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1998 ASSESSMENT REPORT

PREPARED FOR
656405 ALBERTA LTD.

Holder of
Metallic and Industrial Mineral Permits
Nos: 9394020021 to 9394020023
ACKNOWLEDGEMENTS

Consultant and Scientific Authority

Dr. Norman Haimila, President of Aurora Projects International Inc., British Virgin Islands

Exploration Research and Program Co-ordination

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and Dr. T. Yoshida, Calgary, AB.

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Beth Haverslew, Petrologist, Calgary, AB.
Loring Laboratories, Calgary, AB.
Staff at Earth Sciences Bldg. and Library at the University of Calgary
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DR. NORMAN E. HAIMILA

Born:
Citizenship:
Social Insurance:

EDUCATION

Primary through High School, Cawnoe Alberta.
B.A. Sc (1960) University of British Columbia
Ph.D. (1974 Michigan State University

AREAS OF EXPERTISE

PROSPECT GENERATION, INTERNATIONAL AND FRONTIER PROSPECT EVALUATIONS, REGIONAL STUDIES, RESOURCE ASSESSMENT, STRUCTURAL GEOLOGY, REMOTE SENSING, GEOPHYSICAL INTERPRETATIONS, BASINAL STRATIGRAPHY.

PROFESSIONAL EXPERIENCE

1994 to Present
President of AURORA PROJECTS INTERNATIONAL INC.
Generated drillable prospects in Argentina and the Middle East. Of three prospects generated, one is producing oil, one was a dry hole with shows and one remains to be drilled in the winter of 1995-1996.

1980 - 1994
President of ZI CONSULTING LIMITED, Cochrane, Alberta
Consulted for the oil and mineral industries and government agencies.

From 1991 to 1994 consulted for an independent oil company in Canada. On my recommendation this company acquired two exploration blocks and two exploitation blocks in Argentina. Prospects have been generated on these and other subsequently acquired blocks. To date, four wells with various levels of hydrocarbon recoveries and four dry wells have been drilled. Outside Argentina blocks have been evaluated for their hydrocarbon potential in Venezuela, Colombia, Ecuador, Peru, Bolivia, Europe and Asia.

From 1987 to 1991 was the Senior Geologist on the Sub-Andean Cooperative Hydrocarbon Studies Project managed by Meneley Enterprises, Ltd. and directed by Petro Canada International Assistance Corporation, the World Bank and Assistance Reciproca Petrolera Estatal Latin America. This project consisted of basin analyses and hydrocarbon endowment studies in Colombia, Ecuador, Peru, Bolivia, Paraguay, Argentina and if the pertinent data held by the companies.

From 1980 to 1987 consulted for independent and major oil company addition to governmental agencies and research institutes. Evaluated the hydrocarbon potential for areas throughout Canada and other international areas.

1978 - 1980
CDC Oil and Gas Ltd. (renamed Centerra and now part of Husky Oil and Nova Corp.) Calgary, Alberta.

Held the positions of Geological Specialist and Consultant responsible for prospect generation, structural analyses and regional studies in the Canadian Foothills Belt from latitudes 49°N to 60°N.

1974 - 1978

Responsible for evaluating hydrocarbon endowment in Canada, especially in the Arctic, the Western Canada Basin and the Foothills Belt.
1967-1974 Atlantic Richfield Company, Dallas, Texas
Held the position of Senior Research Geologist in the Geosciences Section. Worked in applied research in remote sensing, structural analysis, regional and basin studies, in addition to engineering and petrological problems related to the oil and mineral industries.

1966-1967 Consulted for small independent oil and mining companies in Michigan and Indiana.

Graduate Assistant and Assistant Instructor.
Taught Introductory Geology and Mineralogy at the undergraduate level.

Worked on special mineral projects. Mapped geology and mineral occurrences in Central Vancouver Island and in the Stewart Area of British Columbia.

