridded data are included in the CD-ROM archive.

## 6.0 SUMMARY

An airborne high sensitivity magnetic survey with three magnetometers was performed at 80 metre mean terrain clearance, 150 metre line interval, 2 kilometre tie line interval, and data sample points at 6 metres along the flight lines. A high sensitivity magnetic and a GPS base station located in Chapleau, Ontario recorded the diurnal magnetic activity and reference GPS data during the survey for adherence to survey tolerances and post flight corrections in the flight path.

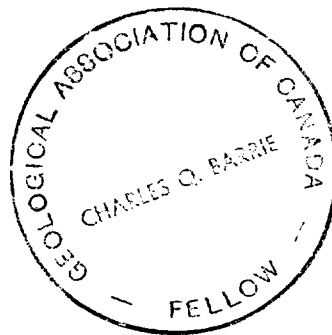
The data were subjected to final processing to produce digital files only of total magnetic field and calculated vertical magnetic gradient combined with vectors of the measured horizontal gradient which are plotted along the flight lines. All data have been archived on a CD-ROM.

Respectfully Submitted,

TERRAQUEST LTD.



Charles Q. Barrie, M.Sc.



## APPENDIX I

### PERSONNEL

Field:	Pilot Operators	Brian Harvey Jim Bursey, Paul Beaubien
Office:	Chief Geophysicist Manager	Chris Vaughan (CGI) Charles Barrie

## APPENDIX II

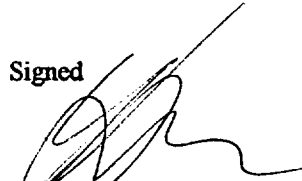
### CERTIFICATE OF QUALIFICATION

I, Charles Barrie, certify that I:

- 1) am registered as a Fellow with the Geological Association of Canada and work professionally as a geologist,
- 2) hold an Honours degree in Geology from McMaster University, Canada, obtained in 1977,
- 3) hold an M.Sc. in Geology from Dalhousie University, Canada, obtained in 1980,
- 4) am a member of the Prospectors and Developers Association of Canada,
- 5) am a member of the Canadian Institute of Mining , Metallurgy and Petroleum,
- 6) have worked as a geologist for over twenty five years,
- 7) am employed by and am an owner of Terraquest Ltd., specializing in high sensitivity airborne geophysical surveys, and
- 8) have prepared this operations and specifications report pertaining to airborne data collected by Terraquest Ltd..

Mississauga, Ontario, Canada  
October 12, 2001

Signed

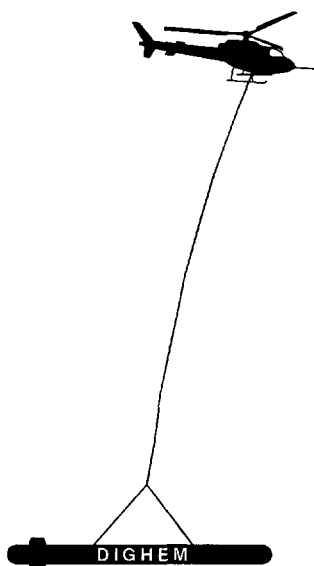


Charles Q. Barrie, M.Sc.  
Vice President, Terraquest Ltd.

**APPENDIX B**  
**REPORT #2094 - FUGRO AIRBORNE SURVEYS**

AIRBORNE MAGNETOMETER SURVEY  
FOR  
CANABRAVA DIAMOND CORPORATION  
BLOCKS 1- 23 CHAPLEAU AREA  
ONTARIO

NTS 410/10,11,14,15



Fugro Airborne Surveys Corp.  
Mississauga, Ontario

Russell Imrie B.Sc. Geology  
Geophysical Dataprocessor

February 28, 2002

## **SUMMARY**

This report describes the logistics and results of an airborne magnetometer survey carried out for Canabrava Diamond Corporation, over 25 targets located in Nimitz, De Gaulle, Tooms, Greenlaw, Mountbatten, Denys, Lackner, Halcrow, Crockett, Raney and Hellyer townships, near Chapleau, Ontario. For the purpose of flying, the targets were combined into 23 survey areas. Traverse lines accounted for 564 line kilometres and the tie lines 79 kilometres for a total of 643 km. The survey was flown from January 29 to February 1, 2002.

The purpose of the survey was to record detailed magnetic data over several areas to provide information that could be used to map the geology and structure of the survey areas. This was accomplished by using a high sensitivity cesium magnetometer. The information from this sensor was processed to produce maps that display the magnetic properties of the survey areas. A GPS electronic navigation system, utilizing a satellite (UHF) link, ensured accurate positioning of the geophysical data with respect to the base maps.



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## APPENDICES

- A. List of Personnel
- B. Statement of Cost
- C. Background Information
- D. Archive Description

## 1. INTRODUCTION

A magnetic survey was flown for Canabrava Diamond Corporation, from January 29 to February 1, 2002 over 25 targets that have been combined to create 23 survey blocks located near Chapleau, Ontario. The survey areas can be located on NTS map sheets 41O/10,11,14,15 (Figures 1-3). The areas were combined onto final map sheets as noted in Chart 1.

Survey coverage consisted of 643 line-km, including tie lines. Flight lines were flown at an azimuth of 0 or 90 (see Chart 1). All areas had a traverse line separation of 50 metres and three tie lines.

The survey employed a magnetometer, radar altimeter, video camera, analog and digital recorders, and an electronic navigation system. The instrumentation was installed in an A-Star 350B2 helicopter, Registration CF ZTA provided by Quesstral Helicopters Ltd. The helicopter flew at an average airspeed of 120 km/h with a sensor height of approximately 30 metres.

Section 2 provides details on the survey equipment, the data channels, their respective sensitivities, and the navigation/flight path recovery procedure.

