BASE RESOURCES LTD.

EXPLORATION LICENCE 48/82

BORRODAILE PLAINS

Technical Report on Year's Work
from 29th August, 1984

(To accompany application for renewal)

Author: B.L. Wood, D.Sc. M.Aus.I.M.M.
Date: 19th September, 1985

AMG REFERENCE POINTS ADDED

INTRODUCTION

E.L. 48/82 Borrodaile Plains was granted to Base Resources Ltd. for one year to remain in force until 29th August, 1984 and was renewed for a second year to 29th August, 1985. The area applied for was approximately 220 sq. km. in extent and corresponded in large part to former E.L. 28/80 held by Shell Company of Australia Ltd., Metals Division. The area granted to Base Resources was reduced by the Department of Mines to 190 sq. km. by excision of an area in the upper Campbell River designated a Proposed National Park Extension.

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 the 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 and 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

No additional field sampling was carried out during the past year and work concentrated on the laboratory aspects. Field methods are as detailed in Technical Report for 1984.

LABORATORY FOLLOWUP 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, 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:-

Mineral	Significance	Transit-Survival Distance
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	

(After Gregory, 1984)

In the present E.L. area the common occurrence of doleritic and basaltic rocks, and of low grade metamorphics in the Proterozoic basement results in a profusion of species in the stream sediments similar to many of those in the above list.

Thus almost all samples include doleritic-basaltic diopside, 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 possibly 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 diposide.

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 E.P.M.A.

Hardness Test

This was carried out on many individual grains in a search for clastic diamond using a tablet of natural corundum. Limpid quartz fragments and zircons were tested frequently and collapsed on being firmly pressed against the test tablet. No diamond has yet been found.

Fluorescence Test

Carried out under the microscope at close range this revealed many zircons with golden fluorescence, but too many to be diagnostic of kimberlite. Fifty-three blue fluorescent grains proved to be diopside, not diamond. These tests are continuing.

REFRACTIVE INDEX AND OTHER TESTS

After visual recognition of possible indicator grains, tests of refractive index in oils are carried out, particularly on garnet and pyroxene grains. This is to check that the sample grains fall within the specific ranges of pyrope and of diopside. Garnets with R.I. 1.67 to 1.78 are retained, as are pyroxenes with R.I. 1.65 to 1.70. Representative grains are then further checked by XRD either by goniometer or by powder camera photography.

At an early stage of the work further checks were made using the Scanning Electron Microscope fitted with an EDAX system, to obtain partial analyses of diagnostic elements in garnet and pyroxene, in particular Mg and Cr respectively. In the later stages this step is being omitted and most reliance is placed on the R.I. determination to screen out inappropriate compositions.

In spite of these lengthy and laborious search and screening procedures, results may still not be definite or certain, and the best that can be expected is that the most appropriate mineral samples have been obtained for the final step, which is Electron Microprobe Analysis (EPMA).

SAMPLE FACTORS

In general the concentrate-samples are highly variable as to quantity, composition and quality, with variations strongly reflecting the general geology of the locality from which each was obtained. Thus the most voluminous concentrates contain mainly the pyroxenes and olivine derived from erosion of dolerite and basalt escarpments, the smallest concentrates contain much limonitic material derived from swampy headwater areas on mainly plateaus of dolerite or basalt or occasionally on schist. In both types of sample the quality is poor because on the one hand any kimberlitic minerals would be diluted by the monotonous profusion of similar but non-indicator species and on the other hand the low energy, high chemical activity of the swampy source areas probably degrades and obscures with limonitic coatings any indicators which may be present.

WORK PERFORMED DURING YEAR

In the first quarter of the year fifteen samples from a total of 250 were finally selected after a lengthy programme of heavy media concentration, scanning and optical testing of individual grains. The fifteen samples were forwarded to Amdel, South Australia for microprobe analysis in early November and results were received in February 1985. A copy of the Amdel Report (G6170/85 Part II - Final) is attached herewith.

Since that time the only activity has been to evaluate the results, to discuss findings with other interested parties with a view to possible joint ventures, and to review the details of the programme and consider the action to be taken in the next stage of the work.

CONCLUSIONS ON RESULTS

(1) Definite kimberlitic indicator minerals have not yet been discovered, nor have clastic diamonds.

