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KIMBERLITE AND AMERICAN MINES, NEAR PRAIRIE CREEK, ARKANSAS.

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Abstract - The petrography and mineral chemistry of a few samples from Kimberlite and American Mines shows that they cannot be classified as kimberlites. Features atypical of kimberlites include the paucity of olivine macrocrysts and the presence of titaniferous potassic richterite, potassium feldspar and glass. The rocks from these localities show a greater affinity to lamproites. This data supports the re-classification of the Prairie Creek intrusion as an olivine lamproite rather than a kimberlite.

1 INTRODUCTION

Four kimberlite-like intrusions ar known to occur in the area of Murfreesboro, Pike County, Arkansas. The Prairie Creek intrusion is well known as it is the only body to have been commercially exploited for diamonds in the United States. Three smaller intrusions occur to the north east of the Prairie Creek body and are called Kimberlite Mine, American Mine and Black Lick. A detailed study of the Prairie Creek intrusion is given by Scott Smith and Skinner (Vol. I) and the results are summarised below. The authors also examined the few samples available to them from Kimberlite and American Mines to compliment the investigation of Prairie Creek. Although this study is not a comprehensive one it presents the first published detailed data for these intrusions, and includes petrography and mineral chemistry.

2 PRAIRIE CREEK (Abstract of Scott Smith and Skinner, Vol. I)

Previous studies of the Prairie Creek occurrence have identified three main rock types namely: "volcanic breccias", "tuffs and fine-grained breccias" and "hypabyssal kimberlite or peridotite". Our investigation confirms the presence of three distinct rock groups which include both magmatic and crater-facies types. The so-called "volcanic breccias" and "tuffs" are both considered to be predominantly of pyroclastic origin. Many features of these rocks are atypical of kimberlite and indicate a complex intrusion history. The magmatic rocks contain two generations of relatively abundant olivine in a fine-grained matrix composed of phlogopite, clinopyroxene, amphibole, perovskite, spinel, serpentine and glass. Although some petrographic features of these rocks are similar to those of kimberlites, the form of the euhedral olivine, presence of abundant glass and occurrence of potassic richterite are uncharacteristic of kimberlite but typical of lamproitic rocks. Both the groundmass phlogopite and the bulk rock have compositions intermediate between known lamproites and kimberlites. All the data presented here shows that the Prairie Creek intrusion is not a kimberlite. Although in many respects, Prairie Creek appears to be transitional between kimberlite and lamproite, it is considered that these rocks form an extension of the lamproite field which has not previously been recognised.

3 PETROGRAPHY

The rocks examined from the Prairie Creek intrusion (Scott Smith and Skinner, Vol. I) were sub-divided as follows.

(i) Group 1 - "hypabyssal" intrusive peridotite or kimberlite (after Miser and Ross, 1923) reclassified as magmatic, glassy olivine lamproite.

(ii) Group 2 - greenish-brown volcanic "breccias" (Miser and Ross 1923) reclassified as Group 2A = pyroclastic, glassy olivine lamproite and Group 2B = reworked tuff.

(iii) Group 3 - grey-blue "tuffs" and fine-grained breccias (Miser and Ross, 1923) reclassified as pyroclastic and epiclastic lamproite.

The numbering of the sub-division of rocks at Kimberlite and American Mines here follows on from above.

3.1 Kimberlite Mine

Only a few samples were examined from this locality and two main rock types were identified. The first (Group 4) appears to be a possible reworked tuff similar to the rocks of Group 2B discussed at Prairie Creek. The sample contains igneous lapilli as well as abundant xenolithic and comminuted material and a few quartz grains.

