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Geology of the Lulo kimberlite cluster of Lunda Norte Province of Angola

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Introduction

The Lulo Kimberlite Exploration Project ("**Lulo Kimberlite Project**") is located within the Lunda Norte Province of Angola 630km east of the capital, Luanda, and is operated as a Joint Venture between Lucapa Diamond Company Limited; an ASX listed company based in Perth Australia, Endiama; an Angolan State owned diamond mining company based in Luanda and Rosas & Petalas; a privately owned company also based in Luanda.

The 3,000 km^2 concession is within one of the world's most prolific alluvial diamond fields where commercial production at the Lulo Alluvial Mine commenced in 2015 through the alluvial mining company Sociedade Mineira Do Lulo (SML).

Lulo regularly produces large, premium Type IIa diamonds. To date, more than 43 >100 carat diamonds have been recovered from Lulo. Some of the largest recorded diamonds in Angola's history have been recovered at Lulo, they are the "4th February Stone" (weighing 404 carats), an un-named 227 carat white diamond and the "Lulo Rose", a 170 carat pink coloured diamond. All of these stones have been classified as Type 2a as have most of the most valuable stones recovered from the alluvial deposits. Lulo currently commands the highest price per carat for alluvial diamonds anywhere in the world and has proven to be a prolific producer of special sized diamonds (those over 10.8 carats in weight) and fancy coloured diamonds in hues of pink and yellow.

The Lulo Kimberlite Project is conducting exploration to locate the primary source(s) of these high value alluvial diamonds. that are being recovered from the Cacuilo River valley by the SML mining operation. The SML mining operation is owned by the same partners as the Lulo Project with the mining license covering the same area as the Lulo Kimberlite Project

Alluvial Deposits

The alluvial deposits are comprised of relatively thin (>1m) matrix supported gravels at the base of an upwardly fining sequence of sands and clays up to 15m thick. The bedrock is a uniform, relatively soft, weathered, Karoo-aged shale with little bedrock topography The gravel clasts appear to be remnant clasts of Gres-Polymorph silcrete which have been locally derived. These features are considered to signal a poor environment for concentration of diamonds. There is little evidence of Calonda gravel clasts within the clast assemblages.

The diamonds recovered from the alluvial deposits are notable for their size, quality and the proportion classified as Type 2a's. Very little evidence of abrasion has been noted on the stones and a few relatively fragile framesite diamonds have been reported. This is considered evidence of a local source for the diamonds. Variations in diamond populations in both size and morphology have been noted along the Cacuilo river which indicates the introduction of multiple diamond sources and also supports local discrete sources for the diamonds.

Geophysics

To date over 560 geophysical targets potentially related to kimberlite pipes have been identified, with 164 targets drilled and 141 kimberlites confirmed to date.

All of the kimberlites identified to date show some form of feature in the aeromagnetic data and approximately 85% of magnetic targets drilled to date have proven to be kimberlite. The features vary in size from >100ha to <0.5ha. Most of the targets confirmed as kimberlites present as sub-circular magnetic anomalies, sometimes in clusters. Linear, dyke like features are also common, generally trending NE/SW although some dykes in the east are rotated more ENE/WSW. Approximately 10% of the targets appear to be reversely polarised. A dense clustering of aeromagnetic targets can be seen covering the upper reaches of the Cacuilo river in the aeromagnetic data upstream of the most prolific alluvial mining areas.

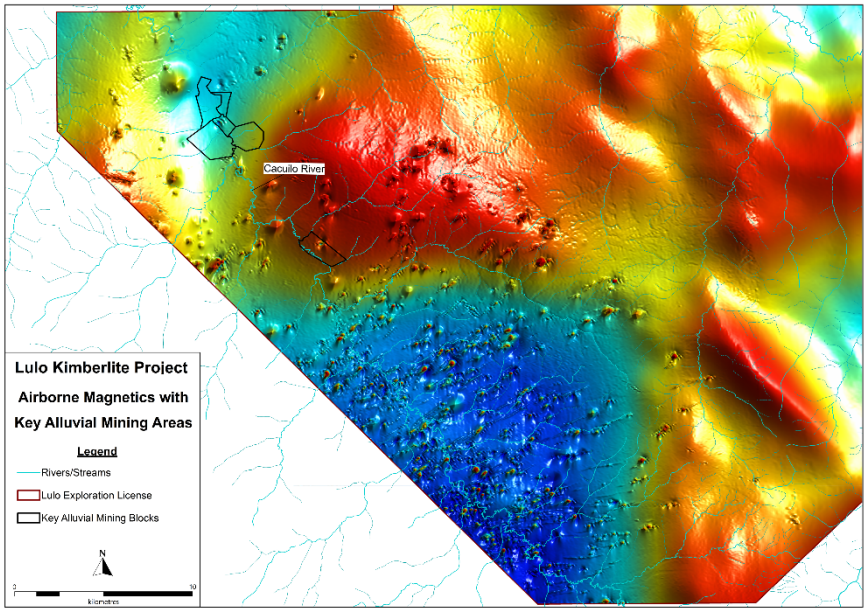

Figure 1: Airborne magnetics with key alluvial mining areas

Kimberlites

A wide variety of kimberlite types and facies are present in the project area. For economic reasons the majority that have been studied to date are pipes, however dykes and a small number of kimberlite sills have been intersected during drilling.

The kimberlite pipes are represented by crater infill deposits, resedimented volcaniclastic kimberlite (RVK), Forte a la Corne-type pyroclastic kimberlite (FPK) and coherent kimberlite. There is a strong correlation between deposit size and the kimberlite type with the largest kimberlites represented by crater deposits, moderate sized kimberlites represented by RVK and PVK and the smallest kimberlites, mostly the dykes and sills represented by coherent kimberlite.

The crater deposits and some of the RVK occurrences are highly diluted with fine grained sand within the kimberlite matrix and in many of the largest bodies, kimberlitic features are only recognisable in occasional bands within a mass of sand. There is usually a transition to RVK at depth which can be either sharp or gradational. The depth to the RVK transition is generally shallowest near the margins of the pipe and in some bodies a ring of RVK around a central core of crater infill sediments is observed close to surface.

The RVK units contain both sand within the matrix and larger particles of shale country rock while the FPK units tend to have very little sand within the matrix and less country rock dilution. The FPK is also the only unit where mantle xenoliths have been identified.

Bulk Sampling

A bulk sampling program is underway to identify potentially kimberlites hosting economic concentrations of diamonds. Diamonds have been recovered from about 50% of the kimberlites sampled to date. The grades of those sampled have been generally low with most bulk sample grades of less than 0.5cpht, however, significant quantities of diamonds have been recovered from one of the kimberlites (L164). Notable from these diamond recoveries is that 110 carats of diamonds have been recovered with an average stone size of 1.14 carats per stone, including individual stones of 15.3 and 12.3 carats. The majority of the stones recovered from this sample have been classified as Type 2a using a Yehuda Colorimeter (Lucapa Diamond Company Limited. (2023)).

The size distribution and morphology of the diamonds recovered in the bulk sampling program are similar to those found in the alluvial deposits which are unique to this area and strongly supports the link between the alluvial deposits and the kimberlites as the likely source for the alluvial diamonds.

The size, location and grade of the L164 kimberlite which is distal to the main alluvial deposits and 3.5 hectares in size suggest that other kimberlite diamond sources are present within the project area.

Photos: Diamonds recovered from kimberlite L164 bulk sample (left) and two Specials weighing 15.3 carats and 12.3 carats (right)

References

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