<b>Anomaly</b>	<b>NAD83 Target x</b>	<b>NAD83 Target y</b>	<b>UTM</b>	<b>NTS</b>	<b>Township</b>	<b>Survey Direction</b>	<b>Map Sheet</b>
CH01-1	339993	5274722	17	41-O/11	Nimitz	N-S	01
CH01-10	345373	5278187	17	41-O/10	De Gaulle	E-W	02
CH01-16	338515	5279197	17	41-O/11	Nimitz	E-W	01
CH01-17	346730	5281650	17	41-O/11	De Gaulle	E-W	02
CH01-21	357654	5282927	17	41-O/10	Tooms	N-S	03
CH01-22	355413	5282455	17	41-O/10	Tooms	N-S	03
CH01-38	357384	5287037	17	41-O/10	Tooms	N-S	04
CH01-39	363065	5288428	17	41-O/10	Greenlaw	N-S	04
CH01-46	362733	5289915	17	41-O/10	Greenlaw	N-S	04
CH01-47	362605	5289534	17	41-O/10	Greenlaw	N-S	04
CH01-44	349874	5289883	17	41-O/11	Mountbatter	E-W	09
CH01-45	354371	5289529	17	41-O/10	Tooms	N-S	05
CH01-49	361848	5292017	17	41-O/10	Denys	E-W	04
CH01-50	349282	5292789	17	41-O/14	Lackner	E-W	09
CH01-52	357208	5293402	17	41-O/15	Halcrow	N-S	04
CH01-55	360358	5295376	17	41-O/15	Halcrow	N-S	06
CH01-57	353914	5295681	17	41-O/15	Halcrow	N-S	05
CH01-61	354226	5296463	17	41-O/15	Halcrow	E-W	09
CH01-62	356768	5297308	17	41-O/15	Halcrow	N-S	06
CH01-65	358414	5298726	17	41-O/15	Halcrow	N-S	06
CH01-71	360634	5301350	17	41-O/15	Crockett	N-S	06
CH01-72	359008	5301379	17	41-O/15	Crockett	N-S	06
CH01-74	355409	5302740	17	41-O/15	Crockett	N-S	07
CH01-81	365770	5309470	17	41-O/15	Raney	N-S	08
CH01-84	365271	5311102	17	41-O/15	Hellyer	E-W	08

**Chart 1. Anomaly location and line direction.** The boxed anomalies were flown as a single area.

## 2. SURVEY EQUIPMENT

This section provides a brief description of the geophysical instruments used to acquire the survey data and the calibration procedures employed.

### Magnetometer

Model: Fugro HM-7 processor with a Scintrex CS2 sensor  
Type: Optically pumped cesium vapour  
Sensitivity: 0.01 nT  
Sample rate: 10 per second

The magnetometer sensor is housed in the bird, 27 m below the helicopter.

### Magnetic Base Station

Model: Fugro CF1 base station  
Sensor type: Geometrics G822 sensor  
Counter specifications: Accuracy:  $\pm 0.1$  nT  
Resolution: 0.01 nT  
Sample rate 1 Hz  
Sensitivity: 0.10 nT  
Sample rate: 0.2 per second

The base station magnetometer was located at latitude 47° 49.26692' N, longitude 83° 21.43664' W at an elevation of 425.8 metres above the WGS84 ellipsoid.

A digital recorder is operated in conjunction with the base station magnetometer to record the diurnal variations of the earth's magnetic field. The clock of the base station is synchronized with that of the airborne system to permit subsequent removal of diurnal drift.

## **Radar Altimeter**

Manufacturer:	Honeywell/Sperry
Model:	RT220
Type:	Short pulse modulation, 4.3 GHz
Sensitivity:	0.3 m

The radar altimeter measures the vertical distance between the helicopter and the ground.

## Analog Recorder

Manufacturer: RMS Instruments  
Type: DGR33 dot-matrix graphics recorder  
Resolution: 4x4 dots/mm  
Speed: 1.5 mm/sec

The analog profiles are recorded on chart paper in the aircraft during the survey. Table 2-1 lists the geophysical data channels and the vertical scale of each profile.

**Table 2-1. The Analog Profiles**

Channel Name	Parameter	Scale units/mm	Designation on Digital Profile
KPA1	Barometric pressure	50mbar	KPA1
ALTR	altimeter (radar)	10 ft	ALTR
MAGC	magnetics, coarse	20 nT	MAGC
MAGF	magnetics, fine	2.0 nT	MAGF

## Digital Data Acquisition System

Manufacturer: RMS Instruments  
Model: DGR 33  
Recorder: Flash Card

The data are stored on a 48Mb flash card and are downloaded to the field workstation PC at the survey base for verification, backup and preparation of in-field products.

## **Video Flight Path Recording System**

Type: Panasonic VHS Colour Video Camera (NTSC)

Model: AG-720

Fiducial numbers are recorded continuously and are displayed on the margin of each image. This procedure allows visual correlation of analog and digital data with topographic features.

## **Navigation (Global Positioning System)**

### Airborne Receiver

Model: Ashtech Z-Surveyor

Type: Dual frequency, 12 channels, full wavelength carrier on L1 and L2

Accuracy: Manufacturer's stated accuracy for differential corrected GPS is <1 metre

The airborne GPS antenna was installed on the bird.

Base Station

Model:	Ashtech Z-Surveyor
Type:	Dual frequency, 12 channels, full wavelength carrier on L1 and L2
Accuracy:	Manufacturer's stated accuracy for differential corrected GPS is <1 metre

The Ashtech Z-Surveyor and the Marconi Allstar units are operated as base stations and utilize time-coded signals from at least four of the twenty-four NAVSTAR satellites. The raw base station data are recorded permitting post-survey processing for theoretical accuracy of better than 5 metres. The GPS records data relative to the WGS84 ellipsoid, which is the basis of the revised North American Datum (NAD83). The Ashtech Z-Surveyor base was used as the primary unit for post processing.

Although the base station receiver is able to calculate its own latitude and longitude, a higher degree of accuracy can be obtained if the reference unit is established on a known benchmark or triangulation point. The GPS base station was located at latitude 47° 49.26564700' N, longitude 83° 21.44312667' W at an elevation of 424.6 metres above the WGS84 ellipsoid. The base station magnetometer was also at this location.

The Ashtech receiver is coupled with a PNAV navigation system for real-time guidance.



## **Field Workstation**

A PC is used at the survey base to verify data quality and completeness. Flight data are transferred to the PC hard drive to permit the creation of a database using a proprietary software package (typhoon-version 17.01.04). This process allows the field operators to display both the positional (flight path) and geophysical data on a screen or printer.

### 3. PRODUCTS AND PROCESSING TECHNIQUES

Table 3-1 lists the maps and products that have been provided under the terms of the survey agreement. Other products can be prepared from the existing data, if requested.

Most parameters can be displayed as contours, profiles, or in colour.

#### Base Maps

Base maps of the survey area have been produced from published topographic maps. These provide a relatively accurate, distortion-free base which facilitates correlation of the navigation data to the UTM grid. The original topographic maps are scanned to a bitmap format and combined with geophysical data for plotting the final maps. All maps are created using the following parameters:

#### Projection Description:

Datum:	NAD83
Ellipsoid:	GRS 1980
Projection:	UTM (Zone: 17)
Central Meridian:	81° W
False Northing:	0
False Easting:	500000
Scale Factor:	0.9996
WGS84 to Local Conversion:	Molodensky
Datum Shifts:	DX: 0 DY: 0 DZ: 0

### **Table 3-1 Survey Products**

1. Final Black and White Maps (3 sets) @ 1:10,000  
Total magnetic field  
Calculated vertical magnetic gradient
  
2. Colour Maps (2 sets) @ 1:10,000  
Total magnetic field  
Calculated vertical magnetic gradient
  
3. Additional Products  
Digital archive including Geosoft format database, grids and HP1055CM plot files  
Survey report (3 copies)  
Analog chart records  
Flight path videocassettes

Note: Other products can be produced from the survey data, if requested.

