MAR 19980014: PEACE DIAMOND

Received date: Jul 31, 1998

Public release date: Aug 01, 1999

19980014

June 1, 1998.

REPORT NAME: TUL PETROLEUMS LTD.
PEACE DIAMOND PROJECT-ASSESSMENT WORK REPORT - HAWK HILLS MAGNETIC ANOMALY Report No. 98-06-01A

TUL PETROLEUMS LTD - ASSESSMENT WORK REPORT

PEACE DIAMOND PROJECT

HAWK HILLS MAGNETIC ANOMALY

TWP 96, RGE 24, W5th Meridian,

PEACE RIVER DISTRICT, ALBERTA.

PEACE DIAMOND PROJECT: PEACE RIVER LOWLANDS & UPLANDS METALLIC & INDUSTRIAL MINERALS EXPLORATION PERMITS

Hawk Hills: 9396010020; an extension to work on Permits: 9393080032, 9393080033, 9393080035 to 9393080040,9393080110, 9393080111,9393080121,9393080122,9393080141, 9393080678 to 9393080680; 9395120003; 9396010021, 9396060014 to 17, 9396070031 to 939670036;

Townships 96 - 97, Ranges 24 - 25, W5M
54 km (34mi)NNE of Manning, Alberta.
Aero Magnetic Target centred on:

N.T.S. 84F

Latitude: 57 degrees 22.6 minutes N.
Longitude: 117 degrees 50.8 minutes W.

UTM Zone 11:
446,000m E.;
6,359,800m N.

by

Murray J. (Jim) Stapleton, B.A., P.Land
President
TUL PETROLEUMS LTD.

TABLE OF CONTENTS

HAWK HILLS MAGNETIC ANOMALY

* TUL Petroleums Ltd. contact: 42030-415-9737 MacLeod Trail S., Calgary, Alberta. T2J 7A6
Phone: (403) 256-0659, Fax (403) 254-9391. Contact: Murray J. (Jim) Stapleton, President.

APPENDICES

LIST OF FIGURES

Metric Conversion Table

Linear Measurement	Convert From				Convert to
1mi (mile) = 1600m (meters)	mi.	X	1600	=	m
1mi = 1.6km (kilometers)	mi.	X	1.6	=	km
1km = 0.625mi	km	X	0.625	=	mi.
1ft (foot) = 0.3048m	ft.	X	0.3048	=	m
1m = 3.28ft	m.	X	3.28	=	ft.
Area Measurement					
1 Township = 23040 acres	twp. 9,216 Ha.	X	23040	=	acres
1 acre = 0.4047 ha (hectares)	acres	X	0.4047	=	ha.
1 ha = 2.471 acres	ha.	X	2.471	=	acres
1 section = 640 acres	section	X	640	=	acres

1.0 INTRODUCTION

Regional magnetic surveys of NTS 84F show a strong magnetic anomaly which TUL calls the "Hawk Hills Anomaly." It centres on Section 31, Township 96, Range 24, West of the Fifth Meridian, in the Peace River Uplands, north west of Manning, Alberta. Federal Government Geophysical Series Aeromagnetic 1:250,000 scale maps show the anomaly as an 700 gamma anomaly. This differential is over a 6 kilometre distance. More detailed data was obtained from a private source by TUL two years ago. The anomaly is broad and considered mostly deep. However, some shallow magnetics appear to be present. TUL set out to investigate the Hawk Hills Magnetic Anomaly and has worked on the project on and off for more than two years.

This report constitutes a complete and independent report on the Hawk Hills Permit. However, TUL has carried out other diamond exploration and associated regional studies on the Peace River Lowlands and Uplands in the Peace River District over the past five years. The Hawk Hills Permit is included in geological, geochemistry, gravity and regional assessment work in "Lamprophyres of the Peace River District"(1997) and "Ashes of the Peace River District" (1997) and "West Peace River Trend, Diamond Indicator Geochemistry Anomalies, Peace River District, Alberta." (1998) (Study Area: Map Figure - 1)

We are not aware of any diamond exploration done on the properties prior to TUL acquiring the Metallic and Industrial Minerals Exploration Permit. (Permit Location: Map Figure - 2)

TUL investigated Hawk Hills by looking at oil and gas exploration drill samples, reviewing seismic surveys available; by air photo interpretation of black and white and colour photos; by doing ground mag surveys and sampling some surface soils. Finally, TUL flew a custom aero magnetic survey over the property in early 1998 in preparation for trenching and drilling. Trenching and drilling could not be carried out because of spring break-up and road bans.

Diamond exploration was the reason for the Hawk Hills assessment work. Federal data shows a strong anomaly at Hawk Hills. Stacked profiles obtained by TUL show the anomaly as being unique in northwest Alberta. What the strong magnetic signature represents, at Hawk Hills, is unknown. This report offers some interpretations, based on regional work and new magnetic data. Although considerable work and resources were invested in the property for ground magnetic surveys and especially for the analysis of the Canagrad Surveys 200metre spaced aero magnetic survey, the results are inconclusive. The results are open to a number of geological and geophysical interpretations.

A summary of the work done by TUL concludes that Hawk Hills is a volcanically related deep geological structure, which is flanked on four sides by magnetically detectable faults. The structure is likely uplifted and forms an horst. Although the strong broad magnetic body tends to obscure smaller kimberlite-like intrusive signatures, magnetics suggest that volcanics may breach local bedrocks in a few places. Overburden on most of this upland is thin, so the shallow volcanics may be within five metres of the surface. Where incised valleys cut deep into the Uplands, possible outcrops are indicated by magnetics.


NORTH AMERICAN DIAMOND EXPLORATION
PEACE DIAMOND PROJECT
HAWK HILLS
ANOMALY
PEACE RIVER, AB.
TUL PETROLEUMS LTD.
HAWK HILLS MAGNETIC
ANOMALY
TUL HAWK HILLS EXPLORATION PERMIT
MANNING, NORTHWEST ALBERTA
page - 2
June, 1998. Scale: 1:28,000,00 Figure - 1
KIMBERLITES
LAMPROITES
DISCOVERIES
NORTH AMERICAN CRATON

2.0 LOCATION & ACCESS

2.1 Location

The TUL Hawk Hills Permit is located about 51 kilometres (about 32 miles) north north-west of Manning, Alberta. (Figure - 2)

TUL Hawk Hills is in the physiographic region known as the Peace River Uplands.

1.2 Access

Access to the Hawk Hills Metallic & Industrial Minerals Permit is by Highway 35 north from Manning, which crosses the Meikle River. North of Manning 51 kilometres is a gravel pit on the east side of Highway 35. Winter access to the permit is straight west along the 25th Base Line from Highway 35. A winter access road can be made, using ice bridges, west from Highway 35 on the DMI-High Level Forest Products right-of-way. It is 19.5 kilometres to the TUL Hawk Hills Permit boundary and 21 kilometres west to the magnetic target.

Other access is by helicopter from Manning or possibly by ATV in summer, if conditions are right.

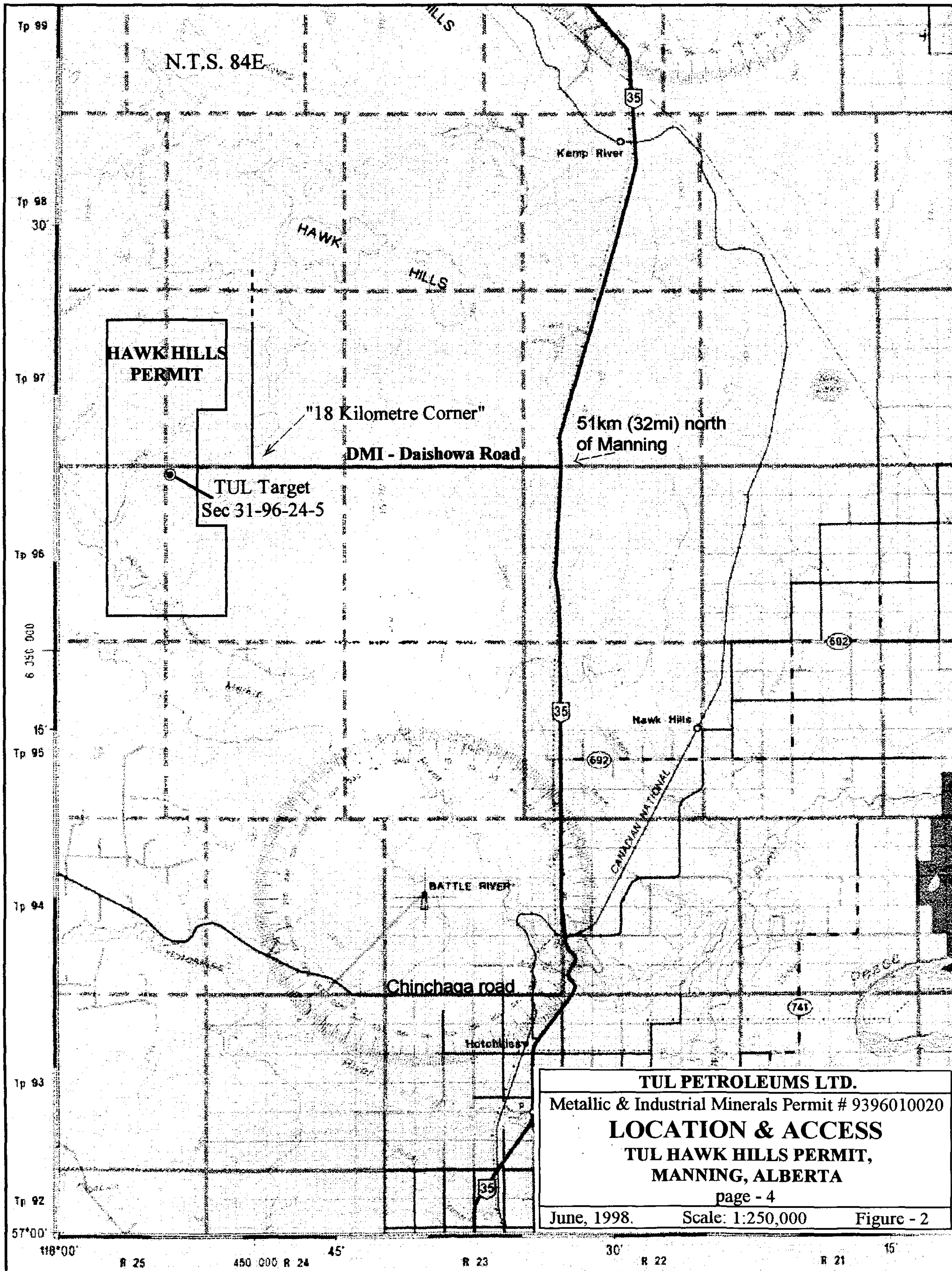
The magnetic high is encompassed by the permit boundaries and is centred in LSD 13, Section 31, Township 96, Range 24, West of the 5th Meridian. Regional one mile spaced aero magnetic and Federal Government aero magnetic data shows the target as being about a square kilometre in aerial extent and oriented in a north-northwesterly direction.

1.3 Topography and Vegetation

Topography on the permit consists of the gently rolling Peace River Uplands with relief on the permit in the order of a few hundred feet or a hundred metres.

The elevation of the target is 2250 feet (X .348 = 783 metres) above sea level (ASL). The elevation of the Peace River 30 miles east (30 X 1.61= 48.3 km) is 900 feet (313 metres) ASL.

The permit consists of spruce and pine covered Downs, surrounded by willow, Black Spruce, and spagnum moss covered, muskegs, fens and bogs. The drainage is generally southwest to Havet Creek into the southeast flowing Botha River and then to the easterly flowing Miekle River. The Botha and Miekle meander over areas of low relief, commonly leaving partially preserved meander forms such as; oxbows, swale and ridge topography, and scroll bars (Hickin, 1974).



TUL PETROLEUMS LTD.

Metallic & Industrial Minerals Permit # 9396010020

LOCATION & ACCESS

TUL HAWK HILLS PERMIT,
MANNING, ALBERTA

page - 4

June, 1998. Scale: 1:250,000 Figure - 2

3.0 TABULATION OF PERMITS

TUL HAWK HILLS

The Permit straddles four townships being; Townships 96 and 97, Ranges 24 and 25, West of the Fifth Meridian in the Province of Alberta.

The registered permitee of the Metallic & Industrial Minerals Exploration Permit is TUL Petroleums Ltd. as follows:

Permit Name	Owner	Permit No.	Commencement Date
Hawk Hills	**TUL**	**9396010020**	January 17, 1996

Work was carried out by TUL Petroleums Ltd. and Canagrad Surveys Ltd. of Calgary, TUL Exploration Licence # 5021.

TUL Petroleums Ltd., Canagrad Surveys Ltd. of Calgary and other minor interest holders form a Working Interest group under a Memorandum of Agreement naming TUL as Operator of the properties.

4.0 GEOLOGY

The Hawk Hills Anomaly is on the western edge of the Buffalo Head Sub-craton, which is a crustal sub-division that is typically magnetically strong.

The country rock is the continental Dunvegan sandstone formation. These sandstones are thought to be virtually magnetically neutral. (Pierce,1995)

The regional Dunvegan bedrocks are shown on Alberta Geological Survey bedrock maps as being above 600 metres in elevation and overlaying the marine Shaftesbury shale formations.

Till maps show overburden on the Dunvegan bedrocks as 0 to 15 metres in thickness on these Uplands. The Shaftesbury should be exposed by deeply incised valleys of Havet Creek, on the west side of the permit, and by Botha River, which cuts across the permit in the south.

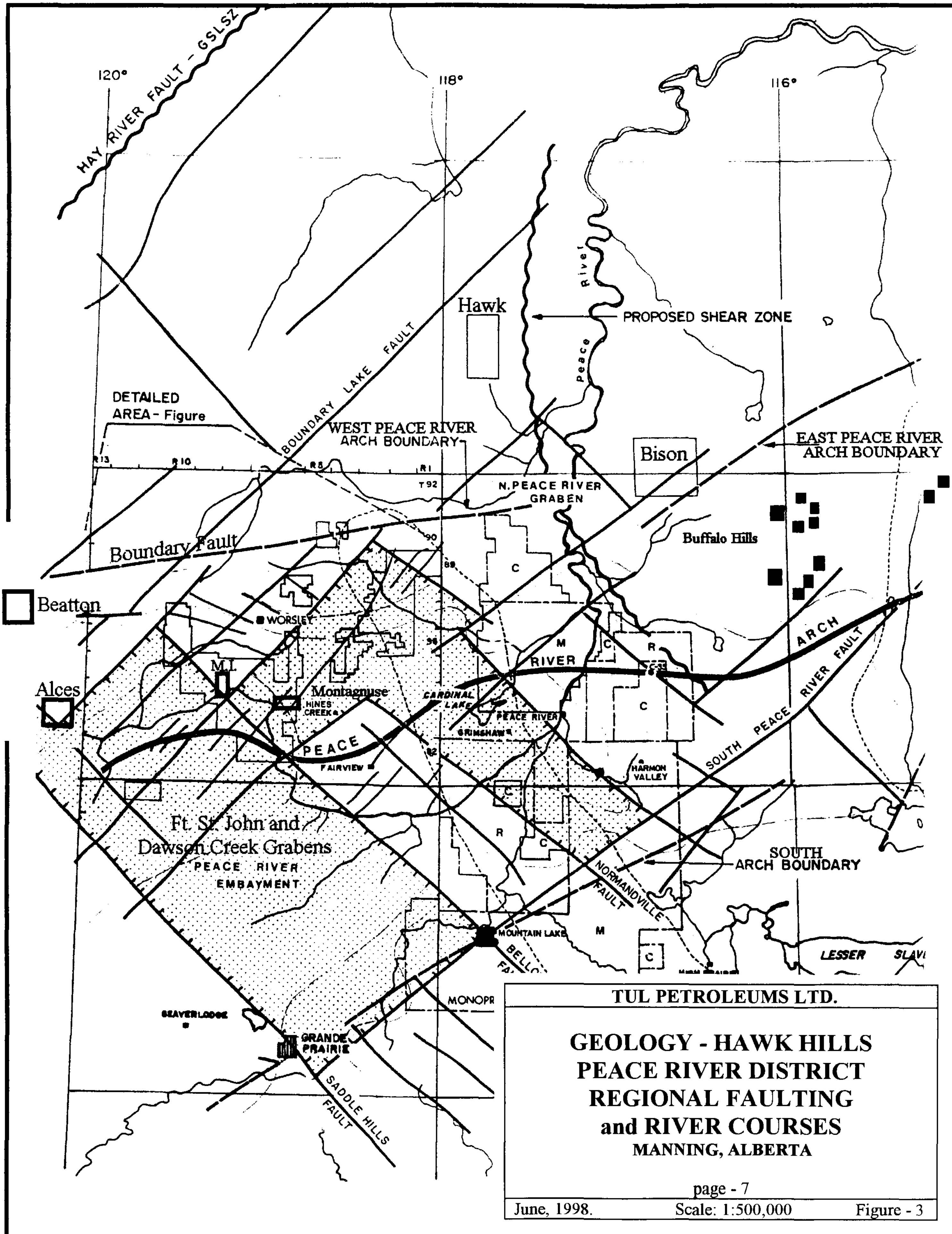
Not much is known by TUL about the geology of the Hawk Hills Permit. The Permit is located near the suture zone between the magnetic Buffalo Head Sub-Craton (Ross et al, 1994) and the not very magnetic Chinchaga Sub-craton. The difference between the Buffalo Head and Chinchaga is not well understood but it is believed that, although the Buffalo Head Terrane is magnetically strong and dates on average 2.3 Ga., and the Chinchaga Low dates on average 2.0 Ga. (Villeneuve, 1993), they may be similar in nature and they may both be underlain by Archean crustal components, although this is unlikely. (Ross, 1997)

Air photo interpretation suggests northeast faulting on the west side of the permit, as expressed by the location of the deeply incised Havet Creek. Aeromagnetic surveys support this interpretation. A paralleling fault cuts northeast through the permit and its surficial expression is the unnamed creek east of Havet Creek. Orthogonal faulting patterns are suspected, as the Meikle River runs southeast. However, there is little doubt that a northwest trending fault transects the permit where "*Beaver Lake*" is aligned along the fault in Section 5- 97-24-W5M. This may be part of the trap for the gas reservoir that produced 14 mcf of natural gas per day on test of Methmex 6-6-97-24-5.* Three traverses across "*Beaver Lake*" with the Overhauser GSM-19 Walking Magnetometer detected mineralization along the fault.

Other faults and magnetic anomalies within the strong Hawk Hills Anomaly were detected, on looking at individual lines and magnetic signatures, and by applying various mathematical filters to the data. These are not shown or specifically mapped here, because the results are inconclusive and TUL intends to do further work on the permit in the next term of assessment.

The Canagrad laser altimeter provided the grey-scale elevations on the map shown as Figure - 4, page 9, with the magnetic measurements on a two hundred metre grid over the whole permit in graduated colours and laid over the topography. Dark lines on the magnetics which break magnetic patterns can be seen as faults. The dark grey-scale underlay shows how topography can be the surface expression of faults, which propagate to surface.

*Could also be known as AEC Unigas Canso Nalor 6-6-97-24-5. "*Beaver Lake*" is our name.



TUL PETROLEUMS LTD.

GEOLOGY - HAWK HILLS
PEACE RIVER DISTRICT
REGIONAL FAULTING
and RIVER COURSES

MANNING, ALBERTA

page - 7

June, 1998.	Scale: 1:500,000	Figure - 3

5.0 SUMMARY OF 1997-1998 PROGRAMS

TUL carried out detailed black and white and colour air photo investigation and interpretation. At that time, TUL was also investigating the ashes and diamond indicators along the Peace River at Montagneuse River, Many Islands at the Bend-in-the-Peace west of Hines Creek, the Clear Hills iron ore deposit at Worsley, Stony Lake Provincial Park and on Rambling Creek (Swift) Creek and Notikewan Fire Tower. These locations are all on NTS 84 D, E and F. Colour air photographs suggested faulting patterns, possible outcrops, possible ashes and a brown hue to the ground in the area of the centre mag anomaly in Section 31-96-24-5. However, the permit was inaccessible for most of the time it was being researched.

Tower Reports and drill cuttings from the oil exploration hole, Methmex 6-6-97-24 at the AEUB Alberta Core Research Lab in Calgary, revealed white mica, hematite and possible altered olivine from a sample taken around the 2225 foot depth. (KB2250-2225= 0'/m ASL)

Seismic surveys on the NW 31-96-24-5 were viewed, but they showed no obvious breaches of sedimentary strata by intruding volcanic events.

Federal Government Geophysical Series Aeromagnetic 1:250,000 scale maps were studied. Private data and stacked profiles were obtained for the permit and surrounding region. These showed Hawk as the largest magnetic anomaly in Northwest Alberta, West of the 6th Meridian.

High Level Forest Products opened a logging road from Highway 35 to within two miles of the east permit boundary in the winter of 1998. TUL made two field trips in to the centre of the permit and conducted a number of ground magnetic surveys.

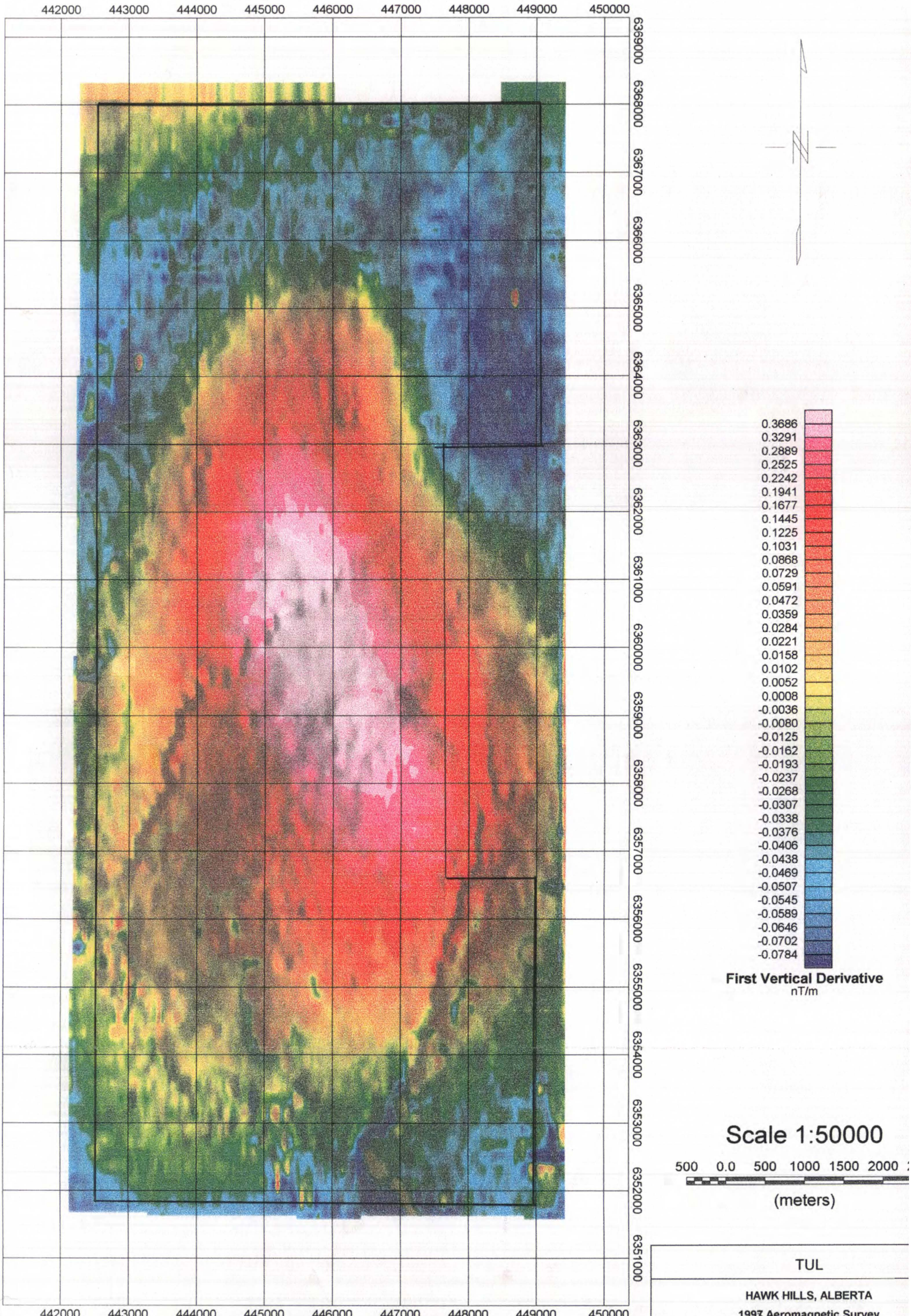
A permit was applied for to Alberta Environment to obtain permission to prepare a drill pad in LSD 13-31-96-24-5 and trench along the edge of the pad to a depth of 7 metres. Then drilling would begin if this was still advisable and warranted. Canagrad Surveys agreed to carry out an aero magnetic survey on the south half of the permit. Approval for trenching a drilling was delayed. Canagrad was delayed in flying the survey. TUL did ground mag surveys while waiting for Canagrad Surveys to complete a survey elsewhere. On about March 17 we were given notice that High Level Forest Products would be closing the road in two days and at the same time road bans came on and our partner was unable to move his tracked hoe to the property. Canagrad Surveys did arrive about March 18 and flew the whole property.

Ground magnetometer surveys, carried out in February and March of 1998, using 25 to 100 metre grids, delineated a local magnetic high in a topographically low meadow. Soil samples were taken after the ground mag surveys, but did not yield information of much value.

The follow-up detailed low-level aero magnetic survey of the whole permit carried out by Canagrad, using two hundred metre spacing, confirmed a strong broad magnetic high, with only a few, poorly defined, magnetic internal anomalies. The Canagrad survey confirmed the ground mag anomaly.

FIGURE - 4

TUL PETROLEUMS LTD.		
AERO MAGNETIC SURVEY **TUL HAWK HILLS** **MANNING, ALBERTA** page - 9		
June, 1998.	Scale: 1:50,000	Figure - 4



TUL

HAWK HILLS, ALBERTA

1997 Aeromagnetic Survey

First Vertical Derivative

Shaded relief of Laser Topography

7.0 CONCLUSIONS

1. The Hawk Hills Permit covers an area of the Buffalo Head Sub-Craton where there is a very strong deep local magnetic anomaly.

2. The magnetic anomaly at Hawk Hills is one of a number of magnetic anomalies in the Hawk Hills/Chinchaga area where Marum Resources, CaribGold, Micrex and Mount Hope Resources are exploring for kimberlites. Hawk Hills is the strongest anomaly in the region.

3. Ground magnetometer surveys, using 25 to 100 meter spacing, showed that there are small localised magnetic anomalies within the greater Hawk Hills Anomaly. The anomaly which was permitted for trenching and drilling was closely associated with a topographic low, being a sparsely treed meadow, having a 20 Nanotesla differential over a 200 metre distance. This mag anomaly is within a 277nt differential over a 1 mile east west distance. The Mag anomaly itself was regionally measured as a 640nt differential over three kilometres. This represents a significant concentration of magnetic material somewhere at Hawk Hills.

4. There are several small magnetic anomalies which appear to be shallow on the properties, either because volcanics reach surface, or because river channels have eroded down to where they may outcrop. These require further identification and exploration.

5. The sediment samples taken by TUL at "Beaver Lake" were powdery, ashy soils, so far unidentified. Samples taken on the steep east bank of Havet Creek were irony soils. These were tabled but these did not reveal anything of interest. Soils in Havet Creek were mixed with glacial material and these did not look promising as good soils or sediments to sample for diamond indicators.

6. The strong magnetic anomaly at Hawk Hills appears to be bounded on four sides by faults. There is a gas trap southwest of the Beaver Lake Fault, as evidenced by 6-6-97-24-5. Aero magnetic patterns and data suggest that the entire block is uplifted forming a structural horst.

7. Much more work is required to fully evaluate the Hawk Hills Permit.

7.0 STATEMENTS and DECLARATIONS

7.1 STATEMENT OF EXPENDITURES

TUL PETROLEUMS LTD - ASSESSMENT WORK REPORT

HAWK HILLS MAGNETIC ANOMALY - PEACE DIAMOND PROJECT

TWP 96-97, RGE 24-25, W5th Meridian,

PEACE DIAMOND PROJECT:

METALLIC & INDUSTRIAL MINERALS EXPLORATION PERMITS

Hawk Hills: 9396010020; an extension to work on Permits: 9393080032, 9393080033, 9393080035 to 9393080040,9393080110, 9393080111,9393080121,9393080122,9393080141, 9393080678 to 9393080680; 9395120003; 9396010021, 9396060014 to 17, 9396070031 to 939670036;

STATEMENT OF EXPENDITURES

Expenditures and Declaration Under Oath submitted under separate cover. Full accounting also included in the previous report: "West Peace River Trend - Geochemistry of DIMs Anomalies."

1	GEOLOGY AND FIELD WORK Transportation, Meals, accommodation	
2	GEOPHYSICAL (AERO MAGNETIC SURVEY)	
3	GEOCHEMICAL Sample taking, Processing, Inventory, storage.	
4	ANALYSIS,GEOLOGICAL REPORT: Field prep, mobe and demobe, digitizing maps and photos, air photos, report writing, maps, photographs and copying.	
5	Field equipment, rentals, microscope, consumables, transport, ATVs, 4X4s, skidoos, 3 Field Trips: 2 geology-geophysical, 1 by contractor for trenching. **TOTAL EXPENDITURE: $ 5.00/Hectare X 9,216 Hectares =** ***As previously reported.**	$46,080.00

7.2 AUTHOR QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

I, Murray J. (Jim) Stapleton, of [redacted] in the City of Calgary, Alberta, am qualified to prepare and submit this Assessment Work Report on the TUL operated Metallic and Industrial Minerals Exploration Permits tabulated herein by virtue of the following and I hereby certify that I have;

1) a degree from Simon Fraser University, Burnaby, British Columbia, Bachelor of Arts in Geography, specialising in Earth Sciences, specifically Geomorphology.

2) been awarded Professional Certification, as a Petroleum Landman (P.Land).

3) spent twenty years working in the Petroleum Industry as a Petroleum Landman, partly doing fieldwork associated with soils, design and construction.

4) author of the "Landman in Action" which is a textbook published by Mount Royal College which partly deals with soils, mapping, air photo interpretation, surficial geology and sedimentary geology.

5) taught at Mount Royal College for three semesters in the Faculty of Sciences and Technology, Geology Department, Petroleum Land Management Program, which included geology and air photo interpretation.

6) worked for Paul Hawkins & Associates doing field geology and exploration program supervision.

7) have familiarized myself with the geology of diamonds, kimberlite and lamproite geochemistry and sat three wellsites on the TUL properties and recovered kimberlitic indicators.

8) conducted 40 field trips into the Peace River Channel, the Peace River Lowlands, the Clear Hills and Northeast B.C. and supervised the work of Paul Hawkins & Associates Ltd., Paul Hawkins, P.Eng and Michael J. Kelly, P.Eng (Mining) in regard to the TUL exploration programs and on geophysical surveys.

9) worked with Loring Laboratories picking grains, recovering and classifying heavies and kimberlitic indicators related to TUL exploration. I have prospected, mapped and done geochemistry on the Peace River Country continuously for over four years. And successfully picked garnet and pyroxene minerals for microprobe.

10) have prepared several internal reports and Assessment Work Report for Alberta Energy on the TUL properties and have given presentations in that regard and made two presentations to the MEG - Mineral Exploration Group Society of Calgary, Mining Forums 1996 and 1997.

11) travelled to London, met with DeBeers, accepted their kind hospitality and looked through their diamond room; visited the British Museum of Natural History and studied minerals, diamond and kimberlite collections.

The above statement is true and correct and is being made as a part of the credentials of this Assessment Report dated at the City of Calgary, in the Province of Alberta this 20 th day of June, 1998.

[redacted]

Murray J. (Jim) Stapleton,
B.A., P. Land, President, TUL

APPENDIX - I

BIBLIOGRAPHY

Abercrombie, Hugh J. and J.W. Peirce. Vertical fluid flow, fractures, intra-sedimentary magnetisation and exotic geochemistry: Observations and speculations. Birch Mountain Resources Ltd. and Geophysical Exploration & Development Corporation (GEDCO.) 1997.

Bertram, E. F., and G. B. Mellon. Peace River Iron Deposits, Information Series 75. Alberta Research Council. 1975.

Bulletin of Canadian Petroleum Geology. Geology of the Peace River Arch - Special Volume 38A, Canadian Society of Petroleum Geologists, Calgary, Alberta. 1990.

Burwash, R.A., McGregor, C.R. and Wilson, J.A., Precambrian basement beneath the Western Canada Sedimentary Basin. *In* G.D. Mossop and I. Shetsen (eds.) Geological Atlas of the Western Canadian Sedimentary Basin, Published Jointly by the Canadian Society of Petroleum Geologists and the Alberta Research Council, Chapter 5. 1994.

Burwash, R.A. and Karlis Muelenbachs, Tectonic Setting of Eastern Alberta Basement Granites Inferred from Pearce Trace Element Discrimination Diagrams. In Ross, G.M. (Compiler), 1997 Alberta Basement Transects Workshop, Lithoprobe Report #59, Lithoprobe Secretariat, University of British Columbia. 1997.

Cant, D. J. Regional Structure and Development of the Peace River Arch, Alberta - A Paleozoic failed-rift system? Bulletin of Canadian Petroleum Geology, Volume 36. 1988.

Craigie, E. Sampling Techniques and the Distribution of Kimberlitic Indicator Minerals in glacial Tills and Sediments. *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario. 1993.

Dawson, F.M., Evans, C.G. Marsh R. and Richardson, R., Uppermost Cretaceous and Tertiary strata of the Western Canada Sedimentary Basin. *In* G.D. Mosssop and I. Shetsen (eds.), Geological Atlas of the Western Canada Sedimentary Basin, Published Jointly by the Canadian Society of Petroleum Geologists and the Alberta Research Council. 1994.

Dufresne, D.R., Eccles, B. McKinstry, D.R. Schmitt, M.M. Fenton, J.G. Pawlowicz and W.A.D. Edwards. The Diamond Potential of Alberta, Bulletin No. 63. Alberta Energy - Alberta Geological Survey. 1996.

Energy, Mines and Resources Canada. Table of Formations. Institute of Sedimentary and Petroleum Geology, Western Canadian Sedimentary Basin. 1995.

Fenton, Mark M., J.G. Pawlowicz and M.B. Dufresne. Reconnaissance Mineral and Geochemical Survey with Emphasis on Northern Alberta - Report for the End Fiscal Year 1993-1994 Year 2 of a 3 Year Project-MDA Project Number: M92-04-006, Alberta Research Council Report: 1994-21. Alberta Geological Survey, Department Alberta Research Council. 1994.

Geological Survey of Canada. Magnetic Anomaly Map of Canada. 1990.

Geological Survey of Canada. Gravity Anomaly Maps of Canada. 1990.

Green, R. and G.B. Mellon. Geology of the Chinchaga River and Clear Hills (North Half) Map-Areas (Bad Heart Ironstone), Alberta - Preliminary Report 62-8. Research Council of Alberta. 1962.

Fipke, C.E., J.J. Gurney and R.O. Moore. Diamond Exploration Techniques Emphasising Indicator Mineral Geochemistry and Canadian Examples. Geological Survey of Canada - Bulletin 423. 1995.

Hart, B.S. and Plint, G. Upper Cretaceous Warping and Fault Movement on the Southern Flank of the Peace River Arch. Bulletin of Canadian Petroleum Geology, Volume 38A. 1990.

Hicken, E.J. The Development of Meanders in Natural River Channels. Am J. Sci. 274, 414-42. 1974.

LeCheminant,A.N., D.G. Richardson, R.M.W. DiLabio, and K.A. Richardson (Eds)SEARCHING FOR DIAMONDS IN CANADA. Geological Survey of Canada, Open File 3228. 1996.

Leckie, D.A. and B. Kjarsgaard et al. Geology of a Late Cretaceous Possible Kimberlite at Mountain Lake, Alberta - Chemistry, Petrology, Indicators Minerals, Aeromagnetic Signature, Age, Stratigraphic Position and Setting. Geological Survey of Canada and the Institute of Sedimentary and Petroleum Geology, Open File 3441. 1997.

Leckie, D.A., Kjarsgaard, B.A., Bloch, J., McIntyre, D., McNeil, D., Stasiuk, L. and Heaman, L Emplacement and Reworking of Cretaceous, Diamond-bearing, Crater Facies Kimberlite of Central Saskatchewan. Canada. *In* Geological Society of America, Bulletin, Volume 109, Number 8, August, 1997.

Leeder, M. R. Sedimentology - Process and Product. Department of Earth Sciences, University of Leeds, Published by George Allen & Unwin, London, England. 1983.

Marum Resources Inc. Peace River Diamond Project Northwest Alberta. Marum Resources Inc. Annual Report. 1997.

Muehlenbachs, K., and R. A. Burwash, and T Chacko. The Oxygen and Hydrogen Isotope Composition of Alberta Basement Rocks: Possible Implications for Crustal Structure and Paleogeographic Reconstructions of the Basement Terrains. Alberta Basement Transects Workshop (February 14-15), Lithoprobe Report # 37, 1994.

O'Connell, S.C., 1994. Geological History of the Peace River Arch. In Mossop, G.D. and Shetsen, I. (Eds.), Geological Atlas of the Western Canada Sedimentary Basin, Alberta Geological Survey and Alberta Research Council of Alberta and Canadian Society of Petroleum Geology, Volume 38A.

O'Connell, S.C., Dix, G.R. and Barclay, J.E., The Origin, History and Regional Structural Development of the Peace River Arch, Western Canada. Bulletin of Canadian Petoleum Geology, Volume 38A. 1990.

Peirce, John W, Serguei A. Goussev, Robert A. Charters, Hugh J. Abercrombie and Glen R. DePaoli. Intrasedimentary Magnetization by Vertical Fluid Flow and Exotic Geochemistry. 1998.

Peirce, J.W., R.A. Charters, S.A. Goussev. Magnetization of the Hines Creek Fault - an HRAM case history. Geophysical Exploration & Development Corporation (GEDCO.) 1997.

Petruk, W., Farrell, D.M. Laufer, E.E. Tremblay, R.J. and Manning, P.G. Nontronite and Ferruginous Opal from the Peace River Iron Deposit in Alberta, Canada. Canadian Mineralogist, Volume 15, 1977.

Pough, F. H. , Peterson Field Guides, Rocks and Minerals, Houghton Mifflin Company, Boston, Massachusetts 02108. 1988.

Reed, L. E. The Geophysics of Kimberlite. *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario.

Ritchie, W. D., The Kneehills Tuff, A dissertation submitted to the school of Graduate Studies, Master of Science, University of Alberta, Edmonton, Alberta, 1957.

Ross, G. et al., the Peace River Arch, Western Canada. Bulletin of Canadian Petroleum Geology, Volume 38A. 1990.

Ross, G. M., Alberta Basement Transects Workshop (March 1-2, 1993), Lithoprobe Report # 31, 1993.

Ross, G. M. Tectonic Evolution of Crystalline Basement, Western Canada: Implications for Mantle Evolution, The Calgary Mineral Exploration Group Society, Third Annual Calgary Mining Forum. March 3 & 4, 1993.

Ross, G. M. Alberta Basement Transects Workshop, Lithoprobe Report # 37, February 14-15, 1994.

Ross, G.M. (Editor), Alberta Basement Transects Workshop Lithoprobe Report #47, Lithoprobe Secretariat, University of British Columbia. 1995.

Ross, G.M. (Compiler), Alberta Basement Transects Workshop Lithoprobe Report #59, Lithoprobe Secretariat, University of British Columbia. 1996.

Santiago, S. P. Geological Assessment Report on the TUL Petroleums Ltd. Metallic Minerals Permits #s 93930800-32,33,35 to 40; 9393801-10,11,21,22,41; 93938006-78 to 80; 93951200-03; 93960100-19 to 21; 93960600-14 to 17; 93960700-31 to 36 Northwestern Alberta for GEO Piaja Exploration Corp. Internal Report. 1996.

Stapleton, M.J. Ashes of the Peace River District. Assessment Work Report on the TUL Petroleums Ltd. Peace River District Metallic Minerals Exploration Permits. TUL Petroleums Ltd. 1997.

Stapleton, M.J. Lamprophyres of the Peace River District. Assessment Work Report on the TUL Petroleums Ltd. Peace River District Metallic Minerals Exploration Permits. TUL Petroleums Ltd. 1997.

Trotter, S., and Ross, G. M. Deep Crust and Basement Structure of the Peace River Arch Region: Constraints on Mechanisms of Formation. Geological Survey of Canada, Bulletin of Canadian Petroleum Geology, Vol. 38A. 1990.

Villeneuve, M.E., G.M. Ross, R.J. Theriault, W. Miles, R.R. Parrish and J. Broome. Tectonic Subdivision and U-Pb Geochronology of the Crystalline Basement of the Alberta Basin, Western Canada. Geological Survey of Canada - Bulletin 447. 1993.

Wood, B.D. and A.C. Williams. Mountain Lake Prospect, Alberta. Monopros Ltd. Metallic and Industrial Minerals Permits 9390080014, 9390080019, and 9390080020. Assessment File Report 19940001, Alberta Geological Survey. 1994.

Yorath, C.J. Where Terranes Collide. Orca Book Publishers, Victoria, British Columbia. 1990.

APPENDIX II

REFERENCES

Abercrombie, Hugh J. and J.W. Peirce. 1997. Vertical fluid flow, fractures, intra-sedimentary magnetization and exotic geochemistry: Observations and speculations. Birch Mountain Resources Ltd. and Geophysical Exploration & Development Corporation (GEDCO.) pp. 1-5

Bertram, E. F., and G. B. Mellon. 1975. Alberta Research Council, Peace River Iron Deposits, Information Series 75. pp. 5-12.

Edwards, D. A., H. V. Lyatsky and R. J. Brown. 1995. Effects of Basement Fault Reactivation on Phanerozoic Stratigraphy in the Alberta Basin.... Presentation made to the 1995 Lithoprobe Alberta Basement Transects Workshop, April 10 & 11, 1995.

Energy, Mines and Resources Canada. 1995. Table of Formations. Institute of Sedimentary and Petroleum Geology, Western Canadian Sedimentary Basin.

Marum Resources Inc. Annual Report 1997. Peace River Diamond Project Northwest Alberta.

Muehlenbachs, K., and R. A. Burwash, and T Chacko. 1994. The Oxygen and Hydrogen Isotope Composition of Alberta Basement Rocks: Possible Implications for Crustal Structure and Paleogeographic Reconstructions of the Basement Terrains. Presentation to the Alberta Basement Transects Workshop, February 14-15, 1994, Lithoprobe Report # 37. pp. 250-253.

O'Connell, S. C., G. R. Dix and J. E. Barclay. 1990. The origin, history, and regional structural development of the Peace River Arch, Western Canada. Bulletin of Canadian Petroleum Geology. Geology of the Peace River Arch - Special Volume 38A, Canadian Society of Petroleum Geologists, Calgary, Alberta. pp. 4-24.

Peirce, J.W., R.A. Charters, S.A. Goussev. 1997. Magnetization of the Hines Creek Fault - an HRAM case history. Geophysical Exploration & Development Corporation (GEDCO.) pp 1-5.

Ross, G. M. 1990. Deep crust and basement structure of the Peace River Arch: constraints on mechanisms of formation. Bulletin of Canadian Petroleum Geology. Geology of the Peace River Arch - Special Volume 38A, Canadian Society of Petroleum Geologists, Calgary, Alberta. pp. 25-34.

Ross, G.M. (Editor), 1995. Alberta Basement Transects Workshop Lithoprobe Report #47, Lithoprobe Secretariat, University of British Columbia. pp. 87.

Ross, G.M. (Compiler), 1997. Alberta Basement Transects Workshop Lithoprobe Report #59, Lithoprobe Secretariat, University of British Columbia. pp. 91-101 & p. 163.

Santiago, S. P. 1996. Geological Assessment Report on the TUL Petroleums Ltd. Metallic Minerals Permits #s 93930800-32,33,35 to 40; 9393801-10,11,21,22,41; 93938006-78 to 80; 93951200-03; 93960100-19 to 21; 93960600-14 to 17; 93960700-31 to 36 Northwestern Alberta for GEO Piaja Exploration Corp. Internal Report.

MAPS AND ILLUSTRATIONS

Alberta Department of Mines and Minerals, Metallic Mineral Permit Areas Map, Scale 1:750,000, Aug. 11, 1997.

Canadian Society of Petoleum Geologists Geological Highway Map Series, Second Edition 1981 (Jackson, P.C.,(Map Committee Chairman), Myhr, D.W., Groeneweg, B, Palmer, H., McLean, G.C., Loney, C.D., Dolphin, D.R.,Dr.Rein de Wit (Editor) Cross-section of Phanerozoic Peace River Arch. A-A'.

Collom, C.J. Effects of the Peace River Arch (not Embayment!) on deposition of the Upper Cretaceaou Bad Heart Formation, and correlation with coeval strata of Alberta. Lithoprobe Report #59, p. 163.

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Chinchaga River, Alberta 84 E, Scale 1:250 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Alberta 84 F, Scale 1:250 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Hines Creek, Alberta 84 D/2, Scale 1:50 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Eureka River Alberta 84 D/7, Scale 1:50 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Many Islands, Alberta 84 D/6, Scale 1:50 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Goffit Creek, Alberta 84 F/5, Scale 1:50 000

Dix, G R., et al. 1990. Structure Contour Map of the Precambrian, The Peace River Arch region: constraints on mechanisms of formation. Geology of the Peace River Arch - Special Volume 38A. Canadian Society of Petroleum Geologists, Calgary, Alberta. pp. 4-24.

Dufresne, D.R., Eccles, B. McKinstry, D.R. Schmitt, M.M. Fenton, J.G. Pawlowicz and W.A.D. Edwards. 1996. The Diamond Potential of Alberta. Alberta Energy - Alberta Geological Survey. Bulletin No. 63. Figure 3. "Domain Map." pp.12;; Figure 9. "Major Faults, Diatemes, Dykes." pp. 24; Figure 17. "Spacial Relationships of bentonites to major faults" pp. 49; Figure 18. "Contour map of crustal thickness of depth to the Mohorovicic discontinuity..." pp. 52; Figure 20. "Horizontal gradient of Bouger gravity anomalies for Alberta" pp.55; Geochemical Trends map. Figure - . pp 83.

Geological Survey of Canada, Department of Mines and Minerals, Map 1251 A Tectonic Map of Canada, Scale 1:5 000000, 1968.

Geological Survey of Canada, 1989: Aeromagnetic Total Field, Bison Lake, Alberta, Geological Survey of Canada, Map 7781G, Scale 1:250 000. (84F)

Geological Survey of Canada, 1989: Aeromagnetic Total Field, Peace River, Geological Survey of Canada, Map 7773G, Scale 1:250 000.

19980014

TRI UNION
RESOURCES LTD.
TUL PETROLEUMS LTD.

P.O. Box 42030, 415 - 9737 McLeod Trail S.
Calgary, Alberta T2J 7A6

Telephone: 256-0659
Fax: 254-9391

June 26, 1998

REPORT NAME: **PEACE DIAMOND PROJECT**
TUL PETROLEUMS - WEST PEACE RIVER TREND
DIAMOND INDICATOR GEOCHEMISTRY ANOMALIES,
Hines Creek to Bear Canyon, Alberta. TUL Report No. 98-01-01A

TUL PETROLEUMS LTD - ASSESSMENT WORK REPORT 1997

PART III

WEST PEACE RIVER TREND, DIAMOND INDICATOR GEOCHEMISTRY ANOMALIES, PEACE RIVER DISTRICT, ALBERTA.

(West Peace River Trend-Geochemistry Anomalies: Exploration Protocol - Magnetics, Fieldwork, Observations, Geochemical regional analysis and Drilling of suspected West Peace River Kimberlite - Magnetic Signature and Associated Ashes.)

PEACE RIVER LOWLANDS & UPLANDS
METALLIC & INDUSTRIAL MINERALS EXPLORATION PERMITS
No. 9393080032, 9393080033, 9393080035 to 9393080040,9393080110,9393080111,9393080121,9393080122, 9393080141, 9393080678 to 9393080680; and 9395120003; 9396010019 to 9396010021, 9396060014 to 17, 9396070031 to 939670036.

N.T.S. 84D

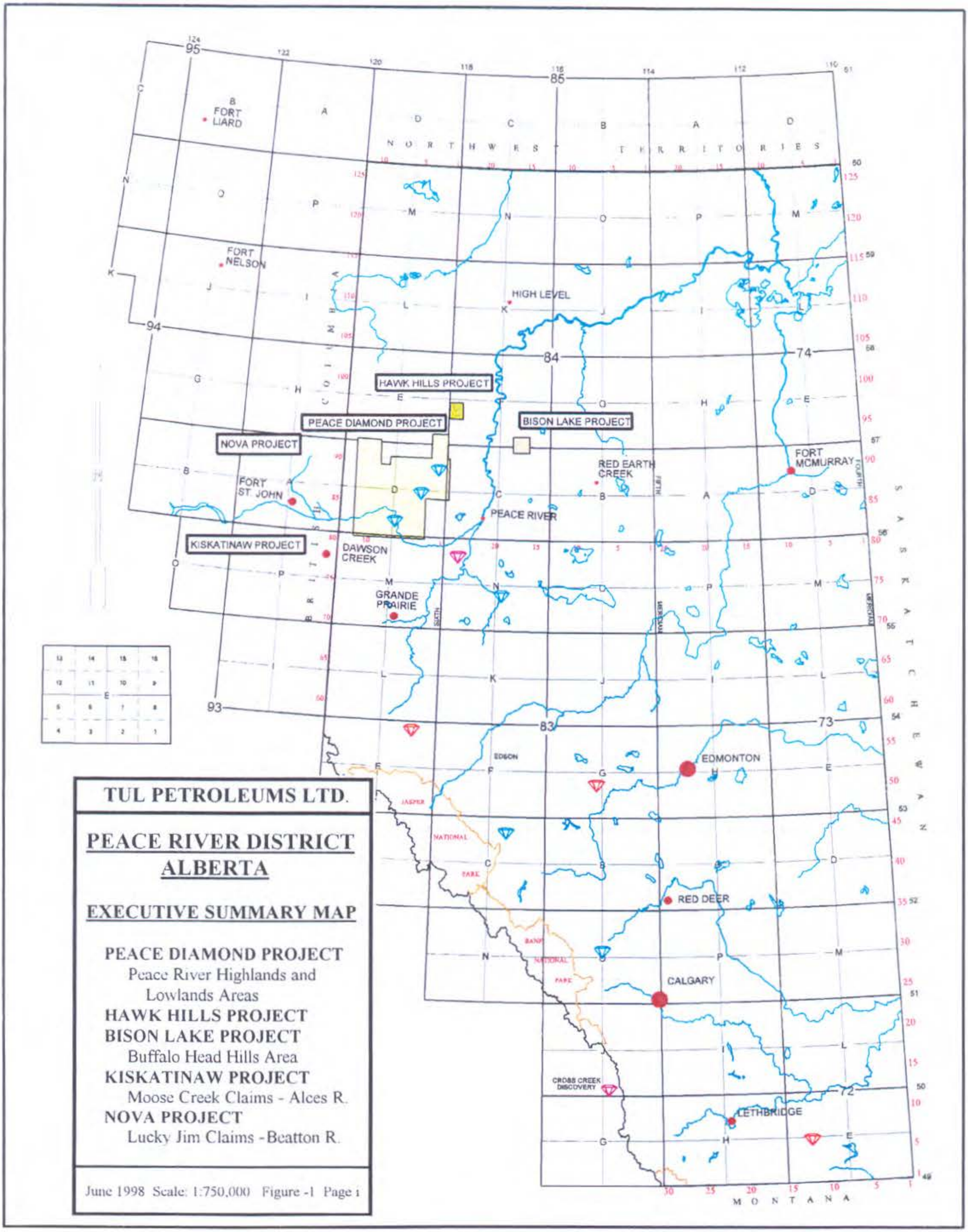
Latitude 56 degrees N to 56 degrees 45'N
Longitude 118 degrees W to 120 degrees W

UTM Zone 11:
300000m E to 440000m E;
6210000m N to 6290000m N

Townships 80 to 89, Ranges 1 to 13, W6M
and Hawk Hills

by

Murray J. (Jim) Stapleton, B.A., P.Land
President
TUL PETROLEUMS LTD.



TUL PETROLEUMS LTD.

PEACE RIVER DISTRICT ALBERTA

EXECUTIVE SUMMARY MAP

PEACE DIAMOND PROJECT
Peace River Highlands and Lowlands Areas
HAWK HILLS PROJECT
BISON LAKE PROJECT
Buffalo Head Hills Area
KISKATINAW PROJECT
Moose Creek Claims - Alces R.
NOVA PROJECT
Lucky Jim Claims - Beatton R.

June 1998 Scale: 1:750,000 Figure -1 Page i

EXECUTIVE SUMMARY

Since 1993 TUL Petroleums Ltd. has been working the Peace River area - about five years. Initially, the presence of Monopros/DeBeers working on a fifteen township block northwest of Peace River and a fifty-five township block between High Prairie and Teepee Creek was enough to encourage exploration in the region. At that time, locations of kimberlites were only rumoured to exist. (map >>>)

In 1994 Monopros filed Assessment Work Report ID19940001 which stated that a kimberlite had been delineated by ground magnetic survey at Mountain Lake in Township 74, Range 24, West of the 5th Meridian northwest of Valleyview. A complete mineralogy investigation was done on the pipe by GSC.

By 1994 serious diamond exploration was underway by a number of companies, between Pelican Mountains and the Alberta-B.C. border, and in the Hinton-Rocky Mountain Foothills area.

TUL Petroleums acquired its first Alberta Metallic and Industrial Minerals Exploration Permits covering about 20 townships or 500,000 acres from Spirit River northeast towards Buffalo Head Hills. Most permits were staked along well defined faults like the Montagneuse Fault. These were mainly aligned in a southwest/northeast direction. Conventional exploration methods included; soil sampling, stream sediment sampling and aero magnetic surveying; and picking and microprobe, for diamond indicator minerals (DIMs).

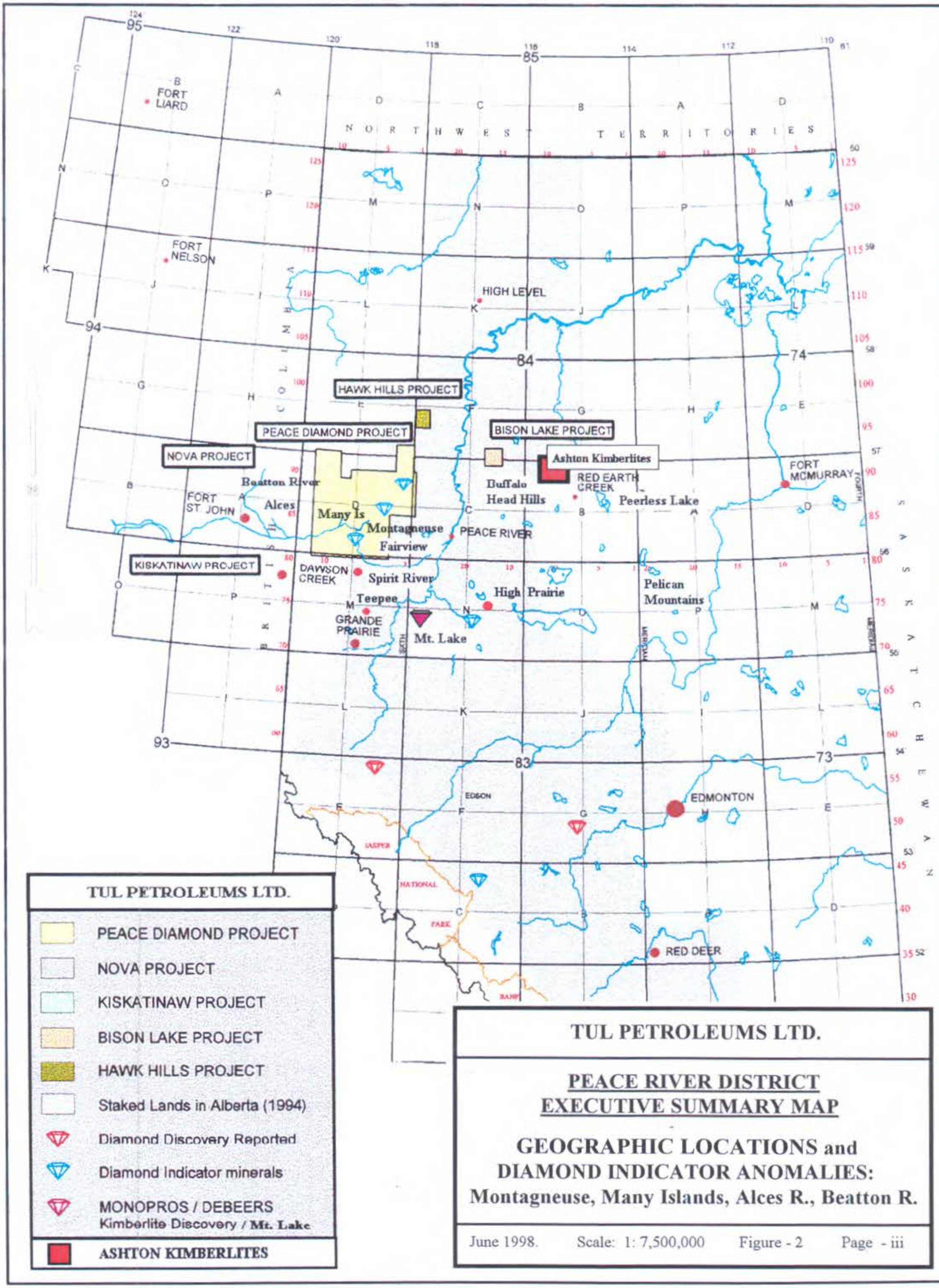
The results of TUL exploration over the first four year period was the discovery of good diamond indicator minerals and associated anomalous magnetic targets. DIMs were centred on Montagneuse River Valley and Many Islands Creek, west of Fairview. It was thought that a new West Peace River Diamond Indicator Geochemistry Trend had been discovered. Good geochemistry near deep basement faulting and magnetic surveys suggested a broad northeast DIMs trend.

In 1997 Ashton Mining of Canada farmed in on a block of permits northwest of Pelican Mountains between Peerless Lake and Buffalo Head Hills. In that area the Alberta Geological Survey recovered soil sample NAT95-134, about 50 km northwest of Red Earth, which contained 27 G9 kimberlitic indicators. This location was in the Wabasca DIMs Trend, near the centre of the Ashton lands. To date, Ashton has drilled at least 24 kimberlites in the trend, several of which have proven to be diamond bearing. Some are thought to be associated with the northeast aligned South Peace River Fault.

By 1998 TUL had continued to work at Hawk Hills, and southwest toward Spirit River, to extend the West Peace River Trend north and south. Westward exploration up Peace River, west of Montagneuse and Many Islands, led to geochemistry and mag anomalies at Alces and Beaton rivers near Fort St.John.

TUL collected and researched geological and geochemistry information available for the region and did a gravel pit inventory and investigations. Whole-rock sampling and Rare Earths analysis followed. Exploration then was focused on the geochemical anomalies. Mapping and sampling of volcanic ashes, geochemistry and mineralogy were stacked onto magnetometer surveys and air photos. In November 1997, Montagneuse M3K1 was drilled and interpreted as an intrusive. Likewise, near Beaton River.

Conclusions reached by TUL are; that volcanic events occurred in the Peace River District periodically since the Mid-Cretaceous. These were mainly associated with deep basement structure and northeast faulting. The axis of the Peace River Arch may be the south boundary of diamondiferous intrusives. Ashes and indicator mineral geochemistry can be used to localise targets. GPS systems and GIS applications allow data stacking. Air photography and accurate mag surveys narrow the area of effort. The result is the possibility of interpreting pipe fabric and selecting correct drill targets.



TUL PETROLEUMS LTD.

PEACE RIVER DISTRICT
EXECUTIVE SUMMARY MAP

GEOGRAPHIC LOCATIONS and DIAMOND INDICATOR ANOMALIES:
Montagneuse, Many Islands, Alces R., Beatton R.

June 1998. Scale: 1: 7,500,000 Figure - 2 Page - iii

TABLE OF CONTENTS

PEACE DIAMOND PROJECT - WEST PEACE RIVER TREND
DIAMOND INDICATOR GEOCHEMISTRY ANOMALIES

ATTACHED POCKET MAPS

MONTAGNEUSE and MANY ISLANDS

1:50,000 Scale

APPENDICES

Metric Conversion Table

Linear Measurement	Convert From				Convert to
1mi (mile) = 1600m (meters)	mi.	X	1600	=	m
1mi = 1.6km (kilometers)	mi.	X	1.6	=	km
1km = 0.625mi	km	X	0.625	=	mi.
1ft (foot) = 0.3048m	ft.	X	0.3048	=	m
1m = 3.28ft	in	X	3.28	=	ft.
Area Measurement					
1 Township = 23040 acres	twp.	X	23040	=	acres
1 acre = 0.4047 ha (hectares)	acres	X	0.4047	=	ha.
1 ha = 2.471 acres	ha.	X	2.471	=	acres
1 section = 640 acres	section	X	640	=	acres

LIST OF FIGURES

LIST OF TABLES

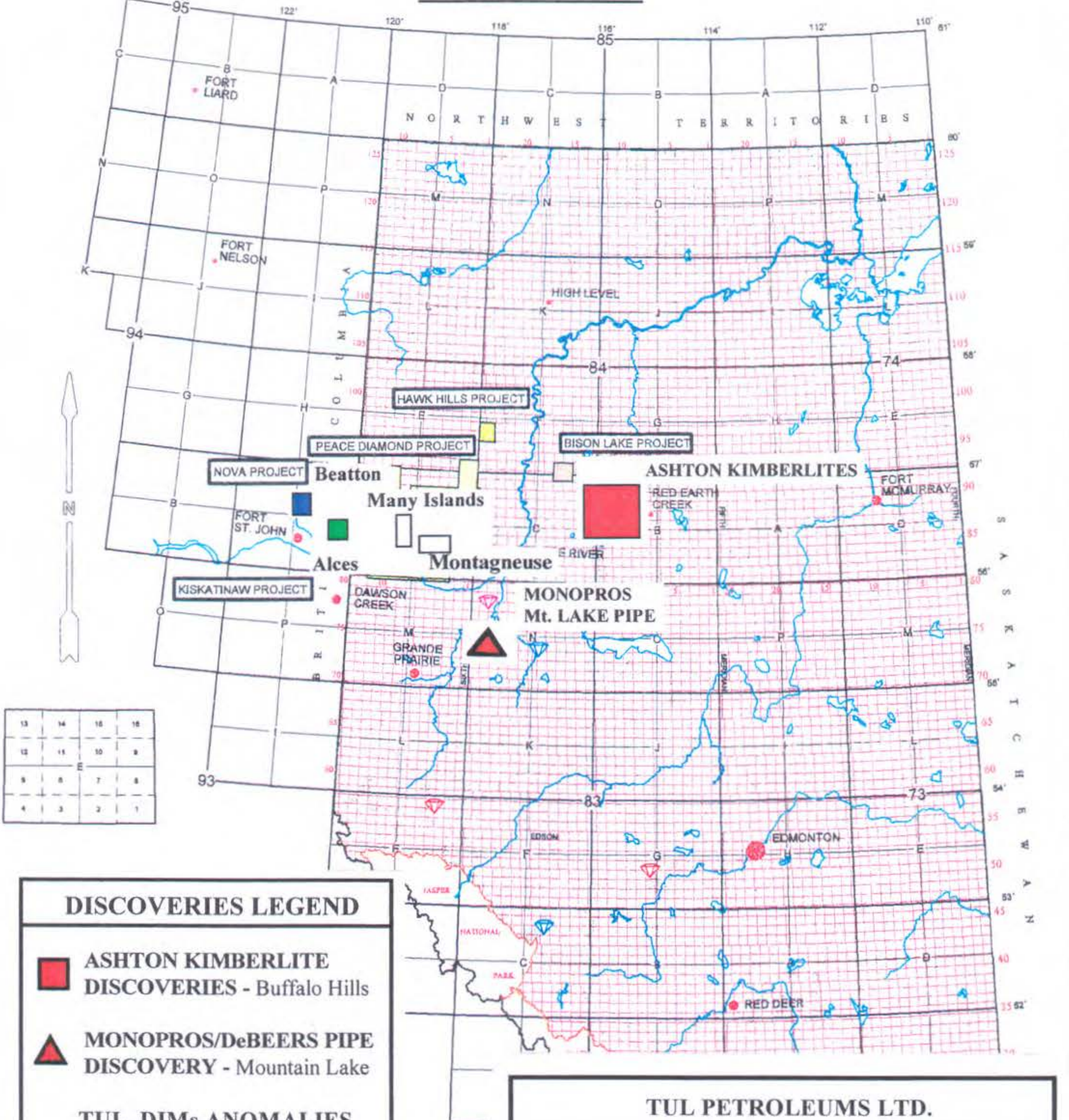
LIST OF PLATES & PHOTOGRAPHS

ACKNOWLEDGEMENTS

This report is prepared in the spirit of making a contribution to the new diamond exploration industry in the Province of Alberta. It is hoped our observations and exploration work help in the development of a new industry.

The author acknowledges the contributions and help of our partners and especially our families who made sacrifices to see this work done and to Michael Stapleton, computer wizard and Robin Stapleton, academic extra-ordinaire.

INTRODUCTION



DISCOVERIES LEGEND

ASHTON KIMBERLITE DISCOVERIES - Buffalo Hills

MONOPROS/DeBEERS PIPE DISCOVERY - Mountain Lake

TUL DIMs ANOMALIES

PEACE DIAMOND PROJECT
Many Islands Creek
Montagneuse River

NOVA PROJECT
Beatton River - Lucky Jim Claims

KISKATINAW PROJECT
Alces River - Moose Creek Claims

TUL PETROLEUMS LTD.

INTRODUCTION

PEACE RIVER DISTRICT
KIMBERLITE DISCOVERIES
TUL GEOCHEMISTRYANOMALIES

June 1998. Scale: 1: 7,500,000 Figure - 3 Page - 1

1.0 INTRODUCTION

"The kimberlites north east of Peace River ... are land based. They are also virtually unique in the world because they have not been eroded. You can actually see the volcanic cones." The Vancouver Sun, December 27,1997, quoting Dr. Dale A. Leckie of the Geological Survey of Canada.

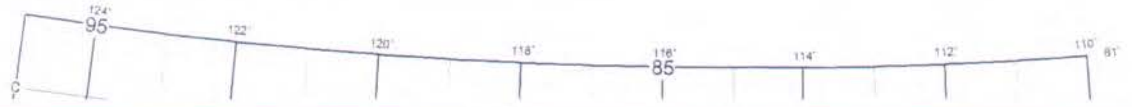
TUL Assessment Report "**Ashes of the Peace River District**" October, 1997 states: *"1. There are volcanic ashes on the TUL properties in the Peace River District. 2. The continental crust of the Peace River Arch is thick enough to be a cool root which harbours a diamond preservation field. 3.Geochronology of the deep crust suggests fabric ancient enough for diamond formation. 4. Diamond host-type rocks are known in the West Peace River District and in the East Peace River District. 5.Diamonds have been found in west central Alberta and in the East Peace River District. 6. Volcanic ashes on the TUL properties in the West Peace River District suggest proximal intrusives on the properties."*

Geophysical and aero magnetic data purchased and flown by TUL on the West Peace River properties presented contradictions, until the observations by Leckie regarding the Ashton Buffalo Hills kimberlites. These observations supported a new interpretation of geophysical data, which showed magnetic rings and lineaments at Montagneuse as remnants of blind pipes and dikes.

We could not previously make out what the relationship was, between good regional diamond indicator mineral geochemistry west of Fairview, which we refer to as the "West Peace River Trend", and magnetic trends; or between the anomalous DIMs in the Montagneuse River Valley and magnetic circles east of the river. Then, the possibility that Montagneuse may contain blind kimberlites; pipes which are concealed by shallower rock formations, tuffs or ashes; was considered. The notion that whole tephra cones may be present, offered the possibility that circular magnetic patterns represented concentrations of magnetite in tuffs and ashes, surrounding preserved volcanic structures.

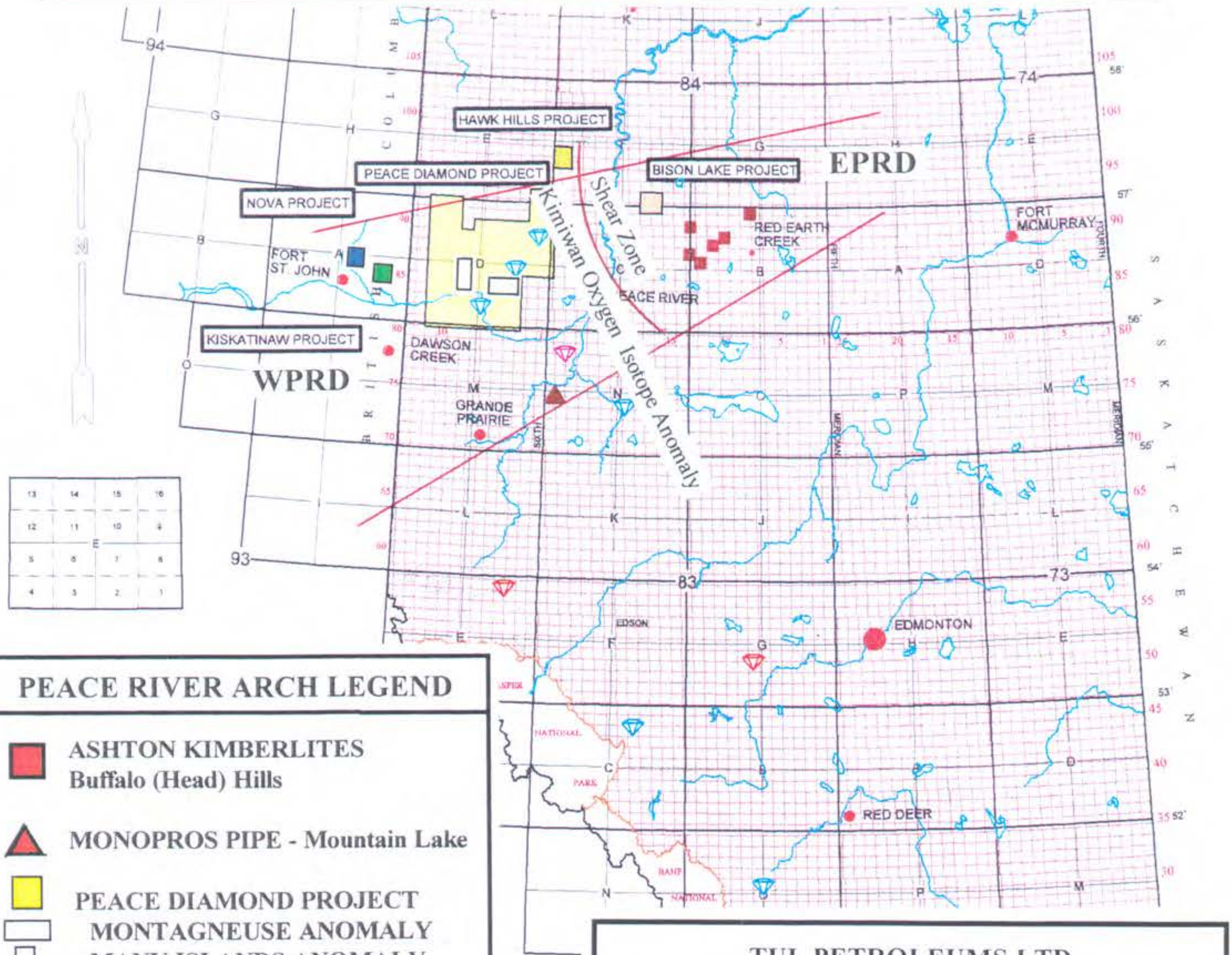
A wet spring in the Peace Country in 1997 caused a slide in a gulch which was a tributary valley to the Montagneuse. This exposed a massive ash deposit. The ash was discovered while TUL routinely explored a magnetic anomaly at that location. The ash was mapped as: Carter Camp - Sample Location #4W and measured over 22 feet in thickness. This lead to the demonstration that magnetite laden ashes or tuffs can show as magnetic stringers where incised channels erode deep into the Peace River peneplain. The peneplain averages 2150 feet above sea level; the Peace River is around 1100 feet ASL. Where magnetic stringers occurred, crossing deeply incised channels, field crews were able to predict and locate volcanics of significant thickness. From these observations it was possible to map ash thickness and elevations and trace them back to source. These sources may be Leckie-style cones.

TUL targeted and drilled the centre of a suspected ash circle with a small mag high in the middle. After 90 feet of overburden the drill encountered 110 feet of volcanic ash and tuff. This mag ring was named M3K1 (Basement Magnetic Anomaly #3 - Kolbert's property - drill hole #1) in LSD16-22-84-6-W6M. Volcanics were encountered between 300 and 800 feet higher than expected. This implies that, during emplacement, volcanics may have risen as much as a thousand feet above their surrounding landscape. Such a structure may have then been inundated by Dunvegan continental sands sweeping in from the northwest, in thickness of as much as 800 feet. This inundation could have partially preserved unstable volcanic ashes and tuffs. Erosion of ash, tuff or kimberlite, in the deep Montagneuse River Valley, is a plausible explanation for the vast amount of pyroxenes and kyanite and DIMs found there. In light of Monopros and Ashton discoveries within DIMs geochemistry trends, TUL continued an effort to marry geophysics to geochemistry. The result was a proposed West Peace River Trend and discoveries.



WEST PEACE RIVER DISTRICT - EAST PEACE RIVER DISTRICT

PEACE RIVER ARCH



PEACE RIVER ARCH LEGEND

- ASHTON KIMBERLITES Buffalo (Head) Hills
- MONOPROS PIPE - Mountain Lake
- PEACE DIAMOND PROJECT
- MONTAGNEUSE ANOMALY
- MANY ISLANDS ANOMALY
- NOVA - BEATTON ANOMALY
- KISKATINAW-ALCES ANOMALY
- ARCH BOUNDARY (North - South)
- SHEAR ZONE (East - West Division)

TUL PETROLEUMS LTD.

INTRODUCTION

KIMBERLITE LOCATIONS
GEOCHEMISTRYANOMALIES
ARCH BOUNDARIES and DIVISIONS

June 1998. Scale: 1: 7,500,000 Figure - 4 Page - 3

2.0 PERMITS

TABULATION OF PERMITS

PERMIT LOCATIONS, BOUNDARIES, NUMBERS & OWNERSHIP

TABLE - 1

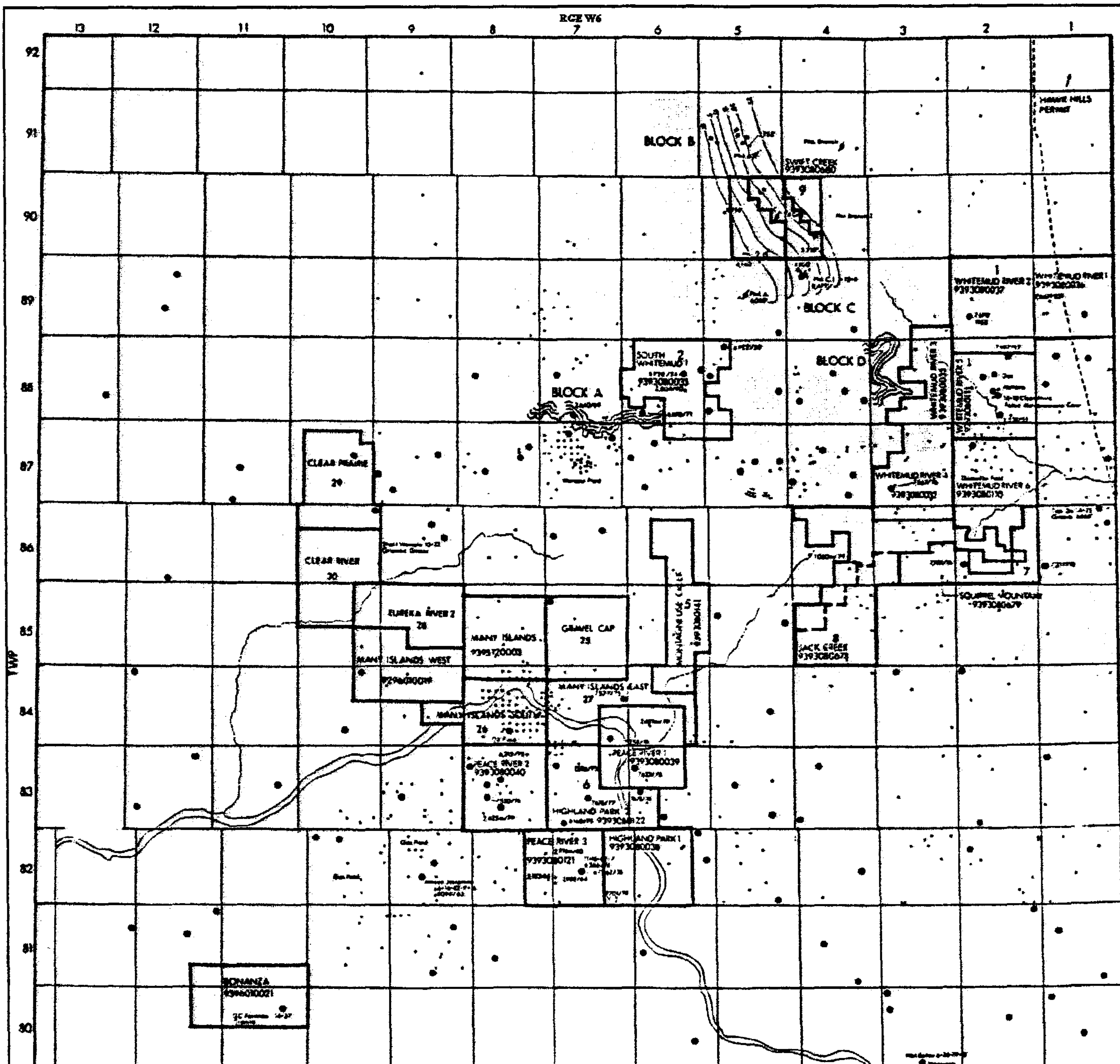
TUL PEACE DIAMOND PROJECT, PEACE RIVER DISTRICT, ALBERTA.

PEACE RIVER LOWLANDS DIAMOND AND GOLD EXPLORATION

METALLIC & INDUSTRIAL MINERALS EXPLORATION PERMITS

PROJECT "A" LANDS

File	AREA BLOCK	PERMIT NAME	PERMIT #	DATE	Location (W6M)	PERMIT Hectares	Ownership/ Operatorship
6	BLOCK 3	Worsley	9393080034	13/08/93	Twp 87 R8 & 9	0.00	DROPPED
7	BLOCK 4	Eureka River	9393080031	13/08/93	Twp 85-86 R4-5	0.00	DROPPED
8	BLOCK 6	Peace River 1	9393080039	13/08/93	Twp 83-84 R6-7	9,152.00	TUL
9	BLOCK 6	Peace River 2	9393080040	13/08/93	Twp 83 R8	9,216.00	TUL
10	BLOCK 6	Peace River 3	9393080121	13/08/93	Twp 82 R 7-8	9,216.00	TUL
11	BLOCK 6	Highland Park 1	9393080038	13/08/93	Twp 82 R6-7	9,216.00	TUL
12	BLOCK 6	Highland Park 2	9393080122	13/08/93	Twp 83 R6-7	9,216.00	TUL
15	BLOCK 5	Montagenuse Cr.	9393080141	13/08/93	Twp 84-86 R6	9,216.00	TUL
19	BLK. 10	Clear Hills	9393090017	22/09/93	Twp 89-90 R9-10	0.00	DROPPED
20	BLK. 11	Doig Tower	9393090018	22/09/93	Twp 91-92 R9-11	0.00	DROPPED
21	BLOCK 6	Many Islands	9395120003	21/12/95	Twp 84-85 R8	9,216.00	TUL
22	BLOCK 6	Many Islands W	9396010019	01/04/96	Twp 84-85 R9-10	9,216.00	TUL
25	BLOCK 6	Many Isl. Gravel Cap	9396070032	01/04/96	Twp 84-85 R7	9,216.00	TUL
26	BLOCK 6	Many Islands S.	9396070033	01/04/96	Twp 84 R8-9	9,216.00	TUL
27	BLOCK 6	Many Islands E.	9396070031	01/04/96	Twp 84 R6-7	9,216.00	TUL
28	BLOCK 6	Eureka River 2	9396070034	01/04/96	Twp 85 R9-10	9,216.00	TUL
29	BLOCK 6	Clear Prairie	9396070035	01/04/96	Twp 86-87 R10	9,216.00	TUL
30	BLOCK 6	Clear River	9396070036	01/04/96	Twp 85-86 R10	9,216.00	TUL
					Total Hectares:	173,424.00	



TUL Petroleums Ltd.

1996 - 1997 PERMITS

Locations & Boundaries, Numbers & Ownership

August, 1997. 1:500,000 Figure - 5 Page - 5

TABULATION OF PERMITS

PERMIT LOCATIONS, BOUNDARIES, NUMBERS & OWNERSHIP

TABLE -2

TUL PEACE DIAMOND PROJECT, PEACE RIVER DISTRICT, ALBERTA.

PEACE RIVER LOWLANDS DIAMOND AND GOLD EXPLORATION

METALLIC AND INDUSTRIAL MINERALS EXPLORATION PERMITS

PROJECT "B" LANDS

File	AREA BLOCK	PERMIT NAME	PERMIT #	DATE	Location (W6M)	PERMIT Hectares	Ownership/ Operatorship
1	BLOCK 1	Whitemud River 1	9393080036	13/08/93	Twp 89 R1: S1-36	9,216.00	TUL
2	BLOCK 1	Whitemud River 2	9393080037	13/08/93	Twp 89 R2 S1-36	9,216.00	TUL
3	BLOCK 1	Whitemud River 3	9393080035	13/08/93	Twp 88 R2&3	9,216.00	TUL
4	BLOCK 1	Whitemud River 4	9393080032	13/08/93	Twp 86 & 87 R2 &3	9,216.00	TUL
5	BLOCK 2	S.Whitemud R.1	9393080033	13/08/93	Twp 87&88,R5&6	9,216.00	TUL
13	BLOCK 1	Whitemud River 5	9393080111	13/08/93	Twp 87-88 R2	9,216.00	TUL
14	BLOCK 1	Whitemud River 6	9393080110	13/08/93	Twp 86-87 R2	9,216.00	TUL
16	BLOCK 7	Squirrel Mountain	9393080679	26/08/93	Twp 86 R2-4	8,840.00	TUL
17	BLOCK 8	Jack Creek	9393080678	26/08/93	Twp 85-86 R4	8,964.00	TUL
18	BLOCK 9	Swift Creek	9393080680	26/08/93	Twp 90 R4-5	9,216.00	TUL
					Total Hectares:	100,748.00	

TABLE - 3

PROJECT "C" LANDS

File	AREA BLOCK	PERMIT NAME	PERMIT #	DATE	LOCATION	PERMIT Hectares	Ownership/ Operatorship
23	BLOCK 20	Hawk Hills	9396010021	17/01/96	Twp 96-97 R24-25 W5	9,216.00	TUL
24	BLOCK 6..6	Bonanza	9396010020	17/01/96	Twp 80-81 R11-12 W6	8,192.00	TUL/#30
25	BLOCK 22	Bison Lake	9396060014 to 17	18/06/96	Twp 92-93 R16-17 W5	36,864.00	Conex Resources
					Total Hectares:	54,272.00	

3.0 ACCESS

This report is the last of three assessment work reports by TUL on the Peace Diamond Properties for the 1997-98 end of assessment period. "Lamprophyres of the Peace River District," "Ashes of the Peace River District" and this report, on the geochemistry in the West Peace River District are a summary of the work carried out during exploration for diamonds and industrial metallics on the Peace Diamond properties for a period of just over two years. This report includes the last work on Hawk Hills, microprobing and drilling at Montagneuse, and work done for British Columbia assessment credits which tie-in to the Alberta properties.

PROJECT AREA

TUL worked on the specific Metallic and Industrial Minerals Exploration Permits operated by TUL, but research spilled over into other areas pertinent to the geology and geochemistry of the TUL permits. The objective was a broader understanding of where any company may find success in the Peace River District in Alberta and in testing well known diamond exploration techniques in the Peace River area. Peace River District is a uniquely difficult area to work because of terrain, environmental concerns, lack of knowledge about some aspects of geology, specifically the Quarternary, and the occurrence of the Tertiary Gravels in paleo-basins and channels. Pleistocene geology and concentrations of DIMs in the Tertiary Gravels obscure the meaning of diamond indicators recovered. Some companies have given up on the area because of the complexity of the surficial and glacial nomenclature. There have been significant successes in the East Peace River District and there have been attempts to drill pipes in the West Peace River District, but these have resulted in limited success.

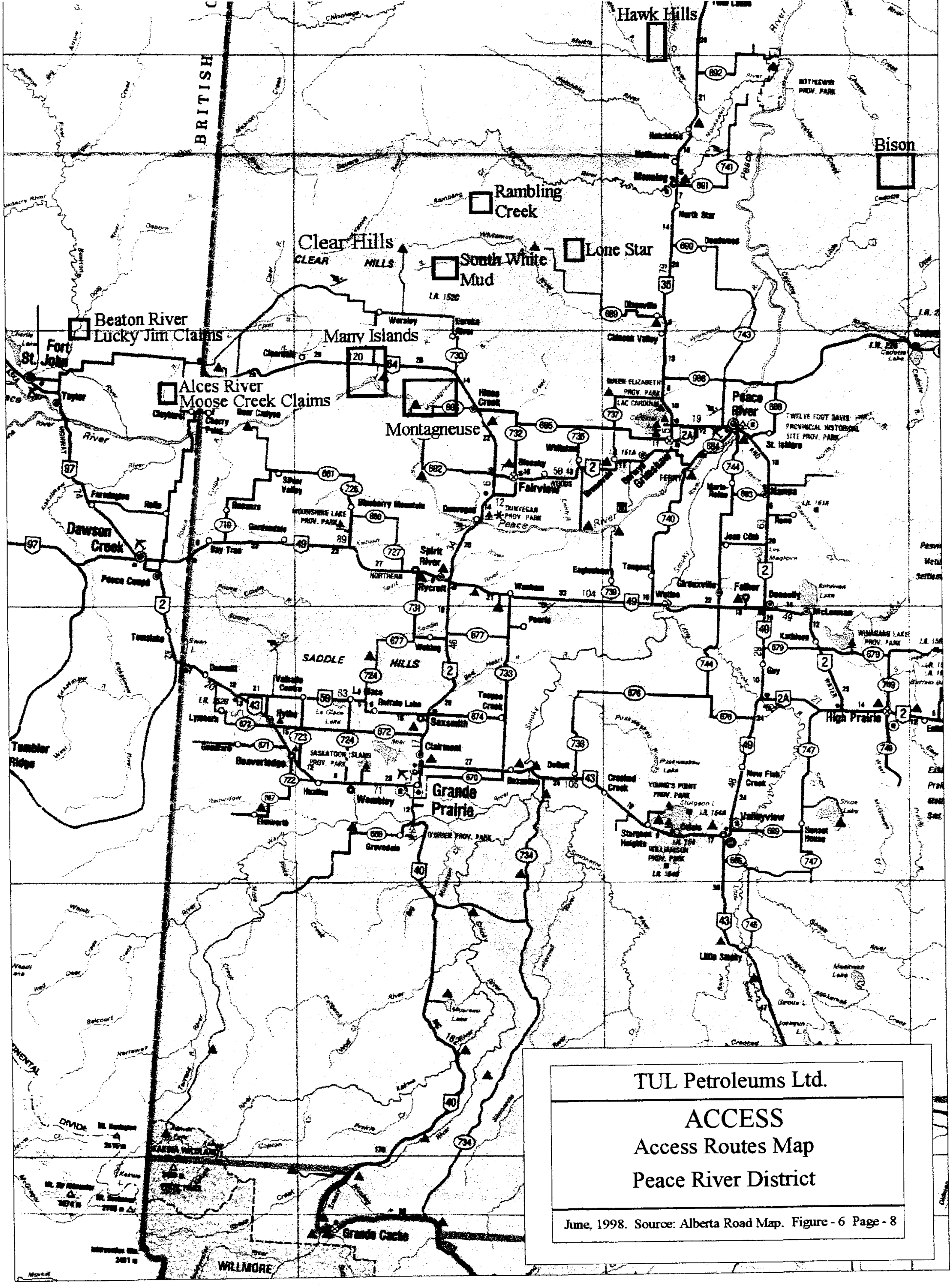
The Project Area in this report includes a consideration of the greater West Peace River District in an attempt to generalise geochemistry results so that a West Peace River Geochemistry Trend could be established. The Project Area was previously described in this report.

PERMIT LOCATIONS

Permit locations of the TUL Metallic and Industrial Minerals Exploration Permits are; the Clear Hills Uplands, the Peace River Lowlands, Hawk Hills, an interest in the Buffalo Head Hills, as shown on Tables 1 and 2. These have been reduced to the lands in Schedule "A" in accordance with expenditures claimed for the past two year assessment period, including Hawk Hills.

ACCESS ROUTES

Access to permit locations is via paved numbered highways interconnecting Valleyview - Grande Prairie; Peace River - Fairview, Hines Creek, Worsley and Fort St. John; Peace River, Grimshaw and Manning; as shown on AMA maps. Further access to the Permit locations is by Secondary Highways and gravel roads. Remote permit areas are accessible by oil and gas access roads and seismic trails. Some remote permits were accessed by ATV (Sulphur Lake - Lone Star, Hawk Hills) and 4 wheel drive vehicles (Clear Hills), jet boat (Peace River Channel) and by helicopter (Notikewan Tower/Rambling Creek.)



TUL Petroleums Ltd.

ACCESS

Access Routes Map

Peace River District

June, 1998. Source: Alberta Road Map. Figure - 6 Page - 8

OWNERSHIP

The lands being assessed for the purposes of this report are the TUL Peace Diamond Project Metallic and Industrial Minerals Exploration Permits tabulated in Section 2.0 and shown on Alberta Energy 1:750,000 Ownership Maps dated August, 1997 and displayed as Permitees #30 and #82. The lands retained after completion of the Ashes of Peace River assessment report are shown on the Alberta Energy Permits Maps as #82 as of about April, 1998 and are shown in Section 9 of this report.

PROSPECT MAPPING

The prime areas of exploration are the areas described previously in this report. In Alberta, they are Montagneuse River Valley and the surrounding peneplain and the Many Islands Creek Prospect, which is the creek and valley complex west of Many Islands Provincial Park and surrounding peneplain.

Other permit areas were investigated and put on hold, or the permits were dropped, or we continue to assess their value, but there is nothing worthy of reporting at this time. On the Hawk Hills permit, Canagrad Surveys flew an aero magnetometer survey and two ground magnetometer surveys were completed there. Spring break-up prevented a planned trenching and drilling program there. Mineral claims which reside in B.C. are included here only for the purposes of perspective.

SAMPLE SITES

The sum total of samples taken to date and all the locations investigated, are not set out in this report. Only the work which is seen to be a contribution to further exploration is described here. The utmost of diligence in location reporting and sample inventory has been carried out and standard industry practice has been adhered to as near as possible.

Independent study and replication of our results to September, 1995 was carried out by S. P. Santiago International Geological Consultants Ltd. during 1996. This report is contained in the Appendixes of the Lamprophyres of the Peace River District assessment report. At the same time, TUL has proceeded on the understanding that work is carried out on a best efforts basis and any result, observation, or discovery, is open to scrutiny and is subject to the test of replication by independent parties, before the work is taken to be true.

4.0 HISTORY

TUL spent several field seasons sampling for diamond indicator minerals northeast along the Montagneuse Fault into the Clear Hills and to the Hawk Hills, and southwest across Cecil Oil Field toward Blueberry Mountain. Samples were also taken south down the Peace River Channel as far as Dunvegan. Aero magnetic data and topography were taken into consideration during sampling.

Beyond sampling for diamond indicator minerals, two other exploration approaches were taken to evaluate the TUL permits:

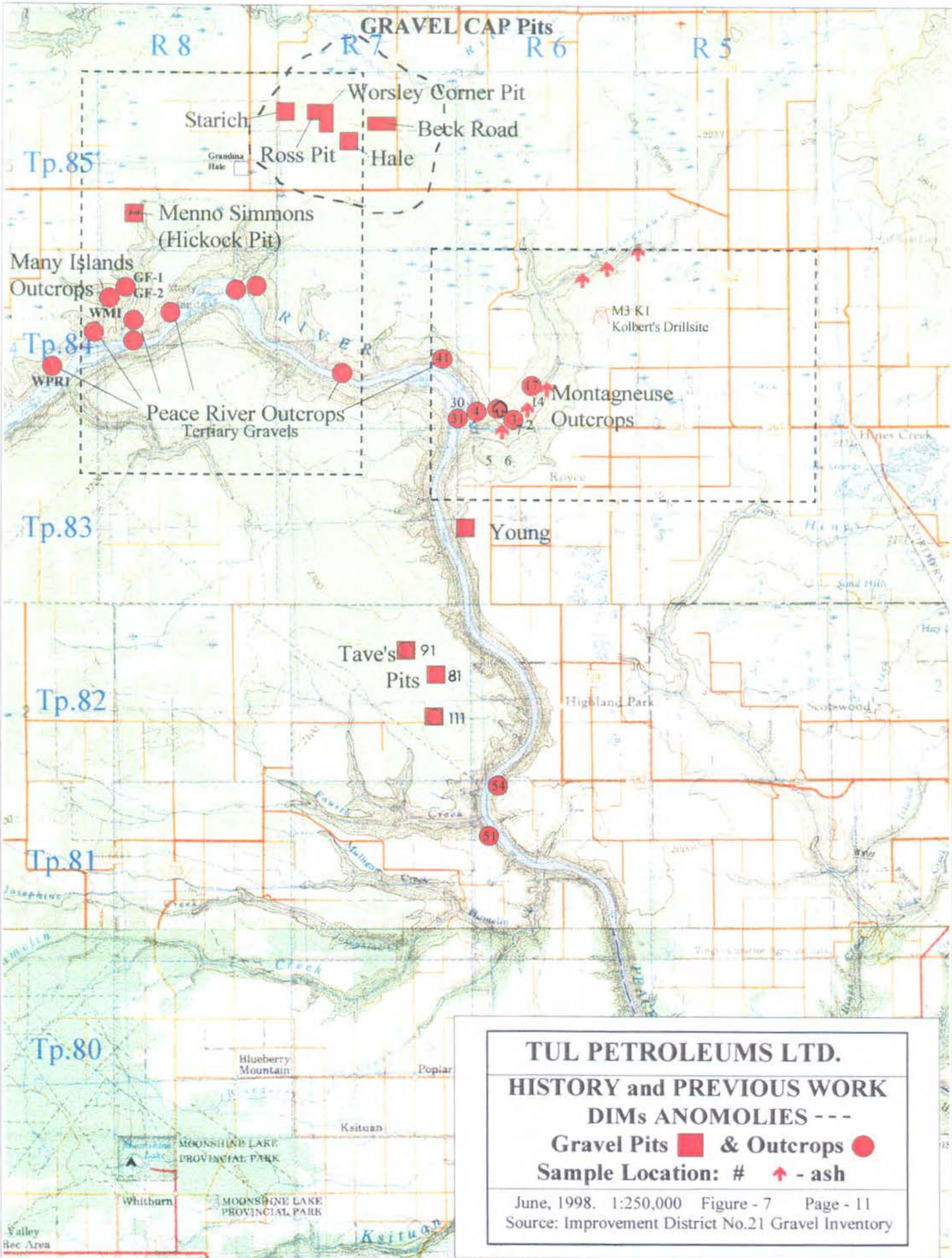
1. Volcanic rocks identified as lamprophyres were found during field exploration in the Peace River and in tributaries to the Peace River. TUL prepared an assessment report for Alberta Energy called "Lamprophyres of the Peace River District," stating that volcanic rocks were found as clasts in the Peace River system and paleo-channels and basins, and that these may be associated with concentrations of diamond indicators. TUL gathered 70 kilograms of the lamprophyres from a Peace River tributary, crushed and processed them, and picked pyroxene and garnets for SEM. Microprobe showed that they contain diamond indicator minerals. (Sample RET-91, Page - 47)

2. TUL set out to reconcile magnetic anomalies found on low-level and high-pass aero magnetic data custom flown in the Hines Creek - Bear Canyon area. Follow-up mapping and sampling led to the recognition of significant mappable occurrences of volcanic ash in the Montagneuse River Valley. Ground magnetic surveys were conducted to further define the ashes and the center of an ash ring was chosen for drill location M-3K-1. M-3K-1 in SE 26, Twp. 84, Rge 6, W6M, was drilled to two hundred feet with a small diameter drill. Ninety feet of overburden was encountered in one hour of drilling, followed by 110 feet of volcanic ashes and/or tuffs during the next eight hours. TUL compiled the data gathered on the ashes and their coincidence with aero magnetic signatures and prepared the assessment report "Ashes of the Peace River District" for submission to Alberta Energy.