1961-1963 External Aid Office (CIDA), Ottawa, Ontario
Technical Advisor to the Ministry of Industries in Ghana under the Special Commonwealth Africa Assistance Program. Part of a two man team mapping and evaluating mineral projects throughout Ghana including gold mining, placer diamond exploitation, manganese occurrences, and aluminum and limestone prospects.

1959-1951 Geological Survey of Canada, Ottawa, Ontario
Technical Officer - assisted in field mapping in Northern Manitoba and Ellesmere Island Northwest Territories. Conducted laboratory work on material from the ultrabasic Muskox Intrusive Complex of the Northwest Territories.

1955-1959 Summer employment with government agencies, mining and oil industries in Canada.

PROFESSIONAL ASSOCIATIONS - Canadian Society of Petroleum Geology
- American Association of Petroleum Geologists #0132516
- Association of Professional Engineers, Geologist and Geophysicists of Alberta #28333
- American Institute of Professional Geologists #4293.

RESEARCH AND REPORTS
Gold Distribution, Structure and Sedimentology of the Banket Deposit in the Vicinity of the Fanti Gold Mine.

Demonstration Equipment and Procedures for Exploiting Small Scale Alluvial Diamond Workings.

The Asuboni Limestone.

Structure and Oil Potential of the Trenton Limestone, Wabash County, Indiana.

Structure and Oil Potential of the Trenton Limestone, Eaton County, Michigan.

Secondary Recovery from the Trenton Limestone of the Lima-Indiana Trend.

Structure and Oil Prospects of the Canadian Maritime Provinces and Offshore Areas.
Gravity Interpretation of a Salt Dome, Offshore Texas.

Gravity and Magnetic Interpretation of a Concession in Libya.

Structural and Seismic Interpretation of a Hydrocarbon Prospect in Nevada.

Gravity, Magnetic, Seismic and Structural Analysis of West Texas and the Permian Basin including Hydrocarbon Prospects.

Review and Training Manual for Gravity and Magnetic Interpretation.

Structural Interpretation of the Laguna Madre Field, South Texas.

Structural Analysis and Hydrocarbon Prospects in the Montana Thrust Belt.

Structural Analysis of the Eastern Brooks Range of Alaska.

Permafrost in the Subsurface of the North Slope of Alaska.

Permafrost and Pleistocene Stratigraphy of Copper River Basin, Alaska for Routing of the Trans Alaska Pipeline.

Fracture Analysis Utilizing Fourier Transforms.

Structural Analysis of the Eastern Arctic Islands, Canada.

Borehole Fracture Analysis for Secondary Recovery Projects.

Fracture Analysis for Massive Hydraulic Fracturing in Low Productivity Gas Sands.


Miscellaneous Petrographic and Mineralogical Investigations.


Hydrocarbon Potential of the Sverdrup Basin of the Arctic Islands.

Hydrocarbon Potential of the Arctic Islands Fold Belt.

Hydrocarbon Potential of the Stable Platform of the Arctic Islands.

Hydrocarbon Potential of the Lower Mannville Interval in Alberta.

Hydrocarbon Potential Reviews of East Coast Offshore Areas.
Research and Reports
(Cont'd)

Hydrocarbon Potential of the British Columbia Offshore Areas.

Hydrocarbon Potential of Third World Countries.

Structural Style and Hydrocarbon Potential of the Alberta and British Columbia Foothills.


Geology and Hydrocarbon Potential of the Canadian Beaufort Sea and Environ.

Hydrocarbon Potential of Arctic North America and Greenland.

Hydrocarbon Potential, Geology and Exploration History of Selected Third World Countries.

Hydrocarbon Potential and Undiscovered Prospects of Several Hydrocarbon Exploration Plays in Alberta and Northeastern British Columbia.

Deltas of the World and Their Potential for Containing Giant Hydrocarbon Accumulations.

Characteristics of Hydrocarbon Accumulations in Four North Sea Sub-basins.

Characteristics of Hydrocarbon Accumulations for Typical Exploration Plays in West Texas and Offshore Louisiana.

