MAR 19980005: CALLING LAKE

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1998 ASSESSMENT REPORT

PREPARED FOR
656405 ALBERTA LTD.

Holder of
Metallic and Industrail Mineral Permits
Nos: 9394020021 to 9394020023

ACKNOWLEDGEMENTS

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RESUME

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Citizenship:

Social Insurance:

EDUCATION

Primary through High School, Canmore 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 [illegible] ll the pertinent data held by [illegible] companies.

From 1980 to 19[illegible] consulted for independent and major oil compan[illegible] 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 Canterra 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 — Energy Subdivision (Petroleum Resource Appraisal Secretarial) of the Institute of Sedimentary and Petroleum Geology (GSC). Calgary Alberta.

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 basinal 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.

1964-1967 Michigan State University. East Lansing, Michigan.
Graduate Assistant and Assistance Instructor.
Taught Introductory Geology and Mineralogy at the undergraduate level.

1963-1966 British Columbia Department of Mines and Petroleum Resources. Victoria, British Columbia.
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.

1960-1961 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.

Research and Reports
(Cont'd)

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 Northslope 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.

Side Looking Radar Study of East Kalimantan, Indonesia.

Remote Sensing Applicability to Exploration in Alaska, Eastern Canada, Arizona, Peru and Indonesia.

Miscellaneous Petrographic and Mineralogical Investigations.

Hydrocarbon Potential of the Mackenzie Valley and the Great Bear Basin in the Vicinity of Norman Wells, Northwest Territories.

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.

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.

Review and Training Manual of Structural Styles in Canadian Petroleum Provinces.

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

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 Industial 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 siesmic 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 siesmic data in this area for 656405 Alberta. Many of the siesmic lines are not for sale.

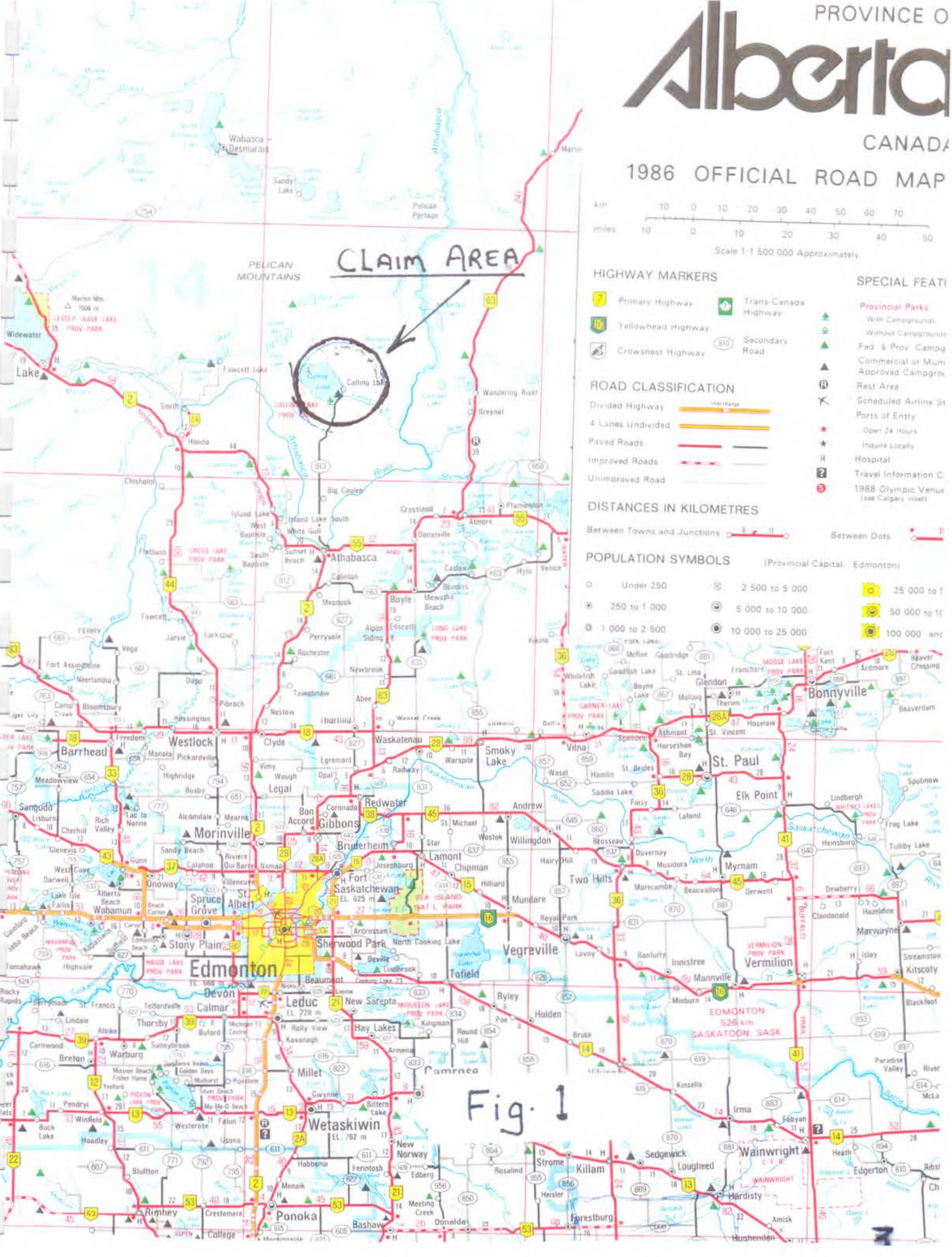
The second part of this Assessment Report is concerned with Metallic and Industrial Mineral Permits #'s 9394020021, secs. 6,7,14N,15N,21W,22,23,26,27,28W and 9394020022. secs. 10N,11, 15.