(2) The two indicator mineral species most intensively studied, that is garnet and diopside, have in a few samples compositions which lie within the known ranges of kimberlitic indicators, but which also lie within the ranges of mafic igneous rocks.

(3) The profusion in the stream sediments of non-indicator mineral species of the same kind as the indicators being sought, adds considerably to the difficulties of the work and is an unexpected butsignificant impediment.

(4) The analytical results of the Microprobe Analyses of the last fifteen samples are largely negative and in only one sample from Borrodaile Plains (No. 396) are the garnets distinctly pyropic, but they are not accompanied by significantly chromiferous diopside or other indicator species.

(5) Within the E.L. only four samples with pyropic garnet have been found, and they lie at widely separated locations. None are accompanied by significantly chromiferous diopside and although the range of compositions does not preclude the presence of either species being kimberlitic, it does not strongly indicate such an origin for follow-up exploration.

PROPOSALS FOR FUTURE WORK

(1) A small remainder of heavy concentrates will be scanned, as before, but is not expected to provide significant results for the following reasons:-

a) Many of the final concentrates used in the scanning work are in very small amounts (e.g. 2-5 gm), although

concentrated from field-panned concentrates of around 200-400 gm.

b) Many panned concentrates also include such authigenic limonite from swampy stream channels and this obscures the clastic assemblage considerably.

c) Certain samples are dominated by mafic minerals from dolerite and basalt and the sheer volume also obscures the assemblage.

(2) It now seems evident that the small-scale treatment of pan-concentrate samples is inappropriate for the above reasons and that the final concentrates obtained are likely to be either statistically nonrepresentative, or unmanageably bulky.

(3) All samples collected from the E.L. included corresponding raw bulk-sieved portions of 8-10 kg with a view to eventually assaying selected bulk samples in a contract laboratory.

It is now proposed that the bulk samples be so assayed on a systematic basis, with an initial batch to include those assemblages already identified as containing possible indicators.

Provided that the concentrates so obtained are found to be statistically representative, work on the remainder is recommended.

(4) Should assays of the initial batch confirm the presence of indicator species, follow-up detailed field sampling is proposed for each location.

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14 February 1985

GS 3/0/0

Belwood Pty Limited
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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

Chief - Geological Services Section: Dr Keith J. Henley

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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 indix 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

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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_2O_3	0.06
CaO	0.07
Cl	0.04
Cr_2O_3	0.13
FeO	0.15
K_2O	0.05
MgO	0.05
MnO	0.13
Na_2O	0.05
NiO	0.22
P_2O_5	0.07
SO_3	0.10
TiO_2	0.11
SiO_2	0.06
V_2O_3	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	tourmaline
		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	(rutile)
	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	(olivine)
	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	iron oxide

*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_2	51.5	1.93	50.3	1.88
TiO_2	0.6	0.02	0.7	0.02
Al_2O_3	2.3	0.10	4.4	0.19
Cr_2O_3	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_2O	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_2	50.5	1.90	38.7	5.95
TiO_2	0.6	0.02	-	-
Al_2O_3	3.8	0.17	22.0	3.99
Cr_2O_3	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_2O	0.2	0.02	-	-
Total	98.0		100.6	

- = not detected at limit quoted above.

Sample 002: (Continued)

	Garnet 2		Garnet 3	
	Wt %	Cations (O=20)	Wt %	Cations (O=24)
SiO_2	38.3	6.01	38.3	5.96
Al_2O_3	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	2.7	0.45	1.6	0.27
Total	99.0		100.8	

Sample 100: PS33684

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO_2	38.5	6.00	39.1	5.91
Al_2O_3	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	6.1	1.02	6.1	1.00
Total	99.5		100.7	

	Garnet 3	
	Wt %	Cations (O=24)
SiO_2	38.7	5.98
Al_2O_3	22.1	4.02
FeO	31.9	4.12
MnO	0.9	0.12
MgO	6.9	1.59
CaO	1.1	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_2	51.7	1.91	51.6	1.92
TiO_2	0.6	0.02	0.5	0.01
Al_2O_3	3.3	0.15	2.7	0.12
Cr_2O_3	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	18.6	0.74	19.3	0.77
Total	99.1		98.6	

	Garnet 1	
	Wt %	Cations (O=24)
SiO_2	39.0	5.98
Al_2O_3	21.9	3.96
FeO	24.2	3.10
MnO	0.5	0.06
MgO	8.3	1.90
CaO	6.2	1.03
Total	100.1	

Sample 159: PS33686

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	50.3	1.84	52.6	1.90
TiO_2	0.4	0.01	0.3	0.01
Al_2O_3	8.8	0.38	6.3	0.27
Cr_2O_3	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_2O	1.4	0.10	1.3	0.09
Total	98.9		99.8	

- = not detected at limit quote above.