Hydrogen Sulphide and Sulphur Occurrences in Petroleum Accumulations of Western Canada.

Sedimentary Basins and Petroleum Resource Potential of the Arctic Ocean Region.

Geology and Hydrocarbon Potential of the Sub-Andean Basins of Colombia, Ecuador, Peru, Bolivia, Paraguay and Argentina.

Geology and Hydrocarbon Potential of the Neuquen Basin of Argentina.

General review of the Gulfo San Jorge Basin.

Geology and Hydrocarbon Potential of the Chaco-Parana and Loma Del Omeda regions of Argentina.
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INTRODUCTION

This Assessment Report consists of two sections.

The first section is concerned with Metallic and Industrial Mineral Permit # 9394020023 (Twp 72, Rge23, W4M, Secs: 10N, 11N, 14,15, 22S, 23S.)

Prospecting and Reconnaissance of this area in the fall of 1996 resulted in finding volcanic breccia and garnet abundant beach sands. An area in Sec. 11 was found to be a topographic hill covered with aspen and poplar trees. Aspen are known to occur over kimberlite in Saskatchewan (-GSC open file 3228 p 219).

Research of seismic data in the area resulted in the acquisition of data. This data shows what appears to be a vertical structure. (see Fig. 5). This vertical structure is directly under the topographic hill. Kary Data Consultants were asked to buy other seismic data in this area for 656405 Alberta. Many of the seismic lines are not for sale.

The second part of this Assessment Report is concerned with Metallic and Industrial Mineral Permits #'s 9394020021, secs. 6,7,14N,15N,21W,22,23,26,27,28W and 9394020022, secs. 10N,11, 15.

A four day reconnaissance in the spring of 1997 and a three day reconnaissance in the fall of 1997 also showed that aspen groves were associated with higher ground in these areas. It was also known that kimberlites discovered by Ashton Mining in Northern Alberta had associations with topographic highs.

An airborne geophysical survey was contracted in late 1997 to cover the above permits. (see enclosed air-mag data). Some of the above topographic highs were plotted on a vertical magnetic gradient map prepared for 656405 Alberta by Spectra Exploration (see Fig. 9).

CGI Controlled Geophysics was also contracted to interpret the air-mag data. See enclosed Euler Depth Deconvolution Solutions (Fig 8)
Location Maps
Section One
This structure has become a very high priority to drill.

位於最西部的磁异常区表明，该结构可能位于最西部的磁异常区低于地表（深度15米）。

The seismic profile was purchased through Kary Data Consultants of Calgary. Their consultants

(differently enlarged) vertical gradient anomaly map of Alberta

seismic profile (Fig. 3). The seismic profile is directly over a magmatic high as seen on Fig. 4.

A reconnaissance seismic line to the south-west found a updip equivalent high point covered

volcanic breccia

as well as diabase inclusion indicative, and a significant chromite. One rock specimen was a

results are included in this report as Table 1-1. A. B, and C. The analysis shows a 0.01 g/m

microscope analysis. The analysis was performed by Laboratories of Calgary, AB, and the

north-east corner of Sw NNE 23W 4, Sec 14, T24N, R6E. Seven grains were picked for a

In the fall of 1999, a sand sample and several rock specimens were collected on Calhoun Lake.

