African Mining

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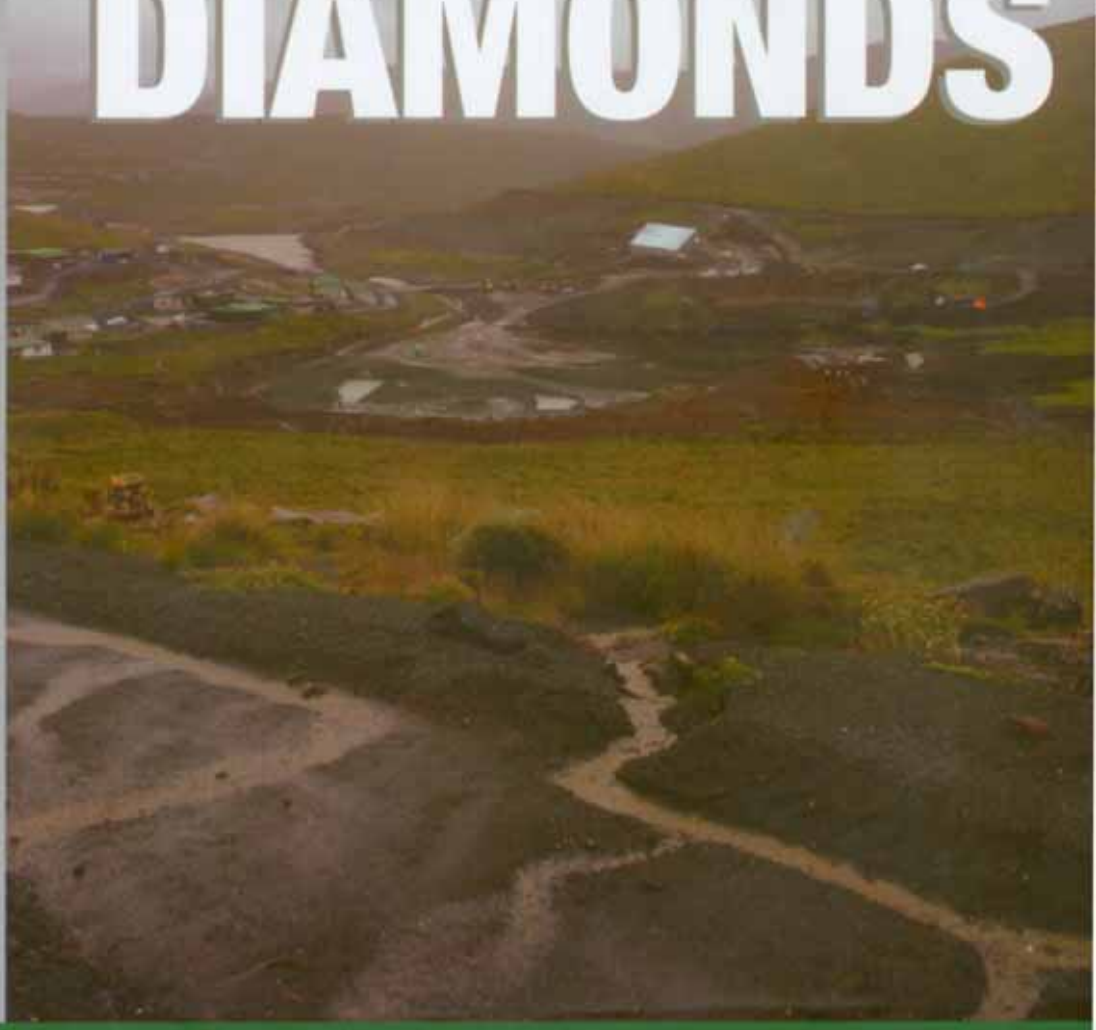
RECOVERY OF QUALITY DIAMONDS



PROJECTS

Egypt

- Use of port facility approved

Madagascar

- Ambatovy contracts to be renegotiated

EXPLORATION

Botswana

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Letseng diamond mine

The Letseng diamond mine is located in the Maluti Mountains and is said to be the highest diamond mine in the world, at an average altitude of 3 100 m above sea level. It is 70% owned by Gem Diamonds, and the Lesotho government owns the remaining 30%. Letseng reopened operations in 2004 and was acquired by Gem Diamonds in late 2006 for US$118,5-million. According to Gem Diamonds, Letseng is characterised by extremely low grade ore, less than 2 ct/100 t, but is well known for producing large diamonds. The company says the mine has the highest percentage of large diamonds, greater than 10,8 ct, of any kimberlite diamond mine in the world, giving it the highest dollar value per carat of any kimberlite diamond mine.