Sample 160: PS33687

	Diopside 1 (Orthopyroxene)		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	55.3	1.90	51.4	1.92
TiO_2	-	-	0.6	0.02
Al_2O_3	4.8	0.20	2.8	0.12
Cr_2O_3	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	0.6	0.02	18.6	0.75
Total	100.1		98.1	

Sample 167: PS33688

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	48.6	1.85	50.7	1.92
TiO_2	1.3	0.04	0.5	0.01
Al_2O_3	5.2	0.23	2.9	0.13
Cr_2O_3	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	20.2	0.82	19.3	0.78
Total	97.4		97.4	

	Diopside 3		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO_2	50.7	1.90	37.4	5.93
TiO_2	0.8	0.02	-	-
Al_2O_3	3.4	0.15	21.5	4.02
Cr_2O_3	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	19.5	0.78	2.6	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_2	51.3	1.92	51.2	1.91
TiO_2	0.5	0.01	0.6	0.02
Al_2O_3	3.1	0.14	3.2	0.14
Cr_2O_3	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	18.8	0.75	19.1	0.76
Total	98.1		98.1	

	Diopside 3		Diopside 4	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	50.7	1.91	50.2	1.89
TiO_2	0.7	0.02	0.6	0.02
Al_2O_3	3.4	0.15	3.9	0.17
Cr_2O_3	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	19.3	0.78	19.2	0.78
Total	97.8		97.4	

	Diopside 5		Diopside 6	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	51.1	1.90	51.5	1.90
TiO_2	0.7	0.02	0.7	0.02
Al_2O_3	3.5	0.15	3.4	0.15
Cr_2O_3	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	20.2	0.80	20.0	0.79
Total	99.2		99.7	

	Diopside 7 (orthopyroxene)		Diopside 8	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	54.9	1.98	52.7	1.95
TiO_2	-	-	0.4	0.01
Al_2O_3	1.2	0.05	2.3	0.10
Cr_2O_3	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	2.2	0.09	18.0	0.71
Total	99.4		98.5	

- = not detected at limit quoted above

Sample 195: (Continued)

	Diopside 9		Diopside 10	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	51.7	1.92	51.5	1.91
TiO_2	0.4	0.01	0.7	0.02
Al_2O_3	2.9	0.12	3.4	0.15
Cr_2O_3	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	18.6	0.74	19.6	0.78
Total	98.5		99.3	

	Diopside 11		Diopside 12	
	Wt %	Cations (O=6)	Wt %	Cations(O=6)
SiO_2	52.2	1.93	50.6	1.89
TiO_2	0.4	0.01	0.7	0.02
Al_2O_3	2.1	0.09	3.8	0.17
Cr_2O_3	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	18.6	0.74	18.3	0.73
Total	98.9		97.9	

	Diopside 13		Diopside 14	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	51.7	1.93	51.6	1.93
TiO_2	0.4	0.01	0.5	0.01
Al_2O_3	2.5	0.11	2.6	0.11
Cr_2O_3	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	18.7	0.75	18.9	0.76
Total	97.9		97.9	

- = not detected at limit quoted above.

