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No. 10,278/85			

BASE RESOURCES LTD.  
EXPLORATION LICENCE 29/83  
LEMONTHYME

OPEN FILE

Technical Report on Year's Work  
from 21st September, 1984  
(To accompany application for renewal)

Author: B.L. Wood, D.Sc., M.Aus.I.M.M.  
Date: 23rd September, 1985

AMG REFERENCE POINTS ADDED

## INTRODUCTION

E.L. 29/83 Lemonthyme was granted to Base Resources Ltd. for one year to remain in force until 21st September, 1984 and renewed for a second year to 21st September, 1985. The area applied for is approximately 110 sq.km. in extent and lies immediately north of E.L. 48/82 Borrodaile Plains, which has also been granted to Base Resources Ltd.

## EXPLORATION CONCEPT

The following brief outline gives the rationale for the exploration programme, the targets of which are diamondiferous kimberlite pipes. The concept is based on the following four points:

- (1) Diamonds were found in alluvial gold workings at Corinna in 1894 (and elsewhere nearby) in the drainage basin of the Pieman River (Twelvetrees, 1918). Tributaries of the Pieman system drain Proterozoic terrain of the north-central highlands, and the diamond sources are more likely to occur in the Proterozoic terrain (as pipes) than elsewhere.
- (2) Recent developments in seismo-tectonics indicate possible extensions of either Victorian and South Australian kimberlitic terrains through Tasmania (B.M.R. Record 1979/2, Stracke, et al., 1979). Former continuity (i.e. pre-kimberlitic) between Tasmania and the known kimberlitic areas of Proterozoic crust of mainland Australia is also indicated by evidence from plate tectonics and structural geology (e.g. Harrington and Korsch, 1976). These points all confirm that the Proterozoic crust of Tasmania may be an appropriate host to kimberlitic intrusives, some of which may be diamondiferous (e.g. like the Orroroo kimberlites at Eurelia, South Australia).
- (3) Much of the north-central highlands of Tasmania consist of Proterozoic rocks of low metamorphic grade and high structural level, which in spite of pre-Permian erosion

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and subsequent removal of Permo-Triassic and Jurassic cover, may contain the upper levels of kimberlitic diatremes rather than the deeper zones of dyke emplacement. Thus structural level and crustal thickness are probably conducive to any kimberlites which may be present being diamondiferous.

- (4) The published information on the Corinna diamonds, the predictive inferences such as those by A.C. Moore (1973), and other as-yet unpublished information on possible diamond sources in the central highlands all point to the Proterozoic terrain as being the most appropriate for a systematic search for kimberlitic source rocks.

#### FIELD EXPLORATION METHODS

The methods employed are those of classical stream sediment heavy mineral search for indicator minerals, in which both pan-concentrate and sieved -20+80 bulk sediment samples are collected at each site. The pan concentrates are subsequently re-concentrated in heavy liquid Tetra-bromoethane (T.B.E.), to recover minerals of density greater than 2.9. These are washed in alcohol and dried for visual scanning under the binocular microscope.

The E.L. area comprises steep to mountainous topography, with a well-developed, youthful trellised-dendritic drainage system most of which is actively eroding and loaded with abundant sediment. In parts, however, upper reaches of streams drain basalt plains or dolerite plateaus, and are slowmoving and swampy with little usable sediment.

The attrition rate of the indicator minerals being sought is not well-known for such high energy conditions, but maximum transit-survival distances are inferred to be less than 5 km and probably more than 3 km. At an optimum spacing of sample

localities between these limits a total of approximately 100 samples is considered adequate for a first phase survey of the area.

In the present area bulk samples of between 5 and 8 kg and pan concentrates of about 200 gm, equivalent to about 10 kg weight of raw sieved sediment, were used. These are thought to be adequate because of the relatively short stream lengths involved, in contrast to the long, poorly defined streams of the West Kimberly, Western Australia where bulk samples of up to several tonnes are necessary, (Gregory, 1984).

#### LABORATORY FOLLOW-UP METHODS

The ultimate purpose of this stage is to locate and identify true indicator minerals of undoubted kimberlitic origin in the rather widely variable assemblages of species in the heavy-concentrate samples.

The first step involves close examination under the binocular microscope, and systematic search through all the sample grains for the diagnostic features of the minerals being sought.

In the case of voluminous samples this may take up to two hours each, with additional time for various tests of individual grains. Most samples are also examined under U.V. light to check for fluorescent grains.

INDICATOR MINERALS AND SPECIFIC TESTS

The indicator species generally sought are as follows (after Gregory, 1984):

<u>Mineral</u>	<u>Significance</u>	<u>Transit-Survival Distance</u>
Picro Ilmenite	Diagnostic	Tens of km
Pyrope Garnet	Diagnostic	Tens of km
Chrome Diopside	Diagnostic	A few km
Kimberlitic Chromite	Diagnostic	A few km
Kimberlitic Zircon	Diagnostic	A few km
Olivine	Depends on country rocks	
Corundum	Depends on country rocks	
Perovskite	Depends on country rocks	
Apatite	Depends on country rocks	

In the present E.L. area the common occurrence of doleritic and basaltic rocks, and of low grade metamorphics in the Proterozoic basements results in a profusion of species in the stream sediments similar to many of those in the above list. In addition, the widespread scattering by glacier-ice transport of many different rock types has tended to homogenise the mineral assemblages of most stream sediments.

Thus almost all samples include doleritic-basaltic diopside, augite, enstatite and olivine, ilmenite, black spinels - some chromitic, magnetite and zircon. Also very common are garnets of all colours (except green) mainly of metamorphic origin but possible also igneous from unmapped porphyries or minor granite bodies. Several other minerals in the stream sediments resemble indicators under the binocular microscope, for example clasts of dark tourmaline from Proterozoic schist may often resemble perovskite, fragments of anatase resemble corundum, and dark-green epidote resemble chrome diopside.

In view of this profusion of distractors, the present search is concentrated mainly on garnet and diopside, and where other possible indicators (e.g. perovskite) may be present (but noted in the tables as tourmaline) the sample is designated for further tests and Electron Microprobe Analysis (E.P.M.A.)