Prospectivne

SECTION ONE (Permit 9394020223)
Analysis
<table>
<thead>
<tr>
<th>Sample#</th>
<th>Location</th>
<th>Data in wt %</th>
<th>Mineral</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>SiO₂ TiO₂ Al₂O₃ Cr₂O₃ FeO MgO CaO Na₂O MnO K₂O Total</td>
<td></td>
</tr>
<tr>
<td>PURPLE</td>
<td></td>
<td>33.64 0.00 0.00 0.03 0.00 0.00 0.00 0.00 0.00 0.00 33.67 zircon</td>
<td></td>
</tr>
<tr>
<td>CL-LILIAC</td>
<td>119 B</td>
<td>41.54 0.13 20.35 5.73 7.09 21.26 3.85 0.02 0.40 0.00 100.37 garnet</td>
<td></td>
</tr>
<tr>
<td>CL-ORANG</td>
<td>119 C</td>
<td>42.01 0.89 20.54 2.28 8.70 20.37 4.86 0.07 0.33 0.00 100.05 garnet</td>
<td></td>
</tr>
<tr>
<td>CL-BLACK</td>
<td>119 D</td>
<td>0.04 52.71 0.59 1.14 34.17 11.62 0.01 — 0.26 — 100.54 ilmenite</td>
<td></td>
</tr>
<tr>
<td>CL-BLACK</td>
<td>119 E</td>
<td>0.01 53.70 0.35 0.84 32.28 12.49 0.03 — 0.35 — 100.05 ilmenite</td>
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</tr>
<tr>
<td>CL-BLACK</td>
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<td>0.02 0.16 63.79 0.00 14.65 21.25 0.00 — 0.12 — 99.99 spinel</td>
<td></td>
</tr>
<tr>
<td>CL-BLACK</td>
<td>119 G</td>
<td>0.08 1.18 8.02 54.98 22.70 12.51 0.01 — 0.32 — 99.80 chromite</td>
<td></td>
</tr>
</tbody>
</table>
Pyrope Garnet Indicators

Fig. A.
Ilmenite Indicators

Fig B.
Chromite Indicator

Fig. C.
Seismic Data
Reprinted from GSC Digitized Vertical Gradient Anomaly Map of Alberta

R23W4  R22W4  R21W4

→ Shows location of seismic profile over anomaly

Fig. 4
Section Two
SECTION TWO

Because it was known that kimberlites discovered by Ashton Mining in Northern Alberta (more specifically the Buffalo Head Terrane) were topographical highs, and the fact that published data showed that there is Aspen growth over kimberlites in Saskatchewan (GSC open file3228,1996) ---a reconnaissance was conducted in the spring and fall of 1997.----specifically looking for topographic highs having growths of Aspen and Poplar.

This information would be compared to magnetic anomalies on air born magnetic data. Spectra was contracted by 656405 Alberta to fly an air born geophysical survey over permit #’s 9394020021 and 9394020022. (see Figs. 6,7 and 9). This data was also further interpreted by CGI Controlled to produce Euler Depth Deconvolution Solutions -see Fig. 9. (Kimberlites and aeromagnetics -P. Keating,1995-page 233-open file 3228, GSC).

Figure 9 clearly shows areas that could be circular magnetic anomalies caused by kimberlites. Some of these areas coincide with aspen growth and topographical highs. These areas are high priority drill targets.
Airborne
Geophysical
Data
1.0 INTRODUCTION

This report describes the specifications and operations of an airborne geophysical survey carried out for 656405 ALTA. LTD., having an office in the city of Calgary, Alberta, in accordance with the contract for services dated December 9, 1997. The survey was performed by Spectra Aviation Services Corp., a wholly owned subsidiary of Spectra Exploration Geoscience Corp. located at Suite 2610, 520 - 5th Avenue SW, Calgary, Alberta T2P 3R7. Telephone (403) 777-9280 and fax (403) 777-9289.

The purpose of a survey of this type is to acquire high resolution, high sensitivity aeromagnetic data in order to map both the near surface and basement rocks and structures in the survey area according to their magnetic signatures. The end result of the processing was to provide detailed maps to assess the area for anomalies and magnetic features pertaining to potential Kimberlite bodies.

To achieve this purpose the survey area was systematically traversed by an aircraft carrying geophysical instruments along parallel flight lines (traverses) spaced at even intervals in a North-South alignment at 250 meters, with tie-lines flown normal to the traverses spaced at 1000m (aligned so as to intersect the regional geology and structure in a way to provide the optimum contour patterns of geophysical data). The flying height was 100 meters above the terrain surface.