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


PROVINCE OF
Alberta
CANADA
1986 OFFICIAL ROAD MAP
Scale 1:1 500 000 Approximately
HIGHWAY MARKERS
Primary Highway
Trans-Canada Highway
Yellowhead Highway
Secondary Road
Crowsnest Highway
ROAD CLASSIFICATION
Divided Highway
4 Lanes Undivided
Paved Roads
Improved Roads
Unimproved Road
DISTANCES IN KILOMETRES
Between Towns and Junctions
Between Dots
POPULATION SYMBOLS
(Provincial Capital: Edmonton)
Under 250
250 to 1 000
1 000 to 2 500
2 500 to 5 000
5 000 to 10 000
10 000 to 25 000
SPECIAL FEATURES
Provincial Parks
Rest Area
Hospital
1988 Olympic Venue
CLAIM AREA
PELICAN MOUNTAINS
Calling Lake
Wabasca - Desmarais
Athabasca
Westlock
Barrhead
Morinville
Redwater
Gibbons
Fort Saskatchewan
Edmonton
Stony Plain
Spruce Grove
Sherwood Park
Leduc
Devon
Vegreville
Tofield
Camrose
Wetaskiwin
Ponoka
Two Hills
St. Paul
Elk Point
Bonnyville
Vermilion
Wainwright
Killam
Smoky Lake
Fig. 1

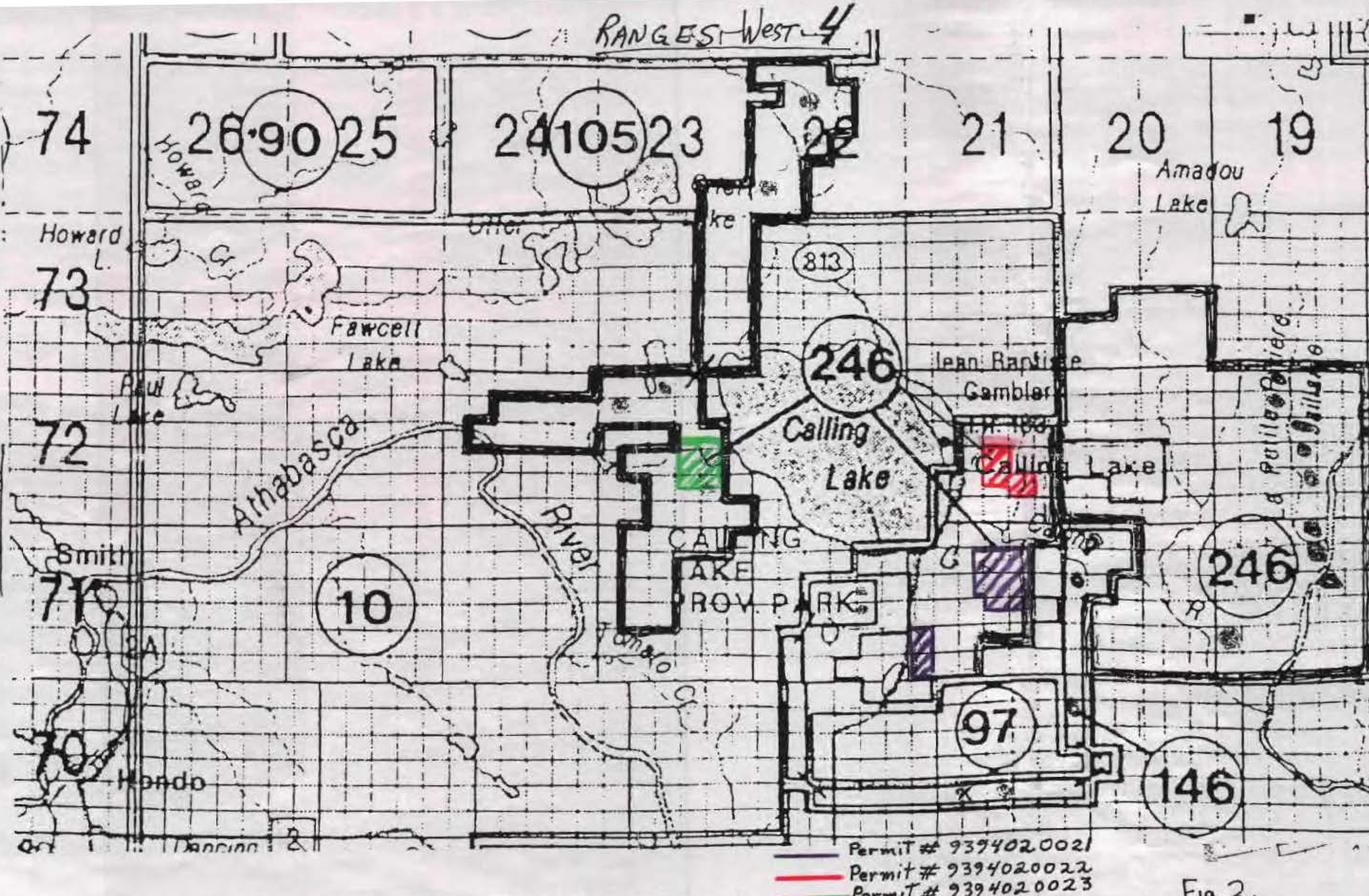

RANGES West 4
74
26
90
25
24
105
23
22
21
20
19
Amadou Lake
Howard L.
73
Fawcett Lake
Paul Lake
72
Athabasca
River
Town Ships
Smith
71
2A
10
70
Hondo
813
246
Jean Baptiste Gambler
Calling Lake
Calling Lake
CALLING LAKE PROV. PARK
246
97
146
Permit # 9394020021
Permit # 9394020022
Permit # 9394020023

Fig.2.

Fig 2

Section One

SECTION ONE (Permit 9394020023)

Prospecting

In the fall of 1996 a sand sample and several rock specimens were collected on Calling Lake - north-east corner of Twp 72 Rge 23W4, Sec 14 (see Fig 3). Seven grains were picked for a microprobe analysis . This analysis was performed by Loring Labs of Calgary, AB., and the results are included in this report as Table 1-Figs. A,B,and C. The analysis shows a G10 garnet, as well as diamond inclusion ilmenite, and a significant chromite. One rock specimen was a volcanic breccia.

A reconnaissance along seismic lines to the south-west found a topographical high point covered with aspen and poplar growth. This hill coincides with the vertical structure that is seen on the seismic profile (Fig 5). The seismic profile is directly over a magnetic high as seen on Fig.4. (digitally enlarged vertical gradient anomaly map of Alberta)

The seismic profile was purchased through Kary Data Consultants of Calgary.Their consultants were very helpful with the research and interpretation of data. One consultant said that the profile is suggesting that the lower portion of the vertical structure (below 0.6sec) is most likely to the east or west of the seimic line-less disruption below that depth (approx. 600metres)

This structure has become a very high priority to drill.

