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**Tsumkwe and
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Kimberlite search
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The search for the source of Tsumkwe and Omatako

Tsodilo Resources is confident that the source of the Tsumkwe and Omatako kimberlites is on its licences in Botswana.

James M Bruchs talking to field team members preparing drill sites prior to the latest drilling campaign.

De Beers, Rio Tinto, BHP, Tsodilo Resources Ltd, Ashton, Reunion Mining, Falconbridge, Motapa, Mt Burgess, Thabex and Namdeb have at various times over the past 30 years spent much money, time and effort in finding the kimberlite(s) that sourced the secondary macro diamond and other kimberlite indicator mineral anomalies located in Namibia at Tsumkwe and Omatako. It is now commonly accepted that these anomalies are indeed secondary sedimentary deposits at the base of the Kalahari Group with a distal provenance area.

Historical perspective

In 1977, De Beers started initial reconnaissance regional sampling in north-eastern Namibia and found a cluster of four kimberlites at Sikereti, with two secondary kimberlite indicator mineral anomalies far in the south of the area at Tsumkwe and to the north at Omatako. It abandoned the project in 1983 due to the escalation of armed conflict in the area. During De Beers' exploration programme on the Namibian licences, Falconbridge had a brief

and unsuccessful foray on the Botswana side of the border in January 1979 after selecting four targets from an aeromagnetic survey flown in 1971. The company drilled one of the targets without intersecting kimberlite and terminated the licences in March 1980. Kalahari dune sand blankets most of the area, varying from just a few meters, to up to 60 m deep, so there is little in the way of outcrop to confirm the underlying geology. Kimberlite exploration in the area only received renewed impetus following a re-interpretation of the exact location of the craton's southern margin using the results of modern airborne magnetic surveys, completed in Namibia in 1995 and in Botswana in 1997.

Tsumkwe

Rio Tinto had taken out licences in Namibia in 1994 in the Tsumkwe area and spent considerable time refining the De Beers data and evaluating newly defined airborne magnetic targets. In 1995, Dr William Griffin, CSIRO, Australia, after examining a batch of garnet from the Tsumkwe anomaly sent to him by Rio Tinto, commented on his findings, "If this sample was a representative

batch of garnets from a single kimberlite, it would look very prospective. The fact that you are picking up this much good material in an apparent mixed sample is very encouraging in terms of the prospectivity of the area, provided of course that they do not come from great distances. For much of the sample, the cratonic geotherm, the presence of depleted and phlogopite-related garnets, and the abundance of garnets in the diamond window indicate that diamondiferous mantle probably has been sampled by the parental kimberlites (or volcanics). If the sample were treated as coming from a single kimberlite, and if this sample is representative of the garnets in that kimberlite, it would have a Γ score of 68, which would give it a maximum probable grade in the order of 70 - 80 cpht. That figure should not be taken seriously, but such a high score for an exploration sample would give some confidence that high-grade sources must have contributed to the mixture."

Despite Griffin's positive comments, Rio Tinto stopped its programme in 1996 following a corporate review of its world-wide exploration activities.

Omatoko

In June 2004, Dr Norman Locke, then of RSG global, stated, "The Omatoko anomaly has been described as a major unexplained diamond-positive kimberlitic indicator minerals (KIM) anomaly". He highlights its location close to an ancient Kalahari basin shoreline that was depositing sediments derived from a source located to the southeast and east and concludes that:

- The Kavango Project area is interpreted to be underlain by diamond-prospective cratonic lithosphere and occurs in a geological environment that is favourable for the occurrence of potentially diamond-bearing kimberlites.
- The favourable location with respect to regional structures and intrusive features are considered conducive to kimberlite magmatism. Of particular interest, the Kavango area lies on the onshore extension of a northeast trending fracture zone known to have been active during the Cretaceous period.
- Regional maps of Kalahari thickness and drilling results indicate that the Kalahari basin deepens towards the west and southwest and