2.0 SURVEY AREA

The survey area is located in east-central Alberta, and consists of portions of 2 townships. The total project area is defined within TWP 71-72 RGE 21W4.

This area is bounded by the following latitude/longitude coordinates:

2.1 Calling Lake Project Area

1. N 55° 15' 30" W 113° 14' 30"
2. N 55° 15' 30" W 113° 06' 30"
3. N 55° 07' 50" W 113° 06' 30"
4. N 55° 07' 30" W 113° 14' 30"

In addition to the above grid, Spectra flew three “lead-in” East-West lines adjacent to the Northwest corner of the grid.

3.0 EQUIPMENT SPECIFICATIONS

3.1 AIRCRAFT

The survey was carried out using Spectra’s Piper Navajo PA31-310 aircraft, registration C-FYTT, which carries a high sensitivity magnetometer and full on-board real time compensation recording computer, and related equipment. It is a twin engine aircraft with full avionics, including real time GPS.

The aircraft has been extensively modified to conduct airborne geophysical surveys. 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 noise. With these modifications this aircraft represents one of the quietest magnetic platforms in the industry with a figure of merit of approximately 8 nT uncompensated and 0.80 nT compensated at this survey location using G.S.C. standards.
The aircraft is operated by Spectra Aviation Services Corp. under full M.O.T approval and certification for specialty flying including airborne geophysical surveys. The aircraft is maintained at base operations by a regulatory AMO Facility, Baker Aviation Inc. and in the field by a Spectra Aviation Services Corp. AME in association with Baker Aviation, AMO.

### 3.2 AIRBORNE GEOPHYSICAL EQUIPMENT

The airborne geophysical system has one high sensitivity, cesium vapor magnetometer. Ancillary support equipment include tri-axial fluxgate magnetometer, video camera, video recorder, radar altimeter, barometric altimeter, GPS receiver and a navigation system which includes a left/right indicator and a screen showing the survey area with real time flight path. All data are collected and stored by the data acquisition system. The following provides the detailed equipment specifications.

#### Cesium Vapor Magnetometer:
- **Manufacturer**: Scintrex
- **Model**: CS-2
- **Resolution**: 0.001 nT counting @ 0.1 per second
- **Sensitivity**: +/-0.005 nT
- **Dynamic Range**: 15,000 to 100,000 nT
- **Fourth Difference**: 0.02 nT

#### Tri-Axial Magnetic Field Sensor (for compensation, mounted in the forepart of the tail stinger):
- **Manufacturer**: Bartington Instruments Ltd.
- **Model**: MAG-03MC
- **Internal Noise**: at 1 Hz - 1 kHz: 0.6 nT rms
- **Bandwidth**: 0 to 1 kHz maximally flat, -12 dB/octave roll off beyond 1 kHz
- **Frequency Response**: 1 Hz - 100 Hz: +/- 0.5%
  100 Hz - 500 Hz: +/- 1.5%
  500 Hz - 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 (camera mounted in belly of aircraft):
- **Manufacturer**: Sanyo
- **Model**: VDC-2982 (colour)
- **Specifications**: 1/2", 470 hr, 1.3LX, 12VDC, C/CS, EI/ES, backlight comp
- **Lens**: Rainbow, 2/3", 4.87 mm, F1.8-360, auto iris

#### Video Recorder (strapped to computer rack/floor plate):
- **Manufacturer**: Panasonic
- **Model**: AG 2400 (commercial grade)

#### Radar Altimeter:
- **Manufacturer**: King
- **Model**: KRA-10A
- **Accuracy**: 5% up to 2,500 feet
- **Calibrate Accuracy**: 1%
- **Output**: Analogue for pilot; Converted to digital for data acquisition
Barometric Altimeter:

- Manufacturer: Sensym
- Model: LX18001AN
- Source: Coupled to aircraft pitot static system

Differential GPS Receiver (# 511 aircraft certified antenna mounted on top of the cabin roof):