Analysis

Loring Laboratories Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 274-2777 Fax: 275-0541

File No. 39413-D
Client: 656405 Alberta Ltd. Microprobe Data August 12, 1997

Location				Data in wt %										
Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	K2O	Total	Mineral
PURPLE	119	D	1	33.64	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	33.67	zircon
CL-LILIAC	119	B	2	41.54	0.13	20.35	5.73	7.09	21.26	3.85	0.02	0.40	0.00	100.37	garnet
CL-ORANG	119	C	2	42.01	0.89	20.54	2.28	8.70	20.37	4.86	0.07	0.33	0.00	100.05	garnet
CL-BLACK	119	D	2	0.04	52.71	0.59	1.14	34.17	11.62	0.01	--	0.26	--	100.54	ilmenite
CL-BLACK	119	E	2	0.01	53.70	0.35	0.84	32.28	12.49	0.03	--	0.35	--	100.05	ilmenite
CL-BLACK	119	F	2	0.02	0.16	63.79	0.00	14.65	21.25	0.00	--	0.12	--	99.99	spinel
CL-BLACK	119	G	2	0.08	1.18	8.02	54.98	22.70	12.51	0.01	--	0.32	--	99.80	chromite

TABLE 1

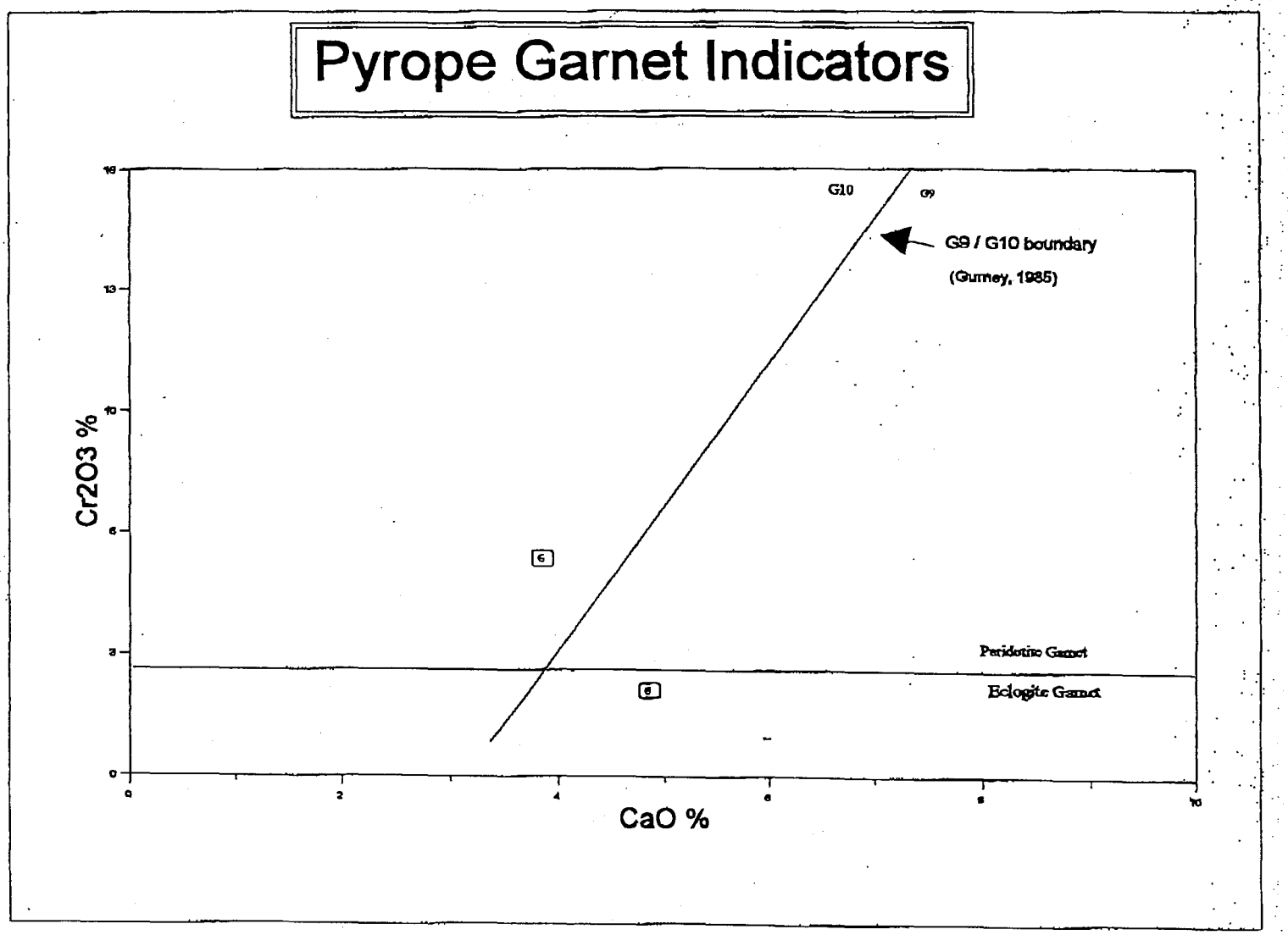

Pyrope Garnet Indicators
G10
G9
G9 / G10 boundary
(Gurney, 1985)
Peridotite Garnet
Eclogite Garnet
Cr2O3 %
CaO %
0
3
6
10
13
16
0
2
4
6
8
10

Fig. A.