Geochemistry anomalies were established on the TUL permits. Starting from the Montagneuse Transform Fault in Township 84, Range 6, West of the Sixth Meridian, where the Montagneuse River enters the Peace River at Bend-in-the-Peace, TUL sampled and mapped good garnet and pyroxene diamond indicators up the Montagneuse River Valley, in sufficient numbers to established the Montagneuse DIMs Anomaly.

TUL moved west, and north, using the aero mag data as support, and discovered anomalous geochemistry, possibly coincident with generally north-south trending magnetic lineaments and likely fault controlled tributaries flowing southward into the Peace River Valley. Many Islands Valley, from the Peace to Hale/Claire Pit was identified as the Many Islands DIMs Anomaly.

At Montagneuse and Many Islands, TUL discovered anomalous high quality diamond indicator minerals geochemistry. The West Peace River DIMs Trend is proposed. Extensions to Alces and Beatton River and Hawk Hills to Spirit River are possible, but TUL did not recover many high quality DIMs southwest or northeast of Montagneuse and the West Peace River Trend is possibly restricted to the Ksituan Sub-craton. Alces and Beatton may be in a different trend.



GRAVEL CAP Pits
R 8
R 7
R 6
R 5
Worsley Corner Pit
Starich
Beck Road
Ross Pit
Hale
Grandma Hale
Tp.85
Menno Simmons
(Hickock Pit)
Many Islands
Outcrops
GF-1
GF-2
WMI
Tp.84
WPR1
RIVER
41
M3 K1
Kolbert's Drillsite
17
14
Montagneuse
Outcrops
30
31
1
3
2
5
6
Peace River Outcrops
Tertiary Gravels
Royce
Tp.83
Young
Tave's
Pits
91
81
111
Tp.82
Highland Park
Scotswood
54
51
Tp.81
Tp.80
Blueberry Mountain
Poplar
Ksituan
MOONSHINE LAKE PROVINCIAL PARK
Whitburn
Valley Rec Area
TUL PETROLEUMS LTD.
HISTORY and PREVIOUS WORK
DIMs ANOMOLIES - - -
Gravel Pits & Outcrops
Sample Location: # - ash
June, 1998. 1:250,000 Figure - 7 Page - 11
Source: Improvement District No.21 Gravel Inventory

HISTORY - Previous Work

TABLE - 4

GRAVEL PITS AND OUTCROPS OBSERVED

(From Lamprophyres Of The Peace River MAP SET 2, 1:250,000 Scale, Figure - 7)

West of Hines Creek, Montagneuse, Bend-in-the-Peace
Hickock Pit, Many Islands, Peace River, Gravel Cap Gravels.

PIT/NAME	TYPE	LOCATION	ASL'	CLASS	OBSERVATIONS
Young	Pit	NW18-83-6-6	2000		
Municipal/Spirit R.	Pit	SW13-82-7-6	2100	iron soil	Sample location #111
Taves 1 South	Pit	NW13-82-7-6	2100	mica noted	Sample location # 81
Taves 2 North	Pit	NE23-82-7-6	2100	iron sands	Sample location # 91
Montagneuse River Sample Locations: 7 to 14 & Magnetic Meadow	Outcrop of River. Meadow	SW4-84-6-6 SW4-84-6-6	1300	G1,G3,G4 G5,G7,G8 G9, CP2,3,4,5	Basal Conglomerated Tertiaries Contain good volcanics Samples 7 to 14 & Mag Meadow Chromite and Ilmenite
Montagneuse north shore in bank	Gravel Outcrop	SE6-84-6-6	1250	G9	Sample Location #2 & #3 Sample #2 - G9.
Montagneuse River Sample Locations: #4,4L,4U,4L-1	Outcrop. Full of pyroxene	SE6-84-6-6	1375	CP2,4,5,7. OP-2	Santiago Report - DIMs
Carter Camp delta	Outwash	NW31-83-6-6	1150		River Gravels mixed delta contains volcanics
Peace River Islands 30,31,32.	Bar	Sec. 1-84-7-6	1150	CP-2 CP-5	Sample Location Island 30, 31, 32. Produced DIM pyroxene
Hale's	Pit	NE12-84-7-6	?		abandoned-could not be accessed
Bend-in-the-Peace	Outcrop	12&13-84-7-6	1500		North wall of channel. 50' thick section of Tertiaries.
Many Islands Campground Pit	Pit	NW24-84-7-6	1200		Behind the camp, some volcanics
Many Islands Campground	Delta	NW24-84-7-6	1200		Boat launch, delta gravels, many lamprophyre grabs
Many Islands Creek GF-1,GF-2	Outcrop many volcanics	E19-84-8-6	1200	G5,G9,G10 CP2,4,5,7 OP-1,2	Thick irony sections, west side of creek for 0.5 miles. Chromite
Many Islands West Creek MRI-1	Outcrop bentonite	S30-84-8-6	1300	not probed yet	various: iron upper layer creek-side conglomerated Tertiaries
Peace River	Outcrop	13&14-84-9-6	1500	not many	irony Tertiaries for a mile. WPR-1
Menno Simmons TUL# 4-0	Pit	SW8-85-8-6	1950	many volcanics	also called Hickock Pit.Tertiaries & volcanics. TUL 4-0: P-3 Chromite
Hale -Many Islands Gravel Cap (MIGC)	Pit	NW21-85-7-6	2250	moderate G5,G6,G8, CP2, CP5	Gravel Cap/Santiago tested. MIGC#16S, samples G1 to G4
Beck Road	Pit	S 27-85-7-6	2150		Gravel Cap
Worsley Corner	Pit	E 29-85-7-6	2200		Gravel Cap

5.0 METHODS

OVERVIEW

Five years of exploration has resulted in a considerable amount of academic work by government funded institutions such as the GSC, provincial geological surveys, the universities and some private work. A moderate amount of geochemical sampling and reporting has been published on the Peace River area. In the order of less than a hundred exploration holes have been drilled for diamonds. Outside of the Ashton discoveries not many companies have been successful; notwithstanding the fact that all valid exploration efforts contribute to the general knowledge.

There are very encouraging geochemical and geophysical targets in the Peace River District. Surveying the area from Spirit River to High Level and from Buffalo Head Hills to Fort St. John, TUL concludes that there are a number of high potential localities where pipes will likely be discovered and that they may contain diamonds. Alluvial diamond concentrations may also be possible in old gravels and in ancient buried channels.

TUL sights a number of methodology problems and field related practical impediments to diamond exploration in the Peace River District.

OVERBURDEN

The known kimberlites in northwest Alberta number about 25 and many of them are under at least 15 metres of overburden. TUL has sampled areas on believed deep basement faulting in locations where there is coincident magnetic anomalies where deeply incised creek and river valleys expose geology to the Mid-Cretaceous. This was the only cost-effective way to look at large areas not covered by glacial overburden.

Alberta Geological Survey overburden thickness maps have contributed to exploration effectiveness.

GLACIALOGY

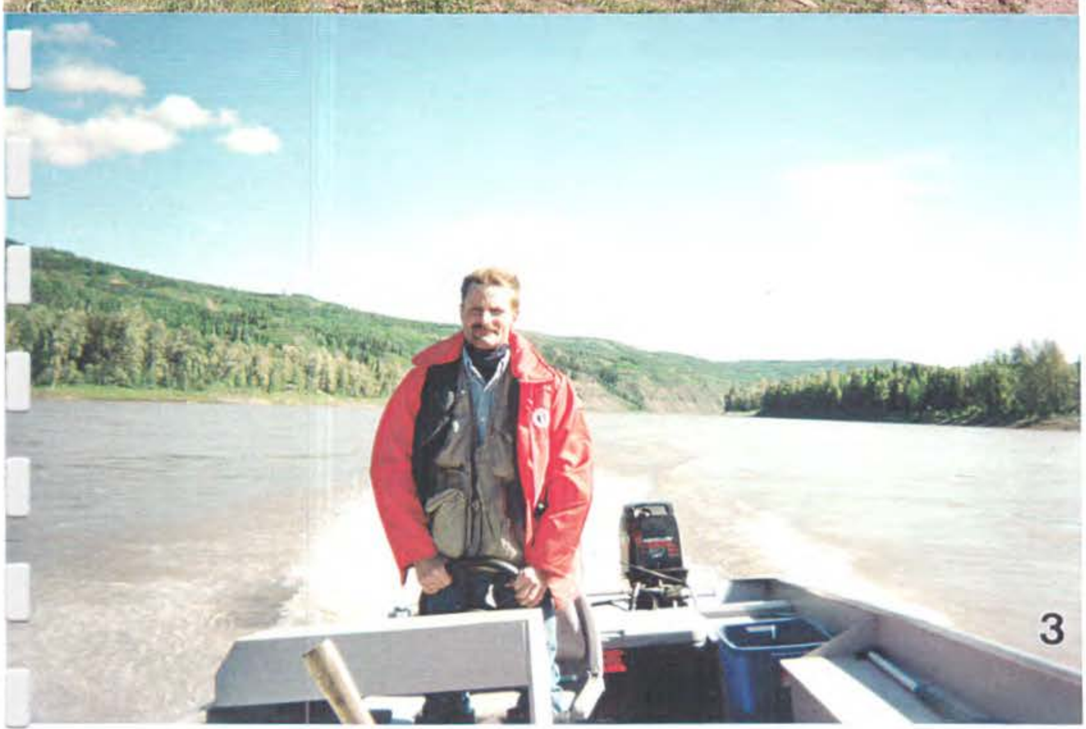
The discovery of good kimberlitic indicator and diamond indicator geochemistry is only useful in light of the transport history of the those indicators.

Northwest Territories exploration showed the effectiveness of following garnets and diamond indicator pyroxenes up-ice and along glacial trains. By recognising that there is a statistical probability that there will be diamond indicators where glaciation has eroded and distributed sediment fans down-ice of a kimberlite, while the up-ice side shows few or no indicators, pipes can targeted within a sampling grid.

The glacial history of the Peace River District is more complex than that of the N.W.T. The Quarternary has not been well mapped yet at West Peace. Exploration companies have to do their own interpretation, from existing literature and air photo interpretation. We know that post glacial lacustrine deposition has not been a good producer of diamond indicator minerals on the Peace River Lowlands peneplain.

FIELD CAMP &
EQUIPMENT:
OFFICE, 4X4s, ATVs,
JET BOAT, EXPLORER
10 CONCENTRATOR

FIELD OPERATIONS
SAMPLE GATHERING,
CONCENTRATING &
EXAMINATION



PROSPECTING:
SEDIMENT SAMPLING
ON THE PEACE RIVER
BY JET BOAT

PALEO LANDSCAPES and BURRIED CHANNELS

The well defined stratigraphic assemblage and the naming of formations provided by oil companies, over the last fifty years, has given diamond exploration teams good markers and stratigraphy to work from. However, surficial information above the Mid-Cretaceous Fish Scales Marker has been of little interest to oil companies in much of the Peace River District, so diamond explorers have had to map what they see at surface and fit it into the geological Table of Formations.

TUL assessment report of 1995 shows that deep basement faults, which are important in diamond exploration, are likely to be related to continent building as far back as the formation and flexure of the Peace River Arch itself. TUL and others have regarded these faults as important to the mantle tapping process and volcanic events and that fault growth is a periodic and recurring process, continuing until today. Therefore, the Peace River Channel in some places, highlands and lowland patterns and structures recognisable on LandSat imagery and air photographs can help to identify faulting patterns. However, since these faulting patterns are likely recurring, some channels have been buried by regional depositional processes such as the Dunvegan channels (proposed by Plint et al) and by glacial in-fill, as in the case of thalwegs called the Scottswold, Berwyn, Shaftesbury and Harmon Valley channels.

In the thalwegs, depositional history is not well understood and it is thought that cross-cutting channels and concentrations of heavies in gravel deposits yield non-representative or misleading diamond indicator results. TUL has found this to be partly true.

Deep channels cut into the Peace River Peneplain have provided useful outcrops for stratigraphic study and orientation. Deep channels have provided unique depositional features to sample, such as the magnetic meadow on the Montagneuse River, but these do not have to be misleading if mineralogy, grain size comparisons along stream courses, and grain morphology are taken into consideration. The proposition that the Magnetic Meadow whole crystals and little travelled pyroxenes indicate a proximal source, has been supported by; ash-fall mapping, mag surveys, and the drilling of M3K1.

GEOMORPHOLOGY

Paleo-channels and Pleistocene Geology are complex in the Peace River District. However, the geomorphology of the post glacial landscape presents an additional challenge. The deep channels in the Peace River Peneplain are prone to mass wasting and earth movements and these pose site specific interpretation problems when evaluating sediment samples. For example, if a gravel bearing horizon, being a lower Tertiary Gravel containing volcanic rocks, produces anomalous diamond indicator mineral geochemistry and large amounts of kimberlitic indicators, then the original deposition elevation would be important, especially when comparing it to proximal ash-fall deposits. In the case set out in the TUL Ash Report 97-09-01A, Section 4.10 - Statigraphy - Upper Cretaceous - Discussion; on page 47: the four geomorphology conditions at work in the Montagneuse River Valley are: "*1. Normal erosion as flood water creates incised channels, 2. Normal displacements occur when erosion creates channel walls near angles of repose and vertical to arcuate growth faults cause rotating and sliding bedrock and soil units;*" and the kimberlite related geomorphologies; "*3. Bentonitic layers, act as pans and trap waters which form muskegs on level lands, but near deep channels they become wetted and lubricate large diameter units which give-way, not unlike the solifluction process, and 4. Units of ash, expansive clays, and bentonitic soils, wet, expand, and flow as earth flows.*" These morphologies have to be recognised in order to correctly evaluate diamond indicator results from samples taken.

4

TUL PETROLEUMS

CANAGRAD
FLYING AERO MAG
SURVEY

5

TUL PETROLEUMS
CONDUCTING
GROUND MAG SURVEY
DRILLSITE M3K1
KOLBERT PROSPECT
MONTAGNEUSE RIVER

6

FIELD OPERATIONS
TRENCHING
HALE STRUCTURE,
MONTAGNEUSE RIVER
G9,ECLOGITE,ILMENITE
CHROME DIOPSIDE.

GIS and HIGH TECH

Research, targeting exploration, sampling for diamond indicators, processing samples and evaluating mineralogy is expensive and time consuming. If any exploration permit holder picks a location and takes a sample on a one township-sized permit, the chances of finding a microdiamond in a 60 kilogram sample, is virtually - “nil.”

GIS, GPS and MAPPING SYSTEMS

Geographical Information Systems and Global Positioning Systems are applied to mapping and data stacking as tools for better control. TUL found that draftsman vs CAD packages and GIS vs light tables requires a give and take judgement call. Overlaying aero mag over topography on a light table can be a quick low-tech method that takes advantage of human intuition. At Montagneuse, geomorphology and high relief, make interpretation so complex, that high tech mapping is better saved for preparing reports.

TUL has opted for keeping aero magnetic data separate and in UTM format. Topographic and air photo representations are best handled using MapInfo ™ . The most cost effective way to stack aero mag and topographic information is with the light table. Air photo mosaics, with digital topographic data overlaid, turned out to be prohibitively expensive.

Grid sampling on steep slopes and in deep bush country is only for detailed study of well defined targets. Outcrops are never where the grid system says it wants data supplied for a co-ordinate. Interpolation is a tool of necessity in places like the Montagneuse River Valley. Observation skills and good field notes are the best low tech methodology in some places. Detailed follow-up is required on targets.

MAGNETICS

TUL has acquired data or flown, or ground surveyed a broad spectrum of magnetic data. In consideration of all that we have learned about magnetic data we have come to the conclusion that it is virtually impossible to conduct diamond exploration without studying the regional and site specific magnetic data.

Acquisition of aero magnetic data and ground magnetic data is vulnerable to mechanical and human error and magnetic variations. Diurnal corrections, elimination of cultural effects and filtering techniques, make additional management of data a further complicating factor. Good targets may be passed over.

Magnetic anomalies, such as the hundred gamma anomalies of some kimberlites, would even stand out on Federal Government 1:250,000 Geophysical Series Aeromagnetic map sheets. The Mountain Lake kimberlite, on the other hand, is a subtle feature.

Ashton K14 kimberlite is a strong anomaly. K14B and K14C are not obvious targets. K14, K14B and K14C form an important complex of intrusives. This shows that if K14 was not strong, the whole complex may have been overlooked. There are many broad shallow magnetic complexes of interesting character at Peace River. TUL has associated some of these with volcanics and ash deposition. Other companies have not been lucky just drilling the mag highs. Gathering of magnetic data, filtering and interpretation, must be carried out with care.

TUL PETROLEUMS LTD.

METHODS - MAGNETICS
SHALLOW MAGNETICS
MONTAGNEUSE to MANY IS.

June, 1998. 1:200,000 Figure - 8 Page - 18

MINEROLOGY

A certain number of garnets and kimberlite indicators and diamond indicators are thought to exist almost everywhere. The word "kimberlite" has become a general term for a number of possible diamond bearing volcanics. These notions are not helpful in diamond exploration.

TUL concentrated on limited areas. Regional geology identified the Peace River Arch as, according to world standards, having the crustal and mantle characteristics which give Peace River a good statistical chance of producing diamond.

Vast amounts of pyroxene and iron; silicates, oxides and sulphides, have been found by TUL in localised regions. Indicators that TUL explored for include; the lamproite, lamprophyre - Kimberlite II and Kimberlite I, mineral suites, and diamonds. All possibilities were considered.

Tapping the mantle at depths of 60 to 160 kilometres means that a small sample of mantle is expressed at surface in an area of less than a 30 acres. This was transported in a chaotic and dynamic system over a short period of time - measured in hours. This process produces intrinsically unique emplacements and mineralogies, in somewhat random locations.

Experienced diamond exploration companies rely heavily on Mineralogists to oversee and evaluate the sample processing procedure, grains picking, microprobe and the evaluation process.

From TUL "Ashes of the Peace River District;" " *"Kimberlite" is a common word of diamond lexicon. Rocks that host diamond are now "kimberlite" as a generalisation, except lamproite.*"

Lamprophyric kimberlite is the micaceous kimberlite, as differentiated from basaltic kimberlite and calcite kimberlites. The micaceous kimberlite is often reclassified as phlogopite kimberlite. (Mitchell, 1995)

The Primary occurrences of diamond are: 1) Kimberlite, 2) Orangeite and 3) Olivine Lamproite. (Mitchell, 1995)

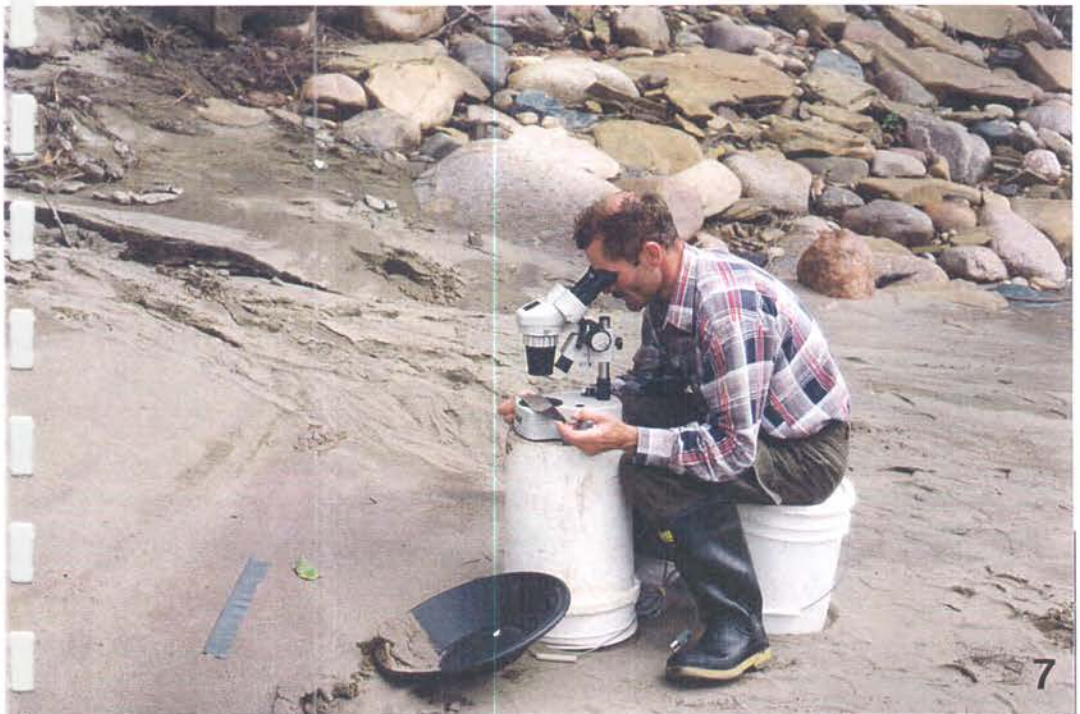
Orangeites are from the lithosphere while kimberlites are from the Asthenosphere. The word "Orangeite" comes from the micaceous kimberlite found at Lion Hill, Orange Free State and named by Wagner, 1928. It is a mica-rich or lamprophyric kimberlite. (Mitchell, 1995)

"Group II rocks should be regarded as from genetically distinct parental magmas, and Group II rocks should not be regarded as a variety of kimberlite but are rocks belonging to an entirely different petrological lineage." (Mitchell, 1995)

"Altered ultramafic alkaline rocks present particular challenges, and it is often extremely difficult, if not impossible, to classify correctly such rocks using simple petrographic criteria." (Mitchell, 1995)

The Mountain Lake kimberlite was originally classified as a juvenile lapilli tuff; an olivine groundmass kimberlite. Presently, the overall structure is thought to be of two pipes, a positive topographic anomaly, being somewhat more resistive to erosion than the surrounding Wapiti continental sandstones. The body is now classified as an alkaline ultrabasic volcanic. TUL continues to look for commonalities amongst the presently discovered intrusives. Mineralogy is the key.

TUL PETROLEUMS



RECONNAISSANCE
SAMPLING
RIVER SEDIMENTS

FIELD OFFICE:
REPORTING,
MAPPING AND
COMPUTER GRAPHICS

CALGARY OFFICE
SAMPLES
EXAMINATION &
INVESTIGATION

Post-emplacement erosion, burial and alteration; local geomorphalogical processes and on-going mineral replacements mean that recognition of potentially meaningful stratigraphy, in the case of crater facies and ash-fall materials, and whole rock sampling and sediment sampling, is more likely to be successful only by experienced companies with experienced individuals.

Picking minerals in the lab presents challenges for smaller companies. Post-emplacement exploration of olivine based kimberlites and lamproites means that there is little likelihood of finding olivine in a sample because olivine only survives for short distances from its point of emplacement and because the lab process of isolating heavies of specific gravities greater than 3.3 would lose Forsterite at 3.222 SG. Also, olivine has proven to be difficult to pick correctly. In addition, mica and pyroxene groundmass kimberlites and lamproites may have little or no olivine. Similar problems exist with a number of other useful indicators.

DIAMOND INDICATOR GEOCHEMISTRY

Large exploration companies use experienced off-shore expertise to aid them in geochemistry evaluation. Some diamond exploration companies have their own labs for quality control.

Only by quantitative observations such as those acquired by whole rock analysis, grain size measurements along a diamond indicator trend, and observation of grain morphology, can we get a handle on what a set of kimberlitic, lamproitic or diamond indicators means.

Picking and probing and getting results means having a fair and reasonable number of good representative samples from a high potential exploration area and getting a feeling for whether a sample is getting you closer or farther from the source.

COLOURS

Minerals and grains picking is an essential part of assessing samples for diamond indicators, in consideration of the fact that one grain can make a lot of difference, like a diamond, in sample assessment and that a 60 kilo sample is a statistically small sample. Therefore, each set of hands and each set of eyes that work on a sample are critical.

Picking minerals and picking diamonds is an art and this expertise is at a premium. Since there are 6,000 varieties of diamonds, even diamond may be difficult to pick in some samples. As with diamonds; carat, colour and clarity; minerals: colour, crystal and angularity, are critical assessment criteria. Since TUL has found very few publications with true colour examples of diamond indicator minerals and good descriptions of them, trial and error and microprobing has given us standards to use, regarding grain types and colour picking. The last microprobe of Montagneuse material (Table - 9, page 47) shows that we are having some success in this regard.

KIMBERLITIC INDICATOR PICKS

("HITS")

TABLE - 5

GARNET PICKS and COLOUR GROUPING OBSERVATIONS **confirmation by SEM and Sample Fraction location**

GARNET classification	MINERAL DESCRIPTION	OBSERVED COLOUR	SOURCE FRACTION	COMMENT
G 1	Titaniun Pyrope	RED-ORANGE ORANGE-PINK BRIGHT-ORANGE	Non Magnetic +28 Non Mag	
G 2	High-Titanium Pyrope	RED-ORANGE	Non Magnetic	
G 3	Calcic Pyrope-Almandine	BLACK BLACK BROWN-BLACK LIGHT ORANGE ORANGE ORANGE-RED RED-ORANGE VERY LIGHT PINK SL.PURPLE-PINK LT PURPLE ORANGE	0.6 Para Magnetic 0.6 0.6 0.6 Non Magnetic 0.6 Inclusion 0.6 Euhedral Inclusion Non Mag Non Mag, 0.6	
G 4	Ti-Ca-Mg Almandine	BLACK DARK BROWN-BLACK LIGHT PURPLE	+28, 0.6 and Non Mag. +28	
G 5	Mangnesian Almandine	RED RED ORANGE DARK ORANGE RED ORANGE RED DARK ORANGE ORANGE LT.PURPLE		
G 6	Pyrope-Grossular-Almandine	DARK BRIGHT RED ORANGE LT YELLOW GREEN	Non Mag	
G 7	Fe-Mg Uvarovite Grossular	EMERALD GREEN	Non Mag	
G 8	Ferro-Magnesiun Grossular	CLEAR WHITE SL YELLOW-TRANSP APPLE-GREEN ORANGE	Non Mag Non Mag Non Mag Non Mag	
G 9	Chrome Pyrope	CHERRY RED SL. ORANGE-PINK PINK-ORANGE PINK PALE PINK HOT PINK LT. HOT PINK VERY LT.HOT PINK VIOLET-LAVENDER VERY LT. PURPLE DARK PURPLE-PINK	Non Mag Non Mag Non Mag Non Mag Non Mag Non Mag Non Mag Non Mag Non Mag Non Mag Non Mag	
G 10	Low-Calcium Chrome Pyrope	-		
G 11	Titanian Uvarovite-Pyrope	ORANGE-RED ORANGE-PINK HOT PINK VERY LT. HOT PINK DARK PURPLE-PINK EMERALD GREEN	+28 (?) Non Mag Non Mag Non Mag Non Mag	
G 12		none	LORING LABORATORIES	

RARE EARTHS ANALYSIS

Rare earths elements analysis and plotting of normalised crustal occurrence has been studied recently. ICP analysis and plotting of rare earths in samples from TUL have been useful in analysing volcanic ashes. Whole rock samples and ashes with almost identical plots are assumed to be from similar or the same sources. All of the Montagneuse ashes tested had similar rare earths plots. They are likely to be related to Kolbert's M3K1 as their common nearby source.

PLATINUM MINERAL GROUP and INDUSTRIAL MINERALS

The location of the Clear Hills Iron Ore deposit may be of some significance. The true nature of the deposit is unknown. It is stratigraphically close to the Mountain Lake and Ashton intrusives. Peace River volcanics and diamond indicator producing anomalies are topographically lower than the Clear Hills Bad Heart iron ores. The Montagneuse River drains from a region of the Clear Hills. The Clear Hills never seem to produce much in the way of diamond indicators. There are elevated platinum values in magnetites, recovered during diamond indicator processing from Montagneuse.

TUL has found that the geochemistry of the Montagneuse and Many Islands permits produce, on average, one leaf of gold per 60 kilogram sample of sediments.

PGMs and Rare Earths tend to be elevated; some to provincial highs. In a sentence, "Some Peace River tributaries contain an awful lot of metal." The source and meaning is unknown, except to say that kimberlites or other mantle tapping events tend to raise rare earths values as well as gold and other heavies. Proximity and elevation of Montagneuse and Many Islands to the Clear Hills Bad Heart iron ores makes one cautious, but we have G7 and pyroxenes that did not travel from Clear Hills. There is speculation that the Clear Hills irons are volcanically derived at or near their present location.

6.0 GEOLOGY

Kimberlite Geology implies the pursuit of exotic mantle rocks of peridotic and eclogitic source.

A strict definition of "Geology," relating to kimberlites, would be; "the description; size, shape and lithology; of intrusive dike and diatreme emplacements, and their surrounding country rocks." Everything else falls within the domain of Geochemistry.

Occurrence of kimberlite; dyke, diatreme and associated pyroclastic, epiclastic and hypabyssal components; includes the lamproite and lamprophyre occurrences. Occurrence of any and all of these mantle-derived volcanogenic emplacements has been covered in detail by numerous and on-going publications. The sum total of what is known about Kimberlite Geology is that the location of these emplacements have an aspect of randomness which defies attempts to make rules about them.

Diamond exploration geology is geology based on regional prediction, which depends upon craton age and thickness, and geochemistry. Kimberlite, lamproite and lamprophyre geochemistry is the prime focus of diamond exploration. Geophysics, gravity and all other prediction methodologies, are a function of the kimberlite's geochemistry. Even the geometry and emplacement dynamics are likely closely related to the geochemistry of the randomly sampled mantle.

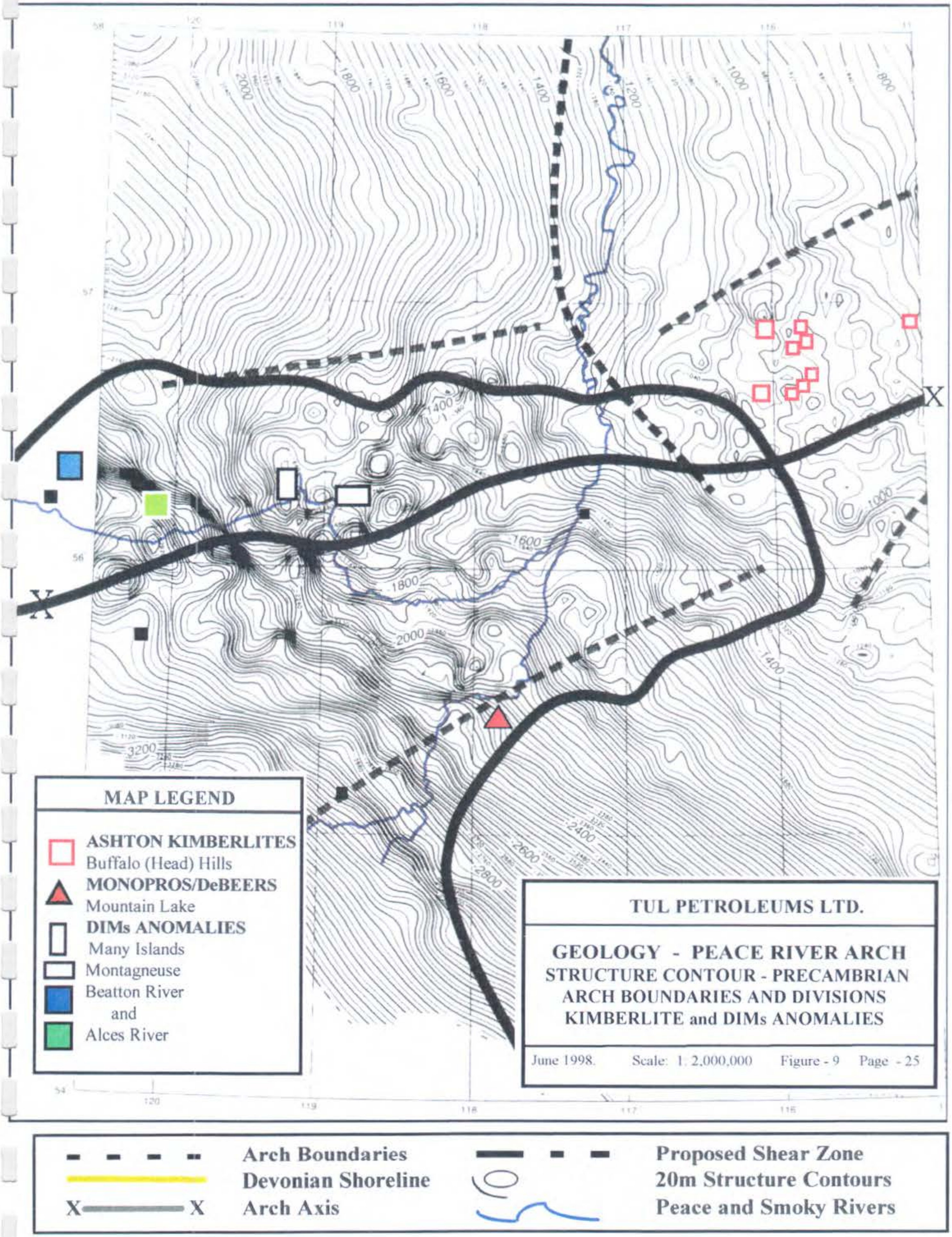
Questions of whether Peace River has the correct attributes for kimberlite and diamond emplacement have been answered over the past five years. Diamondiferous kimberlites have been found. However, questions remain about how broad the area is for diamond host-rock emplacement and how prospective some sub-cratons are regarding diamond formation and preservation.

Peace River is prospective for diamond discoveries because it overlies suitable craton fabric, of sufficient age and thickness; and correct mantle geochemistry, for diamond formation. There, thick craton and cool root(s) maintain regions of long term stability and therefore diamond formation and preservation.

Delivery of diamond to surface within associated host rocks suggest a contradiction in geological terms because periodic instability is required to provide opportunities for diamond to hitchhike to surface. Predicting where volcanogenic emplacements of diamond bearing mantle-derived material might be, is considered the "*art*" in diamond exploration geology. This geology usually involves structure, cycles of faulting and instability, or any other crustal condition which provides mantle material a cause, or control, resulting in diamond and host-rock emplacement, but not the destruction of the diamond.

Successful Peace River diamond exploration is being directed at thick ancient craton and associated cool root(s), believed to exist under the anticlinal structure - the Peace River Arch. The fact that the Arch is faulted and cross-faulted, points to locations of sufficient instability within the boundaries of a mainly stable craton, therefore creating structural opportunities for mantle sampling and delivery of diamond to surface through host-rock emplacement.

TUL data compilation and field investigation suggests that at present, the only geological boundary which discriminates between regions likely to harbour diamond bearing emplacements vs areas where there may be non-diamond bearing emplacements, is the axis of the Peace River Arch. Good diamond geochemistry occurs in a number of localities in northwest Alberta within prospective sub-cratons, but to date, only "kimberlite" north of the PRA Axis has produced diamond of potential economic interest.


MAP LEGEND
ASHTON KIMBERLITES
Buffalo (Head) Hills
MONOPROS/DeBEERS
Mountain Lake
DIMs ANOMALIES
Many Islands
Montagneuse
Beatton River
and
Alces River
TUL PETROLEUMS LTD.
GEOLOGY - PEACE RIVER ARCH
STRUCTURE CONTOUR - PRECAMBRIAN
ARCH BOUNDARIES AND DIVISIONS
KIMBERLITE and DIMs ANOMALIES
June 1998.
Scale: 1: 2,000,000
Figure - 9
Page - 25
Arch Boundaries
Devonian Shoreline
X X
Arch Axis
Proposed Shear Zone
20m Structure Contours
Peace and Smoky Rivers
X
X
2000
1800
1600
1400
1200
1000
800
1400
1600
1800
2000
3200
2400
2600
2800
1000
1400

STRUCTURE and BOUNDARIES

West Peace River Diamond Indicator Minerals say that mantle material has reached surface between Fairview and Fort St. John. A West Peace River Trend is proposed, based on these occurrences. These diamond indicators fall within generalised boundaries, being the axis of the Peace River Arch and the north shore of the Devonian continental Precambrian landmass. The latter is approximated by an east-west Boundary Fault.

Diamond Indicator Geochemistry Anomalies indicate that intrusives exist between Fairview and Fort. St. John because suites of minerals, angularity of grains and some of their limits of distance of travel, determine that they are local.

The boundaries of a proposed West Peace River DIMs Trend are still tentative because north-south extensions are not delineated and because it has not been determined if Beatton and Alces should be included with Montagneuse and Many Islands.

Helicopter sampling of Rambling Creek (Swift Creek) and a number of other places in the Clear Hills shows that there are few diamond indicators on those uplands. Similar sampling toward Blueberry Mountain on the south side of the Peace River showed few diamond indicator minerals. The proposed West Peace River Trend can not be extended north past the Devonian shoreline or south past the PRA Axis. Sparse returns toward Manning and Spirit River could be due to topography in the Clear Hills or glacial dispersion toward Blueberry.

The TUL Diamond Indicator Anomalies are located north of the Peace River Arch Axis and south of the approximate location of the Devonian shoreline at time of maximum inflection. Topography of the Precambrian surface represents an erosional remnant, complicated by fracturing, displacement, transform faults, horsts and grabens. If these could be generalised as "structure," all intrusives so far discovered, may be associated with the Precambrian anticline. Unconfirmed reports indicate that volcanics also exist, on structure, between Mt. Lake and Buffalo Hills. (Sask. Energy, Ghent, 1992)

Geology of West Peace is encouraging for diamond exploration, while DIMs geochemistry and post Devonian Peace River Arch down-warping and collapse suggest limiting structures and boundaries for diamond discoveries. Boundaries and structural limits shown on map figures 8 and 9 are:

1. North-south limits of remnant disturbed Precambrian PRA surface from structure contours.

2. Shoreline of the continental Peace River Arch landmass at Late Devonian maximum uplift.

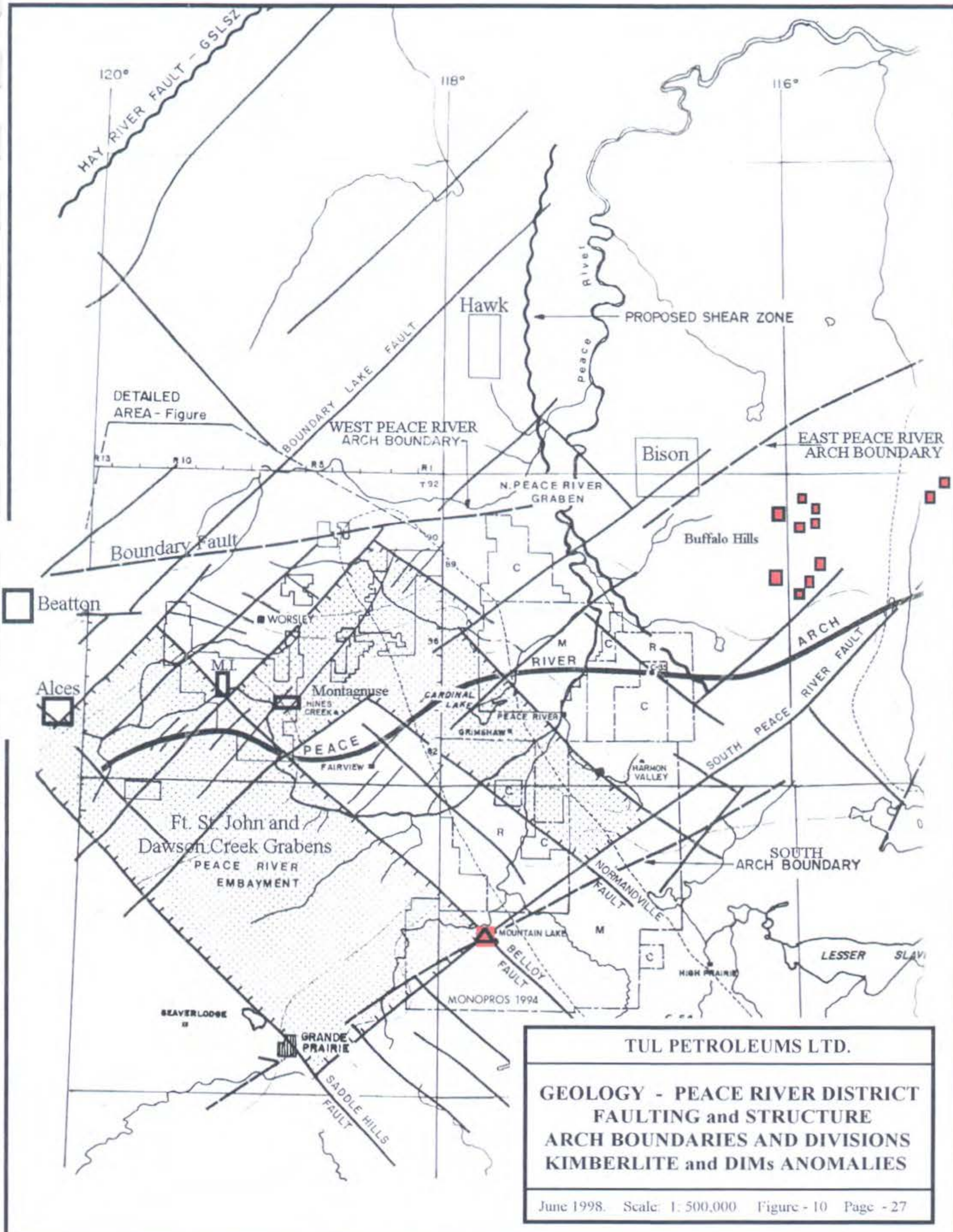
3. Axis of the Peace River anticline or anticlise with possible extensions to the east.

4. Proposed Arch Shear Zone and paralleling Kimiwan Anomaly, being diamond unfriendly.

5. Northeast trending deep basement faults.

6. Northwest trending stress release faults.

7. Rims of collapse structures, or grabens, which define boundaries of diamond unfriendly regions.



TUL PETROLEUMS LTD.

GEOLOGY - PEACE RIVER DISTRICT
FAULTING and STRUCTURE
ARCH BOUNDARIES AND DIVISIONS
KIMBERLITE and DIMs ANOMALIES

June 1998. Scale: 1: 500,000 Figure - 10 Page - 27

IGNEOUS INTRUSIVES

Volcanic cones; carrot-shaped Mitchell models of kimberlite diatremes; Lorenze collapsed structures; champagne-glass shaped effusive lamproitic intrusive models of diatremes; which model best describes the Peace River kimberlites and volcanic intrusives? A model would help exploration companies search for diamonds in Northwest Alberta, because a number of attempts to drill West Peace intrusives have resulted in drilling mineralised shales, magnetite laden gravels and ashes of unknown origin.

We must accept that "exploration" means that we may never find what we are looking for. Regardless, the West Peace District is endowed with impressive concentrations of minerals, as in the Clear Hills Bad Heart iron ore deposits and in the Many Islands Tertiary Gravels gold.

The Peace River Arch represents a major structural feature. TUL drilling and mapping of volcanic ash layers in the west, and Monopros and Ashton kimberlite discoveries, suggest that the Peace River Arch is shot through with volcanics of various types and during a number of periods.

It can be shown that many igneous intrusives are yet to be found in Alberta. Many of the Alberta pipes are being discovered, using aero magnetic de-cultured surveys, in well situated geology, on sub-cratons suitably deep faulted and cross-faulted. However, on a statistical basis, only 50% of all kimberlites will exhibit strong magnetic responses. The others will either be weak, neutral or negative, in magnetic response, in comparison to surrounding country rock.

In the Hinton diamond exploration camp, some twenty or so diamonds were found and good diamond indicators were discovered; especially chromite and ilmenite; however, the source-pipes were not found.

In Saskatchewan, the Leckie-model Fort a LaCorne kimberlites are Strombolian-style, largely complete intrusives, with tephra cones, preserved by in-filling muds, silts and sands. This is a plausible structural model for some of the Peace River intrusives.

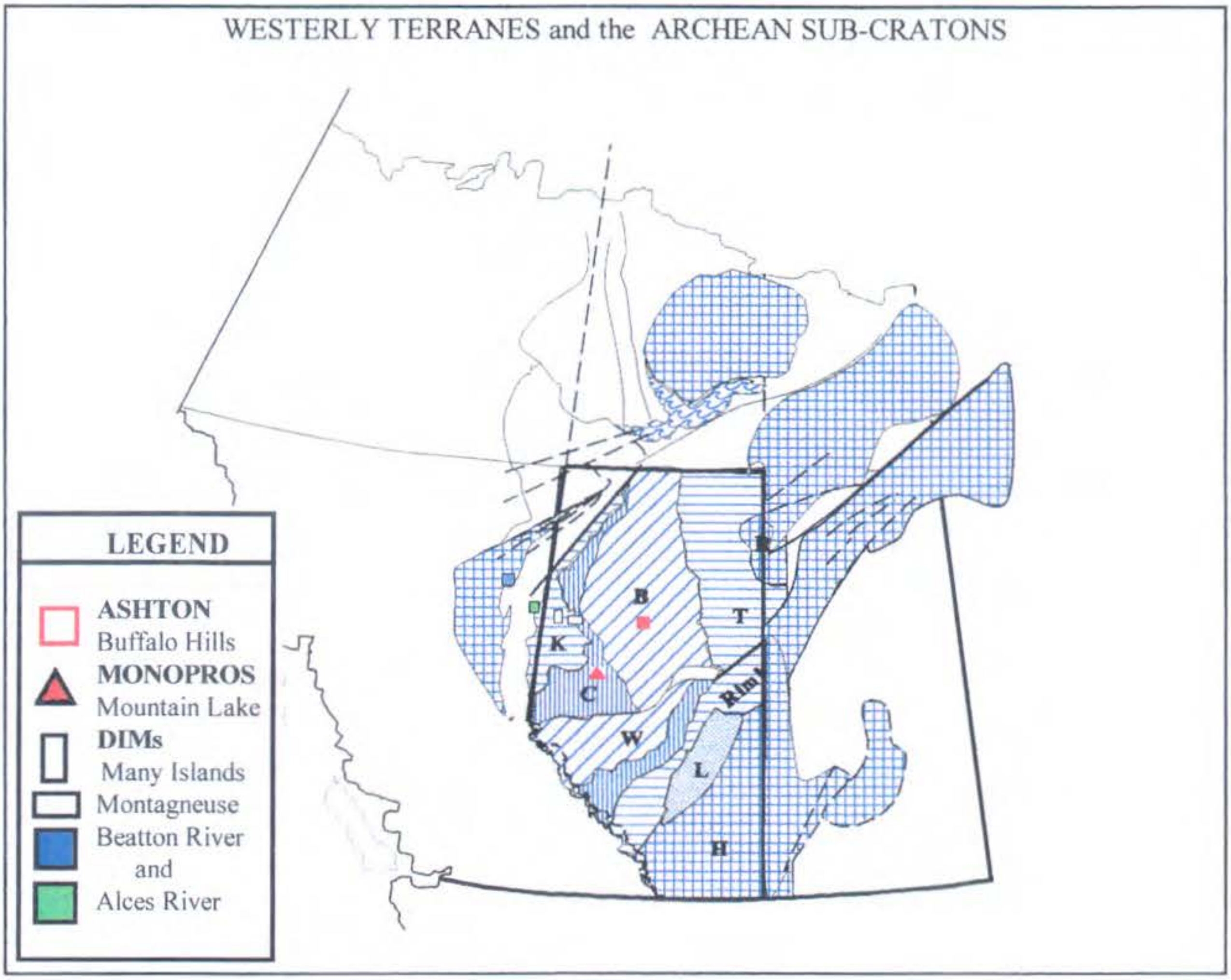
The remarkable aspect of the Leckie Model is that "kimberlite," strictly defined, is a small part of the volcanic body. Much of the material associated with emplacement is of ash, tephra, and juvenile olivine in; lahare, bomb, point bar, beach and spit landforms. Emplacement is proposed as one of a complex series of varying mantle magmas in Strombolian pyroclastic explosive styles of volcanism. The structure concludes as a complex deposition of air-fall and pyroclastics as primary depositions and several styles of secondary fluvial and marine depositions. Saskatchewan volcanics produced diamonds.

Buffalo (Head) Hills kimberlites are being discovered between the north and south boundaries of the disturbed Precambrian basement. "The kimberlites north east of Peace River ... are land based. They are also virtually unique in the world because they have not been eroded. You can actually see the volcanic cones," says Leckie.

Buffalo Hills is east of the proposed shear zone and Kimiwan Oxygen Isotope Anomaly and is on the Buffalo Head Sub-craton. The area is faulted and cross-faulted. Some of the pipes are considered to be associated with an easterly extension of the South Peace River Fault. Several of the intrusives are diamondiferous. The K14, K14B and K14C make up a complex of intrusions that is about the aerial extent of Argyle, Australia, the world's largest diamond producer.

PEACE DIAMOND PROJECT

DIAMOND EXPLORATION by TUL PETROLEUMS LTD.,
PEACE RIVER DISTRICT, NORTH WEST ALBERTA, CANADA.



TUL PETROLEUMS LTD.

GEOLOGY - PEACE RIVER DISTRICT
NW ALBERTA-NE BRITISH COLUMBIA

BASEMENT - CRATON ASSEMBLAGE
IGNEOUS INTRUSIVES - KIMBERLITES

The Mountain Lake kimberlite may fit the Leckie model because it is a positive topographic feature rising about 200 feet above the surounding landscape. Mountain Lake is more correctly described as an alkaline ultrabasic volcanic. ("pyroclastic material from drill core ML95-3 consist mainly of olivine-rich juvenile lapilli tuffs. Euhedral to anhedral olivine is completely altered to clay minerals and serpentine. Juvenile lapilli contain crystals of altered olivine and fresh, euhedral clinopyroxene. The lapilli consist of devitified vesicular glass (serpentine) and microcrystaline phlogopite-biotite mica, clinopyroxene, spinel, rutile, perovskite and apatite." (Kjarsgaard,1997) Mountain Lake is south of the Peace River Arch Axis on the south boundary of the disturbed Precambrian basement in the West Peace River District. It is west of the proposed shear zone and Kimiwan Anomaly on the Chinchaga Sub-craton. The intrusive is thought to be a pair of pipes, associated with the northwest trending Belloy Fault and the northeast trending South Peace River Fault. Mountain Lake is described as mildly diamondiferous.

TUL DIMs ANOMALIES

The TUL Diamond Indicator Anomalies are located north of the Peace River Arch Axis within the proposed West Peace River DIMs Trend and south of the approximate location of the Devonian shoreline at time of maximum flexure.

MONTAGNEUSE

Montagneuse DIMs Anomaly is in an area of significant structure, being the Montagneuse transform fault, and is in a large-scale surfacial displacement, being the Montagneuse River Valley. This is on the east boundary of the proposed Ksituan Sub-craton and the anomaly is cross-faulted from the southeast by Dunvegan Fault.

MANY ISLANDS

Many Islands DIMs Anomaly is north of the Peace River Arch Axis, well onto the Ksituan Sub-craton. The DIMs anomaly is transected by an east northeast trending Carboniferous fault, evident on a TUL aero magnetic mid-level survey, and terminates at an east-west Carboniferous fault, names unknown.

ALCES

Alces DIMs Anomaly is centred around a gravel pit and magnetic anomalies on the Peace River peneplain, cut by the Alces River and Flatrock Creek. The pit contains ample volcanic clasts of pebble to cobble size. The pit exposes the flank of glassy tuff or dike containing; magnetite, eclogitic garnet and a fossil burnt tree. This is north of the Peace River Arch Axis and is thought to occur on a southwest extension to the Boundary Lake Fault. This appears to be cross-faulted from the southeast along the Alces River. The anomaly occurs where the Dunvegan Formation sandstones are the country rock. The area is on a band of crust identified as the Kiskatinaw Oceanic Lithosphere.

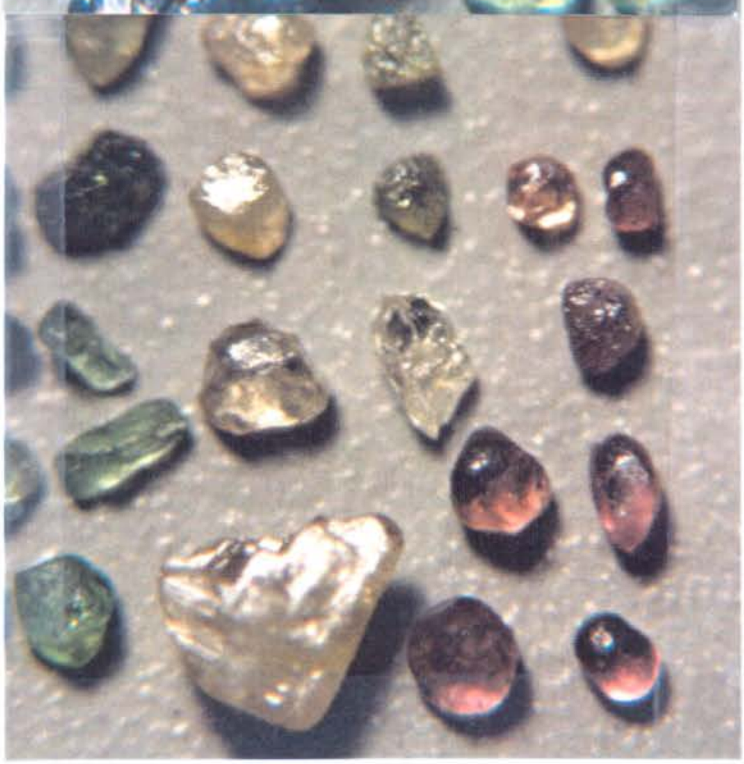
BEATTON

The Beatton DIMs Anomaly is north of the PRA Axis, on crust associated with 2.8 billion year Archean craton, which we propose as the Remnant Slave Craton. The anomaly is associated with an extension of the southwest trending Chinchaga Fault and possible northwest cross-faulting at Lucky Jim Claim. High concentrations of heavy minerals occur on Beatton River beaches, up to one kilometre downstream from the magnetic target known as "Lucky Jim." The believed source, outcrops as an olivine-sandy tuff on Indian Creek, near the Beatton River, and surfaces on a bench two hundred and fifty feet above the outcrop as an olivine rich weathered soil, which is likely an outcropping pipe.

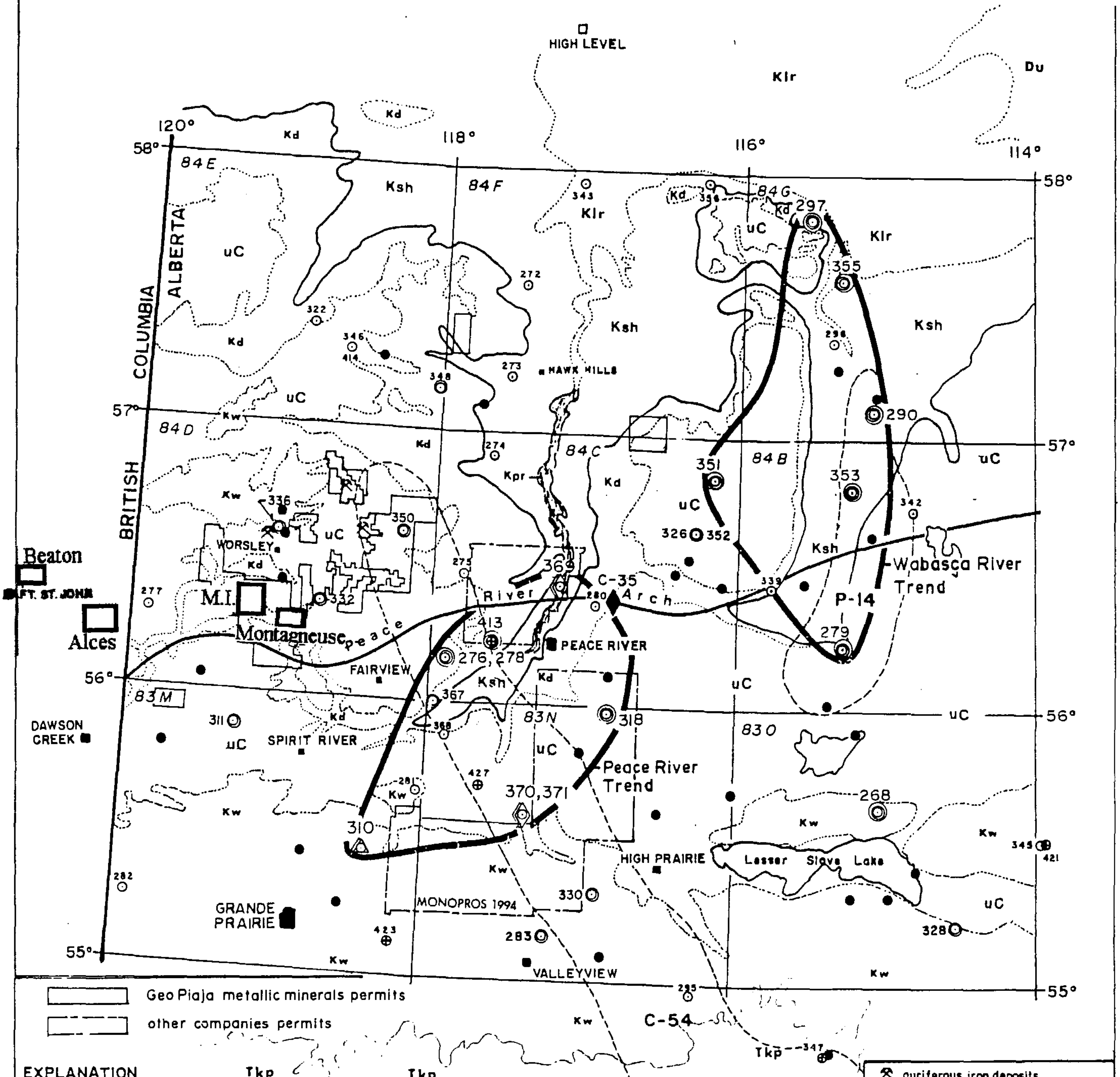
10

Mantle derived grains including eclogitic garnets and pyroxenes.

11



Pyroxenes, angular grains and mauve zircons which are travel indicators



EXPLANATION

⊙, ⊕ ; ● ARC-AGS N.Alberta till, preglacial & recent sand and gravel samples analyzed for diamond indicator minerals ; sampled, but not analyzed

C-35 ◈, ◆ sample site with multiple diamond indicator minerals of high quality chemistry, diamond indicator anomaly

◬ sample site with one or more diamond indicator minerals of good to high quality chemistry.

◎, ◉ ; ○, ⊕ sample site with one or more ; one moderate quality diamond indicator mineral/s

C-54, P-14 approximate size and shape of the geochemical, geophysical anomaly

trend of anomalous diamond indicator minerals

basement axial trend of Peace River Arch

STRATIGRAPHY

TERTIARY

Tkp Paskapoo Fm.

UPPER CRETACEOUS

Kw Wapiti Fm.

uC { Puskwaskau Fm., Badheart Fm. ⚒, Kaskapau Fm. }

Kd Dunvegan Fm.

Ksh Shaftesbury Fm.

LOWER CRETACEOUS

Kpr Peace River Fm.

Klr Loon River Fm.

UPPER DEVONIAN

Du undivided

TUL Petroleums Ltd.

DIMs Anomalies West of the Peace River Trend

June, 1998 1:2,500,000 Figure - 12 Page - 32

SOURCE : MDA PROJECT M93-04-037, ALBERTA RESEARCH COUNCIL OPEN FILE REPORT 1994-10 : The Diamond Potential of Alberta : A regional synthesis of the structural and stratigraphic setting, and other preliminary indications of diamond potential. prepared by M.B.Dufresne & R.A.Olson, D.R.Schmitt, B.McKinstry, D.R.Eccles, M.M.Fenton, J.G.Pawlowicz, W.A.D.Edwards and R.J.H.Richardson.
Figures 2.1, 6.2, 6.21-6.26, 6.44
Appendices 6.1B, 6.2 ; Table 6.2

compiled by s.p.santiago
8-18-96

7.0 GEOCHEMISTRY

The TUL permits on the Peace River Lowlands overlie the Ksituan Sub-craton. Known faulting of the Ksituan and mineralization, or intrusions through the sub-craton, give the Ksituan lineaments or magnetic highs; therefore the name, "Ksituan High."

The Ksituan; Montagneuse and Many Islands; is thought to be a possible magmatic arc with an age of 1.9 Ga., similar to age of the Chinchaga Low - 2.1Ga. Although the Ksituan is seen as "hotter" than the Chinchaga or the Buffalo Head, it is also apparently underlain by Archean crust according to Villeneuve et al. (1993, p.74). It is not seen to have been as stable as the Buffalo Head Terrane, dating - 2.3 Ga. However TUL exploration reveals that the mantle has been well tapped, as Montagneuse and Many Islands diamond indicator geochemistry shows.

Gravity surveys indicate that the crust thickens toward the west to greater than 35 kilometres at the Alberta-B.C. border (35-40km). This is thicker than Lac De Gras. (Dufresne et al,1996.p.52)

The primary consideration in exploring for economic diamond deposits is the age, thickness and temperature of the craton. These determine the geochemistry of the regions of diamond formation and the geochemistry of the host magmas which carry diamond to surface.

Economic discoveries of diamond will likely only take place where Archean craton, of sufficient thickness, harbours long-standing high pressure - low temperature environments.

Host magmas deliver the hitchhiker diamond - xenocryst to surface primarily in: 1) Kimberlite, 2) Orangeite (Type II Kimberlite - Lamprophyre) and in, 3) Olivine Lamproite. Orangeites are from the lithosphere while kimberlites are from the asthenosphere. (Mitchell, 1995)

Certainly, the centre of the Buffalo Head sub-craton is the focus of exploration at this time and olivine kimberlites and an assortment of crater facies materials are being found there.

Ashton K14, K14B and K14C represent a complex of intrusives which is, in total, large enough to have constituted a good tap of the mantle. The Buffalo Head is not a simple crustal unit. It is magnetic. It is at least underlain by ancient Archean material. And it has produced diamond.

So far, Alberta sub-cratons have not yet proven to be of sufficient age and to have hosted intrusives of appropriate geochemistry, to have carried quality and quantity of diamond, for an economic discovery. However, the geochemistry suite of minerals found in the Peace River District present a picture where; lamproite, kimberlite or the lamprophyre; may be the host-rock, and none of these can be ruled out as potential economic diamond-bearing hosts in Peace River District as a whole.

The Chinchaga is a younger accreted sub-craton to the Buffalo Head and it is a magnetic low. The meaning of this is unknown. The Chinchaga may be cooler than the Buffalo Head and gravity suggests that it is thicker, but it is certainly younger than the diamond producer in N.W.T., the Archean Slave Craton. The Chinchaga Mountain Lake pipes are not thought to have any economic potential.

The Peace River Lamprophyres produce diamond indicators, but are not seen to have much potential to produce diamond, and their source is unknown.

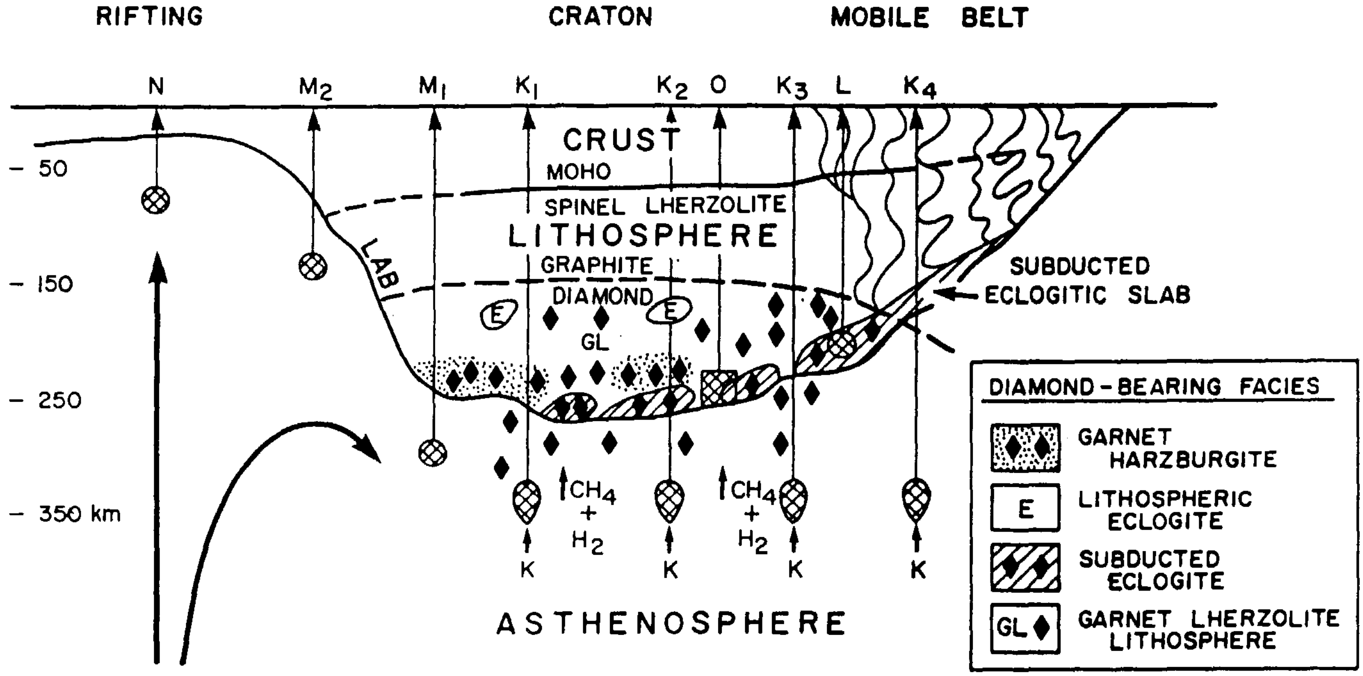


Figure 4.19. Hypothetical cross section of an Archean craton, ancient accreted mobile belt, and younger incipient rift, showing the location of the lithosphere–asthenosphere boundary (LAB) relative to the stability fields of diamond and graphite. The diagram illustrates why different kimberlites (K) differ with respect to sources of xenocrystal diamond. K_1 may contain lithospheric and asthenospheric garnet lherzolite diamonds together with garnet harzburgite/dunite-derived diamonds. K_2 contains diamonds from the aforementioned sources plus diamonds derived from lithospheric and subducted eclogites, i.e., five distinct sources. K_3 contains only lithospheric and asthenospheric garnet lherzolite-derived diamonds. K_4 does not pass through any diamond-bearing zones and is barren. Orangeites (O) are shown originating at the LAB and contain diamonds derived from garnet harzburgite/dunites and subducted eclogites. Lamproite (L) contains diamonds derived only from subducted eclogite and lithospheric garnet lherzolite sources. Melilititic magmas are considered to be derived by greater degrees of melting from the same asthenospheric sources as kimberlites. Depending upon the depth of segregation of the magma they may (M_1) or may not (M_2) contain diamonds. High degrees of partial melting at shallow depths in the rift zone produces nephelinite-suite magmas (N) which are always diamond free (modified from Mitchell 1991b).

Peace River Intrusives: Kimberlite ? Orangeite? Lamproite? Melilitite? Lamprophyre?

TUL Petroleums Ltd.		
GEOCHEMISTRY LITHOSPHERE and CRUST MANTLE CONDITIONS for DIAMOND FORMATION, PRESERVATION and EMPLACEMENT Source: Mitchell, 1995: Kimberlites, Orangites and Related Rocks, page - 383		
June, 1998	Figure - 13	Page - 34

7.1 MINERALOGY

TUL lab work on olivine based kimberlites suggests that the olivines are quite unstable in the open environment. They can easily be peeled with a steel probe. Olivine is acknowledged to have almost no travel. However, the garnet, magnetite, ilmenite, zircons, spinels, and some other minerals associated with the olivine kimberlites, are resistive and can travel varying distances. Chrome diopside (CP-5) is thought to travel in the order of 3 to 10 kilometres before breaking down. At Montagneuse, some of the pyroxenes are virtually ubiquitous. Some are quite angular and many of the CP-5 and CP-2 (diopsides) are diamond indicators.

TUL has encountered and mapped bentonites and ashes in the Montagneuse and Many Islands and other areas in the Peace River District. These slimy aluminous muds are fairly readily recognisable along stream-sides. When a stream is carrying a 100% bed load of bentonitic material, it has a unique appearance. The smectite and illite derivatives of volcanic ash are the bentonites we talk about. However, there is some question about the source of some of the clays and magnetite laden slimy materials we see in the field.

At Lucky Jim Claim - Beatton River DIMs Anomaly, the garnets and diamond indicators occur by the pound, up to a kilometre downstream from a magnetic anomaly. Sampling of outcrops and shallow drilling, has provided ample material which is identifiable as a crystalline groundmass. This matrix weathers and breaks down readily in the open environment and when washed with water. We have tentatively identified this as weathered olivine, part of a pipe or pyroclastic emplacement. The nature of this greasy product, produced by the weathered or wetted crystalline groundmass at Lucky Jim, raises questions about the true source and nature of the Montagneuse and Many Islands ash outcrops and bentonitic soils.

The Peace River Lamprophyres also present a mineralogy problem. These are highly altered rocks of unknown source. They are about 2% magnetite. These are fine grained and are very resistive to mechanical weathering. However, they are micaceous and contain a fair amount of additional iron; pyrite, hematite. In the environment of the Tertiary Gravels, they appear not to chemically weather. Open to a moist environment, they oxidise. There are many questions to be answered about where the blood-red iron springs come from at Montagneuse, where there are many of these grey-blue lamprophyric grabs that look like kimberlite.

At Peace River, diamond exploration has been a function of two methodologies: 1. Flying and drilling magnetic anomalies. It is understood that Ashton delineated and drilled K14 by aero magnetic interpretation and then drilling. The geochemistry and mineralogy of the Buffalo Hills pipes is still subject to a long period of research. Hypabyssal root mineralogies have not been found yet. Most Ashton reports discuss drilling kimberlite and crater facies materials and sometimes drilling through these into country rock. Our inspection of the Ashton diamond indicators shown to us indicate that these are good textbook diamond indicator garnets and pyroxenes. Our sample of Ashton Buffalo Hills kimberlite (assumed correct), shows that it is an olivine kimberlite of typical waxy nature.

2. Sampling for Diamond Indicators. Mountain Lake is thought to have been discovered, first, by indicator minerals. Samples of Mountain Lake kimberlite (alkaline ultrabasic volcanic) are also an olivine groundmass volcanic. These are described as pyroclastic, air-fall and sedimentary by Leckie et al. These also contain exquisite lilac garnet and emerald-green clino-pyroxene. Again, the matrix is filled with olivine and this has a soft waxy feel to it.

Appendix 4.0

Kimberlite and Lamproite hosted diamonds and Placer diamonds.

Kimberlites and Lamproites, and models for emplacement (Dufresne et al, 1994) and Diamond Mineral Deposit Models for Alberta, Kimberllte or Lamproite hosted diamonds and Placer diamonds (Olson et al, 1994) are summarized as follows:

Kimberlites and lamproites are, to date, the only two known economic primary sources of diamonds in the world. Both are geologically similar in many respects since they are both products of deep-seated continental intraplate alkaline volcanism.

Both kimberlites and lamproites are not truly primary deposits in the sense that all or at least most of the diamonds did not originate within the source magma.
Instead, the macrodiamonds in these host igneous rocks are actually derived from the disaggregation of sometimes highly diamondiferous source rocks that exist in places in the lithospheric upper mantle. Therefore, the kimberlite and lamproite magmas simply provided the transport medium to move diamonds formed in the upper mantle source rock to the surface.

Kimberlites and lamproites which originate from within or below the diamond source rocks have the potential to transport diamonds to the Earth's surface while those that originate at the craton margins can not transport diamonds to the surface because they do not sample the diamondiferous source rocks.

Primary diamonds or graphite pseudomorphs after diamonds are also known to occur in some lamprophyres, alkali basalts and alpine type peridotites, but significant quantities of diamonds have not yet been found in these rocks.

Kimberlites and lamproites are not just confined to the Archean parts of cratons but also can occur within mobile belts, either during periods of normal faulting prior to the orogenic movements or subsequent to deformation and cratonization of the mobile belt. The AustralianArgyle deposit hosted in lamproite that has intruded into a Proterozoic fold belt illustrates the possibility for large accumulations of post-Archean eclogitic diamonds to occur outside of, but adjacent to, an Archean craton.

The four requirements for a large primary diamond deposit to occur at the Earth' s surface are: 1) the kimberlite/lamproite host rock must originate in or below a diamond-rich source region of the upper mantle where diamonds have remained stable since the time of their formation; 2) the kimberlite/lamproite intrusion must sample the diamond-bearing source region(s); 3) the kimberlite/lamproite magma must ascend fast enough and provide a suitable reducing chemical environment for diamonds to survive the transport to the Earth's surface; and 4) the host magma must encounter emplacement sites where conditions are conducive to the formation of sufficiently large pipes.

Diamond-rich placer deposits are a secondary but a major source of world diamonds. They result from the mechanical concentration of moderate to high density minerals.

The following summarizes the significant (and differences in) characteristics of diamondiferous kimberlites / lamproites and diamond-rich placer deposits:

Diamondiferous Kimberlites

Tectonic Framework

generally restricted to regions of the continental crust underlain by Archean basement; large, deep-seated regional structures within the Archean basement may act as conduits for kimberlite emplacement; also occurs in regions underlain by Proterozoic but are generally not economic.

Regional Characteristics

1. flat lying Phanerozoic platform or basinal sedimentary rocks that overlie Archean cratonic rocks; kimberlites, especially the diatreme facies, are much less common in exposed Archean rocks due to erosion.
2. kimberlites tend to occur in clusters, often the clusters may be spatially associated with regional zones of crustal weakness.
3. crustal extension zones characterized by the presence of diabase dyke swarms or continental flood basalts.
4. arcuate or linear crustal fracture zones that exist at the flanks of regional cratonic warps, domes, arches or structural basins.
5. arcuate or linear zones characterized by the presence of alkali intrusive rocks related to hot spot volcanic activity or volcanic activity along transform faults.
6. craton scale drainage divides which may mirror cratonic domes or arches.
7. positive regional gravity anomalies which may indicate anomalous thickness' of cratonic crust.

Deposit Characteristics

1. the 3 textural-genetic groups of kimberlites are:
 1) crater facies- includes epiclastic to pyroclastic rocks such as tuffs; typically forms a ring around the perimeter of the kimberlite;
 2) diatreme facies- diatremes are vertical or steeply inclined cone-shaped bodies that consist primarily of tuffistic or volcaniclastic kimberlite breccias; the steep sides(75-85^0 dip) and downward tapering margins of the diatreme result in a cross-sectional

Diamondiferous Lamproites

Tectonic Framework

most common along the margins of cratons and in adjacent accreted mobile belts that have undergone relatively young and persistent faulting.

Regional Characteristics

many of the characteristics that are important for kimberlites are also important fro lamproites; some of the characteristics that may be important for lamproites but not for kimberlites include:

1. thick crust and lithosphere below or immediately adjacent to accreted mobile belts with multiple episodes of both compressional and extensional tectonic events.
2. Proterozoic mobile belts adjacent to Archean cratons are considered particularly favourable.
3. continental scale lineaments both parallel to the strike of the mobile belt or crosscutting the strike.
4. paleorift or subduction zones

Deposit Characteristics

lamproite hosted diamond deposits exhibit many of the same characteristics that kimberlite hosted deposits exhibit; some of the differences that may be exhibited by lamproite hosted deposits include:

1. lamproites occur principally as extrusive, subvolcanic and hypabyssal rocks.
2. volcanic vents or edifices are shallow and wide and commonly are compared to the shape of a champagne glass; composite craters with

area decreasing regularly with depth and lead to its 'carrot-shaped' description; approximately elliptical or subcircular outcrop plans of this facies are also characteristic; the axial lengths of the diatremes range from about 300 to 2,000 m.

3) hypabyssal root zone facies- the grading downward continuation of the diatreme, as irregular to regular dykes and sills.

2. the majority of kimberlitic diamonds are recovered from diatreme breccias or root zone dykes but diamond grades can be highly variable, even in separate zones within individual pipes; crater facies rocks contain important concentrations of diamonds but are volumetrically insignificant due to erosion.
3. depending upon the level of erosion, diamond producing pipes have a surface area between 5 and 30 hectares; the pipes range from oval to lenticular in shape and tend to occur in clusters.
4. kimberlites are essentially potassic, olivine-rich, ultramafic rocks with a high CO_2 content; the mega-cryst/macrocryst and groundmass assemblage is characterized by olivine, Mg-ilmenite(picroilmenite), Cr-poor/Ti-rich pyrope garnet, subcalcic diopside to enstatite, Ti-poor phlogophites and a variety of spinels (such as magnesian chromite); accessory minerals present include monticellite, perovskite, apatite, calcite and serpentine; **garnets** that are high in Mg & Cr, and low in Ca(G10 garnets) are key indicators of diamonds that originate from peridotitic sources; associated chromites are abnormally rich in Cr; garnets that have high Ti and trace amounts of Na are often indicators of diamonds that originate from **eclogitic sources**.
-compared to the average ultramafic rock, kimberlites are usually enriched in incompatible elements that includes Li, F, P, K, Ti, Rb, Sr, Zr, Nb, Sn, Ba, Pr, Nd, Sm, Eu, Gd, Hf, Ta, Tl and Pb by a factor of between 10 and 100, and C, Cs, La, Ce, Th and U by a factor greater than 100; overlying residual soils may have high concentrations of Ti, Cr, Ni, Mg, Ba and Nb.

associated bedded volcaniclastic deposits and volcanic debris are common where the craters are preserved; extrusive lamproitic volcanism is characterized by lava flows and pyroclastics similar in style to those of basaltic volcanism.

3. in contrast to kimberlites, the majority of diamond deposits in lamproites are found in pyroclastic rocks.
4. the crater facies of a lamproite is commonly intruded by magmatic lamproite; diamonds occur mainly in the pyroclastic rocks of the crater facies, with the magmatic lamproite phases being diamond-poor. as a result, the diamondiferous tonnage potential of lamproites tends to be restricted to the volume of pyro-clastics preserved in the vent.
5. lamproites exhibit an extremely wide range in modal mineralogy; primary phases include Ti-rich and Al-poor phlogopite, Ti-K-rich richterite, forsterite, Al-Na-poor diopside, Fe-rich leucite and sanidine; minor and accessory phases include priderite, wadeite, apatite, perovskite, Mg-chromite and Mg-Ti-magnetite.
6. Lamproites are ultra-potassic ($K_2O/Na_2O>3$), peralkaline ($K_2O+Na_2O/Al_2O_3>1$) and rich in Ba, Zr, Sr, La and F.

Two types of kimberlites are recognized worldwide and are commonly referred to as Group I and Group II kimberlites. These two groups correspond to the original 1914 Wagner classification of olivine kimberlites and micaceous kimberlites.

Group I : found worldwide, generally characterized by the presence of abundant olivine, the characteristic megacryst/macrocryst suite and by the presence of minor amounts of phlogophite; from the following three sources are derived crystals that may be contained in this petrographically complex rocks with overall mineralogy varying widely depending on the relative contribution of each of the following three sources:

1) the fragmentation of upper mantle xenoliths
-xenolithic minerals are Cr-rich subcalcic pyrope (G9 and G10 garnets), olivine, Cr-diopside, high-Cr chromite and diamond.

2) **the** primary phenocryst and groundmass minerals which crystallize directly from the kimberlitic magma
-primary minerals are olivine, phlogophite, perovskite, spinel varieties (e.g. magnesian

chromite), monticellite (Ca-rich olivine), apatite, calcite and primary serpentine

3) the megacryst/ macrocryst or discrete nodule suite

-megacrysts are large(1-20 cm) single crystals of low-chrome titanian pyrope (G1 or G2 garnets), magnesian(picro)ilmenite, subcalcic to calcic diopside, olivine, Ti-poor chromite, enstatite, phlogophite and zircon; lamellar intergrowths between picroilmenites and pyroxenes are common.

-macrocrysts are somewhat smaller crystals, but tend to be rounded to subrounded and are compositionally similar to the megacryst suite of minerals with the exception that macrocrysts include abundant olivine.

-it is not clear whether the megacryst/macrocryst suite of minerals are xenocrysts or cognate phenocrysts, or a combination of the two; the megacrysts are believed to have formed in the upper mantle, and the existence of such megacryst minerals is generally believed to be an indicator of kimberlite magmatism.

Group II : kimberlites are only known from southern Africa and comprise principally rounded olivine macrocrysts in a matrix of abundant phlogophite and diopside, with calcite and relatively rare spinel and perovskite; in contrast to Group I , the kimberlites lack the megacryst suite and minerals such as monticellite and ulvospinel.

7.2 <u>DIAMOND INDICATORS</u>
<u>DIMs ANOMALIES</u>
MONTAGNEUSE Pit-1
ALCES - RET-91 rock
BEATTON - LJB - G9

7.2 DIAMOND INDICATORS

The TUL samples which were processed, picked and microprobed are described further in this report. Sample locations are on the Pocket Maps attached. Microprobe analyses and graphs show that a discovery of kimberlite at Montagneuse is likely.

Initial sampling and microprobe was done between 1993 and 1995. S. P. Santiago International was contracted to carry out an independent report for a third party in 1996 and our results were replicated by Santiago at Montagneuse and at Many Islands. Pages 36 to 39 are excerpts from Santiago, as a description of the important mineralogies of diamond bearing kimberlites and lamproites. (from Dufresne et al, 1994 and Olsen et al, 1994)

Further microprobe for this report conclude that the previous TUL results and the Santiago results showing kimberlitic indicators and diamond inclusion field minerals from Montagneuse are again confirmed. Further microprobe for Many Islands has not been carried out.

Montagneuse, Many Islands, Alces and Beatton contain anomalous diamond indicator geochemistry and diamond inclusion field minerals.

Diamond Indicators, when properly referred to, are the minerals known to have been found as an inclusion in diamond or known to have formed in the environment of diamond formation. Most kimberlites are a combination of peridotic and eclogitic mantle material. Eclogitic material is often a prolific diamond producer. Diamond Indicators are also classified on a statistical basis if a mineral contains chemical compositions within certain percentages. The primary diamond indicators are the garnets, clinopyroxenes, ilmenites and chromites; but others, include spinel, phlogopite, and even tourmaline.

Kimberlitic indicators are the suite of minerals shown on Table - 12, page - 76. In the garnet class, kimberlitic indicators are generally agreed to be the Dawson and Stephens Classifications: G1, G2, G7, G9, G10 and G11. These are shown on the next page for reference. They are understood to be the group of garnets representing the peridotic sample of the mantle associated with kimberlites.

The group of garnets classified under the Dawson and Stephens Classification System as being associated with the eclogitic mantle or subducted slabs of crust that produce eclogitic diamonds are the G3, G4, G8 class garnets.

G5 is not considered a diamond indicator unless it is accompanied by other diamond indicators.

G7 is considered a peridotic indicator, but this garnet is soft and does not travel well, so it is rare.

G10 would be considered a diamond indicator in kimberlites. G9 would be considered a diamond indicator in lamproites (Argyle) and in some cases, kimberlites.

The Pyroxene Group minerals within the clinopyroxene and orthopyroxene sub-groups are shown with the Montagneuse microprobe data as to what compositions qualify them as Diamond Inclusion Field minerals, according the Fipkie system of classification, 1989.

Garnet Classification (after Dawson and Stephens, 1975)

Sample #	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
1. Titanian Pyrope	1	..	..	..	..	..	..	..	..	..	..	..
2. High-Titanium Pyrope	..	2	..	..	..	..	..	..	..	..	..	..
3. Calcic Pyrope-Almandine	..	..	3	..	..	..	..	..	..	..	..	..
4. Ti-Ca-Mg Almandine	..	..	..	4	..	..	..	..	..	..	..	..
5. Magnesian Almandine	..	..	..	..	5	..	..	..	..	..	..	..
6. Pyrope-Grossular- Almandine	..	..	..	..	..	6	..	..	..	..	..	..
7. Fe-Mg Uvarovite Grossular	..	..	..	..	..	..	7	..	..	..	..	..
8. Ferro-Magnesian Grossular	..	..	..	..	..	..	..	8	..	..	..	..
9. Chrome Pyrope	..	..	..	..	..	..	..	..	9	..	..	..
10. Low-Calcium Chrome Pyrope	..	..	..	..	..	..	..	..	..	10	..	..
11. Titanian Uvarovite-Pyrope	..	..	..	..	..	..	..	..	..	..	11	..
12. Knorringitic Uvarovite-Pyrope	..	..	..	..	..	..	..	..	..	..	..	12
	---	---	---	---	---	---	---	---	---	---	---	---
	1	1	1	1	1	1	1	1	1	1	1	1
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12

Pyroxene Classification (after Stephens and Dawson, 1977)

Sample #	Classification														
Orthopyroxene															
Enstatite	OP-1	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cr-Al Enstatite	---	OP-2	---	---	---	---	---	---	---	---	---	---	---	---	---
Na-Ca Enstatite	---	---	OP-3	---	---	---	---	---	---	---	---	---	---	---	---
Ti Enstatite	---	---	---	OP-4	---	---	---	---	---	---	---	---	---	---	---
High Ti Enstatite	---	---	---	---	OP-5	---	---	---	---	---	---	---	---	---	---
Clinopyroxene															
Sub-calcic Diopside	---	---	---	---	---	CP-1	---	---	---	---	---	---	---	---	---
Diopside	---	---	---	---	---	---	CP-2	---	---	---	---	---	---	---	---
Ti-Cr Diopside	---	---	---	---	---	---	---	CP-3	---	---	---	---	---	---	---
Low Cr Diopside	---	---	---	---	---	---	---	---	CP-4	---	---	---	---	---	---
Chrome Diopside	---	---	---	---	---	---	---	---	---	CP-5	---	---	---	---	---
Ureyitic Diopside	---	---	---	---	---	---	---	---	---	---	CP-6	---	---	---	---
High Uryitic Diopside	---	---	---	---	---	---	---	---	---	---	---	CP-7	---	---	---
Jadeitic Diopside	---	---	---	---	---	---	---	---	---	---	---	---	CP-8	---	---
Omphacite	---	---	---	---	---	---	---	---	---	---	---	---	---	CP-9	---
Diopsidic Jadeite	---	---	---	---	---	---	---	---	---	---	---	---	---	---	CP-10

Loring Laboratories

Figure - 14

DIAMOND INDICATOR MINERALS (DIMs) and Kimberlitic Indicators

GARNETS

"Garnets in kimberlites are members of solid solutions between pyrope ($Mg_3Al_2Si_3O_{12}$), almandine ($Fe_3Al_2Si_3O_{12}$), grossular ($Ca_3Al_2Si_3O_{12}$), uvarovite ($Ca_3Cr_2Si_3O_{12}$), and knorringite ($Mg_3Cr_2Si_3O_{12}$). Mitchell: Statistical Classification of Garnets, in clusters of composition, to assign grains to a distinct paragenetic source according to Dawson & Stephens (1975). G1, G2, G7, G9, G10, G11 - Peridotic kimberlitic paragenetic group. G3, G4 - Eclogitic garnet group. Kimberlite usually contains peridotic and eclogitic garnets. G-5 can be an indicator if in company with pyropes. Mitchell p.138:colours may be lilac, red-purple, red-brown, orange, pink, yellow or green.

TABLE - 6

G	Dawson and Stephens 1975 Classification		TiO2	CrO3	FeO	MgO	CaO	Commonly
1	Titanian pyrope garnet	(P)	0.58	1.34	9.32	20.00	4.82	orange
2	High-titanium pyrope	(P)	1.09	0.91	9.84	20.30	4.52	red orange
3	Calcic pyrope-almandine	(E)	0.31	0.30	16.49	13.35	6.51	orange
4	Titanian, calcic, magnesiun almandine	(E)	0.90	0.80	17.88	9.87	9.41	dark brown
5	Magnesian almandine		0.05	0.03	28.33	7.83	2.44	red orange
6	Pyrope-grossular almandine		0.24	0.27	10.77	10.38	14.87	orange
7	Ferro-magnesian uvarovite-grossular	(P)	0.29	11.52	5.25	8.61	21.60	emeraldgreen
8	Ferro-magnesian grossular	(E)	0.25	0.04	6.91	4.69	24.77	apple green
9	Chrome-pyrope	(P)	0.17	3.47	8.01	20.01	5.17	red, purple
10	Low-calcium chrome-pyrope	(P)	0.04	7.73	6.11	23.16	2.13	purple,violet
11	Uvarovite-pyrope	(P)	0.51	9.55	7.54	15.89	10.27	hot pink
12	Knorringitic uvarovite-pyrope		0.18	15.94	7.47	15.40	9.51	green

PYROXENES

Mitchell p.185 - Microphenal/Groundmass Pyroxenes in Hypabyssal Kimberlite: In hypabassal facies of micaceous kimberlite, Diopside (CP-2) is a characteristic microphenal and/or groundmass phase and can comprise 10% - 40% of such kimberlites. ...acicular to prismatic .1-.05 mm euhedral crystals randomly incorporated in phlogopite plates or forming borders of calcite-serpentine segregations. Essentially pure diopsides... typically contain < 1% TiO_2,Al_2O_3 or Na_2O and are notably Cr_2O_3 poor <.5%. ie: Joss Dyke Summerset Islands, N.W.T., Mitchell. 1980. "Mineralogy of Micaceous Kimberlite."