#### WORK PERFORMED DURING THE YEAR

The only work performed during the past year was the microprobe analyses of seventeen samples of possible kimberlitic garnets and pyroxenes. These were selected by binocular scanning and various tests from 102 samples of stream sediment concentrates. Raw sieved bulk sediment samples from the same localities as the concentrates have also been obtained but have not yet been assayed.

Results of the seventeen microprobe assays are included herewith as Amdel Report G6170/85 - Part II - Final. In spite of rigorous selection of appropriate mineral grains, the results are disappointingly negative and in only one sample (No. L024) is the garnet significantly pyropic. The composition is not definitely kimberlitic, does not exclude that possibility, but also lies within the range of granulitic-metamorphic garnet. No significantly chromiferous diopside was revealed by assays, in spite of the fact that many submitted grains had the appropriate optics and the distinctly apple-green colour. Again the diopsides do not exclude possible kimberlitic origins, but are not sufficiently indicative to warrant follow-up at specific locations.

#### CONCLUSIONS ON RESULTS TO DATE

- (1) Definite kimberlitic minerals have not yet been discovered, nor have clastic diamonds.
- (2) The two indicator mineral species most intensively studied, that is garnet and diopside, appear in seventeen samples

analysed by microprobe to have compositions which lie within the range of mafic igneous and granulitic metamorphic types, and are not sufficiently distinctive to provide a basis for follow-up work. This does not exclude the possibility that they are kimberlitic, but makes it extremely unlikely on the present information.

- (3) In spite of largely negative results so far, the original exploration concept still stands, and further work is warranted to complete the stream sediment survey of the middle reaches of the Dove River and tributaries, and to assay sediment concentrates for kimberlitic indicators. This coverage had been prevented by floods during the general stream sediment survey of December 1983, and is proposed for the next field season, as and when conditions permit.
- (4) During the course of work on the field-concentrated sediment samples, many of the final fractions from the heavy liquid stage proved to be very small (2-5 gm) because of various sample factors. These small samples are now suspected to be statistically unrepresentative, and in order to check this, it is proposed that a selection of raw bulk sediment samples be assayed by a contract laboratory, involving a full scan of all possible species.

#### PROPOSED FUTURE WORK

- (1) Completion of the stream sediment survey coverage in the middle reaches and tributaries of the Dove River is proposed for the next field season as and when river conditions permit access. Follow-up laboratory scanning, tests, and microprobe analyses will be carried out on sample concentrates.
- (2) A small number of raw bulk sieved sediment samples will be assayed in full by a contract diamond search laboratory to check the possibility that some of the samples used during the work to date may have been too small to be statistically representative.



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14 February 1985

GS 3/0/0

Belwood Pty Limited  
753 Kingsway  
GYMEA NSW 2227

Attention: Dr B.L. Wood

REPORT G 6170/85 - PART II - FINAL

YOUR REFERENCE: Letter dated 8 November 1984

IDENTIFICATION: 002-403, L006-L102 (not inclusive)

MATERIAL: 153 sand grains from 28 locations

DATE RECEIVED: 15 November 1984

WORK REQUIRED: Analysis for kimberlite indicator minerals

Investigation and Report by: Michael Till

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ANALYSIS OF SAND GRAINS FOR KIMBERLITE INDICATOR MINERALS

1. INTRODUCTION

Sand grain samples from thirty two localities were received from Dr B.L. Wood on behalf of Base Resources Limited, Sydney with a request for brief microscopic examination and microprobe analyses of suspected kimberlite indicator minerals.

2. PROCEDURE

The samples were examined microscopically in loose grain mounts, the diopside grains in an oil of refractive index of 1.66 and the garnet grains in an oil of refractive index 1.77. The diopside grains with a refractive index of not less than 1.66 and with inclined extinction or indeterminable extinction were mounted in a polished section and analysed by an electron probe microanalyser. The garnet grains with a refractive index of not greater than 1.77 were also mounted in a polished section and analysed by an electron probe microanalyser.

Several vials with clear plastic tops were loose upon receipt of the sample container. A summary of the grains received, examined and probed is as follows:

Sample	Grains Received/Examined	Grains Submitted for Mounting in Polished Section	Grains Probed
	Diopside:Garnet	Diopside:Garnet	Diopside:Garnet
002	5:4	4:4	3:3
100	2:6	0:3	0:3
124	4:2	2:2	2:1
159	2:1	2:0	2:0
160	2:1	2:0	2:0
167	3:1	3:1	3:1
195	16:3	15:3	15:1
201	2:5	2:4	2:4
207	1:4	1:0	1:0
368	6:9	2:6	2:5
369	3:3	2:2	2:2
387	1:2	1:1	1:1
396	1:2	1:2	1:2
398	2:5	1:2	1:2
403	1:3	1:3	1:3
L006	0:4	0:0	0:0
L008	0:6	0:0	0:0
L009	0:2	0:0	0:0

BORADA

LEWISTHINE

Sample	Grains Received/Examined	Grains Submitted for Mounting in Polished Section	Grains Probed
	Diopside:Garnet	Diopside:Garnet	Diopside:Garnet
L024	6:8	6:7	6:6
L028	2:0	2:0	2:0
L032	1:5	0:0	0:0
L039	1:1	1:0	1:0
L048	3:3	3:0	2:0
L065	3:0	1:0	1:0
L087	2:2	1:0	1:0
L091	1:1	1:0	1:0
L099	0:0	0:0	0:0
L102	0:0	0:0	0:0

The following elements/oxides were analysed. Their detection limits are as follows:

Element/Oxide	Detection Limit (Wt %)
Al <sub>2</sub> O <sub>3</sub>	0.06
CaO	0.07
Cl	0.04
Cr <sub>2</sub> O <sub>3</sub>	0.13
FeO	0.15
K <sub>2</sub> O	0.05
MgO	0.05
MnO	0.13
Na <sub>2</sub> O	0.05
NiO	0.22
P <sub>2</sub> O <sub>5</sub>	0.07
SO <sub>3</sub>	0.10
TiO <sub>2</sub>	0.11
SiO <sub>2</sub>	0.06
V <sub>2</sub> O <sub>3</sub>	0.14