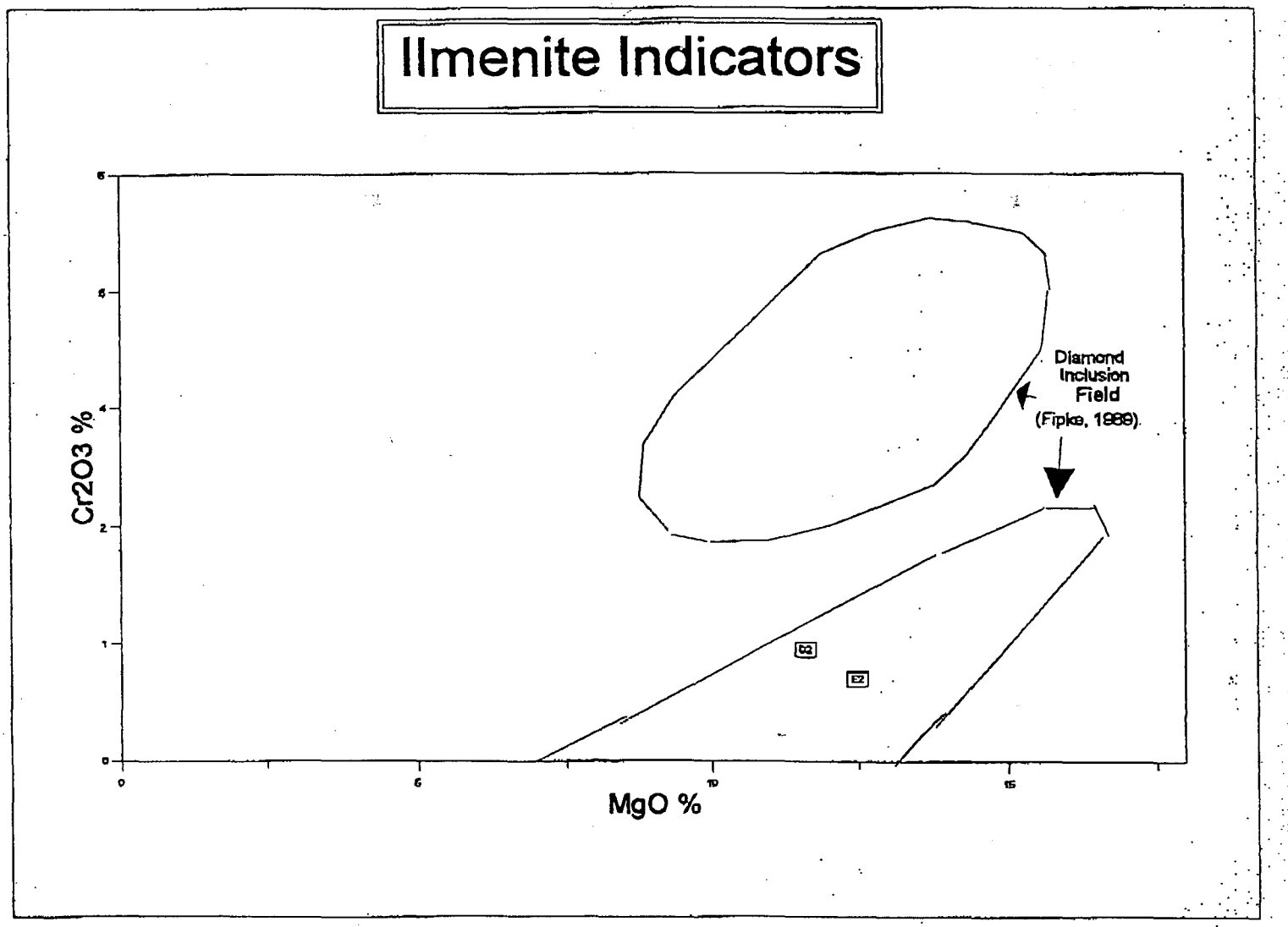

Ilmenite Indicators
Diamond Inclusion Field (Fipke, 1988).
Cr2O3 %
MgO %
0
1
2
4
5
6
0
5
10
15
E3
E2

Fig B.

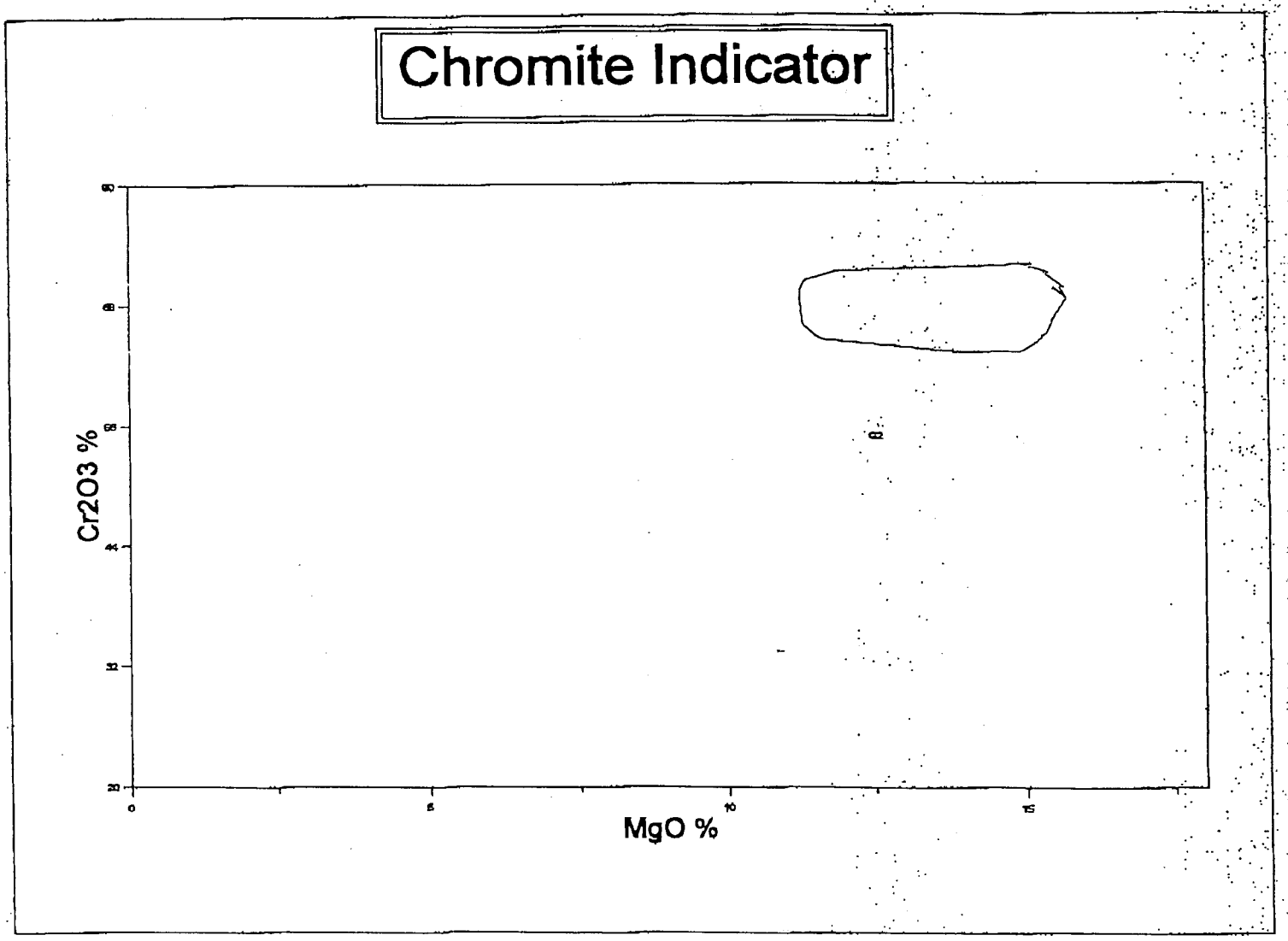


Fig. C.

