

THE ARIES DIAMONDIFEROUS KIMBERLITE PIPE CENTRAL KIMBERLEY BLOCK, WESTERN AUSTRALIA.

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The Aries kimberlite pipe is situated in the Kimberley Region of Western Australia, 270 km east-north-east of the coastal town of Derby and 250 km west of the Argyle diamond mine.

The pipe is intruded into the Proterozoic sediments and basalts comprising the Kimberley Basin which is thought to be underlain by an Archean cratonic basement.

The pipe has been dated by the Rb-Sr phlogopite method at about 820 Ma (C.B. Smith 1989). Nearby tillites provide evidence of subsequent glaciation at 700ma.

II. EXPLORATION

Systematic diamond exploration of the Kimberley Region commenced in 1971 and this led to the discovery of numerous kimberlites and lamproites including the Argyle pipe in the period from 1975 to 1980.

Traditional drainage sampling by the Triad/Freeport partners confirmed the presence of kimberlitic chrome spinels which led to the Aries pipe discovery in 1985.

Three depressions up to 20m deep form the surface expression of the kimberlite within the sandstone country rock and are easily visible on aerial photographs.

The 40 Nanoteslar aeromagnetic response is distinctive but not dipolar.

The VLF magnetic and electric field signatures fairly consistently but not invariably define the pipe contact zones.

The surface spectral signature as detected by the Geoscan MKII multispectral scanner indicates a clear anomaly in band ratios typical of montmorillonite.

III. THE ARIES PIPE

A. Structural

The size of the pipe is 20 hectares based on contacts primarily inferred from sandstone outcrop. Limited drilling to a maximum depth of 100m has shown that the wallrock contacts dip at 60-80°. There are four distinct lobes.

The northern extension appears to either contain massive reefs of basalt and sandstone, or else it has a small central core with radiating dykes and sills.

A 1m thick sill has been confirmed approximately 100m from the centre of this lobe.

The northern lobe is mostly xenolithic breccia with 95% basalt xenoliths and <5% kimberlite matrix.

The central lobe contains two large basalt reefs and in the vicinity of these the predominant rock type is xenolithic breccia as above. Kimberlite, micaceous kimberlite and kimberlite breccia with little xenolithic dilution are found in the southeast portion of the lobe.

The southern lobe is mostly kimberlite breccia with a high dolerite and sandstone content as well as basalt. It degenerates into a zone of brecciated quartzite country rock with kimberlite dykes in the southern tail.

The top 20m of the kimberlite is heavily oxidized to clay with a sharp transition to silicified kimberlite separated by a thin laterite layer. In the central lobe there are 1-4m of overlying ferruginous gravels with a marked depletion of -2mm diamonds compared to the underlying kimberlite. This indicates a fossil drainage no longer visible. Clayey silt overlies the gravel ranging from several centimetres to 6m depth.

B. Geochemistry

A loam sample taken from the central lobe in the surficial clayey silt gave no anomalous geochemical signature compared to the nearby basaltic soils apart from enhancement of Cr and Zr (0.4% on Kimberlite). Compared to proximal doleritic soils Cr, Ni and La have been shown to be enhanced. A kimberlite soil analysis is given in table 1.

The yellow ground analysis shows a surprising similarity to the soil sample from above. This sample of yellow ground was taken from weathered kimberlite breccia with <20% Xenolithic dilution.

TABLE 1 (Values in ppm)

ELEMENT :	Nb	Nd	Ce	La	V	Cr	Ni	Sr	Ba
Surface Soil	11	<20	NA	17	23	415	14	8	56
Yellow ground (6m depth)	10	<2	70	20	100	NA	<5	50	210

IV. ALLUVIALS

The extensive alluvial deposits downstream of the Aries pipe were initially detected and outlined by the surface chromite distribution pattern within the Harris Creek valley system.

At least three gravel horizons west were uncovered, the ages of which are thought to date from Miocene to present times. The two main channel deposits are weakly diamondiferous.