### **Total Magnetic Field**

The aeromagnetic data were inspected in grid and profile format. Spikes were removed manually with the aid of a fourth difference calculation and small gaps were interpolated using an Akima spline. The diurnal magnetic data had a base of 57620 nT removed, were inspected and filtered, then subtracted from the total field magnetic data. Grids were created and compared to the non-diurnally corrected data to ensure diurnal removal resulted in a better quality of data. The diurnally corrected grids were then contoured and the lag was determined and applied. Calculated Vertical Magnetic Gradient grids were

produced to aid in the detection and removal of lag. Once the lag had been removed grids were created and examined to determine if additional leveling was required. Tie line leveling was used on areas; CH01-1, CH01-10, CH01-16, CH01-22, CH01-38, CH01-49, CH01-50, CH01-57, CH01-61, CH01-62, CH01-65, CH01-74, CH01-81. The remaining areas did not show improvement with tie line levelling. Manual adjustments were applied to any lines that required levelling, as indicated by shadowed images of the gridded vertical gradient.

## **Calculated Vertical Magnetic Gradient**

Geosoft's Magmap software was used to calculate the first vertical gradient of the levelled total magnetic field data. This calculation enhances the response of magnetic bodies in the upper 500 metres and attenuates the response of deeper bodies. The resulting vertical gradient map provides better definition and resolution of near-surface magnetic units. It also identifies weak magnetic features that may not be evident on the total field map. However, regional magnetic variations and changes in lithology may be better defined on the total magnetic field map.

## **Magnetic Derivatives (optional)**

The total magnetic field data can be subjected to a variety of filtering techniques to yield maps of the following:

enhanced magnetics

second vertical derivative

reduction to the pole/equator

magnetic susceptibility with reduction to the pole

upward/downward continuations

analytic signal

All of these filtering techniques improve the recognition of near-surface magnetic bodies, with the exception of upward continuation. Any of these parameters can be produced on request. Fugro's proprietary enhanced magnetic technique is designed to provide a general "all-purpose" map, combining the more useful features of the above parameters.

## **Contour, Colour and Shadow Map Displays**

The geophysical data are interpolated onto a regular grid using a modified Akima spline technique. The resulting grid is suitable for generating contour maps of excellent quality. The grid cell size is 12.5 metres.

Interpolating the grid cells before plotting produces smoothly varying colour maps. The parameter is then incremented with respect to specific amplitude ranges to provide colour "contour" maps. On maps where two or more survey grids are presented the colour histogram has been calculated to best show the features on both grids. Colour maps of the total magnetic field are particularly useful in defining the lithology of the survey area.

The colour distribution for the Calculated Vertical Gradient maps has been computed with zero as the midpoint. This makes the grid values of zero appear as yellow on all the Calculated Vertical gradient maps.

## **4. SURVEY RESULTS**

### **General Discussion**

The survey results are presented on 9 separate map sheets for each parameter at a scale of 1:10,000. The maps have been named by the product type (ex. MAG, CVG) followed by the map sheet number. Sheets 5 and 9 cover the same area but sheet 5 has the anomalies that were flown north south and sheet 9 has the anomalies that were flown east west. The anomaly names, their UTM coordinates, their townships and their map sheet numbers are listed in Chart 1. The Geosoft format grids of the total magnetic intensity and calculated vertical gradient data are named with the product type (ex. MAG, CVG) and then the anomaly name. In the case where two anomalies are contained in the same grid both the anomaly names are used (ex. MAGCH01-394647.GRD)

Respectfully submitted,

**FUGRO AIRBORNE SURVEYS CORP.**

Russell Imrie B.Sc. Geology  
Geophysical Dataprocessor

R2094FEB.28

## APPENDIX A

### LIST OF PERSONNEL

The following personnel were involved in the acquisition, processing, and presentation of data, relating to an airborne magnetic survey carried out for Canabrava Diamond Corporation, near Chapleau, Ontario.

David Miles	Manager, Helicopter Operations
Emily Farquhar	Manager, Data Processing and Interpretation
Will Marr	Senior Geophysical Operator
Brett Robinson	Field Geophysicist
Bill Hofstede	Pilot (Questral Helicopters Ltd.)
Russell Imrie	Geophysical Dataprocessor
Lyn Vanderstarren	Drafting Supervisor

The survey consisted of 643 km of coverage, flown from January 29 to February 1, 2002.

All personnel are employees of Fugro Airborne Surveys, except for the pilot who is an employee of Questral Helicopters Ltd.



**APPENDIX B**  
**STATEMENT OF COST**

Date: February 28, 2002

**IN ACCOUNT WITH FUGRO AIRBORNE SURVEYS**

To: Fugro flying of Agreement dated January 28, 2002, pertaining to an Airborne Geophysical Survey of 25 targets combined into 23 survey blocks near Chapleau, Ontario.

Survey Charges

23 blocks at a fixed charge	\$ 72,220.00
37 extra line kms at \$59.00	\$ 2,183.00
plus mobilization costs of	<u>\$ 5,000.00</u>

Total (GST not included)	<u>\$ 79,403.00</u>
--------------------------	---------------------

Allocation of Costs

- Data Acquisition	(87.5%)
- Data Processing	(12.5%)

## **BACKGROUND INFORMATION**

### **Magnetics**

Total field magnetics provides information on the magnetic properties of the earth materials in the survey area. The information can be used to locate magnetic bodies of direct interest for exploration, and for structural and lithological mapping.

The total field magnetic response reflects the abundance of magnetic material, in the source. Magnetite is the most common magnetic mineral. Other minerals such as ilmenite, pyrrhotite, franklinite, chromite, hematite, arsenopyrite, limonite and pyrite are also magnetic, but to a lesser extent than magnetite on average.

In some geological environments, an EM anomaly with magnetic correlation has a greater likelihood of being produced by sulphides than one that is non-magnetic. However, sulphide ore bodies may be non-magnetic (e.g., the Kidd Creek deposit near Timmins, Canada) as well as magnetic (e.g., the Mattabi deposit near Sturgeon Lake, Canada).

Iron ore deposits will be anomalously magnetic in comparison to surrounding rock due to the concentration of iron minerals such as magnetite, ilmenite and hematite.

Changes in magnetic susceptibility often allow rock units to be differentiated based on the total field magnetic response. Geophysical classifications may differ from geological classifications if various magnetite levels exist within one general geological classification.

