

New surprises at old discoveries: Exploration and Sampling of the AK11 Kimberlite, Orapa Kimberlite Field, Botswana

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The AK11 kimberlite was first discovered in 1970 within what is now known as the Orapa Kimberlite Field. Historical work consisted of a single pit excavation with no records of drilling having been identified.

The AK11 geophysical anomaly is comprised of a circular intense magnetic high (~200nT above the local background; >0.008 SI units in the 3d inversion model) with an approximate surface area of 2.5Ha.

The kimberlite was interpreted as hypabyssal (magmatic) kimberlite and given poor diamond results the pipe was subjected to no further exploration.

In 2014 Lucara Diamond acquired a prospecting license over AK11 and proceeded with a program of ground geophysics and core drilling.

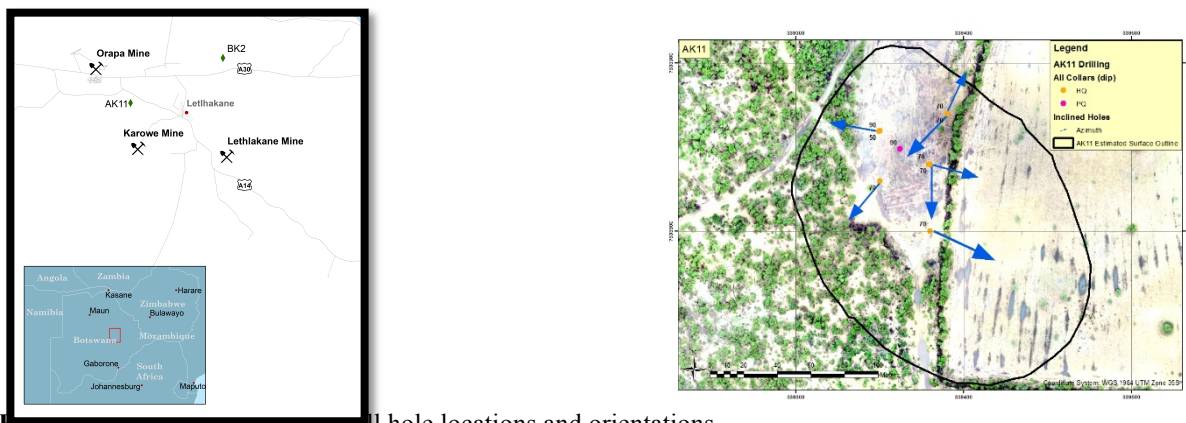


Figure 1: General location and drill hole locations and orientations.

Ground geophysical surveys confirmed the historical work with a circular intense magnetic high feature of approximately 2.5 ha in diameter (**Figure 2**) and a small gravity low, offset slightly to the south east but still within the magnetic anomaly's area. Local geology is comprised of basalts (80 to 100metres thick) overlying sandstones preliminarily identified to be of the Ntane formation.

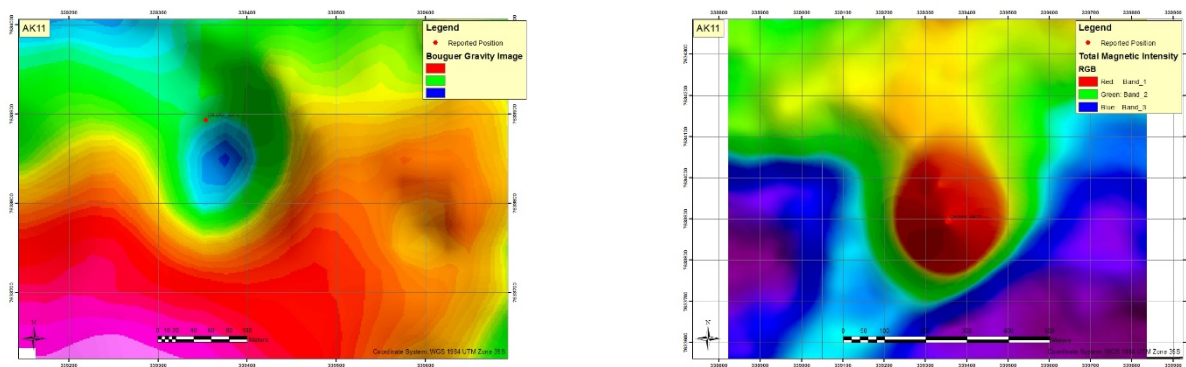
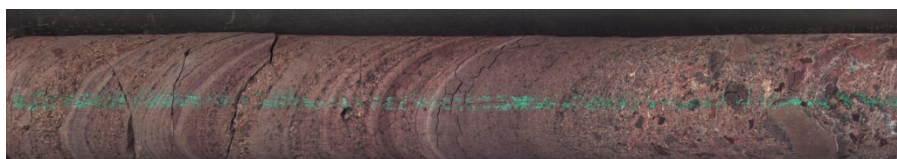