Seismic Data

Twp 72
Rge 23W4

Twp 72
Rge 21W4

I. R.
NO. 183

CALLING LAKE

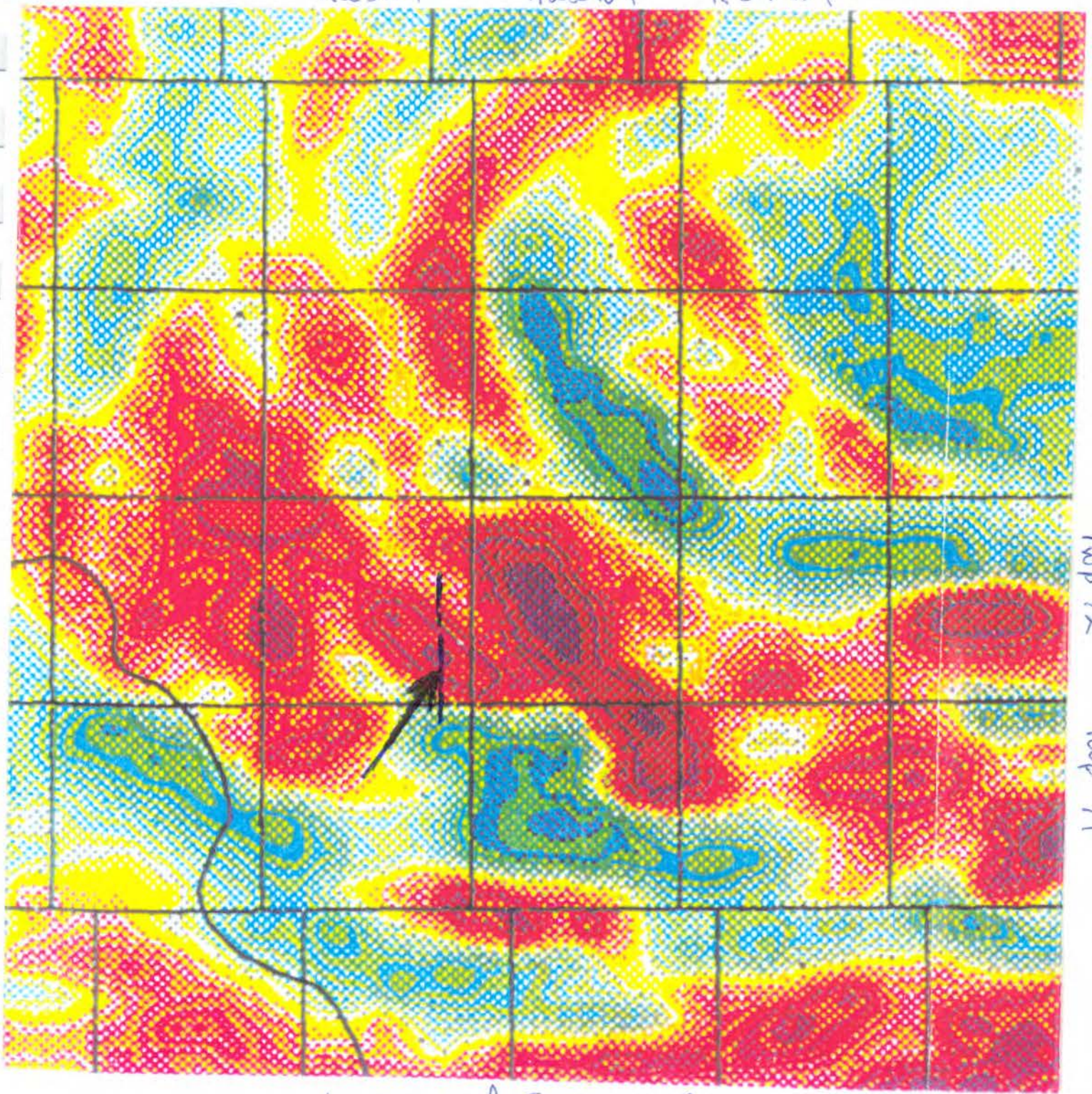
Sampled ilmenite garnets + breccia samples

Seismic PROFILE (Fig. 5)

Twp 71
Rge 21W4

Fig. 3

Reprinted from GSC Digitized Vertical Gradient Anomaly Map of Alberta



→ shows location of seismic profile over anomaly

Fig 4

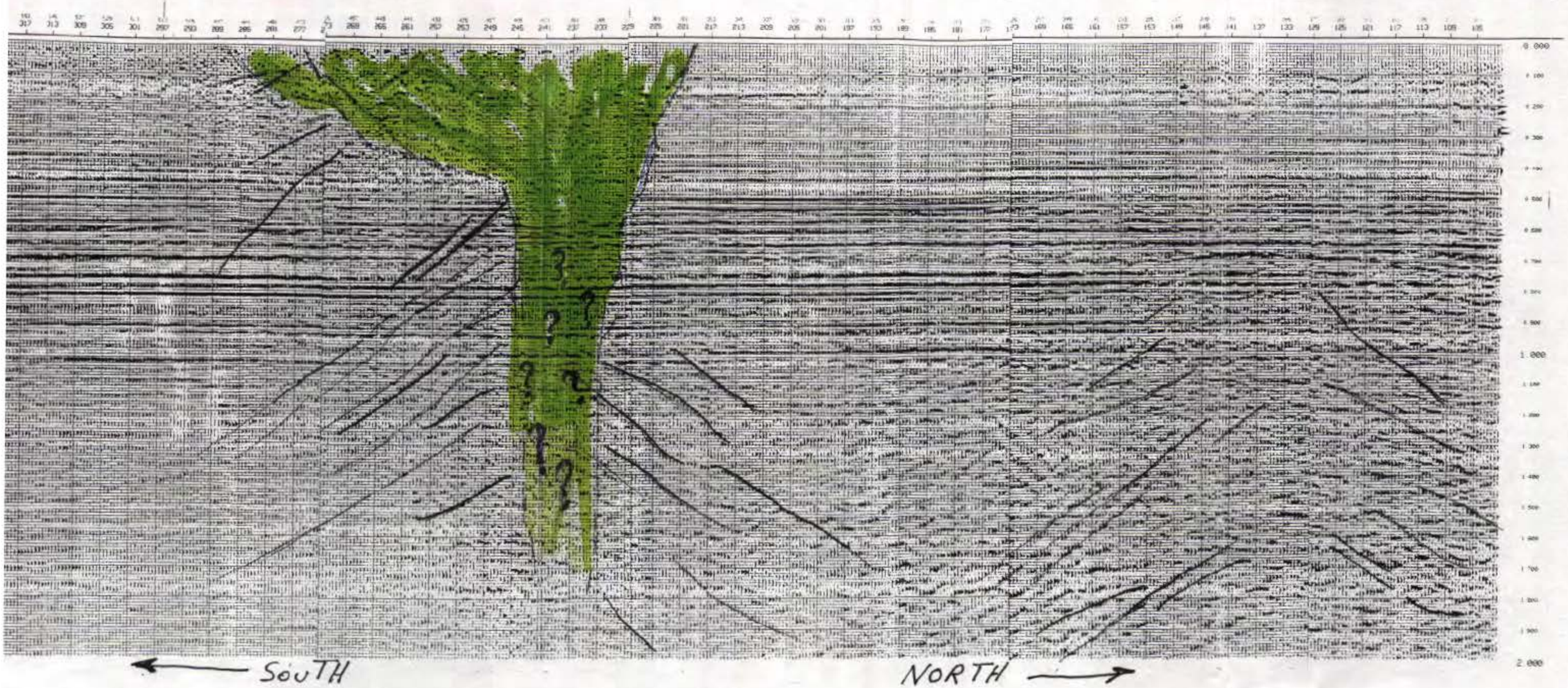


Fig. 5

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 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, backlite 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	80486dx - 66 CPU
Coprocessor	Intel 8048dx
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-luminscent 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

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>1K Ohm

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) TheHelimag 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

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.