- Appendix C.2 -

Geometric considerations of the source such as shape, dip and depth, inclination of the earth's field and remanent magnetization will complicate such an analysis.

In general, mafic lithologies contain more magnetite and are therefore more magnetic than many sediments which tend to be weakly magnetic. Metamorphism and alteration can also increase or decrease the magnetization of a rock unit.

Textural differences on a total field magnetic contour, colour or shadow map due to the frequency of activity of the magnetic parameter resulting from inhomogeneities in the distribution of magnetite within the rock, may define certain lithologies. For example, near surface volcanics may display highly complex contour patterns with little line-to-line correlation.

Rock units may be differentiated based on the plan shapes of their total field magnetic responses. Mafic intrusive plugs can appear as isolated "bulls-eye" anomalies. Granitic intrusives appear as sub-circular zones, and may have contrasting rings due to contact metamorphism. Generally, granitic terrain will lack a pronounced strike direction, although granite gneiss may display strike.

Linear north-south units are theoretically not well-defined on total field magnetic maps in equatorial regions due to the low inclination of the earth's magnetic field. However, most stratigraphic units will have variations in composition along strike, which will cause the units to appear as a series of alternating magnetic highs and lows.

- Appendix C.3 -

Faults and shear zones may be characterized by alteration, which causes destruction of magnetite (e.g., weathering) which produces a contrast with surrounding rock. Structural breaks may be filled by magnetite-rich, fracture filling material as is the case with diabase dikes, or by non-magnetic felsic material.

Faulting can also be identified by patterns in the magnetic total field contours or colours. Faults and dikes tend to appear as lineaments and often have strike lengths of several kilometres. Offsets in narrow, magnetic, stratigraphic trends also delineate structure. Sharp contrasts in magnetic lithologies may arise due to large displacements along strike-slip or dip-slip faults.

## APPENDIX D

### ARCHIVE DESCRIPTION

Reference: CCD01695  
Disc 1 of 1  
Archive Date: 2002-03-07

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This archive contains FINAL DATA ARCHIVES of an airborne geophysical survey conducted by FUGRO AIRBORNE SURVEYS LTD. near Chapleau, Ontario on behalf of CANABRAVA DIAMOND CORPORATION during January 29 - February 1, 2001.

Job # 2094

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This archive comprises 107 files contained in 7 directories

\*\*\*\*\* Disc 1 of 1 \*\*\*\*\*

\

                  README.TXT - This file

GDB\

                          23 Geosoft Format Databases  
                  CH01-\*.GDB - Archive database for area CH01-\*

GRIDS\

                          46 Grids in Geosoft binary (float) format  
                  CVGCH01-\*.GRD - Vertical Gradient calculated from the Total Magnetic Intensity  
                  area ch01-  
                  MAGCH01-\*.GRD - Total Magnetic Intensity area CH01-\*

PLOTS\B&W

                          18 Black and white plot files created with an HP1055CM driver  
                  CVGBW\*.PRN - Calculated Vertical Gradient map \*  
                  MAGBW\*.PRN - Total Magnetic Intensity map \*

PLOTS\COLOUR

                          18 Colour plot files created with an HP1055CM driver  
                  CVG\*.PRN - Calculated Vertical Gradient map \*  
                  MAG\*.PRN - Total Magnetic Intensity map \*

REPORT\

                  2094.DOC - Logistics report for 2094 in MS Word 97 SR-2

---

The following is a list of data channels archived in the final .GDB's found on this CD;

- 1 - ALTBIRD - Height of the bird above the terrain (metres)
- 2 - CVG - Vertical Gradient calculated from the T.M.I (nT/m)
- 3 - DIURNAL - Diurnal magnetic variation (nT)
- 4 - FID - Fiducial
- 5 - MAG - Levelled, Diurnally corrected Total Magnetic Intensity (nT)
- 6 - MAGR - Raw Total Magnetic Intensity (nT)
- 7 - X - UTM Easting NAD27 Manitoba/Ontario (metres)
- 8 - Y - UTM Northing NAD27 Manitoba/Ontario (metres)
- 9 - Z - Height of bird above WGS84 Spheroid (metres)
- 10 - BALT - Barometric height of aircraft above sea level (metres)

---

The coordinate system for all grids is projected as follows

Datum	NAD83
Spheroid	GRS 1980
Projection	UTM
Central meridian	81 West
False easting	500000
False northing	0
Scale factor	0.9996
Northern parallel	N/A
Base parallel	N/A
WGS84 to local conversion method	Molodensky
Delta X shift	+0
Delta Y shift	+0
Delta Z shift	+0

---

If you have any problems with this archive please contact

Processing Manager  
FUGRO AIRBORNE SURVEYS LTD.  
2270 Argentia Road  
Mississauga, Ontario  
Canada L5N 6A6  
Tel (905) 812-0212  
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E-mail [toronto@fugroairborne.com](mailto:toronto@fugroairborne.com)

**APPENDIX C**  
**EXCERPT FROM:**  
**DEFINITION OF ANOMALIES FOR KIMBERLITE EXPLORATION**  
**ON THE CHAPLEAU CLAIM BLOCK BY MARTIN SAINT PIERRE**

**DEFINITION OF ANOMALIES FOR KIMBERLITE  
EXPLORATION ON THE CHAPLEAU CLAIM BLOCK.**

**Prepare  
By  
Martin St. Pierre  
For  
Canabrava Diamond Corporation**

**November 2001**



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Chapleau Claim Block Airborne Magnetic Anomaly Description and Location Table

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## **1.0 Introduction**

Canabrava Diamond Corporation contracted Martin St. Pierre, Geophysicist to conduct an interpretation of the airborne magnetic data acquired over their Chapleau claim block in Ontario, Canada. The interpretation consisted of defining magnetic anomalies for the purpose of discovering kimberlite intrusive bodies. The airborne data was collected by Terraquest Limited and processed by CGI Controlled Geophysics Inc. A fixed wing aircraft was used with flight lines at 150 metres interval and a nominal terrain clearance of 80 metres for a total line km of approximately 7,100 km. The survey measured the Total Magnetic Intensity (TMI) and magnetic gradients in the flight line and transverse directions. The anomalies were ranked according to a priority scheme based on five levels as follow: Low, Low to Moderate, Moderate, Moderate to High and High. A total of 84 anomalies were defined within the survey area, and resulted in 23 “Low”, 35 “Low to Moderate”, 21 “Moderate”, and 5 “Moderate to High”. No “High” priority anomalies were defined.