Figure 2: Geophysical data, left: ground gravity at a grid spacing of 50m; right: magnetic data at a line spacing of 20m.

Core drilling of the AK11 kimberlite comprised 9 drill-holes, 2 vertical and 7 inclined at either 50° or 70° (**Figure 1**). All but one of the holes were HQ diameter and all inclined holes were oriented (where recoveries were suitable).

Core drilling of the AK11 anomaly revealed an unexpectedly complex crater infill sequence, some examples are shown in **Figure 3** to **Figure 8**. A sequence of RVK, VK, and debris / collapse features



are observed in the upper 85 meters of the pipe.

Figure 3: AK11_DD007, 71.04m to 71.42m



Figure 4: AK11_DD007, 66.15m to 66.49m.

Graded beds, cross-bedding and variable bed thickness are observed.

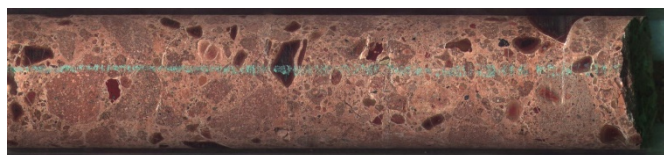


Figure 5: AK11_DD007_57.18m to 57.54m

Variable oxidation states are observed with anoxic and oxidised units observed.



Figure 6: AK11_DD007, 29.04m to 29.91m

This sequence is cut by a more magmatic to pyroclastic sequence with magmaclast development, that is present across at least 60m horizontally through the kimberlite, but shallowing to the south east.



Figure 7: AK11_DD001, 88.55m to 88.75m near pipe center; AK11_DD005, 67.65m to 68.04m in the south east of the pipe.

Both these sequences appear to overlie or are intruded by a competent pyroclastic to magmatic unit that extends from 90metres below present day surface to >200 meters of depth (extent of drilling).



Figure 8: AK11_DD001; Depth 156.1m to 156.57m

The upper units have raised magnetic susceptibility, similar in value to the surrounding basalt, however the deeper unit has significantly higher magnetic susceptibility values associated with it, and is the likely primary cause of the magnetic anomaly (**Figure 9**).

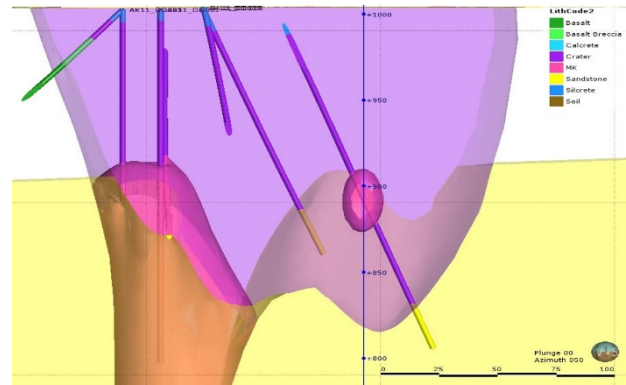
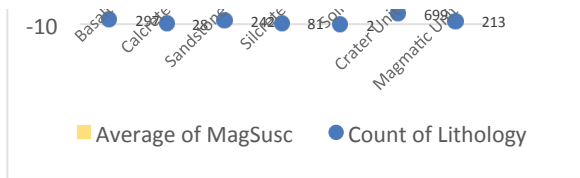


Figure 9: Magnetic susceptibility values per lithology; Right: Section looking NE showing 3d model of pipe based on simplified logs.