The second group (Group 5) is a magmatic one but there are two types within this group. Both are porphyritic rocks containing abundant olivines in a finer-grained groundmass. The first type (5A) contains numerous, extensively serpentinised olivines. The olivines fall into two similar groups to those described at Prairie Creek although in some instances the large or macrocrystal grains appear to be less abundant. The shapes of both groups of olivine are similar to those described from Prairie Creek. The fine-grained groundmass appears to have undergone relatively well-developed segregation (Figure 1) which is clearly evident under crossed-nicols. Surrounding the olivines the groundmass has an orange colour and appears to be composed almost exlusively of small (less than 0.05 mm) crystals of phlogopite with relatively high birefringence together with some glass. Small crystals of perovskite may also occur in these areas.

The remainder of the groundmass which occurs interstitially to the olivine and phlogopite-rich segregated groundmass has a microporphyritic texture. Two types of microphenocrysts appear to be present but they seem to be altered or pseudomorphed and have not been identified. The first and most abundant of these two minerals occurs throughout this part of the groundmass as numerous colourless, subhedral crystals approximately 0.05 mm in size (Figure 1). Another but much less abundant microphenocryst occurs as euhedral laths less than 0.2 mm in length. Their habit is reminiscent of melilite. In some instances these laths have been replaced by a felt of tiny crystals of probable clinopyroxene. Clear, amber-coloured perovskites are also common. The base to these minerals has a darkish grey colour which contrasts to the phlogopite-rich areas of groundmass. It is not possible to positively discern the nature of this base but it appears to be composed predominantly of a felt of microlites of clinopyroxene. A few opaque grains of possible spinel also occur throughout the groundmass.

Pools or segregations within the groundmass are composed predominantly of an unusual mineral which occurs as radiating clusters of acicular crystals with low birefringence. The mineral was

Fig. 1. Sample PK2/3 - Kimberlite Mine - Group 5A Hypabyssal.

Field of view = 0.4 mm. PPL. An euhedral, olivine pseudomorph (O) is surrounded by a fairly narrow zone of the segregated phlogopite-glass groundmass which contains a few perovskites. The main part of the groundmass shown in this photomicrograph comprises numerous euhedral to subhedral, unidentified, colourless microphenocrysts (as discussed in the text), a few perovskites and opaque spinels set in a more turbid base which is probably composed of a felt of clinopyroxene laths. The main contrast between the two different areas of segregated groundmass is in colour and birefringence which cannot be observed here.

identified as zeolite using X-ray diffraction techniques.

Some clue to the identity of some of the minerals in Group 5A were found from mineral chemistry investigations and are discussed later.

The second sample of hypabyssal material examined from this locality is rather different (Group 5B). The olivines are predominantly fresh. Truly anhedral olivines are rare but do occur. Most of the olivines are euhedral with either simple or more complex multiple growth aggregate crystals (Figure 2). The groundmass is coarser-grained than that of the sample described above (up to 0.15 mm). The groundmass is composed of phlogopite, clinopyroxene, perovskite, spinel, amphibole, apatite and probable interstitial glass. The clinopyroxene, perovskite, apatite and spinel occur as subhedral to euhedral crystals. The phlogopite occurs as interstitial, anhedral plates which sometimes poikiliticaly enclose other groundmass minerals. The phlogopite is unusual in that it has reverse pleochroism to a dark orange-brown colour and as such resembles tetraferriphlogopite. The amphibole also occurs as interstitial, anhedral crystals. Pool-like segregations of zeolite similar to those described from Group 5A also occur here. The interstitial base to all the other groundmass minerals described here is colourless to pale brown and isotropic and is probably glass. Some possible crystallisation of the glass to sanidine may have occurred in places. A few substantially altered and replaced xenoliths are also present.

The fine-grained nature of Group 5A would suggest relatively rapid cooling while Group 5B presumably cooled somewhat more slowly although an interstitial glassy base is still present.