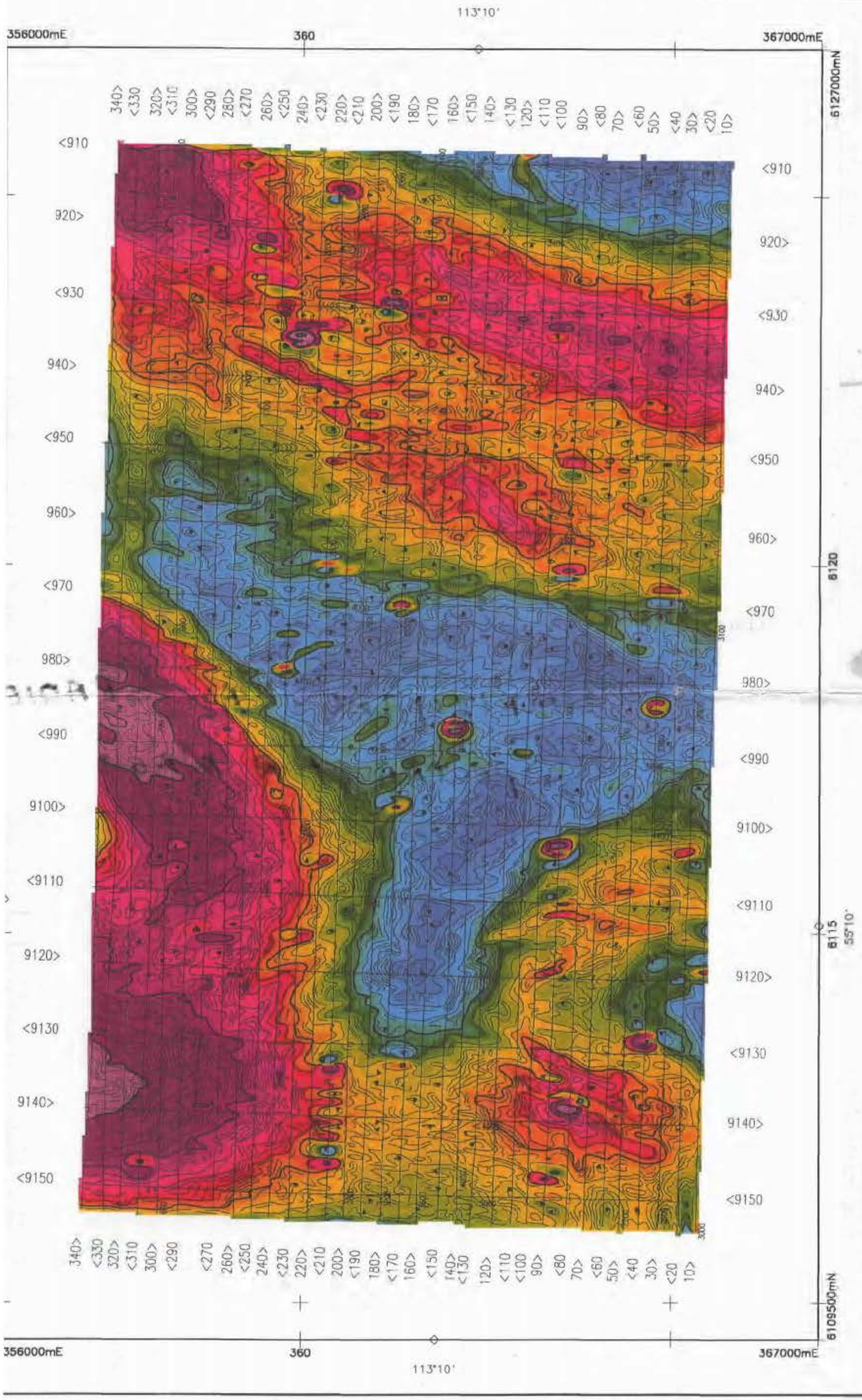
4.4 OPERATIONAL LOGISTICS

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: 55^0 17' 51.24"N, 114^0 47' 16.1"W; 560.16m ASL.

The crew consisted of: Bruce Waines - Senior Survey Pilot
Greg Bernetic - 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.



Scale 1:50000

1000 0 1000 2000 3000 4000
(metres)

2500 0 2500 5000 7500 10000 12500 15000
(feet)

0.200
0.150
0.100
0.081
0.076
0.073
0.070
0.068
0.065
0.064
0.062
0.060
0.058
0.056
0.055
0.054
0.052
0.051
0.050
0.048
0.047
0.046
0.044
0.043
0.042
0.041
0.039
0.038
0.036
0.035
0.034
0.033
0.031
0.030
0.028
0.026
0.025
0.022
0.021
0.018
0.016
0.013
0.010
0.005
0.000

Horizontal Gradient [nT/m]

40 metres Grid Cell Size
Contour Intervals (nT/m)

0.001
0.005
0.025
0.100

Spectra Exploration Geoscience Corp.