Sample 195: (Continued)

	Diopside 15		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO_2	51.0	1.89	38.0	5.99
TiO_2	0.9	0.02	-	-
Al_2O_3	4.2	0.18	21.8	4.05
Cr_2O_3	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_2	49.6	1.87	49.5	1.87
TiO_2	0.8	0.02	0.7	0.02
Al_2O_3	4.8	0.21	4.9	0.22
Cr_2O_3	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_2	37.2	6.00	36.9	5.93
Al_2O_3	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_2	36.8	5.86	41.6	6.56
Al_2O_3	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_2	51.7	1.91
TiO_2	0.3	0.01
Al_2O_3	5.8	0.25
Cr_2O_3	0.7	0.02
FeO	2.5	0.08
MgO	15.0	0.83
CaO	20.4	0.81
Na_2O	1.4	0.10
Total	97.8	

Sample 368: PS33692

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	51.3	1.97	51.7	1.96
TiO_2	0.3	0.01	0.2	0.01
Al_2O_3	1.4	0.06	1.4	0.06
Cr_2O_3	-	-	-	-
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_2	38.6	5.97	38.2	5.95
Al_2O_3	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	6.0	0.99	4.7	0.78
Total	100.5		100.8	

	Garnet 3		Garnet 4	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO_2	38.4	5.97	38.7	5.95
Al_2O_3	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	6.1	1.01	1.3	0.22
Total	100.8		100.6	

	Garnet 5	
	Wt %	Cations (O=24)
SiO_2	37.7	5.96
Al_2O_3	21.6	4.03
FeO	33.1	4.37
MnO	1.8	0.23
MgO	5.3	1.24
CaO	1.2	0.20
Total	100.7	

Sample 369: PS33693

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	51.7	1.98	51.6	1.97
TiO_2	-	-	0.1	0.01
Al_2O_3	0.8	0.04	1.1	0.05
Cr_2O_3	-	-	-	-
V_2O_3	-	-	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	5.9	0.24	17.3	0.71
Total	98.5		98.4	

- = not detected at limit quoted above

Sample 369: (Continued)

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO_2	38.5	5.92	39.2	5.95
Al_2O_3	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	0.8	0.12	2.3	0.38
Total	100.7		101.5	

Sample 387: PS33694

	Diopside 1		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO_2	47.7	1.81	39.7	6.00
TiO_2	1.7	0.05	-	-
Al_2O_3	6.4	0.28	21.9	3.91
Cr_2O_3	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	20.5	0.83	11.1	1.79
Total	97.5		100.6	

Sample 396: PS33695

	Diopside 1	
	Wt %	Cations (O=6)
SiO_2	51.5	1.94
Al_2O_3	2.1	0.09
Cr_2O_3	0.2	0.01
FeO	7.3	0.23
MgO	16.5	0.93
CaO	19.6	0.79
Total	97.2	

- = not detected at limit quoted above.

Sample 396: (Continued)

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO_2	38.6	5.92	39.7	5.98
Al_2O_3	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	0.7	0.12	5.5	2.72
Total	101.4		99.0	

Sample 398: PS33696

	Diopside 1	
	Wt %	Cations (O=6)
SiO_2	50.5	1.88
TiO_2	1.2	0.03
Al_2O_3	4.1	0.18
Cr_2O_3	0.3	0.01
FeO	7.2	0.22
MgO	14.9	0.83
CaO	20.5	0.82
Total	98.7	

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO_2	39.0	6.07	38.9	5.95
Al_2O_3	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	33.3	0.55	5.6	0.02
Total	99.0		100.7	

- = not detected at limit quoted above.

Sample 403: PS33697

	Diopside 1		Garnet 1	
	Wt %	Cations (O=6)	Wt %	Cations (O=24)
SiO_2	50.9	1.91	38.1	5.99
TiO_2	0.4	0.01	0.2	0.01
Al_2O_3	3.4	0.15	21.1	3.90
Cr_2O_3	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_2	38.2	5.99	38.5	6.00
Al_2O_3	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 LO24: PS33701

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	51.8	1.96	52.6	1.96
TiO_2	0.4	0.01	0.4	0.01
Al_2O_3	1.5	0.07	2.0	0.09
Cr_2O_3	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.