3.2 American Mine

Again only a few samples were examined from this locality. Comparing them with those from Prairie Creek several of them probably represent a possible reworked tuff (Group 6) while one sample comprises hypabyssal-facies material. The sample of hypabyssal material (Group 7) is broadly similar to the sample forming Group 5A at Kimberlite Mine. The sample contains abundant olivine in a groundmass which has segregated into phlogopite-rich, orange-brown, birefringent areas and clinopyroxene-rich, grey, lower birefringent areas. Amphibole is also relatively abundant in the groundmass. The amphibole is pleochroic from pink to yellow. The sample however differs from other hypabyssal rocks examined from any of these localities in that it contains a significant amount of xenolithic material. Abundant pools of polycrystalline potassium feldspar are also peculiar to this sample. Serpentine also occurs in these pools.

3.3 Discussion

Kimberlite and American Mine are even less like kimberlites than Prairie Creek. There is a paucity of anhedral olivine macrocrysts at both these localities. The morphology of the phenocrystal olivine is different from most kimberlites. The occurrence of the segregated groundmass and the most abundant unidentified colourless peudomorphs of a microphenocrystal phase are not observed in kimberlites. Primary potassium feldspar, amphibole and glass are not found in kimberlites but do occur in some lamproites. The unusual pleochroic scheme of the amphibole is characteristic of lamproitic rocks.

4 MINERAL CHEMISTRY

All the analyses were obtained using the Anglo American Research Laboratories' ARL SEMQ electron microprobe. Count rates for fluorine are inherently low so the detection limit of F is 0.2 wt% and the error on any determination is 0.47 wt% at the 95% confidence level which obviously is the overiding factor in the accuracy of these results.

