

6. SAMPLING

To get an indication of the minerals present and whether any of these minerals are of kimberlitic origin, several samples of the surface gravels and previously concentrated material were taken for heavy mineral analysis.

Initially 15 fifty-kilogram samples were taken from the study area; from the main run in the southern part, the shallow gravels of the central area and from the Rooisloot in the northern part of the area (fig. 25). These were washed, concentrated and divided into a coarse, medium and fine fraction defined as follows ;

Coarse	1 - 2 mm
Medium	0,5 - 1 mm
Fine	0,3 - 0,5 mm

Most of the samples were taken from unworked gravels. However, sample numbers 3, 9, 14 and 15 (fig. 25) were taken from wash concentrates left by diggers during their exploitation for diamonds. The latter concentrates thus represent large volumes of gravels which enhances the possibility of finding kimberlitic minerals such as garnet, ilmenite and chrome-diopside in them. Samples 14 and 15 were in fact taken from the famous King's and Malan's potholes.

Following the initial gravity concentration of the samples the heavy minerals were separated in bromoform. Not one kimberlitic mineral grain was identified. Consequently a further 9 samples (fig. 25 A-I) were analyzed. The minimum size of the initial 15 samples was 0,3 mm or about 45 mesh, whereas only the -60 mesh fraction was used in the second series of samples. The nine samples were analyzed by Mr E. Peters of the Geological Survey of South Africa using X-ray diffraction techniques. The results are listed in Table 4.

Magnetite, hematite, hydrated iron oxides and iron hydroxide (lepidocrocite, limonite and goethite), manganese oxides (pyrolusite)



— Track
 — Fence

□ Diggings

• Sample no.: -45mesh
 E • Sample no.: -60mesh

and the andalusite are all thought to have been derived either from the sedimentary rocks of the Pretoria group or from the dolomite itself.

Barite is known to be associated with the fluorite in the dolomite (Wilson, 1977).

Zircon, tourmaline, sphene and chlorite are ubiquitous and could have been derived from the granite of the Bushveld Complex or from the Archaean granite.

Olivine, enstatite and ilmenite are the only minerals which can be related to basic and ultrabasic rocks, of which kimberlite is a member. However, mafic and ultramafic rocks of the Bushveld Complex and dolerite dykes could equally have contributed these minerals.

A microprobe analysis of the ilmenites, using the SEMQ electron microprobe at the Anglo American Research Laboratories classified these minerals as non-kimberlitic (AARL geology laboratory reference no. M/79/487).

Several samples were examined by the author from the Orange River terraces near Hopetown (De Wit, 1980). These samples were treated and washed in the same way as the Bakerville samples using the same fractions, and proved to contain abundant kimberlitic mineral grains, up to 2 mm in size. Most of them are only slightly abraded. Eighty per cent of these minerals were ^{considered} found to be derived from a known kimberlite occurrence north of Philipstown, a distance of at least 130 km from the Hopetown terrace (De Wit, 1980). These terraces contain gravels similar to those in the Lichtenburg area ^{the latter} and appear to have been deposited under similar environmental conditions. Although direct comparison between the heavy mineral contents of gravels and the distance between the gravel and the primary source of the heavy minerals in the two areas may not be entirely justified, it appears anomalous that no evidence of kimberlitic minerals other than diamonds was found in the Bakerville gravels, even from the concentrate of the two famous potholes.

TABLE 4 Minerals in Samples A - I (-60 mesh)

MINERALS	A	B	C	D	E	F	G	H	I
Secondary manganese oxides	X	X	X	X	X	X	X	X	X
Secondary iron oxides	X	X	X	X	X	X	X	X	X
Magnetite	X	X	X	X	X	X	X	X	X
Andalusite	X		X	X				X	
Barite				X			X	X	X
Tourmaline		X							
Zircon			X	X					
Chlorite		X	X	X					
Sphene									X
Anatase									X
Ilmenite	X	X	X	X	X	X	X	X	X
Enstatite	X								
Olivine		X							