- Manufacturer: Novatel
- Model: Novatel Card for magnetic system; King KLN-89B for pilot (interfaced)
- Serial Number: GPS 511
- Type: Continuous tracking, L1 frequency, C/A code (SPS), 12 channel (independent)
- Position Sensitivity: once per second
- Accuracy: position (SA implemented) 100 meters, position (no SA) 30 m, velocity 0.1 knot, time recovery 1 pps, 100 nsec pulse width
- Data Recording: all GPS data and positional data logged by PDAS 1000

Navigation Interface (with pilot and operator readouts):

- Manufacturer: Picodas Group Inc.
- Model: Helimag
- Data Input: Real time processing of GPS output data
- Pilot Readout: Left/Right indicator
- Operator Readout: Screen modes: map, survey and line
- Data Recording: All data recorded in real time by Helimag

Data Acquisition System:

- Manufacturer: Picodas Group Inc.
- Model: Helimag
- Operating System: MS-DOS
- Microprocessor: Intel 8048dx
- Coprocessor: 80486dx - 66 CPU
- Memory: On board up to 8 MB, page interleaving, shadow RAM for BIOS, support EMS 4.0
- Clock: Real time, hardware implementation of MC14618 in the integrated peripherals controller
- I/O Slots: 5 AT and 3 PC compatible slots
- Display: Electro-luminiscent 640x400 pixels
- Graphic Display: Scrolling analog chart simulation with up to 5 windows operator selectable; freeze display capability to hold image for inspection
- Recording Media: Standard 540 Mbyte hard disk with extra shock mounts; Standard 1.44 Mbyte floppy disk; Standard tape backup
- Sampling: Selectable for each input type; 1, 0.5, 0.25, 0.2 or 0.1 seconds
- Inputs: 12 differential analog input with 16 bit resolution
- Serial Ports: 2 RS-232C (expandable)
- Parallel Ports: Ten definable 8 bit I/O; Two definable 8 bit outputs

The Helimag also contains the magnetometer processor boards, one for each cesium vapor magnetometer installed

- Manufacturer: Picodas Group Inc.
- Model: PCB
- Input Range: 20,000 - 100,000 nT
- Resolution: 0.001 nT
- Bandwidth: 0.7, 1 or 2 Hz

Spectra Aviation Services Corp.
Calgary, Alberta Canada
Client: 656405 ALTA LTD.
Project: Calling Lake HRAM Survey

<table>
<thead>
<tr>
<th>Microprocessor</th>
<th>TMS 9995</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firmware</td>
<td>8 Kbit EPROM board resident</td>
</tr>
<tr>
<td>Internal Crystal</td>
<td>18,432 kHz</td>
</tr>
<tr>
<td>Absolute Crystal Accuracy</td>
<td>&lt;0.01%</td>
</tr>
<tr>
<td>Host Interfacing</td>
<td>8 Kbyte dual port memory</td>
</tr>
<tr>
<td>Address Selection</td>
<td>Within 20 bit addressing in 8 Kbyte software selectable steps</td>
</tr>
<tr>
<td>Input Signal</td>
<td>TTL, CMOS, Open collector compatible or sine wave with decoupler</td>
</tr>
<tr>
<td>Input Impedance</td>
<td>TTL&gt;1K Ohm</td>
</tr>
</tbody>
</table>

Magnetic compensation for aircraft and heading effects is done in real time. Raw magnetic values are also stored and thus if desired, compensation with different variables can be run at a later time.

Other Boards:

| Analog Processor | PCB - 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 |

Power Supplies:

1) Power Distribution Unit manufactured by Picodas Group Inc. interfaces with the aircraft power and provides filtered and continuous power at 27.5 VDC to all components.

2) The Helimag contains a 32 volt DC cesium sensor switching power supply for the cesium vapor magnetometers in conjunction with real time magnetometer compensation; also enables interfacing the fluxgate magnetometer and the barometric altimeter; also provides clean power for radar altimeter and ancillary equipment (PC notebook, printer)

3.3 MAGNETOMETER BASE STATION

High sensitivity base station data are provided by a cesium vapor magnetometer, data logging onto a PC 486sx notebook and time synchronization with ground GPS receiver.