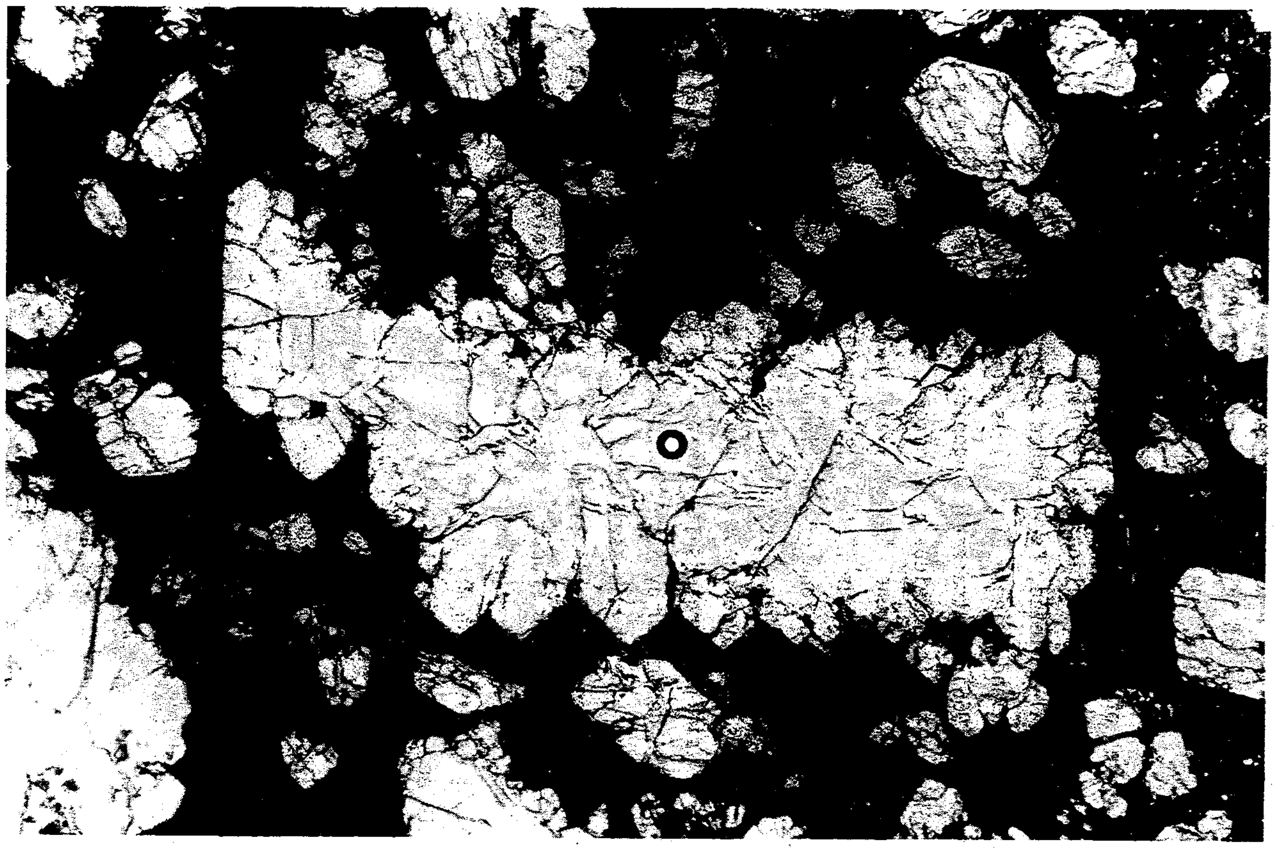

Fig. 2. Sample PK2/4 - Kimberlite Mine - Group 5B Hypabyssal.

Field of view = 4 mm. PPL. A partially serpentinised, euhedral, parallel multiple growth aggregate of olivine (O). The surrounding area comprises other euhedral olivine microphenocrysts set in a fine-grained groundmass.

4.1 Kimberlite Mine

Mineral chemisty was limited to two relatively fresh hypabyssal rocks representing Groups 5A and 5B.

Olivine: The compositional range (Mg 89.3-92.1) of the olivines in the one sample of hypabyssal material (Group 5B) analysed from Kimberlite Mine is similar to that found at Prairie Creek (Table 1, this paper and Figure 4 of Scott Smith and Skinner, Vol. I). There is a decrease in NiO near to the margin of the crystals similar to that found at Prairie Creek. The total range of NiO contents is 0.23-0.66 wt%. Also in many crystals the CaO contents increases at the margin of the olivine where the total compositional range is 0.02 (not detected) to 0.30 wt%.

Most of the olivines analysed from this sample show negligible serpentinisation and the grain can be analysed as close to the margin as possible (10-15 microns from edge). The complex zoning confined to the outer 100-150 microns of kimberlitic olivines (Boyd and Clement 1977) is not present in the sample from Kimberlite Mine. Olivines from the other rock types at Kimberlite Mine are totally altered.

Phlogopite: The unusual nature of the phlogopite occurring in one of the hypabyssal samples (Group 5B) was noted in the petrography section of this paper and that they optically resemble so-called tetraferriphlogopite. The Al-depleted, Fe-enriched nature of these phlogopites (Table 2, this paper and Figure 6 of Scott Smith and Skinner, Vol. I) is also similar to tetraferriphlogopite (Rimskaya-Korsokova and Sokolova, 1966). Tetraferriphlogopite is found occurring as mantles to phlogopites in kimberlites and lamproites (eg Emeleus and Andrews, 1975; Scott, 1981).

Clinopyroxenes: The groundmass clinopyroxene is similar in composition to those analysed at Prairie Creek and they are titaniferous diopsides (Table 2). A few laths of clinopyroxene which are slightly coarser in size were analysed in the zone of reaction or alteration surrounding a xenolith (eg analysis 82-168, Table 2). These grains have very variable compositions most of which are very different from the other groundmass clinopyroxenes. The modification of the magma surrounding the xenolith is considred to be a similar process to that which produces the crystallisation of pectolite in kimberlites and has been described by Scott Smith et al. (1983).

Perovskite: The perovskites from the hypabyssal rock (Group 5B) are similar to those from Prairie Creek and from kimberlites in general (Table 2).

Spinel: The spinels from the two hypabyssal rocks at Kimberlite Mine are relatively constant in composition (Table 2) and somewhat different from those at Prairie Creek. The Kimberlite Mine spinels have higher MgO and Al_2O_3 values which makes them closer in composition to some kimberlitic spinels (Figure 8 of Scott Smith and Skinner, Vol. I).