Results from microdiamond analysis are still pending.

Hyperspectral imaging of 1482.4 metres of core that was undertaken in Dec 2016 produced spectra including minerals expected in kimberlite, being carbonate, serpentine and saponite. Crustal rocks, (xenoliths and host) are characterised by chlorite and aluminium rich mineral phases (mica group, kaolinites). The textures of different types of kimberlite, including magmaclasts are illustrated in the following pictures. Some magmaclasts have very similar responses in their spectra to the magmatic kimberlite and potentially derive from that unit.

New modern diamond processing, analytical methods and drilling information have enhanced the understanding of the diamond content and intrusive history of the AK11 kimberlite.

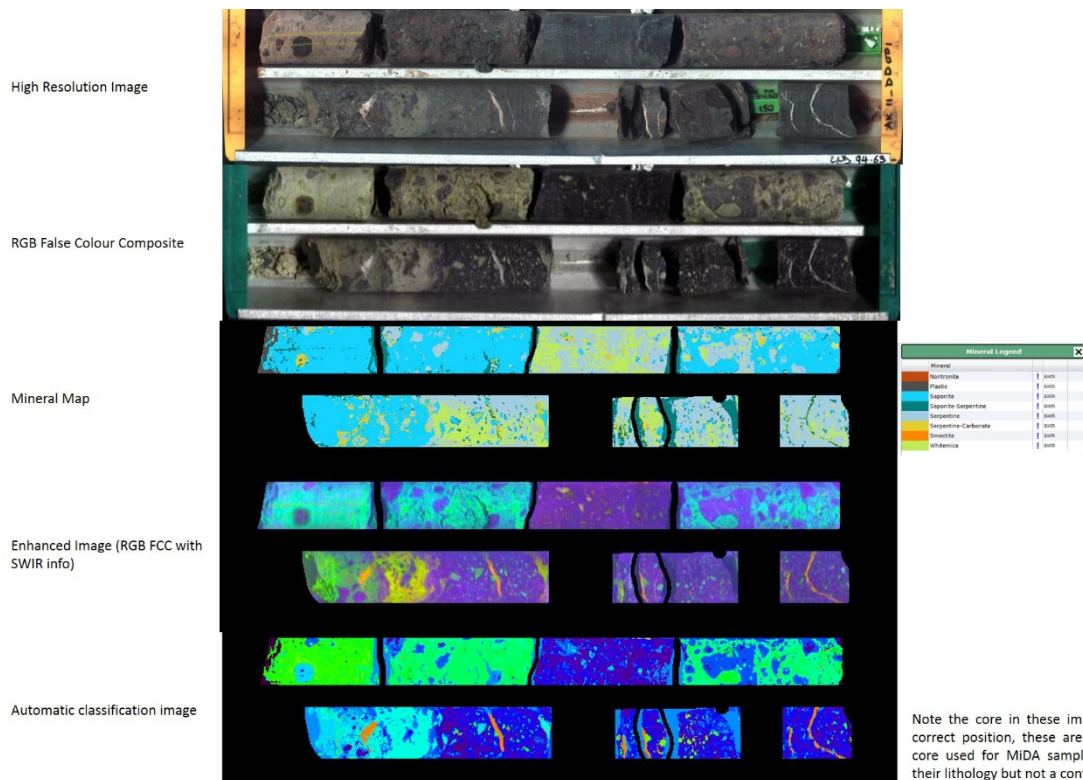


Figure 10: Examples of data/images available from the core imaging.

References

Mxinwa, T., Apr 2017, Boteti Mine – Karowe 2016 Spectral Processing and Interpretation and Data Product Summary. Consultant Report. Internal Company Document Terracore TCR17173.