## **2.0 Interpretation methodology**

The interpretation was carried out using Geosoft Montaj software. It provides numerous gridding, filtering and viewing tools. One can view numerous image windows simultaneously, and interactively display several profiled parameters directly related to the geographic location on the image windows. When viewing specific areas the computer screen is partitioned into quarters, which consist of one profile and three image windows. Typically the profile window will show the TMI and Digital Terrain Model (DTM) data. The three remaining windows would display the following colour image: Total Magnetic Intensity (TMI), TMI with a vertical sun angle shadow of the TMI overlain, and in the final window two images consistinf of the Analytical Signal (AS), and the Automatic Gain Correction (AGC), were viewed alternatively. The AS combines the magnetic derivatives (calculated gradients), in the three Cartesian directions (x,y,z) in order to produce an enhanced image of the variations in the magnetic field. Since the airborne survey directly measures the gradients in the x and y directions, these values were used with the calculated z derivative to produce the AS grid. The AGC is used to enhance magnetic trends. It applies a predefined window size throughout the TMI grid for which it calculates the background, and then equalizes the values for the entire grid. This permits weaker trends that would otherwise be almost invisible due to the large dynamic range, to be clearly seen. The entirety of the survey was viewed with a window size 2.6 X 1.6 km. For each window subsection grids of the TMI, AS and AGS were produce in order to maximize detail. A total of 185 windows were needed to cover the entire area.

Viable kimberlite targets can range in diameter from 100 to 500 meters and more. It is therefore necessary to examine relatively small feature, and because of the 150 meter spaced flight lines, one line anomalies need to be taken seriously. The volcanic origin of kimberlites make them inherently unconformable, and their magnetic properties can range from high to low susceptibilities. In some cases non magnetic kimberlites can be detected because they are hosted in magnetic rock and therefore form a low. When

hosted within rocks of very similar susceptibility, a kimberlite may be recognised by disruptions in the fabric of the magnetic background. This type of detections benefits greatly from high density surveys with line spacing of 100 meters or less, and sensor terrain clearance of 35 meters or less.

The anomalies were ranked according to a priority scheme based on five levels as follow: Low, Low to Moderate, Moderate, Moderate to High and High. A “High” priority magnetic anomaly would have to be a circular feature clearly transecting geologic trends, and possessing characteristic magnetic properties. A circular magnetic low amplitude feature that clearly transects a magnetic high dyke could achieve the “High” priority ranking. A “Low” priority magnetic anomaly would usually be a weak low or high that is only partially isolated from surrounding magnetic features. A total of 84 anomalies were defined within the survey area, and resulted in 23 “Low”, 35 “Low to Moderate”, 21 “Moderate”, and 5 “Moderate to High”. A complete listing of the anomalies is provided in a table included in Appendix I. Appendix II contains 84 Drawings, one for each anomaly defined within the survey area. These drawings are screen dumps of the Geosoft Montaj presentation, as described in the first paragraph of this section, and inserted within a template containing titles and other information. For these drawings presentations the windows are 1.7 by 1 km. The following table presents a simplified listing of the anomalies sorted in their priority ranking.

ANOMALY NAME	EASTING	NORTHING	PRIORITY
	UTM 17N NAD27	UTM 17N NAD27	
"CH01-50"	349268	5292565	Moderate to High
"CH01-55"	360344	5295152	Moderate to High
"CH01-65"	358400	5298502	Moderate to High
"CH01-71"	360620	5301126	Moderate to High
"CH01-84"	365257	5310878	Moderate to High
"CH01-1"	339979	5274498	Moderate
"CH01-10"	345359	5277963	Moderate
"CH01-16"	338501	5278973	Moderate
"CH01-17"	346716	5281426	Moderate
"CH01-21"	357640	5282703	Moderate
"CH01-22"	355399	5282231	Moderate
"CH01-24"	352855	5282692	Moderate
"CH01-38"	357370	5286813	Moderate
"CH01-39"	363051	5288204	Moderate
"CH01-44"	349860	5289659	Moderate
"CH01-45"	354357	5289305	Moderate
"CH01-46"	362719	5289691	Moderate
"CH01-47"	362591	5289310	Moderate
"CH01-52"	357194	5293178	Moderate
"CH01-57"	353900	5295457	Moderate
"CH01-59"	344186	5294593	Moderate
"CH01-61"	354212	5296239	Moderate
"CH01-62"	356754	5297084	Moderate
"CH01-72"	358994	5301155	Moderate

"CH01-74"	355395	5302516	Moderate
"CH01-81"	365756	5309246	Moderate
"CH01-3"	343271	5274179	Low to Moderate
"CH01-6"	346562	5276348	Low to Moderate
"CH01-7"	341929	5276135	Low to Moderate
"CH01-8"	338633	5277581	Low to Moderate
"CH01-9"	340872	5277487	Low to Moderate
"CH01-13"	344930	5278898	Low to Moderate
"CH01-14"	340292	5279624	Low to Moderate
"CH01-15"	340288	5278668	Low to Moderate
"CH01-18"	350036	5280133	Low to Moderate
"CH01-19"	350610	5280463	Low to Moderate
"CH01-20"	359146	5282006	Low to Moderate
"CH01-25"	351662	5281860	Low to Moderate
"CH01-27"	339231	5282130	Low to Moderate
"CH01-32"	350297	5284820	Low to Moderate
"CH01-34"	342975	5285849	Low to Moderate
"CH01-37"	351058	5286334	Low to Moderate
"CH01-40"	354490	5288014	Low to Moderate
"CH01-41"	351816	5288517	Low to Moderate
"CH01-43"	341621	5288301	Low to Moderate
"CH01-48"	361692	5289809	Low to Moderate
"CH01-49"	361834	5291793	Low to Moderate
"CH01-51"	352844	5292415	Low to Moderate
"CH01-53"	359292	5293511	Low to Moderate
"CH01-54"	363499	5295082	Low to Moderate
"CH01-56"	355411	5295226	Low to Moderate
"CH01-60"	351054	5297046	Low to Moderate
"CH01-63"	363645	5298503	Low to Moderate
"CH01-66"	357654	5298754	Low to Moderate
"CH01-67"	354050	5298536	Low to Moderate
"CH01-69"	356299	5299442	Low to Moderate
"CH01-70"	363338	5301391	Low to Moderate
"CH01-76"	363346	5305130	Low to Moderate
"CH01-78"	366332	5307976	Low to Moderate
"CH01-79"	359765	5307832	Low to Moderate
"CH01-82"	366041	5309820	Low to Moderate
"CH01-2"	342059	5274530	Low
"CH01-4"	348649	5275122	Low
"CH01-5"	351814	5276177	Low
"CH01-58"	348683	5294542	Low
"CH01-64"	359738	5298049	Low
"CH01-68"	348364	5300253	Low
"CH01-73"	347329	5300959	Low
"CH01-75"	367241	5304833	Low
"CH01-77"	364378	5306458	Low
"CH01-80"	358993	5307415	Low
"CH01-83"	366928	5310175	Low
"CD01-28"	338942	5283533	Low
"CH01-11"	351658	5277508	Low
"CH01-12"	346885	5278808	Low
"CH01-23"	354205	5282422	Low