Apatite: An analysis of apatite is given in Table 2. The presence of some SiO_2 probably results from the fact that the grain analysed was very small. It can be seen, however, that the apatite has high concentrations of SrO and F.

Zircon: One anhedral grain of zircon was observed and analysed. It is not possible to assess whether this grain is xenocryst or not.

Unidentified Minerals: There are two unidentified minerals in the groundmass of one of the hypabyssal rocks (PK 2/3, Group 5A) at Kimberlite Mine. One of these has a definite lath-like habit somewhat resembling melilite. Several of these laths were analysed in an attempt to identify them. Some appear to be composed of a secondary aggregate of tiny laths. These have the composition of clinopyroxene (analysis 82-113, Table 3). Others which are apparently the same mineral contain significant amounts of P_2O_5 and higher CaO contents and might be composed of a mixture of clinopyroxene and apatite (analysis 82-115, Table 3). The nature of the secondary minerals replacing the lath-like crystal may in fact have little relationship to their original composition. One suggestion, however, is that these laths were originally melilite and their shape and alteration to fine-grained clinopyroxene would be consistent with this. The presence of abundant

TABLE 1 - Selected olivine analyses from the hypabyssal facies rocks at Kimberlite Mine.

Mineral	Olivine					
Sample Number	PK2/4A (Group 5B)					
Analysis Number	82-351	82-352	82-353	82-354	82-357	82-358
SiO_2	40.41	40.25	40.74	40.16	40.10	40.20
TiO_2	nd	nd	nd	nd	nd	0.01
Al_2O_3	nd	nd	nd	nd	nd	0.02
Cr_2O_3	nd	nd	nd	nd	nd	0.01
FeO	8.48	8.33	8.81	8.35	8.50	8.31
MnO	0.11	0.14	0.13	0.15	0.11	0.14
NiO	0.43	0.36	0.39	0.36	0.42	0.39
MgO	50.08	50.20	49.70	50.04	49.85	50.12
CaO	0.02	0.14	0.02	0.12	0.04	0.14
TOTAL	99.53	99.42	99.79	99.18	99.02	99.34
Atomic Ratio $\frac{Mg}{Mg + Fe}$	0.913	0.915	0.910	0.914	0.913	0.915

82-351 - centre of 3.7 mm subhedral grain; 82-352 - 10 μ from edge of 82-351; 82-353 - centre of 1.7 mm parallel multiple growth aggregate; 82-354 - 15 μ from edge of 82-353; 82-357 - centre of 0.39 mm euhedral microphenocryst; 82-358 - 10 μ from edge of 82-357; nd = not detected.

TABLE 2 - Selected mineral analyses from the hypabyssal fecies rocks at Kimberlite Mine.