025

Sample L024: (Continued)

	Diopside 3		Diopside 4	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	52.0	1.94	51.7	1.94
TiO_2	0.6	0.02	0.5	0.01
Al_2O_3	2.0	0.09	2.2	0.10
Cr_2O_3	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_2	49.8	1.89	50.5	1.91
TiO_2	0.7	0.02	0.8	0.02
Al_2O_3	3.4	0.15	3.8	0.17
Cr_2O_3	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_2	39.8	5.95	39.4	5.98
Al_2O_3	22.8	4.01	22.2	3.96
Cr_2O_3	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_2	39.4	6.00	38.9	5.95
Al_2O_3	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)

	Garnet 5		Garnet 6	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO_2	38.9	5.94	38.5	5.97
Al_2O_3	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	2.1	0.34	4.0	0.67
Total	101.0		100.6	

Sample L028: PS33702

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	52.2	1.95	51.7	1.94
TiO_2	0.6	0.02	0.4	0.01
Al_2O_3	2.2	0.97	2.4	0.11
Cr_2O_3	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	19.6	0.78	19.7	0.79
Total	98.1		97.4	

Sample L039: PS33703

	Diopside 1	
	Wt %	Cations (O=6)
SiO_2	54.4	1.99
Al_2O_3	1.6	0.07
Cr_2O_3	1.1	0.03
FeO	2.4	0.07
MgO	16.1	0.88
CaO	22.3	0.87
Na_2O	0.9	0.06
Total	98.8	

- = not detected at limit quoted above.

Sample L048: PS33704

	Diopside 1		Diopside 2	
	Wt %	Cations (O=6)	Wt %	Cations (O=6)
SiO_2	52.4	1.94	51.7	1.91
TiO_2	0.7	0.02	0.7	0.02
Al_2O_3	2.3	0.10	3.3	0.14
Cr_2O_3	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_2O	0.2	0.02	0.3	0.02
Total	99.2		99.8	

Sample L065: PS33705

	Diopside 1 (?High Fe Chlorite)
	Wt %
SiO_2	22.1
Al_2O_3	23.2
FeO	32.2
MnO	0.4
MgO	8.5
Total	86.4

Sample L087: PS33706

	Diopside 1	
	Wt %	Cations (O=6)
SiO_2	51.9	1.89
TiO_2	0.3	0.01
Al_2O_3	7.0	0.30
Cr_2O_3	0.9	0.03
FeO	2.5	0.08
MgO	14.6	0.79
CaO	20.2	0.79
Na_2O	1.6	0.11
Total	99.0	

- = not detected at limit quoted above.

Sample L087: 028 (continued)

	Garnet 1		Garnet 2	
	Wt %	Cations (O=24)	Wt %	Cations (O=24)
SiO_2	37.3	5.93	37.4	5.93
Al_2O_3	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	9.3	1.58	23.2	3.94
Total	102.7		96.2	

Sample L091: PS33707

	Diopside 1 (Epidote)
	Wt %
SiO_2	37.2
Al_2O_3	21.6
FeO	13.1
CaO	23.0
Total	94.9

- = not detected at limit quoted above.

4. SUMMARY

A summary of the Cr_2O_3 contents of the diopsides analysed and the MgO content of the garnets analysed is as follows:

Sample	Diopside	Garnet
	Cr_2O_3 (Wt %)	MgO (Wt %)
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, 0.91, 0.92, 0.94, 0.99, 1.01, 1.05, 1.09, 1.14	5.77
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, 10.75, 10.83
L028	0.63, 0.82	
L039	1.12	-
L048	0.41, 1.05	-
L087	0.91	0.19, 0.58

030

100

90

80

20

30

E.L. 29/83.

E.L. 48/82.

CRADLE MT. – LAKE ST. CLAIR NATIONAL PARK

BORRADAILE PLAINS

EMU PLAINS

Olivia Ck.

Quaile Falls

AMG 418080E 5397020N

Dove River

Carruthers River

Swift Ck.

Forth River

Campbell River

Cethana Lake

Addisons Creek

Ration Tree Creek

Lemonthyme Power Stn.

Lemonthyme Ck.

Hansons R.

Barradaile Ck.

Mersey River

Parangana Lake

Lake Rowallan

Gardiner Creek

Arm River

AMG 434030E 5371090N Rowallan Power Stn.

LEGEND

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

MAJOR UNCONFORMITY

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

5 cm

AMG REFERENCE POINTS ADDED

086031

BASE RESOURCES LTD.

E.L. 48/82 BORRADAILE PLAINS

E.L. 29/83 LEMONTHYME

STREAM SEDIMENT SAMPLE LOCATION AND GEOLOGY

SCALE 1:50000