"CH01-26"	350173	5282502	Low
"CH01-29"	350023	5283507	Low
"CH01-30"	352249	5283236	Low
"CH01-31"	356899	5285482	Low
"CH01-33"	347314	5285634	Low
"CH01-35"	343140	5287310	Low
"CH01-36"	350175	5287063	Low
"CH01-42"	347180	5287703	Low

### 3.0 Conclusions

An interpretation of the airborne magnetic data acquired over Canabrava's Chapleau claim block has produced 84 anomalies possibly representing kimberlite intrusive bodies. Of these 23 are defined as "Low" priority, 35 "Low to Moderate", 21 "Moderate", and 5 "Moderate to High". No "High" priority anomalies were defined. The flight line spacing of 150 meters is relatively coarse, considering that a kimberlite with a 200 meter diameter is an attractive body. The aircraft terrain clearance is between 80 and 100 meters. Since kimberlites are volcanic they are usually found close to the surface covered only by the local overburden material and/or lakes. Because of this proximity to surface, aircraft terrain clearance has a large effect on resolving the magnetic expression of kimberlites. It is recommended that all "Moderate to High" and "Moderate" anomalies be subjected to high resolution geophysical surveys after a site visit has not ruled them out as possible kimberlites. Anomalies of "Low to Moderate" and "Low" priority should be investigated only if other compelling information, such as mineralogical evidence or the close proximity of another kimberlite, exists. High resolution geophysics can be done with airborne or ground methods. Airborne methods such as helicopter borne magnetics or Mag/EM with 50 meter line spacing and 25 to 35 meter terrain clearance flown over specific targets would go a long way to refine prioritization. Ground methods measuring the magnetic field 2 meters above ground on 50 meter spaced lines would provide greater resolution, but with 27 "Moderate" and "Moderate to High" anomalies the cost may be prohibitive. A follow up of the helicopter geophysics with ground grids may provide the best alternative.

**APPENDIX D  
DRILL LOG.**



# Canabrava Diamond Corporation

## DIAMOND DRILL HOLE RECORD SHEET

METRES		DESCRIPTION	SAMPLE (m)					ASSAYS					
FROM	TO		NO.	% SULPH	FROM	TO	TOTAL	Au					
		-1% white cross-cutting milky white qtz and qtz-calcite stringers -<1% po overall with tr. cpy,py											
98.5	100.7	Chert-Sulfide Iron Formation -25% light to dark grey well banded chert, 15-20% po, <1% py and tr. cpy, sph within a med grey matrix with mod pervasive calcite altn, local dark gre carbonaceous material within unit, 10% white irregular to patchy qtz vein material containing tr. po within the more deformed upper half of the unit -chert banding near base @ 65 deg to core axis, abrupt contacts	28106	15	98.5	99.6	1.1						
			28107	20	99.6	100.7	1.1						
100.7	113.0	Mafic Ash Tuff -similar to unit at 85.8-87.5m, minor cherty bands with minor po,py -107.3-107.8m -banded chert unit with 5% po, tr py -110.35-111.95m -med grey, massive, slightly mottled feldspar porphyry dyke @ 55-70 deg to core axis, tr py											
113.0	114.3	Chert-Sulfide Iron Formation -well banded with 50% chert bands alternating with green chloritic po-rich layers with mod calcite altn, overall 15-20% po, <1% py and tr. cpy -mod to strongly magnetic, banding @ 55 deg to core axis	28108	17	113.0	114.3	1.3						
114.3	122.0	Mafic Ash Tuff -fg, med green, commonly massive to locally wk to mod foliated with minor diss to wispy po, tr. py, rare chert bands associated with sulfides, weak pervasive calcite alteration appears to be decreasing downwards, -1-2% irreg calcite+/- qtz stringers and blotches with minor po,py -chert band @ 65 deg to core axis -118.5-118.8m -med grey, weakly siliceous, slightly mottled feldspar porphyry dyke, tr. py											
	122.0	End of Hole											

*Kerry Kuttan*



**Certificate of Qualifications  
George Henry Read  
Diamond Exploration Consultant**

I, George Henry Read, do hereby certify:

1. I am a consulting geologist with a business office at 20505 - 122nd Ave Maple Ridge B.C. V2X 2N6 Canada.
2. I am a graduate of the University of Cape Town with a degree of B.Sc. (Hons) in Geochemistry (1983).
3. I am a Professional Geoscientist (# 24070) registered with the Association of Professional Engineers and Geoscientists of British Columbia.
4. I am a Fellow of The Geological Association of Canada: Fellow # F6739.
5. I have been employed by Anglo American Corporation / De Beers Group Companies for the period March 1984 to November 1996. This period of employment included work at: Anglo American Research Laboratories in Johannesburg, South Africa, on kimberlite indicator mineral chemistry and associated mantle petrology (March 1984 - April 1990, October 1994 - November 1996), the office of the Consulting Geologists (Diamonds) in Johannesburg, South Africa, as their Technical Assistant (April 1990 - September 1992) and Monopros Limited (Thunder Bay, Canada: October 1992 -September 1994) where I worked on diamond exploration projects in Quebec, Ontario, Saskatchewan, Alberta and the Northwest Territories. I resigned from the Anglo American Corporation to immigrate to Canada in November 1996. Since February 1997 I have operated as an independent diamond exploration consultant.

I am the author of the report entitled "**KIRKWOOD PROJECT: PROSPECTING, SAMPLING, AIRBORNE GEOPHYSICAL SURVEYS AND DRILLING**", prepared for Canabrava Diamond Corporation. by examination of available data.

Vancouver, Canada, May 23, 2002


A handwritten signature in black ink, appearing to read 'G H Read', with a stylized flourish extending to the right.

**George H Read**

## CERTIFICATE OF QUALIFICATION

I, Nigel Luckman, certify that:

1. I am a geological engineer residing at 24353 101 Avenue, Maple Ridge, British Columbia, V2W 1W8.
2. I hold a B.A.Sc degree in Geological Engineering from the University of British Columbia obtained in 1988.
3. I have practised my profession continuously since 1988.

  
Nigel Luckman

May 23, 2002



**Work Report Summary**

<b>Transaction No:</b>	W0260.00804	<b>Status:</b>	APPROVED
<b>Recording Date:</b>	2002-MAY-24	<b>Work Done from:</b>	2001-JUN-30
<b>Approval Date:</b>	2002-OCT-10	<b>to:</b>	2002-MAR-27
<b>External Credits:</b>	\$0		
<b>Reserve:</b>			
	\$5,779	Reserve of Work Report#:	W0260.00804
	<u>\$5,779</u>	Total Remaining	

Status of claim is based on information currently on record.