## 3. RESULTS

The results of the microscopic examination of the submitted grains are as follows:

Sample	Inferred Mineral	No. of Grains	Refractive Index	Extinction Angle	Submitted for EPMA
002	Diopside	1	<1.66	0°	x
		2	>1.66	22°, 27°	✓
		2	>1.66	n.d.	✓
		Garnet	4	<1.77	-
100	Diopside	2	<1.66	n.d.	x
	Garnet	1	>1.77	-	x
		3	<1.77	-	✓
124	Diopside	2	>1.66	0°	x
		1	>1.66	n.d.	✓
		1	n.d.*	n.d.	✓
159	Garnet	2	<1.77	-	✓
	Diopside	1	>1.66	33°	✓
		1	>1.66	n.d.	✓
160	Garnet	1	>1.77	-	x
	Diopside	1	>1.66	n.d.	✓
		1	n.d.*	n.d.	✓
167	Garnet	1	>1.77	-	x
	Diopside	2	>1.66	30°, 45°	✓
		1	>1.66	n.d.	✓
195	Garnet	1	1.77	-	✓
	Diopside	7	>1.66	12-35°	✓
		8	>1.66	n.d.	✓
		1	>1.66	n.d.	x
	Garnet	3	<1.77	-	✓
201	Diopside	1	>1.66	40°	✓
		1	>1.66	n.d.	✓
	Garnet	1	>1.77	-	x
		4	n.d.*	-	✓
207	Diopside	1	>1.66	n.d.	✓
		3	>1.77	-	x
		1	>1.77	-	x

\*Grains too large to determine refractive index.

Sample	Inferred Mineral	No. of Grains	Refractive Index	Extinction Angle	Submitted for EPMA
368	Diopside	3	<1.66	0°, 35°, n.d.	x (one grain is tourmaline)
		1	>1.66	0°	x
		2	>1.66	40°	✓
	Garnet	3	>1.77	-	x
		6	<1.77	-	✓
369	Diopside	2	>1.66	33°, n.d.	✓
		1	<1.66	n.d.	x
	Garnet	2	1.77	-	✓
		1	>1.77	-	x
387	Diopside	1	n.d.	42°	✓
	Garnet	1	<1.77	-	✓
		1	>1.77	-	x
396	Diopside	1	>1.66	25°	✓
	Garnet	2	<1.77	-	✓
398	Diopside	1	>1.60	0°	x
		1	n.d.	n.d.	✓
	Garnet	3	>1.77	-	x
		2	<1.77	-	✓
403	Diopside	1	>1.66	45°	✓
	Garnet	3	<1.77	-	✓
L006	Garnet	4	>1.77	-	x
L008	Garnet	6	>1.77	-	x
L009	Garnet	2	>1.77	-	x
L024	Diopside	5	>1.66	n.d.	✓
		1	>1.66	11°	✓
	Garnet	7	<1.77	-	✓
		1	>1.77	-	x
L028	Diopside	2	>1.66	38°, 40°	✓
L032	Diopside	1	<1.66	0°	x
	Garnet	5	>1.77	-	x
L039	Diopside	1	>1.66	44°	✓
	Garnet	1	>1.77	-	x
L048	Diopside	2	>1.66	n.d.	✓
		1	>1.66	30°	✓
	Garnet	3	>1.77	-	x
L065	Diopside	2	<1.66	n.d.	x (one is tourmaline)
		1	>1.66	n.d.	✓
L087	Diopside	1	>1.66	40°	✓
		1	1.66	0°	x
		2	>1.77	-	x

Sample	Inferred Mineral	No. of Grains	Refractive Index	Extinction Angle	Submitted for EPMA
L091	Diopside	1	>1.66	10°	✓
	Garnet	1	>1.77	-	x

The results of the electron probe microanalyses are as follows (note that FeO refers to total Fe as FeO).

Sample 002: PS33683

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.5	1.93	50.3	1.88
TiO <sub>2</sub>	0.6	0.02	0.7	0.02
Al <sub>2</sub> O <sub>3</sub>	2.3	0.10	4.4	0.19
Cr <sub>2</sub> O <sub>3</sub>	0.3	0.01	1.2	0.03
FeO	8.3	0.26	6.4	0.19
MgO	15.3	0.85	15.5	0.87
CaO	20.1	0.81	19.7	0.79
Na <sub>2</sub> O	0.4	0.03	0.3	0.02
Total	98.8		98.5	

	Diopside 3		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO <sub>2</sub>	50.5	1.90	38.7	5.95
TiO <sub>2</sub>	0.6	0.02	-	-
Al <sub>2</sub> O <sub>3</sub>	3.8	0.17	22.0	3.99
Cr <sub>2</sub> O <sub>3</sub>	0.9	0.03	-	-
FeO	6.4	0.20	23.0	2.96
MnO	0.2	0.01	3.0	0.39
MgO	15.8	0.88	7.2	1.65
CaO	19.6	0.79	6.7	1.10
Na <sub>2</sub> O	0.2	0.02	-	-
Total	98.0		100.6	

- = not detected at limit quoted above.

Sample 002: (Continued)

	<u>Garnet 2</u>		<u>Garnet 3</u>	
	<u>Wt %</u>	<u>Cations (O=20)</u>	<u>Wt %</u>	<u>Cations (O=24)</u>
SiO <sub>2</sub>	38.3	6.01	38.3	5.96
Al <sub>2</sub> O <sub>3</sub>	21.5	3.98	22.0	4.03
FeO	27.9	3.66	31.4	4.09
MnO	1.0	0.13	0.7	0.09
MgO	7.6	1.78	6.8	1.59
CaO	<u>2.7</u>	0.45	<u>1.6</u>	0.27
Total	99.0		100.8	

Sample 100: PS33684

	<u>Garnet 1</u>		<u>Garnet 2</u>	
	<u>Wt %</u>	<u>Cations (O=24)</u>	<u>Wt %</u>	<u>Cations (O=24)</u>
SiO <sub>2</sub>	38.5	6.00	39.1	5.91
Al <sub>2</sub> O <sub>3</sub>	21.4	3.93	22.1	3.98
FeO	26.4	3.44	24.3	3.10
MnO	0.5	0.06	0.7	0.08
MgO	6.6	1.53	8.4	1.91
CaO	<u>6.1</u>	1.02	<u>6.1</u>	1.00
Total	99.5		100.7	

	<u>Garnet 3</u>	
	<u>Wt %</u>	<u>Cations (O=24)</u>
SiO <sub>2</sub>	38.7	5.98
Al <sub>2</sub> O <sub>3</sub>	22.1	4.02
FeO	31.9	4.12
MnO	0.9	0.12
MgO	6.9	1.59
CaO	<u>1.1</u>	0.18
Total	101.6	

- = not detected at limit quoted above.