Prelim. Horizontal Magnetic Gradient Colour Image with Contours

Project 9721

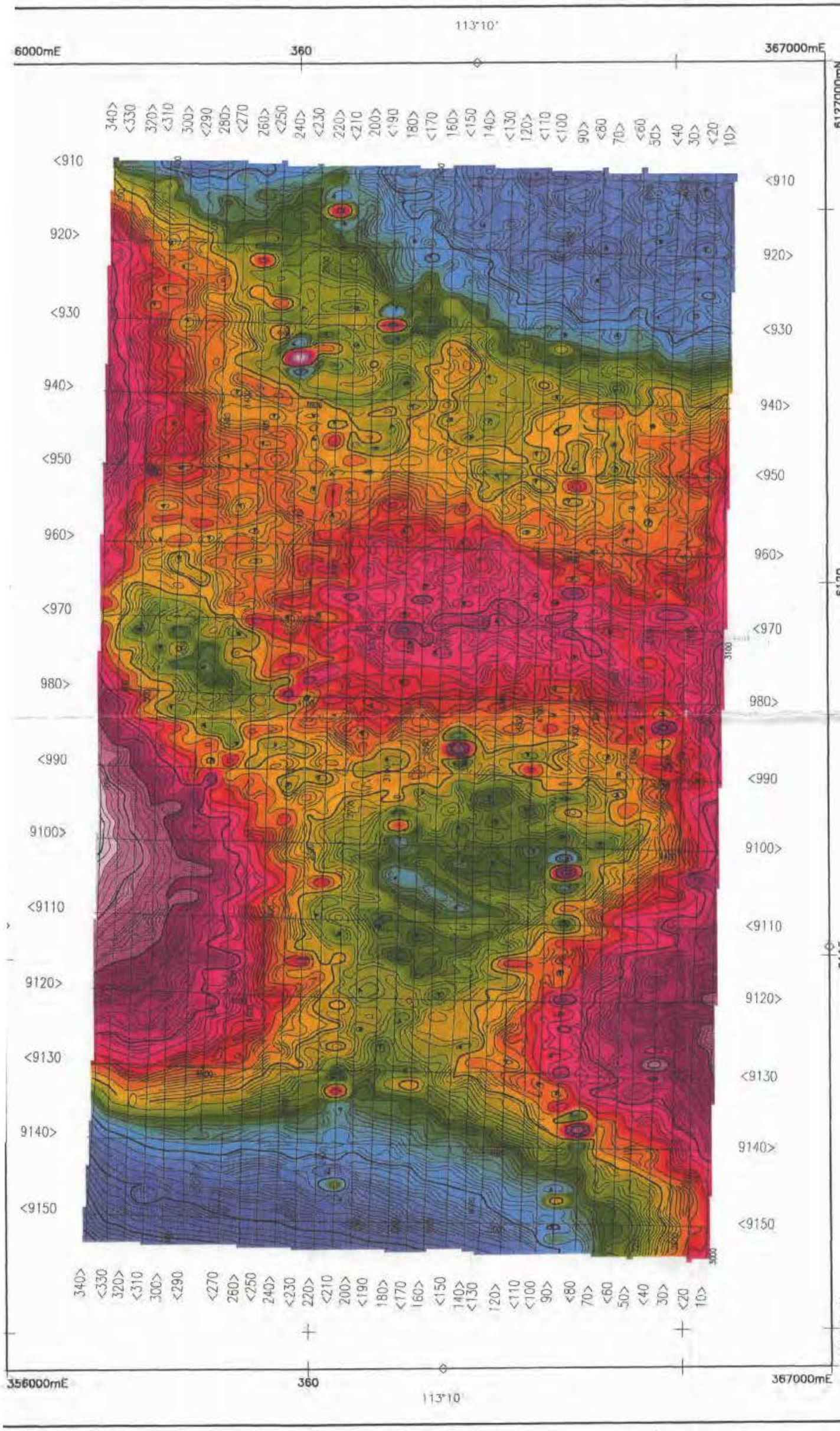
Calling, Alberta

Surveyed by
SPECTRA EXPLORATION
Calgary, Alberta, CANADA

Data Compiled and Plotted by
CGI *CONTROLLED* GEOPHYSICS Inc.
Thornhill, Ontario, CANADA

Date: February, 1998

Figure: 9721 - HG



Scale 1:50000

1000 0 1000 2000 3000 4000
(metres)
2500 0 2500 5000 7500 10000 12500 15000
(feet)

0.180
0.140
0.100
0.078
0.068
0.062
0.056
0.052
0.046
0.042
0.038
0.036
0.032
0.028
0.026
0.022
0.020
0.018
0.016
0.012
0.010
0.008
0.004
0.002
0.000
0.000
-0.004
-0.006
-0.008
-0.012
-0.014
-0.016
-0.020
-0.022
-0.026
-0.030
-0.032
-0.036
-0.040
-0.044
-0.050
-0.056
-0.062
-0.072
-0.082

Vertical Gradient [nT/m]

40 metres Grid Cell Size
Contour Intervals (nT/m)

0.002
0.010
0.050
0.250

Spectra Exploration Geoscience Corp.