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Liqhobong project

The Liqhobong project is situated about 120 km from Lesotho's capital, Maseru, at the head of the Liqhobong valley at an altitude of about 2 650 m above sea level. According to Kopane Diamonds, which owns 75% of the project, the 390 ha mining lease contains five kimberlites and three are yet to be extensively explored. The Liqhobong diamondiferous kimberlite pipes, which are connected by a dyke, were discovered in the late 1950s by Jack Scott, who also discovered the Letseng mine.

The main pipe, which is near circular, is 8,5 ha in diameter, and the satellite pipe, which is lobate in shape, is approximately 1 ha. Liqhobong Mining Development Company (LMDC) has a mining lease over the Liqhobong pipes and achieved commercial production in 2006. The Lesotho government owns 25% of the project's shares and receives royalties on its gross sales.

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Kolo project

The Kolo diamondiferous kimberlite project is located in the Lesotho lowlands, about 38 km southwest of the capital, Maseru. According to Angel Diamonds, which has the prospecting licence for the area, the Kolo pipe and its associated kimberlitic rocks were subsequently emplaced into the Karoo Supergroup and the Drakensberg basalts during the late Cretaceous. The pipe represents an irregularly-shaped, northwest-southeast trending body, covering an estimated area of 1,1 ha emplaced along the contact between the sedimentary rocks and a doleritic sill. Read more about the Kolo project on page 38.

The Kolo pipe represents an irregularly-shaped, northwest-southeast trending body.

Mothae project

The Mothae project is located 6,5 km to the northwest of the Letseng diamond mine, at an altitude of about 2 900 m above sea level. Motapa Diamonds says it has secured the exclusive rights to Mothae on the premise that the kimberlite may contain diamonds of similar value to those recovered from the adjacent Letseng mine. According to Motapa, the kimberlite intrudes basaltic rocks and occurs along a structural lineament that also hosts the Letseng intrusion. The kimberlite is not exposed at surface and is covered by extensive gravels and peat deposits to an average depth of 4,5 m, the company says. Read more about Mothae on page 46.

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Kolo bulk sampling programme accelerated

A probe into the economic viability of the Kolo diamond kimberlite in Lesotho is being accelerated with the construction of a bulk sampling plant, **Lesego Mashigo** *learns while visiting the site.*

The Kolo project is in the bulk sampling phase, in which the plant is expected to process up to 15 000 t of the kimberlite ore representative of the whole pipe at the site, according to Michael Brennan, technical and operations director at Mantle Diamonds. Mantle Diamonds is building the plant in a joint venture with prospecting rights holder, Angel Diamonds.

Through the use of data obtained through diamond drilling and geological mapping, which established the geology of the area, the ore has been stockpiled in six 2 500 t samples. "From there we have been able to define where to collect our samples so that they are different and representative of the project area," says Brennan.

According to Mantle Diamonds, the primary aim of the bulk sampling programme is to recover a minimum parcel of about 1 500 ct of diamonds to assess the economic viability of the Kolo kimberlite pipe.

However, since the beginning of 2008, Angel Diamonds has processed a total of 5 227 t of mainly Type A kimberlite, which has resulted in the production of 388 ct at an indicated grade ranging between 4,49 ct/100 t and 13,21 ct/100 t through a 20 t/h dense medium separation (DMS) plant with a bottom cut-off screen size of 2 mm.

Up to 30% of the diamonds recovered are of gem quality, says Neels Engelbrecht, director of Angel Diamonds.

According to him, these results compare favourably with the results previously reported by the United Nations Development Programme's Exploration for Diamonds project, which took place during 1981. The largest diamond recovered by Angel Diamonds, to date, is 7,99 ct in size, of gem quality and irregularly shaped. Previous sales brokers' notes indicate that the Kolo pipe produced large diamonds between 1993 and 1997 – 38 ct, 52 ct and 138 ct at values of up to US$7 600/ct.