Sample 124: PS33685

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.7	1.91	51.6	1.92
TiO <sub>2</sub>	0.6	0.02	0.5	0.01
Al <sub>2</sub> O <sub>3</sub>	3.3	0.15	2.7	0.12
Cr <sub>2</sub> O <sub>3</sub>	0.9	0.03	0.9	0.03
FeO	7.4	0.23	6.9	0.21
MgO	16.6	0.92	16.7	0.92
CaO	<u>18.6</u>	0.74	<u>19.3</u>	0.77
Total	99.1		98.6	

Garnet 1		
	Wt %	Cations (O=24)
SiO <sub>2</sub>	39.0	5.98
Al <sub>2</sub> O <sub>3</sub>	21.9	3.96
FeO	24.2	3.10
MnO	0.5	0.06
MgO	8.3	1.90
CaO	<u>6.2</u>	1.03
Total	100.1	

Sample 159: PS33686

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	50.3	1.84	52.6	1.90
TiO <sub>2</sub>	0.4	0.01	0.3	0.01
Al <sub>2</sub> O <sub>3</sub>	8.8	0.38	6.3	0.27
Cr <sub>2</sub> O <sub>3</sub>	0.2	0.01	0.6	0.02
FeO	7.4	0.23	2.8	0.08
MgO	16.6	0.91	15.4	0.83
CaO	13.8	0.54	20.5	0.79
Na <sub>2</sub> O	<u>1.4</u>	0.10	<u>1.3</u>	0.09
Total	98.9		99.8	

- = not detected at limit quote above.

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Sample 160: PS33687

	Diopside 1 (Orthopyroxene)		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	55.3	1.90	51.4	1.92
TiO <sub>2</sub>	-	-	0.6	0.02
Al <sub>2</sub> O <sub>3</sub>	4.8	0.20	2.8	0.12
Cr <sub>2</sub> O <sub>3</sub>	0.3	0.09	0.4	0.01
FeO	6.5	0.19	7.5	0.23
MgO	32.6	1.67	16.8	0.93
CaO	<u>0.6</u>	0.02	<u>18.6</u>	0.75
Total	100.1		98.1	

Sample 167: PS33688

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	48.6	1.85	50.7	1.92
TiO <sub>2</sub>	1.3	0.04	0.5	0.01
Al <sub>2</sub> O <sub>3</sub>	5.2	0.23	2.9	0.13
Cr <sub>2</sub> O <sub>3</sub>	0.3	0.01	0.6	0.02
FeO	8.2	0.26	7.3	0.23
MgO	13.6	0.77	16.1	0.91
CaO	<u>20.2</u>	0.82	<u>19.3</u>	0.78
Total	97.4		97.4	

	Diopside 3		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO <sub>2</sub>	50.7	1.90	37.4	5.93
TiO <sub>2</sub>	0.8	0.02	-	-
Al <sub>2</sub> O <sub>3</sub>	3.4	0.15	21.5	4.02
Cr <sub>2</sub> O <sub>3</sub>	0.7	0.02	-	-
FeO	7.5	0.23	32.2	4.27
MnO	-	-	1.5	0.20
MgO	15.9	0.88	4.9	1.16
CaO	<u>19.5</u>	0.78	<u>2.6</u>	0.43
Total	98.5		100.1	

- = not detected at limit quoted above.

Sample 195: PS33689

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.3	1.92	51.2	1.91
TiO <sub>2</sub>	0.5	0.01	0.6	0.02
Al <sub>2</sub> O <sub>3</sub>	3.1	0.14	3.2	0.14
Cr <sub>2</sub> O <sub>3</sub>	0.8	0.02	1.1	0.03
FeO	7.1	0.22	6.9	0.21
MgO	16.5	0.92	16.0	0.89
CaO	<u>18.8</u>	0.75	<u>19.1</u>	0.76
Total	98.1		98.1	
	Diopside 3		Diopside 4	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	50.7	1.91	50.2	1.89
TiO <sub>2</sub>	0.7	0.02	0.6	0.02
Al <sub>2</sub> O <sub>3</sub>	3.4	0.15	3.9	0.17
Cr <sub>2</sub> O <sub>3</sub>	0.9	0.03	1.0	0.03
FeO	6.9	0.22	7.0	0.22
MgO	15.9	0.89	15.5	0.87
CaO	<u>19.3</u>	0.78	<u>19.2</u>	0.78
Total	97.8		97.4	
	Diopside 5		Diopside 6	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.1	1.90	51.5	1.90
TiO <sub>2</sub>	0.7	0.02	0.7	0.02
Al <sub>2</sub> O <sub>3</sub>	3.5	0.15	3.4	0.15
Cr <sub>2</sub> O <sub>3</sub>	1.1	0.03	1.0	0.03
FeO	6.8	0.21	7.1	0.22
MgO	15.8	0.87	16.0	0.88
CaO	<u>20.2</u>	0.80	<u>20.0</u>	0.79
Total	99.2		99.7	
	Diopside 7 (orthopyroxene)		Diopside 8	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	54.9	1.98	52.7	1.95
TiO <sub>2</sub>	-	-	0.4	0.01
Al <sub>2</sub> O <sub>3</sub>	1.2	0.05	2.3	0.10
Cr <sub>2</sub> O <sub>3</sub>	0.2	0.01	0.5	0.02
FeO	14.3	0.43	7.1	0.22
MgO	26.6	1.43	17.5	0.97
CaO	<u>2.2</u>	0.09	<u>18.0</u>	0.71
Total	99.4		98.5	