Mineral	Phlogopite		Clinopyroxene		Perovskite		Spinel				Apatite
Sample Number	PK2/4A		PK2/4	PK2/1	PK2/4A	PK2/3	PK2/3			PK2/4A	PK2/4A
Analysis Number	82-122	82-123	82-127	82-168	82-125	82-146	82-153	82-154A	82-129	82-155A	82-131
SiO_2	40.72	41.84	52.69	51.42	nd	nd	nd	nd	nd	nd	0.54
TiO_2	3.48	2.94	2.14	1.54	55.04	55.53	2.99	3.53	3.21	3.27	0.01
Al_2O_3	2.07	1.82	0.40	2.26	0.09	0.08	6.17	5.37	5.79	5.89	0.01
Cr_2O_3	nd	nd	0.13	0.23	0.94	0.77	54.05	51.78	54.54	54.85	nd
FeO	15.52	14.00	3.19	7.60	1.09	1.08	25.07	28.32	23.00	23.04	0.12
MnO	0.12	0.09	0.10	0.12	nd	nd	1.22	1.31	0.98	0.99	0.01
NiO	0.05	0.02	0.01	0.01	nd	nd	0.11	0.13	0.14	0.12	0.01
MgO	22.12	22.03	16.57	15.90	0.05	0.03	9.57	8.03	11.42	11.26	0.09
CaO	0.02	0.02	24.55	16.45	37.28	37.40	0.10	0.23	0.13	0.13	55.65
Na_2O	0.54	0.88	0.50	3.22	0.47	0.52	nd	nd	nd	nd	0.04
K_2O	9.66	10.06	0.16	0.51	0.21	0.09	0.03	0.07	0.07	0.04	0.03
BaO	1.04	0.58	-	-	0.29	0.26	-	-	-	-	0.10
SrO	nd	nd	-	-	0.65	0.65	-	-	-	-	1.30
ZrO	0.01	0.01	-	-	0.13	0.06	-	-	-	-	nd
P_2O_5	0.02	nd	-	-	0.04	0.04	-	-	-	-	40.24
F	2.38	2.89	-	-	0.30	0.17	-	-	-	-	3.77
F = 0	96.75	95.96	-	-	96.38	96.61	-	-	-	-	100.33
TOTAL	97.75	97.18	100.44	99.26	96.50	96.68	99.31	98.77	99.28	99.59	101.92
Atomic Ratio $\frac{Mg}{Mg + Fe}$	0.718	0.737	0.902	0.789	-	-	-	-	-	-	-

82-122 - centre of 0.12 mm subhedral basal section; 82-123 - edge of 82-122; 82-127 - 82 μ groundmass lath; 82-168 - lath within alteration zone around a "kimberlitized" xenolith; 82-125 - centre of 16 μ grain; 82-146 - centre of 40 μ subhedral grain; 82-153 - centre euhedral, 40 μ grain, Fe_2O_3 = 7.20, FeO = 18.59, Total = 101.03; 82-154A - 20 μ euhedral grain, Fe_2O_3 = 7.44, FeO = 21.63, Total= 99.52; 82-129 - 30 μ euhedral grain, Fe_2O_3 = 6.88, FeO = 16.81, Total = 99.97; 82-155A - 40 μ euhedral grain, Fe_2O_3 = 6.36, FeO = 17.32, Total = 100.23; 82-131 -30 μ subhedral grain. nd= not detected. Samples PK 2/1, PK 2/3 = Group 5A, Samples PK 2/4, PK 2/4A = Group 5B.

TABLE 3

Analyses of various constituents of the hypabyssal-facies rocks at Kimberlite Mine.

Mineral	Lath-like Mineral			Unidentified Mineral			Glassy Base		Segregation		
Sample Number	PK2/1		PK2/3								PK2/4A
Analysis Number	82-113	82-115	82-144	82-151	82-277	82-276	82-142	82-148	82-155	82-139	82-136
SiO_2	45.50	16.11	42.50	41.05	45.11	48.40	47.92	43.38	47.76	49.84	52.45
TiO_2	2.83	0.33	1.05	0.11	0.10	0.13	1.56	5.18	0.07	0.04	nd
Al_2O_3	2.61	0.15	0.61	29.46	23.37	19.90	7.74	4.81	19.26	21.51	21.85
Cr_2O_3	nd	nd	nd	nd	nd	nd	nd	0.01	nd	nd	nd
FeO	8.25	1.79	4.83	2.92	2.11	2.31	8.24	11.99	1.01	0.48	0.04
MnO	0.11	0.04	0.12	0.08	0.06	0.05	0.20	0.17	0.01	0.06	0.02
NiO	0.01	0.02	0.01	nd	0.02	0.02	0.02	0.09	0.02	0.01	0.01
MgO	20.54	6.04	14.11	4.15	5.08	2.22	15.29	19.74	2.06	5.04	1.90
CaO	12.61	45.03	24.69	0.54	0.86	1.44	8.32	1.30	0.95	2.68	3.55
Na_2O	0.35	0.35	1.19	0.84	0.28	0.21	1.46	0.56	0.10	0.35	0.25
K_2O	0.50	0.09	0.17	14.24	5.63	1.76	2.60	7.57	0.29	4.72	4.61
BaO	0.10	0.31	0.62	0.40	7.94	15.18	1.05	0.47	19.98	2.73	3.49
SrO	nd	1.58	1.07	nd	nd	nd	nd	nd	nd	0.09	0.29
ZrO	nd	nd	nd	nd	nd	nd	0.09	0.01	nd	nd	0.06
P_2O_5	1.16	26.78	8.03	0.03	0.45	0.04	0.07	0.01	nd	nd	0.01
F	nd	3.62	0.16	0.74	nd	nd	0.01	1.05	nd	nd	0.04
F = 0	-	100.71	99.09	94.25	-	-	-	95.90	-	-	88.55
TOTAL	94.57	102.24	99.16	94.56	91.01	91.66	94.57	96.34	91.51	87.55	88.57
Atomic Ratio $\frac{Mg}{Mg + Fe}$	0.816	-	-	-	-	-	0.768	0.761	-	-	-