Magnetic Sensor:

Identical to magnetometer in aircraft

Magnetic Processor:

| Manufacturer | Picodas Group Inc. |
| Model | PCB |
| Input range | 20,000 - 100,000 nT |
| Resolution | 0.001 nT |
| Resolution (fdd) | 1 pt |
| Bandwidth | 0.7, 1 or 2 Hz |
| Microprocessor | TMS 9995 |
| Firmware | 8 Kbit EPROM board resident |
| Internal Crystal | 18,432 kHz |
| Absolute Crystal Accuracy | <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 collector compatible or sine wave with decoupler |
| Input Impedance | TTL>1kohm |
| Clock Stability | 2 ppm per year |
| Absolute accuracy correction | +/- 999x10e-6 |

Spectra Aviation Services Corp.
Calgary, Alberta Canada
Logging Software:
Logging software by Picodas Group Inc. version 5.02 to IBM compatible PC with RS 232 input; supports real time graphics, automatic startup, compressed data storage, selectable start/stop times, automatic disk swapping, plotting of data to screen or printer at user selected scales, and fourth digital difference and diurnal quality flags set by user.

3.4 GPS BASE STATION

Ground GPS data was collected to perform post flight differential correction to the flight path. The ground GPS base station equipment is described below:

Manufacturer: Novatel
Model: Novatel Card
Type: Continuous tracking, L1 frequency, C/A code (SPS), 10 channel (independent)
Position Update: once per second
Accuracy: with SA implemented 100 meters, no SA 30 meters, velocity 0.1 knot, time recovery 1 pps, 100 nsec pulse width
Data Recording: all GPS raw and positional data logged by PDAS 1000

3.5 IN-FIELD COMPUTING FACILITIES

The following equipment was supplied for infield preliminary processing including base station logging and GPS differential calculations:
- one 266MHz and two 486DX/66 desk-tops, and two 386SX/25 notebooks, External Colorado tape drive, writeable CD.
- one color and two black and white printers

Software included C3NAV by Picodas Group Inc. for GPS differential corrections, and Oasis and Montaj suite of software by Geosoft Inc. to provide binary database functions, tie line leveling, mapping and imaging.

4.0 SURVEY SPECIFICATIONS

4.1 LINES AND DATA

Survey area coverage: Calling Lake total 715 line km
Line Direction: 000 - 180 degrees azimuth
Line Interval: 250 meters
Tie Line Interval: 1.0 kilometers (1000 meters) - flown orthogonal to survey lines
Terrain Clearance: 100 meters, drape mode
Average ground speed: 70-80 meters/second
Data point interval: Magnetic: 7-8 meters relative ground spacing per sample point

4.2 TOLERANCES

Line spacing: Any gaps wider than 10% of the nominal line spacing for a distance of more than 12 kilometers. Also at no point shall the traverse or control lines deviate more than +/- 100 meters from the pre-plot line locations.

Terrain clearance: In general the true flight altitude must be less than +/- 15 meters for a distance of over 5 kilometers from the norm drape level of the survey. This survey has specific requirements with regard to altitude control; the critical element is the difference in altitude between the survey line...
and the control line, referred to as elevation misties. The misties must be less than +/-10 meters absolute.

Diurnal magnetic variation: A maximum deviation of +/- 2.50 nT from a curvilinear mean within the time span required to acquire 10 line kilometers of data at the specified minimum sampling interval.

4.3 NAVIGATION AND RECOVERY

The satellite navigation system is used to ferry to the survey site and to survey along each line using latitude/longitude coordinates. The coordinates of the survey outline for navigation purposes and flight path recovery were supplied by the client.

The navigation accuracy is variable depending on the number and condition of the satellites, however it is generally less than twenty five meters and typically in the ten to fifteen metre range. Post flight differential correction of the flight path, which corrects for satellite range errors, improves the accuracy of the flight path recovery to approximately within one to three meters.