## Sample 195: (Continued)

	Diopside 9		Diopside 10	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.7	1.92	51.5	1.91
TiO <sub>2</sub>	0.4	0.01	0.7	0.02
Al <sub>2</sub> O <sub>3</sub>	2.9	0.12	3.4	0.15
Cr <sub>2</sub> O <sub>3</sub>	0.7	0.02	1.1	0.03
FeO	7.1	0.21	7.0	0.22
MgO	17.1	0.94	16.0	0.88
CaO	<u>18.6</u>	0.74	<u>19.6</u>	0.78
Total	98.5		99.3	

	Diopside 11		Diopside 12	
	Wt %	Cations (O=6)	Wt %	Cations(O=6)
SiO <sub>2</sub>	52.2	1.93	50.6	1.89
TiO <sub>2</sub>	0.4	0.01	0.7	0.02
Al <sub>2</sub> O <sub>3</sub>	2.1	0.09	3.8	0.17
Cr <sub>2</sub> O <sub>3</sub>	0.6	0.02	0.9	0.03
FeO	7.4	0.23	7.4	0.23
MgO	17.6	0.97	16.2	0.90
CaO	<u>18.6</u>	0.74	<u>18.3</u>	0.73
Total	98.9		97.9	

	Diopside 13		Diopside 14	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.7	1.93	51.6	1.93
TiO <sub>2</sub>	0.4	0.01	0.5	0.01
Al <sub>2</sub> O <sub>3</sub>	2.5	0.11	2.6	0.11
Cr <sub>2</sub> O <sub>3</sub>	0.9	0.03	0.8	0.02
FeO	6.7	0.21	6.9	0.21
MgO	17.0	0.95	16.6	0.92
CaO	<u>18.7</u>	0.75	<u>18.9</u>	0.76
Total	97.9		97.9	

- = not detected at limit quoted above.

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Sample 195: (Continued)

	Diopside 15		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO <sub>2</sub>	51.0	1.89	38.0	5.99
TiO <sub>2</sub>	0.9	0.02	-	-
Al <sub>2</sub> O <sub>3</sub>	4.2	0.18	21.8	4.05
Cr <sub>2</sub> O <sub>3</sub>	0.9	0.03	-	-
FeO	7.0	0.22	30.6	4.02
MnO	-	-	1.5	0.21
MgO	15.6	0.86	5.8	1.35
CaO	18.9	0.77	2.2	0.37
Total	98.5		99.9	

## Sample 201: PS33690

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	49.6	1.87	49.5	1.87
TiO <sub>2</sub>	0.8	0.02	0.7	0.02
Al <sub>2</sub> O <sub>3</sub>	4.8	0.21	4.9	0.22
Cr <sub>2</sub> O <sub>3</sub>	0.8	0.02	0.8	0.02
FeO	7.0	0.22	6.8	0.21
MgO	14.9	0.83	15.1	0.85
CaO	20.0	0.81	19.5	0.79
Total	97.9		97.3	

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	37.2	6.00	36.9	5.93
Al <sub>2</sub> O <sub>3</sub>	20.9	3.98	21.2	4.02
FeO	22.5	3.03	26.6	3.58
MnO	15.0	2.05	13.0	1.76
MgO	0.6	0.15	0.8	0.18
CaO	4.5	0.78	2.8	0.48
Total	100.7		101.3	

- = not detected at limit quoted above.

Sample 201: (Continued)

	Garnet 3		Garnet 4	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	36.8	5.86	41.6	6.56
Al <sub>2</sub> O <sub>3</sub>	21.7	4.06	19.0	3.54
FeO	25.4	3.39	24.9	3.29
MnO	14.9	2.01	14.5	1.94
MgO	1.0	0.23	1.0	0.24
CaO	2.2	0.37	0.5	0.08
Total	102.0		101.5	

Sample 207: PS33691

	Diopside 1	
	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.7	1.91
TiO <sub>2</sub>	0.3	0.01
Al <sub>2</sub> O <sub>3</sub>	5.8	0.25
Cr <sub>2</sub> O <sub>3</sub>	0.7	0.02
FeO	2.5	0.08
MgO	15.0	0.83
CaO	20.4	0.81
Na <sub>2</sub> O	1.4	0.10
Total	97.8	

Sample 368: PS33692

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.3	1.97	51.7	1.96
TiO <sub>2</sub>	0.3	0.01	0.2	0.01
Al <sub>2</sub> O <sub>3</sub>	1.4	0.06	1.4	0.06
Cr <sub>2</sub> O <sub>3</sub>	-	-	-	-
FeO	13.3	0.43	12.3	0.39
MgO	14.3	0.82	15.1	0.86
CaO	17.0	0.70	17.4	0.71
Total	97.6		98.1	

- = not detected at limit quoted above.

## Sample 368: (Continued)

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	38.6	5.97	38.2	5.95
Al <sub>2</sub> O <sub>3</sub>	21.3	3.88	21.6	3.96
FeO	25.7	3.33	29.5	3.84
MnO	1.4	0.18	1.0	0.13
MgO	7.5	1.74	5.8	1.34
CaO	<u>6.0</u>	0.99	<u>4.7</u>	0.78
Total	100.5		100.8	

	Garnet 3		Garnet 4	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	38.4	5.97	38.7	5.95
Al <sub>2</sub> O <sub>3</sub>	21.8	3.99	22.3	4.05
FeO	28.0	3.64	29.4	3.78
MnO	0.8	0.10	0.3	0.04
MgO	5.7	1.32	8.6	1.98
CaO	<u>6.1</u>	1.01	<u>1.3</u>	0.22
Total	100.8		100.6	

	Garnet 5	
	Wt %	Cations (O=24)
SiO <sub>2</sub>	37.7	5.96
Al <sub>2</sub> O <sub>3</sub>	21.6	4.03
FeO	33.1	4.37
MnO	1.8	0.23
MgO	5.3	1.24
CaO	<u>1.2</u>	0.20
Total	100.7	