Date: 2002-OCT-11

GEOSCIENCE ASSESSMENT OFFICE  
933 RAMSEY LAKE ROAD, 6th FLOOR  
SUDBURY, ONTARIO  
P3E 6B5

ELIZABETH JEAN KIRKWOOD  
21 NESBITT DRIVE  
TORONTO, ONTARIO  
M4W 2G2 CANADA

Tel: (888) 415-9845  
Fax: (877) 670-1555

**Submission Number:** 2.23520  
**Transaction Number(s):** W0260.00804

Dear Sir or Madam

**Subject: Approval of Assessment Work**

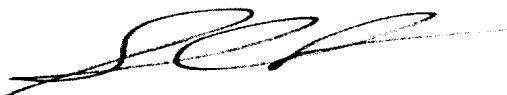
We have approved your Assessment Work Submission with the above noted Transaction Number(s). The attached Work Report Summary indicates the results of the approval.

At the discretion of the Ministry, the assessment work performed on the mining lands noted in this work report may be subject to inspection and/or investigation at any time.

The airborne magnetic survey and the drilling program were credited as reported on the Statement of Costs. The Prospecting portion was reduced to \$900.00 as there was not much information provided for the work. Page 2 of the report provided states that small exposures of granite-gneiss and volcanics were seen during the traversing yet that and other information is not conveyed on the map.

If you have any question regarding this correspondence, please contact LUCILLE JEROME by email at [lucille.jerome@ndm.gov.on.ca](mailto:lucille.jerome@ndm.gov.on.ca) or by phone at (705) 670-5858.

Yours Sincerely,



Sheila Lessard  
Acting Senior Manager, Mining Lands Section

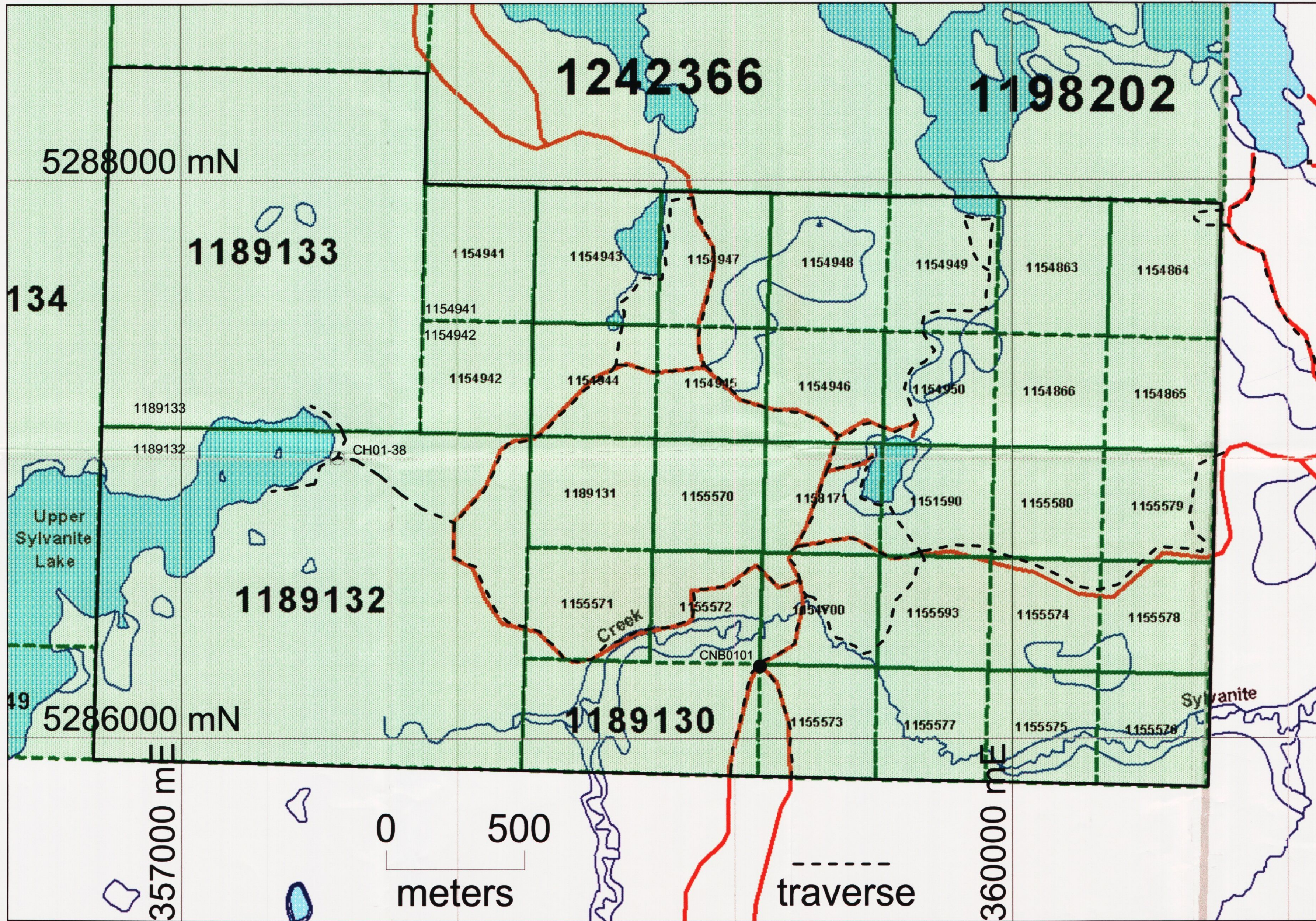
**Cc:** Resident Geologist

Elizabeth Jean Kirkwood  
(Claim Holder)

Assessment File Library

Elizabeth Jean Kirkwood  
(Assessment Office)