82-113 - fresh looking core of lath-like mineral; 82-115 - another point in same lath as 82-133; 82-144 - 0.24 mm lath-like mineral; 82-151 - 42μ grain; 82-277 - 20μ grain; 82-276 - 20μ grain; 82-142 - dark grey, turbid microcrystalline base; 82-148 - orange-brown coloured segregated groundmass adjacent to olivines; 82-155 - zeolite in pool-like segregation; 82-139 - similar to 82-155 in different segregation; 82-136 - zeolite in pool-like segregation. nd = not detected. Samples PK2/1, PK2/3 - Group 5A, Sample PK2/4A = Group 5B.

apparent apatite in some of the pseudomorphs might indicate different alteration of the same mineral or the presence of a second lath-like mineral, possibly apatite.

The second unidentified mineral (Figure 1) described in the petrographic section is finer-grained, more abundant, isotropic and colourless. It has variable subhedral to euhedral shapes. The interpretation of the original nature of this mineral is also problematic with the results obtained. In one thin section of sample PK 2/3 five analyses all approach that of potassium feldspar. However, in a second thin section of the same sample the mineral contained up to 11.82 wt% BaO but lower K_2O and Al_2O_3. This mineral is similar to the zeolite occurring in pool-like segregations which are described below.

Pool-like segregations: A zeolite mineral occurs in pool-like segregations in the hypabyssal rocks at Kimberlite Mine. The composition of this mineral appears to vary (Table 3). In parts it contains high BaO contents where its composition resembles that of the barium zeolite harmatome. In other areas the BaO contents are much lower while the CaO and K_2O contents are higher. These are similar in composition to some potassic zeolites such as phillipsite. The variable composition of these zeolites probably results from the fact that they crystallise from late-stage pools of magma each of which represents a closed system.

Microcrystalline Base: The groundmass in sample PK 2/3 from one of the hypabyssal varieties (Group 5A) at Kimberlite Mine is segregated. Close to the olivine phenocrysts the base or groundmass has an orange-brown colour and has the appearance of a phlogopite-glass. In many parts tiny crystals of phlogopite can be discerned. The composition of this area of the base (analysis 82-148, Table 3) approaches that of titaniferous phlogopite somewhat similar to that found in the hypabyssal facies at Prairie Creek. The high CaO contents presumably reflect the presence of some cryptocrystalline, extremely fine-grained or potential clinopyroxene. The reverse applies for the darker, grey areas of the groundmass where the composition (analysis 82-142, Table 3) has lower K_2O and TiO_2 values and presumably is composed of a higher proportion of clinopyroxene to phlogopite.

4.2 American Mine

Amphibole: The amphibole in the hypabyssal (Group 7) rock from American Mine is similar to that from Prairie Creek and is also titaniferous, potassic richterite (Table 4). Compared to Prairie Creek, the TiO_2 contents are higher and the Mg/(Mg+Fe) atomic ratios and F contents are lower.