## Sample 369: PS33693

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.7	1.98	51.6	1.97
TiO <sub>2</sub>	-	-	0.1	0.01
Al <sub>2</sub> O <sub>3</sub>	0.8	0.04	1.1	0.05
Cr <sub>2</sub> O <sub>3</sub>	-	-	-	-
V <sub>2</sub> O <sub>3</sub>	-	-	0.2	0.01
FeO	21.7	0.69	13.6	0.43
MnO	0.4	0.01	0.3	0.01
MgO	18.0	1.03	14.2	0.81
CaO	<u>5.9</u>	0.24	<u>17.3</u>	0.71
Total	98.5		98.4	

Sample 369: (Continued)

	<u>Garnet 1</u>		<u>Garnet 2</u>	
	<u>Wt %</u>	<u>Cations (O=24)</u>	<u>Wt %</u>	<u>Cations (O=24)</u>
SiO <sub>2</sub>	38.5	5.92	39.2	5.95
Al <sub>2</sub> O <sub>3</sub>	22.4	4.05	22.2	3.97
FeO	29.0	3.73	26.8	3.40
MnO	0.4	0.05	1.3	0.16
MgO	9.6	2.20	9.7	2.20
CaO	<u>0.8</u>	0.12	<u>2.3</u>	0.38
Total	100.7		101.5	

Sample 387: PS33694

	<u>Diopside 1</u>		<u>Garnet 1</u>	
	<u>Wt %</u>	<u>Cations (O=6)</u>	<u>Wt %</u>	<u>Cations (O=24)</u>
SiO <sub>2</sub>	47.7	1.81	39.7	6.00
TiO <sub>2</sub>	1.7	0.05	-	-
Al <sub>2</sub> O <sub>3</sub>	6.4	0.28	21.9	3.91
Cr <sub>2</sub> O <sub>3</sub>	0.5	0.01	-	-
FeO	7.2	0.23	19.3	2.44
MnO	-	-	0.2	0.03
MgO	13.5	0.76	8.4	1.88
CaO	<u>20.5</u>	0.83	<u>11.1</u>	1.79
Total	97.5		100.6	

Sample 396: PS33695

	<u>Diopside 1</u>	
	<u>Wt %</u>	<u>Cations (O=6)</u>
SiO <sub>2</sub>	51.5	1.94
Al <sub>2</sub> O <sub>3</sub>	2.1	0.09
Cr <sub>2</sub> O <sub>3</sub>	0.2	0.01
FeO	7.3	0.23
MgO	16.5	0.93
CaO	<u>19.6</u>	0.79
Total	97.2	

- = not detected at limit quoted above.

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## Sample 396: (Continued)

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	38.6	5.92	39.7	5.98
Al <sub>2</sub> O <sub>3</sub>	22.3	4.03	22.5	3.99
FeO	30.6	3.92	18.7	0.03
MnO	0.2	0.02	0.4	2.36
MgO	9.0	2.04	12.2	0.05
CaO	<u>0.7</u>	0.12	<u>5.5</u>	2.72
Total	101.4		99.0	

## Sample 398: PS33696

	Diopside 1			
	Wt %	Cations (O=6)		
SiO <sub>2</sub>	50.5	1.88		
TiO <sub>2</sub>	1.2	0.03		
Al <sub>2</sub> O <sub>3</sub>	4.1	0.18		
Cr <sub>2</sub> O <sub>3</sub>	0.3	0.01		
FeO	7.2	0.22		
MgO	14.9	0.83		
CaO	<u>20.5</u>	0.82		
Total	98.7			

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	39.0	6.07	38.9	5.95
Al <sub>2</sub> O <sub>3</sub>	19.5	3.57	22.0	3.97
FeO	6.2	0.81	25.2	3.23
MnO	1.0	0.14	0.5	0.07
MgO	-	-	8.5	1.93
CaO	<u>33.3</u>	0.55	<u>5.6</u>	0.02
Total	99.0		100.7	

- = not detected at limit quoted above.

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Sample 403: PS33697

	Diopside 1		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO <sub>2</sub>	50.9	1.91	38.1	5.99
TiO <sub>2</sub>	0.4	0.01	0.2	0.01
Al <sub>2</sub> O <sub>3</sub>	3.4	0.15	21.1	3.90
Cr <sub>2</sub> O <sub>3</sub>	1.0	0.03	-	-
FeO	6.4	0.20	28.2	3.70
MnO	-	-	1.1	0.15
MgO	17.0	0.95	5.1	1.19
CaO	18.3	0.74	6.5	1.09
Total	97.4		100.3	

	Garnet 2		Garnet 3	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	38.2	5.99	38.5	6.00
Al <sub>2</sub> O <sub>3</sub>	21.3	3.94	21.4	3.94
FeO	29.3	3.83	27.5	3.59
MnO	1.1	0.14	1.0	0.13
MgO	5.1	1.20	5.5	1.29
CaO	5.6	0.94	6.5	1.08
Total	100.6		100.4	

Sample L024: PS33701

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	51.8	1.96	52.6	1.96
TiO <sub>2</sub>	0.4	0.01	0.4	0.01
Al <sub>2</sub> O <sub>3</sub>	1.5	0.07	2.0	0.09
Cr <sub>2</sub> O <sub>3</sub>	0.4	0.01	0.7	0.02
FeO	8.7	0.28	8.4	0.26
MgO	17.0	0.96	17.4	0.97
CaO	16.9	0.69	16.8	0.67
Total	96.7		98.3	

- = not detected at limit quoted above.