TABLE - 7

OP	PYROXENE CLASSIFICATIONS	TiO2	CrO3	FeO	MgO	CaO	Commonly
	ORTHOPYROXENE						
	Lherzolitic groundmass						**pale green
1	Enstitite - Sample GC-1,Grain # 51	0	0.08	4.14	0.05	0	olive green
2	Cr Al Enstitite - GC-1, Grain #47	0	0.48	5.68	33.83	0.69	olive green
2	Cr Al Enstitite - TUL 4, Grain # 22	0.17	0.39	6.22	32.26	0.83	pale olive gr
CP	CLINOPYROXENES						
2	Diopside - CP-2: numerous, some diamond indicators, some not.	0.20 1.08	0.00 0.25	0.76 8.98	11.71 17.78	21.88 25.58	lime green green
3	Ti-Cr Diopside - Montagneuse Meadow Pit-1	0.5	1.22	2.24	16.02	19.55	lime-green
4	Low-Chrome Diopside-CP-4:GC1#50,TUL3#53	0.33	0.01	6.23	15.43	20.38	light green
5	Chrome Diopside - CP-5: usually diamond ind.	0.04	1.14	2.31	16.70	22.06	emeraldgreen
7	High Chrome Pyroxene - CP-7: GF2#9,4L1#24	0.80	10.96	16.41	0.15	33.28	emerald green

SECTION 7.2
DIAMOND INDICATORS

DATA: TABLE - 8

Summary Table: Samples List and Locations

Summary Table: Samples List and Locations

TABLE - 8

Block	Permit Name	Permit #	Sample #	Latitude North	Longitude West	Feature/Location	Sample Type	Sampler	Lab (Y/N)
1	WHITEMUD RIVER 1	93993080036	TUL-L# 11	56.720°	118.135°	SANDY RIDGE/TUFF RING	SOIL SAMPLE	TUL	Y
			TUL-L# 11.1	56.700°	118.133°	SAND RIDGE	TRENCHED	TUL	Y
			TUL-L# 11.11	56.720°	118.133°	SAND RIDGE	"B" & "C" SOILS	TUL	Y
			TUL-L# 11.12	56.700°	118.133°	SAND RIDGE	SOILS	TUL	Y
			TUL-L# 11.12 (CB7)	56.700°	118.133°	SAND RIDGE	SOILS	TUL	Y
			TUL-L# 11.17	56.700°	118.133°	SAND RIDGE	ROCK & GRABS	TUL	N
			TUL-L# 11.2	56.720°	118.136°	SAND RIDGE	SOILS	TUL	N
			TUL-L# 11.3	56.700°	118.136°	SAND RIDGE	SOILS	TUL	N
			TUL-L# 11.4	56.720°	118.136°	SAND RIDGE	SOILS	TUL	N
			TUL-L# 12	56.718°	118.133°	CIRCULAR FEATURE	SOIL SAMPLE	TUL	Y
			TUL-L# 12.10	56.718°	118.133°	CIRCULAR FEATURE	AUGER HOLE	TUL	N
			TUL-L# 12.11	56.718	118.133°	CIRCULAR FEATURE	"B" & "C" SOILS	TUL	N
			TUL-L# 13	56.720°	118.113°	DEPRESSION & RING	CLAY/BENTONITE	TUL	Y
			TUL-L# 14	56.720°	118.112°	MAG. HIGH/RISE/HILL	CLAY	TUL	Y
			TUL-L# 15	56.712°	118.112°	CIRCULAR FEATURE/CREEK	MID-CHANNEL	TUL	Y
			TUL-L# 15.1	56.712°	118.112°	CREEK BED	SEDIMENTS	TUL	N
			TUL-L# 15.2	56.712°	118.112°	ROADSIDE/IRON SAND	SOIL	TUL	N
			TUL-L# 15.21	56.712°	118.112°	ROADSIDE/IRON SAND	SOIL	TUL	N
			TUL-L# 15.22	56.712°	118.112°	ROADSIDE/IRON SAND	GRABS FROM AUGER	TUL	N
			TUL-L# 16	56.722°	118.122°	MAGNETIC CENTRE	TRENCHED	TUL	Y
			TUL-L# 16.1	56.720°	118.122°	MAGNETIC CENTRE	TRENCHED	TUL	Y
			TUL-L# 17	56.720°	118.123°	ANIMAL MINERAL LICK	TRENCHED	TUL	Y
			TUL-L# 17.0	56.720°	118.123°	ANIMAL MINERAL LICK	TRENCHED	TUL	N
			TUL-L# 17.1	56.720°	118.123°	ANIMAL MINERAL LICK	TRENCHED	TUL	Y
			TUL-L# 18.0	56.723°	118.130°	EDGE OF HILL/SURFACE FEATURE	TRENCHED	TUL	N
			TUL-L# INT18	56.723°	118.130°	CUTLINES INTERSECT	TRENCHED	TUL	N
			TUL-L# INT2.10	56.723°	118.130°	BESIDE SEISMIC LINE	TRENCHED	TUL	N
			TUL-L# INT2.11	56.723°	118.130°	BESIDE SEISMIC LINE	TRENCHED	TUL	N
			TUL-L# 19.0	56.708°	118.128°	SANDY RIDGE/RING FEATURE	TRENCHED	TUL	N

Block	Permit Name	Permit #	Sample #	Latitude North	Longitude West	Feature/Location	Sample Type	Sampler	Lab (Y/N)
1	WHITEMUD RIVER 1	9393080036	TUL-L# 19.1	56.708°	118.128°	SANDY RIDGE/RING FEATURE	"C" HORIZON	TUL	N
			TUL-L# 19.2	56.708°	118.128°	SANDY RIDGE/RING FEATURE	"C" HORIZON	TUL	N
			TUL-L# 19.2	56.708°	118.128°	SANDY RIDGE/RING FEATURE	"C" HORIZON	TUL	N
			TUL-L# 19..21	56.708°	118.128°	SANDY RIDGE/RING FEATURE	"C" HORIZON	TUL	N
	WHITEMUD RIVER 2	9393080037	TUL-L# 24	56.668°	118.267°	MAG. HIGH/HILL	ABANDONED	TUL	N
	WHITEMUD RIVER 3	9393080035	TUL-L# 22	56.618°	118.350°	MAG. HIGH/RIVER	CHENNEL	TUL	Y
	WHITEMUD RIVER 4	9393080032	TUL-L# 21	56.563°	118.419°	MAG. HIGH/CREEK BANK	SOIL SAMPLE	TUL	Y
			TUL-L# 61	56.510°	118.350°	MAG. ANOMALY/HILLY	CLAY SOIL.MAGNETITE	TUL	N
			TUL-L# 62	56.507°	118.443°	SUTURE Z./RING FEATURE	CIR. SANDY RIDGE	TUL	N
	WHITEMUD RIVER 5	9393080111	TUL-L# 23	56.592°	118.255	GRAVEL PIT/MORRAINE	IRONY SOIL	TUL	Y
			TUL-L# 25	56.590°	118.25	CLEAN SAND CLIFFS	QUARTZE SAND	TUL	Y
			TUL-L# 26	56.587°	118.253	CLEAN SNAD BANKS	QUARTZE SAND	TUL	Y
2	SOUTH WHITEMUD 1	9393080033	BL2-1	56.583°	118.767	BROWN IRONY SAND	IRON FORMATION	TUL	N
			BL2-2	56.625°	118.758	BROWN IRONY SAND	IRON FORMATION	TUL	N
			BL2-3	56.642°	118.758	BROWN IRONY SAND	IRON FORMATION	TUL	N
6	HIGHLAND PARK 1	9393080038	TUL-PR# 51	56.063°	118.933	TAVES'/MAG. ANOMALY	WEST SHORE	TUL	Y
			TUL-PR# 52	56.053°	118.932	TAVES'/MAG. ANOMALY	WEST SHORE	TUL	Y
			TUL-PR# 53	56.064°	118.925	TAVES'/MAG. ANOMALY	EAST SHORE	TUL	Y
			TUL-PR# 54	56.073°	118.917	N. OF PRATT'S LANDING	EAST SHORE	TUL	Y
			TUL-L# 81	56.108°	118.952	TAVES' GRAVEL PIT	GRADED SAND/GRAVEL	TUL	N
			TUL-L# 91	56.128°	118.972	TAVES' GRAVEL PIT	PLOGOPITE/SAND	TUL	Y
			TUL-L# 111	56.100°	118.927	FLAT TREED SEIS. LINE	RED/IRON/CLAY	TUL	N
	HIGHLAND PARK 2	9393080122	14-30 - WELL	56.230°	118.100°	14-30-83-6 W6M	RAT HOLE SOIL	TUL	Y
	MANY ISLANDS	9395120003	TUL 4-0	56.358°	118.233°	MENNO-SIMMONS PIT (Hickock's Pit)	GRAVEL	TUL	Y
	M.I. EAST	3936070031	MONO#4	56.296°	118.890°	MONOPROS DRILLSITES 1, 2, 3 & 4	DRILL CUTTINGS	TUL	N
	M.I. GRAVEL CAP	3936070032	MIGC# 16S-G1	56.385°	119.048°	CLAIRS GRAVEL PIT	GRAVEL	Sandiago	Y
			MIGC# 16S-G2	56.385°	119.048°	CLAIRS GRAVEL PIT	GRAVEL	Sandiago	Y
			MIGC# 16S-G3	56.385°	119.048°	CLAIRS GRAVEL PIT	GRAVEL	Sandiago	Y
			MIGC# 16S-G4	56.385°	119.048°	CLAIRS GRAVEL PIT	GRAVEL	Sandiago	Y
			MIGC# GR-BR SAND	56.385°	119.048°	CLAIRS GRAVEL PIT	GRAVEL	Sandiago	Y
	M.I. GRAVEL CAP	9396070098	TUL-ELB	56.385°	119.048°	CLAIRS GRAVEL PIT	TROMMEL CONC.	TUL	Y
			TUL-ELU	56.385°	119.048°	CLAIRS GRAVEL PIT	TROMMEL CONC.	TUL	Y

Block	Permit Name	Permit #	Sample #	Latitude North	Longitude West	Feature/Location	Sample Type	Sampler	Lab (Y/N)
6	M.I. SOUTH	9396070033	AMR# 1	56.305°	119.244°	CUT IN BANK AT RIVERBEND	Conc. sand & gravel	Sandiago	N
			AMR# 2	56.305°	119.244°	CUT IN BANK AT RIVERBEND	Conc. sand & gravel	Sandiago	N
			AMR# 3	56.305°	119.244°	CUT IN BANK AT RIVERBEND	Conc. sand & gravel	Sandiago	N
			AMR# 4	56.305°	119.244°	CUT IN BANK AT RIVERBEND	Conc. sand & gravel	Sandiago	N
			AMRSC1	56.305°	119.244°	CONC. FROM AMR# 1 + 2 + 3 + 4	Conc. sand & gravel	Sandiago	Y
			MICR# 1	56.327°	119.238°	STREAMBED IN BEND IN RIVER	Conc. sand & gravel	Sandiago	Y
			MICR# 2	56.307°	119.240°	STREAMBED IN BEND IN RIVER	Conc. sand & gravel	Sandiago	Y
			MICR# 3	56.293°	119.247°	STREAMBED IN BEND IN RIVER	Conc. sand & gravel	Sandiago	Y
			MICR# 4	56.296°	119.245°	STREAMBED IN BEND IN RIVER	Conc. sand & gravel	Sandiago	Y
			MICRO1	56.296°	119.245°	CONC. FROM MICR#1 - MICR# 4	Conc. sand & gravel	Sandiago	Y
	MANY ISLANDS	SAMPLES	GF- 1	56.298°	119.242°	Pre-glacial gravels - Cliff and creek bank	Fines - from processor	Sandiago	Y
			GC-1	56.298°	119.242°	Pre-glacial gravels - Cliff and creek bank	Course - from processor	Sandiago	Y
			GF-2	56.300°	119.241°	Pre-glacial gravels - Cliff and creek bank	Fines - from processor	Sandiago	Y
			GC-2	56.300°	119.241°	Pre-glacial gravels - Cliff and creek bank	Course - from processor	Sandiago	Y
	PEACE RIVER 1	9393080039	TUL-M# 71 - WELL	-	-	03-36-83-7-W6M	SOIL GRAB	TUL	N
			TUL-M# 1	56.247°	118.901°	RIVER CHANNEL/C.CK.	STREAM SEDIMENT	TUL	Y
			TUL-M# 14	56.254°	118.886°	BLACK ROCK SPRING	STREAM SEDIMENT	TUL	Y
			TUL-M# 2	56.249°	118.897°	RIVER BED/CHANNEL	STREAM SEDIMENT	TUL	Y
			TUL-M# 2 - AGS	56.249°	118.897°	RIVER BED/CHANNEL	STREAM SEDIMENT	TUL	Y
			TUL-M# 3	56.246°	118.905°	RIVER CHANNEL	STREAM SEDIMENT	TUL	Y
			TUL-M# 4	56.247°	118.938°	RIVER BED/CHANNEL	STREAM SEDIMENT	TUL	Y
			TUL-M# 4-0	56.358°	118.233°	NEW GRAVEL OUTCROP	GRAVEL PIT GRAB	TUL	Y
			TUL-M# 4L	56.247°	118.938°	L. GRAVEL OUTCROP	COBBLEY IRON SAND	TUL	Y
			TUL-M# 4L-1	56.247°	118.938°	L. GRAVEL OUTCROP	BROWN IRON SAND	TUL	Y
			TUL-M# 4L-U	56.247°	118.938°	U. GRAVEL OUTCROP	FLUVIAL CLEAN SAND	TUL	Y
			TUL-M# 5	56.237°	118.917°	HILLSIDE COLLAPSE	STREAM SEDIMENT	TUL	Y
			TUL-M# 6	56.237°	118.898°	HILLSIDE COLLAPSE	STREAM SEDIMENT	TUL	Y
			TUL-M# 7	56.248°	118.893°	STREAM SEDIMENTS	SLUICED RIVER	TUL	Y
			TUL-M# 31	56.247°	118.950°	FAULT/RIVER BAR	BARS	TUL	Y
			TUL-M# 32	56.254°	118.950°	FAULT/RIVER BAR	BARS	TUL	Y
			TUL-M# 41	56.268°	118.967°	FAULT/ISLANDS	SANDBANK	TUL	Y
			M-TR1	56.250°	118.883°	ANIMAL LICK	TRENCH	TUL	Y
			M-TR2 - 1 & 2	56.248°	118.888°	TRENCH 2 - BUCKET 1 & 2	TRENCHED	TUL	Y

Block	Permit Name	Permit #	Sample #	Latitude North	Longitude West	Feature/Location	Sample Type	Sampler	Lab (Y/N)
6	PEACE RIVER 1	9393080039	M-TR3	56.256°	118.889°	TRENCH 3	TRENCHED	TUL	Y
			M-RIVER BED TR II	56.256°	118.889°	BLACK ROCK	TRENCHED	Sandiago	Y
			Mag Meadow-Pit-1	56.248°	118.889°	MAGNETIC MEADOW SEDIMENTS	TRENCH/PIT	TUL	Y
			DC 1&2	56.256°	118.889°	MONTAGNEUSE TRENCH 3	CONCENTATE	Sandiago	Y
			DF 1&2	56.256°	118.889°	MONTAGNEUSE TRENCH 3	CONCENTATE	Sandiago	Y
	PEACE RIVER 2	9393080040	08-36 - WELL	56.230°	188.110°	8-36-83-6W6M	RAT-HOLE SOIL	TUL	Y
8	JACK CREEK	9393080612	SL-1	56.475°	118.518°	IRONY SOIL	HAND TRENCHED	TUL	N
			SL-2	56.487°	118.511°	IRONY SOIL	HAND TRENCHED	TUL	N
			SL-2A	56.487°	118.103°	IRONY SOIL	HAND TRENCHED	TUL	Y
			SL-3	56.490°	118.501°	IRONY SOIL	HAND TRENCHED	TUL	N
			SL-3A	56.490°	118.501°	IRONY SOIL	HAND TRENCHED	TUL	Y
			SL-3B	56.490°	118.501°	IRONY SOIL	HAND TRENCHED	TUL	Y
			SL-3C	56.490°	118.501°	IRONY SOIL	HAND TRENCHED	TUL	Y
			SL-4	56.501°	118.483°	IRONY SOIL	HAND TRENCHED	TUL	N
			SL-4A	56.502°	118.482°	IRONY SOIL	HAND TRENCHED	TUL	Y
			SL-4B	56.502°	118.482°	IRONY SOIL	HAND TRENCHED	TUL	Y
			SL-4C	56.502°	118.482°	IRONY SOIL	HAND TRENCHED	TUL	Y
9	SWIFT CREEK	9393080680	RL-2	56.848°	118.683°	RAMBLING CREEK	STREAM SEDIMENT	TUL	N

DIAMOND INDICATORS

TABLE - 9

GRAINS PICKING

TUL PETROLEUMS LTD.						SAMPLE GRAINS PICKED FOR MICROPROBE					Form :Microprobe Form1
Micropobe File: Montagenuse98/5/#1 Grains						Montagneuse: Magnetic Meadow Pit-1, #7 and Rock RET-91					Print: May 27/98
Grain	**Plug**	**Location**				**GARNET GROUP**					Picker:TUL=M.J. Stapleton
#	**133**	**R#**	**C#**	**Sample**	**Colour**	**Mineral**	**Shape**	**Fraction**	**Type**	**Process**	**Comments**
0	133	0	0		**Blank**						
					Pit 1 was not concentrated in the field. Consisted of one Garbage bucket of seds. Some from green layer.						
10	133	2	A	Pit-1	Light Purple	Garnet	sub-angular	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
11	133	2	B	Pit-1	Red	Garnet	angular	"+28	pit seds	Loring/Ray	Montagnuse Mag Meadow
12	133	2	C	Pit-1	Light Red	Garnet	angular	"+28	pit seds	Loring/Ray	Montagnuse Mag Meadow
13	133	2	D	Pit-1	Violet	Garnet	angular	"+28	pit seds	Loring/Ray	Montagnuse Mag Meadow
14	133	2	E	Pit-1	Red Red-Orange	Garnet	angular-mot	0.5PM	pit seds	Loring-Ray	Montagnuse Mag Meadow
15	133	2	F	Pit-1	Dark Champagne	Garnet	sub-rounded/fr	0.5PM	pit seds	Loring-Ray	Montagnuse Mag Meadow
16	133	2	G	Pit-1	Red/black inclusion	Garnet	angular	0.5PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
17	133	2	H	Pit-1	Dark Champagne	Garnet	angular	0.5PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
18	133	2	I	Pit-1	Light Violet/incl.	Garnet	angular	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
19	133	2	J	DBB	Wine-red crystal	Gar/Zircon	angular	test	test	test	Dry Bones Bay kimberlite
20	133	3	A	Pit-1	Wine-red>mauve	Gar/Zircon	sub-rounded	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
21	133	3	B	Pit-1	Cloudy Purple	Garnet	angular	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
22	133	3	C	Pit-1	Cloudy Purple	Garnet	angular	0.7PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
23	133	3	D	Pit-1	Hot Pink	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
24	133	3	E	Pit-1	Red Hot Pink	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
25	133	3	F	Pit-1	Hot Pink	Garnet	angular	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
26	133	3	G	Pit-1	HotPink/orange incl	Garnet	angular	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
27	133	3	H	Pit-1	HotPink/orange incl	Garnet	ang & mottled	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
28	133	3	I	Pit-1	Red Champagne	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
29	133	3	J	Pit-1	Champagne	Garnet	tabular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
30	133	4	A	Pit-1	Champagne/mottled	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
31	133	4	B	Pit-1	Champagne/mottled	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
32	133	4	C	Pit-1	Clear Champagne	Garnet	angular/incl.	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
33	133	4	D	Pit-1	Clear Champagne	Garnet	Shard	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
34	133	4	E	Pit-1	Champagne	Garnet	crystal	0.5PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
35	133	4	F	Pit-1	Red-brown Clear	Garnet	rounded cryst.	0.7PM	pit seds(G5?)	Loring/Amy	Montagnuse Mag Meadow
36	133	4	G	Pit-1	Red-brown Clear	Garnet	angular	0.7PM	pit seds(G5?)	Loring/Amy	Montagnuse Mag Meadow
37	133	4	H	Pit-1	Red-brown Clear	Garnet	dead angular	0.7PM	pit seds(G5?)	Loring/Amy	Montagnuse Mag Meadow
38	133	4	I	Pit-1	Red-brown Clear	Garnet	crystal/frac.	0.6PM	pit seds(G5?)	Loring/Amy	Montagnuse Mag Meadow
39	133	4	J	Pit-1	Red-brown Clear	Garnet	split crystal	0.6PM	pit seds(G5?)	Loring/Amy	Montagnuse Mag Meadow
40	133	5	A	Pit-1	Champagne & red	Garnet	fractured	"+28"	pit seds	Loring/Ray	Montagnuse Mag Meadow
41	133	5	B	Pit-1	Cloudy Yellow Ecl	Garnet	fracturing	"+28"	pit seds	Loring/Ray	Montagnuse Mag Meadow
42	133	5	C	Pit-1	Yellow Eclogitic	Garnet	angular	0.7PM	pit seds	Loring/Amy	Montagnuse Mag Meadow
43	133	5	D	Pit-1	Yellow Eclogitic	Garnet	angular	0.7PM	pit seds	Loring/Amy	Montagnuse Mag Meadow

TABLE - 9

TUL GRAINS PICKING and MICROPROBE

44	133	5	E	Pit-1	Yellow Eclogitic	Garnet	angular	0.7PM	pit seds	Loring/Amy	Montagnuse Mag Meadow
45	133	5	F	Pit-1	Yellow Eclogitic	Garnet	rounded	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
46	133	5	G	Pit-1	Clear Yellow+ 1 incl	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
47	133	5	H	Pit-1	Dark Yellow	Garnet	angular	1.2PM	pit seds	Loring/Amy	Montagnuse Mag Meadow
48	133	5	I	Pit-1	Dark Yellow	Garnet	angular/incl.	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
49	133	5	J	Pit-1	Dark Yellow	Garnet	angular/incl.	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
50	133	6	A	Pit-1	Dark Yellow	Garnet	angular/incl.	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
51	133	6	B	Pit-1	Orange	Garnet	rounded	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
52	133	6	C	Pit-1	Dark Orange Eclo	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
53	133	6	D	Pit-1	Light Orange Eclo	Garnet	angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
54	133	6	E	Pit-1	Bright Em-green	Garnet	rounded	0.5PM	pit seds	Loriing/Am	Montagnuse Mag Meadow
55	133	6	F	Pit-1	Bright Em-green	Garnet	rounded	0.6PM	pit seds	Loriing/Am	Montagnuse Mag Meadow
56	133	6	G	Pit-1	Bright Em-green	Garnet	rounded	0.6PM	pit seds	Loriing/Am	Montagnuse Mag Meadow
57	133	6	H	Pit-1	Dark Em-green	Garnet	rounded	0.5PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
58	133	6	I	Pit-1	Lime-green	Garnet	rounded	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
59	133	6	J	Pit-1	Emerald Green	small garnet	sub-angular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
60	133	7	A	Pit-1	White	Kaynite	tabular	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
61	133	7	B	Pit-1	Mauve Zircon	Zircon	rounded	1.2PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
nil	ICP	7	C	Pit-1	Silver	Metal	rounded	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
nil	ICP	7	D	Pit-1	Yellow silver	Metal	sphere	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
nil	ICP	7	E	Pit-1	Dull-silver	Metal	rod	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
62	133	7	F	Pit-1	Black with wh. rind	Ilmenite	rounded/frac.	"+28	pit seds	Loring/Ray	Montagnuse Mag Meadow
63	133	7	G	Pit-1	Black with luster	Ilmenite	concoidal frac	0.6PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
64	133	7	H	Pit-1	Black	Ilmenite	sub-rounded	2.0NM	pit seds	Loring/Amy	Montagnuse Mag Meadow
65	133	7	I	Pit-1	Lustrous Black	Ilmenite	concoidal frac	0.5PM	pit seds	Loring/Amy	Montagnuse Mag Meadow
66	133	7	J	Pit-1	Black with luster	Ilmenite	concoidal frac	0.6PM	pit seds	Loring/Amy	Montagnuse Mag Meadow
67	133	8	A	Pit-1	Lustrous Black	Ilmenite	with white rind	0.5PM	pit seds	Loring/TUL	Montagnuse Mag Meadow
68	133	8	B	TUL-7	Hot Pink/il.incl.	Garnet(G9)	angular	"+28	sluced seds	Loring/TUL	Montagnuse R. near Mead
69	133	8	C	TUL-7	Beerbottle Dk Or Ec	Garnet Crys	rounded/frac.	"+28	sluced seds	Loring/TUL	Montagnuse R. near Mead
7	133	1	H	RET-91	Clear Champagne	Garnet	angular	0.6PM	crushed rock	Loring/TUL	Esau Pit-Alces
8	133	1	I	RET-91	Yellow Eclogitic	Garnet	angular	1.2PM	crushed rock	Loring/TUL	Esau Pit-Alces
9	133	1	J	RET-91	Hot Pink	Garnet/G9	angular	0.6PM	crushed rock	Loring/TUL	Esau Pit-Alces

TABLE - 9

TUL GRAINS PICKING and MICROPROBE

Grain #	Plug	Location R#	C#	Sample	Colour	Mineral	Shape	Fraction	Type	Process	Comments
						PYROXENE GROUP					Print: May 27/98
											Picker:TUL=M.J. Stapleton
70	133	8	D	Pit-1	Olive Oil Green	Olivine?	rounded	2.0Mag	sediments	Loring/TUL	Montagnuse Mag Meadow
71	133	8	E	Pit-1	Olive Oil Green	Olivine?	rounded	2.0Mag	sediments	Loring/TUL	Montagnuse Mag Meadow
72	133	8	F	Pit-1	Dull Yellow-brown	Olivine/Serp	rounded	0.5PM	sediments	Loring/TUL	Montagnuse Mag Meadow
73	133	8	G	Pit-1	Dull Yellow-brown	Olivine/Serp	rounded	1.2PM	sediments	Loring/TUL	Montagnuse Mag Meadow
74	133	8	H	Pit-1	Lemon-yellow	Olivine?	rounded	2.9X3.3	sediments	Loring/TUL	Montagnuse Mag Meadow
75	133	8	I	Pit-1	Lemon-yellow	Olivine?	rounded	2.9X3.3	sediments	Loring/TUL	Montagnuse Mag Meadow
76	133	8	J	Pit-1	Jade-green	Jadeite	rounded	2.9X3.3	sediments	Loring/TUL	Montagnuse Mag Meadow
77	133	9	A	Pit-1	Lime-green	Chrome-D	sub-rounded	1.2PM	sediments	Loring/TUL	Montagnuse Mag Meadow
78	133	9	B	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	Loring/TUL	Montagnuse Mag Meadow
79	133	9	C	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	Loring/TUL	Montagnuse Mag Meadow
80	133	9	D	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	Loring/TUL	Montagnuse Mag Meadow
81	133	9	E	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	Loring/TUL	Montagnuse Mag Meadow
82	133	9	F	Pit-1	Lime-green	Chrome-D	**tabular**	2.0NM	sediments	Loring/TUL	Montagnuse Mag Meadow
83	133	9	G	Pit-1	Lime-green	Chrome-D	angular	2.0NM	sediments	Loring/Amy	Montagnuse Mag Meadow
84	133	9	H	Pit-1	Lime-green	Chrome-D	sub-rounded	2.0NM	sediments	Loring/Amy	Montagnuse Mag Meadow
85	133	9	I	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	Loring/Amy	Montagnuse Mag Meadow
86	133	9	J	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	Loring/Amy	Montagnuse Mag Meadow
87	133	10	A	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	Loring/Amy	Montagnuse Mag Meadow
88	133	10	B	RET-91	Lime-green	Chrome-D	rounded	2.0Mag	Crushed rock	Loring/TUL	Esau Pit-Alces

TABLE - 9

DIAMOND INDICATORS

DATA

MICROPROBE

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

File No. 40251-D
Client: TUL PETROLEUM

July 06, 1998

Microprobe Data

Weight Percent

Grain #	Sample	Plug	Loc.	Comments	SiO2 %	TiO2 %	Al2O3 %	Cr2O3 %	FeO %	MnO %	MgO %	CaO %	Na2O %	K2O %	Total %
8	RET-91	133	1I	garnet	38.72	0.11	21.59	0.04	27.89	0.37	10.10	1.22	0.00	0.02	100.05
9	RET-91	133	1J	garnet	42.01	0.06	21.14	3.49	7.66	0.49	19.59	5.25	0.01	0.02	99.71
10	Pit-1	133	2A	garnet	37.97	0.00	21.09	0.01	28.32	0.40	9.52	1.13	0.00	0.01	98.45
11	Pit-1	133	2B	garnet	36.53	0.00	19.26	0.00	33.79	0.40	0.94	7.80	0.03	0.00	98.73
12	Pit-1	133	2C	garnet	37.33	0.08	20.09	0.00	28.89	2.14	3.46	7.27	0.01	0.02	99.28
13	Pit-1	133	2D	garnet	37.37	0.00	20.90	0.00	35.35	0.54	4.49	1.10	0.00	0.00	99.75
14	Pit-1	133	2E	garnet	36.45	0.05	19.58	0.00	33.94	0.34	1.10	7.45	0.00	0.00	98.90
15	Pit-1	133	2F	garnet	37.50	0.02	20.92	0.00	32.91	1.67	5.69	0.83	0.00	0.02	99.56
16	Pit-1	133	2G	garnet	36.55	0.02	20.61	0.00	33.95	4.30	2.90	0.84	0.01	0.01	99.18
17	Pit-1	133	2H	garnet	37.61	0.00	20.75	0.05	32.76	0.67	5.61	1.87	0.01	0.03	99.36
18	Pit-1	133	2I	garnet	37.57	0.04	21.44	0.06	31.21	0.58	7.46	0.75	0.00	0.00	99.11
19	DBB	133	2J	garnet	42.53	0.65	19.09	4.65	7.72	0.29	20.49	5.12	0.04	0.00	100.58
20	Pit-1	133	3A	staurolite	27.31	0.72	50.43	0.03	13.34	0.03	2.09	0.00	0.02	0.00	93.97
21	Pit-1	133	3B	zircon; EDS indic Zr	32.63	0.00	0.00	0.00	0.06	0.01	0.02	0.03	0.02	0.00	32.76
22	Pit-1	133	3C	garnet	37.88	0.03	21.32	0.07	29.74	0.61	8.73	1.08	0.01	0.02	99.50
23	Pit-1	133	3D	garnet	37.97	0.00	21.20	0.00	31.32	0.78	7.40	1.03	0.00	0.00	99.70
24	Pit-1	133	3E	garnet	36.41	0.00	20.52	0.02	30.53	7.65	1.59	2.29	0.01	0.01	99.03
25	Pit-1	133	3F	garnet	36.63	0.06	20.11	0.02	37.19	0.22	1.09	4.09	0.01	0.00	99.41
26	Pit-1	133	3G	garnet	36.94	0.02	20.54	0.00	35.64	1.20	3.32	0.96	0.03	0.01	98.64

Loring Laboratories Ltd.

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

File No. 40251-D
Client: TUL PETROLEUM

July 06, 1998

Microprobe Data

Weight Percent

Grain #	Sample	Plug	Loc.	Comments	SiO2 %	TiO2 %	Al2O3 %	Cr2O3 %	FeO %	MnO %	MgO %	CaO %	Na2O %	K2O %	Total %
27	Pit-1	133	3H	garnet	42.36	0.28	21.74	2.15	9.16	0.39	19.68	4.44	0.02	0.01	100.23
28	Pit-1	133	3I	garnet	36.73	0.00	20.51	0.02	36.69	0.31	2.40	3.57	0.00	0.00	100.23
29	Pit-1	133	3J	garnet	36.95	0.12	20.18	0.00	31.57	1.35	1.95	6.71	0.00	0.01	98.85
30	Pit-1	133	4A	garnet	38.20	0.11	21.26	0.00	27.30	0.35	9.61	2.21	0.00	0.00	99.04
31	Pit-1	133	4B	garnet	38.03	0.00	21.26	0.04	29.31	0.38	9.16	1.00	0.00	0.02	99.20
32	Pit-1	133	4C	garnet	37.72	0.00	21.23	0.01	32.01	0.43	6.99	1.05	0.00	0.00	99.44
33	Pit-1	133	4D	garnet	37.29	0.01	21.19	0.02	33.72	0.90	5.77	0.84	0.03	0.00	99.79
34	Pit-1	133	4E	staurolite	27.27	0.68	51.38	0.00	13.82	0.10	2.06	0.00	0.01	0.00	95.32
35	Pit-1	133	4F	garnet	36.90	0.13	20.27	0.00	35.52	0.22	1.88	4.42	0.00	0.00	99.34
36	Pit-1	133	4G	garnet	39.17	0.10	21.82	0.11	25.12	0.29	11.99	1.11	0.05	0.00	99.76
37	Pit-1	133	4H	garnet	36.25	0.06	20.28	0.00	38.01	0.19	0.80	3.58	0.01	0.02	99.18
38	Pit-1	133	4I	staurolite	27.27	0.73	51.71	0.05	13.29	0.20	1.74	0.00	0.00	0.00	94.99
39	Pit-1	133	4J	garnet	37.20	0.06	19.95	0.06	30.48	2.25	1.26	7.82	0.00	0.00	99.08
40	Pit-1	133	5A	staurolite	26.86	0.49	50.22	0.00	14.34	0.13	1.76	0.00	0.00	0.01	93.80
41	Pit-1	133	5B	garnet	37.21	0.04	21.29	0.08	31.96	0.87	6.87	0.83	0.03	0.00	99.19
42	Pit-1	133	5C	garnet	37.78	0.03	20.78	0.08	28.99	0.42	6.39	4.95	0.03	0.00	99.45
43	Pit-1	133	5D	monazite; EDS indic P, Ce, La	0.22	0.00	0.00	0.00	0.01	0.00	0.00	1.52	0.00	0.00	1.75
44	Pit-1	133	5E	garnet	37.96	0.07	21.31	0.03	30.81	0.73	7.10	1.93	0.00	0.01	99.94
45	Pit-1	133	5F	staurolite	27.24	0.62	51.32	0.00	13.81	0.03	1.83	0.00	0.00	0.00	94.84
46	Pit-1	133	5G	staurolite	27.20	0.74	51.69	0.07	13.24	0.28	1.62	0.00	0.00	0.00	94.84

Loring Laboratories Ltd.

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

File No. 40251-D
Client: TUL PETROLEUM

July 06, 1998

Microprobe Data

Weight Percent

Grain #	Sample	Plug	Loc.	Comments	SiO2 %	TiO2 %	Al2O3 %	Cr2O3 %	FeO %	MnO %	MgO %	CaO %	Na2O %	K2O %	Total %
47	Pit-1	133	5H	monazite; EDS indic P, Ce, La	1.42	0.00	0.00	0.00	0.03	0.00	0.00	0.36	0.00	0.00	1.81
48	Pit-1	133	5I	staurolite	27.39	0.64	52.42	0.00	12.74	0.17	1.72	0.01	0.00	0.03	95.11
49	Pit-1	133	5J	staurolite	27.26	0.71	51.52	0.01	12.76	0.28	1.64	0.00	0.00	0.03	94.21
50	Pit-1	133	6A	garnet	36.40	0.00	20.26	0.00	34.59	3.98	2.72	0.81	0.00	0.00	98.77
51	Pit-1	133	6B	monazite; EDS indic P, Ce, La	0.99	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00	0.00	2.24
52	Pit-1	133	6C	staurolite	26.82	0.79	50.50	0.03	11.94	0.23	1.58	0.01	0.00	0.00	91.89
53	Pit-1	133	6D	staurolite	26.95	0.42	51.50	0.00	13.70	0.02	1.67	0.00	0.00	0.01	94.26
54	Pit-1	133	6E	garnet	35.83	0.38	0.27	3.51	23.31	0.13	0.12	33.97	0.00	0.00	97.52
55	Pit-1	133	6F	garnet	35.61	0.34	0.21	3.57	23.47	0.10	0.12	34.42	0.00	0.00	97.85
56	Pit-1	133	6G	garnet	35.74	0.08	1.13	2.39	23.61	0.08	0.12	34.32	0.00	0.05	97.51
57	Pit-1	133	6H	garnet	33.72	0.25	0.26	9.16	18.82	0.02	0.22	32.03	0.00	0.01	94.49
61	Pit-1	133	7B	zircon; EDS indic Zr	32.49	0.07	0.00	0.00	0.05	0.00	0.02	0.00	0.02	0.00	32.65
68	TUL-7	133	8B	garnet	36.31	0.00	20.48	0.01	33.98	4.26	2.73	0.77	0.00	0.00	98.52
69	TUL-7	133	8C	staurolite	27.08	0.49	51.86	0.01	13.71	0.08	1.84	0.01	0.01	0.00	95.08
58	Pit-1	133	6I	pyroxene	52.26	0.33	6.69	0.91	2.54	0.09	15.17	20.54	1.85	0.01	100.38
59	Pit-1	133	6J	pyroxene	52.68	0.20	5.30	1.31	2.59	0.05	15.69	20.25	1.75	0.00	99.82
60	Pit-1	133	7A	staurolite	36.74	0.03	59.61	0.00	0.11	0.07	0.02	0.01	0.00	0.01	96.61
70	Pit-1	133	8D	pyroxene	52.63	0.32	1.49	0.03	4.58	0.05	16.07	23.83	0.38	0.01	99.40
71	Pit-1	133	8E	pyroxene	51.86	0.21	2.85	0.95	4.74	0.18	17.10	22.12	0.14	0.03	100.19
72	Pit-1	133	8F	unknown; EDS indic P	0.02	0.00	0.00	0.00	48.29	0.28	1.26	4.94	0.10	0.00	54.88

Loring Laboratories Ltd.

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

File No. 40251-D
Client: TUL PETROLEUM

July 06, 1998

Microprobe Data

Weight Percent

Grain #	Sample	Plug	Loc.	Comments	SiO2 %	TiO2 %	Al2O3 %	Cr2O3 %	FeO %	MnO %	MgO %	CaO %	Na2O %	K2O %	Total %
73	Pit-1	133	8G	epidote	39.22	0.09	28.83	0.00	3.61	0.26	0.01	24.08	0.19	0.00	96.28
74	Pit-1	133	8H	quartz	95.43	0.00	0.34	0.00	0.19	0.00	0.00	0.00	0.05	0.15	96.16
75	Pit-1	133	8I	epidote	37.75	0.05	26.73	0.00	2.60	0.27	1.05	23.62	0.04	0.00	92.10
76	Pit-1	133	8J	epidote	37.58	0.00	25.88	0.03	2.18	0.17	2.54	23.46	0.06	0.01	91.89
77	Pit-1	133	9A	pyroxene	51.40	0.83	6.65	1.19	3.07	0.09	15.53	16.75	1.86	0.01	99.37
78	Pit-1	133	9B	pyroxene	52.33	0.50	6.52	0.81	2.91	0.13	15.53	20.06	1.66	0.01	100.46
79	Pit-1	133	9C	pyroxene	52.50	0.04	4.29	1.14	2.31	0.07	16.70	22.06	0.67	0.00	99.78
80	Pit-1	133	9D	pyroxene	51.83	0.62	6.82	1.22	2.70	0.08	15.35	19.86	1.87	0.00	100.36
81	Pit-1	133	9E	pyroxene	52.30	0.37	6.72	1.04	2.51	0.11	15.12	19.82	1.66	0.00	99.65
82	Pit-1	133	9F	pyroxene	52.72	0.35	5.07	1.27	2.47	0.10	16.46	20.28	1.32	0.03	100.08
83	Pit-1	133	9G	pyroxene	52.04	0.34	6.84	0.89	3.01	0.03	15.91	20.01	1.64	0.01	100.72
84	Pit-1	133	9H	pyroxene	53.01	0.37	2.31	1.07	2.48	0.09	16.95	24.14	0.30	0.00	100.72
85	Pit-1	133	9I	pyroxene	51.95	0.33	6.58	0.83	2.66	0.06	15.37	20.25	1.71	0.00	99.72
86	Pit-1	133	9J	pyroxene	53.16	0.30	6.41	1.22	2.24	0.05	16.02	19.55	1.64	0.00	100.58
87	Pit-1	133	10A	pyroxene	52.21	0.51	4.66	1.06	2.40	0.08	16.07	22.69	0.80	0.00	100.47
88	Pit-1	133	10B	pyroxene	52.35	0.07	4.69	1.01	2.21	0.12	15.93	22.28	0.86	0.00	99.50
62	Pit-1	133	7F	ilmenite	0.00	40.11	0.10	2.66	47.95	0.24	5.42	0.00			96.48
63	Pit-1	133	7G	spinel	0.11	0.22	63.36	0.00	16.03	0.09	20.81	0.00			100.62
64	Pit-1	133	7H	tourmaline?	35.03	1.17	31.82	0.00	10.75	0.00	4.41	0.79			83.97

Loring Laboratories Ltd.

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

File No. 40251-D
Client: TUL PETROLEUM

July 06, 1998

Microprobe Data

Weight Percent

Grain #	Sample	Plug	Loc.	Comments	SiO2	TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	CaO	Na2O	K2O	Total
					%	%	%	%	%	%	%	%	%	%	%
65	Pit-1	133	7I	ilmenite	0.02	49.61	0.03	0.02	48.88	0.32	0.31	0.00			99.19
66	Pit-1	133	7J	spinel	0.12	0.21	62.43	0.07	17.26	0.14	19.82	0.02			100.06
67	Pit-1	133	8A	ilmenite	0.03	52.85	0.00	0.00	44.02	2.30	0.22	0.00			99.42

DIAMOND INDICATORS

TABLE - 10

MICROPROBE RESULTS

TUL GRAINS PICKING and MICROPROBE

TUL PETROLEUMS LTD.						SAMPLE GRAINS PICKED FOR MICROPROBE					Form :Microprobe Form1
Micropobe File: Montagenuse98/5/#1 Grains						Montagneuse: Magnetic Meadow Pit-1, #7 and Rock RET-91					Print: July/98
Grain	**Plug**	**Location**				**GARNET GROUP**					Picker:TUL=M.J. Stapleton
#	**133**	**R#**	**C#**	**Sample**	**Colour**	**Mineral**	**Shape**	**Fraction**	**Type**	**Probed**	**Comments**
0	133	0	0		**Blank**			DIF=Diamond Inclusion Field			DIM=Diamond Indicator Mineral
					Pit 1 was not concentrated in the field. Consisted of one Garbage bucket of seds. Some from green layer.						
10	133	2	A	Pit-1	Light Purple	Garnet	sub-angular	2.0NM	pit seds	G-5	garnet
11	133	2	B	Pit-1	Red	Garnet	angular	"+28	pit seds	G-5	garnet
12	133	2	C	Pit-1	Light Red	Garnet	angular	"+28	pit seds	G-5	garnet- Eclogitic DIF
13	133	2	D	Pit-1	Violet	Garnet	angular	"+28	pit seds	G-5	garnet
14	133	2	E	Pit-1	Red Red-Orange	Garnet	angular-mot	0.5PM	pit seds	G-5	garnet
15	133	2	F	Pit-1	Dark Champagne	Garnet	sub-rounded/fr	0.5PM	pit seds	G-5	garnet
16	133	2	G	Pit-1	Red/black inclusion	Garnet	angular	0.5PM	pit seds	G-5	garnet
17	133	2	H	Pit-1	Dark Champagne	Garnet	angular	0.5PM	pit seds	G-5	garnet
18	133	2	I	Pit-1	Light Violet/incl.	Garnet	angular	0.6PM	pit seds	G-5	garnet
19	133	2	J	DBB	Wine-red crystal	Gar/Zircon	angular	test	test	G-11	Dry Bones Bay kimberlite
20	133	3	A	Pit-1	Wine-red>mauve	Gar/Zircon	sub-rounded	2.0NM	pit seds	stauralite	
21	133	3	B	Pit-1	Cloudy Purple	Garnet	angular	0.6PM	pit seds	zircon	
22	133	3	C	Pit-1	Cloudy Purple	Garnet	angular	0.7PM	pit seds	G-5	garnet
23	133	3	D	Pit-1	Hot Pink	Garnet	angular	1.2PM	pit seds	G-5	garnet
24	133	3	E	Pit-1	Red Hot Pink	Garnet	angular	1.2PM	pit seds	G-5	garnet
25	133	3	F	Pit-1	Hot Pink	Garnet	angular	0.6PM	pit seds	G-5	garnet- Eclogitic DIF
26	133	3	G	Pit-1	HotPink/orange incl	Garnet	angular	0.6PM	pit seds	G-5	garnet
27	133	3	H	Pit-1	HotPink/orange incl	Garnet	ang & mottled	0.6PM	pit seds	G-9	garnet- Eclogitic DIF
28	133	3	I	Pit-1	Red Champagne	Garnet	angular	1.2PM	pit seds	G-5	garnet
29	133	3	J	Pit-1	Champagne	Garnet	tabular	1.2PM	pit seds	G-5	garnet
30	133	4	A	Pit-1	Champagne/mottled	Garnet	angular	1.2PM	pit seds	G-5	garnet
31	133	4	B	Pit-1	Champagne/mottled	Garnet	angular	1.2PM	pit seds	G-5	garnet
32	133	4	C	Pit-1	Clear Champagne	Garnet	angular/incl.	0.6PM	pit seds	G-5	garnet
33	133	4	D	Pit-1	Clear Champagne	Garnet	shard	0.6PM	pit seds	G-5	garnet
34	133	4	E	Pit-1	Champagne	Garnet	crystal	0.5PM	pit seds	G-3	staurolite
35	133	4	F	Pit-1	Red-brown Clear	Garnet	rounded cryst.	0.7PM	pit seds(G5?)	G-5	garnet- Eclogitic DIF
36	133	4	G	Pit-1	Red-brown Clear	Garnet	angular	0.7PM	pit seds(G5?)	G-5	garnet-close to E DIF
37	133	4	H	Pit-1	Red-brown Clear	Garnet	dead angular	0.7PM	pit seds(G5?)	G-5	garnet
38	133	4	I	Pit-1	Red-brown Clear	Garnet	crystal/frac.	0.6PM	pit seds(G5?)	G-3	staurolite
39	133	4	J	Pit-1	Red-brown Clear	Garnet	split crystal	0.6PM	pit seds(G5?)	G-5	garnet
40	133	5	A	Pit-1	Champagne & red	Garnet	fractured	"+28"	pit seds	G-3	staurolite
41	133	5	B	Pit-1	Cloudy Yellow Ecl	Garnet	fracturing	"+28"	pit seds	G-5	garnet
42	133	5	C	Pit-1	Yellow Eclogitic	Garnet	angular	0.7PM	pit seds	G-5	garnet
43	133	5	D	Pit-1	Yellow Eclogitic	Garnet	angular	0.7PM	pit seds	G-4	monazite; P, Ce, La

44	133	5	E	Pit-1	Yellow Eclogitic	Garnet	angular	0.7PM	pit seds	G-5	garnet
45	133	5	F	Pit-1	Yellow Eclogitic	Garnet	rounded	1.2PM	pit seds	G-3	staurolite
46	133	5	G	Pit-1	Clear Yellow+ 1 incl	Garnet	angular	1.2PM	pit seds	G-3	staurolite
47	133	5	H	Pit-1	Dark Yellow	Garnet	angular	1.2PM	pit seds	G-4	monazite; P, Ce, La
48	133	5	I	Pit-1	Dark Yellow	Garnet	angular/incl.	1.2PM	pit seds	G-3	staurolite
49	133	5	J	Pit-1	Dark Yellow	Garnet	angular/incl.	1.2PM	pit seds	G-3	staurolite
50	133	6	A	Pit-1	Dark Yellow	Garnet	angular/incl.	1.2PM	pit seds	G-5	garnet
51	133	6	B	Pit-1	Orange	Garnet	rounded	0.6PM	pit seds	G-4	monazite; P, Ce, La
52	133	6	C	Pit-1	Dark Orange Eclo	Garnet	angular	1.2PM	pit seds	G-3	staurolite
53	133	6	D	Pit-1	Light Orange Eclo	Garnet	angular	1.2PM	pit seds	G-3	staurolite
54	133	6	E	Pit-1	Bright Em-green	Garnet	rounded	0.5PM	pit seds	G-9	garnet
55	133	6	F	Pit-1	Bright Em-green	Garnet	rounded	0.6PM	pit seds	G-9	garnet
56	133	6	G	Pit-1	Bright Em-green	Garnet	rounded	0.6PM	pit seds	G-3	garnet
57	133	6	H	Pit-1	Dark Em-green	Garnet	rounded	0.5PM	pit seds	G-7	garnet
58	133	6	I	Pit-1	Lime-green	Garnet	rounded	1.2PM	pit seds	CP-2	Diopsite - DIM
59	133	6	J	Pit-1	Emerald Green	small garnet	sub-angular	1.2PM	pit seds	CP-5	Chrome Diopside-good DIM
											and in Eclogitic Low Cr DIF
60	133	7	A	Pit-1	White	Kaynite	tabular	1.2PM	pit seds	stauralite	staurolite
61	133	7	B	Pit-1	Mauve Zircon	Zircon	rounded	1.2PM	pit seds	G-4	Zircon?
nil	ICP	7	C	Pit-1	Silver	Metal	rounded	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
nil	ICP	7	D	Pit-1	Yellow silver	Metal	sphere	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
nil	ICP	7	E	Pit-1	Dull-silver	Metal	rod	2.0NM	pit seds	Loring/TUL	Montagnuse Mag Meadow
62	133	7	F	Pit-1	Black with wh. rind	Ilmenite	rounded/frac.	"+28	pit seds	Loring/Ray	ilmenite with rind/good il.
63	133	7	G	Pit-1	Black with luster	Ilmenite	concoidal frac	0.6PM	pit seds	Loring/TUL	spinel
64	133	7	H	Pit-1	Black	Ilmenite	sub-rounded	2.0NM	pit seds	Loring/Amy	tourmaline?
65	133	7	I	Pit-1	Lustrous Black	Ilmenite	concoidal frac	0.5PM	pit seds	Loring/Amy	ilmenite
66	133	7	J	Pit-1	Black with luster	Ilmenite	concoidal frac	0.6PM	pit seds	Loring/Amy	spinel
67	133	8	A	Pit-1	Lustrous Black	Ilmenite	with white rind	0.5PM	pit seds	Loring/TUL	ilmenite
68	133	8	B	TUL-7	Hot Pink/il.incl.	Garnet(G9)	angular	"+28	sluced seds	G-5	garnet
69	133	8	C	TUL-7	Beerbottle Dk Or Ec	Garnet Crys	rounded/frac.	"+28	sluced seds	stauralite	staurolite
7	133	1	H	RET-91	Clear Champagne	Garnet	angular	0.6PM	crushed rock		Esau Pit-Alces
8	133	1	I	RET-91	Yellow Eclogitic	Garnet	angular	1.2PM	crushed rock	G-5	Esau Pit-Alces
9	133	1	J	RET-91	Hot Pink	Garnet/G9	angular	0.6PM	crushed rock	G-9	Esau Pit-Alces

TABLE - 10

TUL GRAINS PICKING and MICROPROBE

Grain		Location			Colour	Mineral	Shape	Fraction	Type	Process	Comments
#	Plug	R#	C#	Sample		PYROXENE GROUP			DIM=Fipkie,1989 Diamond Inclusion Field		
									DIF = Eclogitic Low Cr. Diamond Inclusion Field		
											Picker:TUL=M.J. Stapleton
											Print Analysis: July/98
70	133	8	D	Pit-1	Olive Oil Green	Olivine?	rounded	2.0Mag	sediments	CP-2	Hypabyssal Diopside E-DIF
71	133	8	E	Pit-1	Olive Oil Green	Olivine?	rounded	2.0Mag	sediments	CP-2	Diopside - DIM
72	133	8	F	Pit-1	Dull Yellow-brown	Olivine/Serp	rounded	0.5PM	sediments	unknown	Not Olivine
73	133	8	G	Pit-1	Dull Yellow-brown	Olivine/Serp	rounded	1.2PM	sediments		epidote-not olivine
74	133	8	H	Pit-1	Lemon-yellow	Olivine?	rounded	2.9X3.3	sediments		quartz-not olivine
75	133	8	I	Pit-1	Lemon-yellow	Olivine?	rounded	2.9X3.3	sediments		epidote-not olivine
76	133	8	J	Pit-1	Jade-green	Jadeite	rounded	2.9X3.3	sediments		epidote-not olivine
77	133	9	A	Pit-1	Lime-green	Chrome-D	sub-rounded	1.2PM	sediments	CP-3	Ti-Cr Diopside DIM
78	133	9	B	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	CP-3	Ti-Cr Diopside
79	133	9	C	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	CP-5	Chrome Diopside DIM
80	133	9	D	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	CP-3	Ti-Cr Diopside - DIM
81	133	9	E	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	CP-2	Diopside - DIM
82	133	9	F	Pit-1	Lime-green	Chrome-D	**tabular**	2.0NM	sediments	CP-2	Good Diopside - DIM
83	133	9	G	Pit-1	Lime-green	Chrome-D	angular	2.0NM	sediments	CP-2	Diopside - DIM
84	133	9	H	Pit-1	Lime-green	Chrome-D	sub-rounded	2.0NM	sediments	CP-5	Chrome Diopside - DIF
85	133	9	I	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	CP-2	Diopside
86	133	9	J	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	CP-2	Diopside - DIM
87	133	10	A	Pit-1	Lime-green	Chrome-D	rounded	2.0NM	sediments	CP-3	Ti-Cr Diopside - DIM
88	133	10	B	RET-91	Lime-green	Chrome-D	rounded	2.0Mag	Crushed rock	CP-5	Chrome Diopside - DIM

TABLE - 10

DIAMOND INDICATORS

TABLE - 11

SUMMARY TABLE

OF

DIAMOND INDICATOR MINERAL DATA

SUMMARY TABLE OF DIAMOND INDICATOR MINERAL DATA

14-30-83-7W6M (WELL)	56.230°	118.100°	HIGHLAND PARK 2	TUL	42' Rat-Hole,Soil					7	7				7	2 CPs,diamond inclusion field
8-36-83-8W6M (WELL)	56.230°	118.110°	PEACE RIVER 2	TUL	42' Rat-Hole,Soil					12	12				12	1 CP, diamond inclusion field
Many Is. Gravel Cap			**NTS 84D**													
MIGC# GR-BR SAND 2	56.385°	119.048°	CAP	**Santiago**	gravel					2	2				2	1 CP-2
MIGC# 16S-G1	56.385°	119.048°	CAP	**Santiago**	gravel				0, 0, 1		1				1	
MIGC# 16S-G2	56.385°	119.048°	CAP	**Santiago**	gravel										0	1 CP-2 (dif); 1 G8;
MIGC# 16S-G3	56.385°	119.048°	CAP	**Santiago**	gravel							1			1	1 CP-2 (dif); 1 G8;
MIGC# 16S-G4	56.385°	119.048°	CAP	**Santiago**	gravel					2	2				2	1 G8
Menno-Simmons Pit			**NTS 84D**													
TUL4-0	56.358°	119.233°	MANY ISLANDS	TUL	gravel pit								1		1	P3 Chromite
Many IslandsGF-1,GC1	56.298°	119.242°	MANY ISLANDS	TUL	Creek bank		0, 1, 0, 0	1		1	1	1	1		4	1OP1,1OP2,5CP2,2CP4
Many IslandsGF-2,GC2	56.300°	119.241°	MANY ISLANDS	TUL	Creek bottom		0, 1, 0, 0	1		5	5	3	1		10	5CP2,1CP7; 7DIMs
Montagenuse River			**NTS 84D**													/both diamond incl.field
M-RIVER BED TR II	56.249°	118.893°	PEACE RIVER 1	**Santiago**	trenched					2	2				2	2 CP-2;1G8; 1 Corundum
M-TR2 - buckets 1 & 2	56.248°	118.888°	PEACE RIVER 1	TUL	trenched		1, 7	8		1	1		2		11	9 Zr; 1 Spinel; 2 Hematite
Mag Meadow-Pit-1	56.248	118.889	PEACE RIVER1-Garb.Can	TUL	trench/pit		1, 3, 0, 0	4	10, 4, 0	33	47	4		1	56	3ec.DIF,16DIF/DIM CPX
M-TR3 - 2 buckets	56.256°	118.889°	PEACE RIVER 1	TUL	trenched	1,	_, 4	5	1,		1				6	did not pick pyroxenes
DF-1 (diamond fines)	56.256°	118.889°	PEACE RIVER 1	**Santiago**	trenched		_, 2	2	1,	2	3		2		7	did not pick pyroxenes
DC-1 (diamond course)	56.256°	118.889°	PEACE RIVER 1	**Santiago**	trenched				3,	1	4		1		5	1 CP-2, diamond incl.field
TUL-M# 14	56.254°	118.886°	PEACE RIVER 1	TUL	stream sediment		_, 1	1		6	6				7	1 Zircon
TUL-M# 1	56.247°	118.901°	PEACE RIVER 1	TUL	stream sediment					1	1				1	2 undefined
TUL-M# 2	56.249°	118.897°	PEACE RIVER 1	TUL	stream sediment		_, 1	1		3	3				4	1 CP-2 (dif); 1 Spinel
TUL-M# 2(AGS probed)	56.249°	118.897°	PEACE RIVER 1	TUL	stream sediment		_, 1	1								G-9 Chrome Pyrope
TUL-M# 3	56.246°	118.905°	PEACE RIVER 1	TUL	stream sediment				1,	2	3				3	1 CP-4
TUL-M# 4	56.247°	118.938°	PEACE RIVER 1	TUL	stream sediment				2,	5	7	1			8	2 CP-2 (difs); 1 Epidote
TUL-M#4L-1(AGSprobed)	56.247°	118.938°	PEACE RIVER 1	TUL	Tertiary Gravels				_, _, 1		1	2			3	4 Zircon; AGS Microprobe
TUL-M# 5	56.237°	118.917°	PEACE RIVER 1	TUL	meadow soil				1,	2	3				3	1 CP-4
TUL-M# 6	56.237°	118.898°	PEACE RIVER 1	TUL	meadow soil					2	2				2	
TUL-M# 7	56.248°	118.893°	PEACE RIVER 1	TUL	sluiced river					1					1	
Montagenuse/			**NTS 84D**													
Peace River																
TUL-PR# 31	56.247°	118.950°	PEACE RIVER 1	TUL	river bar							3			3	& 3 CP-2,diamond incl. field
TUL-PR# 32	56.254°	118.950°	PEACE RIVER 1	TUL	river bar							1			1	CP5,diamond inclusion field
TUL-PR# 41	56.268°	118.967°	PEACE RIVER 1	TUL	N. shore sand							1			1	CP5,diamond inclusion field
Pratt's Landing																
TUL-PR# 52	56.053°	118.932°	HIGHLAND PARK 1	TUL	west shore											1 CP-2
TUL-PR# 54	56.073°	118.917°	HIGHLAND PARK 1	TUL	east shore											
Lone Star																
TUL-L# 11	56.720°	118.135°	WHITEMUD RIVER 1	TUL	soil sample				1,	5	6				6	1 CP-4
TUL-L# 12	56.718°	118.133°	WHITEMUD RIVER 1	TUL	soil sample					6	6				6	2 CP-4
TUL-L# 13	56.720°	118.133°	WHITEMUD RIVER 1	TUL	clay/bentonite					3	3				3	1 CP-4
TUL-L# 14	56.720°	118.133°	WHITEMUD RIVER 1	TUL	clay					4	4				4	
TUL-L# 15	56.712°	118.112°	WHITEMUD RIVER 1	TUL	mid-channel sed.					3	3				3	
Clear Hills																
TUL# 22	56.618°	118.350°	WHITEMUD RIVER 3	TUL	creek channel					2	2				2	1 CP-2
TUL# 23	56.592°	118.255°	WHITEMUD RIVER 5	TUL	irony soil					1	1				1	1 Rutile
TUL# 25	56.590°	118.250°	WHITEMUD RIVER 5	TUL	quartz sand					1	1				1	
TUL# 26	56.587°	118.253°	WHITEMUD RIVER 5	TUL	quartz sand											3 CP-2; 1 CP-4

.....continued from page 42

7.2 DIAMOND INDICATORS

Primary kimberlitic suite, lamproite and lamprophyre suite minerals are shown on Table - 12 Page 76 and in Appendix III: Santiago Report - Appendix 5.0 Page 101.

Initial reconnaissance of the TUL properties was done for: garnet, eclogitic garnets, clino-pyroxenes; CP-2 diopside, CP-4 low chrome diopside, CP-5 chrome diopside; picroilmentite and chromite. The results of this exploration, sampling and microprobe is contained in APPENDIX III: Santiago Report APPENDIX 6.0 - "MICROPROBE RESULTS" - GEOLOGICAL REPORTs #1 and #2, starting at Santiago Appendix - page 104. The Many Islands DIMs Anomaly data is added as Report #11.

Initial reconnaissance was not encouraging because not enough material was probed. Further exploration, sampling and microprobe, was more encouraging as magnetic surveys were flown, site investigation was carried out more thoroughly, and more grains were microprobed. This microprobe data is contained in the appended Santiago Report - Geological Reports #3 to #10.

It was found that average grain size near the mouth of Montagneuse River was less than half of the grain size of garnets found on the Hale Structure in the Magnetic Meadow; Trench 2 and Pit -1. Angularity of grains similarly pointed to an up-stream source.

Later sediment sampling at Mag Meadow and microscopic investigation, included a greater variety of minerals; the Primary kimberlitic indicators and some Secondary indicator minerals; Section 7.28: Table-12, page - 76. More attention was paid to the character of sediment layering at Pit-1 than at the earlier Trenches 1 and 3, where mixed irony soils were encountered. Trench -3 and Santiago DF-1 and DF-2 were at about the same location, because the Santiago work was meant to replicate the earlier TUL trenching results for an independent appraisal. Other Primary kimberlitic suite minerals picked for, were; olivine, phlogopite and apatite. Magnetite was evident in all samples.

Later sampling, and re-investigation of all samples and grabs, included looking for olivine and Secondary Minerals; serpentine, various types of zircons, calcite, chlorite, limonite, hematite, pyrites, enstatite, rutile, spinel and fossil organics. The Santiago Report was of benefit because it showed that a high diamondiferous potential upper eclogitic horizon and lower high potential kimberlitic source was indicated by sampling and geochemistry analysis.

TUL recently did a broad investigation and microprobe of the green sand layer at the +2.5m level in Magnetic Meadow Pit-1. Grains were carefully picked and recorded, as to colour, inclusions and angularity. Some were photographed. Grains were picked as "base-types," so that they could be used later as a guide to estimate the total number of grains "of-type," that occurred in the sample. "Pit-1"contains a large number of violet angular grains with small black inclusions. Now these grains can be counted, with a reasonable estimate of the total number of indicators, of this type, that there are in "Pit-1." This grain-type is described on Table-10, page-55, grain #18. The investigation led to the encouraging microprobe results on Summary Table of Diamond Indicator Mineral Data - 11, page 58 -"Mag Meadow Pit-1." Geochemistry detail is on the following pages; Diamond Indicators: Sections: 7.21 to 7.28.

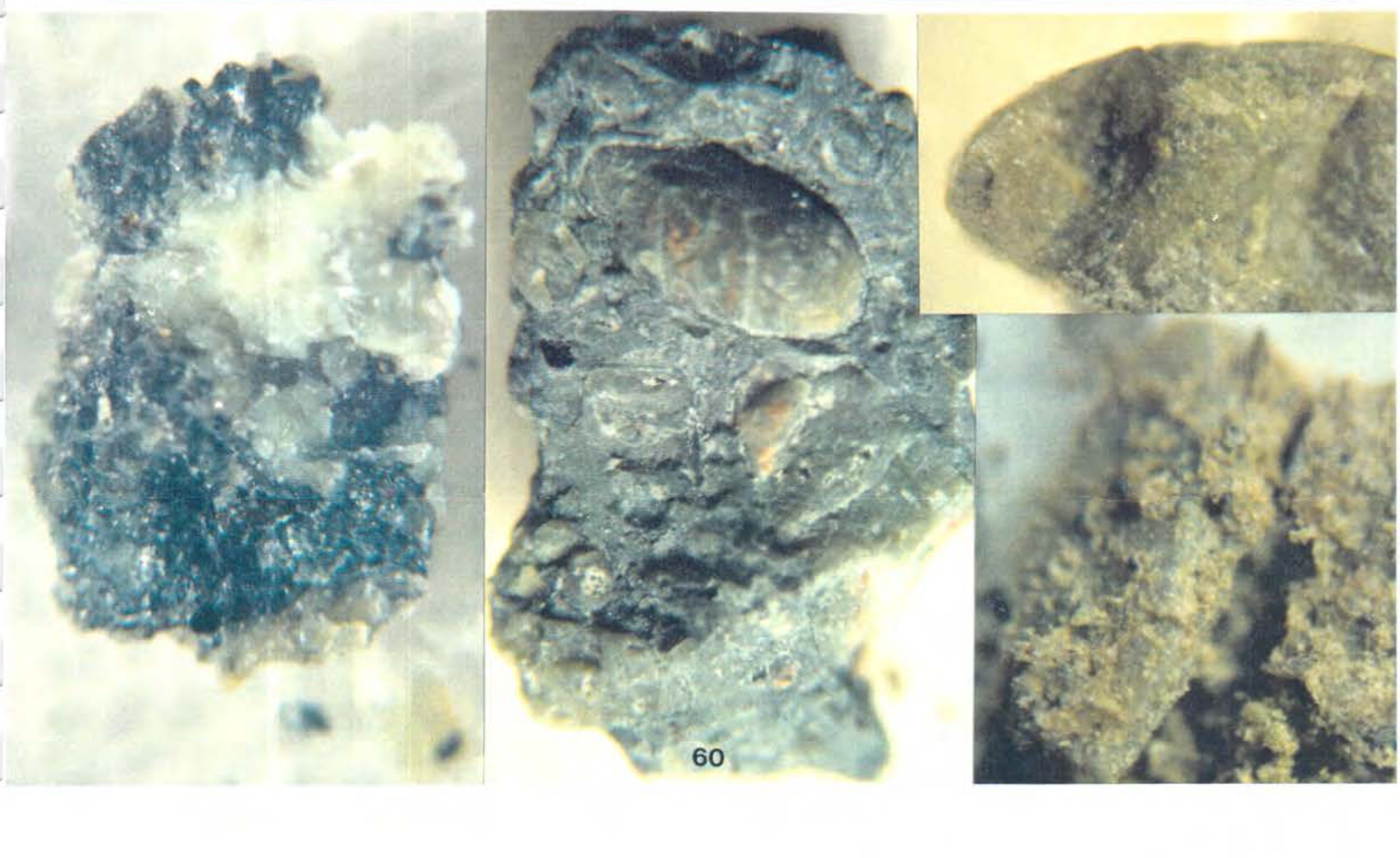
7.21 OLIVINE

OLIVINE GROUP	**Orthorhombic Silicate - Primary groundmass mineral of most kimberlites.**			
	(Mg,Fe) olivines	**forsterite Mg_2SiO_4 to**	**Fayalite Fe_2SiO_4**	**$CaMgSiO_4$ - monticellite**
SG		**3.222**	**4.392**	
Hardness	**6.5 - 7, often soft or creamy in kimberlite**			
Cleavage	**imperfect**			
Colour	**light green, green, lemon, pale yellow, like olive oil in a clear glass bottle held up to the light.**			
Special	**Gelatinizes in HCL. Distinguished from Diopside by poor cleavage. Often groundmass of kimberlite and lamproite. Susceptible to hydrothermal alteraton, weathering. Products of alteration; serpentine, iddingsite: smectite, chlorite and geothite/hematite. Iron zonation of grains in some volcanic and hypabyssal rocks.**			

The paucity of kimberlite associated minerals at Montagneuse, Many Islands, Alces and Beatton River - Lucky Jim Claim suggest that olivine exists as a part of these volcanics, but none survives the transport and weathering processes. Serpentinite would be the stable alteration product of olivine as are other minerals. Serpentine has been observed, but it is not uncommon. Other alteration products of olivine may be the clays observed at the DIMs geochemistry anomalies.

Igneous rocks are formed by successive melt and solidification. The reaction sequence from silicate melts to formation of Olivine Group minerals depends upon the reaction being discontinuous.The Discontinuous Reaction Sequence results in olivine, pyroxene, amphibole, biotite, quartz. The degree of polymerisation, starting with the orthosilicate, forming; rings, chains, sheets and networks; proceeds on the Reaction Sequence. The Continuous Reaction Sequence results in plagioclase (Ca-rich), plagioclase (Na-rich), alkali feldspar, quartz. Olivine and pyroxene solidify first on the discontinuous reaction sequence, so these are the silica-poor ultrabasic rocks with magnesium being predominant. (Cox, 1995)

Photos: Olivines in kimberlites: Buffalo Hills Lac De Gras M3K1 Drill Lucky Jim



7.22 GARNET

GARNET GROUP (,)Si_3O_{12}		**Pyrope**	**$Mg_3Al_2Si_3O_{12}$**
Hardness:	**6-7.5**	**Almandine**	**$Fe_2Al_2Si_3O_{12}$**
Colour:	**red,brown,black green, yellow,pink, white; colourless.**	**Spessartine**	**$Mn_3Al_2Si_3O_{12}$**
		Grossular	**$Ca_3Al_2Si_3O_{12}$**
		Andradite	**$Ca_3(Fe,Ti)_2Si_3O_{12}$**
		Uvarovite	**$Ca_3Cr_2Si_3O_{12}$**
SG	**3.4 - 4.6**	**Hyrogrossular**	**$Ca_3Al_2Si_2O_8(SiO_4)$ (OH)**
Cleavage	**none, subconcoidal.**		

TUL recovered a significant number of kimberlitic indicator garnets from Montagneuse and Many Islands. These were mainly recovered from irony gravels or from irony soils, on the Hale Structure (Trenches 1 & 3), and from natural deposits like the Magnetic Meadow. (Trench 2 & Pit - 1)

A combination of peridotic and eclogitic garnets were recovered along with DIMs pyroxenes. Two probed G7s are important because more than one was found, at two sampling locations on the Magnetic Meadow, and because these are rare and do not travel. G9 is also encouraging as a near diamond indicator. Some G9s were also (high pressure) eclogitic garnets, which is unusual.

The Microprobe Summary Table - 11, page 58, shows that over 50 G1 to G9 garnets were recovered in the Montagneuse Mag Meadow - Pit-1 on the Hale Structure, mainly from a "green sand" layer. This new data is shown on following pages. New Many Islands microprobe data is shown in the last section (11) of this report, because it was not completed when Santiago finished his geological report.

RET-91 is crushed lamprophyre rock from Alces River, Moose Creek Claims. Ignore Test Grain DBB#19.

Photo: Samples of garnet from Montagneuse; G9 grain #27: HotPink/orange incl./ angular mottled Pit-1 seds.

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

ile No. : 40251-D

Date: July 6, 1998

Client: TUL PETROLEUM

arnet Classification (after Dawson and Stephens, 1975)

		Location		Data in wt %						Garnets Classification											
rain #	Sample #	P#	C#	TiO2	Cr2O3	FeO	MgO	CaO	Na2O	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
8	RET-91	133	1I	0.11	0.04	27.89	10.10	1.22	0.00	..	..	..	..	5	..	..	..	..	..	..	..
9	RET-91	133	1J	0.06	3.49	7.66	19.59	5.25	0.01	..	..	..	..	..	..	..	..	9	..	..	..
10	Pit-1	133	2A	0.00	0.01	28.32	9.52	1.13	0.00	..	..	..	..	5	..	..	..	..	..	..	..
11	Pit-1	133	2B	0.00	0.00	33.79	0.94	7.80	0.03	..	..	..	..	5	..	..	..	..	..	..	..
12	Pit-1	133	2C	0.08	0.00	28.89	3.46	7.27	0.01	..	..	..	..	5	..	..	..	..	..	..	..
13	Pit-1	133	2D	0.00	0.00	35.35	4.49	1.10	0.00	..	..	..	..	5	..	..	..	..	..	..	..
14	Pit-1	133	2E	0.05	0.00	33.94	1.10	7.45	0.00	..	..	..	..	5	..	..	..	..	..	..	..
15	Pit-1	133	2F	0.02	0.00	32.91	5.69	0.83	0.00	..	..	..	..	5	..	..	..	..	..	..	..
16	Pit-1	133	2G	0.02	0.00	33.95	2.90	0.84	0.01	..	..	..	..	5	..	..	..	..	..	..	..
17	Pit-1	133	2H	0.00	0.05	32.76	5.61	1.87	0.01	..	..	..	..	5	..	..	..	..	..	..	..
18	Pit-1	133	2I	0.04	0.06	31.21	7.46	0.75	0.00	..	..	..	..	5	..	..	..	..	..	..	..
19	DBB	133	2J	0.65	4.65	7.72	20.49	5.12	0.04	..	..	..	..	..	..	..	..	..	..	11	..
22	Pit-1	133	3C	0.03	0.07	29.74	8.73	1.08	0.01	..	..	..	..	5	..	..	..	..	..	..	..
23	Pit-1	133	3D	0.00	0.00	31.32	7.40	1.03	0.00	..	..	..	..	5	..	..	..	..	..	..	..
24	Pit-1	133	3E	0.00	0.02	30.53	1.59	2.29	0.01	..	..	..	..	5	..	..	..	..	..	..	..
25	Pit-1	133	3F	0.06	0.02	37.19	1.09	4.09	0.01	..	..	..	..	5	..	..	..	..	..	..	..
26	Pit-1	133	3G	0.02	0.00	35.64	3.32	0.96	0.03	..	..	..	..	5	..	..	..	..	..	..	..
27	Pit-1	133	3H	0.28	2.15	9.16	19.68	4.44	0.02	..	..	..	..	..	..	..	..	9	..	..	..
28	Pit-1	133	3I	0.00	0.02	36.69	2.40	3.57	0.00	..	..	..	..	5	..	..	..	..	..	..	..
29	Pit-1	133	3J	0.12	0.00	31.57	1.95	6.71	0.00	..	..	..	..	5	..	..	..	..	..	..	..
30	Pit-1	133	4A	0.11	0.00	27.30	9.61	2.21	0.00	..	..	..	..	5	..	..	..	..	..	..	..
31	Pit-1	133	4B	0.00	0.04	29.31	9.16	1.00	0.00	..	..	..	..	5	..	..	..	..	..	..	..
32	Pit-1	133	4C	0.00	0.01	32.01	6.99	1.05	0.00	..	..	..	..	5	..	..	..	..	..	..	..
33	Pit-1	133	4D	0.01	0.02	33.72	5.77	0.84	0.03	..	..	..	..	5	..	..	..	..	..	..	..
34	Pit-1	133	4E	0.68	0.00	13.82	2.06	0.00	0.01	..	..	3	..	..	..	..	..	..	..	..	..
35	Pit-1	133	4F	0.13	0.00	35.52	1.88	4.42	0.00	..	..	..	..	5	..	..	..	..	..	..	..
36	Pit-1	133	4G	0.10	0.11	25.12	11.99	1.11	0.05	..	..	..	..	5	..	..	..	..	..	..	..
37	Pit-1	133	4H	0.06	0.00	38.01	0.80	3.58	0.01	..	..	..	..	5	..	..	..	..	..	..	..
38	Pit-1	133	4I	0.73	0.05	13.29	1.74	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
39	Pit-1	133	4J	0.06	0.06	30.48	1.26	7.82	0.00	..	..	..	..	5	..	..	..	..	..	..	..
40	Pit-1	133	5A	0.49	0.00	14.34	1.76	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
41	Pit-1	133	5B	0.04	0.08	31.96	6.87	0.83	0.03	..	..	..	..	5	..	..	..	..	..	..	..
42	Pit-1	133	5C	0.03	0.08	28.99	6.39	4.95	0.03	..	..	..	..	5	..	..	..	..	..	..	..
43	Pit-1	133	5D	0.00	0.00	0.01	0.00	1.52	0.00	..	..	..	4	..	..	..	..	..	..	..	..
44	Pit-1	133	5E	0.07	0.03	30.81	7.10	1.93	0.00	..	..	..	..	5	..	..	..	..	..	..	..

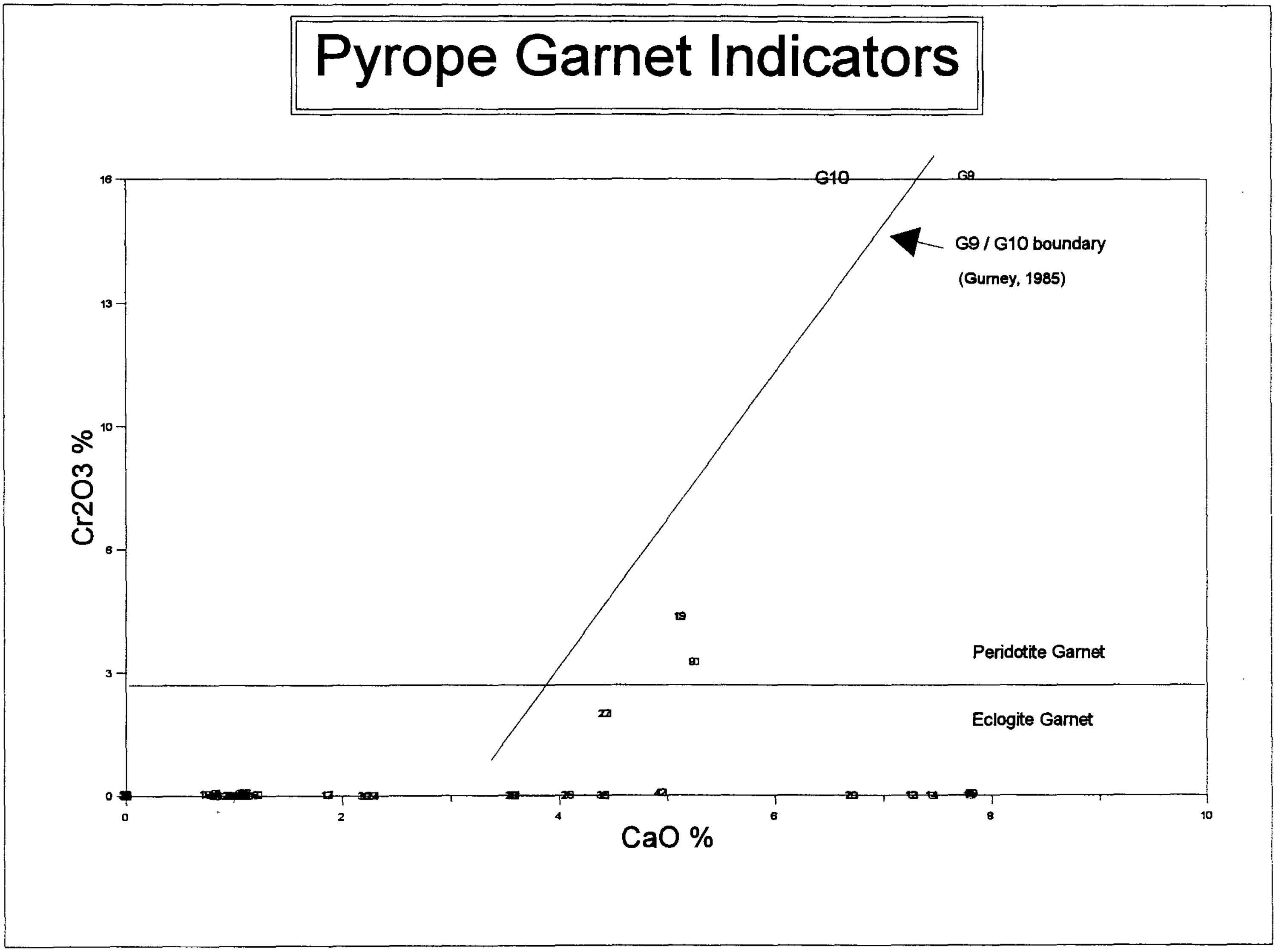
Loring Laboratories Ltd.

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

File No. : 40251-D
Date: July 6, 1998
Client: TUL PETROLEUM

Garnet Classification (after Dawson and Stephens, 1975)

		Location		Data in wt %						Garnets Classification											
Grain #	Sample #	P#	C#	TiO2	Cr2O3	FeO	MgO	CaO	Na2O	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
45	Pit-1	133	5F	0.62	0.00	13.81	1.83	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
46	Pit-1	133	5G	0.74	0.07	13.24	1.62	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
47	Pit-1	133	5H	0.00	0.00	0.03	0.00	0.36	0.00	..	..	..	4	..	..	..	..	..	..	..	..
48	Pit-1	133	5I	0.64	0.00	12.74	1.72	0.01	0.00	..	..	3	..	..	..	..	..	..	..	..	..
49	Pit-1	133	5J	0.71	0.01	12.76	1.64	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
50	Pit-1	133	6A	0.00	0.00	34.59	2.72	0.81	0.00	..	..	..	..	5	..	..	..	..	..	..	..
51	Pit-1	133	6B	0.00	0.00	0.00	0.00	1.25	0.00	..	..	..	4	..	..	..	..	..	..	..	..
52	Pit-1	133	6C	0.79	0.03	11.94	1.58	0.01	0.00	..	..	3	..	..	..	..	..	..	..	..	..
53	Pit-1	133	6D	0.42	0.00	13.70	1.67	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
54	Pit-1	133	6E	0.38	3.51	23.31	0.12	33.97	0.00	..	..	..	..	..	..	..	..	9	..	..	..
55	Pit-1	133	6F	0.34	3.57	23.47	0.12	34.42	0.00	..	..	..	..	..	..	..	..	9	..	..	..
56	Pit-1	133	6G	0.08	2.39	23.61	0.12	34.32	0.00	..	..	3	..	..	..	..	..	..	..	..	..
57	Pit-1	133	6H	0.25	9.16	18.82	0.22	32.03	0.00	..	..	..	..	..	..	7	..	..	..	..	..
61	Pit-1	133	7B	0.07	0.00	0.05	0.02	0.00	0.02	..	..	..	4	..	..	..	..	..	..	..	..
68	TUL-7	133	8B	0.00	0.01	33.98	2.73	0.77	0.00	..	..	..	..	5	..	..	..	..	..	..	..
									50	0	0	10	4	30	0	1	0	4	0	1	0
										G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12


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

7.23 ECLOGITE

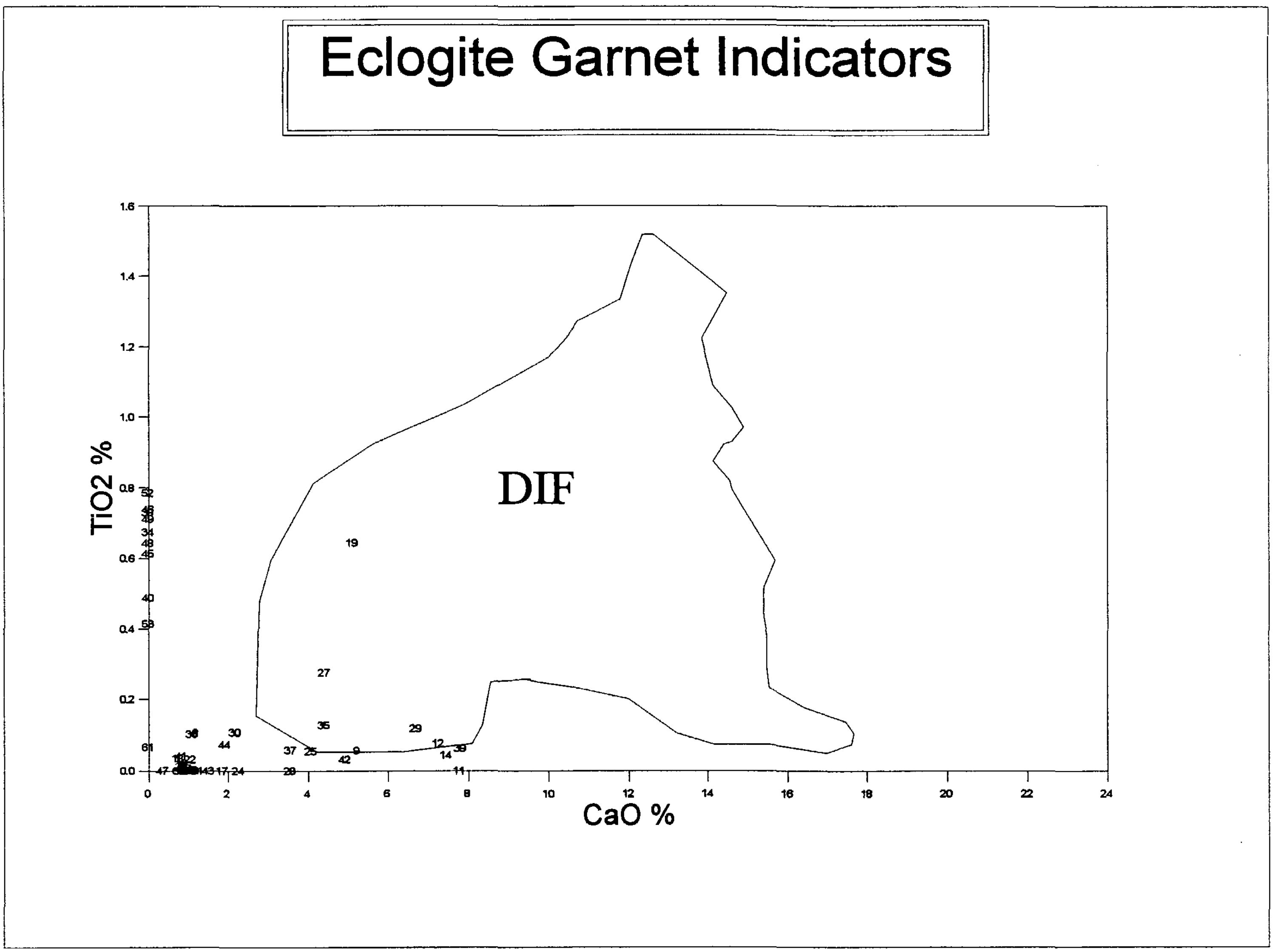
ECLOGITIC GARNET	
Special	**Eclogitic garnets are an important component of high potential, high carat-weight per ton diamond producing intrusives.**
Hardness	7
Colour	**yellow, red-orange, dark yellow, orange, dark orange, mottled fragmented crystals**
S G	**3.3+ fraction**

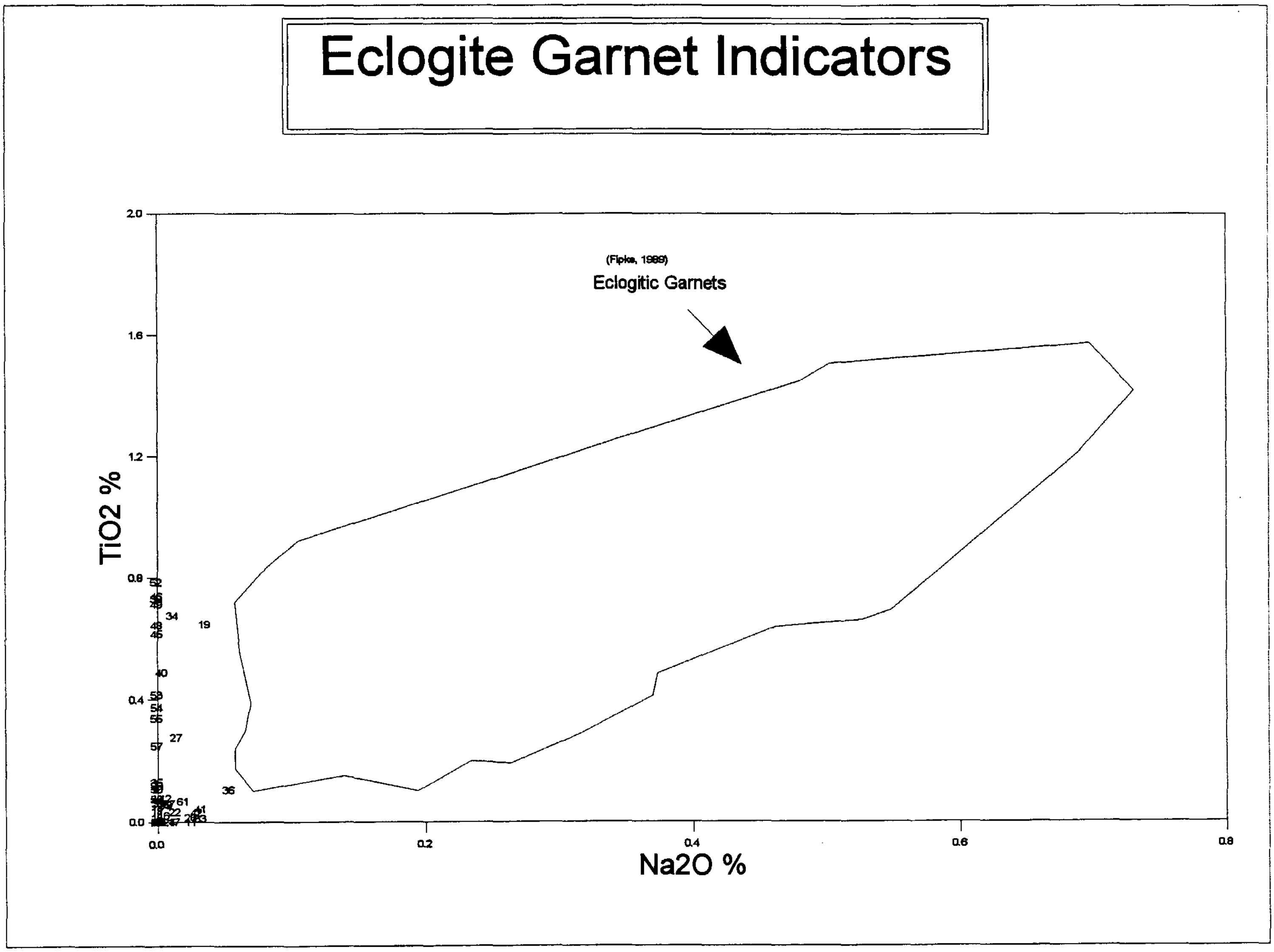
TUL microprobe results on page 63 show a good representation of eclogitic and peridotic material. A mantle source has likely been well tapped. This supports the argument that Montagneuse Fault is a deep basement fault and mantle material has followed the fault, as a partial conduit to location of emplacement. Diamond Indicator and high pressure eclogitic garnets in TUL samples typically microprobed and plotted as G5s. We also recovered 19 G3s and 4 G4s. Four eclogitic grains plotted as G9s. Many Islands and Lucky Jim are equally interesting.

Eclogitic Garnet Indicators which fall into the Diamond Inclusion Field indicate that the diamond prolific component of the peridotic-eclogitic mantle has been sampled, when the peridotic suite minerals are also present in a sample. Then it may be assumed that the eclogitic grains did not come from shallow subducted crustal slabs. Eclogitic diamond indicator garnets are thought to be high pressure garnets formed deep in the lithosphere, as opposed to common megacryst low-pressure eclogite found in a number of places.

Drillsite M3K1-Kolbert's, Figure-18, page 94, show lineaments of magnetite laden material emplaced and being cross-cut by faults. This could be displacement due to reactivation of the Montagneuse Fault. It is better illustrated on Pocket Map 4, page 110. There, similar occurrences can be noted at Many Islands, the Grandma Hale Prospect, and across other north-south magnetic lineaments shown as being cut by Carboniferous faulting. Eclogitic garnets seem to be common at these geochemistry anomalies.

Photos: Eclogite & Garnet: Eclogite rock-British Museum of Natural History; Montagneuse; Dry Bones Bay.


Eclogite Garnet Indicators
DIF
TiO2 %
CaO %
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
0
2
4
6
8
10
12
14
16
18
20
22
24


Eclogite Garnet Indicators
(Fipke, 1989)
Eclogitic Garnets
TiO2 %
Na2O %
2.0
1.6
1.2
0.8
0.4
0.0
0.2
0.4
0.6
0.8
52
34
19
40
27
61
36

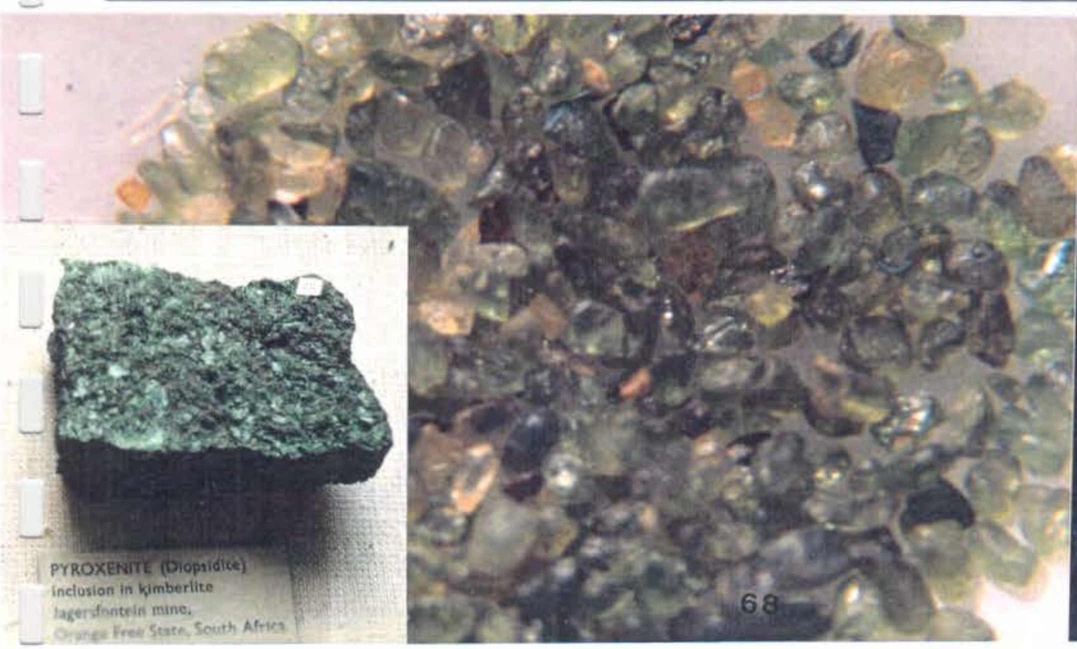
7.24 PYROXENE

PYROXENE GROUP	Clinopyroxenes	Orthopyroxenes
References	Dawson & Stephens page - 41; TUL page - 42; Mitchell, 1986, 1991, 1995.	
Colour	Variatons of almost clear to dark green, with lime green often being DIMs.	
Crystal	various; laminar, euhedral, subhedral	
Specific Gravity	3.22-3.556.Good chrome diopside, diopside, etc. seem to show in the 3.3+ fractions.	
Special	Cr-poor and Cr-rich groups for kimberlites. The Chrome poor suite characteristic of most kimberlites. Diopside absent KI, common KII. High K (>/=0.1% K2O) is an indicator of diamondiferous eclogitic source rock. (Appendix Page 103)	

The Microprobe Summary Table - 11, page 58, shows that Santiago and TUL established that Many Islands Creek, Hale-Claire Gravel Pit on the Gravel Cap and Montagneuse River Valley produced good pyroxenes within the boundaries of the proposed West Peace DIMs Trend. Retained TUL samples show that not many grains were microprobed compared to the number in the samples. This ~~is~~ was a function of cost. It was also a matter of not knowing how many pyroxenes need to be microprobed for our purposes. TUL has noted pyroxenes to be "ubiquitous" at TUL Sample Location #4, riverside, upper gravels and lower gravels. At Montagneuse Mag Meadow - Pit-1 on the Hale Structure, pyroxenes were probably recovered, mainly from a "green sand" layer, about 2 metres below surface. New data is shown on following pages and summarised on page - 58. Last probe,16 out of 16 picks were pyroxenes. All but one (grain #84) was in or very nearly in the Fipke'89 Diamond Inclusion Field. Grain #70 was an olivine pick.

Pyroxene is a component of most kimberlites, lamproites and lamprophyres. Olivine is in the Pyroxene Group. Dawson and Stephens attempted to establish a kimberlite - lamproite diamond related pyroxene group classification system for the orthopyroxenes and clinopyroxenes. Clinopyroxene is a common groundmass of kimberlite. Orthopyroxenes are rare in kimberlites. (Mitchell, 1986) In hypabyssal facies, diopside is a characteristic groundmass phase and in micaceous kimberlite (lamprophyre-Kimberlite II?) Diopside can comprise 10% to 40% of the groundmass phase. Clinopyroxenes and orthopyroxenes are stable crystals formed from mantle solutions stabilising as particular pyroxene group chain silicates. Probing CP2,3,4,5,7 & 8 shows that this is a gradational process. The CPXs are not so stable that they are resistant to weathering at surface. Instead, they have limited travel and are useful in indicating distance from a kimberlite and predicting the nature of the source intrusive.

Photos: Examples of Montagneuse Pyroxenes; ideal Dry Bones Bay Pyroxenes. Mt. Lake has exquisite CP5



Loring Laboratories Ltd.