Prelim. Vertical Magnetic Gradient Colour Image with Contours

Project 9721

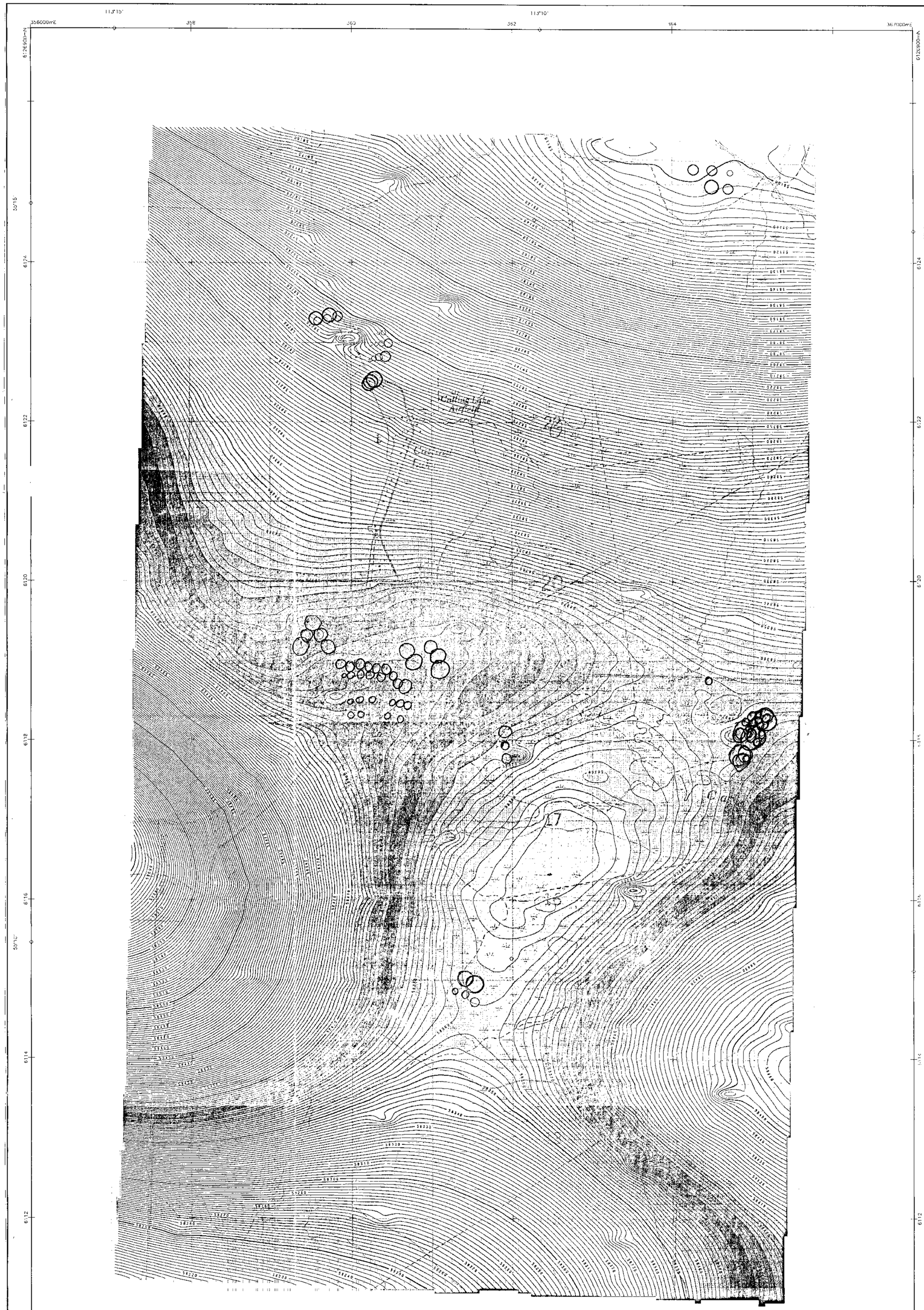
Calling, Alberta

Surveyed by
SPECTRA EXPLORATION
Calgary, Alberta, CANADA

Data Compiled and Plotted by
CGI *CONTROLLED* GEOPHYSICS Inc.
Thornhill, Ontario, CANADA

Date: February, 1998

Figure: 9721 - VG



Scale 1:20000

500 0 500 1000 1500
(metres)
1000 0 1000 2000 3000 4000 5000 6000
(feet)

Euler Depth De-convolution Processing Notes

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 100% 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 reported depth will be deeper than the top of the source owing to loss of high frequency wavelengths in the anomaly during gridding and micro-levelling.

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

656405 Alberta Limited

Euler Depth Deconvoluton
Solutions for Stuct Index of 2
Calling Lake Project
Alberta

Surveyed by
SPECTRA EXPLORATION
Calgary, Alberta, CANADA

Data Compiled and Plotted by
CGI *CONTROLLED* GEOPHYSICS In
Thornhill, Ontario, CANADA

Date: February, 1998 | Figure: 9721 –

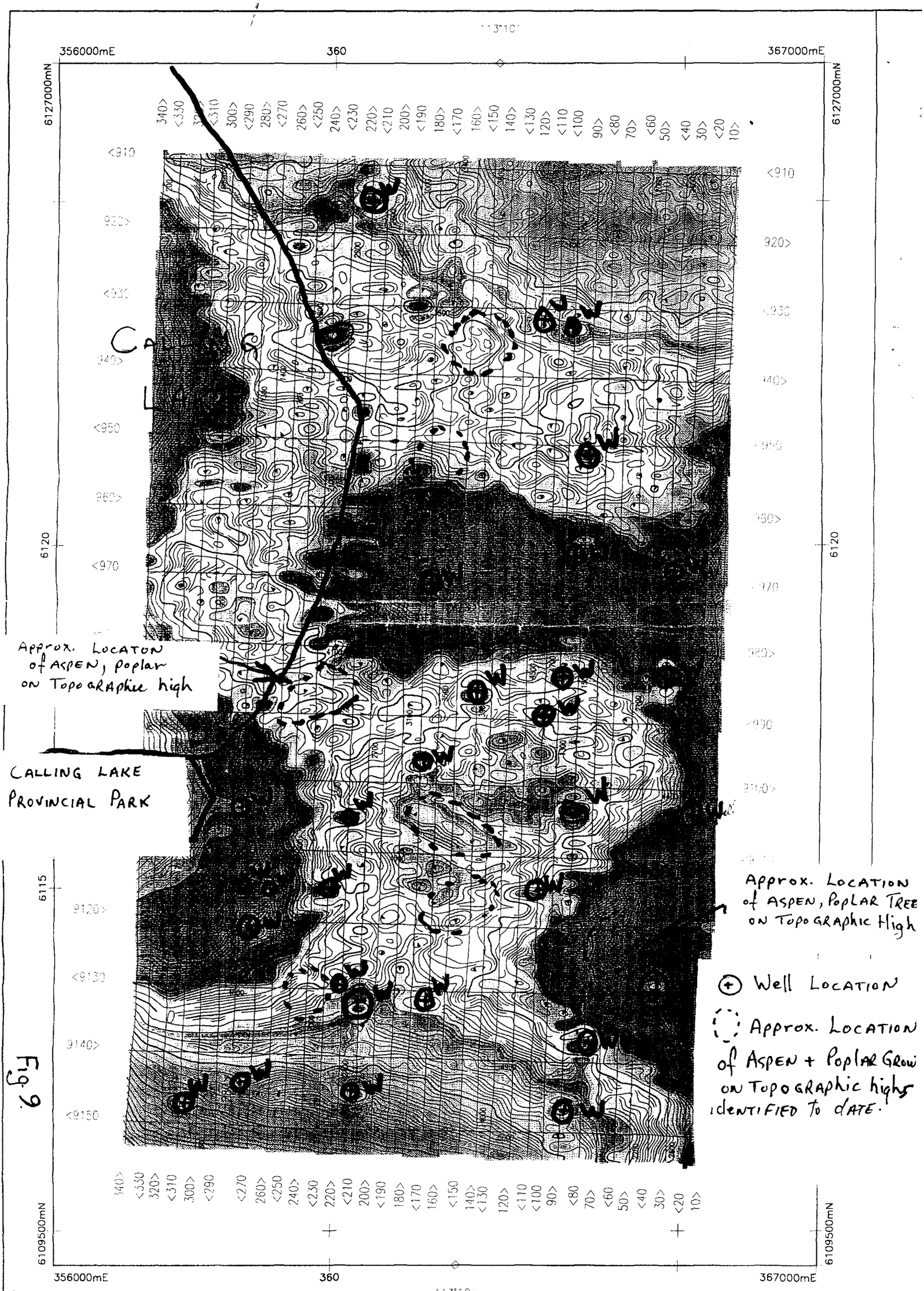

356000mE
360
367000mE
6127000mN
6120
6115
6109500mN
CALLING LAKE PROVINCIAL PARK
Approx. Locaton of Aspen, poplar on Topographic high
Approx. Location of Aspen, Poplar Tree on Topographic High
⊕ Well Location
Approx. Location of Aspen + Poplar Grow on Topographic highs identified to date.

Fig. 9.

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.

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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.....$335.00
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 Deconvoluton.....$1800.00
Research and Consulting.....$3300.00
Buisness 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**