The navigational and flight path recovery positioning is based on the 1:50,000 NTS maps which are NAD 1927. The datum shift from WGS-84 to local is North American 1927, Canada, Clarke 1866.

A video camera recorded the ground image along the flight path. A video screen in the cockpit enabled the operator to monitor the accuracy of the flight path during the survey. This system also provided a backup system and verification for flight path recovery.

4.4 OPERATIONAL LOGISTICS

The main base of operations with the base station magnetometer and GPS equipment was at Slave Lake, Alberta, near the Slave Air hanger (at the Peace River airport). The coordinates for the base station were: 55° 17' 51.24''N, 114° 47' 16.11''W; 560.16m ASL.

The crew consisted of: Bruce Waines - Senior Survey Pilot
Greg Bemetic - Equipment Operator
James Mohns - Aircraft Mechanical Engineer

The survey crew arrived in Peace River in early January 1998, to set up the base station and establish local support facilities for several surveys to be flown. The first data acquisition flight for the Calling Lake survey was made on January 27, and completed on January 28, 1998. There were a total of 3 flights on the Calling Lake block, including ferry and survey flights, compensation, scrubbed missions, and reflights. The figure of merit (FOM) was measured at 0.80 nT.

Each line of data was presented in paper profile format displaying rawmag, groundmag, noise, 4th difference RA, barometric altimeter, Lat./Long. These, with the digital review, were the basis for the data QC.
The total magnetic intensity data were upward continued by 50 metres to unify the shallow and deep anomaly footprints.

A Structural Index of 2.0 (the magnetic pipe model) was employed with a moving window of 750 by 750 metres, a maximum depth tolerance of 1000 of modelled depth, and a maximum distance of solution from window centre of 375 metres (50% of the window size).

For map presentation, all obtained solutions are plotted as grey circles using a proportional circle diameter of 1 mm per 20 metres of depth. To identify the best solutions, a solution set limited to a location error of less than 22% of depth below surface and a depth error of less than 14% of depth below surface are plotted in black.

All depths are in metres below the surface. The resultant depths will be deeper than the top of the horizon during the scale of Euler Deconvolution calculations.

A magnetic anomaly that agrees with the model will exhibit a high degree of clustering of solutions.
Conclusion

The combination of airborne geophysics, seismic profiles, diamond indicator trains, topographical maps, and geobotanical profiles, has resulted in discovering some very high priority anomalies that should be sampled by a drilling program.
REFERENCES


LeCheminant, A.N., Richardson, D.G., DiLabio, R.N.W., Richardson, K.A. (edited by) 1996 Searching for Diamonds in Canada. GSC open file 3228


## Statement of Costs

**Section One (Permit 9394020023)**

- Prospecting- 2 men, equipment, and 4x4 vehicle
  (4 days @ 10 hrs/day @ $50/hr/man)................................. $4000.00
- Assay and electron probe................................................. $325.00
- Seismic Data Purchase.................................................... $7110.43
- Research and Interpretation........................................... $1200.00
- Management (15%)......................................................... $1800.00

Total to be applied to permit 9394020023......................... **$14,445.43**

**Section Two (Permit #’s 9394020021 & 9394020022)**

- Prospecting and Reconnaissance- 2 men, equipment, and 4x4 vehicle
  (7 days @ 10 hrs/day @ $50/hr/man)................................. $7000.00
- Airborne Survey............................................................. $12,000.00
- CGI Controlled Geophysics Euler Depth Deconvolution......... $1800.00
- Research and Consulting............................................... $3300.00
- Business Supplies (office, phone, fax, copying, etc.)......... $400.00
- Report Cost (digital color printing, preparation time, and binding costs).................................................... $1200.00
- Management (15%).......................................................... $3800.00

Total to be applied to permit #’s 9394020021 & 9394020022... **$29,500.00**