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

ile No: 40251-D
Client: TUL PETROLEUM

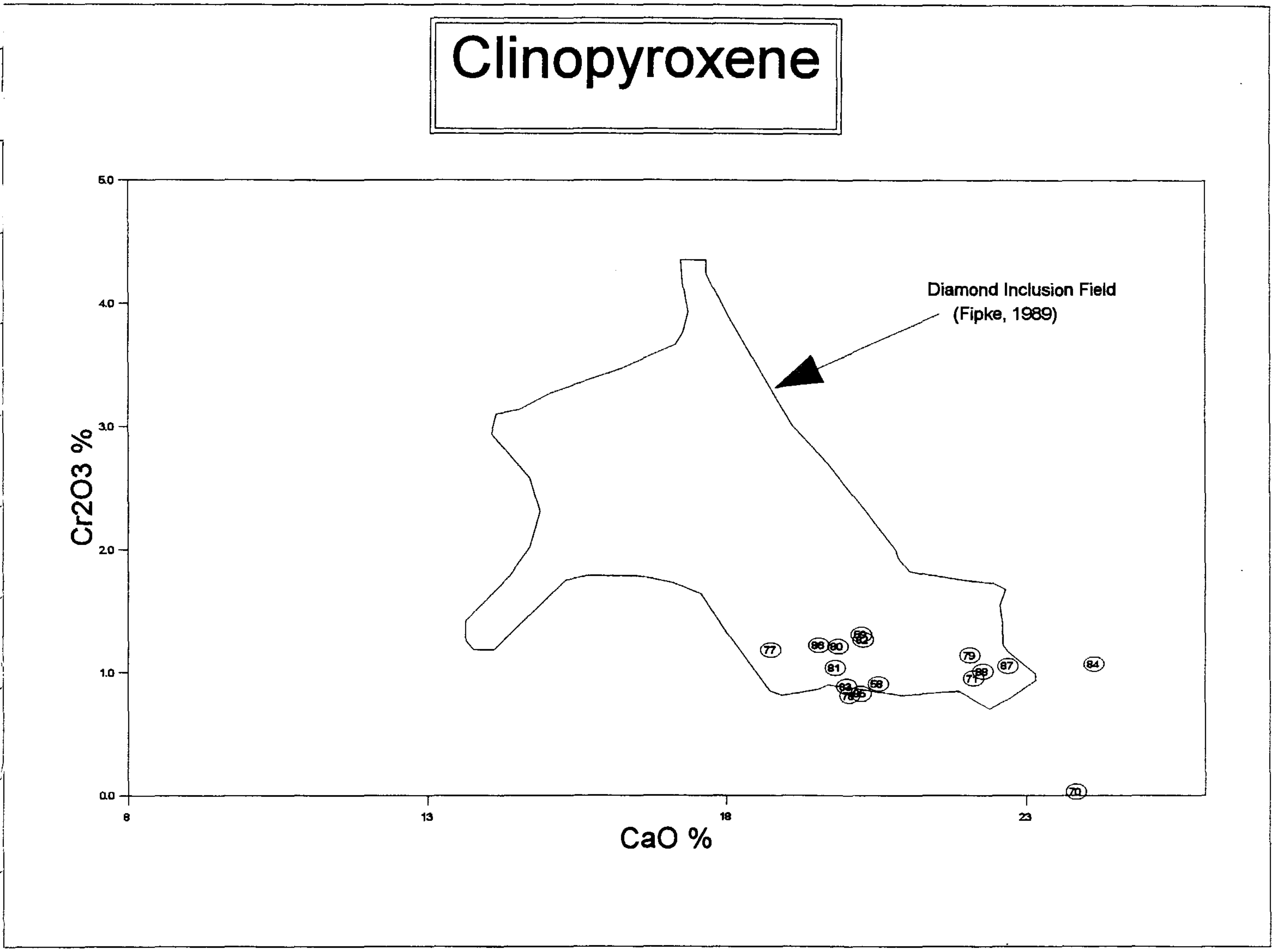
Date: July 6,

roxene Classification (after Stephens and Dawson, 1977)

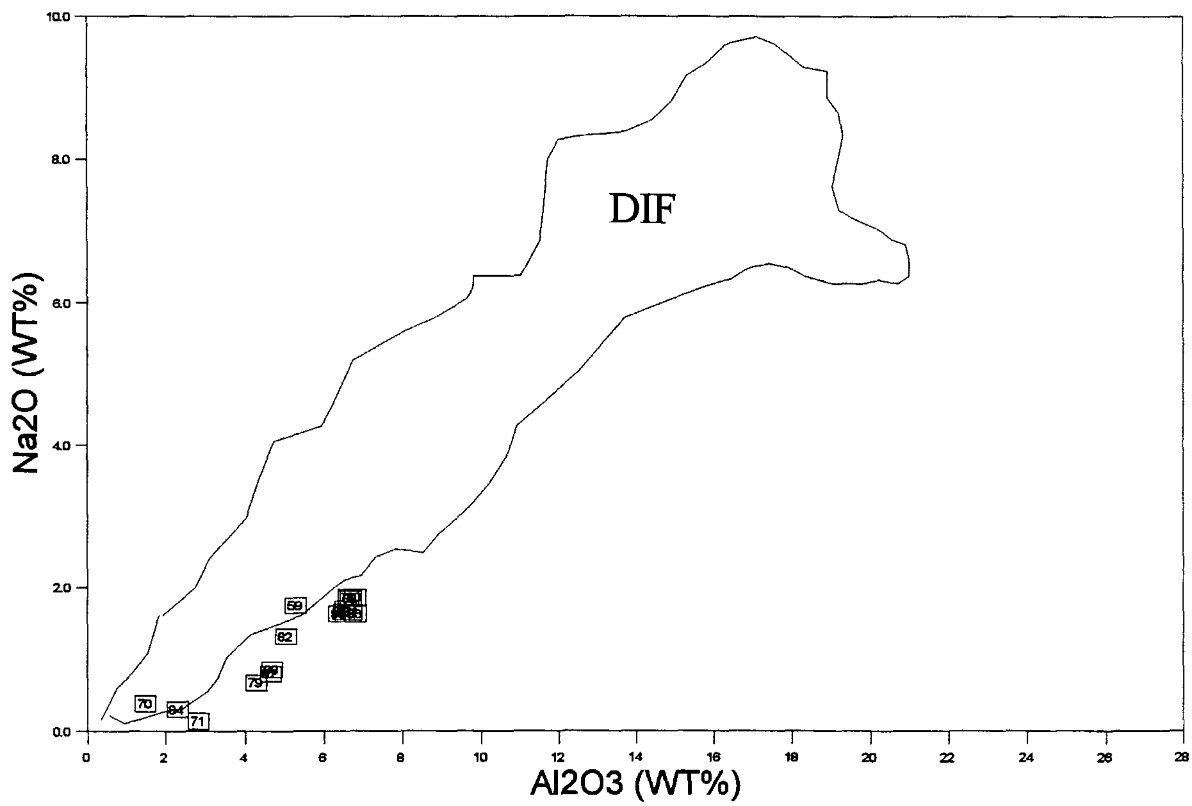
		Location		Data in wt %							ORTHOPYROXENE					CLINOPYROXENE									
#	Sample #	P#	C#	TiO_2	Al_2O_3	Cr_2O_3	FeO	MgO	CaO	Na_2O	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10
68	Pit-1	133	6I	0.33	6.69	0.91	2.54	15.17	20.54	1.85							2								
69	Pit-1	133	6J	0.20	5.30	1.31	2.59	15.69	20.25	1.75										5					
70	Pit-1	133	8D	0.32	1.49	0.03	4.58	16.07	23.83	0.38							2								
71	Pit-1	133	8E	0.21	2.85	0.95	4.74	17.10	22.12	0.14							2								
77	Pit-1	133	9A	0.83	6.65	1.19	3.07	15.53	18.75	1.86								3							
78	Pit-1	133	9B	0.50	6.52	0.81	2.91	15.53	20.06	1.66								3							
79	Pit-1	133	9C	0.04	4.29	1.14	2.31	16.70	22.06	0.67										5					
80	Pit-1	133	9D	0.62	6.82	1.22	2.70	15.35	19.86	1.87								3							
81	Pit-1	133	9E	0.37	6.72	1.04	2.51	15.12	19.82	1.66							2								
82	Pit-1	133	9F	0.35	5.07	1.27	2.47	16.48	20.28	1.32							2								
83	Pit-1	133	9G	0.34	6.84	0.89	3.01	15.91	20.01	1.64							2								
84	Pit-1	133	9H	0.37	2.31	1.07	2.48	16.95	24.14	0.30										5					
85	Pit-1	133	9I	0.33	6.58	0.83	2.66	15.37	20.25	1.71							2								
86	Pit-1	133	9J	0.30	6.41	1.22	2.24	16.02	19.55	1.64							2								
87	Pit-1	133	10A	0.51	4.66	1.06	2.40	16.07	22.69	0.80								3							
88	Pit-1	133	10B	0.07	4.69	1.01	2.21	15.93	22.28	0.86										5					

RET-91

		ORTHOPYROXENE					CLINOPYROXENE									
		1	2	3	4	5	1	2	3	4	5	6	7	8	9	10
Total Pyroxene =	16	0	0	0	0	0	0	8	4	0	4	0	0	0	0	0


Clinopyroxene
Diamond Inclusion Field
(Fipke, 1989)
Cr2O3 %
CaO %
5.0
4.0
3.0
2.0
1.0
0.0
8
13
18
23
77
86
80
56
82
81
62
58
78
85
79
87
88
71
84
70

Eclogitic Low-Chrome Diopsides



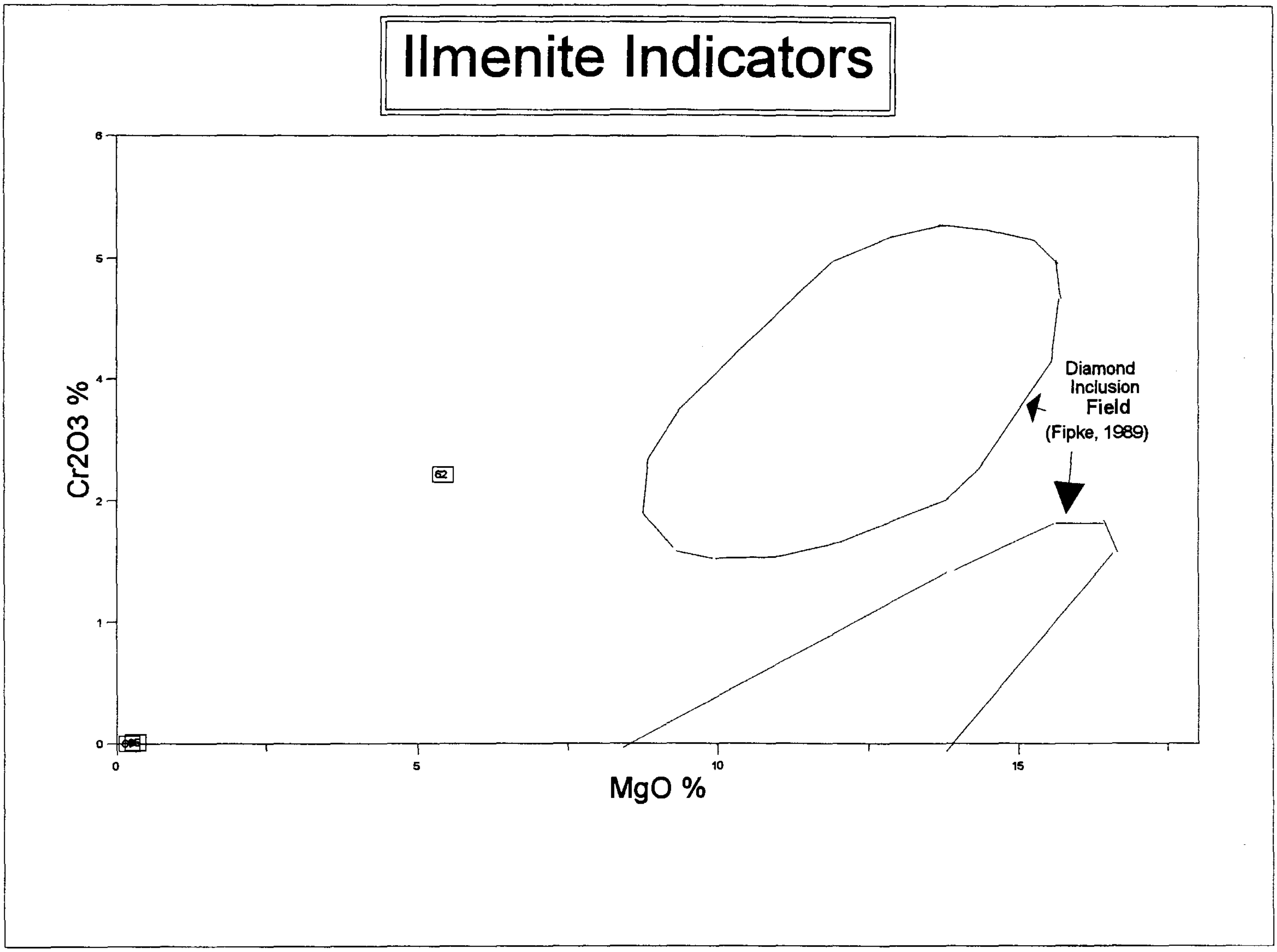
7.25 ILMENITE

OXIDES			
NON-SILICATES		**Crustal Ilmenite**	**Picroilmenite**
Iron or Titanium Oxide		**(Fe,Mg,Mn) TiO3**	**Magnesian Ilmenite**
Colour	**Black-opaque**	**soft, grey black**	**lustrous black**
Fracture	**none - concoidal**		
Specific Gravity	**Heavy 4.70 - 4.79**		
Special	**leucoxene rind useful indication**		
	resilient and can travel in streams		**coexistence with magnetite**
	slowly soluble in HCl		**can be a geothermometer**
	weakly magnetic		

TUL picked some grains for microprobe for this report and two people from the lab picked also. Each of us picked one ilmenite. Loring picked the best one. Two of us got at least one wrong.

The +28 black rounded fractured grain #62 from the Montagneuse Magnetic Meadow Pit-1faired the best, but none of the ilmenites we picked fell into the diamond inclusion field. Reviewing information about other companies and their experience picking ilmenite, it may not be necessary to hit the diamond inclusion field.

Photo: Examples; ilmenite picked from Montagneuse-left & lower; some examples from known pipes -Rt.Up.



Ilmenite Indicators
Diamond
Inclusion
Field
(Fipke, 1989)
62
Cr2O3 %
MgO %
0
1
2
4
5
6
0
5
10
15

7.26 CHROMITE

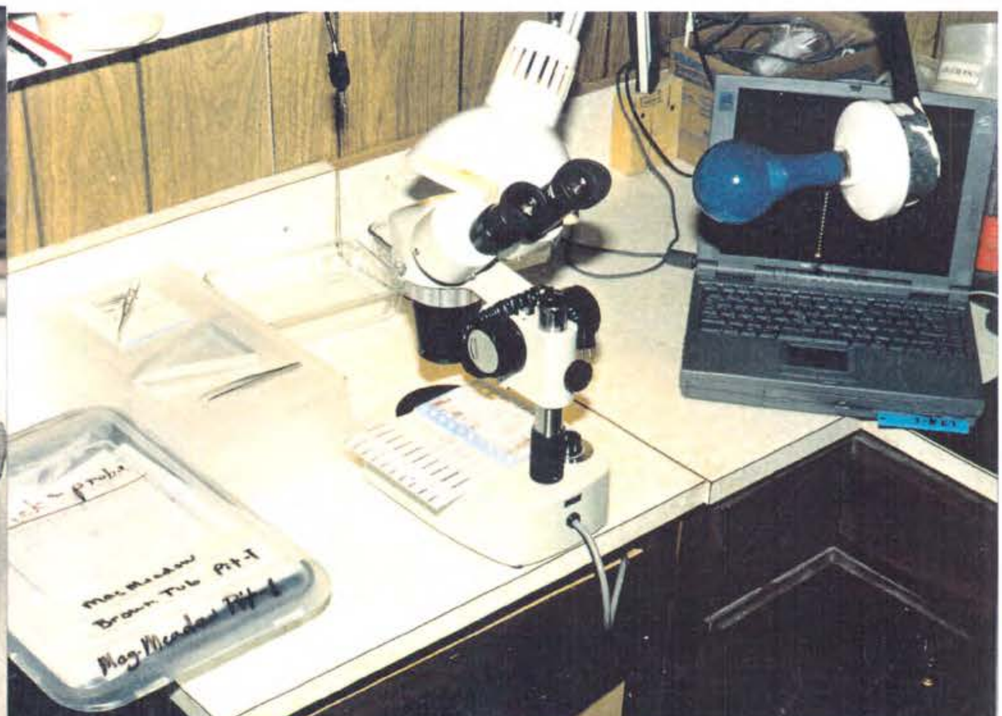
SPINEL GROUP		Al Series,	Fe Series	Chromite Series
Hardness	7.5 - 8	(Mg) Spinel	Magnetite	Magnesiochromite
Colour	red brown, red, brown, blue, black .... Almost opaque	(Fe) Hercynite		Chromite
Crystal	octahedral, twinning common			
Cleavage	none			
Special	almost insoluble in acids. Do not travel long distances in secondary environments. (Mitchell)			
Classification	P-1 - Peridotic Source Rock xenocrysts. Domiant in KI. Significant in KII. P-2 - Macrocrysts in KII. P-3 - Lamproitic indicator. P-4 - Minor Lamproitic indicator. (Mitchell; from Santiago et al., 1996.)			

References: Griffin, W. L. and C. G. Ryan. Trace Elements in Garnets and Chromites: Evaluation of Diamond Exploration Targets. *In* Diamonds: Exploration, Sampling And Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario. 1993 and Deer, 1993; Mitchell; Santidago et al., 1996.

TUL has observed octahedral brown crystals, sometimes fresh but mostly with rounded edges and once a twin was picked. It was lost in gluing and polishing of Plug 133 - Lucky Jim Beach.

TUL only successfully completed microprobe one of chromite, from Menno-Simmons (Hickock) gravel pit. This was analysed as a P-3. The Menno-Simmons Pit is within the Many Islands Diamond Indicator Geochemistry Anomaly. There are several chromites from samples ~~with~~ which have been probed as chromite, but these have not been classified yet.

No chromites. Weathered Kimberlite, Yellow Ground - British Museum of Natural History, left; TUL picking and recording process. Rt.



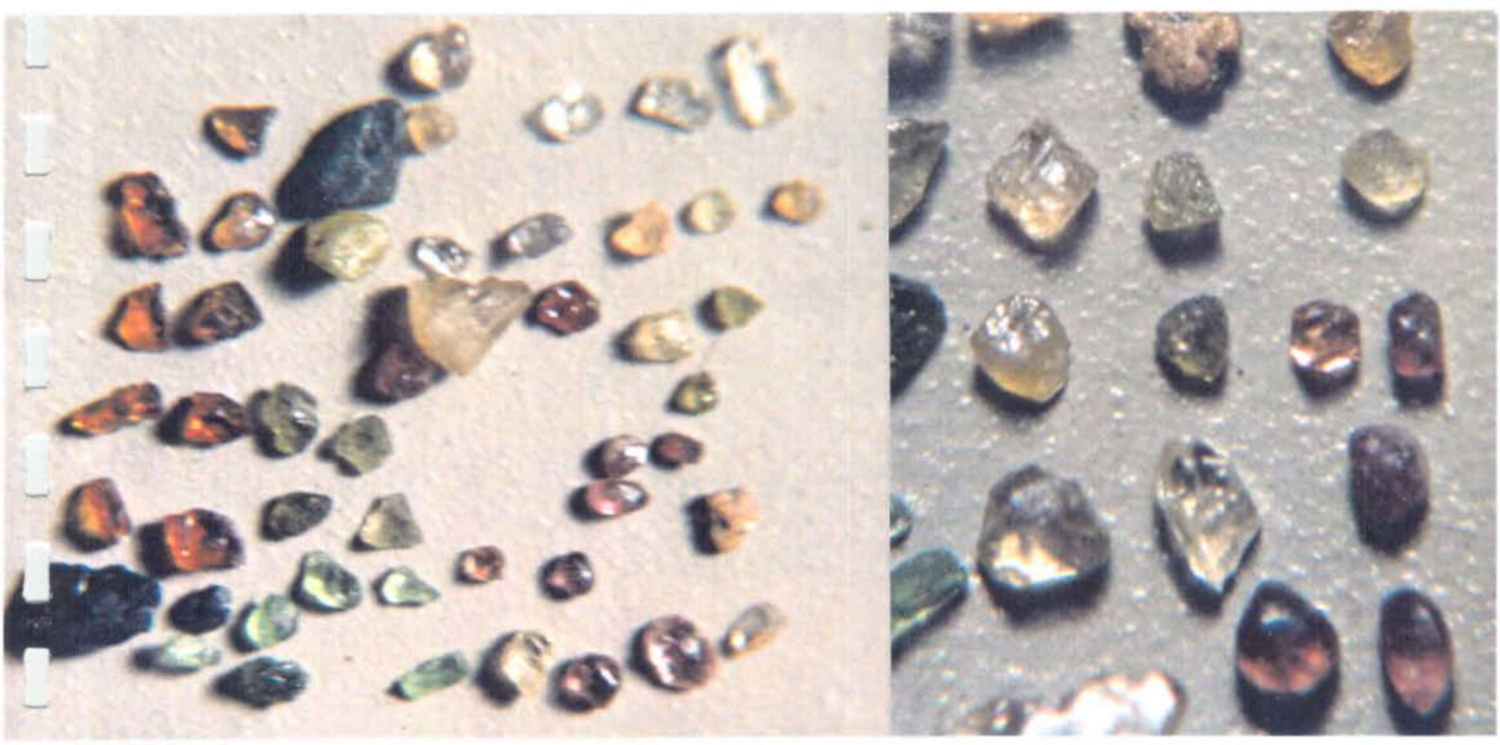
7.27 ZIRCON

Hardness	**7.5**
Colour	**red, brown, honey, yellow, green, grey, colourless.**
SG	**Heavy; 4.6 - 4.7**
Cleavage	**imperfect, poor**
Crystal	**often corroded or pitted grains, surfaces appear extremely smooth and reflective euhedral**
Special	**Useful for U/Pb and fision track dating intrusives for time of mineral formation. Proposed as part of the kimberlite megacryst suite. May survive more than one cycle of erosion and sedimentation. (Ref: Deer,1993)**

Reference: Fipkie mentioned zircons along with tourmalines as indicators. *In* Fipke, C.E., Significance of chromite, ilmenite, G5 Mg-almandine garnet, zircon and tourmaline in heavy mineral detection of diamond bearing lamproite. GAC-MAC Mid-Continent Diamonds, Symposium, Edmonton, Alberta. 1993.

Curious mauve zircon occurs in the Peace River District where other diamond indicator minerals are found. They occur in a range of forms, as whole pristine crystals of bright mauve coloration to a clearly observable series of degradational characteristics; splitting, rounding, washed coloration, to breaking in half across the crystal. These are obviously good indicators of travel. There is work to be done on these mineral crystals. Up to 120 have been picked from one 2.0 non mag fraction at Montaneuse Mag Meadow - Pit-1 varying from pristine to rounded crystals.

Photo: Examples of mauve zircon.



7.28 OTHERS:

TABLE - 12

KIMBERLITE I & II - ORANGEITE and ECLOGITE INDICATORS

MINERALS ECLOGITE	EXAMPLE Roberts Victory Mine, S.A.	SOURCE "Diamonds" by E.Bruton	COMMENT Roberts Victory eclogite is green pyroxene, red garnet, bluish kyanite and white mica.
PEACE RIVER	**Montagneuse**	**Samples:**	**Recovered from various TUL Peace River samples:**
KIMBERLITE(P)	**& Many Islands**		
with Eclogite. (E)	**Montagneuse**	**Many Is.**	**CONTAIN:**
Pimary			
olivine			probably replaced by chlorite, spinel, +
ilmenite	x		crustal ilmenite common, picroilmenite probed
phlogopite	x	x	replacement phlogopite and groundmass phlogopite
perovskite			unknown if we have this
magnetite	x	x	abundant magnetite
apatite	x		yes, but apatite it is often a common mineral
trace nickel			still trying to evaluate this
Secondary	x	x	Gold and Platinum values in magnetite, fee gold.
serpentine	x		seen in samples, but is a common mineral
calcite	x		yes, common
chlorite	x		abundant and almost groundmass as replacement
talc			common, but not specifically identified
magnetite	x	x	very common and abundant
limonite	x	x	very common as grains and in beds.
siderite			reported in the area, probably common in our sample
phlogopite	x	x	abundant as crystals and in groundmass form
perovskite			not identified
amphibole	x	x	common
haematite		x	common and found in many crystal forms
leucoxene	x		as rind on ilmenite
pyrites	x		very common and in many crystal forms
Transported			Also: white kyanite, blue kyanite and barite.
pyrope	x	x	microprobed: G1,_G3,G4,G5,G6,G7,G8,G9,G10.
garnet	x	x	common
chrome diopside	x	x	microprobed. Does not travel far, it gets rounded.
chrome spinel			Spinel - yes. Evaluating. Probed high zinc spinel.
enstatite	x		yes. Microprobed. Lherzolitic groundmass indicator
ilmenite	x		common, but only as a crustal ilmenite
magnetite	x		very common. Unfamiliar with the various types.
rutile	x		yes. Microprobed.
hornblende	x		common mineral
augite			need to research it
diamond			Microprobed: Zircon, Corrundum, graphite, Quartz
Mica	x	x	white mica, biotite, phlogopite. Other: tourmaline,
Inclusions			mauve zircon (Fipke)
coal			yes, but probably not as an inclusion
organics - like trees			We appear to have such a specimen from Esau Dyke
fossils	x		yes. Many identified marine fossils, especially shells

7.3 ELEMENTS

Peace River has elevated values for some elements. TUL analysis of tills indicate geochemistry anomalies. These analyses support the proposition that volcanics intruded into local country rock or, alternatively, regional concentrations of elements are due to some other process.

Whole rock analysis of samples 30-1 and 30-2 from Montagneuse - Sample Location: Island 30 was carried out also.

It may be useful to note that Alberta Geological Survey MDA Report Open File 92-16 data shows that Buffalo Head Hills has a Calcium level of 3.8%, which is the highest in Northern Alberta. This can be seen as a geochemistry anomaly in light of the discovery of the Buffalo Hills kimberlites discoveries.

If the Buffalo Hills diamond camp proves to contain a field of a hundred or so kimberlites geochemistry anomalies could be expected in some till samples and heavies analyses.

There is a northwest trend of high elemental values that flows from the Monopros Mountain Lake region along probable faulting (the Dunvegan Fault) toward Montagneuse and Many Islands. This trend parallels the Chinchaga/Ksituan Sub-craton suture zone and Kimiwan Oxygen18 isotope anomaly. There is also a trend following the Hay River Fault region which cuts Northwest Alberta along a line from Fort. St. John, B.C. to Yellowknife, N.W.T. and separates the Slave Craton (Lac Des Gras) from the Nova Sub-craton, which we now refer to as remnant Slave.

Geochemistry anomalies and elevated elemental occurrences may be a good exploration tool. Note the following from one of our previous reports:

Ag - Fairview area has highest counts in ppms for Silver in Northern Alberta.
Ba - Fairview/Hines Creek has a 428.0 ppm anomaly which is only higher in the Buffalo Head Hills.
Cd - Fairview, Worsley, Boundary Lake are definite anomalies at 0.5, .42, .40 ppm values.
Co - Cobalt is anomalous toward the B.C. border, with Grand Prairie and Boundary Lake being 14.0 ppm
Cr - Northern Alberta tends to be high in Chrome. Anomalies of 17 ppm appear along the Hay River Fault.
Fe - There are expected concentrations of Iron north and south of the Peace River where the Bad Heart ironstone formation is know, but also north of Fort McMurray, where gold exploration is going on.
Hg - Mercury is found in high concentrations (120 ppb) at Brownvale, Hotchkiss and High Level. Mt.= 95 and TUL found about 14 - 1millimetre Hg blobs in the Many Islands 2.0 Non Mag fraction of GF-2.
Mg - Montagneuse and Mountain Lake have regionally low levels of magnesium at .6 to .4 ppm.
Mg - Manganese levels vary like those of Magnesium with Mountain Lake and Montagneuse at 250ppm.
Mo - Molybdenum levels of 3.0ppm are concentrated along the Hay River Fault and Grande Centre while the Mountain Lake and the Montagneuse trends are flat at levels of 2.0ppm.
Na - The significance of concentrations of Sodium are unknown with levels of .01 to .04 percent.
Pb - High Level, Boundary Lake and Grande Prairie have high concentrations of Lead at 15ppm. ML= 14, Mt=15 and the Montagneuse sample location TUL#7 having 36 ppm.
As - Arsenic levels are anomalously high over the Dunvegan Fault at 17 ppm; ML=9, Mt=13.
Sr - Strontium increases toward Northwest Alberta and is anomalously high: 60 to 120 along the Hay River Fault. Mountain Lake and Montagneuse belong to unrelated trends at levels of 60 to 65ppm.
V - Vanadium levels at Mountain Lake and Montagneuse, 26-29ppm, flank an anomalous level of 34 near Belloy.
Zn - Zinc levels are more anomalous toward NW Alberta with the Hines Creek. being the highest at 124ppm.

"Incompatible elements are hosted essentially by spinels and olivines and to a lesser degree perovskite (Sc), sulfides (Cu, Ni), and diopside (Cr, V, Ni)." (Mitchell, 1989, p.288)
(In kimberlites these elements may not be removed from the liquid until the later stages of the crystalization of the groundmass; therefore whole-rock analyses may provided reasonable estimates of their abundances and ratios.)

Lamproites, in common with many other mantle-derived alkaline mafic to ultramafic rocks, possess **elevated contents** of compatible **Ni, Cr, Co, V, Sc** --and incompatible **Rb, Sr, Ba, Zr, Hr, Ti, P, Nb, REE, Y, Th, U** --- elements, relative to average crustal rocks. This distictive geochemical signature allows lamproites to distinguished easily from common ultramafic rocks which are not enriched in incompatible elements.

Soil geochemical anomalies (Ni, Co, Cr, Nb) are developed in sand and soil over burden immediately above lamproite vents --. Olivine lamproites are commonly marked by topographic depression---little dispersion ---- vents are well defined. On sloping ground anomalies do not extend for more than the diameter of the vent. Anomalies are found where the overburden is up to 7 m in thickness.

Two diagnostic signature elements is sufficient for the recognition of lamproite soil: **Ni and Nb.** Geochemical anomalies (Ni,Cr,Ti,Ba,La,Nb) delineate the intrusion and can be used as a mapping tool.
REFERENCE: Mitchell & Bergman, 1991. P 382.

TUL Trench 2 and TUL Trench 3 have concentrates analyses with Sm - Th ratios which fall on the Bellsbank trend (Fesq et al. 1975) (Mitchell, 1989, p. 298.)

LORING LABORATORIES - 30 ELEMENTS ANALYSIS

MITCHELL, ALBERTA RESEARCH COUNCIL and MONTAGNEUSE

ARC shows till averages for Northern Alberta

	Mo	La	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	Au	Sr	Cd	Sb	Th	U
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	17	3.1
MIT	3-12	150	93	15.	69	.134 250	965	65	1160			.5- 8.4	851	.073		2.8- 920	.5- 22.9
ARC	1.25	17.6	27.1	11.2	88.8	0.52	25.8	9.52	330.2	2.24	8.27	nd	55.1	1.00	<2		**n/a**
TR 3		81														**26.6**	**10.3**
DF-1		80														**22.9**	**16.0**
TR 2		69														**28.3**	**16.2**
#7	34	19	50	36	268	<.3	168	61	3021	36.6	204	<2	43	1.8	6	17	3.1
30-1	2	21	55	25	57	1.0	88	66	838	4.45	<1	<1	38	<1	2	**10**	**147**
30-2	2	18	44	20	42	1.3	80	53	669	3.31	<1	<1	64	<1	2	**2**	**189**

	Bi	V	Ca	P	Cr	Mg	Ba	Ti	B	Al	Na	K	W	
	ppm	ppm	%	%	ppm	%	ppm	%	ppm	%	%	%	pp m	
MIT	.024	100			893		1100	11800						
ARC	6.00	17.2	1.96	0.07	12.2	0.75	227	0.01	n/a	0.75	0.02		<2	rounded to fit
#7	3	102	0.66	0.203	37	0.41	41	0.01	<3	0.54	0.03	0.06	<2	
30-1	<1	119	1.86	0.054	49	1.38	261	0.33	27	2.94	0.04	0.04	<1	
30-2	<1	84	1.41	0.058	83	1.38	134	0.36	22	2.29	0.08	0.15	<1	

Whole rock analysis of samples 30-1 and 30-2 from Montagneuse - Sample Location: Island 30 are shown above.

Loring Laboratories Ltd.

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

TO:GEO PIAJA EXPLORATION
P.O. Box 42030
415 - 9737 Macleod Trail South
Calgary, Alberta
T2J 7A6

File: # 40179

DATE:June 15, 1998

79

Attn:Jim Stapleton

ICP ANALYSIS

Sample No.	Ag ppm	Al %	As ppm	Au ppm	B ppm	Ba ppm	Be ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P %	Pb ppm	Sb ppm	Se ppm	Sr ppm	Th ppm	Ti %	U ppm	V ppm	W ppm	Zn ppm
30-1	1.0	2.94	<1	<1	27	261	1	<1	1.86	<1	66	49	55	4.45	0.04	21	1.38	838	2	0.04	88	0.054	25	2	<1	38	10	0.33	147	119	<1	57
30-2	1.3	2.29	<1	<1	22	134	1	<1	1.41	<1	53	83	44	3.31	0.15	18	1.38	669	2	0.08	80	0.058	20	2	<1	64	2	0.36	189	84	<1	42

7.31 RARE EARTHS ELEMENTS

Some Rare Earths Elements occur in values that can be demonstrated as enrichment; of soils, clays and tills, at Peace River. Analysis of the ash/clay outcrops at Montagneuse indicate high values for some REEs.

The results of TUL Rare Earths analysis of the ashes outcrops only shows that the Montagneuse ashes are related, probably by a common source.

Chondrite-normalised logarithmic graphs of REE occurrence for the Montagneuse ashes and Sample Location: Island 30 grab samples of volcanics, do not fit into published values for kimberlitic or lamproitic occurrences.

Reference: Mitchell sites the Rare Earths as Kimberlitic indicators in "compatible vs incompatible" element groups.

a) alkaline earths: Nb, Zr, Ta, Hf, U, Th;
b) rare earth elements;
c) alkali and volatile elements.

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	**U**	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Mitchell indicators: I. Incompatible Trace Elements have solid/liquid distribution coefficients in common rock forming silicates of approximately zero. Their abundances may be reduced by the presence of Olivine. Whole-rock ananlyses recommended. This can be for: Ba-Sr, Zr-Hf, Nb-Ta, U-Th.

Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Mitchell indicators: II. Rare Earth Elements abundances have been found in kimberlites. Enrichment in dykes is due to closed-system crystallization preventing loss of REE along with volatiles. Low abundance in diatremes. The principle carrier of REE in kimberlites is **perovskite** and subordinately, **apatite**.

Mitchell indicators: **Incompatible Trace elements: III and Volatile Elements:** Li, Rb, Cs; Volatiles: B, F, Cl, S, Se, Pb, Cd, Hg, Tl and Bi.

Source: Mitchell; "Kimberlites" and Alberta Geological Survey; "Diamond Potential of Alberta."

Loring Laboratories Ltd.

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

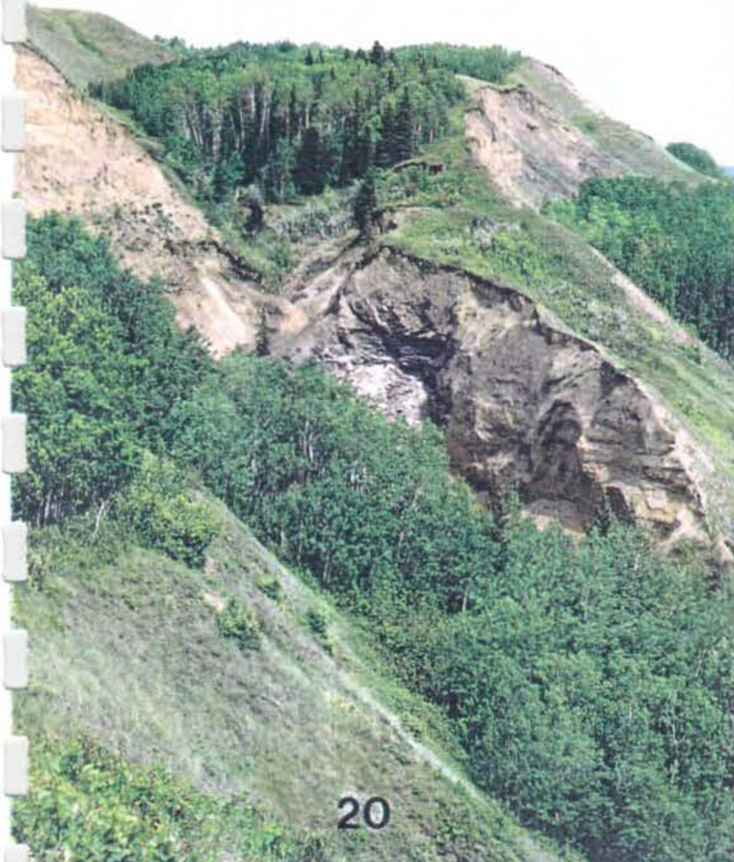
TO: TUL PETROLEUM
P.O. Box 42030
415 - 9737 Macleod Tr. S.
Calgary, Alberta
T2J 7A6
Attn: Jim Stapleton

File : 3 9 9 4 1

Date: June 18, 1998

RARE EARTH - ICP ANALYSIS

Sample Name	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sm	Tb	Tm	Y	Yb
Element	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
TUL M4W	63.7	1.9	7.8	2.1	119.0	<1	39.2	1.4	109.5	11.5	19.5	12.8	0.8	16.5	2.9
TUL ES7	66.3	1.7	5.4	1.5	107.6	<1	41.3	0.5	96.4	9.1	13.4	9.2	0.6	15.8	2.5
TUL M3K1	71.4	2.1	5.4	1.9	81.0	<1	42.7	1.2	78.2	6.8	15.1	8.5	0.6	16.2	2.6
TUL M3O1	84.9	2.8	4.3	1.8	106.2	<1	52.9	1.2	102.1	12.7	15.5	9.7	0.6	18.8	3.1
30-1	38.0	0.8	6.0	2.0	<1	<1	35.0	<1	257.0	<1	35.0	<1	5.8	16.5	2.1
30-2	744.0	6.0	7.1	12.0	<1	<1	337.0	1.4	628.0	<1	70.0	3.9	6.7	25.0	2.0

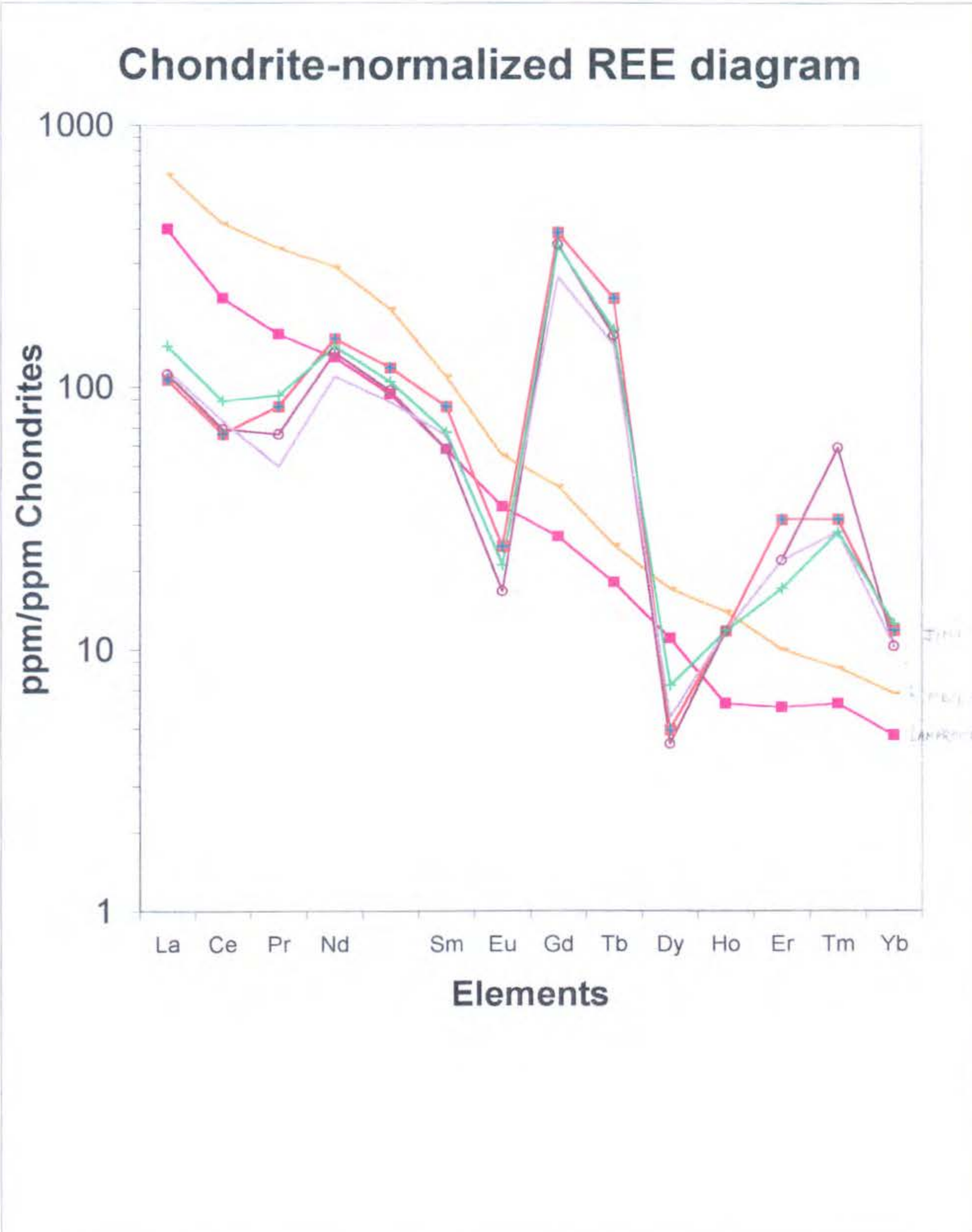


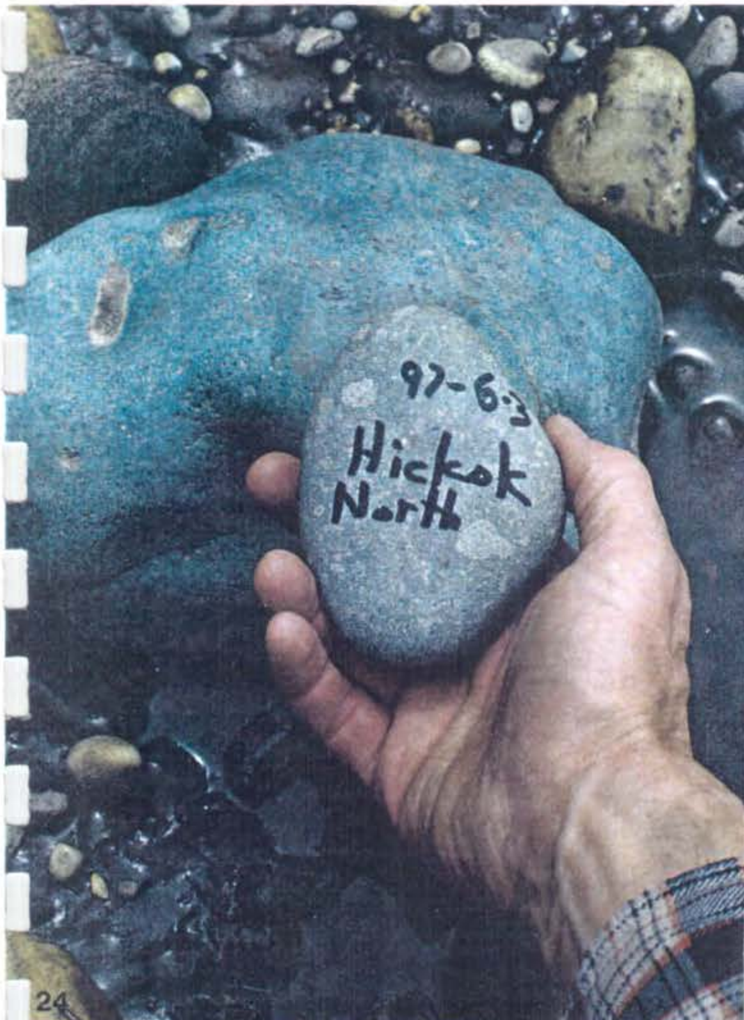
20

21

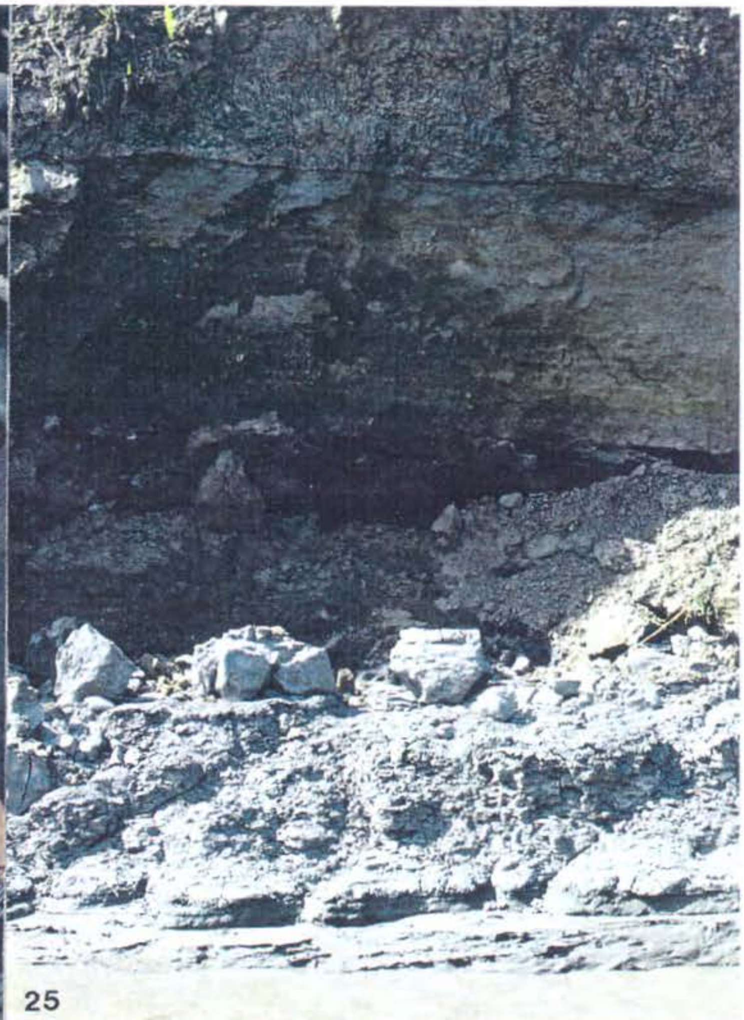
22

23


Chondrite-normalized REE diagram
1000
100
10
1
ppm/ppm Chondrites
La
Ce
Pr
Nd
Sm
Eu
Gd
Tb
Dy
Ho
Er
Tm
Yb
Elements



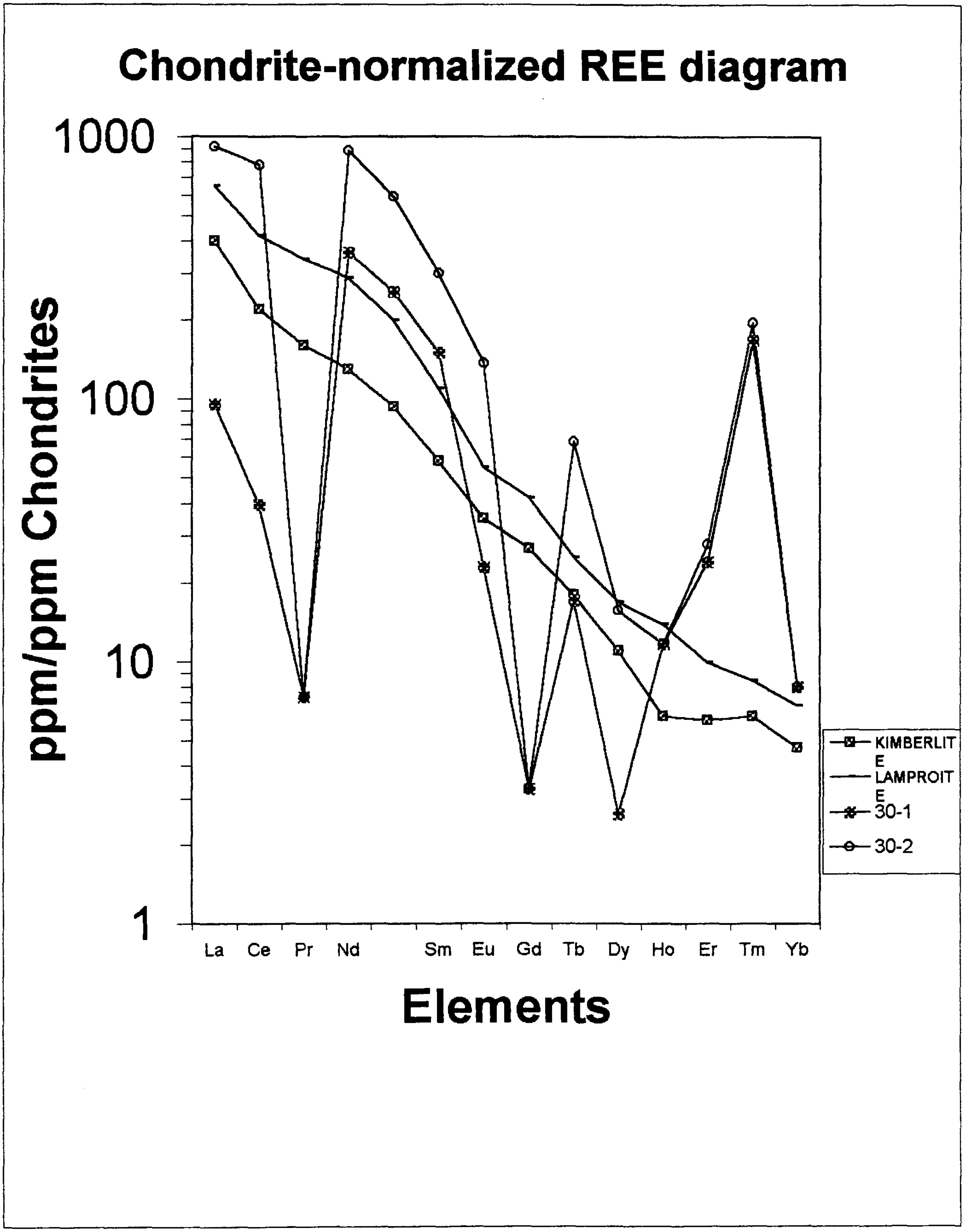
24



25

26

27



Chondrite-normalized REE diagram
1000
100
10
1
ppm/ppm Chondrites
La
Ce
Pr
Nd
Sm
Eu
Gd
Tb
Dy
Ho
Er
Tm
Yb
Elements
KIMBERLITE
LAMPROITE
30-1
30-2

7.32 GOLD and PLATINUM MINERAL GROUP

TUL established that magnetites from Montagneuse and Many Islands concentrates have gold and platinum tied-up in them. The significance of this is not clearly understood.

History books on the Peace River District mention panning for gold by prospectors. Louis Garski was said to have recovered gold somewhere west of Bend-in-the-Peace in the late 1920's.

TUL Many Islands aero magnetic surveys suggested that mineral occurrences panned by Garski are likely on Many Islands Creek south of Menno-Simmons (Hickock) gravel pit.

Santiago-TUL sampling and concentrating irony gravels (Tertiaries laying unconformably on the Saftesbury Shales) as Sample GF-1(gold fines) and GC-1 (gold course) and from a pit dug into Many Islands Creek, as Sample GF-2 and GC-2, showed that concentrations of gold occur there. Particularly interesting were the many thin foils of ragged edged gold found adhering to cobbles (surface tension) in the creek.

Leaves of gold were recovered at Montagneuse and +50ppm values were recovered from the TUL#7 concentrates.

An attempt to evaluate the Gold and PGMs at Montagneuse and Many Islands resulted in ICP analysis of the magnetic fraction of GC-2 and Magnetic Meadow Pit-1 (Pit-1 = Garbage Can: Garbage can, being a plastic garbage bin taken from the Magnetic Meadow Pit - 1, not concentrated in the field, but delivered to Loring Labs for processing with Santiago River Bed Trench II sample.)

Montagneuse ICP for Au, Pt, Pd and Rh resulted in identification of platinum in the magnetites at levels of 765 ppb. Gold showed as a component at 50 ppb.

The magnetic fraction from Many Islands GC-2 resulted in elevated levels of gold tied in with the magnetites, with 2100 ppb Au, but less than 10 ppb Pt. Pd and Rh were under 10 ppb in both samples.

ABUNDANCES OF SOME TRACE ELEMENTS IN KIMBERLITES: PLATINUM GROUP :
Mitchell: Abundances of some Trace Elements in Kimberlites for the Platinum Group (ppb).

PGMs	ppb	RANGE				LOW	HIGH	MEAN
	LOW	HIGH	MEAN		Ru	2	18	6.5
Rh	0.2	23	7.1		Re	34	221	37.5
Ag	5	250	134		Os	2	12	5
Pd	4	170	53			26	65	45.5
	1.3	19	8.1		Ir	2	11	7.6
Pt	30	430	187			0.49	5.9	3
			250					
			87					
Au	0.5	8.4	2.94					
	0.11	43	12					
			95					
			80					
	1.2	18	3.9					

To : GEO PIAJA EXPLORATION
P.O. Box 42030
415, 9737 MacLeod Trail South
Calgary, Alberta T2J 7A6
ATTN : Jim Stapleton

File No : 40198
Date : June 13, 1998
Samples :
Project :
P.O.#

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	Au ppb	Pt ppb	Pd ppb	Rh ppb
"Concentrate Analysis"				
GG-2	2100	< 10	< 10	< 10
LJI-1	136	15	< 10	< 10
Mag Meadow Garbage Can	50	765	< 10	< 10

NOTE: Samples previously concentrated by tabling and heavy media separation.

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]

Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

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

Date: August 29, 1997
File: 39215-D
Client : Geo-Piaja Exploration

SUMMARY OF POTENTIAL INDICATORS PICKED

Sample	Garnet	CPX	Ilmenite	Chromite	Olivine	Diamond	Total Grains	Remarks
WMI-1	17	1	6	0	3	0	27	
PRW-1	139	103	2	0	10	0	254	1 gold grain
TR-7	46	17	2	0	5	0	70	1 gold grain
Totals	**185**	**120**	**4**	**0**	**15**	**0**	**324**	

CPX = Clinopyroxene

7.4 TRENDS

Ashes, tuffs and bentonitic soils are the most immediately available materials we can use to identify kimberlite, lamproite and lamprophyre source regions. Diamond indicator minerals are occurrences of mantle material which can be generalized into trends that are sign posts to kimberlites.

Success has been achieved in the discovery of fifteen or twenty pipes in the Wabasca Diamond Indicator Geochemistry Trend in the East Peace River (Arch) District. The Buffalo Hills diamond camp may be the site of the first Alberta diamond mine.

The Mountain Lake diatreme was found in the Peace River Diamond Geochemistry Trend. This has been well studied by the AGS and the GSC and 3-D modelled by GEDCO corporation.

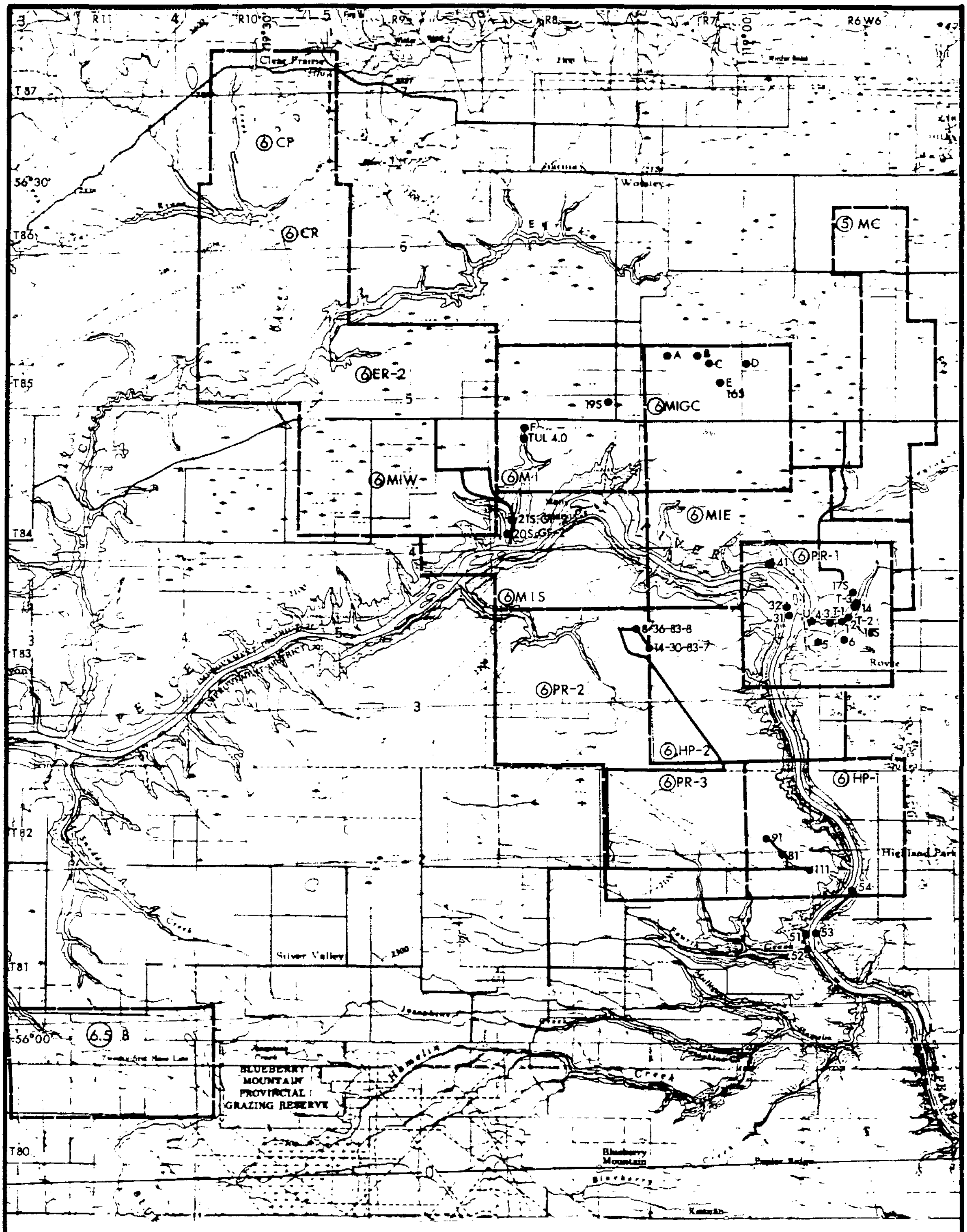
What do the kimberlites of Alberta have in common? How do these intrusives compare to Northwest Territories pipes, which are now thought to be small on a world-wide comparison basis, but with high potential to produce gem quality stones? In the West Peace River Trend, Mountain Lake diatreme and Grand Prairie Pipes; and the Wabasca River Trend, Ashton Mining Buffalo Hills pipes, are similar in that they are olivine groundmass intrusives. In Alberta, style of emplacement appears to be common and the age of crust is similar.

The Leckie proposition is that kimberlite extrusive volcanic cones and associated pyroclastic, epiclastic and tephra and crater facies materials formed 500 foot cones, as in the case of Fort a la Corne. Leckie studies indicate that volcanic intrusives of kimberlite or kimberlite-like mantle materials breached the Western Canadian Sedimentary Basin paleo-surface in explosive and continuing eruptive styles. In Saskatchewan, this was in marine and deltaic environments taking place around 95 million years B.P. This time period equates to the Shaftesbury. The Shaftesbury is the grouping of marine shales noted for the Fish Scales marker which divides the Upper Cretaceous from the Lower Cretaceous and which contains several bentonitic horizons, especially the Fish Scales biotic die-off.

The interesting aspect of the Leckie Model is that kimberlite and associated materials are emplaced as ash, tephra, and juvenile olivine in lahare, bomb, point bar, beach and spit landforms. These should create diamond indicator geochemistry trends and dispersal fans on paleo-surfaces.

Ashes and tuffs of the Peace River kimberlites; and suites of garnet, pyroxene and accessory minerals; are the erosional and depositional remnants of volcanoclastics. Type, quality, distance of travel, are the date points which we have, to re-construct a trail back to source kimberlites.

Extrusive style, a model of emplacement and degree of erosion and transport of the original volcanics are valuable knowledge with which to envision the original emplacement and then to extrapolate from known data to find hidden kimberlites within trends.



PERMITS

⑥ CP: BLOCK ⑥ PERMIT-CLEAR PRAIRIE
⑥ CR: BLOCK ⑥ PERMIT-CLEAR RIVER
⑥ ER2: BLOCK ⑥ PERMIT-EUREKA RIVER 2
⑥ MIW: BLOCK ⑥ PERMIT-MANY ISLANDS WEST
⑥ MI: BLOCK ⑥ PERMIT-MANY ISLANDS
⑥ MIGC: BLOCK ⑥ PERMIT-MANY ISLANDS GRAVEL CAP
⑥ MIS: BLOCK ⑥ PERMIT-MANY ISLANDS SOUTH
⑥ MIE: BLOCK ⑥ PERMIT-MANY ISLANDS EAST
⑥ PR-1 BLOCK ⑥ PERMIT-PEACE RIVER 1
⑥ PR-2 BLOCK ⑥ PERMIT-PEACE RIVER 2
⑥ PR-3 BLOCK ⑥ PERMIT-PEACE RIVER 3
⑥ HP-1 BLOCK ⑥ PERMIT-HIGHLAND PARK 1
⑥ HP-2 BLOCK ⑥ PERMIT-HIGHLAND PARK 2
6.5 B BLOCK 6.5 PERMIT-BONANZA

• 32 SAMPLE LOCATIONS

Many Islands and Montagneuse Anomalies within a West Peace River DIMs Trend

GRAVEL PITS
A STARICH
B ROSS
C WORSLEY
D BECK
E HALE-CLAIR
F MENNO-SIMONS

TUL PETROLEUMS LTD.

LOWLANDS
PEACE RIVER AREA
SAMPLE LOCATIONS

1:500,000 | Figure - 15

Plate 28
Looking up West Many Islands Cr.

Plate 29
Peace River Channel & Tertiaries.

Plate 30
Many Islands Creek toward Hikock Pit and Peace River Peneplain.

7.5 DRILLING

7.5 DRILLING

UNIVERSAL GEOLOGICAL LOG

TUL Montagneuse M3K1 Kolberts

COMPANY: TUL PETROLEUMS LTD./MONTNEY CONST. - SUBCONTRACTOR

WELL: Core Hole - M3K1 Kolbert's

LOCATION: LSD 16-22-84-6-W6M

FIELD: Hines Creek - Montagneuse Valley **PROVINCE:** Alberta

CONTRACTOR: DESTNY DRILLING

SPUDDED: November ,1997 **RIG RELEASED:** November ,1997

TOTAL DEPTH: Driller: 63 m; Logger: ______ m.

Plugged Back: ______ m.

BOTTOM HOLE FORMATION: Dunvegan Montagneuse ashes

STATUS: Complete and abandoned, cleaned up.

ELEVATIONS

KB: 2100 feet - 675 metres m.

GL: 675 m.

CASING RECORD

No casing x ______ with ______ Tonnes

Seismic Drill x ______ with ______ Tonnes

Commander Heli portable rig on tracks. Air drilled and mud drilled. Tonnes

CORES

No.	INTERVAL	FORMATION	RECOVERY
No cores			
Drilling	30 metres	Overburden - glacial	none
Sampling	30 to 47 metres	Ashbeds.	ash/tuff/Qtz/bentonite
Sampling	47 to 63 metres	Hard Ash/Tuff Beds	fine clay/ash/tuff

DRILLSTEM TESTS

No.	INTERVAL	FORMATION

Samples saved in 3 5 gallon sample buckets, total weight about 100 kilograms

Samples: small freezer bags from 30 metres to 47 metres and 47 metres to 63 metres to Calgary for immediate appraisal via Loomis.

OPEN HOLE LOGS

COMPANY:

DATE(S):

LOGS RUN INTERVAL

GEOLOGIST: Operator: Curtis Hale. Off-site Superivsion: Murray J. (Jim) Stapleton.

DATE:

REMARKS:

Samples of recovered material available from 30-47metre and 47 to 63 metre intervals for Alberta Energy and EUB Core facility.

LEGEND

- BRECCIA; CONGLOMERATE
- SANDSTONE
- SILTSTONE
- SHALE
- CHERT
- LIMESTONE
- DOLOMITE; SIDERITE
- MARLSTONE; CALCAREOUS; DOLOMITIC
- ANHYDRITE; GYPSUM
- SALT
- COAL
- IGNEOUS; METAMORPHIC

- SILTY; SANDY; PEBBLES
- ARGILLACEOUS; SILICEOUS
- CALCAREOUS; DOLOMITIC
- ANHYRITIC; GYPSIFEROUS
- NODULES
- GLAUCONITE
- B BENTONITE
- P PYRITE
- K KAOLIN
- FISH REMAINS
- PLANT REMAINS
- F FOSSILS

OIL SHOWS

- ● EVEN
- ◑ SPOTTED
- ○ QUESTIONABLE
- D DEAD (BITUMEN)

POROSITY

- X INTERCRYSTALLINE/INTERGRANULAR
- V; PP VUGGY; PIN POINT
- F; E FRACTURE; EARTHY
- CORED INTERVAL (IN DEPTH COLUMN)

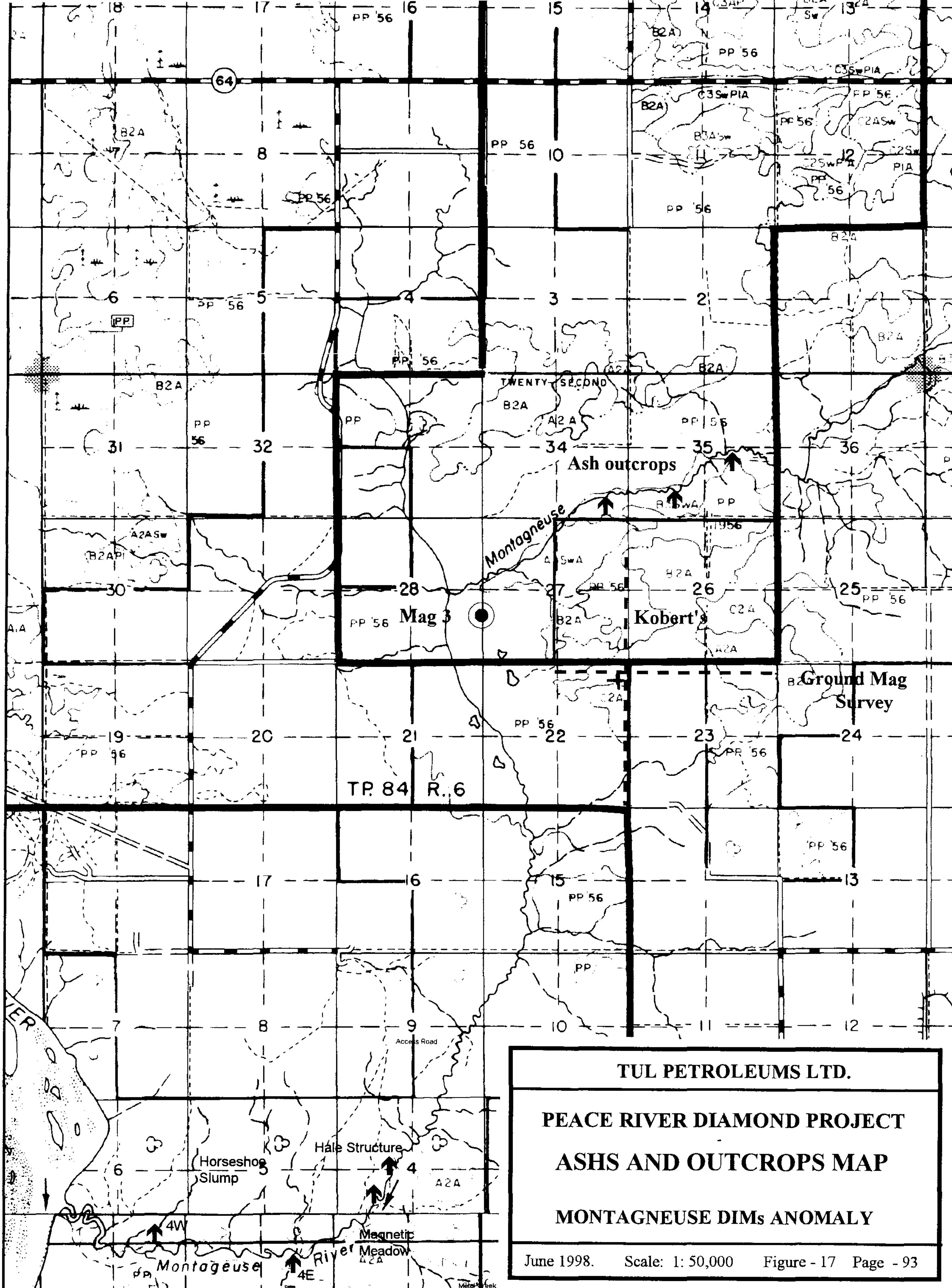
ROUNDING

- A; a ANGULAR; SUBANGULAR
- R; r ROUNDED; SUBROUNDED

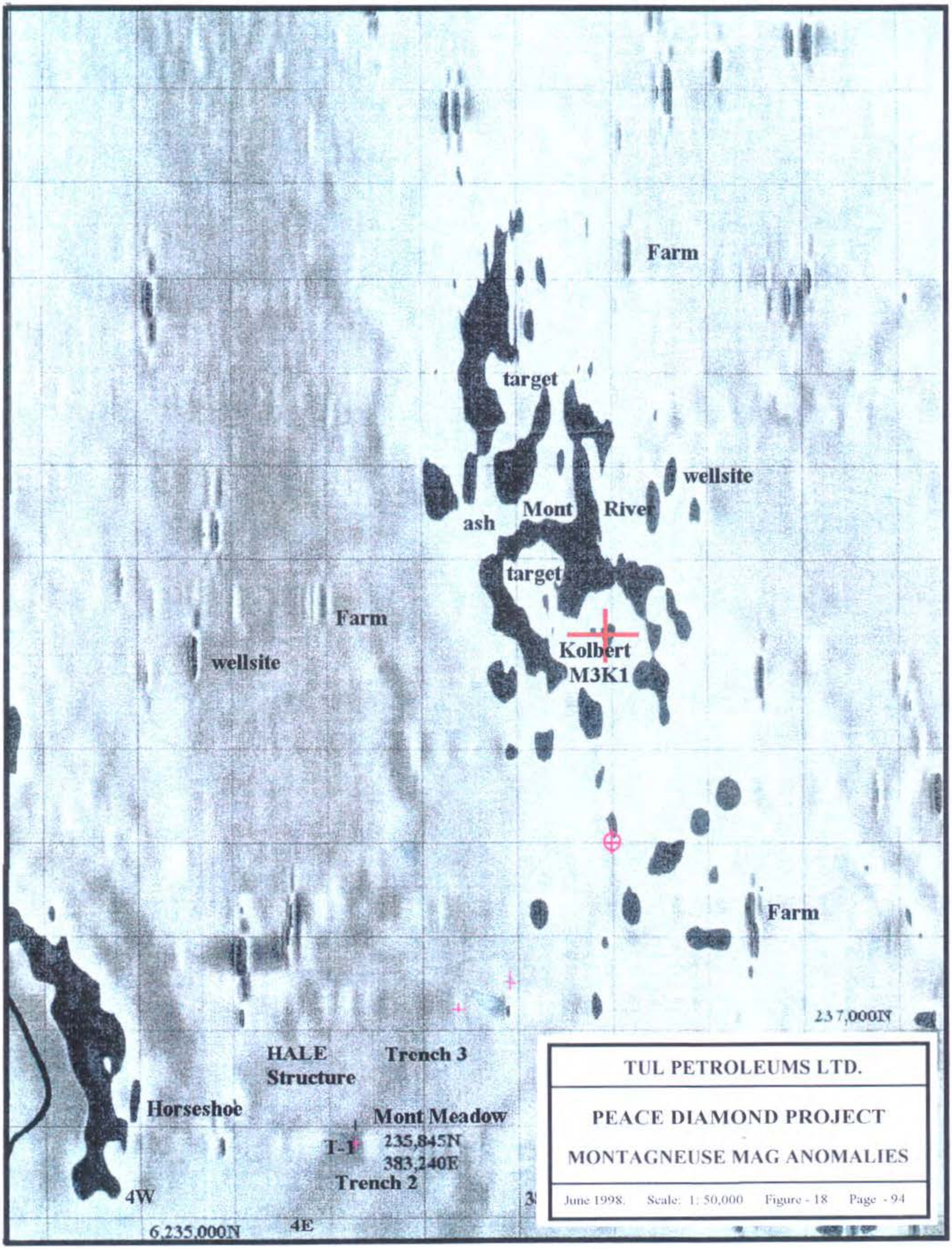
SORTING

W; M; P WELL; MEDIUM; POOR

Figure - 16



Ash outcrops
Montagneuse
Mag 3
Kobert's
Ground Mag Survey
TWENTY SECOND
TP. 84 R. 6
Access Road
Horseshoe Slump
Hale Structure
Magnetic Meadow
4W
4E
Montageuse River
TUL PETROLEUMS LTD.
PEACE RIVER DIAMOND PROJECT
ASHS AND OUTCROPS MAP
MONTAGNEUSE DIMs ANOMALY
June 1998.
Scale: 1: 50,000
Figure - 17
Page - 93


Farm
target
wellsite
ash
Mont
River
target
Farm
wellsite
Kolbert
M3K1
Farm
237,000N
HALE
Structure
Trench 3
Horseshoe
Mont Meadow
T-1
235,845N
383,240E
Trench 2
4W
6,235,000N
4E
TUL PETROLEUMS LTD.
PEACE DIAMOND PROJECT
MONTAGNEUSE MAG ANOMALIES
June 1998. Scale: 1: 50,000 Figure - 18 Page - 94

8.0 CONCLUSIONS

1. Montagneuse and Many Islands are geochemistry anomalies.

2. Montagneuse and Many Islands diamond indicator geochemistry is similar.

3. Montagneuse and Many Islands are on the same craton.

4. Montagneuse and Many Islands are in similar geological settings as to; faulting, basement, location on the Arch, bedrocks and Quarternary; morphology and paleo-basins.

5. The West Peace River Trend is proposed.

6. The West Peace Trend geochemistry anomalies are on gravity lows.

7. Shallow magnetics and ash outcrops suggest a number of volcanic targets at West Peace.

8. Alces - Moose Creek and Beatton - Lucky Jim, are kimberlitic and diamond indicator geochemistry anomalies. Since Alces and Beatton are on separate cratons and these are different from that of Montagneuse and Many Islands, Alces and Beatton may not be associated with the West Peace River Trend.

9. All four geochemistry anomalies are at similar elevations and are associated with south trending valleys, deeply incised into the Peace River Peneplain and are north of the Peace River.

TUL PETROLEUMS LTD.

PEACE DIAMOND PROJECT
ASSESSMENT WORK REPORTS

STATEMENT OF EXPENDITURES
SCHEDULE "A"

and

TABULATION OF PERMITS - ASSIGNMENT OF EXPENDITURES
SCHEDULE "B"

TUL PETROLEUMS LTD.

STATEMENT OF EXPENDITURES
SCHEDULE "A"

Pursuant to the Alberta Mines and Minerals Act Section 15{3(1)}

Addendum to TUL Petroleums Assessment Work Reports Lamprophyres of the Peace River District & Ashes of the Peace River District Statement of Expenditures for Exploration Permits covered in the above reports plus Tabulation of Permits Schedule "B" attached.

to Field Trip 55	**PEACE DIAMOND PROJECT and HEAVY METALLICS ASSESSMENT**	From: To:	March 13,1996. March 11,1998.
Spreadsheet 1	*120 day extension granted for fall program*	File:	97statement of exp3

#	Description **MANPOWER**	Rate	Units	Subtotal
1	Project Manager: Field Programs, design & budgeting	$400.00	**200**	$80,000.00
2	Project Geology: Research, Mapping, Analysis	$400.00	**225**	$90,000.00
3	Geological Consultant - [redacted]	$5,000.00	1	$5,000.00
4	Geological Consultant - Santiago International	$400.00	20	$8,000.00
5	Mining Engineering Consultant - [redacted]			
	reports, methods, valuations, supervision.	$80.00	56	$4,480.00
6	Geochemistry: Grains picking, analysis, photography	$360.00	**70**	$25,200.00
7	Geochemistry: results, analysis, tabulating.	$600.00	**50**	$30,000.00
8	Geophysical (Canagrad Surveys) plotting & analysis	$125.00	80	$10,000.00
9	Geological Technician - [redacted] of Loring Labs	$320.00	4	$1,280.00
10	Environment Biologist Consultant - [redacted] +Exp	$400.00	48	$19,200.00
11	Geological & Prospecting Assistants [redacted]	$200.00	10	$2,000.00
12	Field Workers: Geological & Survey Assistants/Labor	$160.00	48	$7,680.00
13	Casual Workers for deliveries and labour	$120.00	40	$4,800.00
14	Heavy Equipment Operators [redacted]	$25.00	16	$400.00
15	Petrologist - [redacted]	$520.00	0.62	$322.40
16	Cutting & polishing samples - Green's Lapidary.	$40.00	11	$440.00
17	Reports: Data coalation, mapping, analysis, writing.	$480.00	**81**	$38,880.00
18	Drafting - Wellens Drafting	$20.00	57.5	$1,150.00
19	Computer Mapping and Air photo splicing-Cornerstone	$65.00	18	$1,170.00
20	Computer, Operator &GIS Mapping - TUL Pet.	$520.00	5	$2,600.00
21	Field Work and Exploration Accounting	$360.00	14	$5,040.00
		TOTAL:		$337,642.40
	Subtotal Stapleton:		**626**	

#	Description **FIELD EXPENSES - Field Trips#30-55**	Rate	Units	Subtotal
1	GSM-19Ground Mag Survey BaseStation+Walking Mag	$ 1,500.00	4	$ 6,000.00
2	Rental-Magellan GPS receiver, Altimeter,Laptop Comp	$ 120.00	33	$ 3,960.00
3	Goldfields Explorer 10 concentrator	$ 200.00	10	$ 2,000.00
4	3 inch Honda 8 H.P. Water Pump and hoses	$ 45.00	10	$ 450.00
5	20 inch Trommel concentrator, pump & generator	$ 125.00	5	$ 625.00
6	Truck - GMC Cargo Van 2700 x 4 trips+ sample trans	$ 0.40	16200	$ 6,480.00
7	Truck - GMC 3/4 ton 4X4	$ 0.45	4000	$ 1,800.00
8	Truck - Chev 1/2 ton 4X4	$ 0.45	40000	$ 18,000.00
9	ATV - Polaris 400 4X4	$ 125.00	33	$ 4,125.00
10	ATV - Honda 200 Trike	$ 75.00	20	$ 1,500.00
11	ATV - 2 Rentco Honda 350 - Lone Star Clean-up	$ 475.00	0	$ -
12	Aircraft - Peace Air	$ 1,350.00	1	$ 1,350.00
13	2 Snowmobiles	$ 75.00	4	$ 300.00
14	Field Trail Bike Honda 100	$ 50.00	10	$ 500.00
15	8' Zodiac and 20 H.P. Outboard and equipment	$ 50.00	20	$ 1,000.00
16	Prospecting Field equipment:flags,bags,consumables.	$ 1,000.00	1	$ 1,000.00
17	32' Crew Camp Trailer	$ 250.00	15	$ 3,750.00
18	22' 5th Wheel Mobile Office equiped	$ 250.00	24	$ 6,000.00
19	3500 Watt Honda Generator	$ 125.00	24	$ 3,000.00
20	16' Storage Trailer	$ 50.00	24	$ 1,200.00
21	8' ATV and boat trailer/Hauling Trailer	$ 75.00	24	$ 1,800.00
22	Twin 40 h.p.Jet Mercs &Yukon 19'River Boat+Trailer	$ 400.00	24	$ 9,600.00
23	Camping Equipment Rentals:stoves,tent,bags,axe, etc.	$ 200.00	24	$ 4,800.00
24	Chainsaw rentals - 2 saws	$ 20.00	22	$ 440.00
25	Meals & Lodging @ 100.00/person/day (33X4)	$ 100.00	132	$ 13,200.00
26	Maintenance, Washing, Extra Repairs, fuel and oil.	$ 400.00	1	$ 400.00
27	Cat 235 Tracked Hoe/trucking Trenching Grandma Hale	$ 130.00	8	$ 1,040.00
28	Cat 235 Tracked Hoe trench testing Hale Structure	$ 130.00	4	$ 520.00
29	Trail and access roads upgrade and maintenance	$ 109.00	8	$ 872.00
30	Landowner entry Fees and restoration costs	$ 2,200.00	1	$ 2,200.00
31	Legal Surveys and location control	$ 2,859.00	1	$ 2,859.00
32	Grimshaw Trucking - samples to Loring	$ 177.00	2	$ 354.00
33	AERO MAG SURVEY-Hawk Hill-450 Line Kilometres	$ 12.50	450	
34	Hawk Hills 450 Line Kl Processing, Maps & Analysis	$ 6.50	450	
35	Ground Mag Survey-Hawk Hills-Prep for trenching & drilling			
36	Helicopter and sampling Rambling Creek (no cost	nill	nill	$ -
	to TUL)			
	Total:			$ 101,125.00

#	Description **OFFICE & LAB EXPENSES**	Rate	Units	Subtotal
1	Permits and Licences	$ 100.00	3	$ 300.00
2	Licences of Occupation Notikewan Road and airstrip	$ 160.50	2	$ 321.00
3	Research Publications Purchases, information,Corelab	$ 950.00	1	$ 950.00
4	Maps and air photographs	$ 1,500.00	1	$ 1,500.00
5	Colour copying of maps and reports & geochysical data	$ 600.00	1	$ 600.00
6	Report Writing, Photographs, Mylars, Inkjet Printer	$ 500.00	1	$ 500.00
7	Report Printing	$ 1,500.00	1	$ 1,500.00
8	Publishers: Report copies and distribution	$ 600.00	1	$ 600.00
9	Agreements, bids, writing and copy expenses	$ 0.20	2000	$ 400.00
10	Lakefield and Loring Laboratories Fees	$ 9,760.00	1	$ 9,760.00
11	Lab expenses and consumables, rock containers, etc.	$ 500.00	1	$ 500.00
12	2 Microscopes/Rental Value - field and lab	$ 10.00	70	$ 700.00
13	Photography: Grains in Lab & for Field Work/processing	$ 21.00	22	$ 462.00
14	Warehouse and storage-24 months,Calgary & Hines Ck	$ 225.00	24	$ 5,400.00
15	Computers: Scanning, Mapping, Word Processing: 2 Office computers, 2 Field Laptops, Scanner, Zip drive, Mapping and drafting softwares: total apx 2,000hrs use	$ 15.00	1000	$ 15,000.00
16	Laser Prints	$ 0.20	1500	$ 300.00
17	Telephone	$ 90.00	24	$ 2,160.00
18	Fax machine & paper (Field & Offices)	$ 1.00	48	$ 48.00
19	Photocopying research and maps.	$ 0.20	2000	$ 400.00
20	Loomis to Field and City Deliveries	$ 600.00	1	$ 600.00
21	Statement of Expenditures Accountant	$ 45.00	20	$ 900.00
22	Tranport of Magnetometers with Insurance to Peace River and to/from from Toronto.	$ 690.00	1	$ 690.00
	TOTAL:			$ 43,591.00

Description **EXPENDITURES TOTALS**	Rate	Units	Subtotal
Brought Forward from above			$ -
MANPOWER			$ 337,642.40
FIELD			$ 101,125.00
OFFICE & LAB			$ 43,591.00
REPORT done for TUL/GEO Piaja Exploration @ COST	$ 50,300.00	1	$ 50,300.00
DRILLING Kolbert's Mag anomaly on Peace River 1	$ 5,500.00	1	$ 5,500.00
MAG SURVEY Data Purchase-2500LineKl@$12.50	$ 31,250.00	1	$ 31,250.00
AERO MAG SURVEY-Hawk Hills-450LineKl@17.50/kl	$ 17.50	450	$ 7,875.00
AERO MAG Plotting & analysis-Hawk Hills Survey@6.50	$ 6.50	450	$ 2,925.00
Trench Testing/Drilling Hawk Hills, samples and lab, including support equipment, sample trans and lab work.	$ 20,000.00	1	$ 20,000.00
Research trip to London and Leeds University (1/2cost)	$ 1,500.00	1	$ 1,500.00
TOTAL EXPENDITURES MADE:			$ 601,708.40
METALLIC & INDUSTRIAL MINERALS PERMITS			
HECTARES RETAINED:	84,730.25 Ha.		
(Acres retained: 302,660.00 acres)			
EXPENDITURE REQUIRED for Hectares retained:			
See Tabulation of Permits - Schedule "B"			
Page 1	$ 77,054.00		
Page 2	$ 223,310.00		
Page 3	$ 46,826.00		
Page 4	$ 46,080.00		
TOTAL Expenditure Required for Hectares retained:	$ 393,270.00		
EXPENDITURES ASSIGNED TO PROPERTIES:	Schedule"B"	$ 457,118.00	
EXPENDITURES not yet ASSIGNED TO PROPERTIES			$ 144,590.40

TABULATION OF PERMITS (Schedule "B") for STATEMENT OF EXPENDITURES (Schedule "A")
TABLE - 1

TUL PEACE DIAMOND PROJECT, PEACE RIVER DISTRICT, ALBERTA.
PEACE RIVER LOWLANDS DIAMOND AND GOLD EXPLORATION
METALLIC & INDUSTRIAL MINERALS EXPLORATION PERMITS

Assessment Work Period or Term "1" @ 5.00/Ha or Assessment Work Period "2" @ 10.00/Ha.

PROJECT "A" LANDS

1 acre = 0.4047 Hectares 259.008 Hectares per Section

File	AREA BLOCK	PERMIT NAME	PERMIT #	DATE	Location (W6M)	PERMIT Hectares	Area (Ha.) Retained	Expenditure Required	Expenditure Claimed	**Lands Retained**
6	BLOCK 3	Worsley	9393080034	13/08/93	Twp 87 R8 & 9	0000.00				DROPPED
7	BLOCK 4	Eureka River	9393080031	13/08/93	Twp 85-86 R4-5	0000.00				DROPPED
8	BLOCK 6	Peace River 1 Term (2)	9393080039	13/08/93	Twp 83-84 R6-7 NW5 Freehold Rife Resources	9,152.00	5,600 Acres 2266.25 Ha 8.75 Sections	$10.00/Ha $22662.50	$22,662.50	**Twp 84 R 6** **Sections: 3, 4,** **NE & S ½ 5, 8, 9, 10, 15, 16, 17.**
9	BLOCK 6	Peace River 2 Term (2)	9393080040	13/08/93	Twp 83 R8	9,216.00	1280 Acres 518.00Ha	$5,180.00	$5,180.00	**Sections 8,9** 2 Sections
10	BLOCK 6	Peace River 3 (2)	838 9393080121	13/08/93	Twp 82 R 7-8	9,216.00	00.00		None	None
11	BLOCK 6	Highland Park 1 Term (2)	9393080038 121	13/08/93	Twp 82 R6-7	9,216.00	1920 Acres 777 Ha. 3 Sections	$7,770.00	$7,770.00	Taves Mag. **82-6: 7, 18** **82-7: 13**
12	BLOCK 6	Highland Park 2 Term (2)	9393080122	13/08/93	Twp 83 R6-7	9,216.00	2560 Acres 1036 Ha. 4 Sections	$10,360.00	$10,360.00	**83-7: 29,30,31,32.**
15	BLOCK 5	Montagenuse Cr. Term (2) "Kobert's" Mag Anomaly Drilled	9393080141	13/08/93	Twp 84-86 R6 120 day extension Report by March 11/98	9,216.00	7680 Acres 3108 Ha. 12 Sections	$31,080.00	$31,080.00 + $ 25,000.00	Drilled Mag. **84-6: 26, 27, 28, 33, 34, 35.** **85-6: 3,23,24 25, 26, 36.**
					19,040 Acres		7,705.25 Ha	$ 77,054.00	$102,052.50	29.75 Sec.

File		Permit Name	Permit #	Date	Location	Total Area - Ha	Retained Ha.	Exp Required	Exp Claimed	Retained
21	BLOCK 6	Many Islands Term (1) @ 5.00	9395120003	21/12/95	Twp 84-85 R8	9,216.00	14,080 Acres 5,698 Ha. 22 Sections	$28,490.00	$28,490.00	**Hickock Pit** **84-8: 31,32, 33, 34, 35,36.** **85-8: 1 to 14, 23 & 24.**
22	BLOCK 6	Many Islands W Term (1) @ 5.00	9396010019	17/01/96	Twp 84-85 R9-10	9,216.00	16,640 Acres 6,734 Ha. 26 Sections	$ 33,670.00	$ 33,670.00	Mag + Ash **85-9: 1 to 8** **84-9: 19-36**
25	BLOCK 6	Many Isl. Gravel Cap Term (1) @ 5.00/Ha.	9396070032	15/07/96 July/98	Twp 84-85 R7	9,216.00	17,280 Acres 6,993 Ha. 27 Sections	$34,965.00	$34,965.00	Gravels + ash **84-7:31 to 36** **85-7: 2 to 10, 15 to 22, 27 to 30.**
26	BLOCK 6	Many Islands S. Term (1)	9396070033	15/07/96 July/98	Twp 84 R8-9	9,216.00	2560 Acres 1036 Ha. 4 Sections	$5,180.00	$5,180.00	D Indicators **84-8: 19, 20, 29, 30.**
27	BLOCK 6 Kolber's Pipe	Many Islands E. Term (1)	9396070031	15/07/96 July/98	Twp 84 R6-7	9,216.00 + 7,770.00 toward next term	9600 Acres 3885 Ha. 15 Sections	$19,425.00	$19,425.00	Mags **84-6: 11, 14, 23, 22, 21,19, 20, 29, 30, 31, 32.** **84-7: 23, 24, 25, 26.**
28	BLOCK 6	Eureka River 2 Term (1)	9396070034	15/07/96 July/98	Twp 85 R9-10	9,216.00	5,120 Acres 2072 Ha. 8 Sections	$10,360.00	$10,360.00	Mag. **85-9: 9, 10, 11, 12, 15,16,17,18.**
29	BLOCK 6	Clear Prairie (1) Exclusions	9396070036	15/07/96 July/98	Twp 86-87 R10 Pts Sec 22 &27	9,028.00	All 35.25+/-Sec.	$ 45,140.00	$ 45,140.00	**All**
30	BLOCK 6	Clear River (1)	9396070035	15/07/96	Twp 85-86 R10	9,216.00	All 36 Sections	$ 46,080.00	$ 46,080.00	**All**
					110,820 Acres		44,662 Ha.	$ 223,310.00	$231,080.00	173.25 Sec.

TABULATION OF PERMITS for STATEMENT OF EXPENDITURES FOR ALBERTA ENERGY

TABLE -2

TUL PEACE DIAMOND PROJECT, PEACE RIVER DISTRICT, ALBERTA.
PEACE RIVER LOWLANDS DIAMOND AND GOLD EXPLORATION
METALLIC AND INDUSTRIAL MINERALS EXPLORATION PERMITS

PROJECT "B" LANDS

All Term or Assessment Period (2) Lands

1 Hectare = 2.471 Acres, 1 Acre = 0.4047 hectares, 1sq mile = 640 acres X .4047 Ha = 259 Ha.

File	AREA BLOCK	PERMIT NAME	PERMIT #	DATE	Location (W6M)	PERMIT Hectares	Hectares Retained	Expenditure Required	Expenditure Claimed	**Lands Retained**
1	BLOCK 1	Whitemud River 1 LoneStar Anomaly	9393080036	13/08/93	Twp 89 R1: S1-36 +6sq.mi for 2 terms	9,216.00	All 23040 9,216 Ha	2 yr. Credit (2)	use credit + $31,080.00	LoneStar, **all**
2	BLOCK 1	Whitemud River 2	9393080037	13/08/93	Twp 89 R2 S1-36	9,216.00	00.00		None	None
3	BLOCK 1	Whitemud River 3	9393080035	13/08/93	Twp 88 R2&3	9,216.00	1280 Acres 518 Ha.	$5,180.00	$5,180.00	**88-3: 12 & 13**
4	BLOCK 1	Whitemud River 4	9393080032	13/08/93	Twp 86 & 87 R2 &3	9,216.00	2560 Acres 1036 Ha.	$10,036.00	$10,036.00	**87-3: 16, 17, ~~20~~, 21.** 22
5	BLOCK 2	S.Whitemud R.1	9393080033	13/08/93	Twp 87&88,R5&6	9,216.00	3200 Acres 1295 Ha.	$12,950.00	$12,950.00	**88-6: 23, 24, 25, 26, 27.**
13	BLOCK 1	Whitemud River 5	9393080111	13/08/93	Twp 87-88 R2	9,216.00	1920 Acres 777 Ha.	$7,770.00	$7,770.00	**88-2: 6, 7, 18.**
14	BLOCK 1	Whitemud River 6	9393080110	13/08/93	Twp 86-87 R2	9,216.00	00.00		None	None
16	BLOCK 7	Squirrel Mountain	9393080679	26/08/93	Twp 86 R2-4	8,840.00	00.00		None	None
17	BLOCK 8	Jack Creek	9393080678	26/08/93	Twp 85-86 R4	8,964.00	2690 Acres 1089 Ha. 23040 Acres	$10,890.00	$10,890.00	**86-4: All lands in: 2, 3, 10, 11, 14, 23, 26, 27.** See map
18	BLOCK 9	Swift Creek	9393080680	26/08/93	Twp 90 R4-5	9,216.00	Not Applicable All 9,216.00 Ha	4 years credit	Use Credit	Ore, All 36 sections
					57,600 Acres		23,147 Ha.	$ 46,826.00	$ 77,906.00	90 Sections

TABULATION OF PERMITS for STATEMENT OF EXPENDITURES FOR ALBERTA ENERGY

TABLE - 3

PROJECT "C" LANDS

File	AREA BLOCK	PERMIT NAME	PERMIT #	DATE	Location	PERMIT Hectares	Hectares Retained	Expenditure Required	Expenditure Claimed	Lands Retained
23	BLOCK 20	Hawk Hills	9396010020	17/01/96	Twp 96-97 R24-25 W5 90 day Extension. Report being done. Mag Surveys and attempt to drill. Credit for Mag Purchase. Report by July 17,1998.	9,216.00	9,216.00	$46,080.00	$46,080.00	Current + Extension. At least: 96-24: 19,20,30,31 96-25: 36, 24, 25. 97-24: 6, 7. 97-25: 1, 12, 13.
24	BLOCK 6..6	Bonanza	9396010021	17/01/96	Twp 80-81 R11-12 W6	8,192.00	00.00	None	None	Drop.
25	BLOCK 22	Bison Lake	9396060014 to 17	18/06/96	Twp 92-93 R16-17 W5	36,864.00		$ 000.00		Con Ex Operation
31	Block 6	Cleardale	App	May '97	Twp 84-85, R10-121W6	9216.00	Current	0	New	All 36
32	Block 6	Clear River 2	App	May '97	Twp 85, R11 W6M	9216.00	Current	0	New	All 36
33	Block 6	Little Clear River	App	May '97	Twp 86, R11 W6	9216.00	Current	0	New	All 36
34	Block 6	MacLean Creek	App	May '97	Twp 86, R12 W6	9216.00	Current	0	New	All 36
			Totals:	ThisPage	115,200 Acres		9,216.00 Ha.	$ 46,080.00	$ 46,080.00	180 Sections
				Page 1	19,040 Acres		7,705.25 Ha.		$102,052.00	
				Page 2	110,820 Acres		44,662 Ha.		$231,080.00	
				Page 3	57,600 Acres		23,147 Ha.		$ 77,906.00	
				Total:	302,660 Acres		84,730.25 Ha.		$457,118.00	Assigned.