Potassium Feldspar: Analyses given in Table 4 confirm that the groundmass mineral in the hypabyssal sample from this locality is feldspar. It also occurs in pool-like segregations where it may be associated with serpentine.

Microcrystalline Base: The base or groundmass of the hypabyssal sample from American Mine is similar to sample PK 2/3 from Kimberlite Mine. Examining the analyses of the different parts of the groundmass (Table 4) it appears that the segregation is better developed that at Kimberlite Mine. Analysis 82-194 (Table 4) is much closer in composition to clinopyroxene than the equivalent at Kimberlite Mine.

4.3 Discusion

The nature of the phlogopite and unidentified minerals and the confirmation of the occurrence of potassium feldspar and titaniferous potassic richterite are all feature atypical of kimberlites and more characteristic of lamproites.

5 CONCLUSIONS

The petrographic and mineral chemistry data presented here shows that Kimberlite and American Mines cannot be classified as kimberlites but that they show a closer affinity to lamproites. A

TABLE 4
Selected mineral analyses of sample PK3/5A hypabyssal-facies rock from American Mine

Mineral	Amphibole			Feldspar		Glassy Base	
Analysis Number	82-185	82-186	82-187	82-182	82-188	82-193	82-194
SiO_2	52.58	53.76	53.76	64.34	64.28	40.64	52.05
TiO_2	6.08	5.17	4.37	nd	nd	6.72	2.71
Al_2O_3	0.72	0.42	0.79	18.31	18.07	7.27	0.89
Cr_2O_3	0.16	nd	0.04	nd	nd	0.01	0.20
FeO	4.76	6.42	4.10	0.10	0.42	9.68	6.52
MnO	0.10	0.11	0.08	0.01	0.01	0.09	0.12
NiO	0.01	0.01	0.06	0.02	0.01	0.04	0.02
MgO	19.06	17.99	20.20	0.20	0.63	16.65	15.49
CaO	6.20	5.96	6.70	nd	0.03	5.41	19.07
Na_2O	4.11	4.20	3.77	0.02	0.06	0.51	1.63
K_2O	4.82	4.79	4.72	16.44	15.94	7.50	0.35
BaO	0.07	0.05	0.05	nd	0.02	0.68	0.03
SrO	0.12	0.01	0.14	nd	nd	nd	nd
ZrO	nd	0.01	0.02	nd	0.03	nd	0.07
P_2O_5	0.02	0.02	0.01	nd	0.04	1.72	0.11
F	1.39	1.06	1.50	0.06	nd	0.81	0.02
F = 0 (Total)	99.64	99.53	99.68	99.47	-	97.39	99.27
TOTAL	100.20	99.98	100.31	99.50	99.54	97.73	99.28
Atomic Ratio $\frac{Mg}{Mg + Fe}$	0.877	0.833	0.898	-	-	0.754	0.809

82-185 - 60 interstitial patch; 82-186 - 50 interstitial patch; 82-187 - 50 interstitial patch; 82-182 - 0.27 mm grain in groundmass; 82-188 - 0.15 mm irregular patch associated with amphibole; 82-193 - orange-brown coloured cryptocrystalline base or groundmass; 82-194 - darker, grey turbid, segregated groundmass. nd = not detected.

more detailed study showed that the nearby Prairie Creek intrusion should be classified as an olivine lamproite rather than as kimberlite (Scott-Smith and Skinner, Vol. I). Petrographically Kimberlite and American Mines are even less like kimberlites than Prairie Creek. Although the magmatic rocks at Kimberlite and American Mines are different from those at Prairie Creek, they probably do form a consanguinious suite or rocks. Unfortunately less information is available for Kimberlite and American Mines but the identification of glass-bearing magmatic rocks and possible reworked pyroclastics suggests that the overall geology of these intrusions may be similar to Prairie Creek.

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