## Sample L024: (Continued)

	Diopside 3		Diopside 4	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	52.0	1.94	51.7	1.94
TiO <sub>2</sub>	0.6	0.02	0.5	0.01
Al <sub>2</sub> O <sub>3</sub>	2.0	0.09	2.2	0.10
Cr <sub>2</sub> O <sub>3</sub>	0.9	0.03	0.7	0.02
FeO	8.3	0.26	8.3	0.26
MgO	16.9	0.94	16.7	0.94
CaO	17.3	0.69	17.9	0.72
Total			98.0	
	Diopside 5		Diopside 6	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO <sub>2</sub>	49.8	1.89	50.5	1.91
TiO <sub>2</sub>	0.7	0.02	0.8	0.02
Al <sub>2</sub> O <sub>3</sub>	3.4	0.15	3.8	0.17
Cr <sub>2</sub> O <sub>3</sub>	1.0	0.03	0.4	0.01
FeO	8.0	0.25	8.9	0.28
MgO	14.9	0.84	15.9	0.90
CaO	19.6	0.80	16.4	0.67
Total	97.4		96.7	
	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	39.8	5.95	39.4	5.98
Al <sub>2</sub> O <sub>3</sub>	22.8	4.01	22.2	3.96
Cr <sub>2</sub> O <sub>3</sub>	0.3	0.03	0.2	0.02
FeO	20.6	2.58	26.8	3.40
MnO	0.6	0.08	0.3	0.04
MgO	10.8	2.41	10.8	2.43
CaO	6.0	0.96	1.2	0.19
Total	100.9		100.9	
	Garnet 3		Garnet 4	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	39.4	6.00	38.9	5.95
Al <sub>2</sub> O <sub>3</sub>	22.0	3.94	22.2	4.01
FeO	23.6	3.00	25.7	3.29
MnO	0.3	0.04	1.3	0.17
MgO	9.1	2.07	6.9	1.56
CaO	5.9	0.97	6.0	0.99
Total	100.3		101.0	

- = not detected at limit quoted above.

Sample L024: (Continued)

	<u>Garnet 5</u>		<u>Garnet 6</u>	
	<u>Wt %</u>	<u>Cations (O=24)</u>	<u>Wt %</u>	<u>Cations (O=24)</u>
SiO <sub>2</sub>	38.9	5.94	38.5	5.97
Al <sub>2</sub> O <sub>3</sub>	22.3	4.02	21.9	4.00
FeO	28.5	3.64	28.7	3.72
MnO	0.6	0.08	0.9	0.12
MgO	8.6	1.95	6.6	1.51
CaO	<u>2.1</u>	0.34	<u>4.0</u>	0.67
Total	101.0		100.6	

Sample L028: PS33702

	<u>Diopside 1</u>		<u>Diopside 2</u>	
	<u>Wt %</u>	<u>Cations (O=6)</u>	<u>Wt %</u>	<u>Cations (O=6)</u>
SiO <sub>2</sub>	52.2	1.95	51.7	1.94
TiO <sub>2</sub>	0.6	0.02	0.4	0.01
Al <sub>2</sub> O <sub>3</sub>	2.2	0.97	2.4	0.11
Cr <sub>2</sub> O <sub>3</sub>	0.6	0.02	0.8	0.02
FeO	6.5	0.20	6.2	0.19
MgO	16.4	0.91	16.2	0.90
CaO	<u>19.6</u>	0.78	<u>19.7</u>	0.79
Total	98.1		97.4	

Sample L039: PS33703

	<u>Diopside 1</u>	
	<u>Wt %</u>	<u>Cations (O=6)</u>
SiO <sub>2</sub>	54.4	1.99
Al <sub>2</sub> O <sub>3</sub>	1.6	0.07
Cr <sub>2</sub> O <sub>3</sub>	1.1	0.03
FeO	2.4	0.07
MgO	16.1	0.88
CaO	22.3	0.87
Na <sub>2</sub> O	<u>0.9</u>	0.06
Total	98.8	

- = not detected at limit quoted above.

Sample L048: PS33704

	<u>Diopside 1</u>		<u>Diopside 2</u>	
	<u>Wt %</u>	<u>Cations (O=6)</u>	<u>Wt %</u>	<u>Cations (O=6)</u>
SiO <sub>2</sub>	52.4	1.94	51.7	1.91
TiO <sub>2</sub>	0.7	0.02	0.7	0.02
Al <sub>2</sub> O <sub>3</sub>	2.3	0.10	3.3	0.14
Cr <sub>2</sub> O <sub>3</sub>	0.4	0.01	1.1	0.03
FeO	7.4	0.23	6.9	0.21
MgO	17.3	0.95	15.8	0.87
CaO	18.5	0.73	20.0	0.79
Na <sub>2</sub> O	0.2	0.02	0.3	0.02
Total	99.2		99.8	

Sample L065: PS33705

	<u>Diopside 1</u>	<u>(?High Fe Chlorite)</u>
	<u>Wt %</u>	
SiO <sub>2</sub>	22.1	
Al <sub>2</sub> O <sub>3</sub>	23.2	
FeO	32.2	
MnO	0.4	
MgO	8.5	
Total	86.4	

Sample L087: PS33706

	<u>Diopside 1</u>	
	<u>Wt %</u>	<u>Cations (O=6)</u>
SiO <sub>2</sub>	51.9	1.89
TiO <sub>2</sub>	0.3	0.01
Al <sub>2</sub> O <sub>3</sub>	7.0	0.30
Cr <sub>2</sub> O <sub>3</sub>	0.9	0.03
FeO	2.5	0.08
MgO	14.6	0.79
CaO	20.2	0.79
Na <sub>2</sub> O	1.6	0.11
Total	99.0	

- = not detected at limit quoted above.

Sample L087: (Continued)

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO <sub>2</sub>	37.3	5.93	37.4	5.93
Al <sub>2</sub> O <sub>3</sub>	19.3	3.61	23.3	4.35
FeO	8.9	1.19	12.1	1.60
MnO	27.3	3.68	-	-
MgO	0.6	0.14	0.2	0.04
CaO	<u>9.3</u>	1.58	<u>23.2</u>	3.94
Total	102.7		96.2	