STATEMENT UNDER OATH

PURSUANT TO:
THE PROVINCE OF ALBERTA, Mines and Minerals Act, METALLIC and INDUSTRIAL MINERALS REGULATION, SCHEDULE 2 (SECTION 15) ASSESSMENT WORK REPORT Part 1 (c); THAT

I, Murray J. (Jim) Stapleton, of [redacted] in the City of Calgary, Alberta,

MAKE OATH AND SAY;

1) THAT I am the President of TUL Petroleums Ltd. and am author of the subject Assessment Work Reports, on the TUL Peace Diamond Project Alberta Metallic and Industrial Minerals Exploration Permits, known as "Lamprophyres of the Peace River District" and "Ashes of the Peace River District;"

and

2) THAT the expenditures of time, effort and money, as set out in the **STATEMENT OF EXPENDITURES - SCHEDULE "A"** and the **TABULATION OF PERMITS - SCHEDULE "B"** attached hereto have been made or are in progress by TUL Petroleums, Operator of the Peace Diamond Project, and these are for the purposes of meeting work commitments on the Metallic Minerals Permits described in schedules "A" and "B" and for the extension of the rights to explore and renewal of the Metallic and Industrial Minerals Permits under the Mines and Minerals Act of Alberta - Metallic Minerals Regulations, from March 13, 1996 to March 11, 1998.

I SO SWEAR THIS STATEMENT TO BE TRUE THIS 24th DAY OF February 1998.

[redacted]

Murray J. (Jim) Stapleton,
President, TUL Petroleums Ltd.

AFFIDAVIT OF EXECUTION

CANADA
PROVINCE OF ALBERTA
TO WIT:

I, Tanya Lestus, of the City of Calgary in the Province of Alberta, a Commissioner for Oaths (or Notary Public) in and for the Province of Alberta, make oath and say;

1. THAT I was personally present and did see Murray J. (Jim) Stapleton sign and duly swear as to the veracity of the above **Statement Under Oath**.

2. THAT I know the said Murray J. (Jim) Stapleton and he is in my belief of the full age of eighteen years of age.

3. THAT the same was executed at the City of Calgary in the Province of Alberta and that I am the subscribing witness thereto this 24 day of February 1998.

Tanya Lestus

A Commissioner for Oaths (or Notary Public)
in and for the Province of Alberta.

TANYA M. LESTUS
My Commission expires September 12, 1997

10.3 AUTHOR QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

I, Murray J. (Jim) Stapleton, of [redacted] in the City of Calgary, Alberta, am qualified to prepare and submit this Assessment Work Report on the TUL operated Metallic and Industrial Minerals Exploration Permits tabulated herein by virtue of the following and I hereby certify that I have;

1) a degree from Simon Fraser University, Burnaby, British Columbia, Bachelor of Arts in Geography, specialising in Earth Sciences, specifically Geomorphology.

2) been awarded Professional Certification, as a Petroleum Landman (P.Land).

3) spent twenty years working in the Petroleum Industry as a Petroleum Landman, partly doing fieldwork associated with soils, design and construction.

4) author of the "Landman in Action" which is a textbook published by Mount Royal College which partly deals with soils, mapping, air photo interpretation, surficial geology and sedimentary geology.

5) taught at Mount Royal College for three semesters in the Faculty of Sciences and Technology, Geology Department, Petroleum Land Management Program, which included geology and air photo interpretation.

6) worked for Paul Hawkins & Associates doing field geology and exploration program supervision.

7) have familiarized myself with the geology of diamonds, kimberlite and lamproite geochemistry and sat three wellsites on the TUL properties and recovered kimberlitic indicators.

8) conducted 40 field trips into the Peace River Channel, the Peace River Lowlands, the Clear Hills and Northeast B.C. and supervised the work of Paul Hawkins & Associates Ltd., Paul Hawkins, P.Eng and Michael J. Kelly, P.Eng (Mining) in regard to the TUL exploration programs and on geophysical surveys.

9) worked with Loring Laboratories picking grains, recovering and classifying heavies and kimberlitic indicators related to TUL exploration. I have prospected, mapped and done geochemistry on the Peace River Country continuously for over four years. And successfully picked garnet and pyroxene minerals for microprobe.

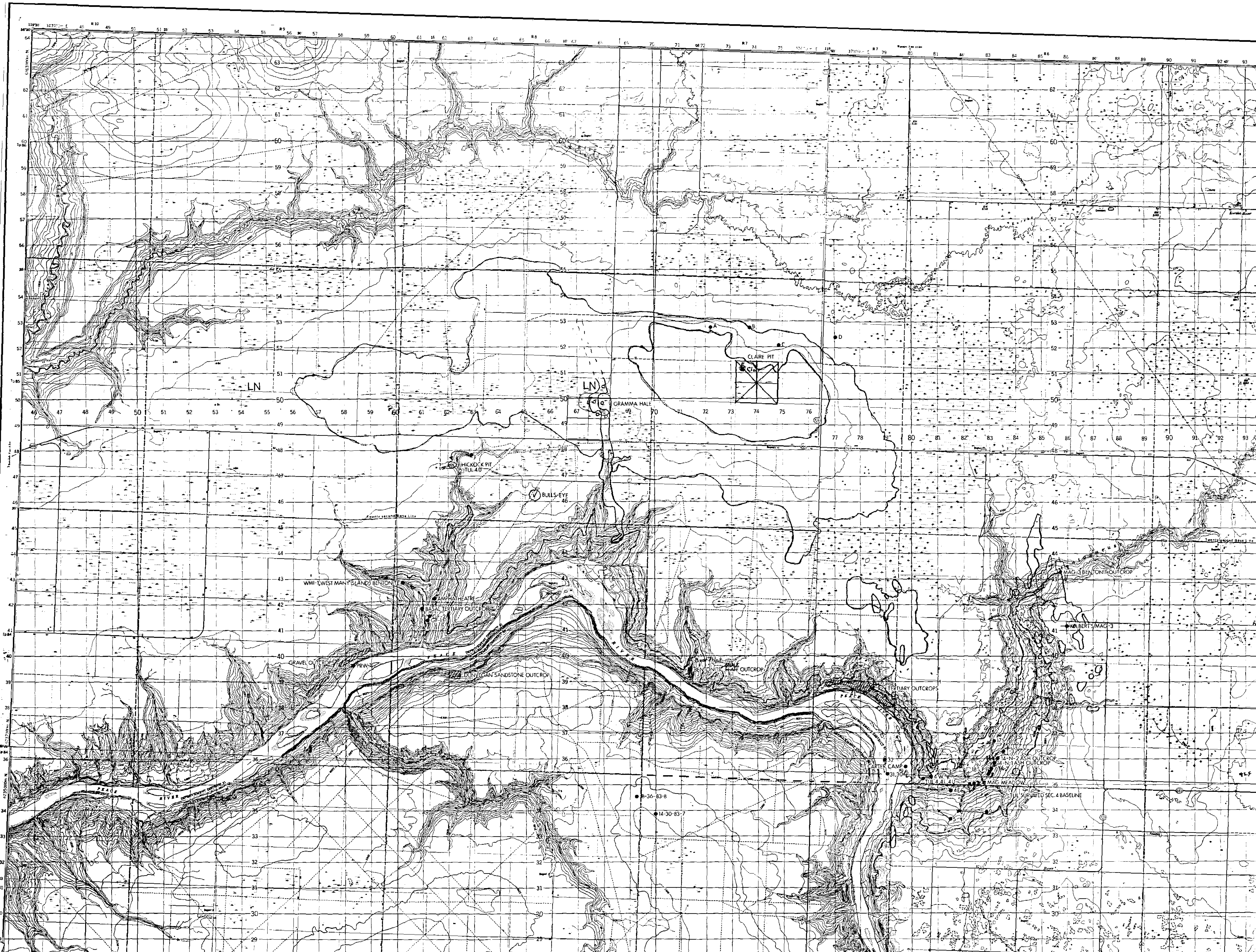
10) have prepared several internal reports and Assessment Work Report for Alberta Energy on the TUL properties and have given presentations in that regard and made two presentations to the MEG - Mineral Exploration Group Society of Calgary, Mining Forums 1996 and 1997.

11) travelled to London, met with DeBeers, accepted their kind hospitality and looked through their diamond room; visited the British Museum of Natural History and studied minerals, diamond and kimberlite collections.

The above statement is true and correct and is being made as a part of the credentials of this Assessment Report dated at the City of Calgary, in the Province of Alberta this 20 th day of July, 1998.

[redacted]

Murray J. (Jim) Stapleton,
B.A., P. Land, President, TUL



1 0.5 0 1 2 3

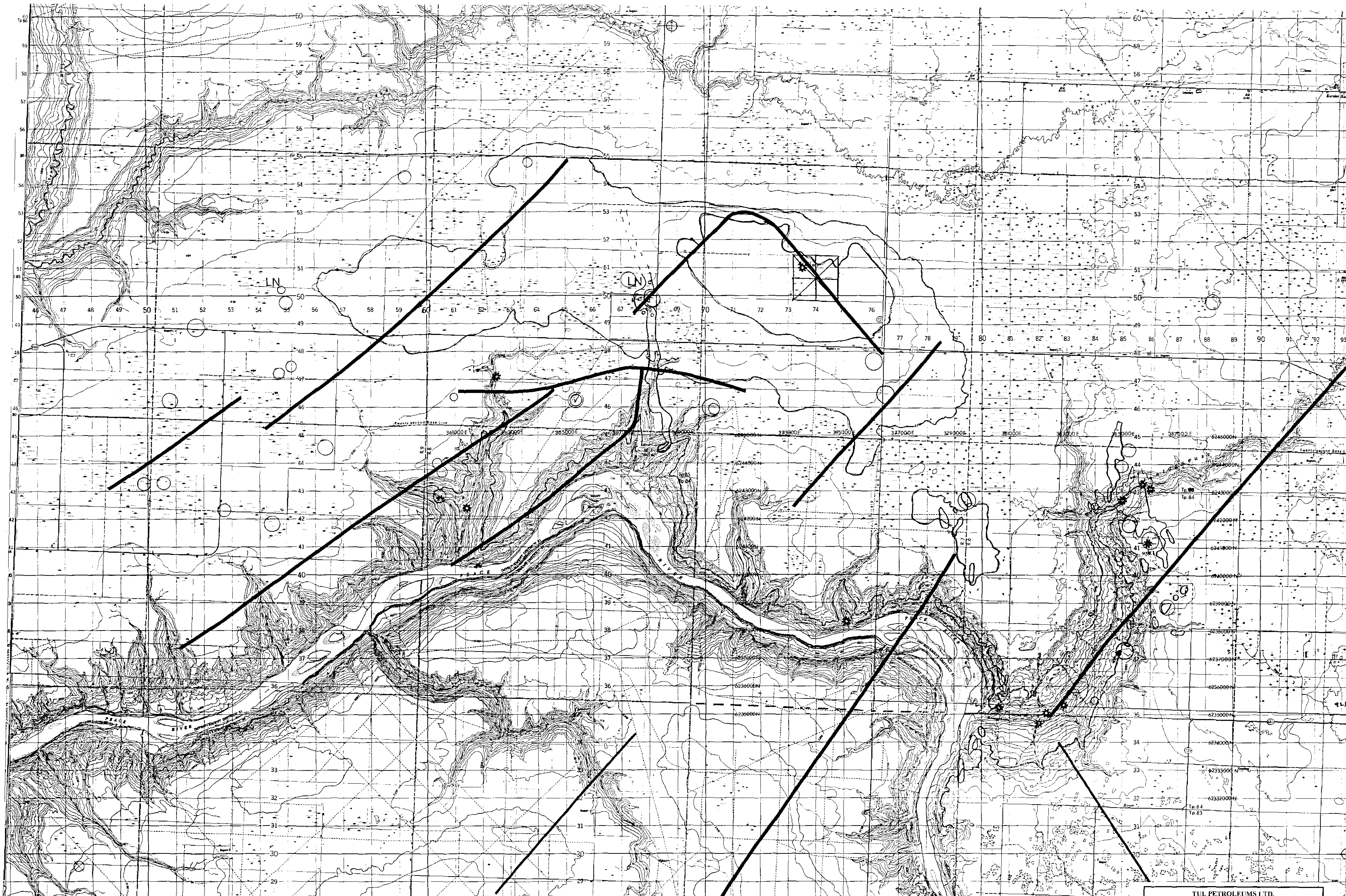
TUL PETROLEUMS LTD.

TUL PEACE DIAMOND PROJECT

SAMPLES LOCATIONS MAP

DIAMOND INDICATOR GEOCHEMISTRY ANOMALIES

June 1998. Scale: 1: 50,000 Figure - 20



TUL PETROLEUMS LTD.

TUL PEACE DIAMOND PROJECT

FAULT LOCATIONS MAP

CARBONIFEROUS AMD DEEP FAULTING

Source: Richards Et-al.; 1994 Lithoprobe Report# 59, 1994

June 1998.	Scale: 1: 50,000	Figure - 21	Page - 108

TUL PETROLEUMS LTD .

TUL PEACE DIAMOND PROJECT

SHALLOW MAGNETICS MAP

CANAGRAD SURVEYS LTD.

June 1998. | Scale: 1: 50.000 | Figure - 22 | Page - 109

TUL PETROLEUMS LTD.

TUL PEACE DIAMOND PROJECT

FALTING/MAGNETICS OVERLAY

June 1998. Scale: 1: 50,000 Figure - 23 Page - 110

APPENDIX I

BIBLIOGRPHY

APPENDIX - I

BIBLIOGRAPHY

Abercrombie, Hugh J. and J.W. Peirce. Vertical fluid flow, fractures, intra-sedimentary magnetization and exotic geochemistry: Observations and speculations. Birch Mountain Resources Ltd. and Geophysical Exploration & Development Corporation (GEDCO.) 1997.

American Geophysical Union. Kimberlites, Diatremes, and Diamonds: Their Geology, Petrology, and Geochemistry. Proceedings of the Second International Diamond Conference, Volume 1. Published by the American Geophysical Union, Washington, D.C. 1979.

American Geophysical Union. The Mantle Sample: Inclusions in Kimberlites and Other Volcanics. Proceedings of the Second International Diamond Conference, Volume 2. Published by the American Geophysical Union, Washington, D.C. 1979.

Ashton Mining of Canada Inc. Ashton Discovers Another Three Kimberlitic Pipes in Alberta. Ashton Mining of Canada Press Release, February 4, 1997.

Ashton Mining of Canada Inc. Press Releases. Http://www.ashton.net.au/news/ January (01), March (03), April (04), May (05), June (06), #14,16,22. 1997.

Ballantyne and D.C. Harris. The Exploration Significance of Central Alberta Modern and Teriary Aluvial Platinum Group Minerals, Chromites, Ilmenites and Placer Gold. Alberta Research Counsel Diamond Conference, 1993,

Bayrock, L. A. Glacial Geology, Alliance-Brownfield District, Alberta. Report 57-2. Alberta Research Council. 1957.

Bertram, E. F., and G. B. Mellon. Peace River Iron Deposits, Information Series 75. Alberta Research Council. 1975.

Bowen, N.L. The Evolution of the Igneous Rocks. General Publishing Company Ltd. 1956.

Bulletin of Canadian Petroleum Geology. Geology of the Peace River Arch - Special Volume 38A, Canadian Society of Petroleum Geologists, Calgary, Alberta. 1990.

Bulletin of the Geological Survey of America Volume 109, Number 8, August 1997, In Circulation: Sept. 15 1998.

Burwash, R.A., McGregor, C.R. and Wilson, J.A., Precambrian basement beneath the Western Canada Sedimentary Basin. *In* G.D. Mossop and I. Shetsen (eds.) Geological Atlas of the Western Canadian Sedimentary Basin, Published Jointly by the Canadian Society of Petroleum Geologists and the Alberta Research Council, Chapter 5. 1994.

Burwash, R.A. and Karlis Muelenbachs, Tectonic Setting of Eastern Alberta Basement Granites Inferred from Pearce Trace Element Discrimination Diagrams. In Ross, G.M. (Compiler), 1997 Alberta Basement Transects Workshop, Lithoprobe Report #59, Lithoprobe Secretariat, University of British Columbia. 1997.

Bruton, Eric. Diamonds. Chilton Book Company, 1978.

Cant, D. J. Regional Structure and Development of the Peace River Arch, Alberta - A Paleozoic failed-rift system? Bulletin of Canadian Petroleum Geology, Volume 36. 1988.

Cowen, A. Hydrological Evaluation of the Grimshaw Gravels Aquifer, Grimshaw, Alberta. Alberta Department of the Environment, Water Resources Division, Soils, Geology & Groundwater Branch, Edmonton, Alberta, Interim Report. 1994.

Cox, P.A. The Elements on Earth. Published in the United States By Oxford University Press Inc., New York. 1995.

Craigie, E. Sampling Techniques and the Distribution of Kimberlitic Indicator Minerals in glacial Tills and Sediments. *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario. 1993.

Davidson, J. G. Diamond Exploration Samples: Laboratory Processing. *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario. 1993.

Dawson, J. B. Geographic and Time Distribution of Kimberlites and Lamproite: Relationship to Tectonic Processes In Kimberlite and Related Rocks. Geological Society of Australia Special Publication No. 14, Volume 1. Edited by J. Ross. 1989.

Dawson, F.M., Evans, C.G. Marsh R. and Richardson, R., Uppermost Cretaceous and Tertiary strata of the Western Canada Sedimentary Basin. *In* G.D. Mosssop and I. Shetsen (eds.), Geological Atlas of the Western Canada Sedimentary Basin, Published Jointly by the Canadian Society of Petroleum Geologists and the Alberta Research Council. 1994.

Decker, R. and Decker, B. Volcanoes. Published by W.H. Freeman and Company. New York, New York. 1989.

Deer, W.A., Howie, R.A. and Zussman, J. An Introduction to the Rock-Forming Minerals. Longman Scientific & Technical UK Limited. 1992.

Dix, G.R., Stages of platform development in the Upper Devonian (Fransian) Leduc Formation, Peace River Arch, Alberta. Bulletin of Canadian Petroleum Geology, Volume 38A. 1990.

Dufresne, M.B., Olson, R.A., Schmitt, D.R., McKinstry, B., Eccles, D.R., Fenton, M.M., Pawlowicz, J.G., Edwards, W.A.D. and Richardson, R., 1994a. The Diamond Potential of Alberta: A regional synthesis of the structural and stratigraphic setting and other preliminary indications of Diamond Potential. Alberta Research Council. 1994.

Dufresne, D.R., Eccles, B. McKinstry, D.R. Schmitt, M.M. Fenton, J.G. Pawlowicz and W.A.D. Edwards. The Diamond Potential of Alberta, Bulletin No. 63. Alberta Energy - Alberta Geological Survey. 1996.

Edwards, W.A.D., and D. Scafe. Gold and Mineral Aggregate Resources of Preglacial Sands and Gravels, Alberta Geological Survey. Presentation at The Calgary Mineral Exploration Group Society Fourth Annual Calgary Mining Forum. April 6 & 7, 1995.

Energy, Mines and Resources Canada. Table of Formations. Institute of Sedimentary and Petroleum Geology, Western Canadian Sedimentary Basin. 1995.

Fenton, Mark M., J.G. Pawlowicz. Alberta Geological Survay, Diamond Indicator Mineral Anomaly From Till Sample Site NAT95-134.
Http://www.ags.gov.ab.ca/ags_pub/geonote97-1/geonote97-1.html

Fenton, Mark M., J.G. Pawlowicz and M.B. Dufresne. Reconnaissance Mineral and Geochemical Survey with Emphasis on Northern Alberta - Report for the End Fiscal Year 1993-1994 Year 2 of a 3 Year Project-MDA Project Number: M92-04-006, Alberta Research Council Report: 1994-21. Alberta Geological Survey, Department Alberta Research Council. 1994.

Fipke, C.E., Significance of chromite, ilmenite, G5 Mg - almandine garnet, zircon and tourmaline in heavy mineral detection of diamond bearing lamproite. GAC-MAC Joint Annual Meeting, Edmonton, Alberta, M17-18, 1993. Program with Abstracts.

Frantsesson, E. V. The Petrology of the Kimberlites. Translated from Russian by D.A. Brown, Professor of Geology, Australian National University, Canberra. 1970

Gent, M. R. Diamonds and Precious Gems of the Phanerozoic Basin, Saskatchewan: Preliminary Investigations, Saskatchewan Energy and Mines, Saskatchewan Geological Survey, Open File Report 92-2, 1992.

Geological Society of Australia. Kimberlite And Related Rocks - Volume I, Their Composition, Occurrence, Origin and Emplacement. GSA Special Publication No.14. Published by Blackwell Scientific Publications. 1986.

Geological Society of Australia. Kimberlite And Related Rocks - Volume 2, Their Mantle/Crustal Setting and Diamond Exploration. GSA Special Publication No.14. Published by Blackwell Scientific Publications. 1986.

Geological Survey of Canada. Magnetic Anomaly Map of Canada. 1990.

Geological Survey of Canada. Gravity Anomaly Maps of Canada. 1990.

Green, R. and G.B. Mellon. Geology of the Chinchaga River and Clear Hills (North Half) Map-Areas (Bad Heart Ironstone), Alberta - Preliminary Report 62-8. Research Council of Alberta. 1962.

Griffin, W. L., C. G. Ryan, J. J. Gurney, N. V. Sobolev, T. T. Win. Chromite Macrocrysts in Kimberlites and Lamproites and Origin. Fifth International Kimberlite Conference, extended abstracts, University of Cape Town, South Africa. 1991.

Griffin, W. L., C. G. Ryan, N. I. Fisher and J. H. Friedman. Elements in Garnets and Chromites: Their Use in Diamond Exploration. CSIRO Division of Exploration Geoscience, North Ryde, Australia. University of Cape Town, South Africa. 1990.

Fipke, C.E., J.J. Gurney and R.O. Moore. Diamond Exploration Techniques Emphasising Indicator Mineral Geochemistry and Canadian Examples. Geological Survey of Canada - Bulletin 423. 1995.

Griffin, W. L. and C. G. Ryan. Trace Elements in Garnets and Chromites: Evaluation of Diamond Exploration Targets. *In* Diamonds: Exploration, Sampling And Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario. 1993.

Harlow, George E. of Cambridge University. The Nature of Diamonds. Cambridge University Press, 1998.

Hart, B.S. and Plint, G. Upper Cretaceous Warping and Fault Movement on the Southern Flank of the Peace River Arch. Bulletin of Canadian Petroleum Geology, Volume 38A. 1990.

Hawkins, P. A. Indicator Mineral Geochemistry in the Peace River Diamond Play. Presentation at The Calgary Mineral Exploration Group Society, Second Annual Calgary Mining Forum. February 10 & 11, 1994.

Helmstaedt, H. H. Natural Occurrences and Tectonic Setting of "Primary" Diamond Deposits, *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario. 1993.

Henderson, E. P. Surficial Geology of Sturgeon Lake Map-Area, Alberta - Memoir 303. Canada Department of Mines and Technical Surveys, Geological Survey of Canada, 1958.

Hunt, Warren C., Environment of Violence. Published by Polar Press, Calgary, Alberta. 1989.

Hunt, Warren C., Expanding Geospheres. Published by Polar Press, Calgary, Alberta. 1992.

Janse, A. J. A. (Bram). The Aims and Economic Parameters of Diamond Exploration. *In* Diamonds: Exploration, Sampling And Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario.

Peirce, John W, Serguei A. Goussev, Robert A. Charters, Hugh J. Abercrombie and Glen R. DePaoli. Intrasedimentary Magnetization by Vertical Fluid Flow and Exotic Geochemistry. 1998.

Jones, J. F. Geology and Groundwater Resources of the Peace River District, Northwestern Alberta - Bulletin 16. Research Council of Alberta. 1966.

Jones, J. F. Wembly Buried Channel, Grand Prairie, Alberta, Research Council of Alberta. 1966.

Kellerhals, R., C. R. Heill and D. I. Bray. Hydraulic and Geomorphic Characteristics of Rivers in Alberta. Research Council of Alberta. 1972.

Kidd, D. J., Iron Occurrence in the Peace River Region, Alberta. Research Council of Alberta. 1959.

Kirkley, M. B., J. J. Gurney and A. A. Levinson. Age, Origin and Emplacement of Diamonds: Scientific Advances in the Last Decade. Gems and Gemology. Spring 1991.

Kjarsgaard, B. A., Geological Survey of Canada. Kimberlite, Lamproite, Diamond, The Calgary Mineral Exploration Group Society, Second Annual Calgary Mining Forum. March 3 & 4, 1993.

Kjarsgaard, B.A., Petroleogy of Somerset Islands kimberlites. *In* Dunne, K.P.E. and Grant, B. (Eds.), Mid-Contenent Diamonds. GAC-MAC Joint Annual Meting, Edmonton, Alberta, May 17-18, Program and Abstracts. 1993.

LeCheminant,A.N., D.G. Richardson, R.M.W. DiLabio, and K.A. Richardson (Eds)SEARCHING FOR DIAMONDS IN CANADA. Geological Survey of Canada, Open File 3228. 1996.

Leckie, D.A. and B. Kjarsgaard et al. Geology of a Late Cretaceous Possible Kimberlite at Mountain Lake, Alberta - Chemistry, Petrology, Indicators Minerals, Aeromagnetic Signature, Age, Stratigraphic Position and Setting. Geological Survey of Canada and the Institute of Sedimentary and Petroleum Geology, Open File 3441. 1997.

Leckie, D.A., Kjarsgaard, B.A., Bloch, J., McIntyre, D., McNeil, D., Stasiuk, L. and Heaman, L Emplacement and Reworking of Cretaceous, Diamond-bearing, Crater Facies Kimberlite of Central Saskatchewan. Canada. *In* Geological Society of America, Bulletin, Volume 109, Number 8, August, 1997.

Leeder, M. R. Sedimentology - Process and Product. Department of Earth Sciences, University of Leeds, Published by George Allen & Unwin, London, England. 1983.

Lehnet-Thiel, Klaus, Loewer, Roland, Orr, Rodney G. and Robertshaw, Phil. Diamond-Bearing Kimberlites I Saskatchewan, Canada: The Fort a la Corne Case History.

Letendre, J., Monopros Limited. Report on the Examination of Samples from the Saskatchewan Geological Survey. 1990. *In* M.R. Gent, SRC Open File Report 92-2.

Lindsay, J. D., S. Pawluk, and W. Odynsky (Appendix by L. A. Bayrock). Exploratory Soil Survey of Alberta Map Sheets 84-D (north half), 84E, 84-F, and 84-G, Research Council of Alberta. 1958.

Lucero Resources Ltd. Internet Press Release and Map.
http://www/newclaymore.com/s/sProperties.asp?PropertyInfoID=27& PropertyMap ID-55 of July 28, 1997.

Marum Resources Inc. Peace River Diamond Project Northwest Alberta. Marum Resources Inc. Annual Report. 1997.

Marchand, M., Diamond Exploration in the Peace River Area, Alberta. Presentation to the Calgary Mineral Exploration Group Society, Fourth Annual Calgary Mining Forum. April 6 & 7, 1995.

Mitchell, R. H. Kimberlites: Mineralogy, Geochemistry and Petrology. Plenum Press, New York. 1989.

Mitchell, Roger Howard. Kimberlites, Orangeites, and Related Rocks. Plenum Press, New York. 1995.

Mitchell, R. H., and S. C. Bergman. Petrology of Lamproites. Plenum Press, New York. 1991.

Morton, R. D. Kimberlites, Lamproites and Diamonds - A Starter's Review. *In* Diamonds in Alberta, What's it all about?, Alberta Research Council - Alberta Geological Survey first conference on diamonds, Edmonton, Alberta. (February 2nd) 1993.

Muehlenbachs, K., and R. A. Burwash, and T Chacko. A Major Isotope Anomaly in the Basement Rocks of Alberta. Alberta Basement Transects Workshop (March 1-2, 1993), Lithoprobe Report # 31, 1993.

Muehlenbachs, K., and R. A. Burwash, and T Chacko. The Oxygen and Hydrogen Isotope Composition of Alberta Basement Rocks: Possible Implications for Crustal Structure and Paleogeographic Reconstructions of the Basement Terrains. Alberta Basement Transects Workshop (February 14-15), Lithoprobe Report # 37, 1994.

Nassichuk, W.W., and D.J. McIntyre. Cretaceous and Tertiary fossils discovered in kimberlites at Lac de Gras in the Slave Province, Northwest Territories. *In* Current Research 1995-B; Geological Survey of Canada, p.109-114. Institute of Sedimentary and Petroleum Geology. 1995.

Nixon, P.H. Regional Diamond Exploration - Theory and Practice. In J.E. Glover and D.I. Groves (eds.), Kimberlites and Diamonds. University of Western Australia, Perth. 1980.

O'Connell, S.C., 1994. Geological History of the Peace River Arch. In Mossop, G.D. and Shetsen, I. (Eds.), Geological Atlas of the Western Canada Sedimentary Basin, Alberta Geological Survey and Alberta Research Council of Alberta and Canadian Society of Petroleum Geology, Volume 38A.

O'Connell, S.C., Dix, G.R. and Barclay, J.E., The Origin, History and Regional Structural Development of the Peace River Arch, Western Canada. Bulletin of Canadian Petoleum Geology, Volume 38A. 1990.

Peirce, J.W., R.A. Charters, S.A. Goussev. Magnetization of the Hines Creek Fault - an HRAM case history. Geophysical Exploration & Development Corporation (GEDCO.) 1997.

Petruk, W., Farrell, D.M. Laufer, E.E. Tremblay, R.J. and Manning, P.G. Nontronite and Ferruginous Opal from the Peace River Iron Deposit in Alberta, Canada. Canadian Mineralogist, Volume 15, 1977.

Pough, F. H. , Peterson Field Guides, Rocks and Minerals, Houghton Mifflin Company, Boston, Massachusetts 02108. 1988.

Prospectors and Developers Association of Canada. Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, Toronto, Ontario, March 27, 1993.

Reed, L. E. The Geophysics of Kimberlite. *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario.

Ritchie, W. D., The Kneehills Tuff, A dissertation submitted to the school of Graduate Studies, Master of Science, University of Alberta, Edmonton, Alberta, 1957.

Ross, G. et al., the Peace River Arch, Western Canada. Bulletin of Canadian Petroleum Geology, Volume 38A. 1990.

Ross, G. M., Alberta Basement Transects Workshop (March 1-2, 1993), Lithoprobe Report # 31, 1993.

Ross, G. M. Tectonic Evolution of Crystalline Basement, Western Canada: Implications for Mantle Evolution, The Calgary Mineral Exploration Group Society, Third Annual Calgary Mining Forum. March 3 & 4, 1993.

Ross, G. M. Alberta Basement Transects Workshop, Lithoprobe Report # 37, February 14-15, 1994.

Ross, G.M. (Editor), Alberta Basement Transects Workshop Lithoprobe Report #47, Lithoprobe Secretariat, University of British Columbia. 1995.

Ross, G.M. (Compiler), Alberta Basement Transects Workshop Lithoprobe Report #59, Lithoprobe Secretariat, University of British Columbia. 1996.

Santiago, S. P. Geological Assessment Report on the TUL Petroleums Ltd. Metallic Minerals Permits #s 93930800-32,33,35 to 40; 9393801-10,11,21,22,41; 93938006-78 to 80; 93951200-03; 93960100-19 to 21; 93960600-14 to 17; 93960700-31 to 36 Northwestern Alberta for GEO Piaja Exploration Corp. Internal Report. 1996.

Scafe, D.W., Alberta Bentonites. Alberta Research Council, Economic Geology Report #2. 1975.

Schulze, D. J. Garnet Xenocrystal Populations in North American Kimberlites. *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario.

Schuman, W. Handbook of Rocks, Minerals & Gemstones. Harper Collins Publishers and Houghton Mifflin Company, 251, Park Avenue South, New York, New York 10003. 1993.

Sinkankas, John. Gemstones and Mineral Data Book, Geoscience Press, 1988

Stapleton, M.J. Ashes of the Peace River District. Assessment Work Report on the TUL Petroleums Ltd. Peace River District Metallic Minerals Exploration Permits. TUL Petroleums Ltd. 1997.

Stapleton, M. J. Diamond Prospecting The Montagneuse River, West Of Fairview, Alberta, Field Report # 94-9-1a. TUL Petroleums Ltd. 1994.

Stapleton, M. J., TUL Petroleums Ltd. TUL 1993 Year End Exploration and Property Report on the Peace River Diamond Exploration Report, Peace River, Alberta. TUL Petroleums Ltd. 1993.

Stapleton, M. J. Peace Diamond Project. Assessment Work Report on the TUL Petroleums Ltd. Peace River District Metallic Minerals Exploration Permits. TUL Petroleums Ltd. 1995.

Stapleton, M.J. Lamprophyres of the Peace River District. Assessment Work Report on the TUL Petroleums Ltd. Peace River District Metallic Minerals Exploration Permits. TUL Petroleums Ltd. 1997.

Tachit, B. The Louis Garski story. From "Our Bend In The Peace" - The Story of Royce and Lubeck (Peace River District, Alberta) Published by the Lubeck Merrymakers Society, Hines Creek, Alberta. 1991.

Trotter, S., and Ross, G. M. Deep Crust and Basement Structure of the Peace River Arch Region: Constraints on Mechanisms of Formation. Geological Survey of Canada, Bulletin of Canadian Petroleum Geology, Vol. 38A. 1990.

University of Western Australia. Kimberlites and Diamonds. Edited by J. E. Glover, and D. I. Groves. The Geology Department and University Extension, The University of Western Australia, Publication No. 5. 1980.

University of Western Australia. Kimberlite Occurrence and Origin: A Basis for Conceptual Models in Exploration. Edited by J. E. Glover, and P. G. Harris. The Geology Department and University Extension, The University of Western Australia, Publication No. 8. 1992.

Urquart W. E. S. and R. Hopkins. Exploration Geophysics and the Search for Diamondiferous Diatremes. *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario.

Villeneuve, M.E., G.M. Ross, R.J. Theriault, W. Miles, R.R. Parrish and J. Broome. Tectonic Subdivision and U-Pb Geochronology of the Crystalline Basement of the Alberta Basin, Western Canada. Geological Survey of Canada - Bulletin 447. 1993.

Wood, B.D. and A.C. Williams. Mountain Lake Prospect, Alberta. Monopros Ltd. Metallic and Industrial Minerals Permits 9390080014, 9390080019, and 9390080020. Assessment File Report 19940001, Alberta Geological Survey. 1994.

Yorath, C.J. Where Terranes Collide. Orca Book Publishers, Victoria, British Columbia. 1990.

APPENDIX II

REFERENCES

APPENDIX II

REFERENCES

Abercrombie, Hugh J. and J.W. Peirce. 1997. Vertical fluid flow, fractures, intra-sedimentary magnetization and exotic geochemistry: Observations and speculations. Birch Mountain Resources Ltd. and Geophysical Exploration & Development Corporation (GEDCO.) pp. 1-5

Ashton Mining of Canada Inc. 1997. Ashton Discovers Another Three Kimberlitic Pipes in Alberta. Ashton Mining of Canada Press Release, February 4, 1997.

Ashton Mining of Canada Inc. Press Releases. Http://www.ashton.net.au/news/ January (01), March (03), April (04), May (05), June (06), #14,16,22. 1997.

Bertram, E. F., and G. B. Mellon. 1975. Alberta Research Council, Peace River Iron Deposits, Information Series 75. pp. 5-12.

Boulay, R. A. 1995. Report on the Ironcap Gold Property, Peace River Area, Alberta - Metallic and Industrial Minerals Permits No. 9390100001 to 9390100008. pp. 27-29.

Cowen, A. 1994. Hydrological Evaluation of the Grimshaw Gravels Aquifer, Grimshaw, Alberta. Alberta Department of the Environment, Water Resources Division, Soils, Geology & Groundwater Branch, Edmonton, Alberta - Interim Report. pp. 9-12.

Dawson, J.B. 1989. Geographic and Time Distribution of Kimberlites and Lamproite: Relationship To Tectonic Processes In Kimberlite and Related Rocks, Geological Society of Australia Special Publication No. 14, Volume 1. Edited by J. Ross. pp. 1-43.

Dufresne, D.R., Eccles, B. McKinstry, D.R. Schmitt, M.M. Fenton, J.G. Pawlowicz and W.A.D. Edwards. 1996. The Diamond Potential of Alberta. Bulletin 63. Alberta Energy-Alberta Geological Survey. pp. 34, 68.

Edwards, D. A., H. V. Lyatsky and R. J. Brown. 1995. Effects of Basement Fault Reactivation on Phanerozoic Stratigraphy in the Alberta Basin.... Presentation made to the 1995 Lithoprobe Alberta Basement Transects Workshop, April 10 & 11, 1995.

Edwards, W.A.D., and D. Scafe. 1995. Gold and Mineral Aggregate Resources of Preglacial Sands and Gravels, Alberta Geological Survey. Presentation at The Calgary Mineral Exploration Group Society, Fourth Annual Calgary Mining Forum, April 6 & 7, 1995.

Energy, Mines and Resources Canada. 1995. Table of Formations. Institute of Sedimentary and Petroleum Geology, Western Canadian Sedimentary Basin.

Hart, B. S. and A. G. Plint. 1990. Upper Cretaceous warping and fault movement on the southern flank of the Peace River Arch, Alberta. Bulletin of Canadian Petroleum Geology. Geology of the Peace River Arch - Special Volume 38A, Canadian Society of Petroleum Geologists, Calgary, Alberta. pp. 190-195.

Helmstaedt, H. H. 1993. Natural Occurrences and Tectonic Setting of "Primary" Diamond Deposits, *In* Diamonds: Exploration, Sampling and Evaluation. Proceedings of a short course presented by the Prospectors and Developers Association of Canada, March 27, 1993, Royal York Hotel, Toronto, Ontario. pp. 1-72.

Henderson, E. P. Surficial Geology of Sturgeon Lake Map-Area, Alberta - Memoir 303. Canada Department of Mines and Technical Surveys, Geological Survey of Canada, 1958, pp. 58.

LeCheminant, A.N., D.G. Richardson, R.M.W. DiLabio, and K.A. Richardson (Eds) 1996. SEARCHING FOR DIAMONDS IN CANADA. Geological Survey of Canada, Open File 3228. B. Kjarsgaard, pp.70.

Leckie, D.A. and B. Kjarsgaard et al. 1997. Geology of a Late Cretaceous Possible Kimberlite at Mountain Lake, Alberta - Chemistry, Petrology, Indicators Minerals, Aeromagnetic Signature, Age, Stratigraphic Position and Setting. Geological Survey of Canada and the Institute of Sedimentary and Petroleum Geology, Open File 3441. pp 10, 12, 60-70.

Marchand, M. 1995. Diamond Exploration in the Peace River Area, Alberta. Presentation to The Calgary Mineral Exploration Group Society, Fourth Annual Calgary Mining Forum, April 6 & 7, 1995.

Marum Resources Inc. Annual Report 1997. Peace River Diamond Project Northwest Alberta.

Mitchell, R. H. 1989. Kimberlites: Mineralogy, Geochemistry and Petrology, Plenum Press, New York.

Mitchell, Roger Howard. 1995. Kimberlites, Orangeites, and Related Rocks. Plenum Press, New York. pp. 1-28; pp. 42; "Ukukitskoye" kimberlite field. Pp. 53.

Mitchell,R. H., and Bergman, S.C. 1991. Petrology of Lamproites. Plenum Press, New York.

Muehlenbachs, K., and R. A. Burwash, and T Chacko. 1994. The Oxygen and Hydrogen Isotope Composition of Alberta Basement Rocks: Possible Implications for Crustal Structure and Paleogeographic Reconstructions of the Basement Terrains. Presentation to the Alberta Basement Transects Workshop, February 14-15, 1994, Lithoprobe Report # 37. pp. 250-253.

Nassichuk, W.W., and D.J. McIntyre. 1995. Cretaceous and Tertiary fossils discovered in kimberlites at Lac de Gras in the Slave Province, Northwest Territories. *In* Current Research 1995-B; Geological Survey of Canada, p.109-114. Institute of Sedimentary and Petroleum Geology.

O'Connell, S. C., G. R. Dix and J. E. Barclay. 1990. The origin, history, and regional structural development of the Peace River Arch, Western Canada. Bulletin of Canadian Petroleum Geology. Geology of the Peace River Arch - Special Volume 38A, Canadian Society of Petroleum Geologists, Calgary, Alberta. pp. 4-24.

Peirce, J.W., R.A. Charters, S.A. Goussev. 1997. Magnetization of the Hines Creek Fault - an HRAM case history. Geophysical Exploration & Development Corporation (GEDCO.) pp 1-5.

Ritchie, W. D. 1957. The Kneehills Tuff, A dissertation submitted to the school of Graduate Studies, Master of Science, University of Alberta, Edmonton, Alberta. pp. 1- 50.

Ross, G. M. 1990. Deep crust and basement structure of the Peace River Arch: constraints on mechanisms of formation. Bulletin of Canadian Petroleum Geology. Geology of the Peace River Arch - Special Volume 38A, Canadian Society of Petroleum Geologists, Calgary, Alberta. pp. 25-34.

Ross, G.M. (Editor), 1995. Alberta Basement Transects Workshop Lithoprobe Report #47, Lithoprobe Secretariat, University of British Columbia. pp. 87.

Ross, G.M. (Compiler), 1997. Alberta Basement Transects Workshop Lithoprobe Report #59, Lithoprobe Secretariat, University of British Columbia. pp. 91-101 & p. 163.

Santiago, S. P. 1996. Geological Assessment Report on the TUL Petroleums Ltd. Metallic Minerals Permits #s 93930800-32,33,35 to 40; 9393801-10,11,21,22,41; 93938006-78 to 80; 93951200-03; 93960100-19 to 21; 93960600-14 to 17; 93960700-31 to 36 Northwestern Alberta for GEO Piaja Exploration Corp. Internal Report.

Stapleton, M. J. 1993. Assessment Work Report #95-15-1A on the TUL Petroleums Ltd. Metallic Minerals Exploration Permits (Peace Diamond Project) Peace River, Alberta.

Wood, B.D. and A.C. Williams. 1994. Mountain Lake Prospect, Alberta. Monopros Ltd. Metallic and Industrial Minerals Permits 9390080014, 9390080019, and 9390080020. Assessment File Report 19940001, Alberta Geological Survey.

MAPS AND ILLUSTRATIONS

Alberta Department of Mines and Minerals, Metallic Mineral Permit Areas Map, Scale 1:750,000, Aug. 11, 1997.

Canadian Society of Petroleum Geologists and the Alberta Research Council. 1994. Figure - 24.14. Structure contour map on the Battle/Kneehills Tuff marker. p. 339; Figure 24.22. "Distribution and formation names of the consolidated and unconsolidated middle to Tertiary sediments. Saskatchewan sands and gravels are Pleistocene." p 405; Figure 28.4. Isopach map from the top of the Devonian to the top of the Precambrian in the Peace River area. p. 431; Figure - 28.5. Structure contour map of the Precambrian surface in the Peace River region (Trotter, 1989). P.432;

Canadian Society of Petoleum Geologists Geological Highway Map Series, Second Edition 1981 (Jackson, P.C.,(Map Committee Chairman), Myhr, D.W., Groeneweg, B, Palmer, H., McLean, G.C., Loney, C.D., Dolphin, D.R.,Dr.Rein de Wit (Editor) Cross-section of Phanerozoic Peace River Arch. A-A'.

Collom, C.J. Effects of the Peace River Arch (not Embayment!) on deposition of the Upper Cretaceaou Bad Heart Formation, and correlation with coeval strata of Alberta. Lithoprobe Report #59, p. 163.

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Deer Hill Alberta 84 D/8, Scale 1:50 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Hines Creek, Alberta 84 D/2, Scale 1:50 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Eureka River Alberta 84 D/7, Scale 1:50 000

Department of Energy Mines and Resources, Surveys and Mapping Branch, 1977: Topographic Map, Many Islands, Alberta 84 D/6, Scale 1:50 000

Dix, G R., et al. 1990. Structure Contour Map of the Precambrian, The Peace River Arch region: constraints on mechanisms of formation. Geology of the Peace River Arch - Special Volume 38A. Canadian Society of Petroleum Geologists, Calgary, Alberta. pp. 4-24.

Dufresne, D.R., Eccles, B. McKinstry, D.R. Schmitt, M.M. Fenton, J.G. Pawlowicz and W.A.D. Edwards. 1996. The Diamond Potential of Alberta. Alberta Energy - Alberta Geological Survey. Bulletin No. 63. Figure 10. "Location and Age of North American Kimberlites and Lamproites." pp. 23.

Dufresne, D.R., Eccles, B. McKinstry, D.R. Schmitt, M.M. Fenton, J.G. Pawlowicz and W.A.D. Edwards. 1996. The Diamond Potential of Alberta. Alberta Energy - Alberta Geological Survey. Bulletin No. 63. Figure 3. "Domain Map." pp.12; Figure 3. "Selected sand and gravel deposits in Alberta, with schematic cross-section and stratigraphic grouping." pp. 15; Figure 9. "Major Faults, Diatemes, Dykes." pp. 24; Figure 17. "Spacial Relationships of bentonites to major faults" pp. 49; Figure 18. "Contour map of crustal thickness of depth to the Mohorovicic discontinuity…" pp. 52; Figure 20. "Horizontal gradient of Bouger gravity anomalies for Alberta" pp.55; Geochemical Trends map. Figure - . pp 83.

Gadd, B. Handbook of the Canadian Rockies. Corax Press, Box 1557, Jasper, Alberta. 1987. "Hardest Rock in the Rockies: Quartzite of theGog and Atan Groups" pp. 88-93.

Geological Survey of Canada, Department of Mines and Minerals, Map 1251 A Tectonic Map of Canada, Scale 1:5 000 000, 1968.

Geological Survey of Canada, 1989: Aeromagnetic Total Field, Clear Hills Alberta, Geological Survey of Canada, Map 7774G, Scale 1:250 000.

Geological Survey of Canada, 1989: Aeromagnetic Total Field, Peace River, Geological Survey of Canada, Map 7773G, Scale 1:250 000.

Green, R. and G.B. Mellon. 1962. Geology of Chinchaga River and Clear Hills (North Half), Alberta, Geology of the Chinchaga River and Clear Hills (North Half) Map-Areas, Alberta, Research Council of Alberta, Preliminary Report 62-8. (Bad Heart Ironstone)

Leckie, D.A. and B. Kjarsgaard et al. Geology of a Late Cretaceous Possible Kimberlite at Mountain Lake, Alberta - Chemistry, Petrology, Indicators Minerals, Aeromagnetic Signature, Age, Stratigraphic Position and Setting. Geological Survey of Canada and the Institute of Sedimentary and Petroleum Geology, Open File 3441. 1997. Figure - 6. "Stratigraphic position of the Mountain Lake volcanics. Fission track dating of apatite indicate an age of emplacement of 72 +/- 7 to 78 +/- 9 Ma. Palynological analyses suggest an age of 75 Ma. pp. 12.

APPENDIX III

REGIONAL GEOLOGY

GEOLOGICAL TABLE OF FORMATIONS
PEACE RIVER ARCH REGION

EON	ERA	PERIOD	EPOCH	AGE
PHANEROZOIC	CENOZOIC	QUATERNARY Lac.to recessional:0-200'	RECENT	MBP
			PLEISTOCENE	.1 - 1.6
		Tertiaries:Deep Channel 2 Peace River:Irony Channel and basin 0-50'	PLIOCENE whitestone & ash marker<30?	? 1.6 - 4.9
		TERTIARY	MIOCENE	4.9 - 23.7
		Uplands Tertiary-Unit 1?	OLIGOCENE	23.7 - 34.0
		deep-paleo channel/ basin conglomerated tertiaries - old ?	EOCENE	34.0-56.5
			PALEOCENE	56.5-66.4 (65.0)

Saskatchewan Gravels,
Grimshaw Gravels,
Montagneuse area gravels?

Grimshaw Gravels? *(Cowen, 1994)*

Caribou Boulder Broadcast *(Hunt 1989)*

Kneehills Volcanics, *(Ritchie, 1957)*

ERA	PERIOD (Description and Thickness)	FORMATIONS	AGE	PRA	LITHOLOGY
MESOZOIC	light grey conglomerate to deltaic: 400-500'	MONTANA GROUP Wapiti	66.4-		Continental,.SST, Coal,Grey Shales
	grey marine: 300-400'	SMOKY GROUP Paskwaskau Nomad Chungo Hanson Thistle Dowling	80	DOWN	Marine,dark grey Shales, Silty Shales, Concretions
	CRETACEOUS red or grey brown: 1-35' base elevation:2450' dark grey marine:200-500'	COLORADO GROUP Bad Heart Muskiki Cardium Kaskapau Opabin Haven Vimy Sunkey	82 85	WARP	Marine/green-br. Oolitic Ironstone brown SST SST &Congl. dark Shales
	pale grey deltaic:160-500' dark grey marine:800-1000'	FORT ST. JOHN GROUP Dunvegan Upper Shaftsbury	88 90		Deltaic to Marine SST and Shales
		FISH SCALES MARKER	95		Marine Shales/fossils

Description and Thickness

Company: TUL PETROLEUMS LTD.
TABLE OF FORMATIONS
PEACE RIVER, ALBERTA

Figure - 24

GEOLOGICAL ASSESSMENT REPORT

ON

THE TUL PETROLEUMS LTD.

METALLIC MINERAL EXPLORATION PERMITS

#s 93930800-32, 33, 35 to 40; 9393801-10, 11, 21, 22, 41;
93938006-78 to 80; 93951200-03; 93960100-19 to 21;
93960600-14 to 17; 93960700-31 to 36

NORTHWESTERN ALBERTA

FOR

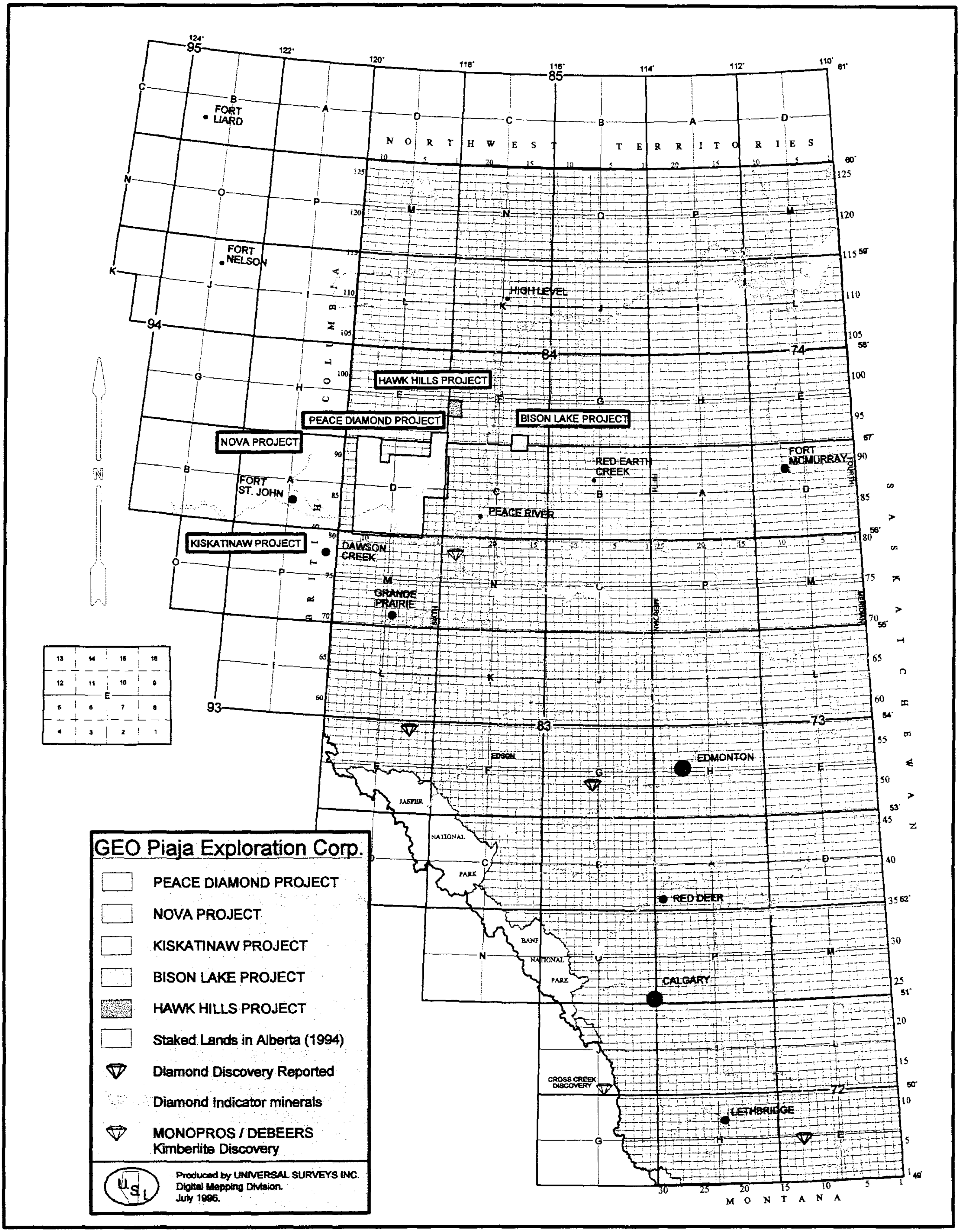
GEO PIAJA EXPLORATION CORP.

BY

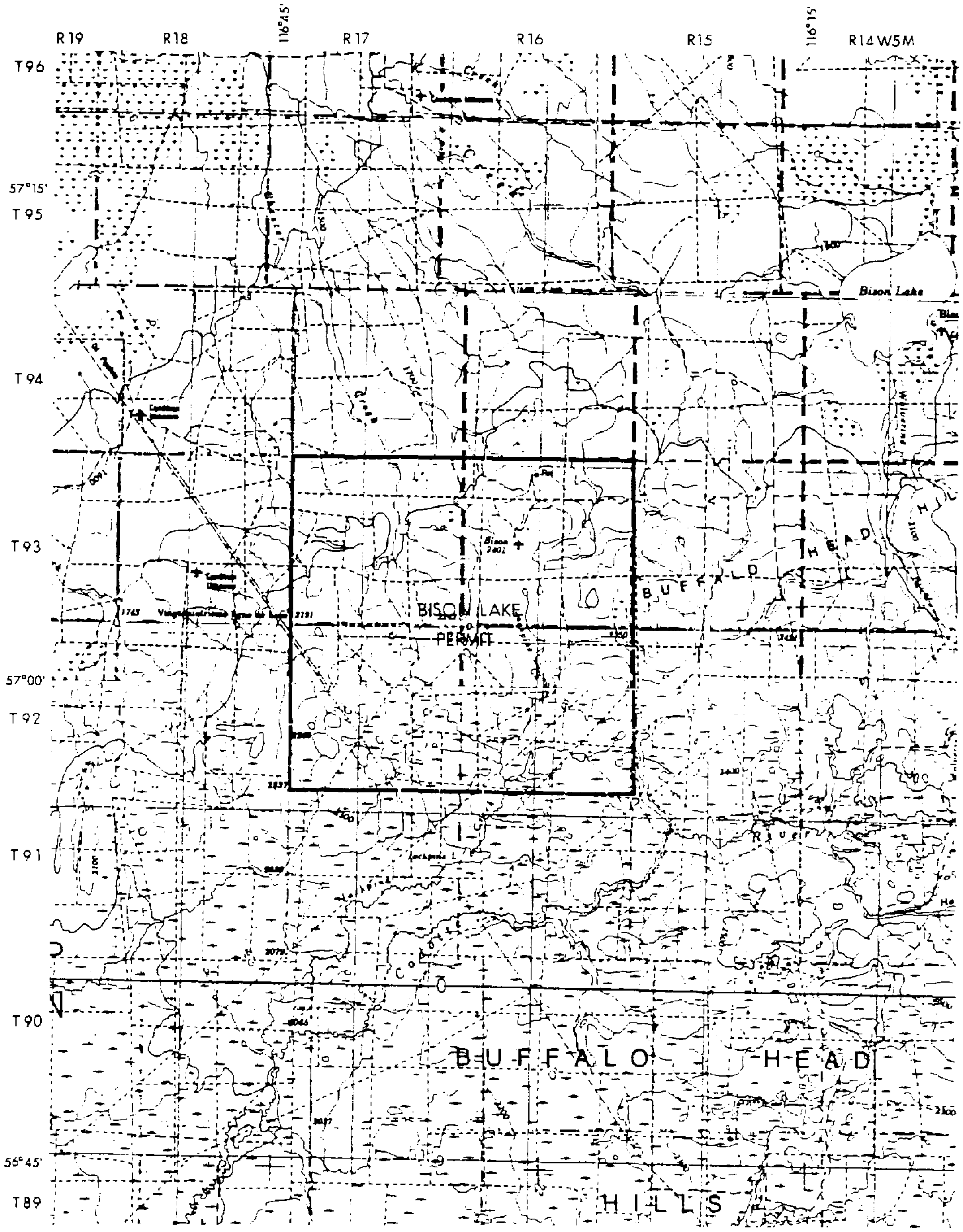
Sigfrido P. Santiago, P.Geo. (B.C.)

S. P. Santiago & Associates Ltd.
Geoscience Consultants International
5016 Maryvale Drive N.E.
Calgary, Alberta T2A 2T3

Revision #1, 15-Oct-96


GEO Piaja Exploration Corp.
PEACE DIAMOND PROJECT
NOVA PROJECT
KISKATINAW PROJECT
BISON LAKE PROJECT
HAWK HILLS PROJECT
Staked Lands in Alberta (1994)
Diamond Discovery Reported
Diamond Indicator minerals
MONOPROS / DEBEERS
Kimberlite Discovery
Produced by UNIVERSAL SURVEYS INC.
Digital Mapping Division.
July 1996.
HAWK HILLS PROJECT
PEACE DIAMOND PROJECT
BISON LAKE PROJECT
NOVA PROJECT
KISKATINAW PROJECT
NORTHWEST TERRITORIES
BRITISH COLUMBIA
SASKATCHEWAN
MONTANA
FORT LIARD
FORT NELSON
HIGH LEVEL
FORT ST. JOHN
DAWSON CREEK
GRANDE PRAIRIE
PEACE RIVER
RED EARTH CREEK
FORT MCMURRAY
EDSON
EDMONTON
JASPER NATIONAL PARK
RED DEER
BANFF NATIONAL PARK
CALGARY
CROSS CREEK DISCOVERY
LETHBRIDGE
FIFTH MERIDIAN
FOURTH MERIDIAN
SIXTH
N

APPENDICES

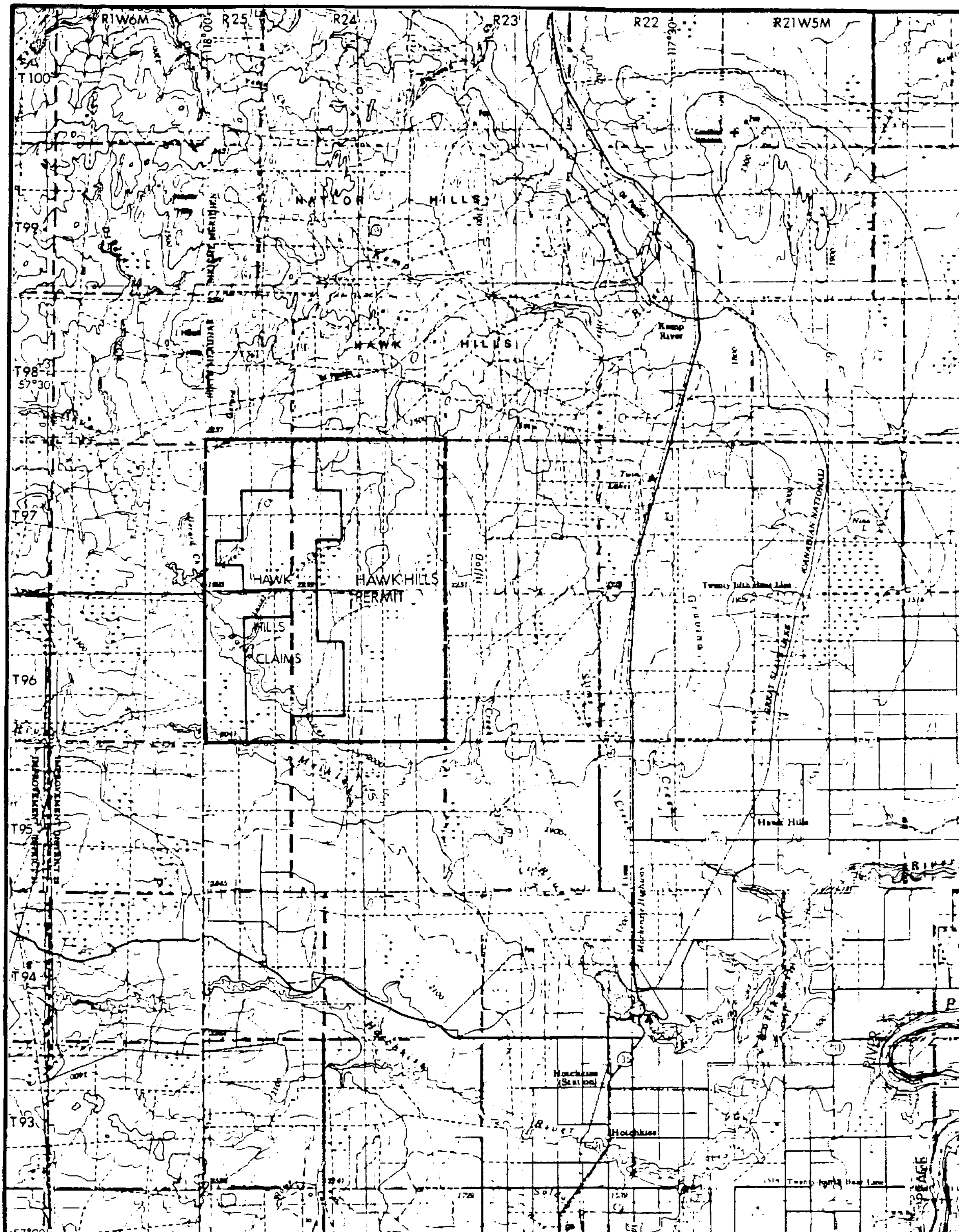


GEO Piaja EXPLORATION CORP.

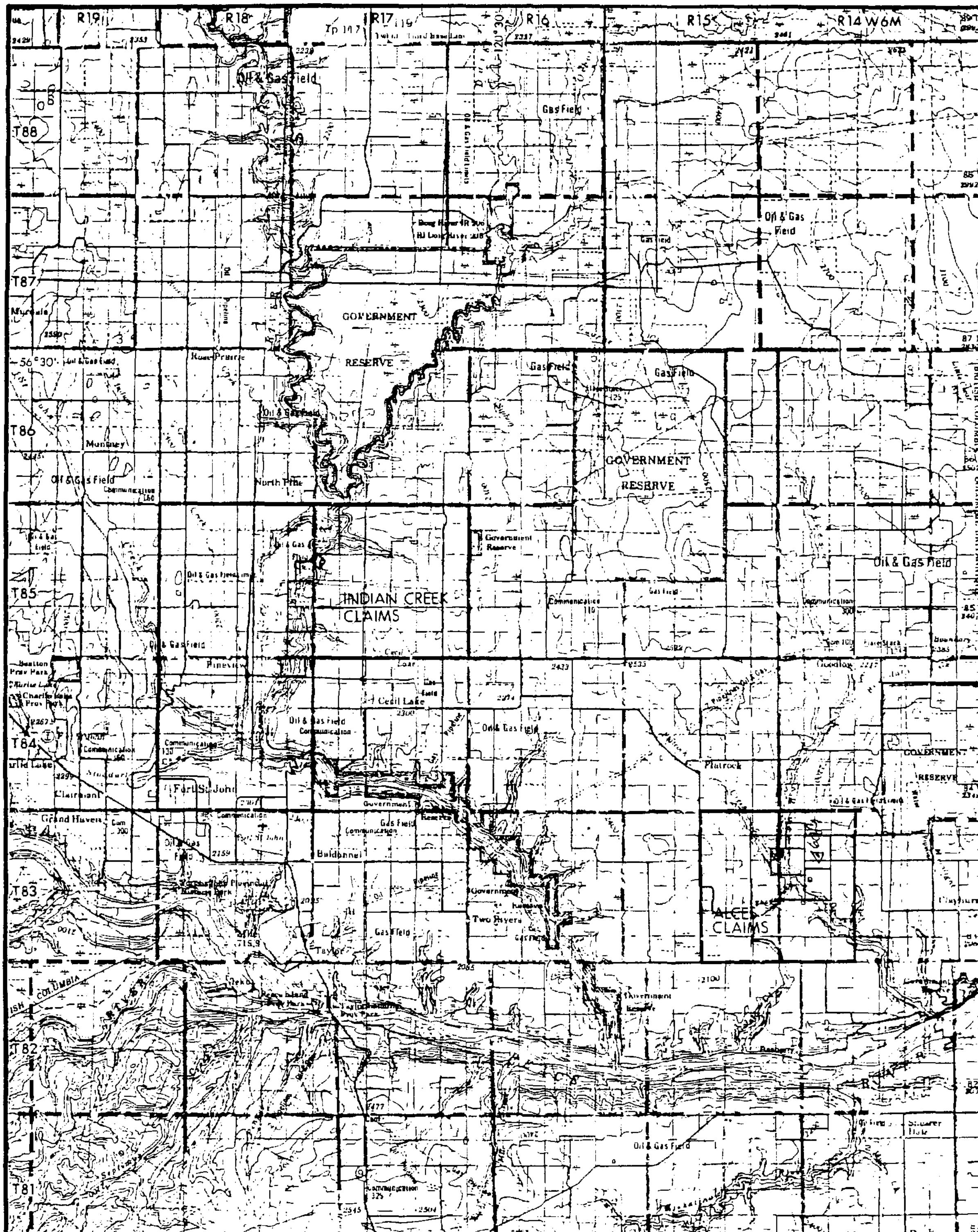
BISON PROJECT

1:250,000

Figure 3.2



GEO Piaja EXPLORATION CORP.	
HAWK HILLS PROJECT	
1:250,000	Figure 3.3



GEO Piaja EXPLORATION CORP.		
INDIAN CREEK AND ALCES PROJECT		
1:250,000		Figure 3.4

Appendix 4.0

Kimberlite and Lamproite hosted diamonds and Placer diamonds.

Kimberlites and Lamproites, and models for emplacement (Dufresne et al, 1994) and Diamond Mineral Deposit Models for Alberta, Kimberllte or Lamproite hosted diamonds and Placer diamonds (Olson et al, 1994) are summarized as follows:

Kimberlites and lamproites are, to date, the only two known economic primary sources of diamonds in the world. Both are geologically similar in many respects since they are both products of deep-seated continental intraplate alkaline volcanism.

Both kimberlites and lamproites are not truly primary deposits in the sense that all or at least most of the diamonds did not originate within the source magma.
Instead, the macrodiamonds in these host igneous rocks are actually derived from the disaggregation of sometimes highly diamondiferous source rocks that exist in places in the lithospheric upper mantle. Therefore, the kimberlite and lamproite magmas simply provided the transport medium to move diamonds formed in the upper mantle source rock to the surface.

Kimberlites and lamproites which originate from within or below the diamond source rocks have the potential to transport diamonds to the Earth's surface while those that originate at the craton margins can not transport diamonds to the surface because they do not sample the diamondiferous source rocks.

Primary diamonds or graphite pseudomorphs after diamonds are also known to occur in some lamprophyres, alkali basalts and alpine type peridotites, but significant quantities of diamonds have not yet been found in these rocks.

Kimberlites and lamproites are not just confined to the Archean parts of cratons but also can occur within mobile belts, either during periods of normal faulting prior to the orogenic movements or subsequent to deformation and cratonization of the mobile belt. The AustralianArgyle deposit hosted in lamproite that has intruded into a Proterozoic fold belt illustrates the possibility for large accumulations of post-Archean eclogitic diamonds to occur outside of, but adjacent to, an Archean craton.

The four requirements for a large primary diamond deposit to occur at the Earth' s surface are: 1) the kimberlite/lamproite host rock must originate in or below a diamond-rich source region of the upper mantle where diamonds have remained stable since the time of their formation; 2) the kimberlite/lamproite intrusion must sample the diamond-bearing source region(s); 3) the kimberlite/lamproite magma must ascend fast enough and provide a suitable reducing chemical environment for diamonds to survive the transport to the Earth's surface; and 4) the host magma must encounter emplacement sites where conditions are conducive to the formation of sufficiently large pipes.

Diamond-rich placer deposits are a secondary but a major source of world diamonds. They result from the mechanical concentration of moderate to high density minerals.

The following summarizes the significant (and differences in) characteristics of diamondiferous kimberlites / lamproites and diamond-rich placer deposits:

Diamondiferous Kimberlites

Tectonic Framework

generally restricted to regions of the continental crust underlain by Archean basement; large, deep-seated regional structures within the Archean basement may act as conduits for kimberlite emplacement; also occurs in regions underlain by Proterozoic but are generally not economic.

Regional Characteristics

1. flat lying Phanerozoic platform or basinal sedimentary rocks that overlie Archean cratonic rocks; kimberlites, especially the diatreme facies, are much less common in exposed Archean rocks due to erosion.
2. kimberlites tend to occur in clusters, often the clusters may be spatially associated with regional zones of crustal weakness.
3. crustal extension zones characterized by the presence of diabase dyke swarms or continental flood basalts.
4. arcuate or linear crustal fracture zones that exist at the flanks of regional cratonic warps, domes, arches or structural basins.
5. arcuate or linear zones characterized by the presence of alkali intrusive rocks related to hot spot volcanic activity or volcanic activity along transform faults.
6. craton scale drainage divides which may mirror cratonic domes or arches.
7. positive regional gravity anomalies which may indicate anomalous thickness' of cratonic crust.

Deposit Characteristics

1. the 3 textural-genetic groups of kimberlites are:
 1) crater facies- includes epiclastic to pyroclastic rocks such as tuffs; typically forms a ring around the perimeter of the kimberlite;
 2) diatreme facies- diatremes are vertical or steeply inclined cone-shaped bodies that consist primarily of tuffistic or volcaniclastic kimberlite breccias; the steep sides(75-85^0 dip) and downward tapering margins of the diatreme result in a cross-sectional

Diamondiferous Lamproites

Tectonic Framework

most common along the margins of cratons and in adjacent accreted mobile belts that have undergone relatively young and persistent faulting.

Regional Characteristics

many of the characteristics that are important for kimberlites are also important fro lamproites; some of the characteristics that may be important for lamproites but not for kimberlites include:

1. thick crust and lithosphere below or immediately adjacent to accreted mobile belts with multiple episodes of both compressional and extensional tectonic events.
2. Proterozoic mobile belts adjacent to Archean cratons are considered particularly favourable.
3. continental scale lineaments both parallel to the strike of the mobile belt or crosscutting the strike.
4. paleorift or subduction zones

Deposit Characteristics

lamproite hosted diamond deposits exhibit many of the same characteristics that kimberlite hosted deposits exhibit; some of the differences that may be exhibited by lamproite hosted deposits include:

1. lamproites occur principally as extrusive, subvolcanic and hypabyssal rocks.
2. volcanic vents or edifices are shallow and wide and commonly are compared to the shape of a champagne glass; composite craters with

area decreasing regularly with depth and lead to its 'carrot-shaped' description; approximately elliptical or subcircular outcrop plans of this facies are also characteristic; the axial lengths of the diatremes range from about 300 to 2,000 m.

3) hypabyssal root zone facies- the grading downward continuation of the diatreme, as irregular to regular dykes and sills.

2. the majority of kimberlitic diamonds are recovered from diatreme breccias or root zone dykes but diamond grades can be highly variable, even in separate zones within individual pipes; crater facies rocks contain important concentrations of diamonds but are volumetrically insignificant due to erosion.
3. depending upon the level of erosion, diamond producing pipes have a surface area between 5 and 30 hectares; the pipes range from oval to lenticular in shape and tend to occur in clusters.
4. kimberlites are essentially potassic, olivine-rich, ultramafic rocks with a high CO_2 content; the megacryst/macrocryst and groundmass assemblage is characterized by olivine, Mg-ilmenite(picroilmenite), Cr-poor/Ti-rich pyrope garnet, subcalcic diopside to enstatite, Ti-poor phlogophites and a variety of spinels (such as magnesian chromite); accessory minerals present include monticellite, perovskite, apatite, calcite and serpentine; **garnets** that are high in Mg & Cr, and low in Ca(G10 garnets) are key indicators of diamonds that originate from peridotitic sources; associated chromites are abnormally rich in Cr; garnets that have high Ti and trace amounts of Na are often indicators of diamonds that originate from **eclogitic sources**.
-compared to the average ultramafic rock, kimberlites are usually enriched in incompatible elements that includes Li, F, P, K, Ti, Rb, Sr, Zr, Nb, Sn, Ba, Pr, Nd, Sm, Eu, Gd, Hf, Ta, Tl and Pb by a factor of between 10 and 100, and C, Cs, La, Ce, Th and U by a factor greater than 100; overlying residual soils may have high concentrations of Ti, Cr, Ni, Mg, Ba and Nb.

associated bedded volcaniclastic deposits and volcanic debris are common where the craters are preserved; extrusive lamproitic volcanism is characterized by lava flows and pyroclastics similar in style to those of basaltic volcanism.

3. in contrast to kimberlites, the majority of diamond deposits in lamproites are found in pyroclastic rocks.
4. the crater facies of a lamproite is commonly intruded by magmatic lamproite; diamonds occur mainly in the pyroclastic rocks of the crater facies, with the magmatic lamproite phases being diamond-poor. as a result, the diamondiferous tonnage potential of lamproites tends to be restricted to the volume of pyroclastics preserved in the vent.
5. lamproites exhibit an extremely wide range in modal mineralogy; primary phases include Ti-rich and Al-poor phlogopite, Ti-K-rich richterite, forsterite, Al-Na-poor diopside, Fe-rich leucite and sanidine; minor and accessory phases include priderite, wadeite, apatite, perovskite, Mg-chromite and Mg-Ti-magnetite.
6. Lamproites are ultra-potassic ($K_2O/Na_2O>3$), peralkaline ($K_2O+Na_2O/Al_2O_3>1$) and rich in Ba, Zr, Sr, La and F.

Two types of kimberlites are recognized worldwide and are commonly referred to as Group I and Group II kimberlites. These two groups correspond to the original 1914 Wagner classification of olivine kimberlites and micaceous kimberlites.

Group I : found worldwide, generally characterized by the presence of abundant olivine, the characteristic megacryst/macrocryst suite and by the presence of minor amounts of phlogophite; from the following three sources are derived crystals that may be contained in this petrographically complex rocks with overall mineralogy varying widely depending on the relative contribution of each of the following three sources:

1) the fragmentation of upper mantle xenoliths
-xenolithic minerals are Cr-rich subcalcic pyrope (G9 and G10 garnets), olivine, Cr-diopside, high-Cr chromite and diamond.

2) **the** primary phenocryst and groundmass minerals which crystallize directly from the kimberlitic magma
-primary minerals are olivine, phlogophite, perovskite, spinel varieties (e.g. magnesian

chromite), monticellite (Ca-rich olivine), apatite, calcite and primary serpentine

3) the megacryst/ macrocryst or discrete nodule suite

-megacrysts are large(1-20 cm) single crystals of low-chrome titanian pyrope (G1 or G2 garnets), magnesian(picro)ilmenite, subcalcic to calcic diopside, olivine, Ti-poor chromite, enstatite, phlogophite and zircon; lamellar intergrowths between picroilmenites and pyroxenes are common.

-macrocrysts are somewhat smaller crystals, but tend to be rounded to subrounded and are compositionally similar to the megacryst suite of minerals with the exception that macrocrysts include abundant olivine.

-it is not clear whether the megacryst/macrocryst suite of minerals are xenocrysts or cognate phenocrysts, or a combination of the two; the megacrysts are believed to have formed in the upper mantle, and the existence of such megacryst minerals is generally believed to be an indicator of kimberlite magmatism.

Group II : kimberlites are only known from southern Africa and comprise principally rounded olivine macrocrysts in a matrix of abundant phlogophite and diopside, with calcite and relatively rare spinel and perovskite; in contrast to Group I , the kimberlites lack the megacryst suite and minerals such as monticellite and ulvospinel.

Diamond-rich Placer Deposits (Olson et al, 1994)

Tectonic Framework

Placer diamond deposits form in a 1) distinct tectonic environment due to the unique setting of diamond bearing rocks and in 2) marginal cratonic basins or intracratonic basins underlain by or in close proximity to stable Archean craton.
Rocks that host placer diamond deposits range in age from Archean to Recent. Placer diamond deposits and other associated heavy mineral deposits span the same age interval.

Regional Characteristics
1. occurrence of diamond-bearing kimberlite or lamproite pipes in the hinterland.
2. a surface of submature to mature topography.
3. relatively long periods of mechanical and chemical weathering resulting in highly weathered and well dissected terrain.
4. periodic uplift and/or subsidence.
5. absence of extensive glaciation.
6. geomorphological and sedimentological features indicative of ancient or present day gulches, creeks, alluvial fans, braided rivers, flood plains, fan deltas and beaches.
7. some alluvial placer diamond deposits are up to 1,000 km from their kimberlite or lamproite source.

Deposit Characteristics

1. placer deposits proximal to a diamond-bearing kimberlite or lamproite generally contain coarse grained diamonds of varying quality in seams, paystreaks or lenses in alluvium at or near bedrock; examples of this type of environment may include gulches, creeks and immature rivers.
2. in proximal deposits, fractured bedrock and false bottoms, such as clay seams, may play an important role in the concentration of diamonds.
3. placer deposits distal to a diamond-bearing kimberlite or lamproite generally contain fine grained diamonds of much higher quality than the proximal deposits; in addition, the diamonds are often finely disseminated to lensoidal throughout the sedimentary column; in the distal deposits diamonds can also be concentrated at bedrock; examples of this type of environment include mature river systems, flood plains, deltas and beaches.
4. the sand, gravel or conglomerate that hosts placer diamonds is usually relatively clean and quartz rich.
5. periodic uplift or subsidence can result in terraced paleoplacer deposits, also cause reworking and further reconcentration of diamonds into higher grade paystreaks in the present day watercourses.
6. based on the environment of deposition, a variety of sedimentological conditions are important for the concentration of diamonds:
   a) in a gulch or creek setting diamonds exist in regular paystreaks that are laterally consistent and are on or near bedrock; the host alluvium is generally thin, with the gravely sediments being poorly sorted and crudely to distinctly stratified.
   b) in a mature river or fan delta environment diamonds may accumulate in many sedimentological facies but their occurrence is often sporadic and discontinuous; in meandering rivers diamonds may concentrate in main channel deposits such as dunes or lag deposits, or in point bar deposits on the inside curve of river meanders; in a braided river diamonds may concentrate in a number of areas including channel junctions, channel bends, bank-hugging bars, sluiceways between restricted stable banks and any other areas where stream flow is convergent.
7. the heavy mineral suite accompanying diamonds in alluvial placers is dependent upon the stable heavy assemblage in the surrounding country rocks and the heavy minerals associated with diamonds in the source area; ilmenite is the most common associated heavy mineral, but it may be accompanied by monazite, rutile, magnetite, pyrope, diopside, chromite, platinoids, uraninite, pyrite, gold, arsenopyrite and zircon.

APPENDIX 4.2

4.2.1 The Western Canada Sedimentary Basin (WCSB)

The WCSB was an extremely long-lived depositional realm having a sedimentary record as 'youthful' as Early Tertiary, and reaching as far back in time as the Middle Proterozoic (Ricketts, 1989).

The WCSB is primarily characterized by a Mesozoic/early Cenozoic predominantly sedimentary wedge that thickens westward from a zero-edge on the Canadian Shield to the foreland thrust and fold belts of the Canadian Cordillera. The wedge is underlain by Paleozoic strata, which, in turn overlie Precambrian basement. The basement shows little evidence of faulting during Phanerozoic time except to the west, where the basin merges with the Foreland Belt. A basin-scale angular unconformity separates these primary units. In places, this primary unconformity separates Permian and Triassic strata. Elsewhere, missing strata span a larger time, from Devonian to the Cretaceous. It is therefore possible that more one kilometre of sediment was eroded sometime between the Permian and the Early Cretaceous.

The Mesozoic to early Cenozoic strata form a classic foreland basin in response to overthrust loading by the Canadian Cordillera. The cause of the Paleozoic subsidence of the Canadian Shield beneath the undeformed part of the basin remains unknown. It is clear, however, that the burial history of the deeper strata was complicated and involved major phases of Paleozoic and Mesozoic subsidence separated and terminated by phases of uplift and erosion (Issler et al,1990).

The WCSB (Figure A-4.2 = Figure 3.1 of Wright et al, 1994) comprises the eastern Canadian Cordillera and two major sedimentary basins: a northwest-trending trough in front of the Cordilleran Fold and Thrust Belt (extending eastward to the Canadian Shield) called the Alberta Basin; and the cratonic Williston Basin centred in North Dakota and extending into southern Saskatchewan. These two features are separated by a broad northeast-trending positive element which include the Bow Island Arch. At the southwestern end of this arch is the Kevin-Sunburst Dome, within which there are Tertiary intrusives while to the east is the Swift Current Platform which formed the locus of intermittent, broad, low-relief topographic highs throughout the Phanerozoic. The Swift Current Platform and the Meadow Lake Escarpment were active during Silurian time.

The northern limit of the WCSB is defined by the Tathlina High in the Northwest Territories. This High formed an uplifted area from the Cambrian until its burial in the Middle Devonian. At the north end of the Alberta Basin are the Liard Basin, a dramatic feature in northeastern British Columbia and the Northwest Territories, bounded on the east by the Bovie Lake fault and fold system; and the east-trending Hay River Fault and coincident Great Slave Lake Shear Zone (GSLSZ) which has up to 700 km of dextral displacement in Lower Proterozoic basement rocks. Vertical and possibly horizontal offset are probably present in Phanerozoic strata near the Hay River Fault.

Strata of Middle Proterozoic to Cenozoic age thicken from an erosional edge in the northeast to more than 20 km within the Cordillera. Within this wedge, the Peace River Arch was a prominent east-northeast-trending topographic high in Cambrian to Late Devonian time that subsequently became, in part, the site of a faulted basin (the Peace River Embayment) in Mississippian to Permian time.

Coincident with the Late Devonian-Mississippian Antler Orogeny of the U.S.A., extensional tectonics produced the Liard Basin and the east-west oriented Peace River Embayment containing the similarly oriented Fort St. John graben. Orthogonal faults are associated with the graben. The Dunvegan Fault near the eastern end of the Peace River Embayment was active primarily in Late Mississippian, Pennsylvanian and possibly Permian time. This fault provides an example of the reactivation of a boundary between two Precambrian elements, the Ksituan magnetically positive arc (the northeast limit of which is approximately coincident with the fault) and the Chinchaga magnetic low. The 88 km long Dunvegan Fault has a northwest orientation and is parallel to many other lineations in northern Alberta and British Columbia, some of which are also identifiable as present-day topographic lineaments (Wright, McMechan and Potter, 1994)

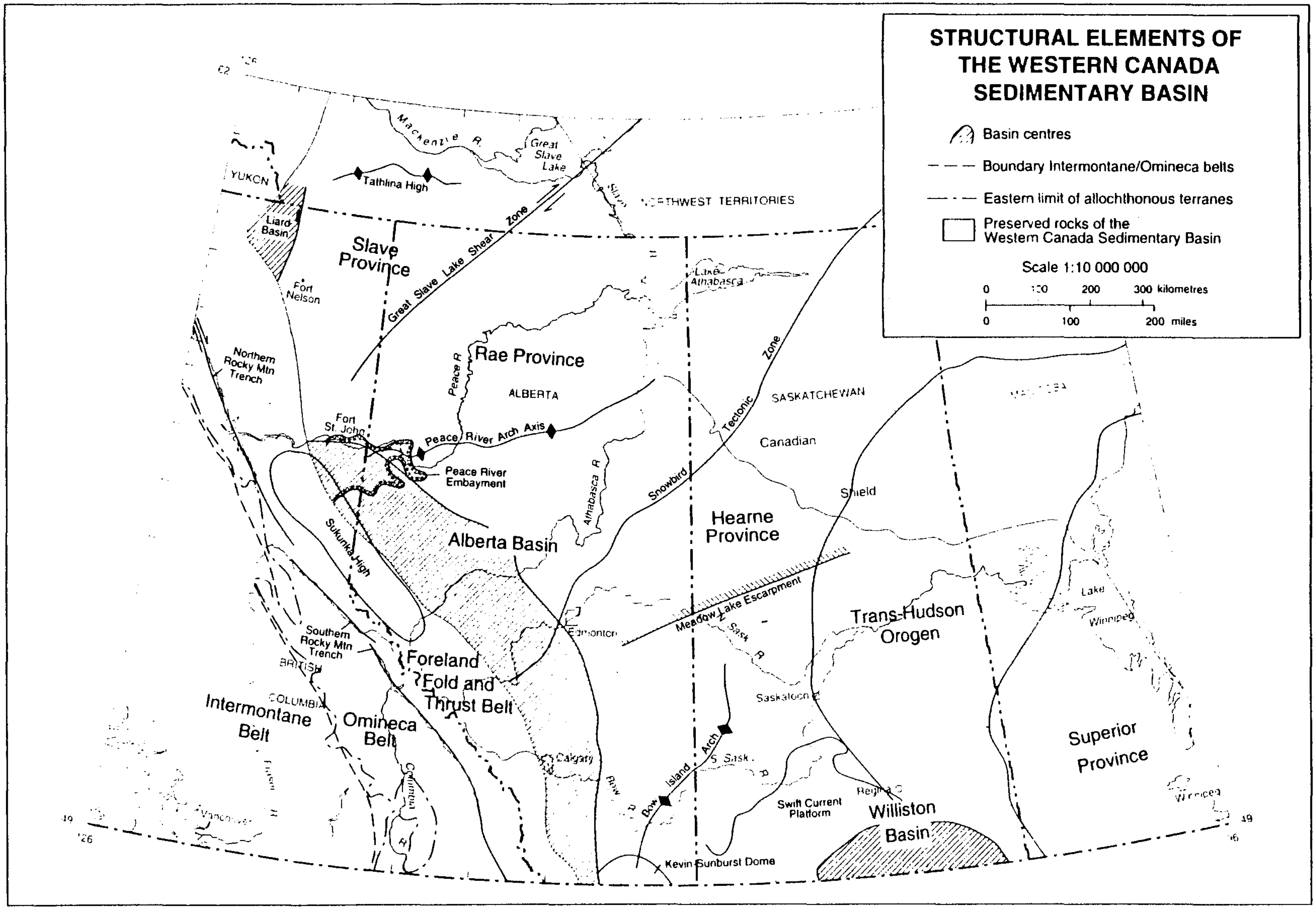


Figure 3.1 Structural elements of the Western Canada Sedimentary Basin. Precambrian domains taken from both Ross et al. and Burwash et al. (Chapters 4 and 5, *this volume*). The western limit of the exposed North American sedimentary wedge is from Wheeler and McFreely (1987) and the Meadow Lake Escarpment is from Porter and Fuller (1959). The Peace River Arch and Embayment, the Alberta and Williston basins, the Tathlina High and Bow Island Arch are delineated by isopachs, and the Kevin-Sunburst Dome by a structural contour.

4.2.2 The Precambrian Basement

The present-day North American Craton (Figure A-4.3) is essentially an aggregation of several Archean microcontinents that were welded together by accretionary and collisional processes operative during the interval 2.0-1.8 Ga (Early Proterozoic) in the assembly of the Canadian Shield (Hoffman, 1990). These cratons are the North Atlantic (Nain), the Superior, the Slave, the Wyoming, the Churchill Structural Provinces (including both the Rae and Hearne Sub-provinces) and the Kaminak (west of Hudson Bay).

The Western Canada Sedimentary Basin (WCSB) is floored by rocks that formed during Kenoran or Hudsonian orogenies, or consists of Archean or lower Proterozoic rocks that have been exposed to Hudsonian metamorphic overprinting.

The Churchill, Superior, Slave and Wyoming cratons and their extensions play a critical role in the basement of the Western Canada Sedimentary Basin (WCSB).

The western margin of the Shield adjacent to the WCSB is cut by a number of faults and shear zones of regional extent (Figure 4.1).

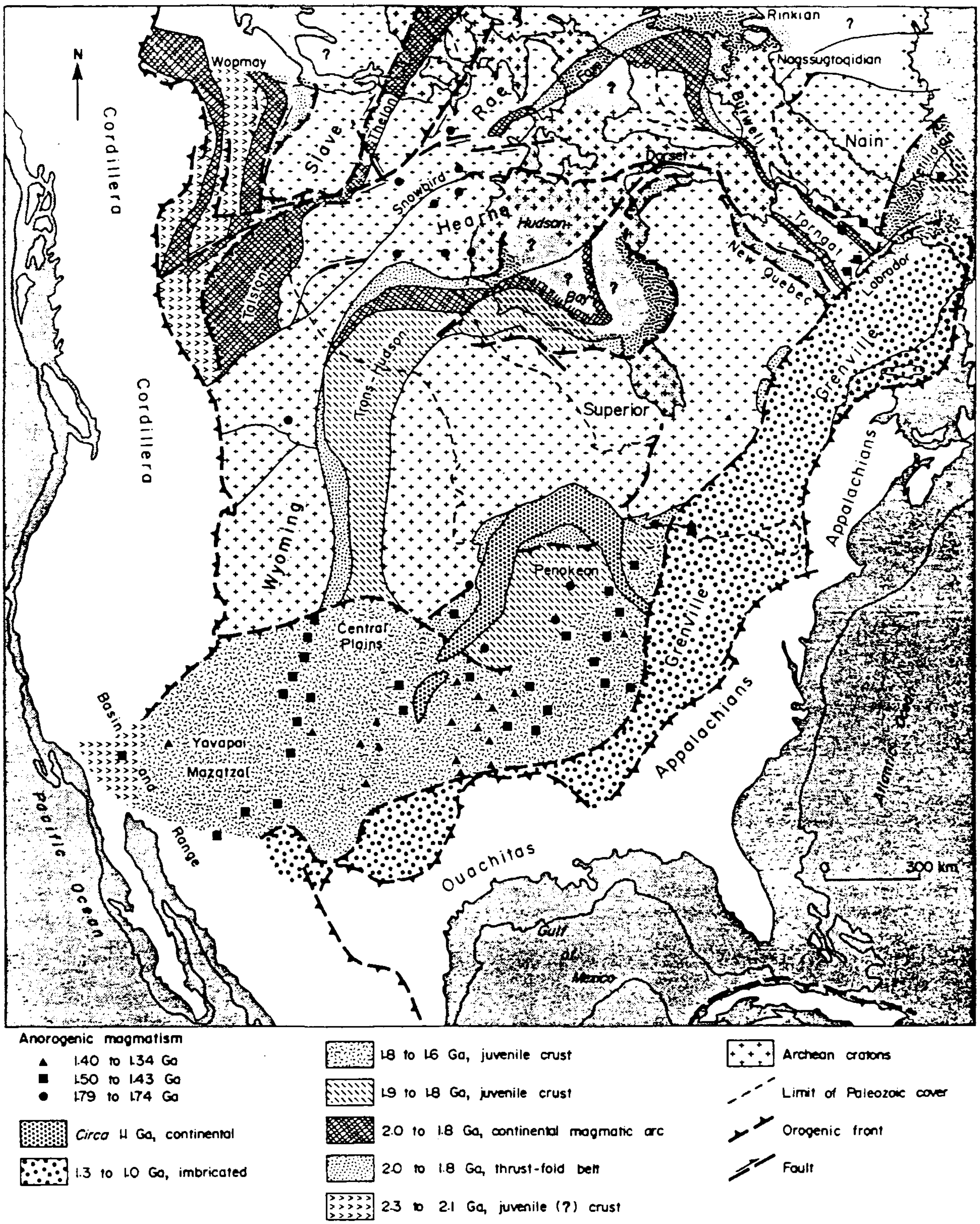
A series of northeast-trending major tectonic zones that segment or bound the Archean crustal blocks include the Great Slave Lake Shear Zone (GSLSZ), the Snowbird Tectonic Zone (STZ), the Needle Falls Shear Zone (NFSZ) and the Churchill-Superior Boundary Zone (CSBZ).

The GSLSZ is a major transcurrent dextral movement shear zone consisting of a broad band of mylonite south of GSL that accommodated the northeast translation of the Slave Craton during its collision with the Rae Province between 2.0 and 1.9 Ga. The GSLSZ can be traced as far west as the eastern edge of the Cordillera.

Conjugate northeast-northwest-trending faults control the basement topography and sedimentation patterns over the Peace River Arch. Vertical movements totaling several hundred meters occurred along these faults in late Paleozoic time. In northeastern Alberta, a series of north-south lineaments, offset by later east-trending faults, were inferred. Trending subparallel are the topographically distinct McDonald fault (MDF), one of a series of northeast-trending, brittle zone, late Hudsonian lineaments and the northeast-trending faults of the East Arm of Great Slave Lake that continue in the subsurface as the Tathlina (TFZ) and Hay River (HRFZ) fault zones.

The STZ is a pronounced aeromagnetic and gravity discontinuity that separates the Rae and Hearne Sub-provinces (formerly Churchill Province) and can be traced from Hudson Bay, across the Shield {Virgin River Shear Zone (VRSZ)] and through Alberta as far west as the frontal thrust of the Rockies.

The dextral movement of the GSLSZ is also characteristic of the VRSZ and NFSZ.



Principal subdivisions of the Precambrian of North America (using the terminology *of* Hoffman 1989)

Figure A-4.3

The CSBZ (Thompson Belt) is the boundary between the Archean Superior Province and the Lower Proterozoic Trans-Hudson Orogen. It is a composite belt of north-trending curvilinear aeromagnetic and gravity anomalies that truncates the east-trending potential field fabric characteristic of the Superior Province and is interpreted as a zone of collision with sinistral transcurrent movement. This boundary zone may have been active in Paleozoic time as indicated by the late, brittle stage of deformation of Paleozoic strata.

Early Proterozoic orogenic belts in Western Canada include Wopmay Orogen [WMO(1.97-1.84 Ga)], Thelon-Taltson Orogen [TTO(2.0-1.9 Ga)] and Trans-Hudson Orogen [THO(1.88-1.79 Ga)]. These are characterized by deformed and metamorphosed trailing (passive) margin and foreland sedimentary sequences, accreted terranes of island arc affinity, and significantly, continental margin magmatic arcs of calc-alkaline affinity. The latter elements provide distinct aeromagnetic signatures that allow each of these orogens to be traced beneath the Phanerozoic cover.