Opposite page: The primary aim of the bulk sampling programme is to assess the economic viability of the Kolo kimberlite pipe.

Above: Angel Diamonds has processed a total of 5 227 t through a 20 t/h DMS plant with a bottom cut-off screen size of 2 mm.

Left: The ore has been stockpiled in six 2 500 t samples.

Below left: The new plant is expected to achieve recovery rates in excess of 90%.

Below: An inferred resource of 2,2-million t at an average grade of 14,1 ct/100 t or 310 000 ct was estimated from surface to 50 m below the level of the regional drainage.

Far left: The pit is planned to go down about 100 m to process about 3,7-million t of ore in the seven-year life-of-mine.

Left: It is hoped that some diamonds will be recovered from the tailings.

Photographs by Lesego Makhoe



Top left: Tailings from previous operations will be used for the commissioning of the plant before the stockpiles are fed into the plant.

Above: The diamonds will be recovered in a "comprehensive and efficient" manner, with all the sorting boxes "hands-off".

Above left: Having set up a camp at the site, the operation will work a single shift of 11 hours a day.

Comprehensive and efficient plant

The DMS plant that is being constructed is expected to run at a rate of 10 t/h, but according to Brennan, this can be increased to a higher rate of up to 15 t/h. Once the ore is crushed, screened and classified into three sizes – fines, middlings and coarse – the concentrate is passed through a Flowsort X-ray machine as well as an Armstrong grease table in order to recover the stones.

According to Brennan, the plant is "comprehensive and efficient", with a recovery rate in excess of 90% and all the sorting boxes "hands-off". The diamonds recovered will be dropped into a safe, which only the directors of Angel Diamond and Mantle Diamonds have access to, and the rejects will be dropped into sealable bags for further analysis.

Brennan tells that tailings from previous operations will be used for the commissioning of the plant, which is expected to take about three weeks. "We will do bulk sampling until we are happy that the plant is operating and that our staff is fully conversant with operations. We hope to recover diamonds from the tailings as they were processed by a relatively inefficient plant," says Brennan, adding that the plant was developed "fairly quickly" in order to generate a cash flow for the project.

"We will work a single shift of 11 hours a day. We have set up a camp on site, and bulk sampling will take place for about six months," he imparts. Depending on the results, says Brennan, Mantle will then "take a position on whether it will take the majority share in the operation and the project forward to full-scale mining".

The company has an option to acquire a further 40% in Angel Diamonds following the bulk sampling phase. "The indications from the available data so far suggest that Kolo could be a lucrative operation," says Brennan.

Right: The Sekameng kimberlite pipe, which lies 5 km to the northwest of Kolo, is one of the exciting pipes that will be looked at.

Below right: 13 holes have been drilled on the 1,2 ha property and sent for analysis at Mineral Services in Cape Town, South Africa.

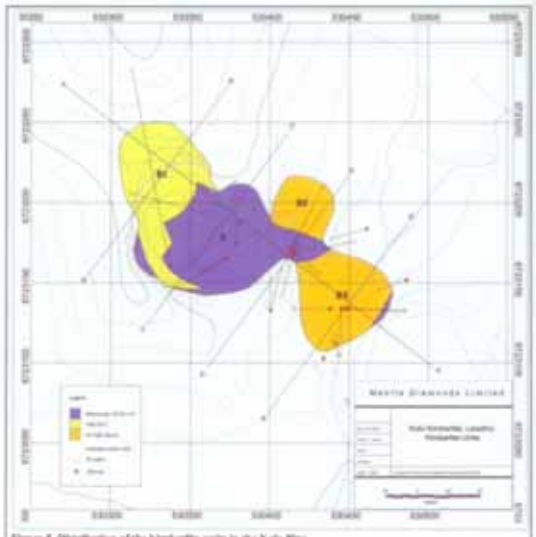

Figure 1. Distribution of the kimberlite units in the Kolo Pipe.

Table 1. Surface areas of the kimberlite units in the Kolo Pipe.