Sample L091: PS33707

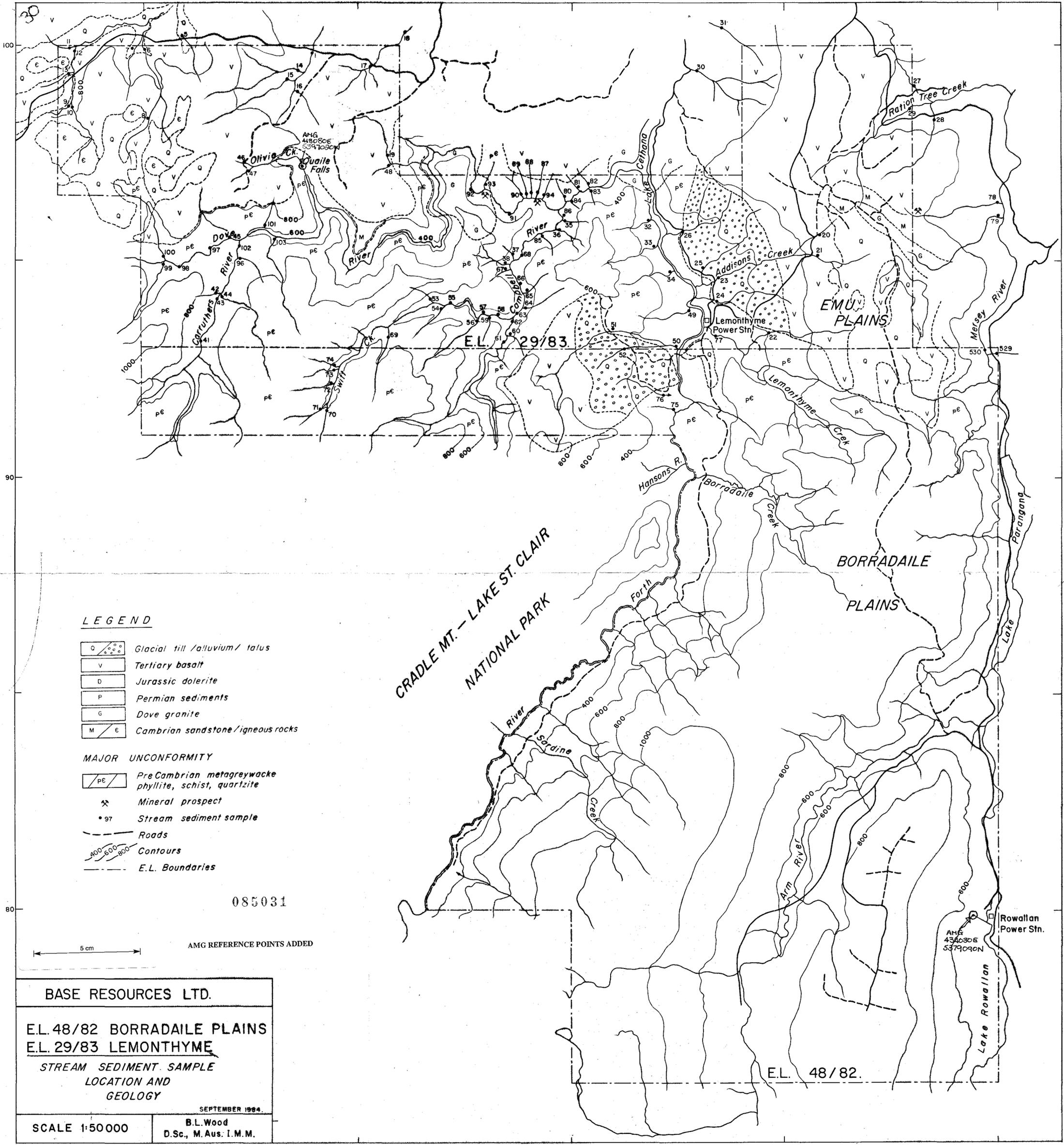
	Diopside 1 (Epidote)
	Wt %
SiO <sub>2</sub>	37.2
Al <sub>2</sub> O <sub>3</sub>	21.6
FeO	13.1
CaO	<u>23.0</u>
Total	<u>94.9</u>

- = not detected at limit quoted above.

## 4. SUMMARY

A summary of the  $\text{Cr}_2\text{O}_3$  contents of the diopsides analysed and the MgO content of the garnets analysed is as follows:

<u>Sample</u>	<u>Diopside</u>	<u>Garnet</u>
	<u><math>\text{Cr}_2\text{O}_3</math> (Wt %)</u>	<u>MgO (Wt %)</u>
002	0.30, 0.86, 1.16	6.84, 7.20, 7.60
100	-	6.59, 6.92, 8.40
124	0.88, 0.94	8.29
159	0.16, 0.61	-
160	0.41	-
167	0.30, 0.55, 0.71	4.89
195	0.54, 0.56, 0.74, 0.76, 0.80, 0.84,	5.77
	0.91, 0.92, 0.94, 0.99, 1.01, 1.05,	
	1.09, 1.14	
201	0.79, 0.83	0.63, 0.66, 0.97, 1.02
207	0.72	-
368	<0.13, <0.13	5.71, 5.79, 7.54, 8.64
369	<0.13, <0.13	9.61, 9.74
387	0.45	8.36
396	0.19	8.95, 12.15
398	0.34	<0.05, 8.47
403	0.99	5.09, 5.13, 5.53
L024	0.43, 0.44, 0.68, 0.70, 0.92, 0.96	6.55, 6.85, 8.57, 9.13,
L028	0.63, 0.82	10.75, 10.83
L039	1.12	-
L048	0.41, 1.05	-
L087	0.91	0.19, 0.58



**LEGEND**

- Q Glacial till / alluvium / talus
- V Tertiary basalt
- D Jurassic dolerite
- P Permian sediments
- G Dove granite
- M / E Cambrian sandstone / igneous rocks

**MAJOR UNCONFORMITY**

- PE Pre-Cambrian metagreywacke phyllite, schist, quartzite
- X Mineral prospect
- 97 Stream sediment sample
- Roads
- 400 600 800 Contours
- E.L. Boundaries

085031

5 cm

AMG REFERENCE POINTS ADDED

<b>BASE RESOURCES LTD.</b>	
<b>E.L. 48/82 BORRADAILE PLAINS</b>	
<b>E.L. 29/83 LEMONTHYME</b>	
<i>STREAM SEDIMENT SAMPLE LOCATION AND GEOLOGY</i>	
<small>SEPTEMBER 1984</small>	
<b>SCALE 1:50 000</b>	<b>B.L. Wood</b> D.Sc., M. Aus. I.M.M.

E.L. 48/82.