The Proterozoic orogens weld older Archean rocks of the Superior Province to the southeast Churchill (Hearne) Province, and Archean Slave Province rocks to the northwest Churchill (Rae) Province. WMO forms the weld between Proterozoic crust (1.97 Ga) of Hottah Terrane and Slave Province, similar to Proterozoic (2.32-1.99 Ga) crustal slivers in northern Alberta that have been accreted to the Rae Province along the TTO.

Three Hudsonian magmatic belts can be traced from the exposed Shield beneath the WCSB: 1) to the west of the Slave Province, the WMO extends beneath the cover rocks of the Northern Interior Plains and is truncated by the TFZ and HRFZ, and by the GSLSZ. The southern continuation of the WMO probably occurs near the Alberta-British Columbia boundary, north of Ft. St. John, along the GSLSZ; 2) to the east of the Slave Province, the TTZ is offset along the Bathurst and McDonald (MFZ) fault systems; the TTZ southern extension, the TMZ can be traced southward from the GSLSZ to the STZ; and 3) the THO, bounded to the west by the NFSZ and to the east by the CSBZ contains the Tabbernor fault which defines the east boundary of the Archean Glennie Lake domain.

The Athabasca Polymetamorphic Terrain (APT),centred by the Peace River Arch and bounded to the west by the GSLSZ and to the east by the VRSZ, includes the north-trending early Hudsonian Allan Fault Zone which has been subjected to recurrent movement after regional metamorphism and a northeast-trending splay with dextral movement Black Bay Fault. Precambrian supracrustal rocks (schist, banded iron formation, and metavolcanics) form nearly 30% of the THO samples compared to about 40% for gneisses and granulites while in the APT, supra-crustal rocks form less than 5% and gneisses and granulites more than 80%. The APT has thus been eroded to a much deeper crustal level than the THO.

Some of the structural elements of the WCSB are associated with movements of the underlying basement. The texture and orientation of integrated potential field data allow the Precambrian basement rocks east of the Cordillera and beneath the WCSB to be subdivided into distinct tectonic-metamorphic domains with ages ranging from Archean (3,278 Ma) to early Proterozoic (1,779 Ma).

From northeast to southwest, the five broad units are the Superior Province, the Trans-Hudson Orogen (THO), the Hearne Province (including the Cree Lake Zone), the Rae Province (or northwest Churchill) and the Slave Province (Figure A-4.4= Figure 4.1, Ross, Bloom and Miles, 1994).

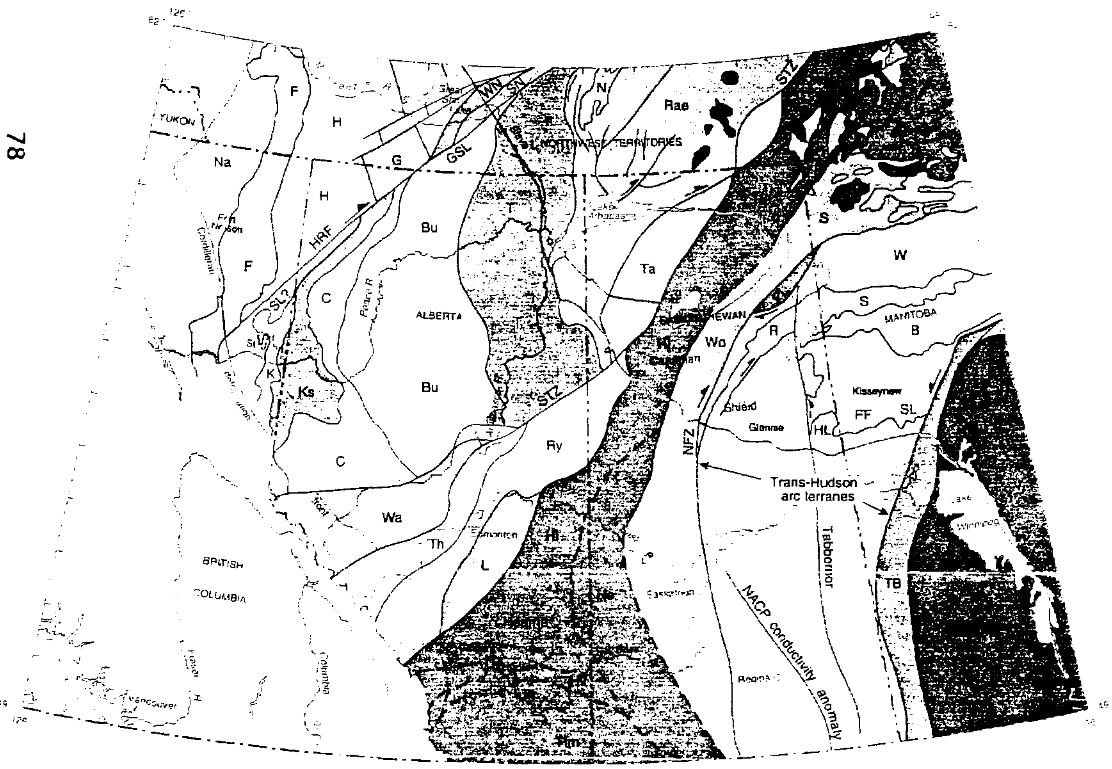
Major structures that segment the basement include the subsurface extensions of the GSLSZ (in northwestern Alberta), the STSZ (in central Alberta) and the Vulcan Low (in southern Alberta), all of inferred Early Proterozoic age (ca. 1.8-2.0 Ga).

The Rae Province is separated from the Hearne Province by the STSZ and from the Slave Province by the GSLSZ. Phanerozoic reactivation of some of these lineaments between the Provinces appears to have had an important influence on the development of the stratigraphic record of the WCSB (Ross, 1995).

Southern Alberta is composed dominantly of Archean Crust (Hearne Province) that has undergone substantial modification by Early Proterozoic activity coeval with the ca. 1.8 Ga Trans-Hudson Orogen to the east (Ross, 1993). The Archean crust which was thermally overprinted during the Husonian Orogeny (I.85 +/- 0.1Ga) underlies the southeastern third of Alberta (Burwash, 1993).

Northern Alberta is composed of a collage of Early Proterozoic age crust (2.0-2.4 Ga) that was assembled and accreted to the Archean Rae Province in the interval of 1.9-2.0 Ga (Ross, 1993). In northwestern Alberta...intense cataclasis... accompanied early, middle and late stages of the Hudsonian metamorphism of pre-existing Archean crust...major shear zones are probably responsible for most of the strong lineaments on aeromagnetic maps...Hudsonian igneous complexes were emplaced in early (1.9- 2.0 Ga) and later (*1.75-1.85 Ga) stages.. Lower Proterozoic(?) cover rocks have been identified adjacent to the GSLSZ... Middle Proterozoic (1.2-1.6 Ga) cover rocks of the Athabasca Basin extend a short distance into the subsurface of northern Alberta (Burwash, op. cit.).

In the WCSB, the Precambrian surface appears to have a gently undulating peneplanar topography punctuated by discrete grabens and half-grabens. The normal faults appear to sole into the low angle basement fabric implying incipient reactivation. There appear to be two main phases of basement reactivation, middle Cambrian and late Cretaceous (Laramide orogeny).



Edge of platform cover

GSL Great Slave Lake Shear Zone

HRF Hay River Fault

NFZ Needle Falls Shear Zone

Age unknown, including Nahanni terrane (Na) and Kiskatinaw domain (K)

Ga 1.76 Rapikivi granite.

Lower Proterozoic continental margin magmatic arcs.

- Rimbey (Ry) (1.85-1.78 Ga).
- Wathamun - Chipewyan (W) (1.85 Ga).
- Fort Simpson (F) and Great Bear (G) (1.86-1.84 Ga).
- Taltson (T) and Ksituan (Ks) (1.9-1.98 Ga).

Belts of mylonitic rock along Snowbird Tectonic Zone (STZ) including Wabamun (Wa) and Tantato (Ta) domains.

Internal zones of Trans-Hudson Orogen.

- Juvenile island arc rocks and metasediments (S-Snake Indian; B-Baldock; SL-Snow Lake; FF-Flin Flon; R-Reindeer; HL-Hanson Lake).
- Subsurface extension

Lower Proterozoic metavolcanic-metasedimentary rocks including Lacombe Domain (L), Wollaston (Wo) and Seal River (S) belts (?), Wilson island terrane (WN) and Nonacho (N).

Lower Proterozoic Terranes (>2.0 Ga)

- Thorsby (Th)
- Chinchaga (C)
- Buffalo Head (Bu)
- Hottah (H)

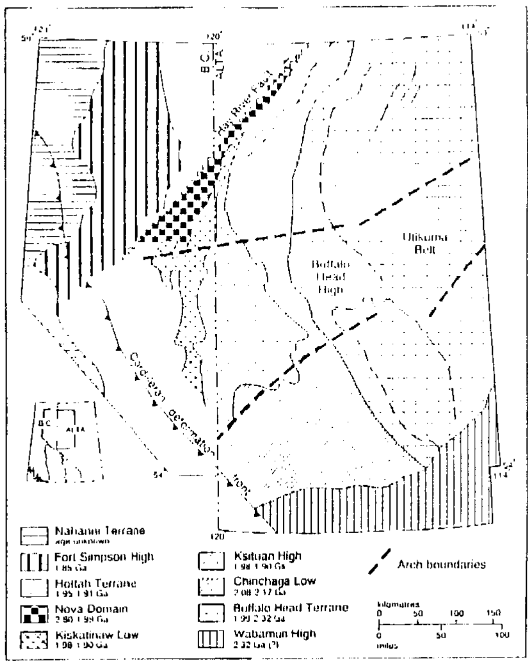
Zones of reactivated Archean crust; Thompson Belt (TB) and Peter Lake Domain (PL)

Arcnean Provinces

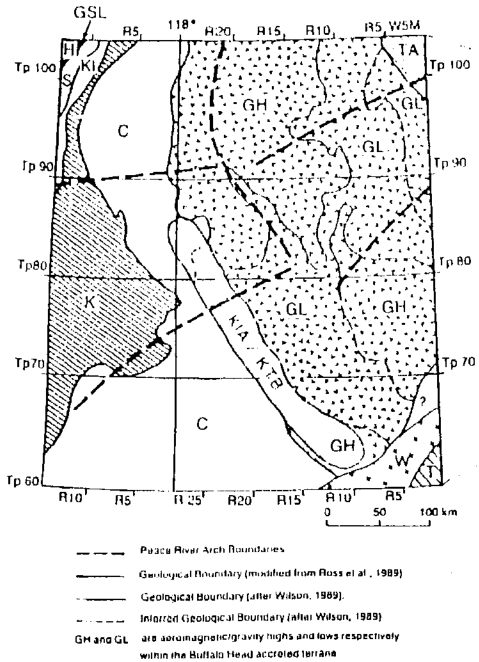
- Slave (SL?) including Simpson Islands terrane (SN)
- Rae
- Hearne : Medicine Hat Block (Hm), Vulcan Low (Hv); Matzhiwin High (Hz); Eyehill High (He); Loverna Block (Hl); Mudjatik Domain (Hj).
- Superior

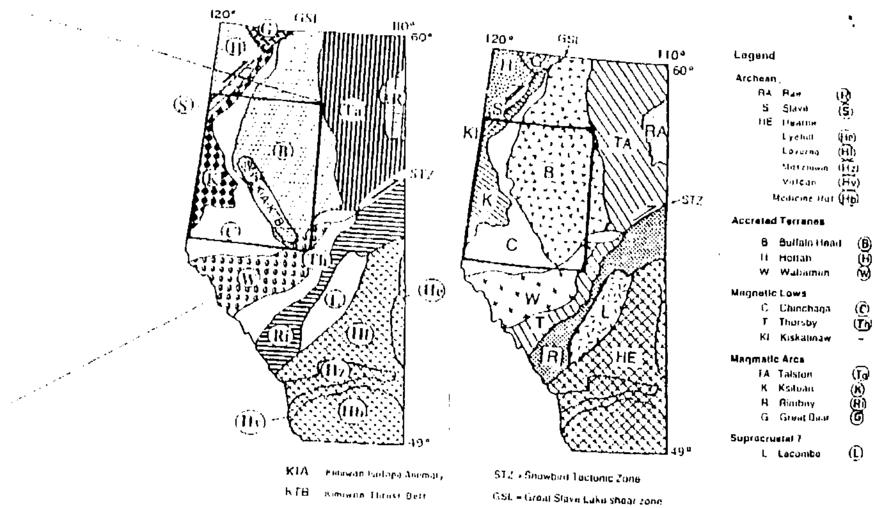
scale 1:10 000 000

Figure 4.1 Tectonic domains for the basement of the Western Canada Sedimentary Basin, based largely on interpretation of potential field data and U-Pb geochronology of selected samples of basement. (Modified from Hoffman, 1989).



Tectonic domains in the basement of the Peace River region (Ross, 1990) based on the interpretation of aeromagnetic anomaly data and U-Pb geochronology. Dashed lines indicate the approximate structural edges of the arch.





Proposed terranes of the Alberta Basement (modified after Ross et al, 1991) by Chacko et al and Burwash et al, 1995.
The Kimiwan Isotope Anomaly/Thrust Belt is at the southwest boundary of the Buffalo Head Terrane

Fig.4-4.5 Tectonic domains of the Alberta basement, after Ross *et al.* (1989a) with a detailed inset of the Peace River Arch region.

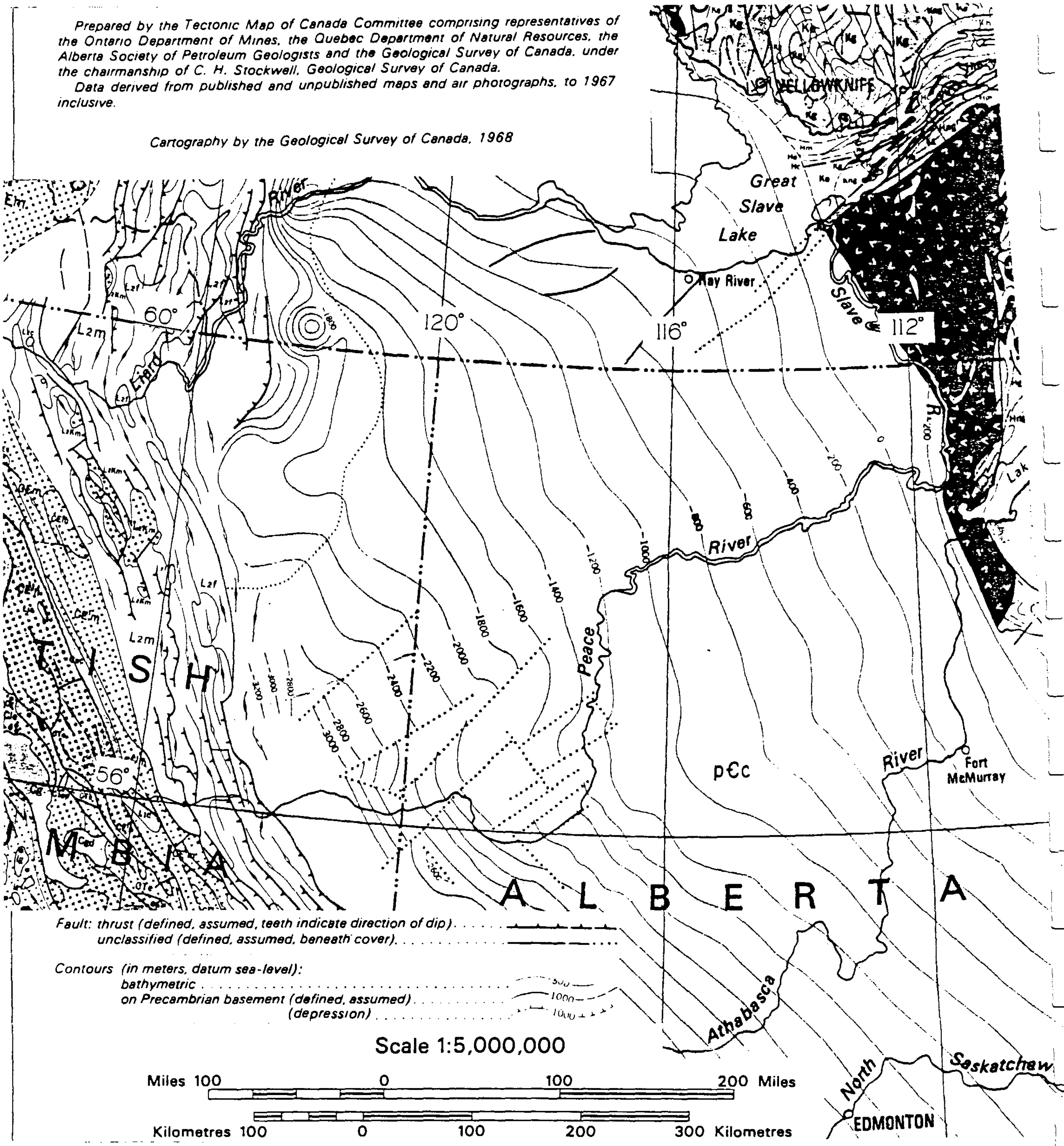

Prepared by the Tectonic Map of Canada Committee comprising representatives of the Ontario Department of Mines, the Quebec Department of Natural Resources, the Alberta Society of Petroleum Geologists and the Geological Survey of Canada, under the chairmanship of C. H. Stockwell, Geological Survey of Canada.
Data derived from published and unpublished maps and air photographs, to 1967 inclusive.
Cartography by the Geological Survey of Canada, 1968
Great Slave Lake
Hay River
Slave
R.
60°
120°
116°
112°
56°
Peace
River
River
Athabasca
Fort McMurray
pЄc
North
Saskatchewan
EDMONTON
ALBERTA
Fault: thrust (defined, assumed, teeth indicate direction of dip)
unclassified (defined, assumed, beneath cover)
Contours (in meters, datum sea-level):
bathymetric
on Precambrian basement (defined, assumed)
(depression)
Scale 1:5,000,000
Miles 100 0 100 200 Miles
Kilometres 100 0 100 200 300 Kilometres

Figure A—4.2T

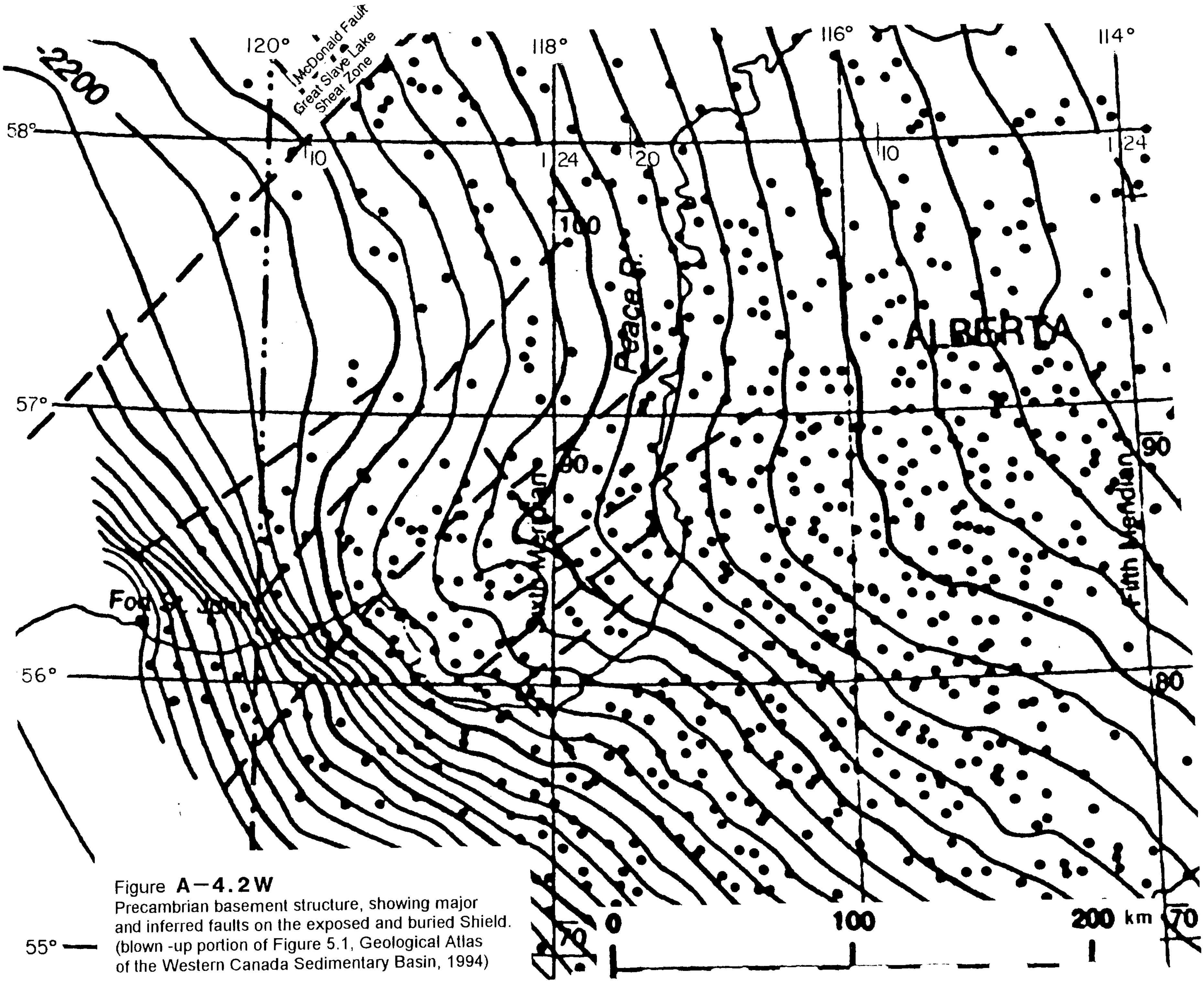


Figure **A—4.2W**
Precambrian basement structure, showing major and inferred faults on the exposed and buried Shield. (blown -up portion of Figure 5.1, Geological Atlas of the Western Canada Sedimentary Basin, 1994)

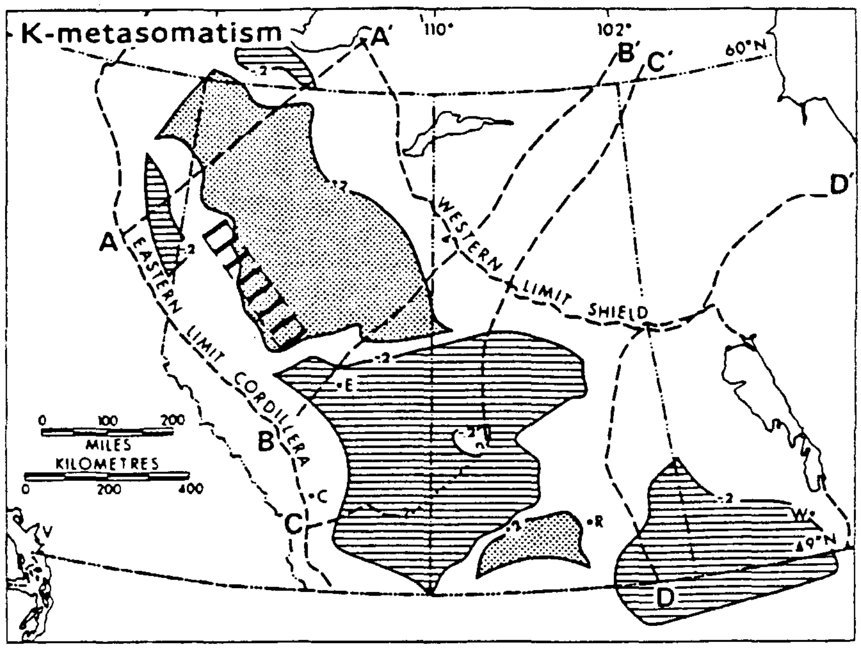
4.2.3 Metamorphism and Metasomatism

Two distinct cycles of metamorphism are recognized in the Precambrian rocks of northeastern Alberta. During the Archean metamorphic cycle, metasediments were metamorphosed under high pressure granulite conditions. In a second cycle, probably related to remobilization during the Aphebian, the metasediments were subjected to conditions of granulite-amphibolite transitional facies retrogressing to greenschist facies metamorphism (Langenberg and Nielsen, 1982).

Trend surface map of Factor 1A, K-metasomatism (Figure 7) shows a large positive area between the Great Slave Lake Shear Zone (GSLSZ) and the Virgin River Shear Zone/Snowbird Tectonic Zone (STZ). The KIA lies along the southwestern edge of the area of K-metasomatism and prograde metamorphism.
In Trend surface map of Factor 2, chloritization (Figure 8), the KIA lies at the transition from negative chloritization (equivalent to K-metasomatism) to positive chloritization (retrograde metamorphism /hydrothermal alteration) to the southwest (Burwash and Culbert, 1976).

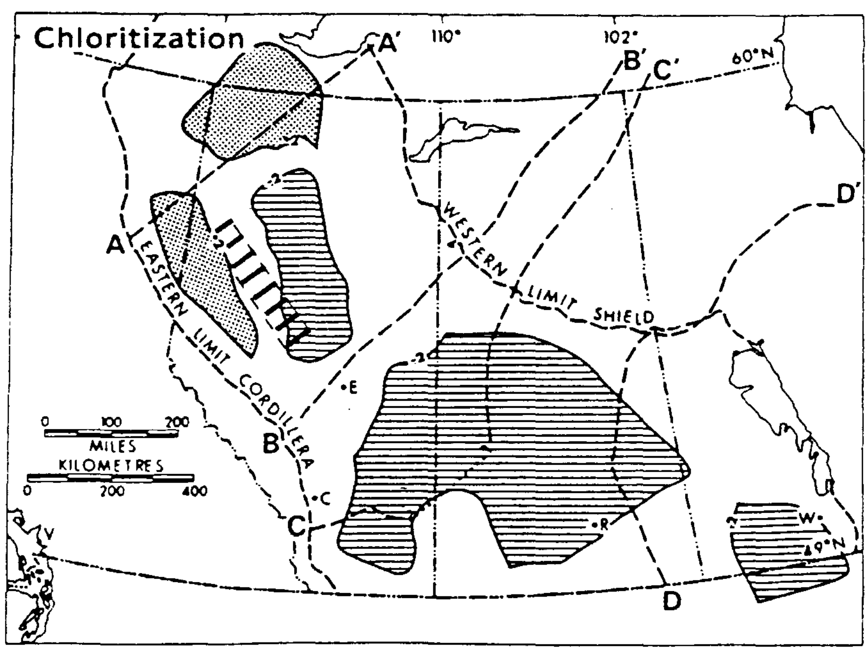
Dolomitization patterns may be a product of fluid movement along fault system. Hitchon (1993) concluded that "it might be more than coincidence that many strongly dolomite trends (in the Devonian of the Alberta Basin) seem related to underlying basement structures."

The WCSB contains a large number of extensively dolomitized carbonates. Dolomitization is widespread in the Paleozoic rocks of Alberta, and particularly within Cambrian to Devonian carbonate formations, with most of this dolomitization probably being of post-diagenetic origin. Examples of dolomite occurrence in the PRA region are the Leduc Platform and the linear dolomite trend within the Wabamun Fm.



Burwash and Culbert (1976, Fig. 11)

Fig. 7. Trend surface map of Factor 1A. K-metasomatism. A large positive area lies between lineament AA' (Great Slave Lake Shear Zone) and BB' (Virgin River Shear Zone/Snowbird Tectonic Zone). KIA lies along the southwestern edge of the area of K-metasomatism and prograde metamorphism.



Burwash and Culbert (1976, Fig. 13)

Fig. 8. Trend surface map of Factor 2, chloritization. KIA lies at the transition from negative chloritization (equivalent to K-metasomatism) to positive chloritization (retrograde metamorphism/hydrothermal alteration) to the southwest. Chlorite and epidote were formed by breakdown of biotite and hornblende.

Figure 7,8

APPENDIX 4.3 The Peace River Arch (PRA)

4.3.1 Introduction

The PRA (Figure 4.2B, report page 14) area bears many of the characteristics of the WCSB as a whole, yet is anomalous in its Paleozoic vertical movements. The Arch area is defined as the area from 54^0N and 115^0W (5th Mer) to the eastern margin of the disturbed belt. It covers about 220,000 km^2 of northwestern Alberta and northeastern British Columbia.

The PRA is an east-northeasterly asymmetrical composite structure that has a total preserved length of approximately 750 km. It has steeply dipping northern flank and a more gently dipping southern slope. The structure consists of an Upper Proterozoic to Devonian Arch and a Lower Carboniferous graben complex. There was later phase of subsidence during the Jurassic and Cretaceous. Precambrian basement fault zones were possibly reactivated during the Phanerozoic.

The Arch was uplifted during the latest Late Proterozoic, perpendicular to the Upper Proterozoic passive margin. It was a relatively passive feature that was onlapped and buried by the end of the Devonian. Although the Arch continually underwent local structural modification, there is no evidence of major structural rejuvenation following its initial uplift.

During the Early Carboniferous, an episode of extension and uplift gave rise to a basin over the central axis of the Arch, centred on a linear series of grabens known as the Dawson Creek Graben Complex (DCGC). An anomalously thick Carboniferous and Permian succession is preserved within this basin. Following the relatively short period of graben formation there was a structural passive character that lasted until the Middle Jurassic.

During the Late Jurassic and Cretaceous, regional subsidence that centred on the underlying DCGC influenced basin configuration and facies distributions.

The Arch represents the manifestation of the continental extension of an oceanic fracture zone. The formation of the DCGC was caused by an episode of extension and uplift, possibly related to an incipient rift. Jurassic and Cretaceous subsidence of Arch-related structures was likely a response to regional loading by thrust sheets from the west and southwest.

The Precambrian surface in the Arch forms a broad, generally northeast-trending zone of structural complexity. The delineated edges of the structure consist of a western block containing a large number of horsts and grabens with a relief of up to 150 m and an eastern block of less complexity, containing structures broader in form, with relief of up to 60 m. The western block is apparently offset to the southeast along a northwesterly trending line. This line coincides with an aeromagnetic low believed to represent an internal shear zone in the basement domain (Figure A-4.5).

The present Precambrian surface reflects a composite history of the structural influences that developed at various times in the Peace River region, namely: the east-northeasterly trending northern arch boundary of the western block, which parallels the northern edge of the Devonian Arch and a northeasterly trending series of grabens discernible within the western block which were formed during the Early Carboniferous (O'Connell et al, 1990).

The PRA is one of the most important intra-cratonic structural domains affecting Phanerozoic sedimentation in the WCSB. Its initial uplift in early Paleozoic and Devonian was followed by collapse in the Carboniferous and Permian to form the Peace River Embayment (PRE) depocentre of the late and early Mesozoic. The influence of the arch/embayment can be detected in strata as high as Upper Cretaceous.

The PRA is one of the most prominent and longest-lived basement features. It existed as topographic high from the Cambrian to late Devonian, lifting granitic Precambrian rocks approximately a kilometre above regional basement levels. By mid-Devonian there were prominent horsts and graben oriented parallel (WSW-ENE) and normal (NNW-SSE) to the arch axis. The arch was inundated in the latest Devonian and carbonates were deposited. Recurrent movement on the faults occurred in the Mississippian, but between the Mississippian and Permian tectonic inversion took place and the Arch became a basin (PRE) as large fault blocks moved downwards at varying rates. Conjugate NE and NW trending faults controlled the basement topography and sedimentation patterns, with movements of several hundred metres during the Paleozoic. However, no large faults can be detected on maps of post Paleozoic horizons in the PRA and during the Mesozoic the embayment subsided as a whole. The differences in topography across the embayment at this time are believed to be related to small amounts of movement of the underlying crust (Bergman and Walker, 1995).

4.3.2 The Peace River Arch region basement

The crystalline basement of the PRA region was divided by Ross (1990) into a series of Archean and Proterozoic distinct tectonic domains, based on magnetic and gravity anomaly data, and on radiometric ages (Figure 4.2.1, page 10 report). These basement zones are the accreted terrane Buffalo Head (B), the magnetic low Chinchaga (C) and the magmatic arc Ksituan High (K) domains, subcrops of which can be traced by their aeromagnetic signatures which have a north-trending curvilinear configuration. The contacts between the B, C, and K basement zones in the PRA region are deep seated crustal features that appear to have been reactivated throughout the Phanerozoic.The reactivation is interpreted on the basis of northwest-southeast-trending structural and sedimentological features in the Phanerozoic that are collinear with the basement contact zones. The juxtaposition of these domains is believed to be the result of Early

Proterozoic collisions and associated magmatism (1.99-1.90 Ga) that occurred as these tectonic elements accreted to the Rae Province on the western edge of the Canadian Shield.

A significant number of core samples from the Precambrian basement of the WCSB have $\delta^{18}O$ values<5%, majority of which are from single elongate zone that extends for 250 km along strike NW of Edmonton. Chacko et al (1995) termed this zone the Kimiwan Isotopic Anomaly (KIA). These anomalously low oxygen isotope samples fall almost entirely along the aeromagnetic high GH which forms the southwest boundary of the Buffalo Head Terrane (B) suggesting a common causal relationship. Muchlenbachs et al (1994) proposed that the low $\delta^{18}O$ values define an extensional zone in the Alberta basement and inferred that the timing of the depletion to be Proterozoic rather than Paleozoic (Figures A-3, A-3A, A-3B, Figure A-4.4). Uplift of these high temperature rocks provided the thermal drive for circulation of surface fluids, which in turn caused widespread $\delta^{18}O$ depletion and mineralogical alteration in the adjacent detachment zone.

Seismic studies near the southwest margin of the KIA identified shear zones (thrusts) with low angle southwest dips, the same sense of original motion, and a close parallel to the orientation of KIA. KIA may therefore have been linked in its initial stages to a Kimiwan Thrust Belt (KTB). A high grade metamorphic area (locally granulite facies) lies to the northeast of KIA/KTB. Slices of metamorphosed Lower Proterozoic cover rocks preserved in the thrust belt is inferred from the presence within KIA/KTB of proportionately more metasedimentary rocks and amphibolites (Figures A-5, A-11, and A-12). Mylonites are more common southwest of KIA/KTB indicating that this western block has been tectonically reworked (Burwash et al, 1995).

The Buffalo Head Terrane (BHT) basement intersections consist of a wide range of rock types that are dominantly felsic-to-intermediate metaplutonic rocks, but also include felsic metavolcanic rocks and high-grade gneisses. The BHT is composed mainly of older Proterozoic rocks formed between 2.0 1nd 2.32 Ga that have been affected by a widespread, younger (1.9-2.0 Ga) thermal-magmatic event.

Drilled basement in the Chinchaga Low (CL) consists of metaplutonic and meta-sedimentary gneiss that range from 2.08 to 2.17 Ga, implying partial age equivalency with BHT rocks to the east. The 1.999-1993 Ga plutonic rocks of central and western BHT are absent from the CL.

The Ksituan High basement cores consist of hornblende-bearing metaplutonic rocks with a narrow range of zircon ages (between 1.998 and 1.900 Ga), which do not overlap with the CL rocks to the immediate east.

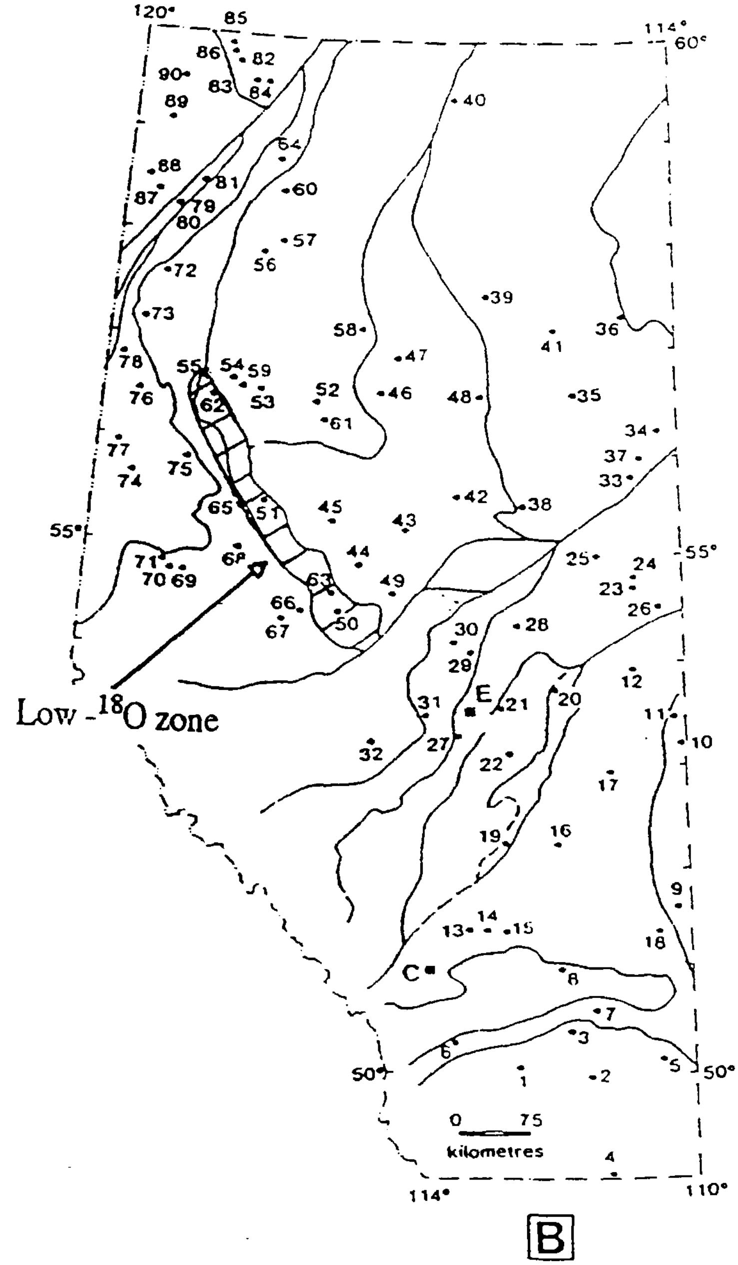
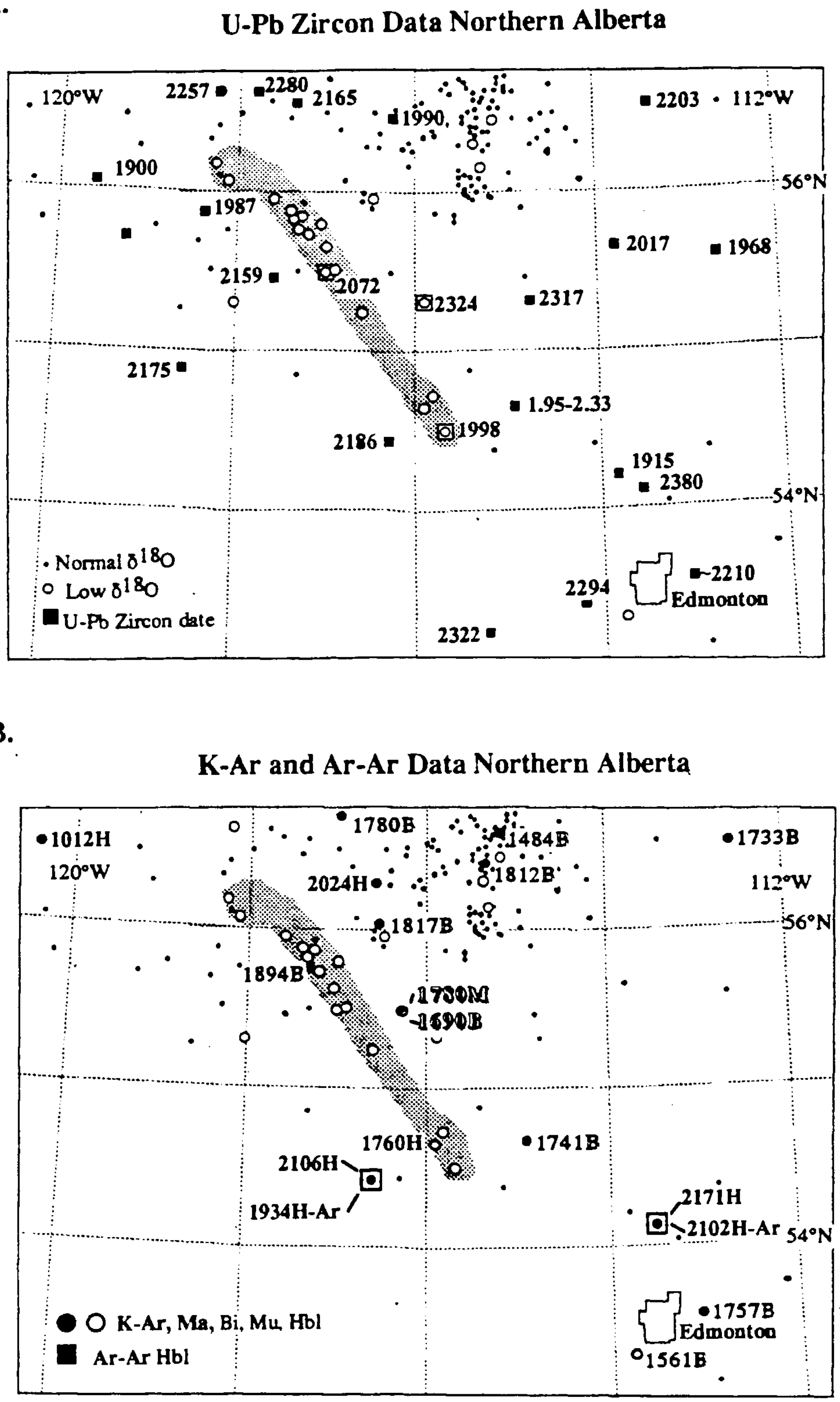


Fig.3. Location map from Ross et al., 1991, showing location of the Kimiwan oxygen isotopic anomaly.

Figure A-3

A.



B.

Fig. 3. A) U-Pb zircon data for rocks of the KIA (stippled region) and adjoining areas. All data from Ross et al., (1991) and Villeneuve et al., (1993). B) K-Ar and Ar-Ar data for rocks of the KIA and adjoining areas. Data from Burwash et al (1962) (recalculated with the decay constants of Steiger and Jager, 1977), Plint and Ross, 1993, and this study. H, B and M after the age denotes hornblende, biotite and muscovite, respectively.

Figure A-3A,B

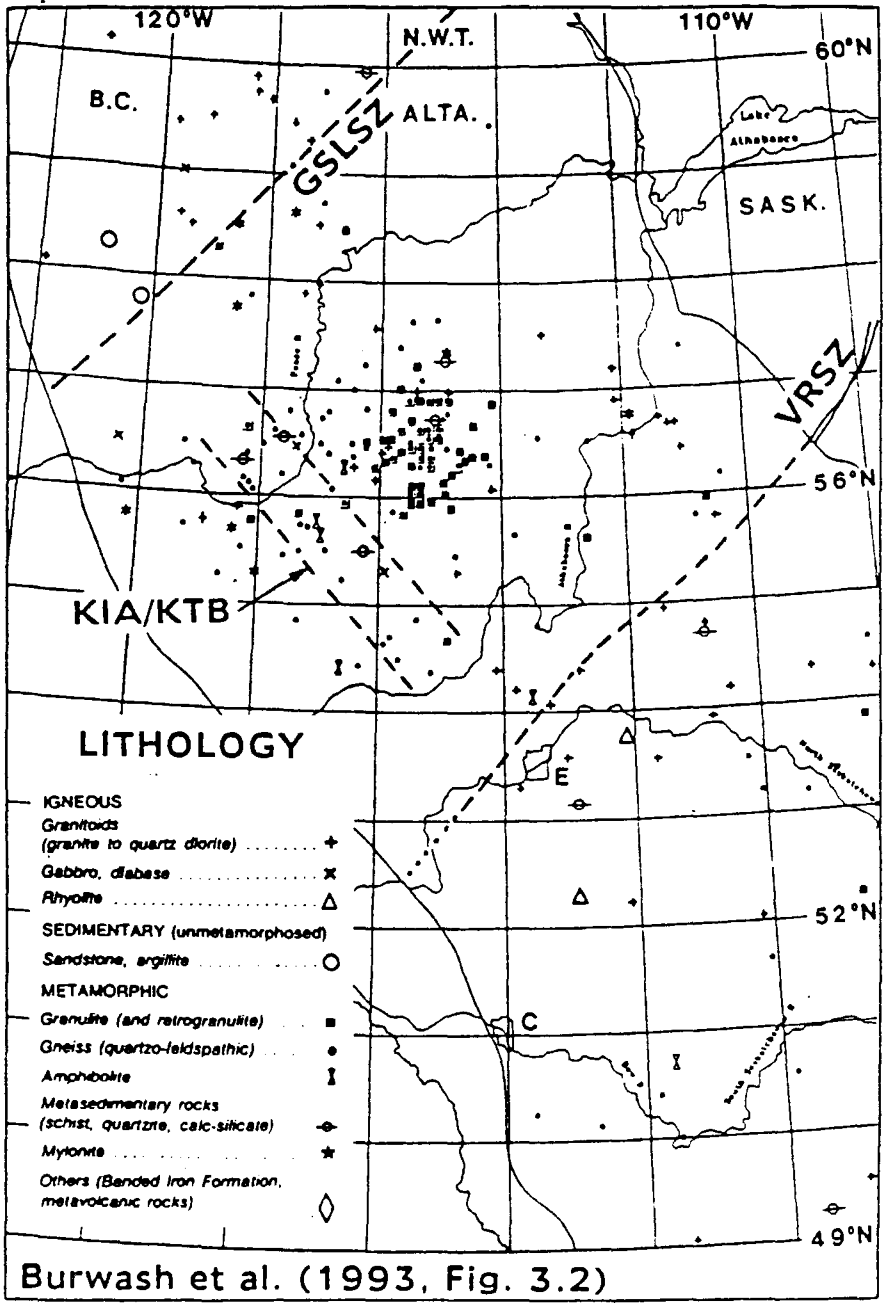


Fig. 5. Lithology of Precambrian basement cores from Alberta. High-grade gneisses are abundant in all terranes. Metasedimentary rocks and amphibolites are proportionately more abundant in KIA than in the area to the northeast. Mylonites are more common southwest of KIA.

Figure A–5

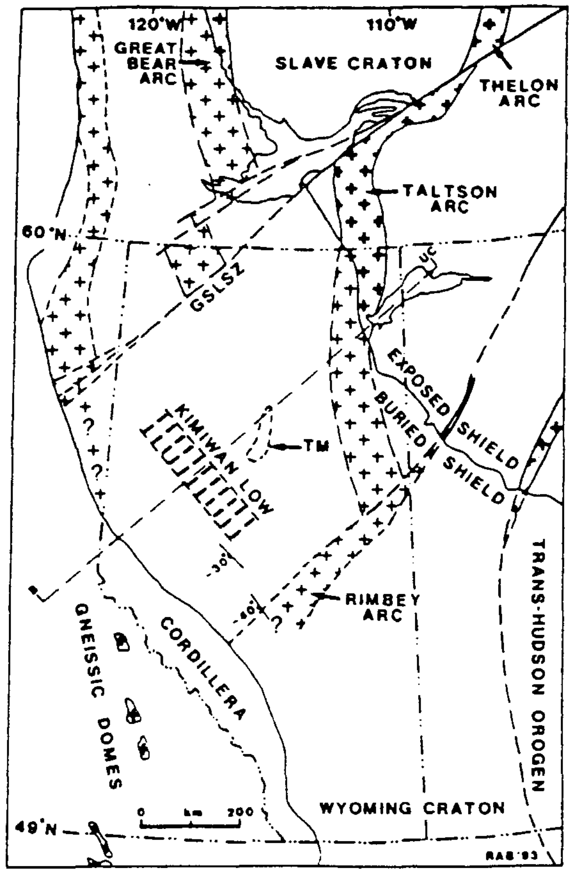


Fig. 11. Precambrian tectonic elements of WCSB and adjacent Shield (after Burwash, et al., 1994). Southwest-dipping thrust faults at Carson Creek North and at Rocky Rapids are aligned with trend of KIA. A pronounced isostatic gravity low, the Trout Mountain (TM) anomaly, lies within the area of maximum K-metasomatism (Burwash and Power, 1990). Position of Barkerville-Uranium City cross-section is B-UC.

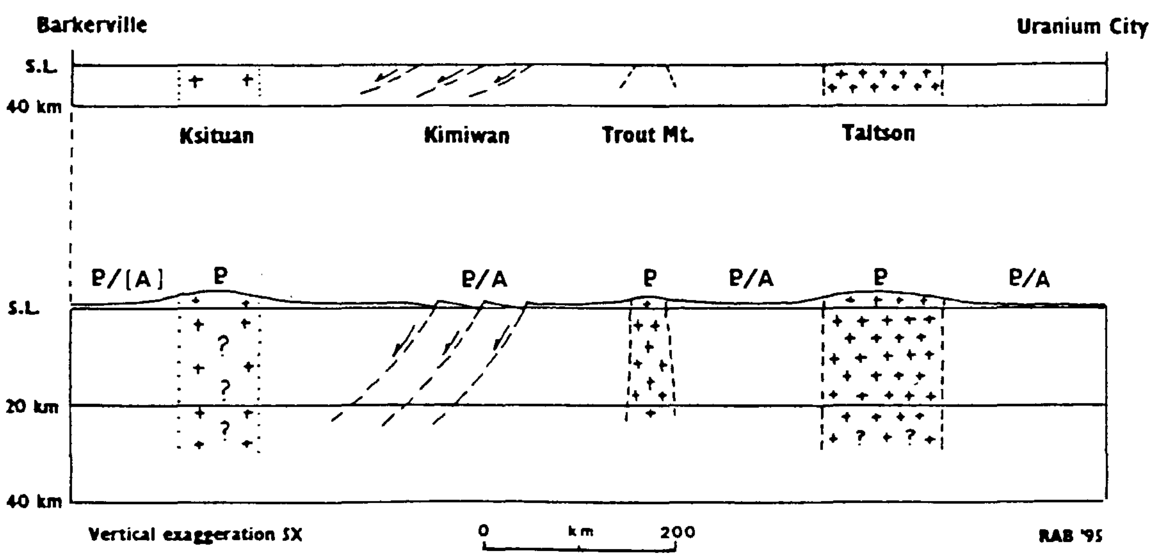


Fig. 12. Cross-section of the Athabasca Polymetamorphic Terrane (APT) at about 1700 Ma. Compression at 1950 to 1900 Ma was followed by intrusion of the Taltson magmatic arc and Trout Mountain and Ksituan plutons. Extensional faulting at 1800 to 1750 Ma permitted alteration of Kimiwan zone rocks.

Figure A–11,12

APPENDIX 4.4 Correspondence between basement structural contacts and various Phanerozoic sedimentary and structural trends

Localized deformation of the crust tends to be repeated in certain areas over geologic time.

In the PRA, tectonic movements are indicated by faults which cut the sedimentary successions during Mississippian, Pennsylvanian, Permian and Cretaceous times. The basement underlying the PRA is composed of three distinct domains: the Buffalo Head, the Chinchaga, and the Ksituan (Figure A-4.4, Ross, 1990). The boundaries between these domains trend NW-SE. These deep-seated crustal features appear to have been reactivated throughout the Phanerozoic as indicated by NW-SE trending sedimentologic and structural features in the Phanerozoic that are co-linear with the basement contact zones.

O'Connell et al (1990), Wright et al (1994) and Bergman and Walker (1995) demonstrated a spatial correspondence between several basement structural contacts and various Phanerozoic sedimentary and structural trends (highlighted **in bold print** below). The correspondence between these features indicate the possibility that regionally significant Precambrian fault zones in the Peace River area were rejuvenated during the Phanerozoic.

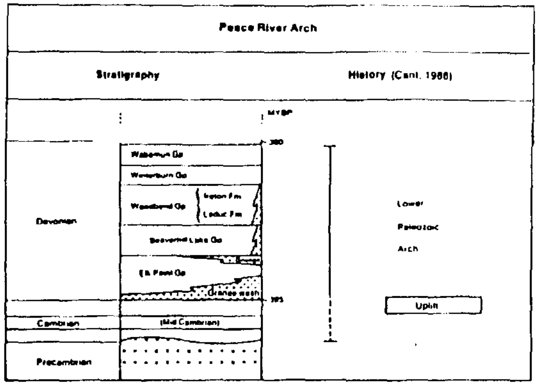
1) The pre-Middle Devonian Granite Wash (GW) lithozone is divided into three areas: a) along the crest of the Arch; b) to the north and south of the structural Arch boundaries; and c) at the eastern edge of the Arch.

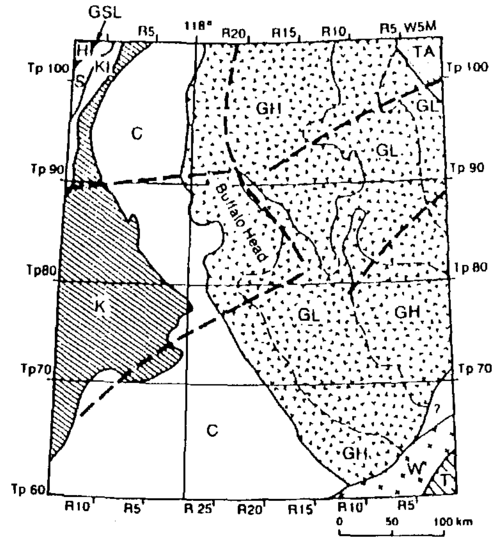
a) Over the crest of the Arch, the GW is 0 to 100 m thick and is largely confined within graben structures with dominantly east-west oriented axes. **A prominent north-south trending of grabens in the central Arch region roughly parallels the underlying Ksituan-Chinchaga basement contact** (Figure A-4.4G), **and lies predominantly within rocks of the Chinchaga Low**. The GW is absent to the east of this trend and thins to 40 m or less to the west implying a basement control on the formation of the graben structures.

b) The GW forms blanket deposits up to 100 m and 60 m thick in the areas north and south of the Arch boundaries respectively

c) To the east of the Arch, the GW forms narrow northeast- and north-northeast-trending bodies the lower parts of which are confined to structural lows on the Precambrian surface. These lows are probably grabens or half-grabens formed by episodes of extension related to Arch uplift farther to the west.

2) For Middle Devonian Beaverhill Lake time, local episodic movements along fault-bounded Precambrian highs influenced sedimentation patterns within and around the patch and platform reefs; the overlying basinal strata of the Waterways Formation prograde from the east, with many units demonstrating a well developed, west-facing clinoform geometry implying a marked increase in subsidence in the basin away from the Arch in order to provide the required accommodation space.

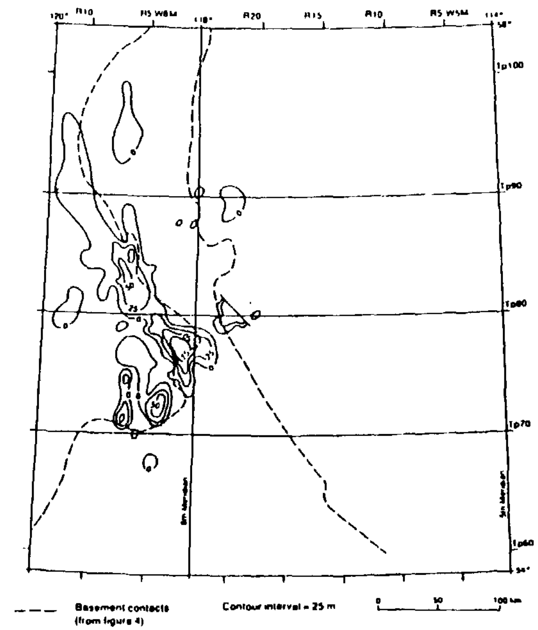




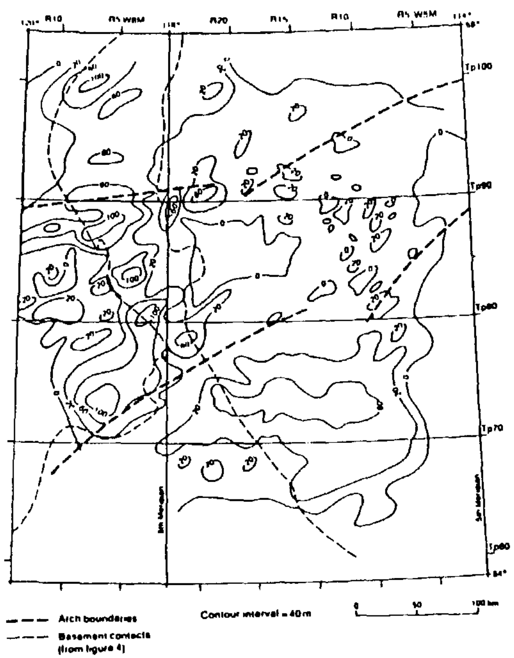
— — — Peace River Arch Boundaries

Magmatic Arc	K	Ksituan High 1.98-1.90 Ga
Magnetic Low	C	Chinchaga Low 2.08-2.17 Ga
Accreted Terrane	BH	Buffalo Head Terrane 1.99-2.32 Ga

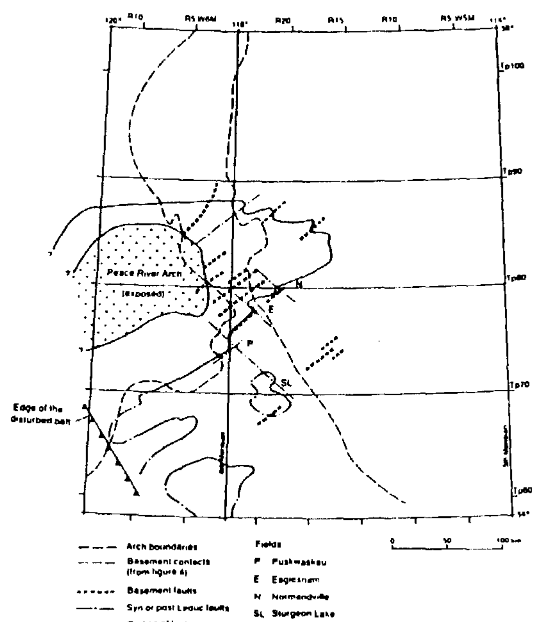
GH and GL are aeromagnetic/gravity highs and lows respectively within the Buffalo Head accreted terrane.



Wabamun dolomite isopach map (Halbertsma, *pers. comm.*, 1988).



Granite Wash isopach map (Trotter, 1989).



Outline of the Leduc platform encircling the Peace River Arch landmass (Dix, *this volume*). Shaded area represents the Leduc platform.

Figure **A–4.4G**

Spatial correspondence between Ksituan High-Chinchaga Low basement structural contact and Phanerozoic sedimentary and structural trend/s (O'Connel et al, 1990).

3) The northern edge of the Middle Devonian Leduc Fm has an approximate east-west orientation. The unit is relatively narrow along this margin and appears to have been controlled by the underlying thick accumulation of GW, which in turn was controlled by the steeply sloping Precambrian surface (Figure A-4.4G). Anomalously thick Leduc successions are present along a northeast-trending structural lineament developed on the Leduc surface and also at the Normandville field location. Pronounced facies changes appear to coincide with an underlying northwest-trending Leduc lineament that extends to the Sturgeon Lake Platform. The influence of Precambrian lineaments is shown by the distribution of silclastics interbedded with Leduc dolomite where at its farthest east extension on the northern Arch margin coincides with a north-northeast-trending lineament that is expressed on the underlying Precambrian surface. There was a local retreat along the northeast margin of the Leduc Platform that gave rise to local embayments during middle and late Leduc time. The formation of the embayments may also have been influenced by underlying Precambrian lineaments. In the upper Leduc a profound change in the style of sedimentation was marked by a transition from a shelf to a ramp setting, accompanied by the erosion of the shelf break around the Arch landmass, and the development of a prograding wedge of GW siliclastics. These changes may have resulted from the differential tilting of the Arch across a major northeast-trending structural lineament at the northern margin of the Arch.

4) **A large northwest-southeast oriented fracture-controlled dolomite zone up to 75 m in thickness occurs within the Upper Devonian Wabamun Fm; its linear distribution corresponds closely to the underlying Chinchaga-Ksituan basement contact, implying a basement-related structural control upon its emplacement.**

5) The Dunvegan gas field (Figure 14.32) and Henderson and Hinds, 1994) produces from the Mississippian Debolt Fm in the eastern part of the Paleozoic PRA and PRE. **The Dunvegan Fault is co-linear with the boundary between Ksituan and Chinchaga domains. It appears that the uplifted Ksituan block formed a bench affecting erosion and deposition during late Mississippian to Permian time. The current strike of the beds still parallels the old ridge, with the Mississippian strata downthrown to the northeast by at least 77 m.**

6) The Peace River Embayment (PRE) was an arcuate zone of subsidence in northwestern Alberta and northeastern British Columbia, in which a thick Lower Carboniferous succession has been preserved (Figure 4.4S). The PRE had an east-west axis, opened to the west and appears to have formed an eastward extension of the Prophet Trough. A low-relief ridge known as the Sukunka Uplift was established during early Upper Carboniferous forming a low rim that defined the southwestern margin of the PRE. The PRE existed from Carboniferous to Triassic time, and confined Stoddart Gp, Belloy Fm, and Triassic strata within its boundaries. The PRE was a broad depression that deepened westward, and was much larger, and longer-lived than the central DCGC discussed below.

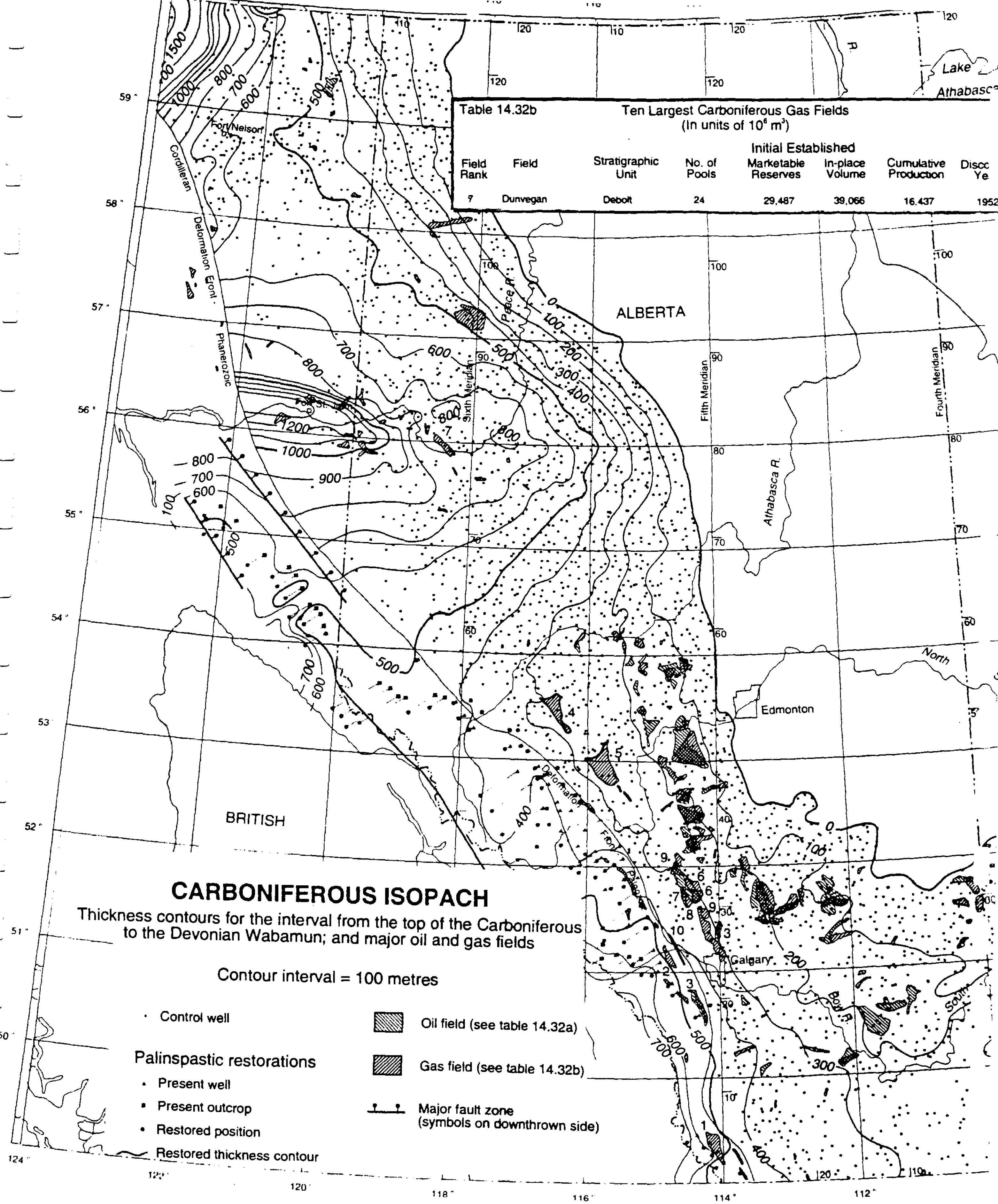


Table 14.32b		Ten Largest Carboniferous Gas Fields (In units of 10^6 m^3)					
				Initial Established			
Field Rank	Field	Stratigraphic Unit	No. of Pools	Marketable Reserves	In-place Volume	Cumulative Production	Disc Ye
7	Dunvegan	Debolt	24	29,487	39,066	16,437	1952

CARBONIFEROUS ISOPACH

Thickness contours for the interval from the top of the Carboniferous to the Devonian Wabamun; and major oil and gas fields

Contour interval = 100 metres

- Control well

Palinspastic restorations

- Present well
- Present outcrop
- Restored position
- Restored thickness contour

Oil field (see table 14.32a)

Gas field (see table 14.32b)

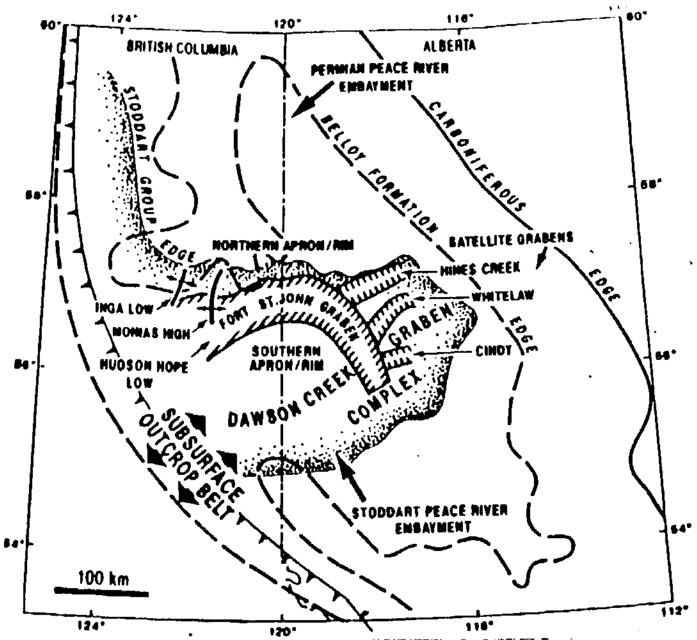
Major fault zone (symbols on downthrown side)

scale 1:5 000 000

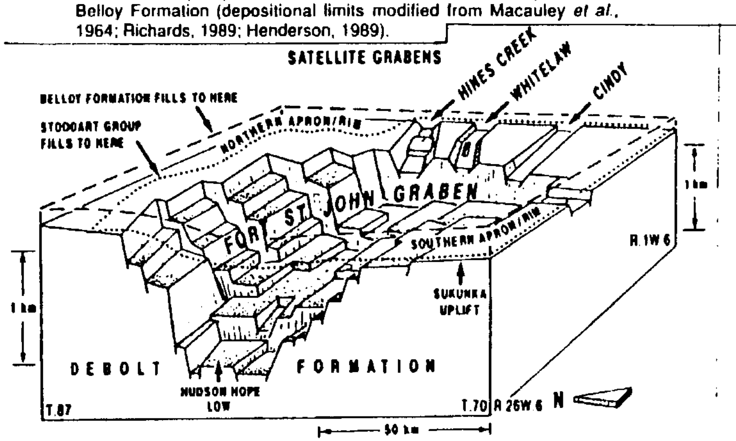
0 100 200 300 kilometres

0 100 200 miles

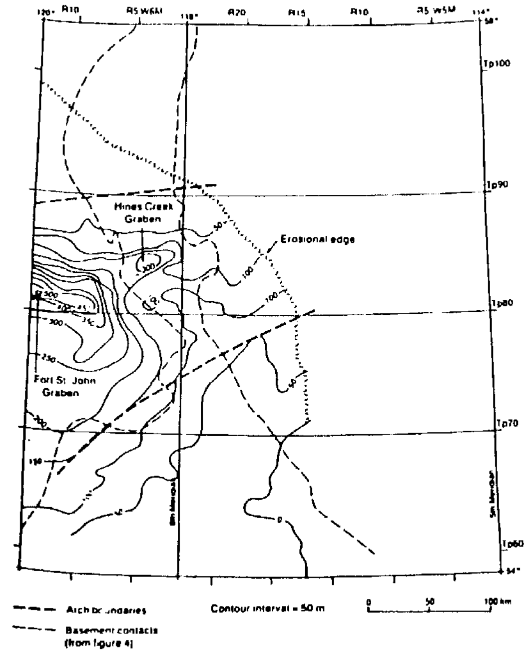
Figure 14.32



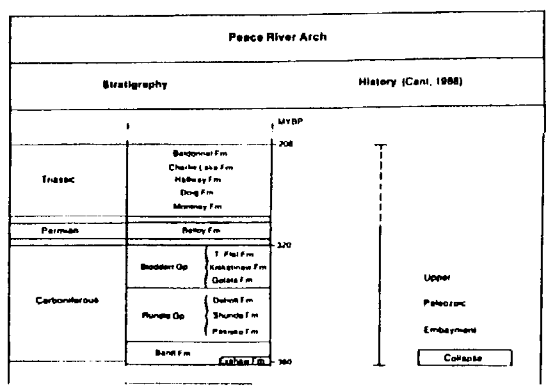
Peace River Embayment (PRE) stratotectonic elements. Dawson Creek Graben Complex includes all the grabens within the Stoddart Group depositional limits and within the central part of the Belloy Formation (depositional limits modified from Macauley *et al.*, 1964; Richards, 1989; Henderson, 1989).

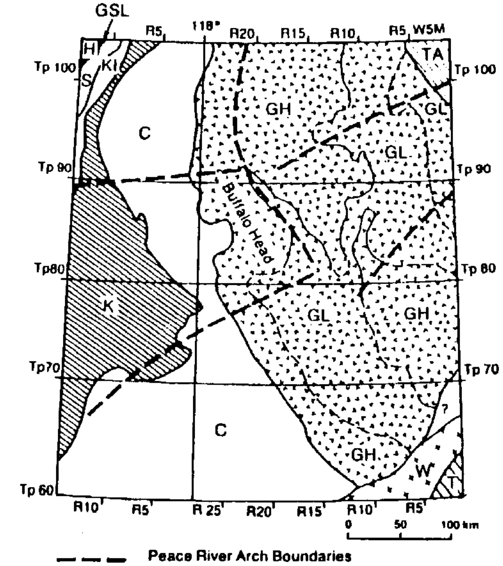


Sketch of Carboniferous-Permian Dawson Creek Graben Complex. Golata, Kiskatinaw, Taylor Flat, and Belloy formations successively filled the graben complex as it developed. The reconstruction shows arcuate shape, wedge-like westward deepening, and internal and satellite grabens and horsts. Sketch is based on cross-sections, and on isopach and structure maps.



Isopach map of the Stoddart Group and the Belloy Formation.





Magmatic Arc	K	Ksituan High 1.98-1.90 Ga
Magnetic Low	C	Chinchaga Low 2.08-2.17 Ga
Accreted Terrane	BH	Buffalo Head Terrane 1.99-2.32 Ga

GH and GL are aeromagnetic/gravity highs and lows respectively within the Buffalo Head accreted terrane.

Figure A-4.4S

Spatial correspondence between Ksituan High-Chinchaga Low basement structural contact and Phanerozoic sedimentary and structural trend/s (O'Connel et al, 1990).

7) The Upper Carboniferous Stoddart Gp (TaylorFlat/Kiskatinaw/Golata Fms) and the overlying Permian Belloy Fm were deposited within a broad regional embayment (PRE) containing a northeast-trending series of graben complex and basin structures collectively termed the Dawson Creek Graben Complex (DCGC).

The Fort St. John Graben (FSJG) is the east- and southeast-trending main graben of the DCGC and includes the Belloy Graben. The FSJG differs from the PRE as it is smaller, deeper, more intensely segmented and block faulted, and oriented differently. It was an asymmetrical, half-graben trough that tapered in depth and width to the east and southeast. It possessed two rims: a steep northern rim bordered to the south by a narrow apron, and a gentle southern rim bordered to the south by a broad apron. The northern rim is composed of a series of faults and can be termed a boundary fault zone (Barclay et al, 1990). **The southeasterly offset at the eastern edge of the FSJG, and the correspondingly thick accumulation of Stoddart/ Belloy sediments, coincide approximately with the basement contact zone between the Ksituan and the Chinchaga domains** (Figure A-4.4S). This contact also marks the boundary between the FSJG and the Hines Creek Graben. It is possible that the development and internal offset of the DCGC was influenced by the basement domain contact in this area.

Three smaller satellite grabens immediately to the east of the FSJG are the Hines Creek Graben and two smaller grabens south that are the Whitelaw and Cindy. These graben open westward and dip into the FSJG. Their geometry suggests that they are tension release fractures developed in response to rotation and southward displacement of the FSJG.

Hudson Hope Low (HHL) is the prominent low expressed by thickened Belloy Fm and Stoddart Gp strata at the western end of the DCGC and FSJG. The HHL began subsiding during Banff Fm deposition, and persisted through deposition of the Rundle Gp, Stoddart Gp, and Belloy Fm. The HHL appears to be the earliest developed, and longest-lived, feature of the DCGC.

The development of the DCGC is the product of a complex extensional regime with kilometer-scale subsidence, significant displacements along growth- type block faults, and possibly strike-slip-related compressional and rotational movements. The DCGC had a different geometry and tectonic trends than the underlying PRA, and tectonic inversion occurred where GCGC down-dropping depressed the formerly uplifted PRA. the casting stages of the DCGC signaled a change from the tectonic regime of the PRA and also signaled changes in tectonic subsidence trends during its development, particularly during its Permian casting stage. Although the GCGC and the PRA must be related, separate driving forces can be considered for the tectonic regime that controlled their geometry and movement. The DCGC subsidence was controlled by a tectonic regime to a western, outboard driving force (perhaps related to a Western Canadian Antler Orogeny).

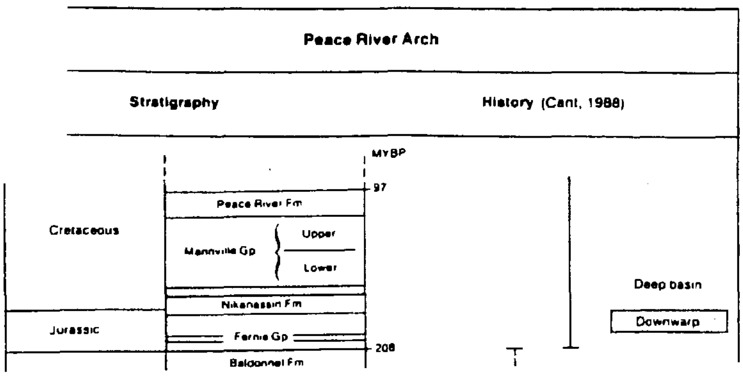
8) From earliest Cretaceous time, accentuated subsidence occurred in the Peace River region, indicating an underlying local structural control of basin configuration in this area (Williams, 1958). Many minor structural offsets within units throughout the Cretaceous were possibly caused by the reactivation of underlying PRA/DCGC structures (Cant, 1988; Hart and Plint, 1990).

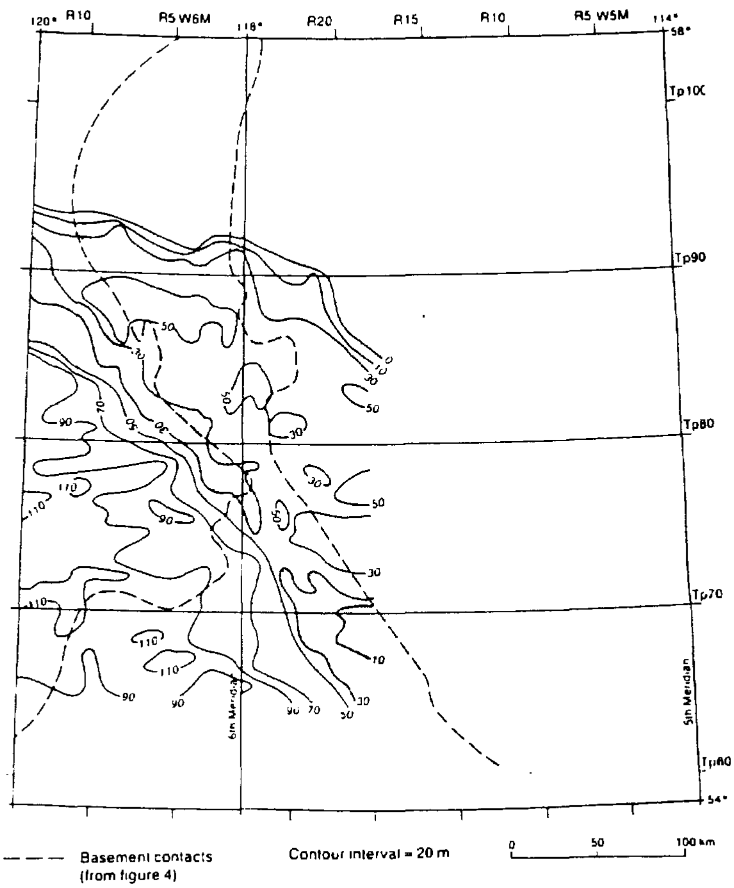
a) Prior to the deposition of the lowermost Cretaceous (Peace River Fm/Mannville Gp) units, a northwest-trending linear escarpment, known as the Fox Creek Escarpment, was uplifted in north-central Alberta (Figure A-4.4X). This uplift subdivided the area into two northwest-trending valleys that influenced Lower Mannville drainage systems and facies distributions within Cadomin, Gething, and Bluesky Fms. **The Fox Creek Escarpment is collinear with the basement contact zone between the Ksituan and the Chinchaga, and also to several other underlying northwest-trending features earlier described.**

b) An anomalous northeast-trending thickening of the Lower Mannville Gething Fm overlies, and is parallel to the DCGC. This thickening may indicate that some fluvial channel trends within the Gething Fm were influenced by renewed subsidence of underlying graben structures. A large northeast-trending sand body within the Bluesky Fm (at the top of the Lower Mannville) that consists of lowstand shoreline and fluvial valley-fill sediments, is contained within the structural boundaries of the DCGC (Figure 28.18) suggesting that renewed subsidence of the Carboniferous graben structures influenced the preferential preservation of this sand unit (O'Connell, 1994).

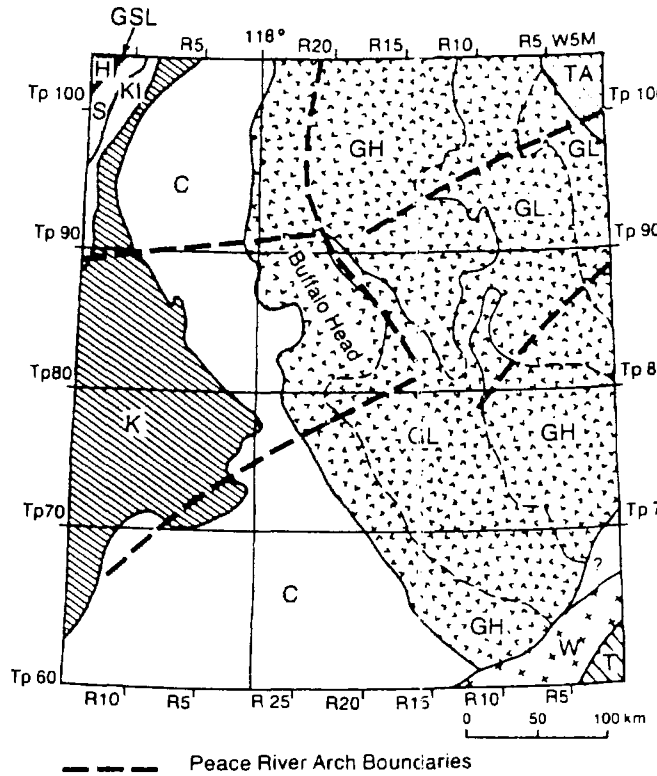
c) During Upper Mannville deposition an area of enhanced subsidence developed in the Peace River region. The axis of this basin parallels the trend of the DCGC and overlies its southern margin (Figure 28.19). Cant (1984) and Leckie (1986) suggested that the southward termination of the five Fahler (Lower Cretaceous Spirit River Fm shoreline units) transgressions at the southern margin of the PRA was due to differential subsidence of the PRA. This created a steeper gradient at the southern margin, thus limiting transgression. This differential subsidence is believed to result in the stacking of these E-W trending shorelines on top of each other and would constitute a clear example of the tectonic location of shoreline sandbodies (Bergman and Walker, 1995). Rapid subsidence of PRA/DCHC structures may have constrained the northward progradation of these shorelines. Subsidence also appears to control the amount of lateral and vertical migration of the beach, and thus "the Spirit River shallow marine sandbodies are mainly controlled by the tectonic setting and the high energy wave dominated environment of deposition" (Cant, 1984).

d) **The pronounced orthogonal drainage pattern displayed by the large fluvial system as the Peace River has been related to basement faults** (Figure A-2,13). Penecontemporaneous subsidence of the underlying DCGC structures of the PRA influenced the depositional, preservational patterns, and facies distributions of sediments of the Lower Cretaceous Peace River Fm (Paddy/Cadotte-Harmon Mbrs). The Cadotte and Paddy Mbr depositional edges are superposed, trend northwest-southeast, and have abrupt northerly limits which correspond to the southern margin of the much deeper Fort St. John Graben. Within the Cadotte Mbr, an abrupt transition from shoreline sandstone to offshore shale overlies the southern margin of the DCGC. An incised fluvial-estuarine system within the overlying Paddy Mbr parallels the





Isopach map of the informally defined 'Lower Gething Member'. The location of the Fox Creek Escarpment is indicated by the shading of the 30 m isopach.



Magmatic Arc	K	Ksituan High 1.98-1.90 Ga
Magnetic Low	C	Chinchaga Low 2.08-2.17 Ga
Accreted Terrane	BH	Buffalo Head Terrane 1.99-2.32 Ga

GH and GL are aeromagnetic/gravity highs and lows respectively within the Buffalo Head accreted terrane.

Figure **A-4.4X**

Spatial correspondence between Ksituan High-Chinchaga Low basement structural contact and Phanerozoic sedimentary and structural trend/s (O'Connel et al, 1990).

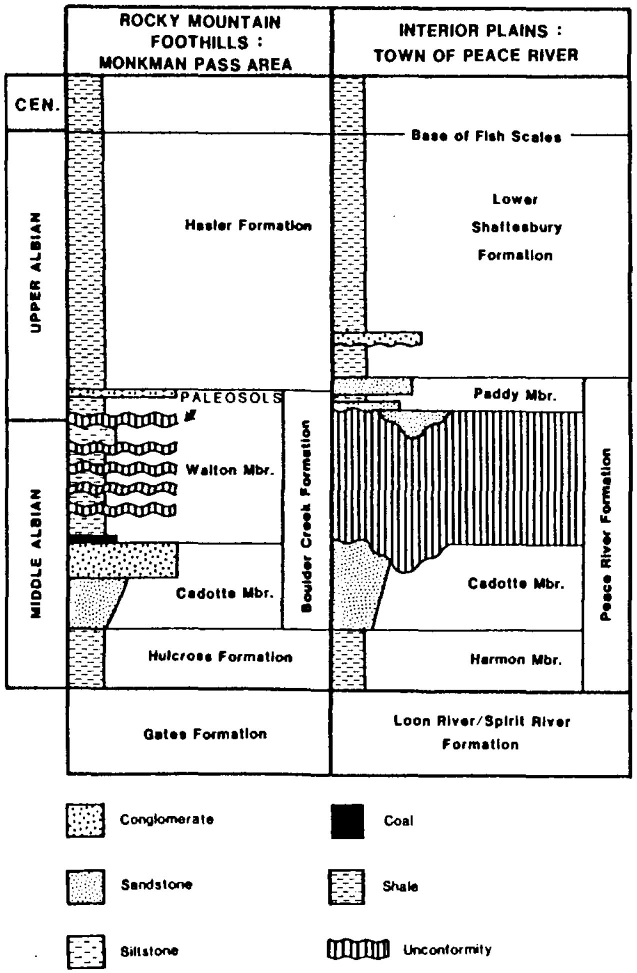


Fig. 2. Stratigraphic nomenclature of mapped units in the Peace River Formation and lower Shaftesbury Formation (modified from Leckie and Reinson, *in press*). "Cen." refers to the Cenomanian.

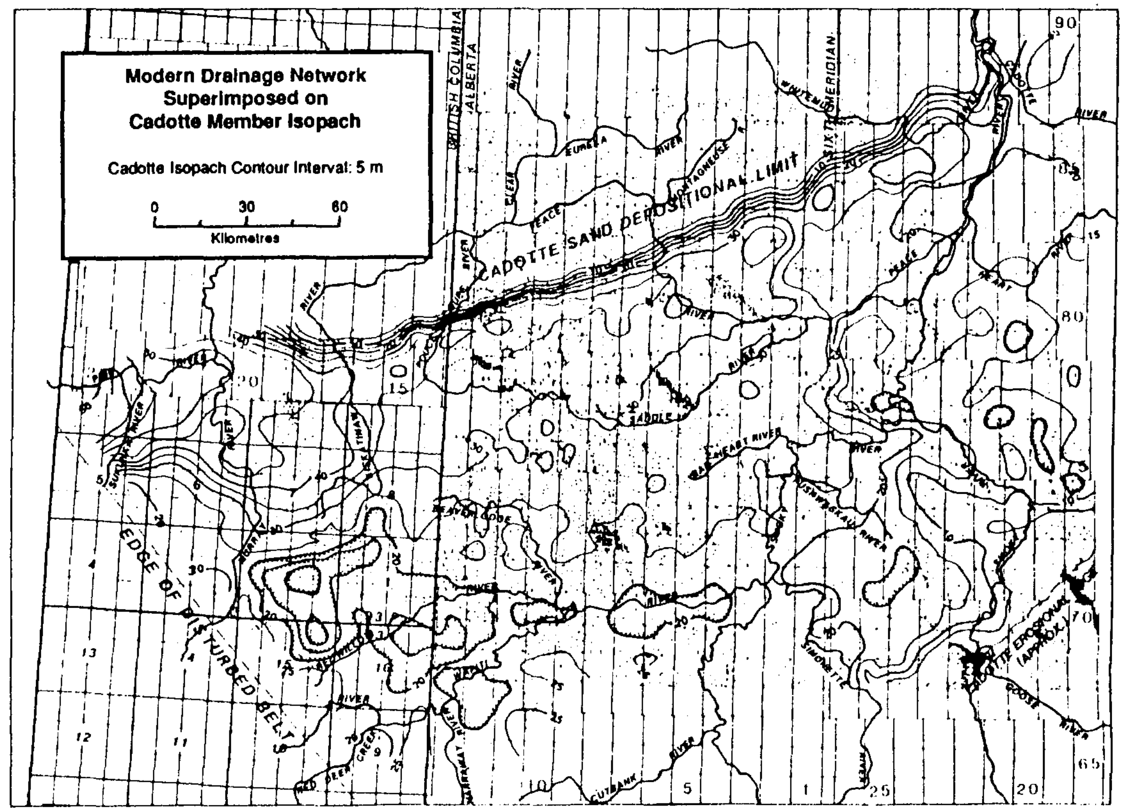


Fig. 13. Overlay of modern drainage network on isopach map of the Cadotte Member.

shoreline, and the southern edge of the DCGC. An overlay of the modern drainage network on isopachs of the Cadotte Mbr shows several coincidences: The paths of Red Willow Creek and Wapiti River coincide with the northeast-trending erosional edge. A significant underlying basement control is suggested by: the Cadotte and Paddy depositional edges (inferred late Albian drainage patterns) paralleling the modern northeast-southwest segments of the Kiskatinaw and Peace Rivers; and in the region east of Rge 6W6 where the Peace River swings southward and then to the north, the river's position coinciding with a region of high magnetic anomaly values. The basement control is manifested by a subtle, northeast-southwest trending structural high that reduced accommodation space and resulted in a depositional thin (Leckie et al, 1990).

9) The deposition of Upper Cretaceous Cardium Fm and the overlying Marshybank and Bad Heart Fms in the PRA area was influenced by basement uplift in the area of the peripheral bulge, and by remobilization of basement faults. The northeastward thinning of the Cardium is believed to be related to upwarping of the PRA contemporaneously with Cardium deposition. The NW-SE sandbody trends observed in isopach maps were attributed to movement during deposition of the Cardium on 1) the Fox Creek Escarpment, 2) a series of inferred Precambrian basement faults and 3) a portion of the Chinchaga Low (Hart and Flint, 1990).

Appendix 5.0

Summary Comparison Tables of Indicator and Determinative Minerals.

(compiled mainly from ISPG's A Review of Geological Material Relevant to Diamond Exploration and a Summary of Results, Oct. 1989; MDA Project M93-03-037 ARC Open File Report 1994-10 prepared by Dufresne et al; Regional Metallogenic Evaluation of Alberta prepared by Olson et al, Mar. 1994; Chromite Macrocrysts in Kimberlites and Lamproites Geochemistry and Origin by Griffin et al, 1994; Kimberlite Indicator Minerals in southwestern Saskatchewan by Simpson, 1993; and Kimberlite and Kimberlite or Apples and Orange(ite)s? by Mitchell, 1993)

Mineralogy Comparisons	Kimberlites		Lamproites
	Group I	Group II	*mineral common with kimberlite comparative unique phase for kimberlite", for lamproite+
Mitchell :	Kimberlite	Orangeite	
Megacrysts/Macrocrysts		(megacryst absent)	
(discrete nodule suite)			
Magnesian picroilmenite	common	absent	
Low Cr,Ti-pyrope (G1,G2) garnet	common	absent	
Olivine	abundant	common	
Phlogophite	common	rare	
Subcalcic to calcic diopside	common	v.v. rare	
Xenoliths/Xenocrysts			
Lherzolite suite			
high Cr (P4) chromite	common	v.v. rare	
Eclogite suite	rare	common	
Cr-rich subcalcic pyrope (G9,G10) garnet	rare	common	
Diamonds	<1CM/tonne	>1CM/tonne	
Phenocrysts/Groundmass			
Primary Minerals			
Olivine	*common	rare	*olivine
Monticellite(Ca-rich Olivine)	"common	absent	—
Forsterite	—	—	+forsterite
Mica	rare	abundant	
Tetraferriphlogophite	rare	*abundant(Ti-poor)	*Ti-rich, Al-poor phlogopite
Diopside	absent	common	Al-Na-poor diopside
Spinel	*abundant	common	
w/ Mg ulvospinel quandilite	hallmark	absent	—
Al-poor, low Ti Fe-Mg chromite	—	*rare	*rare
Chromites population: P1	dominant	significant	typically insignificant
P2	—	macrocrysts	—
P3	—	—	macrocrysts-high Mg (variable Cr) dominant
P4	—	—	minor
Phosphates:Sr-REE, Apatites	poor, common, not ubiquitous	rich, *characteristic	*apatite, minor & accessory phase
Sr-REE, Perovskite	poor. ubiquitous (caperovskite)	rich,*common (Ce-Sr-Ca perovskite)	*Ce-Sr-Ca perovskite
Rutile	rare	common	—
Mn-ilmenite	rare	common	—
Mg-Ti-magnetite	—	—	minor & accessory phase
K-Ba-titanates	v. rare	common	—
Zr-silicates	absent	rare	—
Sanidine	absent	rare	+K-feldspar
K-richterite	absent	rare	+K-Ti richterite (4-8 wt% TiO_2)
Carbonates	"abundant (calcite)	*common (as calcite, Fe-dolomite, norsethite, witherite, strontianite, ancyllite)	—
Ca-Ba,Sr, REE	rare	common	+Sr-barite
Pyroxenes			
ortho-	as macro-/mega-crysts or from magma contamination by siliceous country rocks	Al-Ti-poor diopsides	—
evolved-	—	towards hedenbergite-aegirine	—
unevolved(composition)-	—	*similar to lamproite	*similar to kimberlite
clino-	—	*clino-pyroxene	*clino-pyroxene
Zircon	*zircon	—	*zircon
Priderite and Wadeite	—	—	+minor & accessory phase
Armacolite and Tourmaline	—	—	minor & accessory phase
Fe-rich Leucite and Glass	—	—	+primary phase minerals

primary Serpentine, Kyanite, Corundum..........no definitive data available ....

Eclogite Source Rock

a) low Fe (<25 wt% FeO), high Mg (>6.5 wt% MgO) G3 to G6 almandine(eclogitic) garnets
b) low Cr, high Na and high Al diopsides
c) sodic diopside, jadeite, corundum and kyanite

Peridotite Source Rock

a) Cr-rich G7 to G11 pyrope garnets
b) chrome diopsides* (.0.5 wt% Cr_2O_3)
c) P1 xenocrystic chromites

* do not travel long distances in the secondary environment

Diamondiferous Eclogite Source Rock

a) high Na (.0.07 wt% Na_2O), high Ti, low Fe and high Mg G3 to G5 eclogitic garnets
b) high K (>/= 0.1wt% K_2O) eclogitic eclogitic clinopyroxenes

Diamondiferous Peridotite Source Rock

a) subcalcic, high Cr G10 pyrope garnets
b) high Mg (>/=11 wt% MgO), high Cr (>/=61 wt% Cr_2O_3) P1 xenocrystic chromites

APPENDIX 6.0

MICROPROBE RESULTS

GEO Piaja Exploration Corp. GEOLOGICAL REPORTS **#1**
TUL PETROLEUMS **MICROPROBE RESULTS -WELLSITE LOCATIONS**

LORING LABORATORIES LTD.

629 Beaverdam Rd. N.E.
Calgary, Alberta T2K 4W7

Tel: (403) 274-2777
Fax: (403) 276-0541

To: Paul Hawkins & Associates

From: Daniel Beauchamp

Date: September 6, 1993

Subject: Sample Results: #8-36 and #14 30

1. Introduction

Enclosed are the final results of the processing of two of your samples.

The data sheets enclosed represent the adjusted microprobe data as received from the technician. Your sample numbers correlate with the plug and location numbers as follows:

8-36	Plug 9 location B1	to C5
14-30	Plug 9 location A6	to E9

The oxides are presented in percent of the composition of the mineral.