Unit	Surface area ha	Surface area %
A	0.45	39%
B1	0.33	28%
B2	0.12	10%
B3	0.27	23%
Total	1.17	100%

Ground work for mining

According to Engelbrecht, about 200 000 t of ore has been mined since the early 1990s at the 1,2 ha property. Recently, 13 holes were drilled and sent for analysis at Mineral Services in Cape Town. He says currently, the pit is planned to go down about 100 m to process about 3,7-million t of ore in the seven-year life-of-mine.

The Kolo pipe forms part of the much larger Sekameng-Kolo kimberlite group, which consists of eight dykes, one blow and four pipes, excluding the Kolo pipe. An inferred resource of 2,2-million t at an average grade of 14,1 ct/100 t or 310 000 ct was estimated from surface to 50 m below the level of the regional drainage.

"Although we have concentrated on Kolo as the best prospect, there are other interesting pipes in the area as well," says Engelbrecht, detailing that the neighbouring Sekameng kimberlite pipe, which lies 5 km to the northwest of Kolo, is one of them. Engelbrecht says that Angel Diamonds is planning to evaluate the economic potential of the Sekameng pipe through diamond drilling during the first half of 2009.

Should the Kolo project go ahead, according to Engelbrecht, 11 km of power line will be installed to provide the mine with an expected 2 MVA of power. Regarding water, which is currently sourced from a borehole, Engelbrecht says the area has the potential for a borehole field, which can also be used by the community.

According to him, the environment management plan has been approved by the authorities in Lesotho and the operation's environmental impact assessment study has commenced. An application for a mining licence has been lodged. "For larger mines, the government can take an

up to 20% stake, but for smaller mines, it is open to negotiation," he says.

According to Engelbrecht, even with the financial crisis, for diamonds, quality is what matters. "There's always a market for good quality diamonds. People are always willing to buy quality," tells Engelbrecht. For verification, in terms of colour and quality, the diamonds will go to the GIA in New York, which Engelbrecht says sets the benchmark in those regards, adding that its credibility is beyond question. "We don't want the quality of our diamonds in doubt."

A less harsh climate

The Kolo kimberlite pipe is located approximately 60 km southwest of Lesotho's capital, Maseru. The project area is located in the lowlands of Lesotho, approximately 1 500 m above sea level, and experiences a relatively mild and less harsh climate compared to the other diamond mining areas in the highlands of the kingdom, such as Letseng and Liqhobong.

According to Engelbrecht, the kimberlite pipe intrudes Karoo sandstones of the upper Beaufort and lower Stormberg groups and a late Karoo dolerite dyke. It outcrops on a topographic rise and benefits from downslopes on several sides, which will reduce the waste to ore strip ratio of the pit. The pipe is also irregularly shaped and elongated in a northwest-southeast direction, with the lobes comprising softer, more weathered kimberlite with a higher country rock and mantle zenolith content than the central, more resistant kimberlite. According to Mantle, even though both types have a similar rock chemistry, past work has shown that the softer kimberlite has a significantly lower grade than the central portion.

Three distinctly different types of kimberlitic rock: A, B and C, which form discrete bodies within the pipe, have been identified. Type A kimberlite is typically bluish green in colour, contains few xenoliths or inclusions and is relatively hard and spatially restricted to the central western portion of the pipe.

Type B kimberlite displays a more tuffaceous nature, is xenolith or inclusion rich and easily weathers to a soft friable yellowish green, yellow or pale brown material. Spatially, type B kimberlite is restricted to the north-western and eastern portions of the Kolo pipe.

Type C kimberlite is characterised by a highly friable, yellow or greenish brown colour, contains numerous sheared or tectonically-rounded clasts and is spatially restricted to a cross-cutting fault that separates type A and type B kimberlite in the north-western portion of the pipe. On average, type A kimberlite contains better grades and quality diamonds than type B kimberlite, while no data is available for type C kimberlite.

Unlike the Kolo pipe, the Sekameng pipe comprises a deeply weathered and decomposed tuffaceous kimberlite, similar to type B kimberlite in the Kolo pipe, with a yellow or greenish brown colour. According to Brennan, the primary aim of the current bulk sampling programme is to recover a minimum parcel of about 1 500 ct of diamonds to assess the economic viability of the Kolo kimberlite pipe and whether Angel Diamonds should apply for a mining lease over the area or not. ❐

Type A kimberlite is typically bluish green in colour and contains few xenoliths or inclusions.