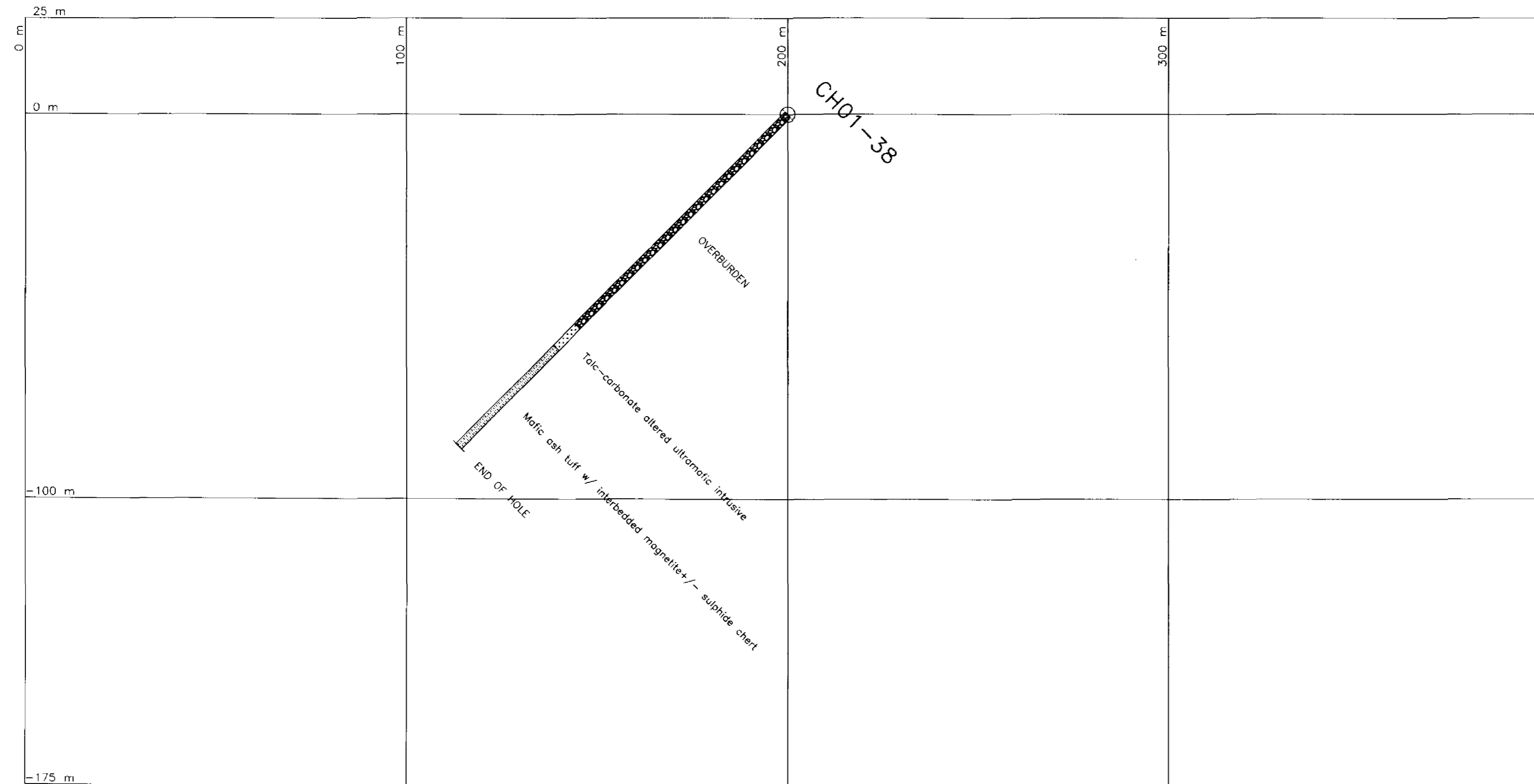
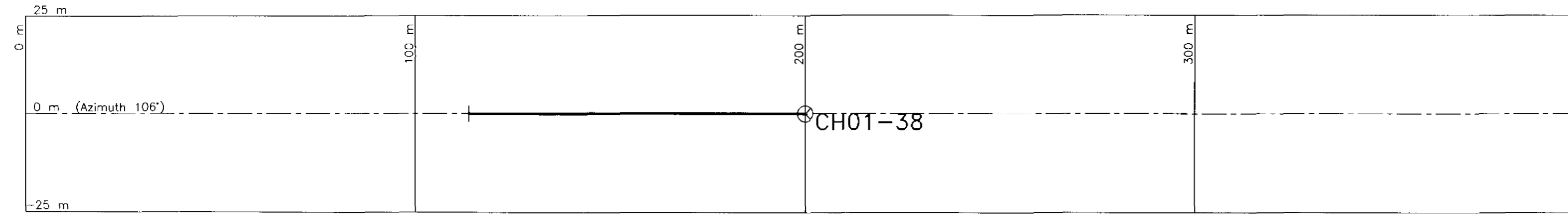
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CANABRAVA DIAMOND CORPORATION  
**KIRKWOOD PROJECT**  
**PROSPECTING TRAVERSES**  
 TOOMS TOWNSHIP, ONTARIO  
 DATE: May, 2002 Datum: NAD83, UTM Zone 17N  
 Scale: 1:10,000



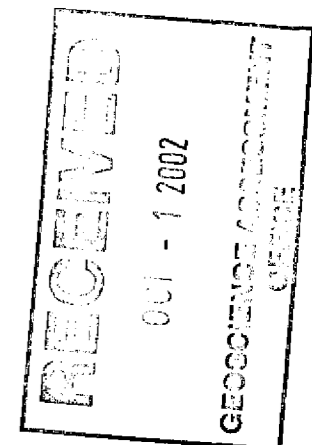
LEGEND

Drillhole Symbols

- ⊗ Drillhole collar
- × Drillhole pierce point
- Drillhole toe



220



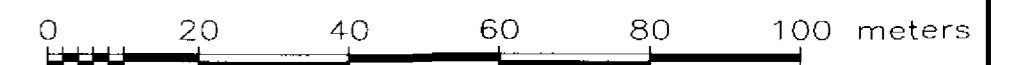
CANABRAVA DIAMOND CORPORATION

KIRKWOOD PROJECT

CH01-38 EAST-WEST SECTION (Azi 106°)

Geology

Looking N (Azi 016°)



SCALE 1:1,000

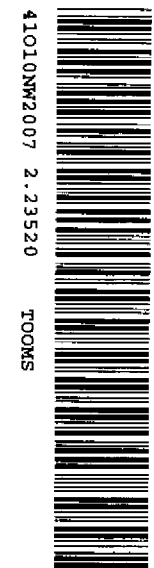
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FILE: ch01-38

BY: NL

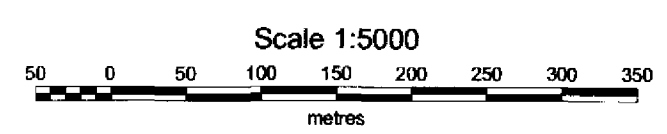
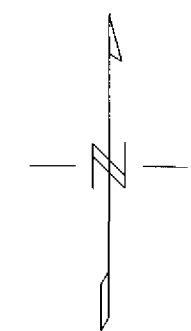
Map No.





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**CANABRAVA DIAMOND CORPORATION**

**KIRKWOOD PROJECT  
HELICOPTER-BORNE MAGNETIC SURVEY  
Drillhole Location and Plan View**

Tooms Township, Porcupine Mining Division  
NAD 83, UTM ZONE 17

*George Read, Nigel Luckman*