As in everything, care must be taken in interpreting this data. Although some of these minerals may be found in kimberlite or lamproite, they may also be present in other rocks.

Following are a few notes on the mineral grains selected from your samples. Tables of results and charts are attached to this report.

2. Garnet

The garnets have been classified according to Dawson and Stephens' (1975) classification on the accompanying table.

Of the 23 grains selected, 22 classify as G5 and 1 as G3.

One grain from sample 14-30 is a G3 (calcic pyrope-almandine).

The G5 (magnesian almandine) are considered by Dawson and Stephens to be of high pressure origin. Fipke (1989) views those containing less than an arbitrary value of 29.94% FeO, as being almandine with kimberlitic affinity. Two of the G5 garnets from sample 8 36 are in Fipke's kimberlitic G5 group.

None of the 23 garnets have any Na_2O and therefore do not fit in the field for eclogitic garnet (Fipke, 1989).

3. Pyroxene

The 15 pyroxenes have been graded according to Stephen and Dawson's (1977) classification on the accompanying table.

Three pyroxenes plot in the diamond inclusion field of Fipke (1989). Of these, two are chrome pyroxene (CP-5) of Stephens and Dawson (1977) and the other in this field classifies as diopside (CP-2), probably because of its higher iron content (5.08% FeO_t).

All other pyroxene grains rate a CP-2 (diopside) or CP-4 (low chrome diopside). Although these pyroxenes are present in kimberlites, they are also found in other rocks and are therefore not viewed as diagnostic of such rocks.

4. Other Minerals

Several other minerals were identified in the suite of grains selected from these samples. They include epidote, staurolite, amphibole, one grain of quartz and possible chloritoid or staurolite. These had been selected because they look very similar to diopside and garnet.

5. References

Dawson J.B. and W.E. Stephens
1975: Statistical Classification of Garnets from Kimberlite and Associated Xenoliths. Journal of Geology, vol. 83, p. 589-607.

Fipke, C. E. (ed.)
1989: The Development of Advanced Technology to Distinguish Between Diamondiferous and Barren Diatremes. Geol. Surv. of Canada, Open File Report 2124.

Stephens W.E. and J.B. Dawson
1977: Statistical Comparison Between Pyroxenes from Kimberlites and their Associated Xenoliths. Journal of Geology, vol. 85, p. 433-449.

M E M O R A N D U M

To: Paul Hawkins & Associates

From: Daniel Beauchamp

Date: September 14, 1993

Subject: Sample Results: #8-36 and #14-30

Enclosed are the complete data for the microprobing of your samples. Please note the following:

1. Several grains have been probed twice. These can be identified by their identical locations (i.e. same P# C# and R#).

2. Data for minerals other than garnet and pyroxene have not been corrected beyond the Bence-Albee adjustment in the microprobe.

3. Minerals preceded by ? indicate that the technician is unsure of the correct identification of the mineral.

4. FeO* indicates that all iron is shown as FeO.

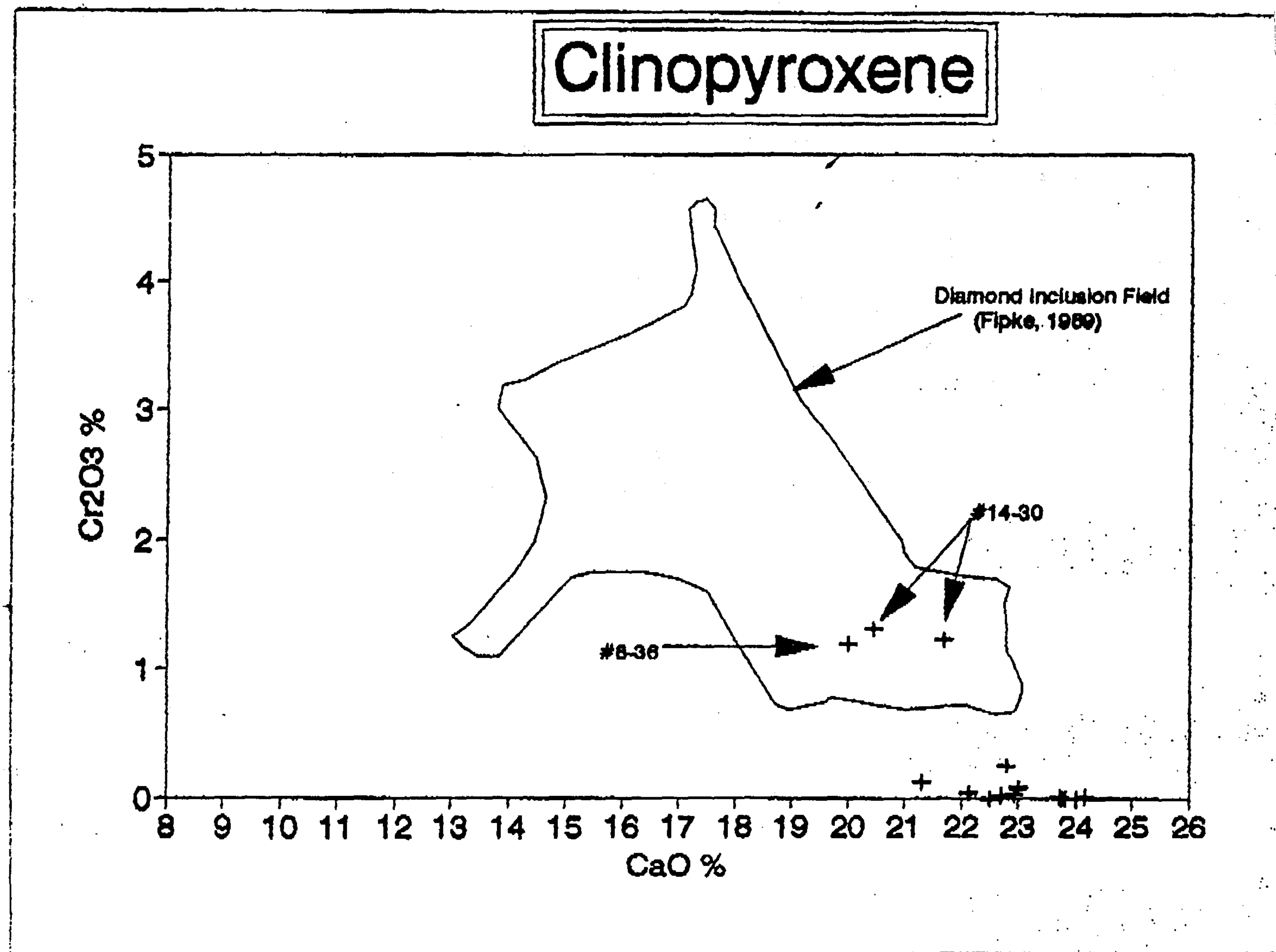
5. Dashes (--) in the MnO and K_2O columns mean that these elements were not analyzed in these grains.

Loring Laboratories Limited

File No. : 35916

Garnet Classification (after Dawson and Stephens, 1975)

Sample #	Location P#	C#	R#	Data in wt % TiO2	Cr2O3	FeO	MgO	CaO	Garnets Classification G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
8-36	9	B	1	0.00	0.00	37.68	5.10	0.85					5							
8-36	9	C	1	0.01	0.01	35.30	0.85	0.58					5							
8-36	9	D	1	0.02	0.07	36.92	2.93	4.20					5							
8-36	9	E	1	0.07	0.01	27.74	6.36	7.39					5							
8-36	9	F	1	0.01	0.04	34.46	3.70	3.32					5							
8-36	9	G	1	0.02	0.02	33.13	2.77	7.40					5							
8-36	9	H	1	0.11	0.01	31.98	1.13	9.75					5							
8-36	9	I	1	0.03	0.00	37.27	0.57	7.66					5							
8-36	9	J	1	0.00	0.02	35.34	3.99	2.90					5							
8-36	9	A	2	0.04	0.01	33.75	2.57	7.03					5							
8-36	9	B	2	0.05	0.01	29.12	4.34	8.83					5							
8-36	9	D	2	0.00	0.02	37.18	3.80	1.80					5							
14-30	9	A	6	0.02	0.02	31.36	9.73	0.76					5							
14-30	9	B	6	0.01	0.02	35.39	5.26	1.45					5							
14-30	9	C	6	0.06	0.01	34.17	1.74	7.81					5							
14-30	9	D	6	0.02	0.02	35.70	0.30	0.48					5							
14-30	9	E	6	0.00	0.00	41.51	1.14	3.18					5							
14-30	9	F	6	0.00	0.01	36.89	4.06	2.34					5							
14-30	9	G	6	0.00	0.14	36.61	5.61	0.91					5							
	Total Garnets							19	0	0	0	0	19	0	0	0	0	0	0	0
									G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12


Clinopyroxene
Diamond Inclusion Field
(Fipke, 1989)
#14-30
#8-36
Cr2O3 %
CaO %
0
1
2
3
4
5
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26

GEO Piaja Exploration Corp. GEOLOGICAL REPORTS **#2**

TUL PETROLEUMS/HAWKINS/MICROPROBE RESULTS-FIRST 80 GRAINS

PAUL HAWKINS GRAINS PICKING and MICROPROBE RESULTS

File: grains hawkinsxl			GARNET GROUP				Sept, 1996.
#	**Colour**	**Mineral**	**Shape**	**Fraction**	**Sample**	**Class**	**Indicators/Comments**
1	Red-Brown	Garnet	sub-rounded	Plus 28	TUL-1	Garnet	no detail
2	Red-Brown	Garnet	rounded	.6 Para	TUL-1	Garnet	no detail
3	Red-Brown	Garnet	rounded	.6 Non	TUL-1	G-5	
4	Red-Brown	Garnet	sub-rounded	Plus 28	TUL-2	G-5	
5	Red-Brown	Garnet	rounded	.6 Para	TUL-2	G-5	
6	Red-Brown	Garnet	sub-rounded	.6 Non	TUL-2	G-5	
7	Orange-Brown	Garnet	sub-rounded	.6 Non	TUL-3	**G-5** Eclogitic	Diamond Inclusion Field
8	Pink	Garnet	sub-rounded	.6 Non	TUL-3	G-5	
9	Red-Brown	Garnet	sub-rounded	.6 Non	TUL-3	**G-3**	
10	Pink	Garnet	sub-rounded	.6 Para	TUL-4	G-5	
11	Red-Brown	Garnet	sub-rounded	.6 Para	TUL-4	G-5	
12	Orange	Garnet	sub-rounded	.6 Para	TUL-4	G-5	
13	Pink	Garnet	sub-rounded	.6 Non	TUL-4	G-5	
14	Orange	Garnet	sub-rounded	.6 Non	TUL-4	**G-3**	
15	Orange	Garnet	sub-angular	.6 Non	TUL-4	**G-5** Eclogitic	Diamond Inclusion Field
16	Red-Brown	Garnet	sub-angular	.6 Para	TUL-4	**G-3**	
17	Pink	Garnet	sub-rounded	.6 Para	TUL-5	**G-3**	
18	Orange	Garnet	sub-rounded	.6 Non	TUL-5	G-5	
19	Pink	Garnet	sub-angular	Plus 28	TUL-5	G-5	
20	Pink	Garnet	sub-angular	.6 Non	TUL-6	G-5	
21	Orange-Brown	Garnet	sub-rounded	.6 Non	TUL-6	G-5	
22	Pink	Garnet	sub-angular	.4 Para	TUL-11	G-5	
23	Pink-Flesh	Garnet	angular	.6 Para	TUL-11	G-5	
24	Red-Brown	Garnet	sub-angular	.6 Para	TUL-11	G-5	
25	Purple	Garnet	sub-angular	.6 Non	TUL-11	G-5	
26	Pink	Garnet	sub-angular	.6 Non	TUL-11	G-5	
27	Red-Brown	Garnet	sub-angular	.6 Non	TUL-11	**G-3**	
28	Pink	Garnet	sub-angular	Plus 28	TUL-12	G-5	
29	Red-Brown	Garnet	sub-angular	Plus 28	TUL-12	G-5	
30	Pink	Garnet	sub-rounded	.6 Para	TUL-12	G-5	
31	Red-Brown	Garnet	sub-rounded	.6 Para	TUL-12	G-5	
32	Pink	Garnet	sub-angular	.6 Non	TUL-12	G-5	
33	Orange-Pink	Garnet	sub-angular	.6 Non	TUL-12	G-5	
34	Red-Brown	Garnet	sub-rounded	.6 Para	TUL-13	G-5	
35	Yellow	?	angular	.6 Non	TUL-13	unknown	
36	Red-Brown	Garnet	sub-angular	.6 Non	TUL-13	G-5	
37	Wine-Red	Garnet	crystal	Plus 28	TUL-14	G-5	
38	Red-Brown	Garnet	sub-angular	.6 Para	TUL-14	G-5	
39	Pink	Garnet	sub-rounded	.6 Non	TUL-14	G-5	
40	Red-Brown	Garnet	sub-rounded	.6 Non	TUL-14	G-5	
41	Red-Brown	Garnet	sub-rounded	.4 Para	TUL-15	G-5	
42	Purple	Garnet	sub-rounded	.4 Para	TUL-15	G-5	
43	Red-Brown	Garnet	sub-rounded	.6 Para	TUL-15	G-5	
44	Red-Brown	Garnet	sub-angular	.6 Non	TUL-21	G-5	
45	Purple	Garnet	sub-angular	.6 Non	TUL-22	G-5	
46	Purple	Garnet	**rounded**	.6 Non	TUL-22	G-5	
47	Purple	Garnet	sub-rounded	.6 Non	TUL-23	G-5	
48	Purple	Garnet	sub-rounded	.6 Non	TUL-23	Rutile	
49	Purple	Garnet	sub-rounded	.6 Non	TUL-25	G-5	

PAUL HAWKINS GRAINS PICKING and MICROPROBE RESULTS

			PYROXENE GROUP				
#	Colour	Mineral	Shape	Fraction	Sample	Class	Indicators/Comments
	Montagenuse River & valley soils						
50	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-1	pyroxene	no result or detail
51	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-2	**CP-2**	Diamond Inclusion Field
52	Blue Green	Chrome-D	sub-angular	.6 Non	TUL-2	Spinel	Zinc peak Spinel
53	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-3	**CP-4**	
54	Dark Green	CPX	sub-rounded	.6 Non	TUL-4	Epidote	
55	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-4	**CP-2**	Diamond Inclusion Field
56	Bright Green	Chrome-D	sub-rounded	.6 Non	TUL-4	**CP-5**	Diamond Inclusion Field
57	Bright Green	Chrome-D	sub-rounded	.6 Non	TUL-4	**CP-2**	Diamond Inclusion Field
58	Light Green	Chrome-D	sub-angular	2.9x3.3	TUL-5	ATC?	
59	Olive Green	?	sub-rounded	.6 Non	TUL-5	CP-2	
	Lone Star - Whitemud River 1						
60	Light Green	?	sub-rounded	.6 Non	TUL-11	**CP-4**	Low-chrome Diopside
61	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-12	CP-2	
62	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-12	CP-2	
63	Bright Green	Chrome-D	sub-rounded	.6 Non	TUL-13	CP-2	Diamond Inclusion Field
64	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-21	**CP-4**	
	Whitemud River and Silver Creek Gravel Pit						
65	Bright Green	Chrome-D	sub-rounded	2.9x3.3	TUL-22	**CP-2**	Diamond Inclusion Field
66	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-26	CP-2	
67	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-26	CP-2	
68	Olive Green	CPX	sub-rounded	.6 Non	TUL-26	CP-2	
69	Dark Green	?	sub-rounded	.6 Non	TUL-26	**CP-4**	
	Peace River Islands						
70	Bright Green	Chrome-D	sub-rounded	2.9x3.3	**TUL-31**	**CP-5**	Diamond Inclusion Field
71	Bright Green	Chrome-D	sub-rounded	2.9x3.3	**TUL-31**	CP-2	
72	Olive Green	CPX	sub-rounded	2.9x3.3	**TUL-31**	CP-2	
73	Bright Green	Chrome-D	sub-rounded	.6 Non	**TUL-31**	**CP-5**	Diamond Inclusion Field
74	Bright Green	Chrome-D	sub-rounded	.6 Non	**TUL-31**	**CP-2**	Diamond Inclusion Field
75	Light Green	Chrome-D	sub-rounded	2.9x3.3	**TUL-31**	**CP-5**	Diamond Inclusion Field
	Peace River						
76	Light Green	Chrome-D	sub-rounded	.6 Non	TUL-32	**CP-2**	Diamond Inclusion Field
77	Bright Green	Chrome-D	sub-rounded	.6 Non	TUL-32	possible sodic Chrome Pyroxene	
78	Light Green	Chrome-D	sub-angular	.6 Non	TUL-41	**CP-5**	Diamond Inclusion Field
79	Light Green	Chrome-D	sub-angular	.6 Non	TUL-52	CP-2	
80	Olive Green	CPX	angular	.6 Non	TUL-54	unknown	

629 Beaverdam Rd. N.E.
Calgary, Alberta T2K 4W7

LORING LABORATORIES LTD.

Tel: (403) 274-2777
Fax: (403) 275-0541

To: TUL PETROLEUMS LTD.

From: LORING LABORATORIES LTD.

Date: November 25,1993

Subject: Sample Results

File: 36226

1. Introduction

Enclosed are the results of the processing of grains 1 to 80 as supplied by Mr. P. Hawkins.

The data sheets enclosed represent the adjusted microprobe data as received from the technician. On the tables and charts attached to this report, the oxides are presented in weight percent of the composition of the mineral and -- indicates that the oxide was not analyzed in the mineral (see Microprobe Data table)

The minerals selected have been identified using the EDS. All minerals were analyzed by electron microprobe.

Care must be taken in interpreting this data. Although some of these minerals may be found in kimberlite or lamproite, they may also be present in other rocks.

Following are a few notes on the mineral grains picked from your samples.

2. Garnet

The garnets have been categorized according to Dawson and Stephens' (1975) classification. Of the 47 grains identified , 5 rank as G-3 and 47 rank as G-5. (see Garnet Classification tables).

Two garnets plot in the Eclogitic Field from Fipke. (1989) (see Eclogite Garnet Indicators chart).

3. Pyroxene

The 26 pyroxenes that were probed have been graded according to Stephen and Dawson's (1977) classification on the accompanying table. Seventeen rank as CP-2 (diopside) and 4 as CP-4 (low-chrome diopside), and 5 rank as CP-5 (Chrome Diopside) (see Pyroxene Classification table).

Several pyroxenes plot in or near the chrome pyroxene indicator mineral region (Fipke, 1989) (see Clinopyroxene chart).

4. Other Minerals

One grain of spinel, one of epidote, one of actinolite, and three unknowns were also identified. A grain was also identified as rutile.

5. References

Dawson J.B. and W.E. Stephens
1975: Statistical Classification of Garnets from Kimberlite and Associated Xenoliths. Journal of Geology, vol. 83, p. 589-607.

Fipke, C. E. (ed.)
1989: The development of advanced technology to distinguish between diamondiferous and barren diatremes. Geol. Surv. of Canada, Open File Report 2124.

Gurney, J. J.
1985: A correlation between garnets and diamonds in Kimberlites; in J.E. Glover and P.G. Harris (eds.), Kimberlite Occurrence and Origin: A basis for conceptual models in exploration, Geol. Dept. and Univ. Exten., Univ. W. Aust., Publ. No. 8, 143-166.

Stephens W.E. and J.B. Dawson
1977: Statistical Comparison Between Pyroxenes from Kimberlites and their Associated Xenoliths. Journal of Geology, vol. 85, p. 433-449.

Loring Laboratories Ltd.

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

File No. 36226

Client: TUL PETROLEUMS LTD. Microprobe Data November 1993

Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	Total	Mineral
Location				Data in wt %										
1	62	B	1	38.72	0.04	21.29	0.00	32.19	2.34	7.32	0.00	0.00	101.90	Garnet
2	62	C	1	37.39	0.11	20.85	0.00	34.22	1.99	6.50	0.00	0.00	101.06	Garnet
3	62	D	1	37.67	0.08	21.22	0.00	33.23	2.17	7.18	0.00	0.00	101.55	Garnet
4	62	E	1	37.35	0.09	20.60	0.00	35.28	0.99	6.95	0.00	0.00	101.26	Garnet
5	62	F	1	37.18	0.09	20.61	0.03	31.92	2.72	6.93	0.00	0.00	99.48	Garnet
6	62	G	1	37.29	0.09	20.61	0.00	33.92	1.83	6.69	0.00	0.00	100.43	Garnet
7	62	H	1	27.54	0.77	54.05	0.04	13.26	1.70	0.00	0.11	0.00	97.47	Garnet
8	62	I	1	38.09	0.01	22.93	0.03	29.89	9.48	1.10	0.00	0.00	101.53	Garnet
9	62	J	1	37.19	0.04	19.89	0.01	34.38	2.85	4.74	0.00	0.00	99.10	Garnet
10	62	A	2	36.67	0.02	21.24	0.03	38.14	3.57	1.10	0.00	0.00	100.77	Garnet
11	62	B	2	37.68	0.10	20.68	0.00	25.29	1.02	13.61	0.00	2.42	100.80	Garnet
12	62	C	2	27.41	0.74	52.81	0.01	14.57	1.97	0.00	0.00	0.00	97.51	Garnet
13	62	D	2	38.07	0.02	21.54	0.04	25.04	2.83	11.92	0.00	0.00	99.46	Garnet
14	62	E	2	26.87	0.72	54.27	0.04	13.78	1.86	0.00	0.01	0.00	97.55	Garnet
15	62	F	2	27.65	0.79	53.11	0.02	13.63	2.34	0.00	0.06	0.00	97.60	Garnet
16	62	G	2	37.65	0.08	20.93	0.02	31.92	2.48	7.56	0.00	0.00	100.64	Garnet
17	62	H	2	37.60	0.02	21.46	0.02	35.01	5.13	1.21	0.00	0.00	100.45	Garnet
18	62	I	2	38.48	0.04	22.07	0.03	32.53	6.19	1.69	0.00	0.00	101.03	Garnet
19	62	J	2	37.59	0.01	21.24	0.02	35.98	3.78	0.88	0.00	2.04	101.54	Garnet
20	62	A	3	39.00	0.04	23.26	0.02	26.10	12.05	0.87	0.00	0.00	101.34	Garnet
21	62	B	3	38.45	0.07	21.58	0.01	34.77	4.83	2.19	0.00	0.00	101.90	Garnet
22	62	C	3	37.00	0.01	20.69	0.00	35.87	1.11	0.84	0.00	6.11	101.63	Garnet
23	62	D	3	38.15	0.01	21.70	0.01	33.23	6.51	1.08	0.00	0.00	100.69	Garnet
24	62	E	3	38.44	0.14	20.71	0.01	25.63	4.72	10.96	0.00	0.00	100.61	Garnet
25	62	F	3	27.93	0.84	53.40	0.04	11.67	4.49	0.00	0.00	0.00	98.37	Garnet
26	62	G	3	38.37	0.02	22.51	0.01	31.01	8.70	0.99	0.00	0.00	101.61	Garnet
27	62	H	3	37.10	0.06	21.12	0.00	31.13	4.60	6.34	0.00	0.00	100.35	Garnet
28	62	I	3	39.26	0.03	22.42	0.08	26.94	10.38	2.41	0.00	0.00	101.52	Garnet
29	62	J	3	39.56	0.08	21.52	0.01	24.82	5.43	8.76	0.00	0.00	100.18	Garnet
30	62	A	4	38.82	0.04	22.29	0.01	32.09	6.94	2.09	0.00	0.00	102.28	Garnet
31	62	B	4	37.42	0.06	20.79	0.04	35.16	2.73	5.32	0.00	0.00	101.52	Garnet
32	62	C	4	39.56	0.01	23.28	0.04	24.13	13.58	0.94	0.00	0.00	101.54	Garnet
33	62	D	4	39.18	0.03	22.03	0.06	27.14	8.76	4.39	0.00	0.00	101.59	Garnet
34	62	E	4	37.96	0.02	21.11	0.01	32.76	4.03	5.62	0.00	0.00	101.51	Garnet
35	62	F	4	20.83	0.88	4.02	0.56	0.88	0.17	0.73	1.79	0.00	29.86	UNK(1)

Loring Laboratories Ltd.

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

File No. 36226
Client: TUL PETROLEUMS LTD. Microprobe Data November 1993

Location				Data in wt %										Mineral
Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	Total	Mineral
36	62	G	4	37.86	0.04	21.00	0.00	31.01	3.64	6.75	0.00	0.00	100.30	Garnet
37	62	H	4	37.01	0.04	20.04	0.03	30.48	0.59	1.47	0.00	11.62	101.28	Garnet
38	62	I	4	37.02	0.03	20.55	0.01	38.55	1.44	3.76	0.00	0.00	101.36	Garnet
39	62	J	4	38.33	0.05	22.14	0.07	25.93	11.60	1.23	0.00	0.00	99.35	Garnet
40	62	A	5	37.69	0.05	20.47	0.01	33.19	2.17	6.88	0.00	0.00	100.46	Garnet
41	62	B	5	37.25	0.15	20.49	0.00	32.74	2.27	7.35	0.00	0.00	100.25	Garnet
42	62	C	5	36.98	0.01	20.05	0.00	39.09	1.09	3.83	0.00	0.00	101.05	Garnet
43	62	D	5	37.97	0.04	21.22	0.00	32.44	2.54	7.60	0.00	0.00	101.81	Garnet
44	62	E	5	38.12	0.02	20.79	0.00	32.08	4.71	5.51	0.00	0.00	101.23	Garnet
45	62	F	5	36.88	0.02	20.07	0.00	38.17	1.07	5.02	0.00	0.00	101.23	Garnet
46	62	G	5	37.03	0.07	20.31	0.04	36.74	0.72	5.92	0.00	0.00	100.83	Garnet
47	62	H	5	37.63	0.04	20.58	0.04	34.40	1.80	7.00	0.00	0.00	101.49	Garnet
48	62	I	5	0.00	51.88	0.06	0.18	0.36	0.00	0.06	0.00	0.00	52.54	RT(5)
49	62	J	5	37.36	0.06	20.25	0.00	34.53	1.77	6.72	0.00	0.00	100.69	Garnet
50	62	A	6	53.73	0.05	0.59	0.12	5.54	15.45	23.16	0.88	0.00	99.52	Pyroxene
51	62	B	6	51.24	0.37	7.11	0.66	2.52	15.11	20.46	1.84	0.00	99.31	Pyroxene
52	62	C	6	0.00	0.04	65.92	0.03	8.32	20.05	0.01	0.40	0.00	94.77	SP(6)
53	62	D	6	51.52	0.33	2.13	0.01	6.23	15.23	23.94	0.36	0.00	99.75	Pyroxene
54	62	E	6	37.15	0.04	25.81	0.02	4.29	2.52	22.34	0.06	0.00	92.23	EP(1)
55	62	F	6	51.06	0.42	6.83	0.76	2.62	15.43	20.38	1.74	0.00	99.24	Pyroxene
56	62	G	6	52.70	0.21	5.50	1.56	2.42	15.70	20.19	1.86	0.00	100.14	Pyroxene
57	62	H	6	51.28	0.34	6.63	0.99	2.82	16.06	19.82	1.68	0.00	99.62	Pyroxene
58	62	I	6	57.27	0.01	0.69	0.12	5.65	20.91	12.67	0.08	0.00	97.40	ACT
59	62	J	6	53.52	0.03	0.63	0.06	7.17	14.60	23.49	0.65	0.00	100.15	Pyroxene
60	62	A	7	53.05	0.01	1.33	0.07	8.00	14.55	21.17	0.77	0.00	98.95	Pyroxene
61	62	B	7	53.65	0.03	1.33	0.24	7.88	14.28	22.22	0.66	0.00	100.29	Pyroxene
62	62	C	7	54.54	0.02	0.46	0.03	5.93	15.43	23.83	0.50	0.00	100.74	Pyroxene
63	62	D	7	51.43	0.33	6.44	1.08	2.83	15.85	20.15	1.55	0.00	99.66	Pyroxene
64	62	E	7	53.23	0.12	1.06	0.02	7.58	14.11	23.01	0.74	0.00	99.87	Pyroxene
65	62	F	7	52.47	0.48	5.01	1.13	3.43	16.59	20.25	1.21	0.00	100.57	Pyroxene
66	62	G	7	52.92	0.03	0.81	0.05	6.12	15.54	23.99	0.34	0.00	99.80	Pyroxene
67	62	H	7	53.55	0.18	1.21	0.38	3.72	18.34	22.94	0.12	0.00	100.44	Pyroxene
68	62	I	7	54.02	0.05	0.75	0.02	6.16	15.03	24.02	0.36	0.00	100.41	Pyroxene
69	62	J	7	52.05	0.34	2.14	0.09	6.31	15.06	23.62	0.35	0.00	99.96	Pyroxene
70	62	A	8	54.49	0.11	1.84	0.89	3.70	15.96	21.04	1.74	0.00	99.77	Pyroxene

Loring Laboratories Ltd.

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

File No. 36226

Client: TUL PETROLEUMS LTD. Microprobe Data November 1993

Location				Data in wt %										
Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	Total	Mineral
71	62	B	8	53.28	0.20	1.90	0.63	4.04	17.63	22.40	0.16	0.00	100.24	Pyroxene
72	62	C	8	51.69	0.42	7.44	0.68	3.19	15.40	19.40	1.78	0.00	100.00	Pyroxene
73	62	D	8	52.88	0.12	4.00	1.22	2.24	17.09	20.88	1.26	0.00	99.69	Pyroxene
74	62	E	8	51.82	0.42	6.15	1.39	2.68	16.15	19.99	1.63	0.00	100.23	Pyroxene
75	62	F	8	51.86	0.27	5.64	1.14	2.47	16.84	20.98	1.25	0.00	100.45	Pyroxene
76	62	G	8	51.48	0.39	6.87	1.11	2.59	16.01	20.15	1.68	0.00	100.28	Pyroxene
77	62	H	8	57.55	0.03	14.44	1.60	4.61	4.59	5.98	7.97	0.00	96.77	UNK(2)
78	62	I	8	53.70	0.06	3.28	1.19	2.13	16.82	21.30	1.59	0.00	100.07	Pyroxene
79	62	J	8	54.32	0.03	0.76	0.09	5.55	15.85	23.09	0.84	0.00	100.53	Pyroxene
80	62	A	9	39.16	0.04	23.94	0.00	5.33	2.22	21.46	0.00	0.00	92.15	UNK(3)

Explanations for numbered codes:

UNK(1), location F4: several spot analyses of this grain reveal a similar composition; cannot be identified

RT(5), location I5: only TiO2 was detected (52%); could be rutile

SP(6), location C6: low total, thera was a peak of zinc in this spinel.

EP(1), location E6: possibly epidote, even with the low total (no peak of Mn, La, or Ce); 2.5 % MgO)

UNK(2), location H8: could be a sodic and chromiferous pyroxene, but total is low; unknown.

UNK(3), location A9: could be an epidote, but total is low; 2.2 % MgO.

Loring Laboratories Ltd.

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

File #36226

Client: TUL PETROLEUMS LTD.

November 1993

Garnet Classification (after Dawson and Stephens, 1975)

Location				Data in wt %						Garnets Classification											
Sample #	P#	C#	R#	TiO2	Cr2O3	FeO	MgO	CaO	Na2O	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
3	62	D	1	0.04	0.00	32.19	2.34	7.32	0.00	..	..	..	..	5	..	..	..	..	..	..	..
4	62	E	1	0.11	0.00	34.22	1.99	6.50	0.00	..	..	..	..	5	..	..	..	..	..	..	..
5	62	F	1	0.08	0.00	33.23	2.17	7.18	0.00	..	..	..	..	5	..	..	..	..	..	..	..
6	62	G	1	0.09	0.00	35.28	0.99	6.95	0.00	..	..	..	..	5	..	..	..	..	..	..	..
7	62	H	1	0.09	0.03	31.92	2.72	6.93	0.00	..	..	..	..	5	..	..	..	..	..	..	..
8	62	I	1	0.09	0.00	33.92	1.83	6.69	0.00	..	..	..	..	5	..	..	..	..	..	..	..
9	62	J	1	0.77	0.04	13.26	1.70	0.00	0.11	..	..	3	..	..	..	..	..	..	..	..	..
10	62	A	2	0.01	0.03	29.89	9.48	1.10	0.00	..	..	..	..	5	..	..	..	..	..	..	..
11	62	B	2	0.04	0.01	34.38	2.85	4.74	0.00	..	..	..	..	5	..	..	..	..	..	..	..
12	62	C	2	0.02	0.03	38.14	3.57	1.10	0.00	..	..	..	..	5	..	..	..	..	..	..	..
13	62	D	2	0.10	0.00	25.29	1.02	13.61	0.00	..	..	..	..	5	..	..	..	..	..	..	..
14	62	E	2	0.74	0.01	14.57	1.97	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
15	62	F	2	0.02	0.04	25.04	2.83	11.92	0.00	..	..	..	..	5	..	..	..	..	..	..	..
16	62	G	2	0.72	0.04	13.78	1.86	0.00	0.01	..	..	3	..	..	..	..	..	..	..	..	..
17	62	H	2	0.79	0.02	13.63	2.34	0.00	0.06	..	..	3	..	..	..	..	..	..	..	..	..
18	62	I	2	0.08	0.02	31.92	2.48	7.56	0.00	..	..	..	..	5	..	..	..	..	..	..	..
19	62	J	2	0.02	0.02	35.01	5.13	1.21	0.00	..	..	..	..	5	..	..	..	..	..	..	..
20	62	A	3	0.04	0.03	32.53	6.19	1.69	0.00	..	..	..	..	5	..	..	..	..	..	..	..
21	62	B	3	0.01	0.02	35.98	3.78	0.88	0.00	..	..	..	..	5	..	..	..	..	..	..	..
22	62	C	3	0.04	0.02	26.10	12.05	0.87	0.00	..	..	..	..	5	..	..	..	..	..	..	..
23	62	D	3	0.07	0.01	34.77	4.83	2.19	0.00	..	..	..	..	5	..	..	..	..	..	..	..
24	62	E	3	0.01	0.00	35.87	1.11	0.84	0.00	..	..	..	..	5	..	..	..	..	..	..	..
25	62	F	3	0.01	0.01	33.23	6.51	1.08	0.00	..	..	..	..	5	..	..	..	..	..	..	..
26	62	G	3	0.14	0.01	25.63	4.72	10.96	0.00	..	..	..	..	5	..	..	..	..	..	..	..
27	62	H	3	0.84	0.04	11.67	4.49	0.00	0.00	..	..	3	..	..	..	..	..	..	..	..	..
28	62	I	3	0.02	0.01	31.01	8.70	0.99	0.00	..	..	..	..	5	..	..	..	..	..	..	..
29	62	J	3	0.06	0.00	31.13	4.60	6.34	0.00	..	..	..	..	5	..	..	..	..	..	..	..
30	62	A	4	0.03	0.08	26.94	10.38	2.41	0.00	..	..	..	..	5	..	..	..	..	..	..	..
31	62	B	4	0.08	0.01	24.82	5.43	8.76	0.00	..	..	..	..	5	..	..	..	..	..	..	..
32	62	C	4	0.04	0.01	32.09	6.94	2.09	0.00	..	..	..	..	5	..	..	..	..	..	..	..
33	62	D	4	0.06	0.04	35.16	2.73	5.32	0.00	..	..	..	..	5	..	..	..	..	..	..	..
34	62	E	4	0.01	0.04	24.13	13.58	0.94	0.00	..	..	..	..	5	..	..	..	..	..	..	..
36	62	G	4	0.03	0.06	27.14	8.76	4.39	0.00	..	..	..	..	5	..	..	..	..	..	..	..
37	62	H	4	0.02	0.01	32.76	4.03	5.62	0.00	..	..	..	..	5	..	..	..	..	..	..	..
38	62	I	4	0.04	0.00	31.01	3.64	6.75	0.00	..	..	..	..	5	..	..	..	..	..	..	..
39	62	J	4	0.04	0.03	30.48	0.59	1.47	0.00	..	..	..	..	5	..	..	..	..	..	..	..
40	62	A	5	0.03	0.01	38.55	1.44	3.76	0.00	..	..	..	..	5	..	..	..	..	..	..	..
41	62	B	5	0.05	0.07	25.93	11.60	1.23	0.00	..	..	..	..	5	..	..	..	..	..	..	..
42	62	C	5	0.05	0.01	33.19	2.17	6.88	0.00	..	..	..	..	5	..	..	..	..	..	..	..
43	62	D	5	0.15	0.00	32.74	2.27	7.35	0.00	..	..	..	..	5	..	..	..	..	..	..	..
44	62	E	5	0.01	0.00	39.09	1.09	3.83	0.00	..	..	..	..	5	..	..	..	..	..	..	..
45	62	F	5	0.04	0.00	32.41	2.54	7.60	0.00					5							
46	62	G	5	0.02	0.00	32.08	4.71	5.51	0.00	..	..	..	..	5	..	..	..	..	..	..	..
47	62	H	5	0.02	0.00	38.17	1.07	5.02	0.00	..	..	..	..	5	..	..	..	..	..	..	..
49	62	J	5	0.07	0.04	36.74	0.72	5.92	0.00	..	..	..	..	5	..	..	..	..	..	..	..

Loring Laboratories Ltd.

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

File #36226

Client: TUL PETROLEUMS LTD.

November 1993

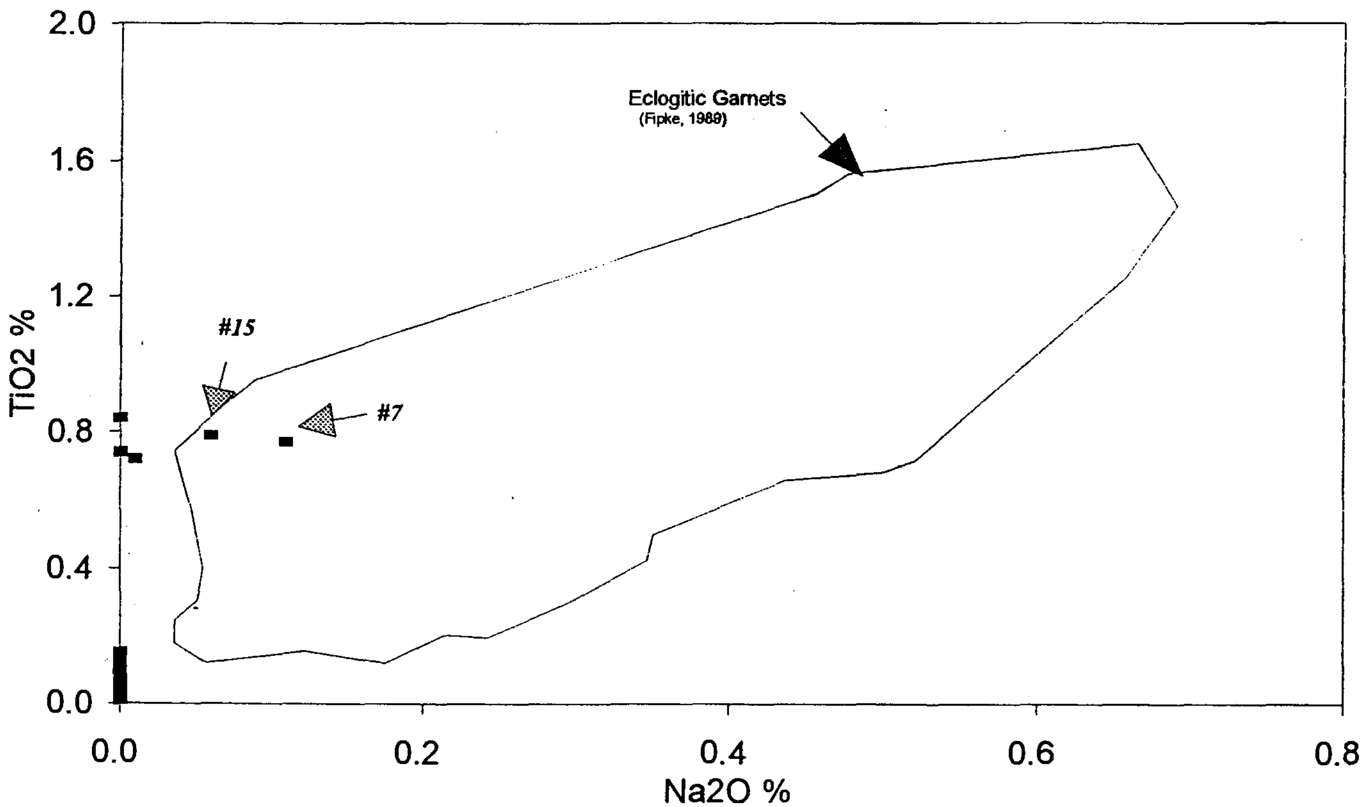
Garnet Classification (after Dawson and Stephens, 1975)

Location				Data in wt %						Garnets Classification											
Sample #	P#	C#	R#	TiO2	Cr2O3	FeO	MgO	CaO	Na2O	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
				Total Garnets					47	0	0	5	0	42	0	0	0	0	0	0	0
										G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12

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

File #36226
Client: TUL Petroleums Ltd.

Eclogite Garnet Indicators



Loring Laboratories Ltd.

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

File #36226
Client: TUL PETROLEUMS LTD.

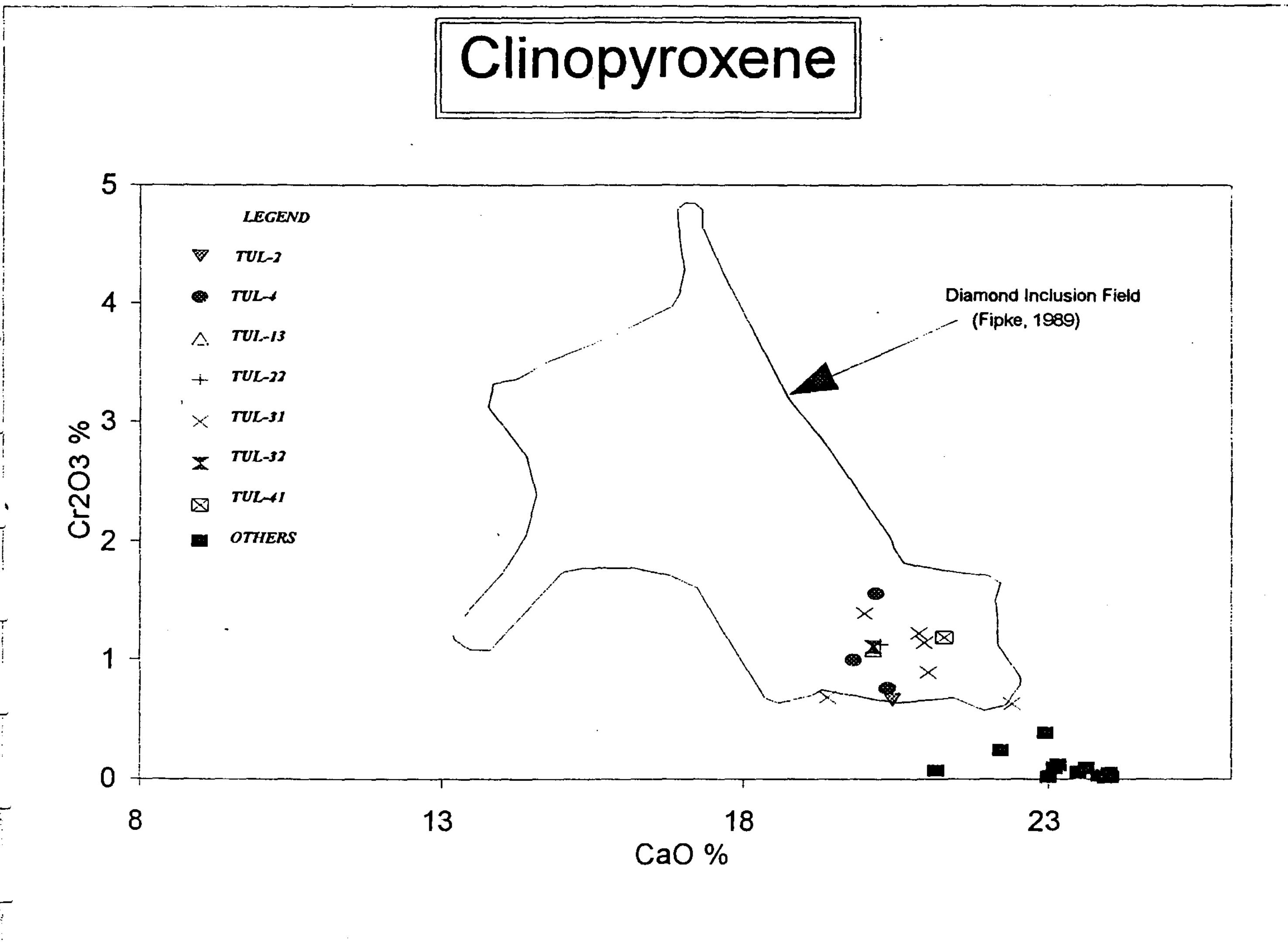
Pyroxene Classification (after Stephens and Dawson, 1977)

Location				Data in wt %							ORTHOPYROXENE / CLINOPYROXENE
Sample #	P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	Classification
50	62	A	6	0.05	0.59	0.12	5.54	15.45	23.16	0.88	2
51	62	B	6	0.37	7.11	0.66	2.52	15.11	20.46	1.84	2
53	62	D	6	0.33	2.13	0.01	6.23	15.23	23.94	0.36	4
55	62	F	6	0.42	6.83	0.76	2.62	15.43	20.38	1.74	2
56	62	G	6	0.21	5.50	1.56	2.42	15.70	20.19	1.86	5
57	62	H	6	0.34	6.63	0.99	2.82	16.06	19.82	1.68	2
59	62	J	6	0.03	0.63	0.06	7.17	14.60	23.49	0.65	2
60	62	A	7	0.01	1.33	0.07	8.00	14.55	21.17	0.77	4
61	62	B	7	0.03	1.33	0.24	7.88	14.28	22.22	0.66	2
62	62	C	7	0.02	0.46	0.03	5.93	15.43	23.83	0.50	2
63	62	D	7	0.33	6.44	1.08	2.83	15.85	20.15	1.55	2
64	62	E	7	0.12	1.06	0.02	7.58	14.11	23.01	0.74	4
65	62	F	7	0.48	5.01	1.13	3.43	16.59	20.25	1.21	2
66	62	G	7	0.03	0.81	0.05	6.12	15.54	23.99	0.34	2
67	62	H	7	0.18	1.21	0.38	3.72	18.34	22.94	0.12	2
68	62	I	7	0.05	0.75	0.02	6.16	15.03	24.02	0.36	2
69	62	J	7	0.34	2.14	0.09	6.31	15.06	23.62	0.35	4
70	62	A	8	0.11	1.84	0.89	3.70	15.96	21.04	1.74	5
71	62	B	8	0.20	1.90	0.63	4.04	17.63	22.40	0.16	2
72	62	C	8	0.42	7.44	0.68	3.19	15.40	19.40	1.78	2
73	62	D	8	0.12	4.00	1.22	2.24	17.09	20.88	1.26	5
74	62	E	8	0.42	6.15	1.39	2.68	16.15	19.99	1.63	2
75	62	F	8	0.27	5.64	1.14	2.47	16.84	20.98	1.25	5
76	62	G	8	0.39	6.87	1.11	2.59	16.01	20.15	1.68	2
78	62	I	8	0.06	3.28	1.19	2.13	16.82	21.30	1.59	5
79	62	J	8	0.03	0.76	0.09	5.55	15.85	23.09	0.84	2

Loring Laboratories Ltd.

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

File #36226
Client: TUL Petroleums Ltd.



GEO Piaja Exploration Corp. **GEOLOGICAL REPORTS** **Hickock Gravel Pit: #3**
TUL PETROLEUMS **MICROPROBE RESULTS-SAMPLE 4.0 Many Islands Chromite**

FUSION PROCESS DONE BY LORING LABS

Loring Laboratories Ltd.

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

FILE # : 37100-D   COMPANY: OAK ISLAND CAPITAL CORPORATION   DATE : Dec 30, 1994

SAMPLE ID.	ORIGINAL WEIGHT (Kg)	SCREEN ANALYSIS +35 mesh (Kg)	SCREEN ANALYSIS 35 x 80 mesh (Kg)	SCREEN ANALYSIS -80 mesh (Kg)	TABLE CONC. +80 mesh (g)	MIDDLINGS 2.9 - 3.3 SG MAG. (g)	MIDDLINGS 2.9 - 3.3 SG NON-MAG. (g)	HEAVIES >3.3 SG MAG. (g)	HEAVIES >3.3 SG +28 Mesh (g)	HEAVIES P.M. 0.5 (g)	HEAVIES P.M. 0.6 (g)	HEAVIES P.M. 0.7 (g)	HEAVIES W.P.M. 1.2 (g)	HEAVIES W.P.M. 2.0 (g)	HEAVIES N.M. 2.0 (g)
TUL 4-0	62.7	5.5	10.3	61.68	85.48	0.76	23.57	1.57	0.01	18.52	24.96	4.73	4.72	0.54	1.40

NOTE : P.M. = PARAMAGNETIC   W.P.M. = WEAKLY PARAMAGNETIC   N.M. = NON-MAGNETIC

[redacted]
ASSAYER

Loring Laboratories Ltd.

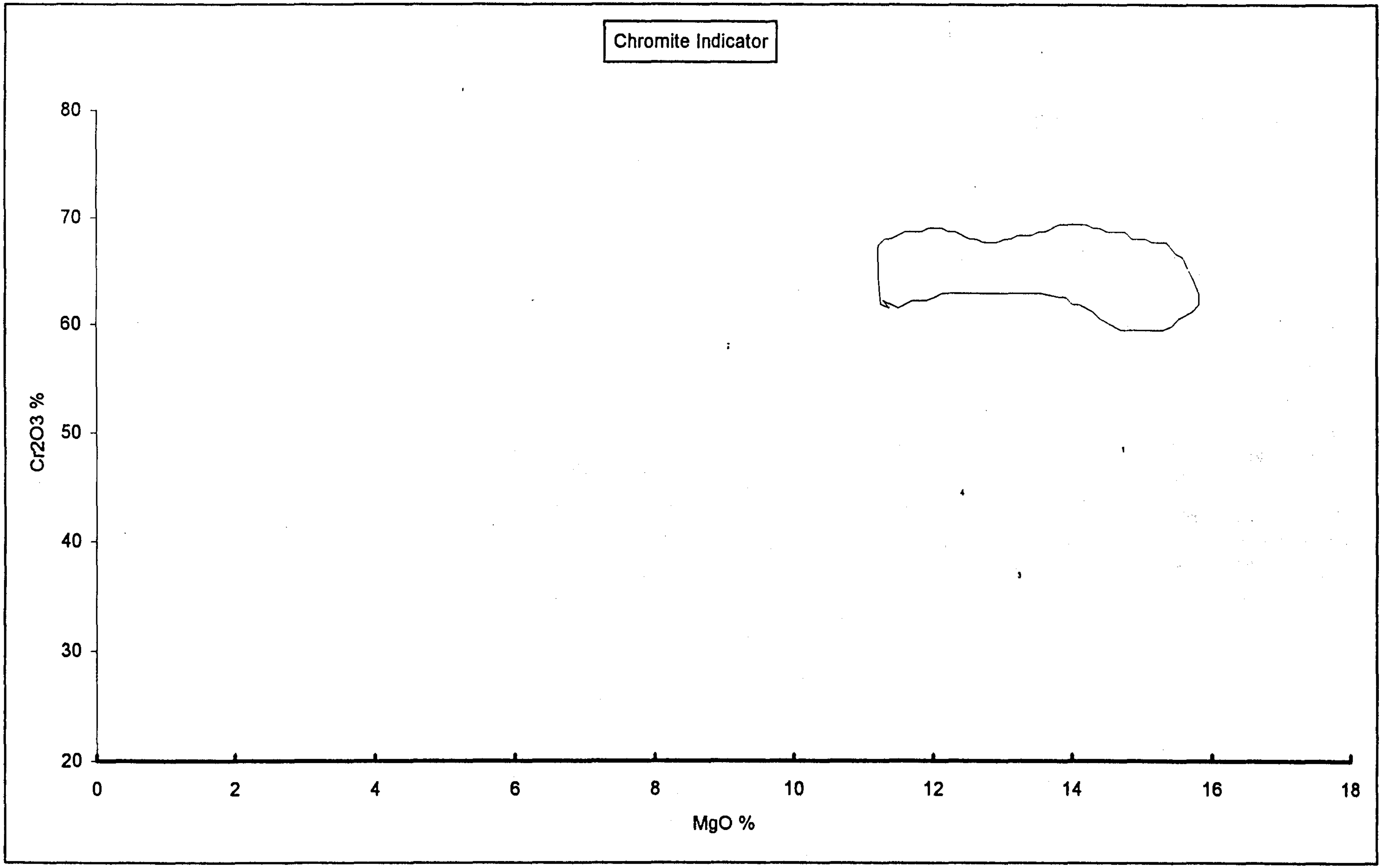
629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 274-2777 Fax: 275-0541

File No. : 37100

Microprobe Data

		Location			Data in wt %													
Grain #	Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	CaO	Na2O	K2O	NiO	ZnO	V2O3	Total
1	4-0	101	A	2	--	0.47	10.38	48.49	23.24	0.26	14.50	--	--	--	0.11	0.04	0.06	97.55
2	4-0	101	B	2	--	0.13	7.46	57.94	24.21	0.50	8.86	--	--	--	0.03	0.36	0.14	99.63
3	4-0	101	C	2	--	0.12	26.50	36.87	22.79	0.27	13.01	--	--	--	0.15	0.25	0.17	100.13
4	4-0	101	D	2	--	0.18	17.19	44.45	23.54	0.26	12.20	--	--	--	0.14	0.24	0.18	98.39
5	4-0	101	D	2	--	14.68	2.18	0.35	70.29	0.30	2.62	--	--	--	0.00	0.03	0.27	90.72

chromite



Chromite Indicator
80
70
60
50
40
30
20
Cr2O3 %
0
2
4
6
8
10
12
14
16
18
MgO %

1.0 INTRODUCTION

Chromite electron microprobe analyses were analyzed using the criteria of Griffen et al. (in press and 1993), Michell and Bergman (1991), Mitchell (1986) and Sobolev et al. (1992). This was done to define the potential source rock, characterize the geochemistry of the source, define the potential for diamonds.

Chromite electron microprobe data was run through a proprietary program which determines the P-type classification and calculates the statistical parameters used in the preparation of this report. The output from this program is subsequently used as input to a statistical software package, mathematical software package and to a graphics package.

2.0 THE P-TYPE CLASSIFICATION SYSTEM

Griffen's chromite population classification system (Griffen et al., in press) is a paragenesis based scheme devised to differentiate lamproitic chromites and kimberlitic chromites from chromites from other sources. Chromites from olivine lamproites, Group I and II kimberlites and diamond inclusions were used to determine the classification parameters. P1 chromites are xenocrysts derived from the desegregation and subsequent incorporation into the ascending magma. P1 chromites are the dominant population in Group 1 kimberlites, a significant population in Group II kimberlites and typically insignificant in lamproites. P4 chromites are low pressure and temperature xenocryst chromites derived from incorporation of lherzolitic chromites in the magma. P2 chromites are macrocrysts, products of magmatic crystallization, in Group II kimberlites. P3 chromites are macrocrysts found in olivine lamproites and are indicators of lamproite magmatism. In lamproites P3 chromites are typically the dominant population with lesser amounts of P4 and a small population of P1 chromites. Diamond inclusion (D.I.) chemistry chromites geochemically overlap with part of the P1 population since D.I. chemistry xenocryst chromites are a subpopulation of the harzburgitic chromites.

Early magmatic products in both kimberlites and lamproites may resemble geochemically xenocrysts. Griffen's classification scheme is currently the only method for determination of xenocryst and macrocryst chromites. Equilibration temperatures of xenocryst chromites (Griffen et al., 1993) and their relative abundance is used to determine which potential source rocks are diamondiferous and target prioritization.

3.0 GEOCHEMISTRY OF CHROMITES

The computer output of a proprietary program was used to generate data used in the graphs and determine the p-type classification of the chromites. Three chromites were analyzed of which one were subsequently found to have compositions suitable for use in this report. One chromite was determined to have p-type classifications. Grain 1 was determined to be a P3 chromite (14.50 wt. % MgO).

4.0 CONCLUSIONS

Grain 1 was deterrmined to be a P3 chromite which indicates that the the chromite more closely resemble lamproite derived chromite as compared to kimberlite derived chromites. A larger number of chromites is needed to conclusively determine the nature of the source for the chromites.

5.0 DISCLAIMER

The above report was written by the author without knowing the source of the chromite data or the client. For report purposes is was assumed the chromites were derived from one sample and are genetically related. The microprobe data was used as received from Loring Labs Ltd. and the integrity of the data is unknown. The small database of chromites presents sampling problems indicative of small sample populations which may not represent the entire chromite population. Because of the the small sample population the conclusions derived in this report are preliminary and subject to change pending a larger chromite database. This report does not imply and similarity to any other property, source, person or company, other that the client, and no claims are to be made thereof.

6.0 REFERENCES

Griffin W.L., Ryan C.G., Gurney J.J., Sobolev N.V. and Win T.T., In Press, Chromite Macrocrysts in Kimberlites and Lamproites Geochemistry and Origin.

Griffin W.L., Sobolev N.V., Ryan C.G., Pokhilenko, Win T.T. and Yefimova E.S., 1993, Trace Elements in Garnets and Chromites: Diamond Formation in the Siverian Lithosphere, Lithos, 29, pp 235-256.

Mitchell R.H., 1986, 1986, Kimberlites: Mineralogy, Geochemistry, and Petrology, Plenum Pressm, New York, 442 pages.

Mitchell R.H. and Bergman S.C., 1992 Petrology of Lamproites, Plenum Press, New York, 447 pages.

Sobolev N.V., Pokhilenko N.P., Grib V.P., Skripnichenko V.A. and Titova V.E., 1992 Specific Compositions and Conditions of Formation of Deep-Seated Minerals in Explosion Pipes of the Onega Peninsula and Kimberlites of the Zimni Coast in the Arkhangelsk Province, Soviet Geology and Geophysics Vol 33, No 10, pp 71-78.

GEO Piaja Exploration GEOLOGICAL REPORTS **AGS MICROPROBE: #4**
TUL PET. MICROPROBE RESULTS -10 GRAINS Sample #2/G9& 4L-1/CP5

TRI UNION RESOURCES LTD.
TUL PETROLEUMS LTD.

P.O. Box 42030, 415 - 9737 McLeod Trail S.
Calgary, Alberta T2J 7A6

Telephone: 256-0659
Fax: 254-9391

admin.edwards

June 20, 1995.
ALBERTA ENERGY
Dixon Edwards/Mark Fenton
Alberta Geological Survey
6th Floor, Petroleum Plaza South,
9945 - 108 Street,
Edmonton, Alberta
T5K 2G6

Tel: 422 -1927
Fax: 422-1449

Dear Mr. Edwards:

Re: Mines and Minerals - Metallic and industrial minerals permits -
Microprobe of grains from TUL sampling program-Fairview Area.

Thankyou for the opportunity of talking to you about my samples and exploration program and to Mr. Fenton for the opportunity to microprobe some of our grains.

Enclosed is a Litho-card with grains for microprobe attached.

	SAMPLE #	FRACTION	IDENTIFICATION	TYPE
1	TUL 4 - 1	.5 PARA MAG	GREEN ?	GARNET?
2	TUL 4-1	.9 PARA MAG	PINK	PYROPE?
3	TUL 4L-1	2.0 NON MAG	PURPLE	ZIRCON?
4	TUL 4-1	2.0 NON MAG	CLEAR (after fussion)	DIAMOND?
5	TUL-7	2.0 NON MAG	CLEAR	DIAMOND?
6	TUL 4L-1	2.0 NON MAG	AMBER	ECLOGITE?
7	TUL-2	.6 PARA MAG	LILAC	G9 PYROPE
8	TUL 4L-1	2.0 NON MAG	GREEN	CHROME DIOPSIDE?
9	TUL 4L-1	2.0 NON MAG	BLUISH	SAPPHIRE?
10	TUL 4L-1	1.2 PARA MAP	DARK GREEN	JADEITE

Yours truly,
TUL PETROLEUMS LTD.

[redacted]

Murray J. Stapleton

Loring Laboratories Ltd.

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

FILE # : 3 7 0 5 9 - D　　COMPANY: TUL PETROLEUM　　DATE : Dec 2, 1994

SAMPLE ID.	ORIGINAL WEIGHT (Kg)	SCREEN ANALYSIS +35 mesh (Kg)			TABLE CONC. +80 mesh	MIDDLINGS 2.9 - 3.3 SG		HEAVIES >3.3 SG							
		+35 mesh (Kg)	35 x 80 mesh (Kg)	-80 mesh (Kg)	+80 mesh	MAG. (g)	NON - MAG. (g)	MAG. (g)	+28 Mesh (g)	P.M. 0.5 (g)	P.M. 0.6 (g)	P.M. 0.7 (g)	W.P.M. 1.2 (g)	W.P.M. 2.0 (g)	N.M. 2.0 (g)
TUL - 4L1	49.3	12.7	32.9	3.7	145.81	1.02	19.96	4.75	0.21	54.75	27.71	14.82	11.76	0.72	4.68

NOTE : P.M. = PARAMAGNETIC　　W.P.M. = WEAKLY PARAMAGNETIC　　N.M. = NON-MAGNETIC

[redacted]
ASSAYER

Alberta ENERGY

AGS Alberta Geological Survey

Facsimile Message

Please deliver this FAX to: MURRAY STAPLETON
TUL PETROLEUMS LTD
FAX 254-9391
19 MAR/96

This FAX is from: JOHN PAWLOWICZ

Alberta Department of Energy
Alberta Geological Survey
6th Floor, Petroleum Plaza North
9945-108 Street
Edmonton, Alberta
T5K 2G6

AGS phone number: (403) 422-1927
AGS FAX number: (403) 422-1449
(403) 422-1459

Number of pages (including cover page) 2

Comments: Murray,

Mark Fenton asked me to FAX you the results of some grains we had probed for you. Sorry for the delay, but we have been away for awhile. If you have any questions you can call me or talk to Mark after April 1st, when he is back in the office.

[redacted]

Samp# Actual	Sample (Bonili)	Mineral	TiO2	Cr2O3	FeO	MgO	CaO	SiO2	Al2O3	Na2O	MnO	Total	K2O	UolS Total
Mineral Grains run for Murray Stapelton; Tri Union Resources														
Data sent 28 February 1996.														
T9	T9H	CALCITE	0.00	0.00	0.01	0.00	52.46	0.00	0.00	0.00	0.12	52.59	0.00	52.59
T8	T8H	CPX 05 CHROME DIOPSIDE >ONE S.D. 1 [redacted]	0.23	1.44	2.45	15.65	21.35	52.73	5.59	1.51	0.07	101.02	0.00	101.01
T8	T8H	CPX 05 CHROME DIOPSIDE >ONE S.D. 2 [redacted]	0.23	1.52	2.69	15.75	18.97	53.45	5.23	2.09	0.07	100.00	0.00	100.01
T8	T8H	CPX 05 CHROME DIOPSIDE >ONE S.D. 1 [redacted]	0.23	1.44	2.45	15.65	21.35	52.73	5.59	1.51	0.07	101.02	0.00	101.01
T8	T8H	CPX 05 CHROME DIOPSIDE >ONE S.D. 2	0.23	1.52	2.69	15.75	18.97	53.45	5.23	2.09	0.07	100.00	0.00	100.01
T7	T7G	G 09 CHROME PYROPE >ONE S.D.	0.03	2.88	8.24	19.55	4.74	42.51	22.08	0.01	0.52	100.56	0.00	100.56
T6	T6G	STAUROLITE	0.52	0.02	13.15	1.87	0.02	27.75	54.95	0.00	0.08	98.36	0.00	98.37
T3	T3G	ZIRCON	0.00	0.00	0.00	0.02	0.00	35.60	0.12	0.02	0.00	35.76	0.00	35.75
T3	T3G	ZIRCON	0.00	0.00	0.01	0.02	0.00	35.64	0.01	0.00	0.00	35.68	0.00	35.68
T3	T3G	ZIRCON	0.00	0.03	0.00	0.01	0.00	35.55	0.01	0.00	0.01	35.61	0.00	35.60
T2	T2G	ALMANDINE	0.00	0.03	34.86	3.79	1.50	38.92	21.67	0.01	0.78	99.56	0.00	99.58
T10	T10H	G 08 FERRO MAGNESIAN GROSSULAR >ONE S.D.	0.05	0.00	6.31	2.25	24.26	37.02	23.26	0.03	0.08	93.26	0.00	93.27

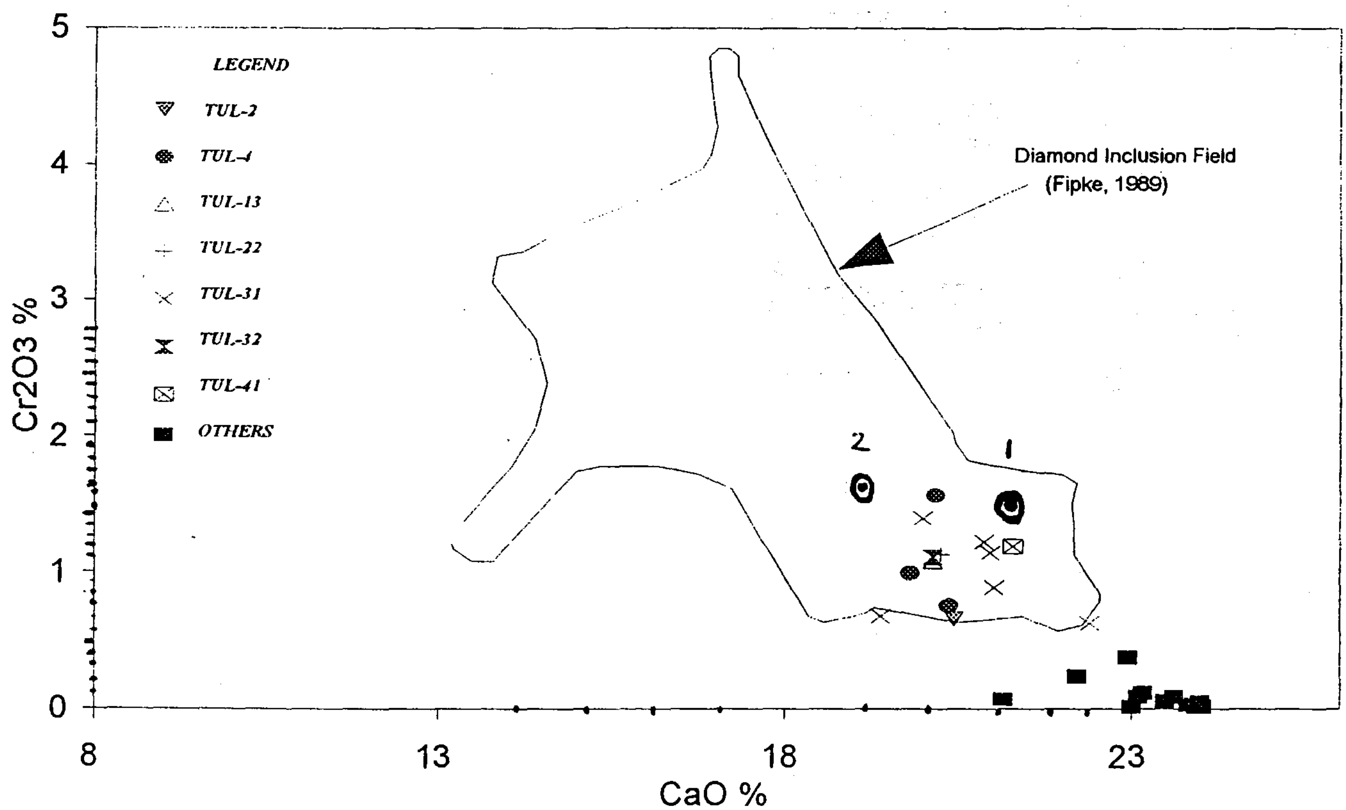
All of the microprobe data released to date were processed using mineral identification programs written in QBASIC and provided by the SRC (Quirt 1992a,b; Gent 1993).

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

File #36226
Client: TUL Petroleums Ltd.

AGS Microprobe Plots

Clinopyroxene



1 ⊙ CPX-5
2 ⊙ CPX-5

LORING LABORATORIES LTD.

629 Beaverdam Rd. N.E.
Calgary, Alberta T2K 4W7

Tel: (403) 274-2777
Fax: (403) 276-0541

To: TUL Petroleums Ltd.

From: LORING LABORATORIES LTD.

Date: October 6, 1994

Subject: Sample Examination

File: 36835

Attention: Jim Stapleton

Jim,

A few notes regarding your sample TUL 4L which you submitted to us for picking.

1) As you suggested there was an abundance of what appears to be Chrome Diopside, I picked >20 grains and there is still quite a lot in the sample.

2) There was no grains of what I would consider Pyrope Garnet in the sample.

3) I picked several grains of what could be Eclogitic Garnet, there was a lot of grains with an orange colour that are probably Staurolite I picked several.

4) There was no grains of Ilmenite in the sample.

5) There was no grains of Chromite in the smple.

6) There was no diamonds in the sample.

629 Beaverdam Rd. N.E.
Calgary, Alberta T2K 4W7

LORING LABORATORIES LTD.

Tel: (403) 274-2777
Fax: (403) 275-0541

TO : TUL PETROLEUM LTD.

FILE # 3 6 8 3 5-D
DATE : AUGUST 31, 1994
PAGE : 1

ATTN : JIM STAPLETON

CERTIFICATE OF ANALYSIS

SAMPLE ID	ORIGINAL WEIGHT (Kg)	MIDDLINGS 2.9 – 3.3 SG MAGN. (Gm)	MIDDLINGS 2.9 – 3.3 SG NON-MAG (Gm)	HEAVIES >3.3 SG MAGN. (Gm)	HEAVIES >3.3 SG NON-MAG +28 Mesh (Gm)	HEAVIES >3.3 SG P.M. -28 Mesh (Gm)	HEAVIES >3.3 SG W.P.M. -28 Mesh (Gm)	HEAVIES >3.3 SG NON-MAG -28 Mesh (Gm)
TUL 4L	31.3	0.35	60.67	3.58	0.50	138.52	33.30	5.13
TUL 4V	27.7	<0.01	6.82	0.05	0.28	1.78	1.54	0.26

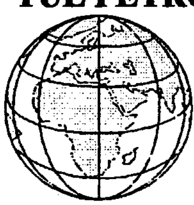
NOTE : P.M. = PARAMAGNETIC W.P.M. = WEAK PARAMAGNETIC

I HEREBY CERTIFY that the above results are those analyses made by me upon the herein described samples....

[redacted]

ASSAYER

GEO Piaja Exploration GEOLOGICAL REPORTS **Montagenuse Trenches: <u>#5</u>**
TUL PETROLEUMS <u>MICROPROBE RESULTS:</u> **#14,T-2,T-3:** <u>Kelly/Hale/Stapleton</u>



NOTE: TR 1 & 2 means Trench #2; Sample bucket 1 and 2

TR 3 means Trench #3; 1of 2 sample buckets of concentrates

Loring Laboratories Ltd.

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

FILE # : 3 7 5 2 1 - D COMPANY: TUL PETROLEUM DATE : Jul 28, 1995

SAMPLE ID.	ORIGINAL WEIGHT	SCREEN ANALYSIS			TABLE CONC.	MIDDLINGS 2.9 - 3.3 SG		HEAVIES >3.3 SG							
								MAG.	+28	P.M.			W.P.M.		N.M.
	(Kg)	+35 mesh (kg)	35 x 80 mesh (kg)	-80 mesh (Kg)	+80 mesh (g)	MAG. (g)	NON - MAG. (g)	(g)	Mesh (g)	0.5 (g)	0.6 (g)	0.7 (g)	1.2 (g)	2.0 (g)	2.0 (g)
TUL 14	62.0	56 *	4.9	1.1	675	0.58	26.84	12.35	87.53	21.66	31.79	24.20	52.81	2.29	65.47
*NOTE: 39.1 Kg of + 10 mesh material included.															

NOTE : P.M. = PARAMAGNETIC W.P.M. = WEAKLY PARAMAGNETIC N.M. = NON-MAGNETIC

[redacted]
ASSAYER

Loring Laboratories Ltd.

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

FILE # : 37915-D COMPANY: TUL PETROLEUMS LTD. DATE : Jan 19, 1996

SAMPLE ID.	ORIGINAL WEIGHT (Kg)	SCREEN ANALYSIS +6 mesh (kg)	SCREEN ANALYSIS +35 mesh (kg)	SCREEN ANALYSIS 35 x 80 mesh (kg)	SCREEN ANALYSIS -80 mesh (Kg)	TABLE CONC. +80 mesh (g)	MIDDLINGS 2.9 - 3.3 SG MAG. (g)	MIDDLINGS 2.9 - 3.3 SG NON - MAG. (g)	HEAVIES >3.3 SG MAG. (g)	HEAVIES >3.3 SG +28 Mesh (g)	HEAVIES >3.3 SG P.M. 0.5 (g)	HEAVIES >3.3 SG P.M. 0.6 (g)	HEAVIES >3.3 SG P.M. 0.7 (g)	HEAVIES >3.3 SG W.P.M. 1.2 (g)	HEAVIES >3.3 SG W.P.M. 2.0 (g)	HEAVIES >3.3 SG N.M. 2.0 (g)
MONTAGNEUSE																
RIVER TRENCH																
3																
SAMPLE 1 & 2	49.4		24.3	22.8	1.6		0.69	66.37	23.06	21.34	98.41	46.27	39.19	19.08	2.29	44.40

NOTE : P.M. = PARAMAGNETIC W.P.M. = WEAKLY PARAMAGNETIC N.M. = NON-MAGNETIC

[redacted]
ASSAYER

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

File No. 38107-D
Client: TUL Petroleum Microprobe Data April 15, 1996

Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	K2O	Total	Mineral
#14	108	B	1	41.10	0.06	21.49	2.65	7.82	20.60	5.07	0.04	0.35	0.01	99.19	garnet
#14	108	C	1	36.93	0.00	21.11	0.03	36.09	3.98	0.85	0.06	1.63	0.02	100.68	garnet
#14	108	D	1	36.82	0.11	21.04	0.00	37.61	3.27	0.91	0.04	1.01	0.00	100.81	garnet
#14	108	E	1	37.63	0.03	21.76	0.01	32.57	6.46	1.62	0.02	0.53	0.02	100.63	garnet
#14	108	F	1	38.44	0.00	22.17	0.00	27.88	10.18	1.44	0.02	0.34	0.02	100.47	garnet
#14	108	G	1	36.69	0.00	21.11	0.00	37.70	3.06	0.70	0.04	1.54	0.00	100.84	garnet
#14	108	H	1	37.44	0.10	21.31	0.02	30.81	7.62	2.24	0.00	0.37	0.00	99.91	garnet
#14	108	I	1	32.04	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.01	32.10	zircon
TR 1& 2	108	A	2	40.69	0.01	19.94	4.28	8.67	19.81	5.64	0.00	0.47	0.00	99.51	garnet
TR 1& 2	108	B	2	40.74	0.25	20.46	3.50	8.02	20.68	4.92	0.03	0.39	0.00	98.99	garnet
TR 1& 2	108	C	2	40.92	0.06	20.35	3.62	8.44	20.07	4.98	0.01	0.47	0.02	98.92	garnet
TR 1& 2	108	D	2	37.51	0.57	11.39	9.46	4.10	0.17	33.25	0.01	0.69	0.00	97.15	garnet
TR 1& 2	108	E	2	40.81	0.25	18.69	6.08	7.83	20.22	5.57	0.07	0.41	0.00	99.93	garnet
TR 1& 2	108	F	2	39.89	0.20	16.88	8.76	7.58	18.78	6.81	0.00	0.43	0.01	99.33	garnet
TR 1& 2	108	G	2	40.08	0.12	17.52	7.68	8.55	18.01	7.02	0.05	0.60	0.00	99.63	garnet
TR 1& 2	108	H	2	40.91	0.07	20.63	4.18	7.92	20.39	5.54	0.00	0.41	0.00	100.05	garnet
TR 1& 2	108	I	2	37.25	0.07	21.08	0.01	31.34	3.34	6.40	0.00	0.66	0.01	100.15	garnet
TR 3	108	A	3	40.43	0.43	17.69	7.06	7.34	20.28	5.67	0.08	0.40	0.00	99.38	garnet
TR 3	108	B	3	41.32	0.15	19.87	4.30	7.36	21.41	4.93	0.04	0.37	0.02	99.75	garnet
TR 3	108	C	3	40.89	0.21	18.43	6.26	7.33	20.35	5.55	0.01	0.39	0.00	99.42	garnet
TR 3	108	D	3	27.68	0.88	53.66	0.01	12.11	1.58	0.00	0.00	0.16	0.00	96.08	staurolite
TR 3	108	E	3	40.31	0.00	20.14	4.17	9.94	18.34	6.28	0.00	0.41	0.02	99.59	garnet
TR 3	108	F	3	40.90	0.50	20.03	3.61	7.44	21.50	4.43	0.04	0.26	0.02	98.71	garnet
TR 3	108	G	3	40.68	0.28	22.12	0.68	14.21	17.67	4.44	0.00	0.46	0.00	100.54	garnet

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

File No. 38107-D
Client: TUL Petorleum

Microprobe Data

April 15, 1996

Location				Data in wt %										
Sample#	P#	C#	R#	TiO2	Al2O3	Cr2O3	V2O3	FeO	MnO	MgO	NiO	ZnO	Total	Mineral
TR 1 & 2	108	B	5	1.97	4.43	48.06	0.25	35.96	0.38	7.86	0.19	0.18	99.28	Chromite
TR 1 & 2	108	C	5	0.15	16.16	44.18	0.12	25.66	0.35	12.57	0.10	0.14	99.43	Chromite
TR 1 & 2	108	D	5	1.12	54.90	0.11	0.14	25.91	0.12	16.69	0.15	0.17	99.31	Spinel
TR 1 & 2	108	E	5	0.06	0.07	0.18	0.19	89.04	0.23	0.03	0.00	0.06	89.86	Hematite
TR 1 & 2	108	F	5	0.17	0.14	0.04	0.20	88.84	0.12	0.00	0.00	0.06	89.57	Hematite

Loring Laboratories Ltd.

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

File No. : 38107-D
Client: TUL Petroleum

Date: April 15, 1996

Garnet Classification (after Dawson and Stephens, 1975)

Grain #	Sample #	Location P#	C#	R#	Data in wt % TiO2	Cr2O3	FeO	MgO	CaO	Na2O	Garnets Classification G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G1
1	#14	108	B	1	0.06	2.65	7.82	20.60	5.07	0.04									9			
2	#14	108	C	1	0.00	0.03	36.09	3.98	0.85	0.06					5							
3	#14	108	D	1	0.11	0.00	37.61	3.27	0.91	0.04					5							
4	#14	108	E	1	0.03	0.01	32.57	6.46	1.62	0.02					5							
5	#14	108	F	1	0.00	0.00	27.88	10.18	1.44	0.02					5							
6	#14	108	G	1	0.00	0.00	37.70	3.06	0.70	0.04					5							
7	#14	108	H	1	0.10	0.02	30.81	7.62	2.24	0.00					5							
8	TR 1& 2	108	A	2	0.01	4.28	8.67	19.81	5.64	0.00									9			
9	TR 1& 2	108	B	2	0.25	3.50	8.02	20.68	4.92	0.03									9			
10	TR 1& 2	108	C	2	0.06	3.62	8.44	20.07	4.98	0.01									9			
11	TR 1& 2	108	D	2	0.57	9.46	4.10	0.17	33.25	0.01							7					
12	TR 1& 2	108	E	2	0.25	6.08	7.83	20.22	5.57	0.07									9			
13	TR 1& 2	108	F	2	0.20	8.76	7.58	18.78	6.81	0.00									9			
14	TR 1& 2	108	G	2	0.12	7.68	8.55	18.01	7.02	0.05									9			
15	TR 1& 2	108	H	2	0.07	4.18	7.92	20.39	5.54	0.00									9			
16	TR 1& 2	108	I	2	0.07	0.01	31.34	3.34	6.40	0.00					5							
17	TR 3	108	A	3	0.43	7.06	7.34	20.28	5.67	0.08									9			
18	TR 3	108	B	3	0.15	4.30	7.36	21.41	4.93	0.04									9			
19	TR 3	108	C	3	0.21	6.26	7.33	20.35	5.55	0.01									9			
20	TR 3	108	E	3	0.00	4.17	9.94	18.34	6.28	0.00									9			
21	TR 3	108	F	3	0.50	3.61	7.44	21.50	4.43	0.04	1											
22	TR 3	108	G	3	0.28	0.68	14.21	17.67	4.44	0.00			3									
										22	1	0	1	0	7	0	1	0	12	0	0	0
											G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G1

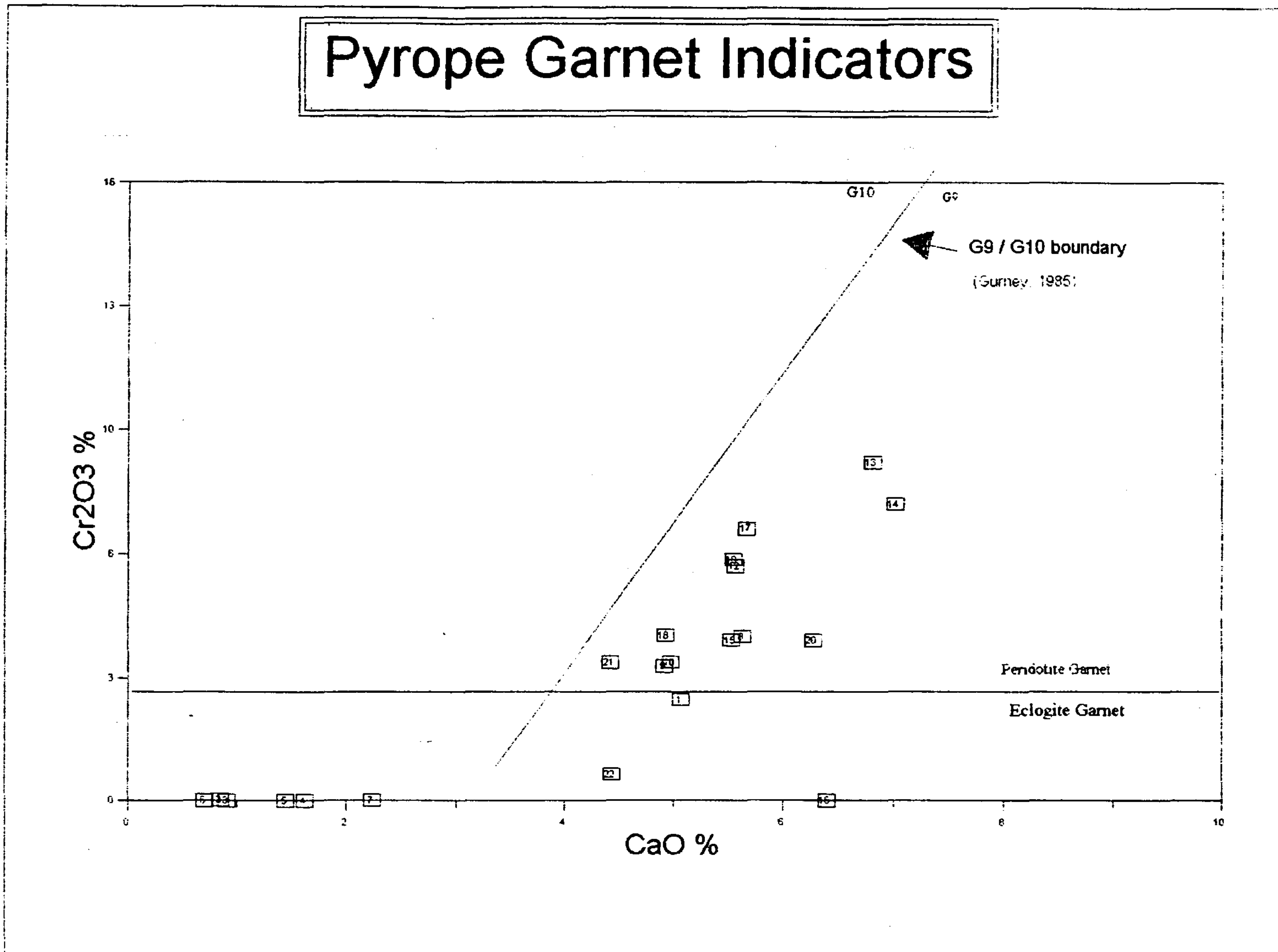
Loring Laboratories Ltd.

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

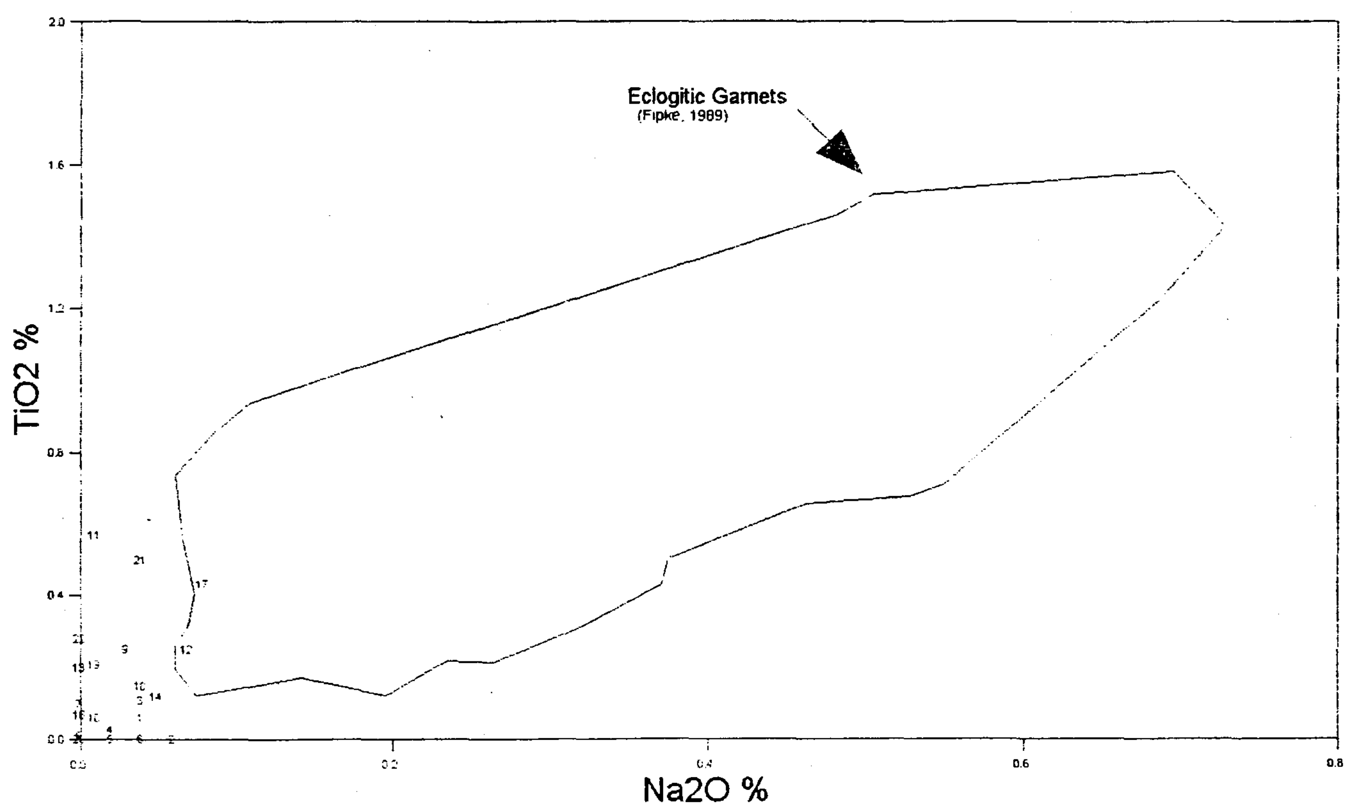
File #36226
Client: TUL PETROLEUMS LTD.

Pyroxene Classification (after Stephens and Dawson, 1977)

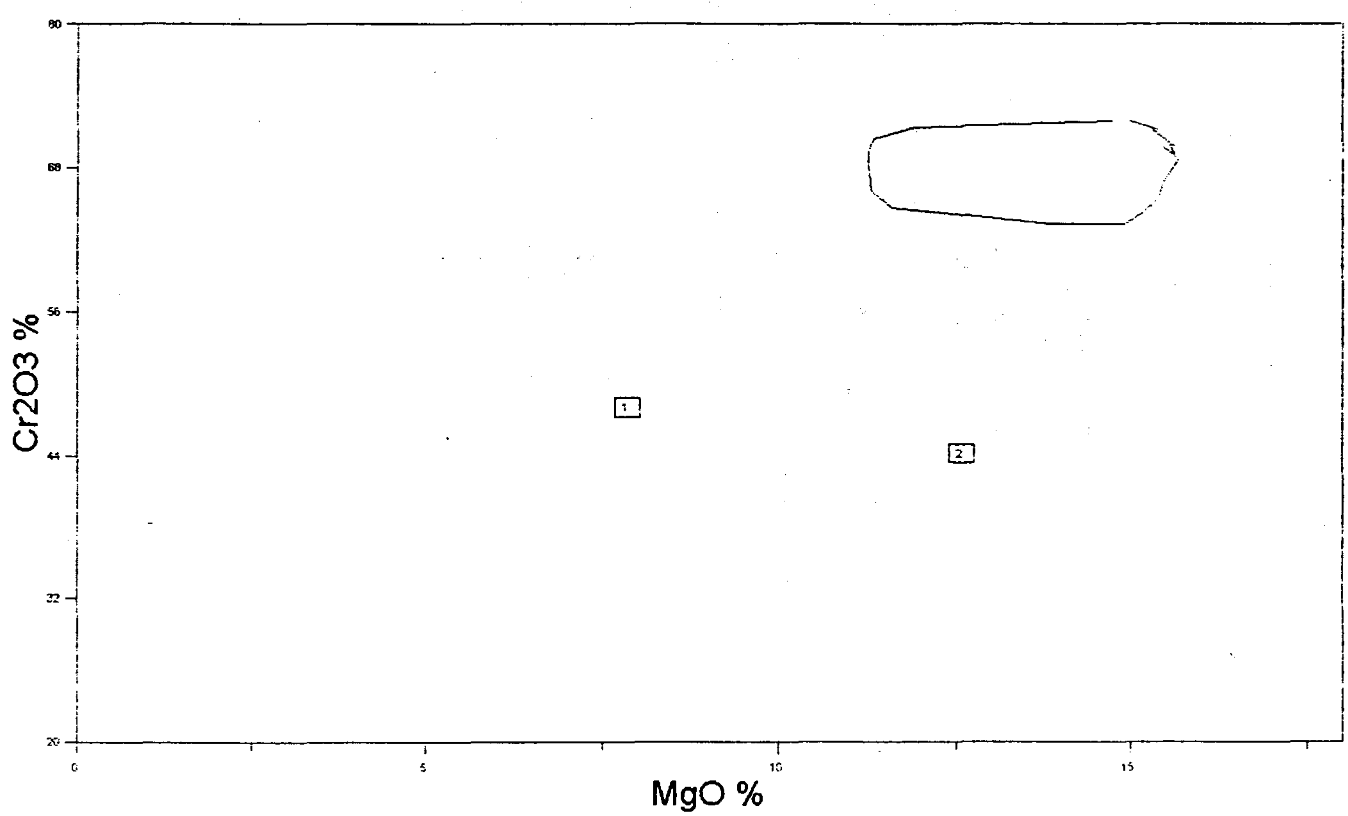
Location				Data in wt %							ORTHOPYROXENE / CLINOPYROXENE
Sample #	P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	Classification
50	62	A	6	0.05	0.59	0.12	5.54	15.45	23.16	0.88	2
51	62	B	6	0.37	7.11	0.66	2.52	15.11	20.46	1.84	2
53	62	D	6	0.33	2.13	0.01	6.23	15.23	23.94	0.36	4
55	62	F	6	0.42	6.83	0.76	2.62	15.43	20.38	1.74	2
56	62	G	6	0.21	5.50	1.56	2.42	15.70	20.19	1.86	5
57	62	H	6	0.34	6.63	0.99	2.82	16.06	19.82	1.68	2
59	62	J	6	0.03	0.63	0.06	7.17	14.60	23.49	0.65	2
60	62	A	7	0.01	1.33	0.07	8.00	14.55	21.17	0.77	4
61	62	B	7	0.03	1.33	0.24	7.88	14.28	22.22	0.66	2
62	62	C	7	0.02	0.46	0.03	5.93	15.43	23.83	0.50	2
63	62	D	7	0.33	6.44	1.08	2.83	15.85	20.15	1.55	2
64	62	E	7	0.12	1.06	0.02	7.58	14.11	23.01	0.74	4
65	62	F	7	0.48	5.01	1.13	3.43	16.59	20.25	1.21	2
66	62	G	7	0.03	0.81	0.05	6.12	15.54	23.99	0.34	2
67	62	H	7	0.18	1.21	0.38	3.72	18.34	22.94	0.12	2
68	62	I	7	0.05	0.75	0.02	6.16	15.03	24.02	0.36	2
69	62	J	7	0.34	2.14	0.09	6.31	15.06	23.62	0.35	4
70	62	A	8	0.11	1.84	0.89	3.70	15.96	21.04	1.74	5
71	62	B	8	0.20	1.90	0.63	4.04	17.63	22.40	0.16	2
72	62	C	8	0.42	7.44	0.68	3.19	15.40	19.40	1.78	2
73	62	D	8	0.12	4.00	1.22	2.24	17.09	20.88	1.26	5
74	62	E	8	0.42	6.15	1.39	2.68	16.15	19.99	1.63	2
75	62	F	8	0.27	5.64	1.14	2.47	16.84	20.98	1.25	5
76	62	G	8	0.39	6.87	1.11	2.59	16.01	20.15	1.68	2
78	62	I	8	0.06	3.28	1.19	2.13	16.82	21.30	1.59	5
79	62	J	8	0.03	0.76	0.09	5.55	15.85	23.09	0.84	2


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

Eclogite Garnet Indicators



Chromite Indicator



Loring Laboratories Ltd.
629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 274-2777 Fax: 275-0641

FILE # : 37944-D   COMPANY: TUL PETROLEUMS LTD.   DATE : Feb 9, 1996

SAMPLE ID.	ORIGINAL WEIGHT	SCREEN ANALYSIS			TABLE CONC.	MIDDLINGS 2.9 - 3.3 SG		HEAVIES >3.3 SG							
								MAG.	+28	P.M.			W.P.M.		N.M.
		+35 mesh	35 x 80 mesh	-80 mesh	+80 mesh	MAG.	NON - MAG.		Mesh	0.5	0.6	0.7	1.2	2.0	2.0
	(Kg)	(kg)	(kg)	(Kg)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)
TRENCH 1, #2	38.2	14.6	20.7	2.9	315	0.49	32.88	14.42	9.27	64.91	58.47	2.75	14.69	1.21	37.48
TRENCH 2, 1+2	82.3	24.9	43.8	13.6	415	0.35	23.37	43.58	27.84	191.79	98.68	2.08	25.16	1.85	124.13

OTE : P.M. = PARAMAGNETIC   W.P.M. = WEAKLY PARAMAGNETIC   N.M. = NON-MAGNETIC

[redacted]
ASSAYER

GEO Piaja Exploration GEOLOGICAL REPORTS **Montagenuse & Clair Pit #6**
TUL PETROLEUMS MICROPROBE RESULTS: River Trench II - ED SANTIAGO
Clair Gravels BR sand, G1,2,3 &4

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

File No. 38050-4-D
Client: TUL Petroleum

Microprobe Data

May 25, 1996

Sample#	Location P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	K2O	Total	Mineral
				Data in wt %											
GR-BR SAND 2	110	B	1	36.78	0.07	20.82	0.00	30.93	3.36	2.74	0.00	4.74	0.00	99.44	garnet
GR-BR SAND 2	110	C	1	37.67	0.05	20.96	0.00	28.62	4.86	3.23	0.00	5.27	0.01	100.66	garnet
G3	110	D	1	39.26	0.39	19.53	0.00	5.96	0.02	32.90	0.01	0.63	0.00	98.70	garnet
G1	110	E	1	37.72	0.07	20.96	0.05	14.78	0.84	16.94	0.01	7.69	0.00	99.06	garnet
G2	110	F	1	27.58	0.76	52.09	0.02	13.23	1.81	0.00	0.03	0.21	0.00	95.73	staurolite
G2	110	G	1	37.18	0.55	18.74	0.00	6.43	0.06	33.20	0.01	1.43	0.01	97.60	garnet
G4	110	H	1	36.52	0.11	20.28	0.06	27.93	0.43	8.80	0.00	6.48	0.00	100.61	garnet
G4	110	I	1	37.31	0.00	20.86	0.00	35.73	5.63	0.97	0.02	0.35	0.00	100.87	garnet
G4	110	J	1	38.02	0.21	17.10	0.00	8.91	0.12	35.41	0.01	0.20	0.01	99.98	garnet
RIVER BED TR II	110	A	2	0.00	0.07	95.82	0.55	0.19	0.02	0.03	0.00	0.00	0.00	96.68	corundum
RIVER BED TR II	110	B	2	36.90	0.00	20.99	0.00	36.72	2.78	2.40	0.01	0.77	0.01	100.57	garnet
RIVER BED TR II	110	C	2	38.37	0.06	21.19	0.02	24.58	7.82	7.05	0.02	0.72	0.00	99.83	garnet
RIVER BED TR II	110	D	2	38.36	0.35	19.63	0.00	8.73	0.10	32.17	0.01	0.24	0.00	99.59	garnet
GR-BR SAND 2	110	A	3	52.13	0.25	6.54	0.79	2.51	15.35	20.55	1.68	0.09	0.01	99.89	pyroxene
G3	110	B	3	51.49	0.37	5.92	1.07	2.65	15.38	20.73	1.60	0.04	0.00	99.25	pyroxene
G3	110	C	3	50.93	0.20	5.27	1.39	2.48	15.64	20.96	1.37	0.10	0.00	98.34	pyroxene
G2	110	D	3	51.63	0.27	6.23	0.85	2.65	15.49	21.39	1.42	0.07	0.00	100.00	pyroxene
RIVER BED TR II	110	E	3	51.05	0.27	6.23	0.85	2.78	15.43	20.81	1.35	0.07	0.00	98.84	pyroxene
RIVER BED TR II	110	F	3	51.53	0.35	6.76	0.99	3.14	15.75	19.77	1.56	0.05	0.01	99.90	pyroxene

Loring Laboratories Ltd.

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

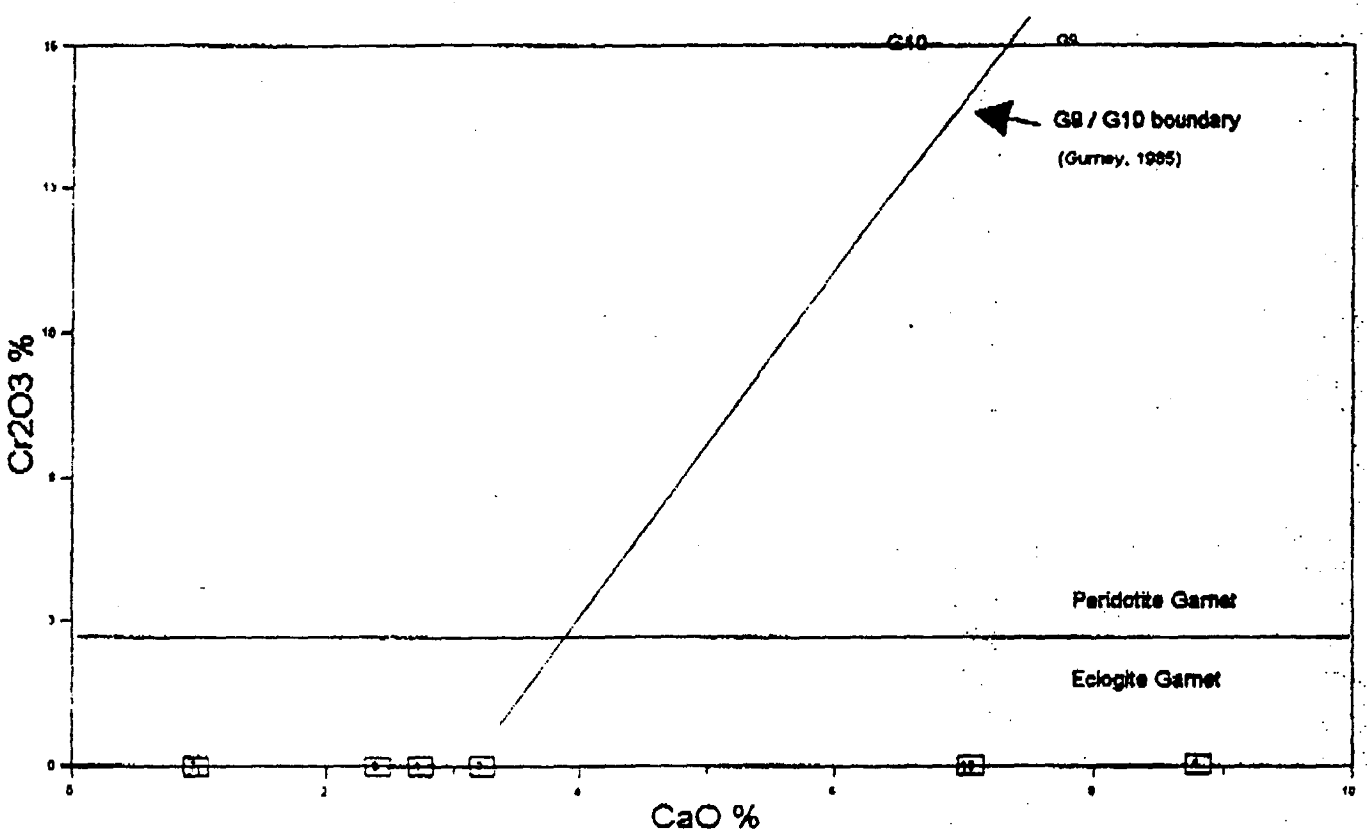
File No. : 38050-D
Client: TUL Petroleum

Date: May 25, 1996

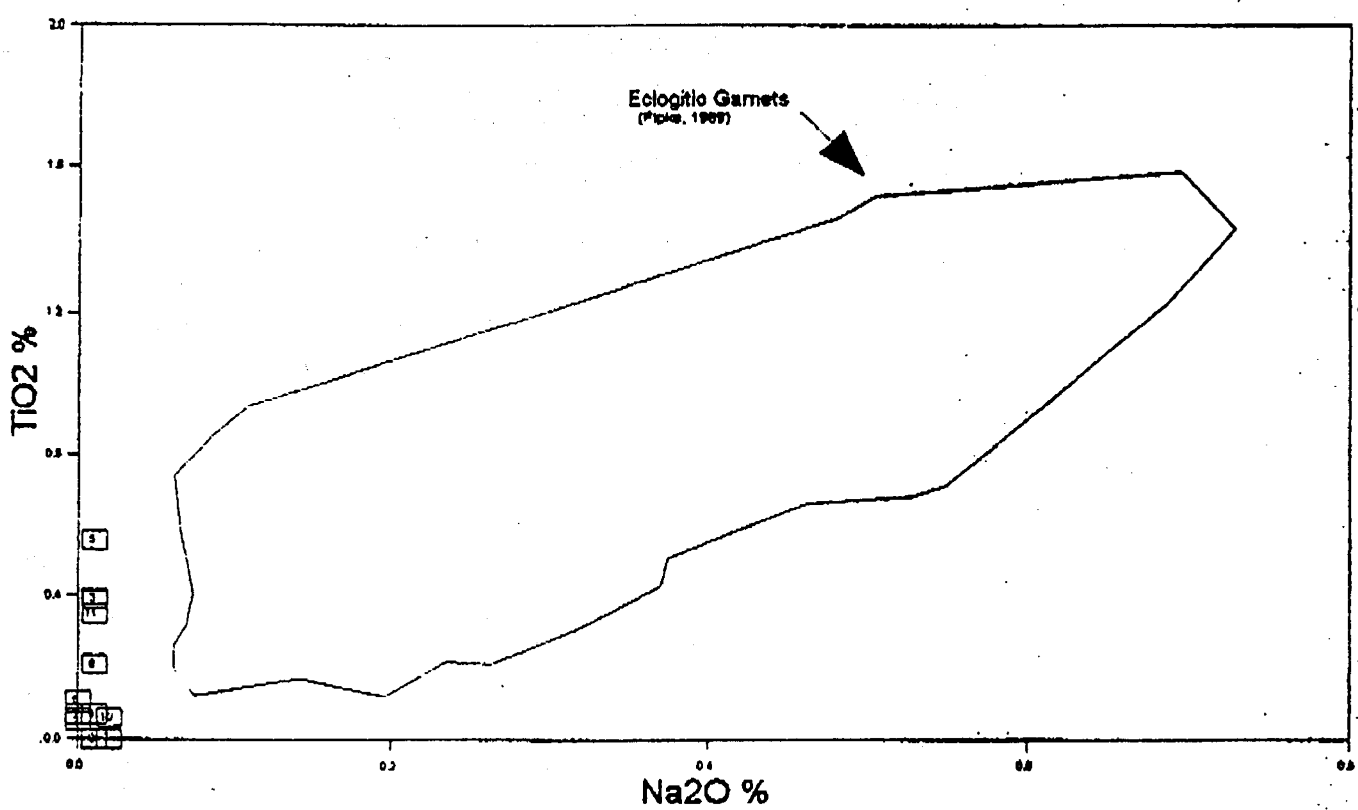
Garnet Classification (after Dawson and Stephens, 1975)

		Location			Data in wt %						Garnets Classification											
Grain #	Sample #	P#	C#	R#	TiO2	Cr2O3	FeO	MgO	CaO	Na2O	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
1	GR-BR SAND 2	110	B	1	0.07	0.00	30.93	3.36	2.74	0.00	..	..	..	..	5	.	..	..	..	..	..	..
2	GR-BR SAND 2	110	C	1	0.05	0.00	28.62	4.86	3.23	0.00	..	..	..	..	5	..	..	..		..	..	..
3	G3	110	D	1	0.39	0.00	5.96	0.02	32.90	0.01	..	..	..	..	..	..	..	8		..	..	..
4	G1	110	E	1	0.07	0.05	14.78	0.84	16.94	0.01	..	..	..	..	..	6	..	..	.	..	..	..
5	G2	110	G	1	0.55	0.00	6.43	0.06	33.20	0.01	..	..	..	..	..	..	..	8	..	..	..	..
6	G4	110	H	1	0.11	0.08	27.93	0.43	8.80	0.00	..	..	..	..	5	..	..	..	..	..	..	..
7	G4	110	I	1	0.00	0.00	35.73	5.63	0.97	0.02	..	..	..	..	5	..	..	..	..	..	..	..
8	G4	110	J	1	0.21	0.00	8.91	0.12	35.41	0.01	..	..	..	..	..	..	..	8	..	..	..	..
9	RIVER BED TR II	110	B	2	0.00	0.00	36.72	2.78	2.40	0.01	..	..	..	..	5	..	..	..	..	..	..	..
10	RIVER BED TR II	110	C	2	0.06	0.02	24.58	7.82	7.05	0.02	..	..	..	..	5	..	..	..	..	..	..	..
11	RIVER BED TR II	110	D	2	0.35	0.00	8.73	0.10	32.17	0.01	..	..	..	..	..	..	..	8	..	..	..	..
										11	0	0	0	0	6	1	0	4	[illegible]	0	0	0
											G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12

Pyrope Garnet Indicators



Eclogite Garnet Indicators



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

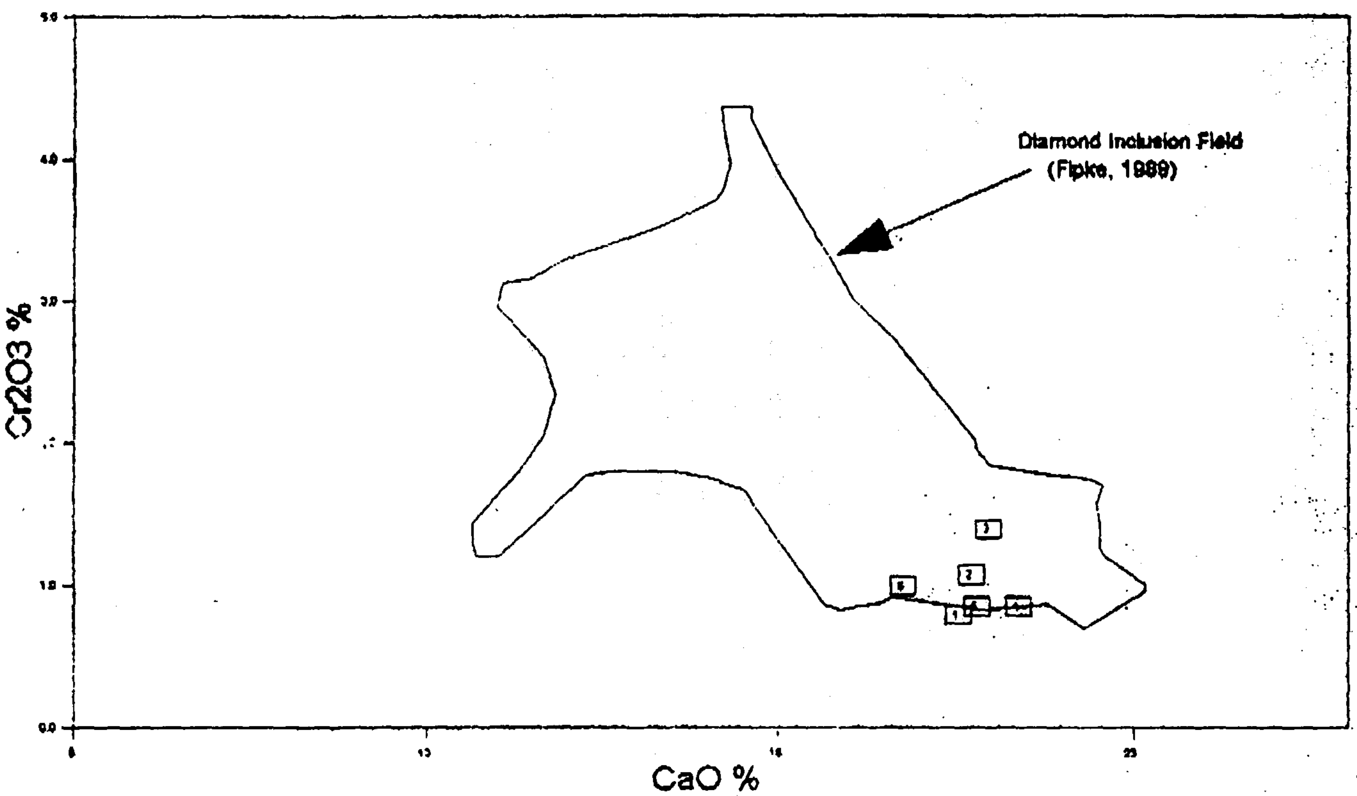
File #: 38050-D
Client: TUL Petroleum

Pyroxene Classification (after Stephens and Dawson, 1977)

G#	Sample #	Location P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	ORTHOPYROXENE 1	2	3	4	5	CLINOPYROXENE 1	2	3	4	5	6	7	8	9	10
1	GR-BR SAND 2	110	A	3	0.25	6.54	0.79	2.51	15.35	20.55	1.68							2								
2	G3	110	B	3	0.37	5.92	1.07	2.65	15.38	20.73	1.60							2								
3	G3	110	C	3	0.20	5.27	1.39	2.48	15.64	20.96	1.37										5					
4	G2	110	D	3	0.27	6.23	0.85	2.65	15.49	21.39	1.42							2								
5	RIVER BED TR II	110	E	3	0.27	6.23	0.85	2.78	15.43	20.61	1.35							2								
6	RIVER BED TR II	110	F	3	0.35	6.76	0.99	3.14	15.75	19.77	1.56							2								

	ORTHOPYROXENE 1	2	3	4	5	CLINOPYROXENE 1	2	3	4	5	6	7	8	9	10
Total Pyroxene = 6	0	0	0	0	0	0	5	0	0	1	0	0	0	0	0

Clinopyroxene



GEO Piaja GEOLOGICAL REPORTS **Montagenuse Trenches 1, 2&3: #7**
TUL PETROLEUMS **LAKEFIELD FUSSION of T-3 & T-2 GRAINS and**
75 Grains - LORING SCM of T1 picks and T2 & T3 fusions

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

TO: GEO PIAJA EXPLORATION
ATTN: JIM STAPLETON

Date: August 8, 1996

RESULT OF 73 GRAINS SUBMITTED FOR MICRO-PROBE

T1, S2, 2.0 NM - 1 grain, ZIRCON

T1, S2. Paramag - 5 grains, EPIDOTE, ZOISITE, STAUROLITE, FERRODIOPSIDE, ORGANIC CRUD

T3 - 26 grains, 13 ZIRCONS, 5 QUARTZ, 4 AL-OXIDES, 1 PLAGIOCLASE, 1 ALMANDINE GARNET, 1 BA-ZR OXIDE, 1 JUNK GRAIN (QUARTZ/PLAG INTERGROWTH)

T2 - 41 GRAINS, 9 ZIRCON, 25 QUARTZ, 3 AL-OXIDES, 1 PLAGIOCLASE, 2 ALMANDINE GARNETS, 1 APATITE

GEO Piaja Exploration GEOLOGICAL REPORT **Montagenuse DF & DC #8**
TUL PETROLEUMS **MICROPROBE RESULTS - ED SANTIAGO: DF-1, DC-1.**

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

FILE # : 38380-D COMPANY: GEO PIAJA EXPLORATION DATE : Jul 23, 1996

SAMPLE ID.	ORIGINAL WEIGHT	SCREEN ANALYSIS			TABLE CONC.	HEAVIES >3.3 SG							
						MAG.	+28	P.M.			W.P.M.		N.M.
		+35 mesh	35 x 80 mesh	-80 mesh	+80 mesh		Mesh	0.5	0.6	0.7	1.2	2.0	2.0
	(Kg)	(kg)	(kg)	(Kg)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)	(g)
DF - 1	88.0	30.7	47.3	10.0	1384	78.39	34.65	142.30	153.16	53.66	37.31	0.25	177.44
DC - 1	10.7	5.8	4.0	0.9	318	16.72	9.09	22.22	14.08	4.08	5.71	0.40	21.53

NOTE : P.M. = PARAMAGNETIC W.P.M. = WEAKLY PARAMAGNETIC N.M. = NON-MAGNETIC

[redacted]
ASSAYER

Loring Laboratories Ltd.

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

File No. 38380-1-D
Client: Geo Piaja Exploration Microprobe Data August 30, 1996

Location				Data in wt %											
Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	K2O	Total	Mineral
DC-1	112	B	1	36.47	0.12	20.52	0.01	34.35	0.78	7.19	0.00	0.90	0.00	100.33	garnet
DC-1	112	C	1	38.95	0.03	21.98	0.04	22.62	6.21	10.00	0.00	0.39	0.00	100.22	garnet
DC-1	112	D	1	41.36	0.23	23.07	0.16	13.63	16.93	3.87	0.03	0.32	0.01	99.61	garnet
DC-1	112	E	1	39.51	0.16	22.33	0.13	19.49	8.93	9.15	0.02	0.42	0.00	100.14	garnet
DF-1	112	B	2	36.93	0.03	21.21	0.00	39.18	2.23	0.95	0.02	0.85	0.01	101.40	garnet
DF-1	112	C	2	40.99	0.07	20.06	5.19	8.29	18.33	5.57	0.00	0.47	0.00	98.97	garnet
DF-1	112	D	2	41.65	0.28	19.66	4.45	6.49	20.38	4.86	0.03	0.26	0.00	98.08	garnet
DF-1	112	G	2	39.43	0.24	22.28	0.13	21.28	5.86	11.12	0.03	0.60	0.00	100.96	garnet
DF-1	112	H	2	39.14	0.07	21.86	0.00	26.95	6.22	6.64	0.00	1.00	0.01	101.88	garnet

Loring Laboratories Ltd.

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

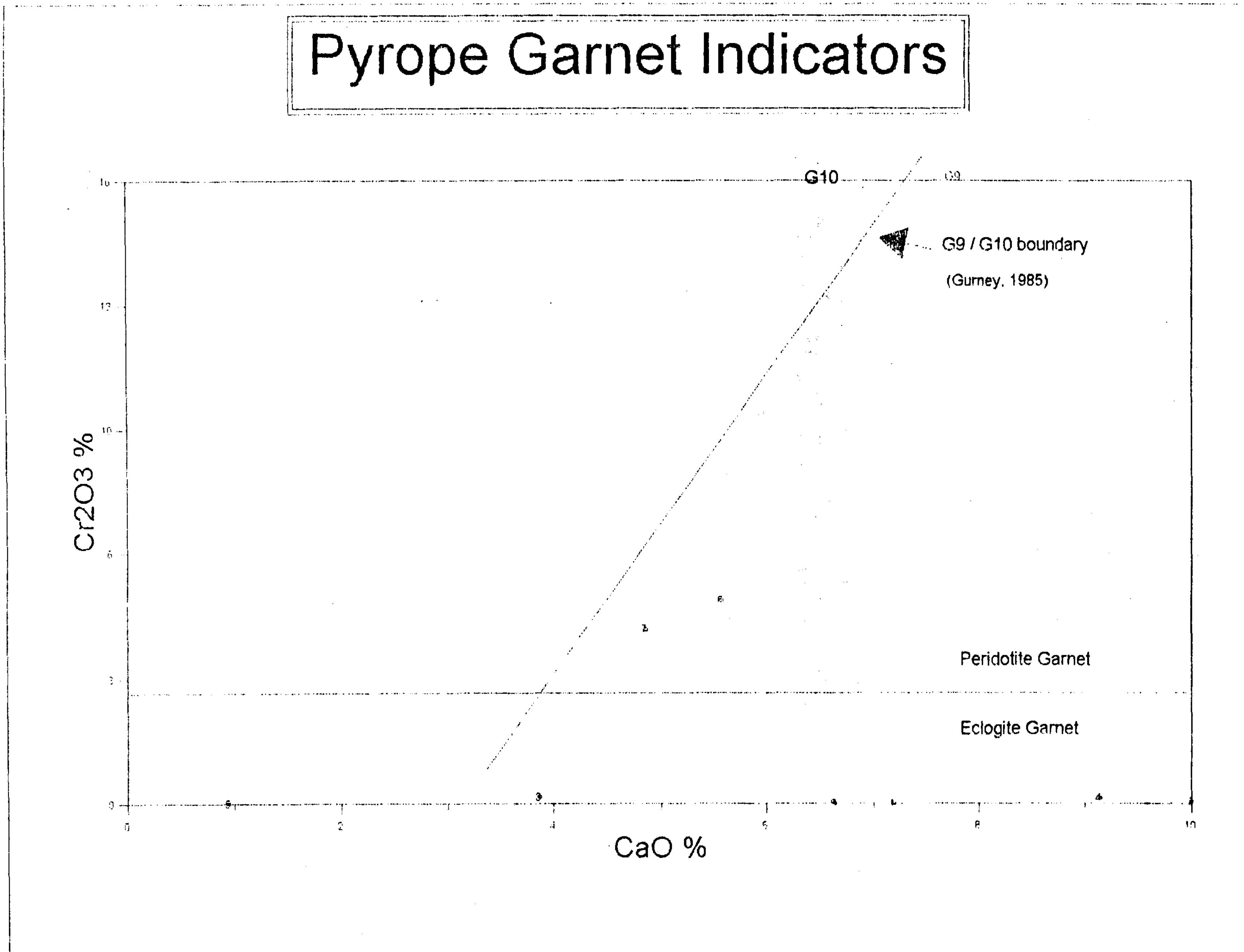
File No. : 38380-1-D

Date: aUGUST 30. 1996

Client: Geo Piaja

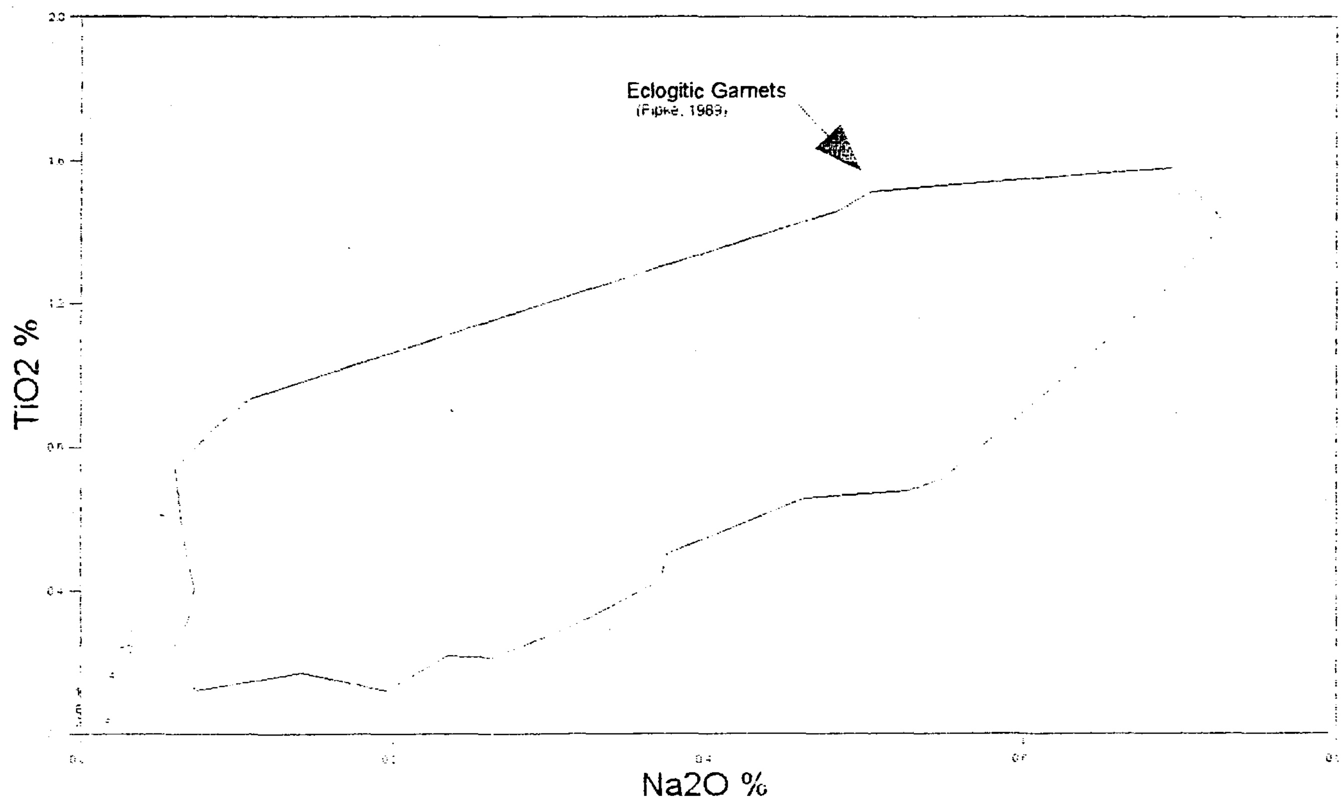
Garnet Classification (after Dawson and Stephens, 1975)

Grain #	Sample #	Location P#	C#	R#	Data in wt % TiO2	Cr2O3	FeO	MgO	CaO	Na2O	Garnets Classification G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
1	DC-1	112	B	1	0.12	0.01	34.35	0.78	7.19	0.00					5							
2	DC-1	112	C	1	0.03	0.04	22.62	6.21	10.00	0.00			3									
3	DC-1	112	D	1	0.23	0.16	13.63	16.93	3.87	0.03			3									
4	DC-1	112	E	1	0.16	0.13	19.49	8.93	9.15	0.02			3									
5	DF-1	112	B	2	0.03	0.00	39.18	2.23	0.95	0.02					5							
6	DF-1	112	C	2	0.07	5.19	8.29	18.33	5.57	0.00									9			
7	DF-1	112	D	2	0.28	4.45	6.49	20.38	4.86	0.03									9			
8	DF-1	112	G	2	0.24	0.13	21.28	5.86	11.12	0.03			3									
9	DF-1	112	H	2	0.07	0.00	26.95	6.22	6.64	0.00					5							
										9	0	0	4	0	3	0	0	0	2	0	0	0
											G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12



Pyrope Garnet Indicators
G10
G9
G9 / G10 boundary
(Gurney, 1985)
Peridotite Garnet
Eclogite Garnet
Cr2O3 %
CaO %

Eclogite Garnet Indicators



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

File #: 38380-1-D
Client: GEO PIAJA

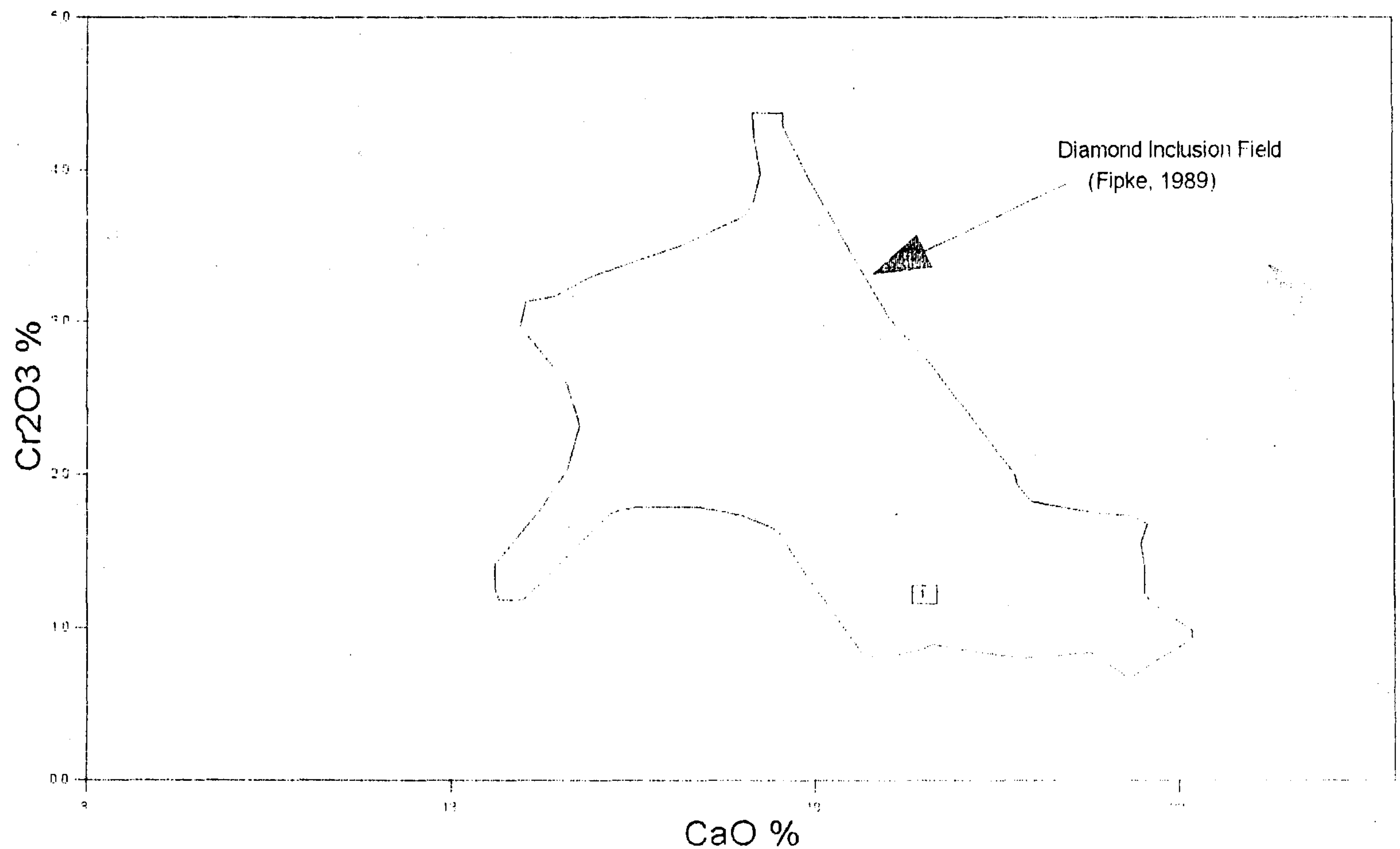
Pyroxene Classification (after Stephens and Dawson, 1977)

G #	Sample #	P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	OPX 1	OPX 2	OPX 3	OPX 4	OPX 5	CPX 1	CPX 2	CPX 3	CPX 4	CPX 5	CPX 6	CPX 7	CPX 8	CPX 9	CPX 10
1	DC-1	112	F	1	0.19	6.22	1.23	2.58	15.42	19.51	1.30	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.

Location; Data in wt %; ORTHOPYROXENE (1–5); CLINOPYROXENE (1–10)

	ORTHOPYROXENE 1	2	3	4	5	CLINOPYROXENE 1	2	3	4	5	6	7	8	9	10
Total Pyroxene = 1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Clinopyroxene



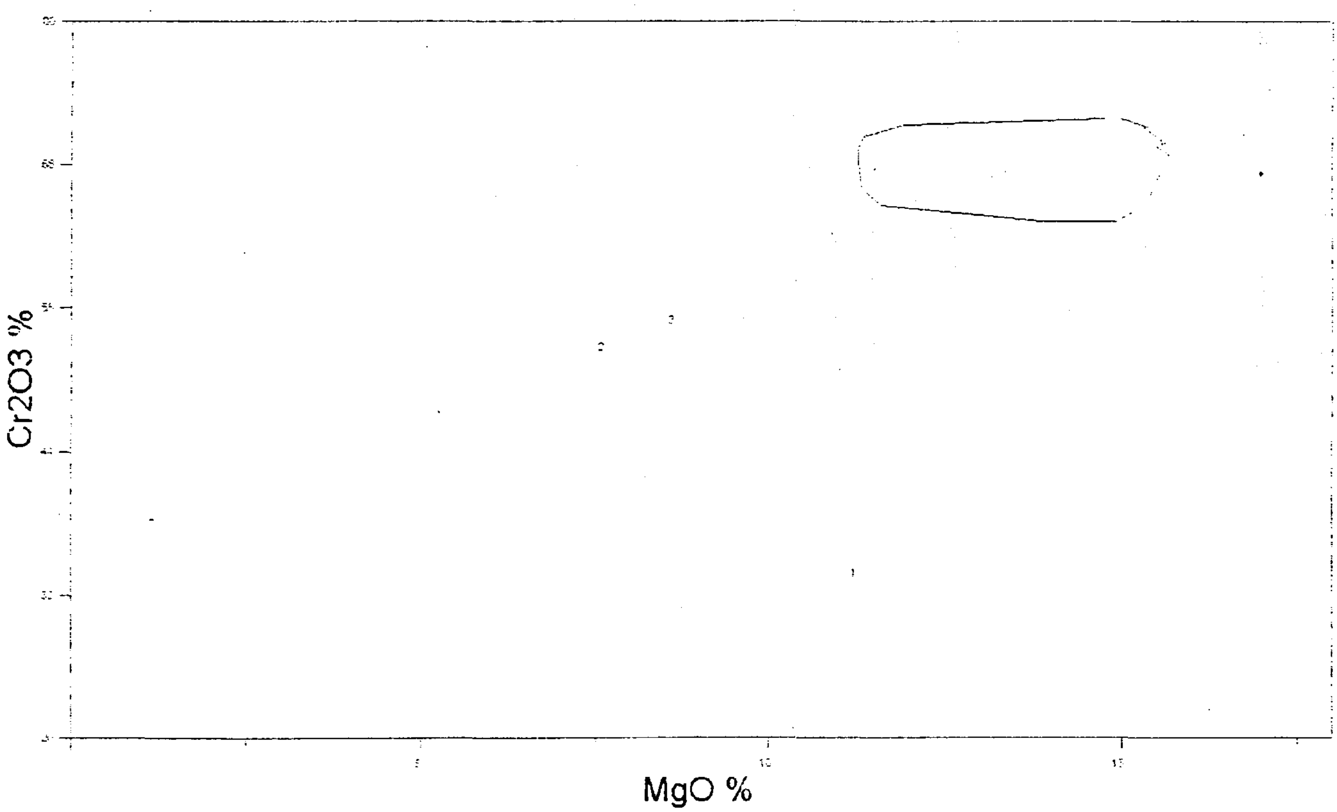
Loring Laboratories Ltd.

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

File No. 38380-1-D
Client: Geo Piaja Exploration   Microprobe Data   August 30, 1996

Location				Data in wt %										
Sample#	P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	NiO	ZnO	V2O3	Total	Mineral
DC-1	112	C	3	1.97	19.58	33.87	31.58	0.28	11.24	0.24	0.05	0.23	99.04	Chromite
DF-1	112	G	3	1.39	2.57	52.78	33.23	0.43	7.62	0.18	0.17	0.24	98.61	Chromite
DF-1	112	H	3	0.19	9.83	55.02	25.40	0.36	8.62	0.10	0.12	0.10	99.74	Chromite

Chromite Indicator



GEO Piaja GEOLOGICAL REPORTS **Montagenuse Trench T-1: #10**
TUL PETROLEUMS MICROPROBE OF T-1GRAINS

NOTE: T 1, S 1 means Trench #1, Sample bucket # 1 concentrates

T 1, S 2 means further microprobe of T 1 bucket #2 concentrates

** ES numbered samples are not covered in this report.

Loring Laboratories Ltd.

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

File No. 38191-1-D
Client: Geo Piaja Exploration   Microprobe Data   August 30, 1996

Location				Data in wt %											
Sample#	P#	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	MnO	K2O	Total	Mineral
T1,S1,2.0NM	111	F	1	38.53	0.00	22.13	0.09	33.40	6.18	1.03	0.00	0.37	0.00	101.72	garnet
T1,S2,1.2 MAG	111	G	1	42.00	0.06	20.70	4.00	8.60	17.83	4.95	0.03	0.47	0.01	98.65	garnet
T1,S2,1.2 MAG	111	H	1	41.56	0.00	21.87	2.69	9.35	18.99	4.76	0.03	0.46	0.01	99.72	garnet
ES-8 & ES-9	111	D	2	41.91	0.49	19.00	5.57	6.39	20.47	4.74	0.01	0.29	0.00	98.87	garnet
ES-5	111	C	2	41.37	0.16	18.66	6.55	7.25	18.51	5.47	0.00	0.37	0.01	98.34	garnet
ES-5	111	C	3	51.98	0.22	6.76	0.94	2.66	15.28	19.99	1.31	0.08	0.00	99.22	pyroxene
ES-8	111	D	3	52.28	0.38	7.04	0.73	2.81	14.79	20.58	1.61	0.10	0.02	100.34	pyroxene
ES-8	111	E	3	53.24	0.12	4.95	1.28	2.41	14.54	20.25	2.05	0.09	0.02	98.95	pyroxene
ES-8	111	F	3	52.05	0.20	6.07	1.27	2.54	15.51	20.64	1.22	0.10	0.02	99.61	pyroxene
ES-8	111	G	3	52.35	0.34	6.95	1.07	2.69	14.74	20.34	1.57	0.08	0.03	100.16	pyroxene
ES-5	111	A	3	51.48	0.29	7.39	0.73	2.83	15.38	20.22	1.45	0.10	0.01	99.89	pyroxene
ES-5	111	B	3	52.75	0.21	5.17	1.32	2.52	16.15	20.09	1.72	0.10	0.03	100.06	pyroxene

Loring Laboratories Ltd.

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

File No. : 38107-D

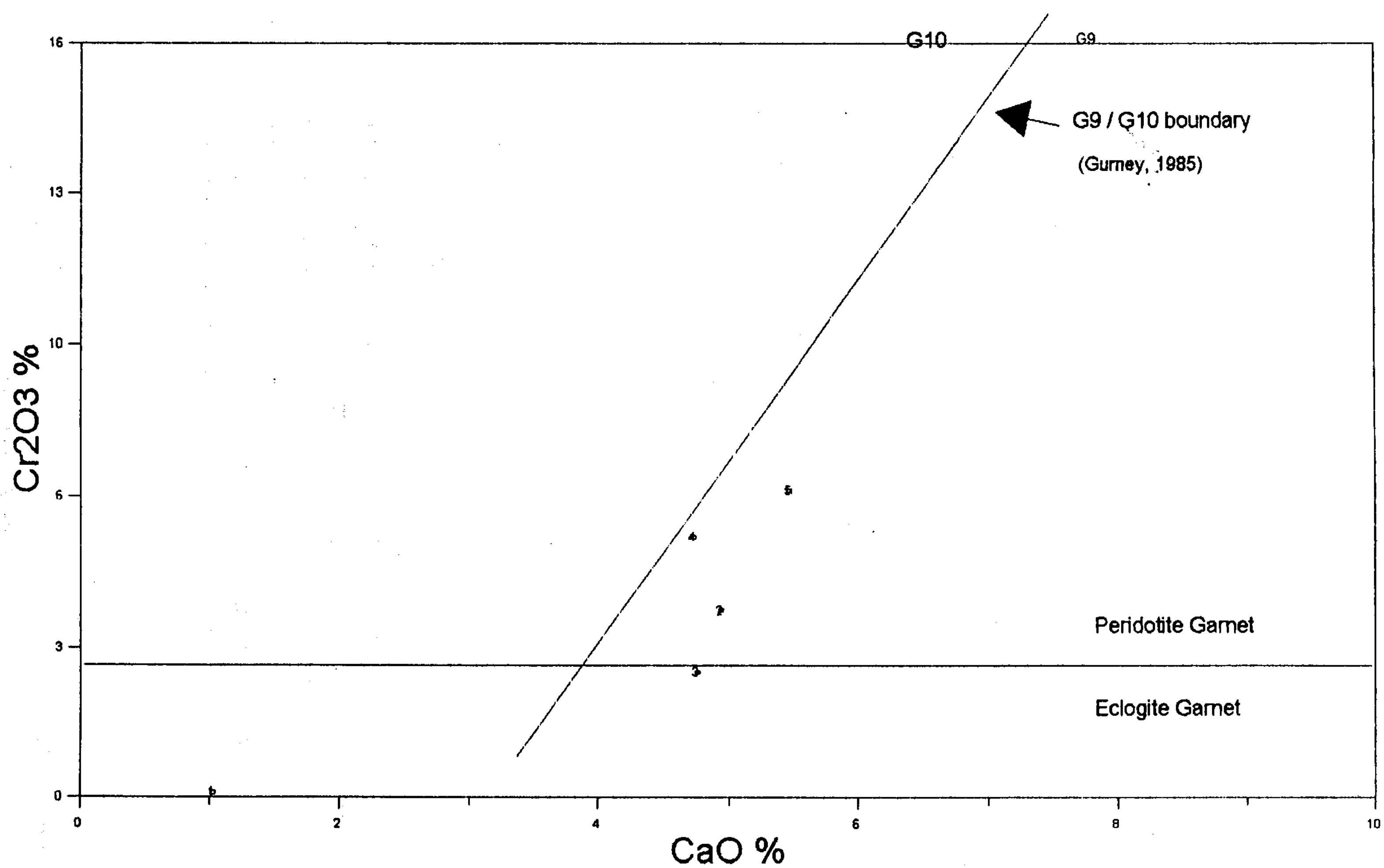
Date: April 15, 1996

Client: TUL Petroleum

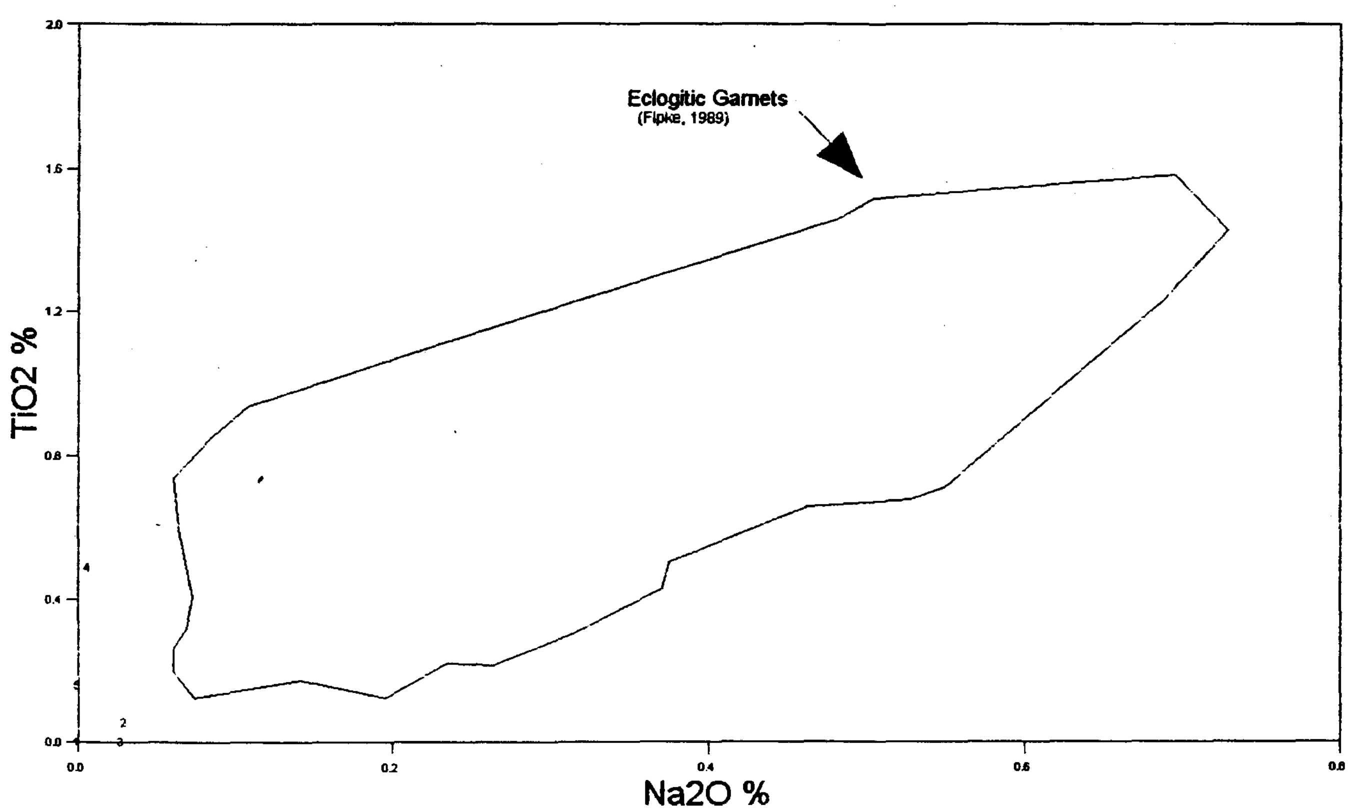
Garnet Classification (after Dawson and Stephens, 1975)

Grain #	Sample #	Location P#	C#	R#	Data in wt % TiO2	Cr2O3	FeO	MgO	CaO	Na2O	Garnets Classification G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
1	T1,S1,2.0NM	111	F	1	0.00	0.09	33.40	6.18	1.03	0.00	..	..	..	..	5	..	..	..	..	..	..	..
2	T1,S2,1.2 MAG	111	G	1	0.06	4.00	8.60	17.83	4.95	0.03	..	..	..	..	..	..	..	..	9	..	..	..
3	T1,S2,1.2 MAG	111	H	1	0.00	2.69	9.35	18.99	4.76	0.03	..	..	..	..	..	..	..	..	9	..	..	..
4	ES-8 & ES-9	111	D	2	0.49	5.57	6.39	20.47	4.74	0.01	..	..	..	..	..	..	..	..	9	..	..	..
5	ES-5	111	C	2	0.16	6.55	7.25	18.51	5.47	0.00	..	..	..	..	..	..	..	..	9	..	..	..
										5	0	0	0	0	1	0	0	0	4	0	0	0
											G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12

Pyrope Garnet Indicators



Eclogite Garnet Indicators



To : GEO PIAJA EXPLORATION
P.O. Box 42030
415, 9737 MacLeod Trail South
Calgary, Alberta T2J 7A6
ATTN : Jim Stapleton

File No : 3 8 3 8 0-1D
Date : August 30, 1996
Samples :
Project :
P.O.#

Certificate of Assay

Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

Sample No.	GC-1	GF-1	GC-2	GF-2
Sample I.D.				
Original Wt.	5.1 kg	59.2 kg	54.0 kg	112.3 kg
+6 Mesh Wt.	0.3 kg	---	3.1 kg	---
6 x 35 Mesh	2.1	---	28.0 kg	---
-35 Mesh	2.7	---	22.9 kg	---
Table Conc. Wt.	0.66	1.28 kg	1.18	1.70 kg
Tail Wt.	4.14	57.92 kg	52.82	110.60 kg
2.90 Sink Wt.	0.15 kg	0.95 kg	0.56 kg	1.42 kg

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : TUL PETROLEUMS LTD.
P.O. Box 42030
415, 9737 MacLeod Trail South
Calgary, Alberta T2J 7A6
ATTN : Ed Santiago

Certificate of Assay
Loring Laboratories Ltd.

File No : 38045
Date : March 18, 1996
Samples :
Project :
P.O.#

Sample No.	PPB Au
"Assay Analysis"	
# 1 Yellow	<5
# 1 Yellow Duplicate	<5
# 1 Red	<5
# 1 Red Duplicate	<5

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

To : GEO PIAJA EXPLORATION
P.O. Box 42030
415, 9737 MacLeod Trail South
Calgary, Alberta T2J 7A6
ATTN : Jim Stapleton

Certificate of Assay
Loring Laboratories Ltd.

629 Beaverdam Road, NE Calgary Alberta
Tel: (403)274-2777 Fax: (403)275-0541

File No : 38380-1D
Date : August 30, 1996
Samples : Sand
Project :
P.O.#

Sample No.	PPB Au Raw Head	PPB Au Tabled Conc
"Assay Analysis"		
GC-1	30	482
GF-1	5	990
GC-2	<5	1097
GF-2	<5	450
2.90 Sink Wt.		

I HEREBY CERTIFY that the above results are those assays made by me upon the herein described samples :

[redacted]
Assayer

Rejects and pulps are retained for one month unless specific arrangements are made in advance.

WEST PEACE RIVER GEOCHEMISTRY TREND
DIAMOND INDICATOR GEOCHEMISTRY ANOMALIES

ADDENDUM

TUL PETROLEUMS LTD.

(POST-SANTIAGO/GEO PIAJA REPORT)

GEOLOGICAL/GEOCHEMISTRY REPORT #11

MICROPROBE DATA

for

MANY ISLANDS CREEK

SAMPLES: GF-1, GC-1, GF-2, GC-2

(Gold and Diamond Exploration "G" - Many Islands Sample Location #1 & #2
Explorer 10 Fines recovery "F" and Course Recovery basket "C":
Sample #1 - Bank above Many Islands Creek
Sample #2 - Pit hand dug in Many Islands Creek

MICROPROBE DATA

and

ANALYSIS

LORING LABS GRAINS PICKING and MICROPROBE RESULTS

Micropobe File: #3 Loring Plugs 116 & 117 Nobember, 1996.						Picked by Stan Wright & Ray Roberts	
File: Microprobe Results Plug 116,117xl							Print: Nov, 1996
			GARNET GROUP				
#	**Colour**	**Mineral**	**Shape**	**Fraction**	**Sample**	**Class**	**Indicators/Comments**
Many Islands Location 1			Creek Bank				Para Magnetic/Non Mag.
52	Red-0range	Garnet	sub-angular-a	0.5 Para	GF-2	G-5	
53	Lt. Violet	Garnet	sub-angular-a	0.6 Para	GF-2	G-5	
54	Red frosted	Garnet	sub-rounded	0.6 Para	GF-2	G-5	
55	Orange	Garnet	angular	0.6 Para	GF-2	G-5	
56	Red	Garnet	angular	0.6 Para	GF-2	G-5	
57	Lt. Pink Rose	Garnet	angular	**1.2 Para**	GF-2	**G-9**	**Light Pink Rose G-9**
Many Islands Location 2			Creek Bottom				
65	Orange	Garnet	no comment	0.6 Para	GC-1	G-5	
66	Pale Violet	Garnet	no comment	**0.7 Para**	GC-1	**G-9**	**This plots as a G-10**
			PYROXENE GROUP				
#	**Colour**	**Mineral**	**Shape**	**Fraction**	**Sample**	**Class**	**Indicators/Comments**
	Montagenuse River & valley soils						
21	Olive Green	L-Chrome-D	no comment	0.6 Para	TUL-3	CP-4	
22	Pale olivegreen	OroPX	no comment	0.6 Para	TUL-4	OP-2	
23	Olive Green	L-Chrome-D	no comment	0.6 Para	TUL-4	CP-4	
24	Bright Green	?	rounded	0.6 Para	TUL4L-1	CP-7	
25	V. Pale Green	OrthoPX	no comment	1.2 Para	TUL4L-1	OP-2	Orthopyroxene
30	Olive Green	Diopside	no comment	2.0 Non	Pit -1	CP-2	Magnetic Meadow Pit 1
31	Olive Green	L-Chrome-D	no comment	2.0 Non	Pit -1	CP-4	
32	Olive Green	Diopside	no comment	2.0 Non	Pit -1	CP-2	
33	Olive Green	L-Chrome-D	no comment	2.0 Non	Pit -1	CP-4	
Many Islands Location 1			W.Creek Bank	Iron layer			Teriary Gravels
42	Lt Olive Green	L-Chrome-D	sub-rounded	0.6 Para	GC-1	CP-4	
43	pale Em Green	Chrome-D	rounded	**2.0 Para**	GC-1	**CP-5**	Diamond Inclusion Field
44	pale Em Green	Diopside	rounded	**2.0 Para**	GC-1	**CP-2**	Diamond Inclusion Field
45	pale Em Green	Diopside	rounded	**2.0 Para**	GC-1	CP-2	slightly low on Chrome
46	pale Em Green	Diopside	rounded	**2.0 Para**	GC-1	**CP-2**	Diamond/Inclusion Field
47	Olive Green	OrthoPX	rounded	2.0 Para	GC-1	OP-2	Orthopyroxene
48	Olive Green	Diopside	rounded	1.2 Para	GC-1	CP-2	
Many Islands Location 2			Creek Bottom				Hand dug pit in creek bend
1	Lt.Green/bluish	Chrome-D	Sub-rounded-r	**1.2 Para**	GF-2	**CP-5**	Diamond Inclusion Field
2	Light Green	Chrome-D	Sub-rounded	**1.2 Para**	GF-2	**CP-5**	Diamond Inclusion Field
3	Light Green	Diopside	Sub-rounded	**1.2 Para**	GF-2	**CP-2**	Diamond Inclusion Field
4	Light Green	Diopside	Sub-rounded	**2.0 Non**	GF-2	**CP-2**	Diamond Inclusion Field
5	Light Green	Diopside	Sub-rounded	**2.0 Non**	GF-2	**CP-2**	Diamond Inclusion Field
6	Light Green	Diopside	Sub-rounded	**2.0 Non**	GF-2	**CP-2**	Diamond Inclusion Field
7	Light Green	Diopside	Sub-rounded	2.0 Non	GF-2	CP-2	0.7 Cr_2O_3 - just low
8	Light Green	?	Sub-rounded	**2.0 Non**	GF-2	**CP-7**	Diamond Inclusion Field
9	Light Green	L-Chrome-D	Sub-ang-S.r.	0.6 Para	GF-2	CP-4	very high Cr, very high Ca

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

File No. : 38697
Client : GeoPiaja Exploration
Microprobe Data

Date: Nov 15, 1996

Grain	Sample	Location Plug	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	CaO	Na2O	K2O	Total	Mineral
52	GF 2	116	B	1	36.77	0.06	20.77	0.01	35.45	0.34	0.73	6.75	0.00		100.88	Garnet
53	GF 2	116	C	1	38.29	0.00	22.18	0.03	30.05	0.64	8.13	1.29	0.06		100.67	Garnet
54	GF 2	116	D	1	37.52	0.09	21.43	0.01	29.82	0.74	4.22	6.96	0.00		100.79	Garnet
55	GF 2	116	E	1	37.68	0.07	21.67	0.04	32.56	0.26	5.55	2.64	0.00		100.46	Garnet
56	GF 2	116	F	1	36.74	0.04	20.46	0.02	34.39	0.16	0.85	7.61	0.00		100.28	Garnet
57	GF 2	116	H	1	41.06	0.28	20.43	4.27	7.62	0.40	19.58	5.01	0.02		98.66	Garnet
58	TUL - ES - 6	116	H	5	36.72	0.00	20.33	0.00	28.03	6.24	0.61	7.95	0.09		99.96	Garnet
59	TUL - ES - 6	116	I	6	36.79	0.05	21.84	0.00	13.81	0.18	0.05	22.57	0.00		95.29	Garnet
60	TUL - ES - 6	116	G	6	33.51	2.38	2.74	0.00	24.36	1.01	0.16	31.19	0.08		95.42	Unknown
61	#7 P.M.	116	G	8	33.86	0.47	0.21	11.51	16.03	0.06	0.41	33.53	0.01		96.09	Unknown
62	TUL - ES - 6	117	F	6	37.01	0.00	20.81	0.05	28.57	1.03	0.84	11.94	0.04		100.29	Garnet
63	TUL - ES - 6	117	G	6	36.39	0.09	19.84	0.00	19.78	7.88	0.12	14.80	0.00		98.91	Garnet
64	TUL - ES - 6	117	A	7	38.27	0.00	22.56	0.09	29.68	0.44	8.44	1.08	0.00		100.56	Garnet
65	GC - 1	117	I	7	36.89	0.05	21.00	0.00	31.26	4.86	1.15	5.32	0.00		100.53	Garnet
66	GC - 1	117	D	8	40.40	0.07	17.73	8.08	5.75	0.32	20.63	4.74	0.00		97.73	Garnet

Loring Laboratories Ltd.

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

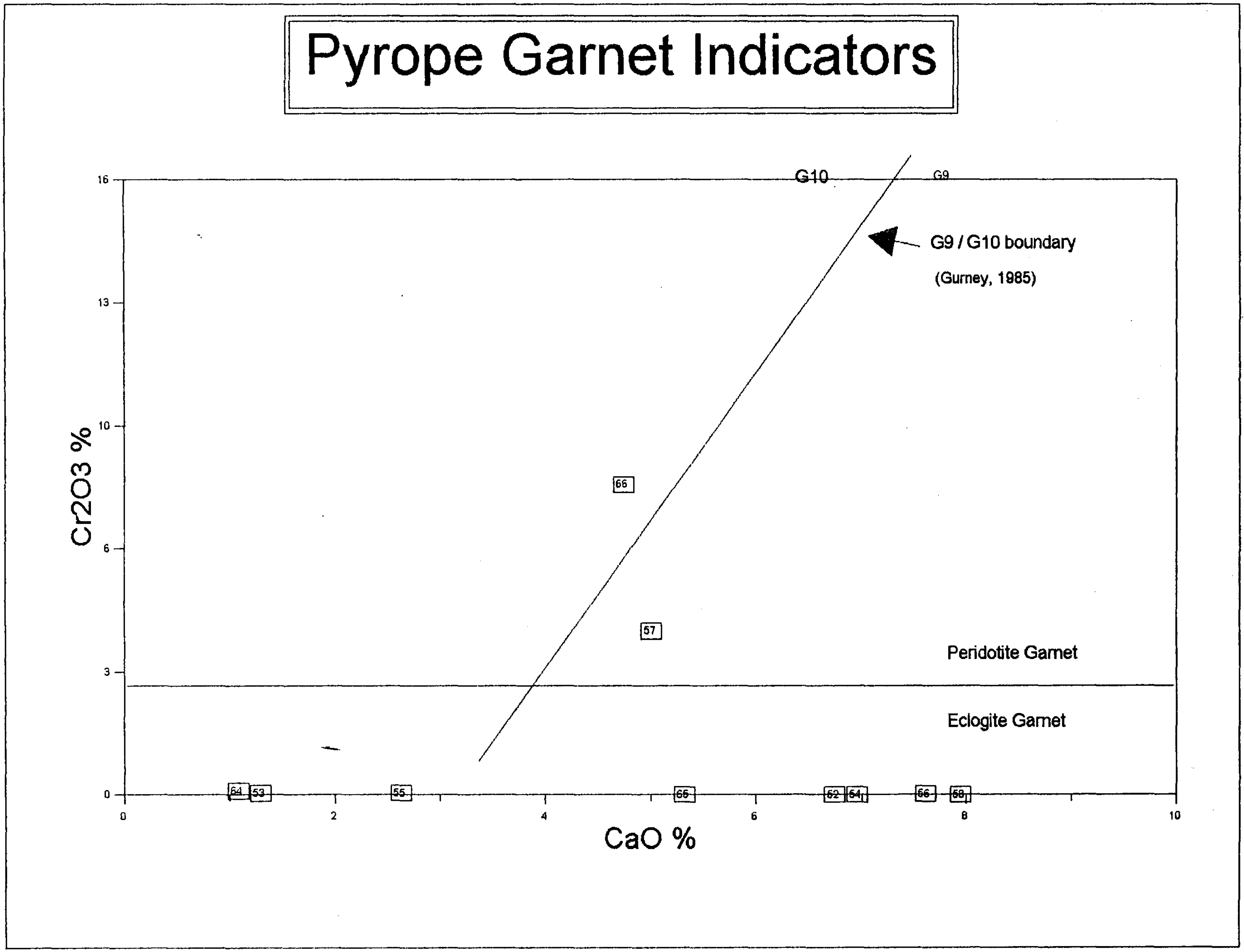
File No. : 38697

Date: Sept 30, 1996

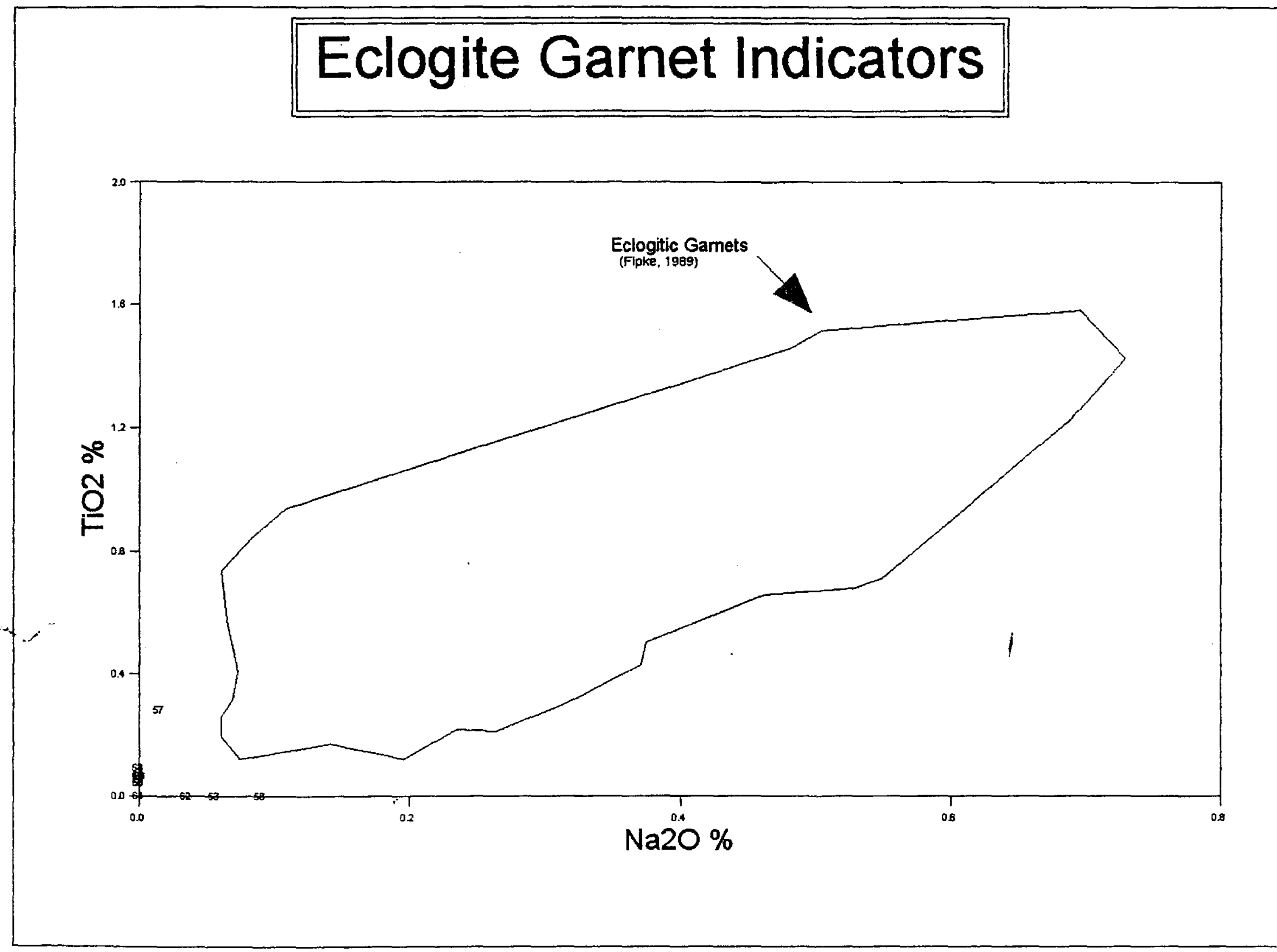
Client : GeoPiaja Exploration

Garnet Classification (after Dawson and Stephens, 1975)

		Location			Data in wt %						Garnets Classification											
Grain #	Sample #	P#	C#	R#	TiO2	Cr2O3	FeO	MgO	CaO	Na2O	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12
52	GF 2	116	B	1	0.06	0.01	35.45	0.73	6.75	0.00	..	..	..	..	5	..	..	..	..	..	..	..
53	GF 2	116	C	1	0.00	0.03	30.05	8.13	1.29	0.06	..	..	..	..	5	..	..	..	..	..	..	..
54	GF 2	116	D	1	0.09	0.01	29.82	4.22	6.96	0.00	..	..	..	..	5	..	..	..	..	..	..	..
55	GF 2	116	E	1	0.07	0.04	32.56	5.55	2.64	0.00	..	..	..	..	5	..	..	..	..	..	..	..
56	GF 2	116	F	1	0.04	0.02	34.39	0.85	7.61	0.00	..	..	..	..	5	..	..	..	..	..	..	..
57	GF 2	116	H	1	0.28	4.27	7.62	19.58	5.01	0.02	..	..	..	..	..	..	..	..	9	..	..	..
58	TUL - ES - 6	116	H	5	0.00	0.00	28.03	0.61	7.95	0.09	..	..	..	..	5	..	..	..	..	..	..	..
59	TUL - ES - 6	116	I	6	0.05	0.00	13.81	0.05	22.57	0.00	..	..	..	..	..	6	..	..	..	..	..	..
62	TUL - ES - 6	117	F	6	0.00	0.05	28.57	0.84	11.94	0.04	..	..	..	..	5	..	..	..	..	..	..	..
63	TUL - ES - 6	117	G	6	0.09	0.00	19.78	0.12	14.80	0.00	..	..	3	..	..	..	..	..	..	..	..	..
64	TUL - ES - 6	117	A	7	0.00	0.09	29.68	8.44	1.08	0.00	..	..	..	..	5	..	..	..	..	..	..	..
65	GC - 1	117	I	7	0.05	0.00	31.26	1.15	5.32	0.00	..	..	..	..	5	..	..	..	..	..	..	..
66	GC - 1	117	D	8	0.07	8.08	5.75	20.63	4.74	0.00	..	..	..	..	..	..	..	..	9	..	..	..
										13	0	0	1	0	9	1	0	0	2	0	0	0
											G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12



Pyrope Garnet Indicators
G10
G9
G9 / G10 boundary
(Gurney, 1985)
Peridotite Garnet
Eclogite Garnet
Cr2O3 %
CaO %
16
13
10
6
3
0
0
2
4
6
8
10
66
57
64
53
55
65
62
64
66
68


Eclogite Garnet Indicators
Eclogitic Garnets
(Fipke, 1989)
TiO2 %
Na2O %
2.0
1.6
1.2
0.8
0.4
0.0
0.0
0.2
0.4
0.6
0.8
57
62
53
58

Loring Laboratories Ltd.

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

File No. : 38697
Client : GeoPiaja Exploration
Microprobe Data

Date: Nov 15, 1996

Grain	Sample	Plug	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	CaO	Na2O	K2O	Total	Mineral
1	GF 2	116	A	3	52.93	0.14	5.16	1.60	2.42	0.06	15.36	19.80	1.73	0.02	99.23	Pyroxenes
2	GF 2	116	B	3	52.86	0.16	5.45	1.39	2.23	0.13	15.08	20.13	1.68	0.02	99.11	Pyroxenes
3	GF 2	116	C	3	52.48	0.28	6.58	1.23	2.41	0.12	14.51	19.96	1.59	0.02	99.16	Pyroxenes
4	GF 2	116	D	3	53.02	0.40	5.12	1.44	2.63	0.06	15.21	20.06	1.54	0.02	99.49	Pyroxenes
5	GF 2	116	E	3	51.86	0.28	6.25	1.41	2.48	0.06	15.55	20.50	1.33	0.02	99.73	Pyroxenes
6	GF 2	116	F	3	51.80	0.23	5.80	1.28	2.68	0.06	15.50	20.46	1.38	0.03	99.21	Pyroxenes
7	GF 2	116	G	3	51.96	0.32	7.34	0.70	2.59	0.10	14.95	20.39	1.31	0.01	99.67	Pyroxenes
8	GF 2	116	H	3	52.05	0.26	6.14	1.00	2.32	0.08	14.75	21.25	1.41	0.03	99.28	Pyroxenes
9	GF 2	116	B	5	35.35	0.80	0.30	10.96	16.41	0.01	0.15	33.28	0.00	0.01	97.26	Pyroxenes
10	TUL ES-6	116	B	6	51.86	0.31	1.98	0.07	5.93	0.06	14.77	23.92	0.29	0.02	99.20	Pyroxenes
11	TUL ES-6	116	C	6	52.14	0.18	2.08	0.75	3.93	0.12	16.65	22.73	0.10	0.02	98.70	Pyroxenes
12	TUL ES-6	116	E	6	53.31	0.11	1.72	0.58	3.54	0.12	17.28	22.91	0.20	0.01	99.80	Pyroxenes
13	TUL ES-6	116	F	6	51.81	0.22	5.51	1.06	2.87	0.11	16.33	19.65	1.21	0.05	98.81	Pyroxenes
14	TUL ES-6	116	A	7	51.32	0.28	2.93	0.06	5.53	0.09	15.65	23.57	0.20	0.01	99.62	Pyroxenes
15	TUL ES-6	116	J	8	50.29	0.36	4.06	0.60	4.60	0.07	15.17	23.14	0.16	0.03	98.49	Pyroxenes
16	TUL ES-6	116	A	9	52.16	0.28	6.35	0.81	2.60	0.07	15.38	20.10	1.52	0.02	99.29	Pyroxenes
17	TUL ES-6	116	B	9	54.36	0.04	1.00	0.95	2.39	0.04	18.09	23.01	0.16	0.02	100.06	Pyroxenes
18	TUL ES-6	116	C	9	51.85	0.25	7.30	0.88	2.48	0.02	14.89	20.57	1.64	0.01	99.88	Pyroxenes
19	TUL ES-6	116	D	9	50.16	0.29	4.49	0.70	4.94	0.05	15.63	21.76	0.23	0.02	98.26	Pyroxenes
20	TUL ES-6	116	E	9	53.50	0.06	1.10	0.69	2.51	0.07	17.36	22.97	0.13	0.01	98.41	Pyroxenes
21	TUL - 3	117	E	1	52.14	0.25	1.69	0.05	6.46	0.24	14.34	22.89	0.76	0.02	98.84	Pyroxenes
22	TUL - 4	117	I	1	54.60	0.17	5.28	0.39	6.22	0.18	32.26	0.83	0.07	0.01	100.01	Pyroxenes
23	TUL - 4	117	J	1	40.53	0.69	3.33	1.05	5.54	0.08	15.30	21.55	0.26	0.02	88.35	Pyroxenes
24	TUL - 4L1	117	E	2	35.21	1.18	0.19	8.08	18.36	0.09	0.22	33.20	0.00	0.00	96.52	Pyroxenes
25	TUL - 4L1	117	B	2	51.90	0.21	2.83	0.80	3.94	0.10	16.58	22.78	0.21	0.01	99.35	Pyroxenes
26	ES - 5	117	F	3	50.12	0.27	3.00	0.19	6.17	0.05	15.29	22.83	0.26	0.02	98.19	Pyroxenes
27	ES - 5	117	H	3	52.52	0.17	1.23	0.28	3.51	0.06	17.05	23.52	0.12	0.02	98.48	Pyroxenes
28	ES - 5	117	J	3	52.10	0.20	5.78	1.14	2.33	0.06	14.86	20.77	1.45	0.02	98.70	Pyroxenes
29	ES - 8+9	117	I	4	51.64	0.49	3.18	0.80	5.42	0.14	16.52	20.80	0.28	0.02	99.28	Pyroxenes
30	P -1	117	F	4	52.15	0.33	1.66	0.00	5.36	0.13	15.00	24.19	0.35	0.01	99.17	Pyroxenes
31	P -1	117	E	4	51.57	0.48	2.40	0.18	7.56	0.19	15.69	20.93	0.23	0.00	99.22	Pyroxenes
32	P -1	117	D	4	51.95	0.24	2.32	0.24	5.66	0.10	15.85	23.08	0.25	0.01	99.71	Pyroxenes
33	P -1	117	C	4	49.45	0.45	4.62	0.11	7.27	0.12	14.81	22.32	0.35	0.03	99.53	Pyroxenes
34	ES - 5	117	H	5	52.34	0.36	7.16	1.02	3.09	0.09	14.87	17.86	2.40	0.02	99.21	Pyroxenes
35	ES - 5	117	I	5	52.75	0.28	6.88	1.16	2.28	0.06	15.18	20.66	1.66	0.01	100.91	Pyroxenes
36	ES - 5	117	J	5	52.30	0.20	5.40	1.33	2.11	0.07	15.32	20.59	1.44	0.02	98.77	Pyroxenes
37	ES - 6	117	J	6	51.61	0.28	6.28	0.81	2.89	0.05	15.50	20.89	0.90	0.01	99.21	Pyroxenes
38	ES - 6	117	I	6	52.99	0.12	1.49	0.41	3.91	0.14	16.83	23.35	0.16	0.01	99.40	Pyroxenes
39	ES - 6	117	H	6	51.66	0.42	6.59	0.96	2.56	0.13	15.54	20.38	1.30	0.01	99.54	Pyroxenes
40	ES - 6	117	G	7	51.50	0.28	2.85	0.75	4.54	0.09	16.23	23.00	0.26	0.03	99.52	Pyroxenes
41	ES - 6	117	B	7	52.52	0.24	1.96	0.56	4.05	0.07	16.90	22.34	0.15	0.01	98.80	Pyroxenes
42	GC - 1	117	A	8	50.03	0.38	4.53	0.56	6.79	0.12	15.15	21.82	0.35	0.02	99.77	Pyroxenes
43	GC - 1	117	E	8	52.20	0.22	6.07	1.31	2.54	0.10	15.07	20.50	1.64	0.03	99.68	Pyroxenes
44	GC - 1	117	F	8	52.10	0.28	6.24	1.21	2.74	0.11	15.53	19.56	1.68	0.01	99.46	Pyroxenes
45	GC - 1	117	G	8	52.67	0.23	6.20	0.77	2.72	0.02	15.82	20.53	1.37	0.02	100.35	Pyroxenes
46	GC - 1	117	H	8	52.22	0.28	6.49	1.19	2.59	0.08	15.56	19.99	1.74	0.00	100.15	Pyroxenes
47	GC - 1	117	I	8	55.67	0.00	3.69	0.48	5.68	0.13	33.93	0.69	0.05	0.01	100.32	Pyroxenes
48	GC - 1	117	H	9	52.92	0.16	1.41	0.79	4.09	0.10	17.13	23.03	0.20	0.01	99.84	Pyroxenes

Loring Laboratories Ltd.

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

File No. : 38697
Client : GeoPiaja Exploration
Microprobe Data

Date: Nov 15, 1996

Grain	Sample	Location Plug	C#	R#	SiO2	TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	CaO	Na2O	K2O	Total	Mineral
49	GC - 1	117	G	9	52.41	0.23	2.20	0.41	4.86	0.12	16.70	22.94	0.19	0.03	100.08	Pyroxenes
50	GC - 1	117	F	9	50.03	0.41	3.90	0.33	6.35	0.05	15.55	22.55	0.33	0.00	99.49	Pyroxenes
51	GC - 1	117	E	9	43.82	0.00	0.47	0.08	4.14	0.05	37.37	0.00	0.00	0.01	85.94	Pyroxenes

Loring Laboratories Ltd.

629 Beaverdam Road N.E.,

Calgary Alberta T2K 4W7

Tel: 274-2777 Fax: 275-0541

File #: 38697-D

Client: Geo Piaja Exploration

Pyroxene Classification (after Stephens and Dawson, 1977)

		Location			Data in wt %							ORTHOPYROXENE					CLINOPYROXENE									
G #	Sample #	P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10
1	GF 2	116	A	3	0.14	5.16	1.60	2.42	15.36	19.80	1.73										5					
2	GF 2	116	B	3	0.16	5.45	1.39	2.23	15.08	20.13	1.68										5					
3	GF 2	116	C	3	0.28	6.58	1.23	2.41	14.51	19.96	1.59							2								
4	GF 2	116	D	3	0.40	5.12	1.44	2.63	15.21	20.06	1.54							2								
5	GF 2	116	E	3	0.28	6.25	1.41	2.48	15.55	20.50	1.33							2								
6	GF 2	116	F	3	0.23	5.80	1.28	2.68	15.50	20.46	1.38							2								
7	GF 2	116	G	3	0.32	7.34	0.70	2.59	14.95	20.39	1.31							2								
8	GF 2	116	H	3	0.26	6.14	1.00	2.32	14.75	21.25	1.41										5					
9	GF 2	116	B	5	0.80	0.30	10.96	16.41	0.15	33.28	0.00												7			
10	TUL ES-6	116	B	6	0.31	1.98	0.07	5.93	14.77	23.92	0.29									4						
11	TUL ES-6	116	C	6	0.18	2.08	0.75	3.93	16.65	22.73	0.10							2								
12	TUL ES-6	116	E	6	0.11	1.72	0.58	3.54	17.28	22.91	0.20							2								
13	TUL ES-6	116	F	6	0.22	5.51	1.06	2.87	16.33	19.65	1.21							2								
14	TUL ES-6	116	A	7	0.28	2.93	0.06	5.53	15.65	23.57	0.20									4						
15	TUL ES-6	116	J	8	0.36	4.06	0.60	4.60	15.17	23.14	0.16									4						
16	TUL ES-6	116	A	9	0.28	6.35	0.81	2.60	15.38	20.10	1.52							2								
17	TUL ES-6	116	B	9	0.04	1.00	0.95	2.39	18.09	23.01	0.16										5					
18	TUL ES-6	116	C	9	0.25	7.30	0.88	2.48	14.89	20.57	1.64							2								
19	TUL ES-6	116	D	9	0.29	4.49	0.70	4.94	15.63	21.76	0.23									4						
20	TUL ES-6	116	E	9	0.06	1.10	0.69	2.51	17.36	22.97	0.13										5					
21	TUL - 3	117	E	1	0.25	1.69	0.05	6.46	14.34	22.89	0.76									4						
22	TUL - 4	117	I	1	0.17	5.28	0.39	6.22	32.26	0.83	0.07		2													
23	TUL - 4	117	J	1	0.69	3.33	1.05	5.54	15.30	21.55	0.26									4						
24	TUL - 4L1	117	E	2	1.18	0.19	8.08	18.36	0.22	33.20	0.00												7			

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

File #: 38697-D
Client: Geo Piaja Exploration

Pyroxene Classification (after Stephens and Dawson, 1977)

		Location			Data in wt %							ORTHOPYROXENE					CLINOPYROXENE									
G #	Sample #	P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10
25	TUL - 4L1	117	B	2	0.21	2.83	0.80	3.94	16.58	22.78	0.21							2								
26	ES - 5	117	F	3	0.27	3.00	0.19	6.17	15.29	22.83	0.26									4						
27	ES - 5	117	H	3	0.17	1.23	0.28	3.51	17.05	23.52	0.12							2								
28	ES - 5	117	J	3	0.20	5.78	1.14	2.33	14.86	20.77	1.45										5					
29	ES - 8+9	117	I	4	0.49	3.18	0.80	5.42	16.52	20.80	0.28									4						
30	P -1	117	F	4	0.33	1.66	0.00	5.36	15.00	24.19	0.35							2								
31	P -1	117	E	4	0.48	2.40	0.18	7.56	15.69	20.93	0.23									4						
32	P -1	117	D	4	0.24	2.32	0.24	5.66	15.85	23.08	0.25							2								
33	P -1	117	C	4	0.45	4.62	0.11	7.27	14.81	22.32	0.35									4						
34	ES - 5	117	H	5	0.36	7.16	1.02	3.09	14.87	17.86	2.40							2								
35	ES - 5	117	I	5	0.28	6.88	1.16	2.28	15.18	20.66	1.66										5					
36	ES - 5	117	J	5	0.20	5.40	1.33	2.11	15.32	20.59	1.44										5					
37	ES - 6	117	J	6	0.28	6.28	0.81	2.89	15.50	20.89	0.90							2								
38	ES - 6	117	I	6	0.12	1.49	0.41	3.91	16.83	23.35	0.16							2								
39	ES - 6	117	H	6	0.42	6.59	0.96	2.56	15.54	20.38	1.30							2								
40	ES - 6	117	G	7	0.28	2.85	0.75	4.54	16.23	23.00	0.26							2								
41	ES - 6	117	B	7	0.24	1.96	0.56	4.05	16.90	22.34	0.15							2								
42	GC - 1	117	A	8	0.38	4.53	0.56	6.79	15.15	21.82	0.35									4						
43	GC - 1	117	E	8	0.22	6.07	1.31	2.54	15.07	20.50	1.64										5					
44	GC - 1	117	F	8	0.28	6.24	1.21	2.74	15.53	19.56	1.68							2								
45	GC - 1	117	G	8	0.23	6.20	0.77	2.72	15.82	20.53	1.37							2								
46	GC - 1	117	H	8	0.28	6.49	1.19	2.59	15.56	19.99	1.74							2								
47	GC - 1	117	I	8	0.00	3.69	0.48	5.68	33.93	0.69	0.05		2													
48	GC - 1	117	H	9	0.16	1.41	0.79	4.09	17.13	23.03	0.20							2								

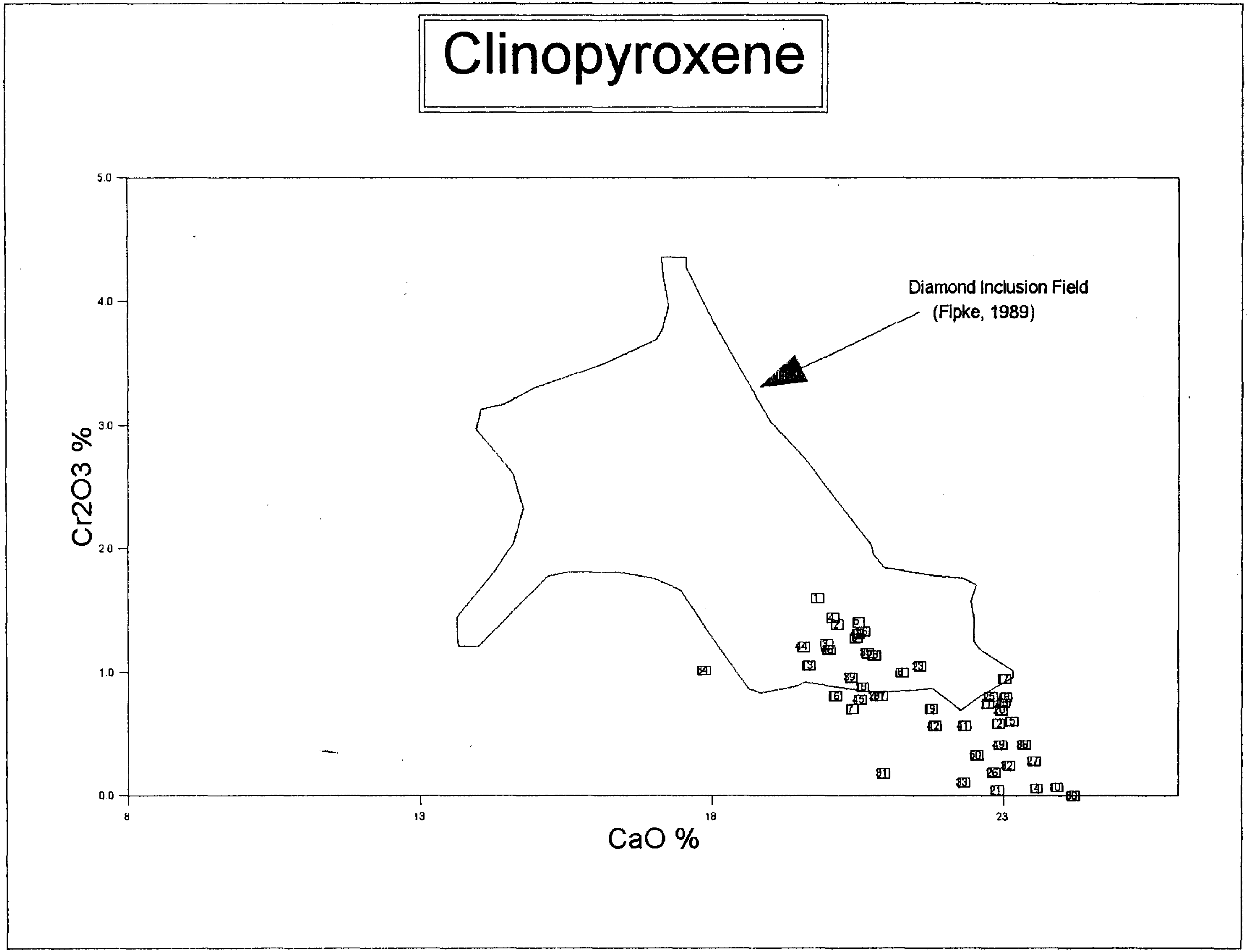
Loring Laboratories Ltd.
629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 274-2777 Fax: 275-0541

File #: 38697-D
Client: Geo Piaja Exploration

Pyroxene Classification (after Stephens and Dawson, 1977)

		Location			Data in wt %							ORTHOPYROXENE					CLINOPYROXENE									
G #	Sample #	P#	C#	R#	TiO2	Al2O3	Cr2O3	FeO	MgO	CaO	Na2O	1	2	3	4	5	1	2	3	4	5	6	7	8	9	10
49	GC - 1	117	G	9	0.23	2.20	0.41	4.86	16.70	22.94	0.19	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...
50	GC - 1	117	F	9	0.41	3.90	0.33	6.35	15.55	22.55	0.33	...	...	...	...	...	...	...	...	4	...	...	...	...	...	...
51	GC - 1	117	E	9	0.00	0.47	0.08	4.14	37.37	0.00	0.00	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...

		ORTHOPYROXENE					CLINOPYROXENE									
		1	2	3	4	5	1	2	3	4	5	6	7	8	9	10
Total Pyroxene =	51	1	2	0	0	0	0	25	0	12	9	0	2	0	0	0



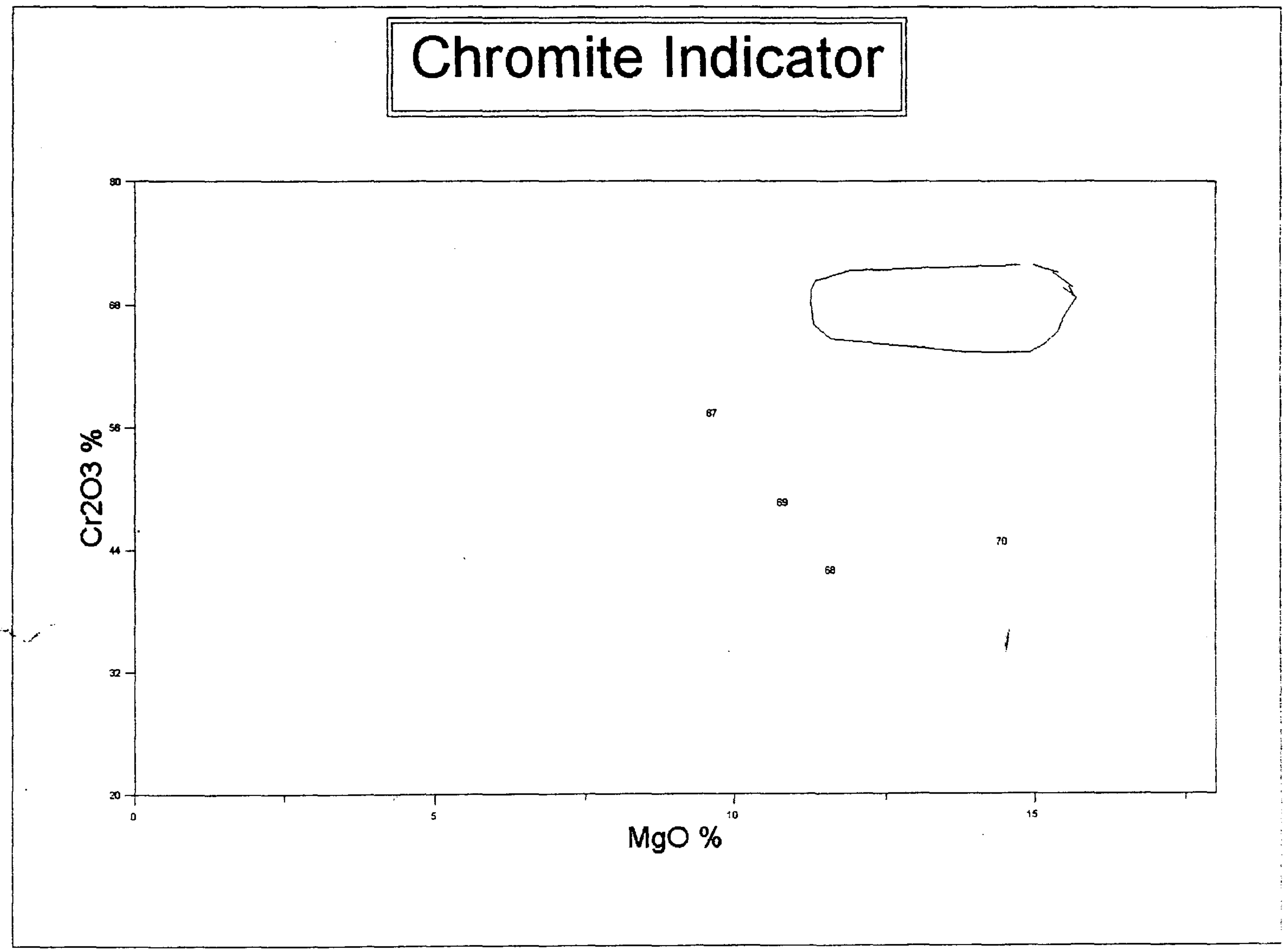
Clinopyroxene
Diamond Inclusion Field
(Fipke, 1989)
Cr2O3 %
CaO %
5.0
4.0
3.0
2.0
1.0
0.0
8
13
18
23

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

File No. : 38697
Client : GeoPiaja Exploration
Microprobe Data

Date: Nov 15, 1996

Grain	Sample	Location Plug	C#	R#	Data in wt % TiO2	Al2O3	Cr2O3	FeO	MnO	MgO	NiO	ZnO	V2O3	Total	Mineral
67	GF 2	116	C	4	0.07	9.14	57.40	21.93	0.31	9.67	0.05	0.00	0.21	98.78	Chromite
68	ES - 6	117	C	6	1.16	17.13	41.95	24.97	0.26	11.62	0.22	0.00	0.18	97.50	Chromite
69	ES - 6	117	D	6	0.38	15.39	48.52	21.21	0.25	10.83	0.10	0.00	0.19	96.86	Chromite
70	GC - 1	117	C	8	1.20	16.52	44.64	19.41	0.22	14.49	0.26	0.00	0.14	96.88	Chromite


Chromite Indicator
Cr2O3 %
MgO %
80
68
56
44
32
20
0
5
10
15
67
69
70
68

Loring Laboratories Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 274-2777 Fax: 275-0641

FILE # : 39719-D COMPANY: GEO-PIAJA RESOURCES DATE : Nov 25, 1997

SAMPLE ID.	ORIGINAL WEIGHT (Kg)	SCREEN ANALYSIS			TABLE CONC.	MIDDLINGS 2.9 - 3.3 SG		HEAVIES >3.3 SG							
		+35 mesh (kg)	35 x 80 mesh (kg)	-80 mesh (Kg)	+80 mesh (g)	MAG. (g)	NON - MAG. (g)	MAG. (g)	+28 Mesh (g)	P.M. 0.5 (g)	P.M. 0.6 (g)	P.M. 0.7 (g)	W.P.M. 1.2 (g)	W.P.M. 2.0 (g)	N.M. 2.0 (g)
RET (91)	77.0	62.8	5.1	9.1	580	9.48	320.4	14.15	3.90	6.35	0.53	1.04	3.31	0.30	0.13

NOTE : P.M. = PARAMAGNETIC W.P.M. = WEAKLY PARAMAGNETIC N.M. = NON-MAGNETIC

[redacted]
ASSAYER