Stage 1

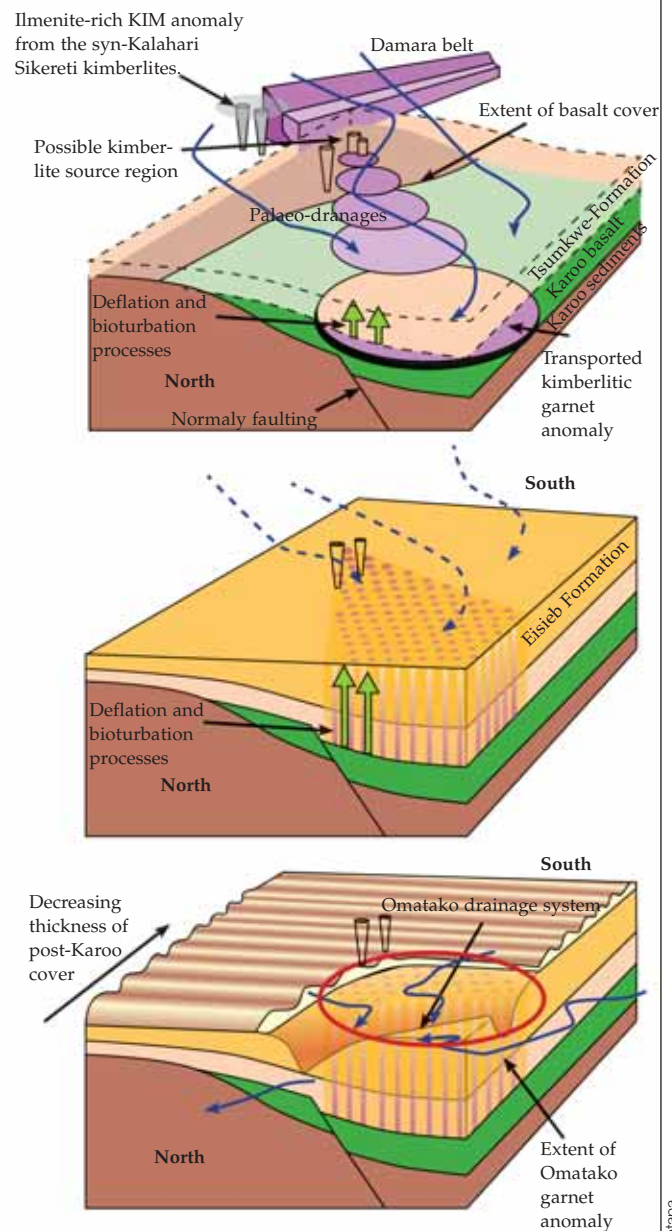
- Post-Karoo, pre-Kalahari kimberlite volcanism in Kavango region.
- Deposition of the "lower" Kalahari Tsumkwe Formation in partially fault-bounded, post-Karoo basin.
- Erosion of Damaran metamorphic lithologies and platform carbonates results in the fluvial input of carbonate-rich sediments and highly abraded non-kimberlitic garnets into the Tsumkwe.
- Fluvial input of KIMs from a potential source region in the southeast into the Tsumkwe (moderate abrasion of KIMs).
- Vertical distribution of KIMs in the "lower" Kalahari.

Stage 2

- Deposition of the "upper" Kalahari Eisieb Formation and continued input of KIMs from the southeast.
- Vertical distribution of KIMs in the Kalahari.
- Dissipation of southeast palaeo-drainages.
- Depositional hiatus and lithification of Kalahari sediments resulting in the "freezing-in" of KIMs in Kalahari sediments.

Stage 3

- East-west aeolian dune formation.
- Masking of the KIM anomaly.
- Development and subsequent incision of the Omatoko drainage system.
- Thinning and removal of aeolian sands and erosion of KIM-rich Kalahari sediments.
- Release of KIMs onto the present-day surface.
- The Omatoko garnet anomaly is limited to exposed, KIM-bearing Kalahari sediments.



that the Kavango area lies close to a topographic high in the sub-Kalahari surface. At some stage this situation changed, possibly as a result of drainage capture, resulting in transport from the west and southwest as it exists today. The carbonate-rich nature of the Kalahari sandstones encountered in the Kavango area provides further support for a sediment source in the south/southeast as these areas are partially underlain by platform carbonates of the Damara Group.

The non-kimberlitic heavy mineral suite that occurs in association with kimberlitic minerals in Kavango is of metamorphic origin, and appropriate sources (not buried by younger sediments) for these minerals are only present in the south and east of the project area. The lack of basaltic heavy minerals in the Kavango area (surface or down-hole samples) also supports a transport direction from the area to the south or southeast, a large proportion of which is not underlain by basalt.

Kavango area: a model of geological development of the Omatoko garnet anomaly.

Q&A with James M. Bruchs, CEO of Tsodilo Resources

Your recent purchase of a diamond core drill rig was a major expenditure for a junior mining company. Why did you decide to go this route?

Frankly, I did not have a choice. With all of the exploration activity in southern Africa, finding a dependable drill contractor that was not booked for the next year or two was impossible. In addition, the demand for drill rigs resulted in the price per meter being three to four times what it was in 2002. We just could not handle the delays or the increased drilling costs so purchasing our own rig was the only alternative if we wanted to advance the project in a timely basis.

What type of drill rig did you purchase and why?

We purchased an Atlas Copco CT14 diamond core drill directly from Atlas Copco in Sweden because it was the best drill rig suited to our rugged conditions and to our specific purposes. In addition, the Atlas Copco folks in Sweden made it happen and for a small company like us that is important. From the date that we placed the order to commissioning of the rig over one of our newest kimberlites, it took just more than four months which included the mounting of the rig on a truck (in Sweden), shipment to Botswana and commissioning on site. It was really fantastic seeing it all come together in such a short timeframe.

The drill rig was mounted on an Iveco 420 6x6 tracker manufactured in Europe and especially made for the African market. In addition to the drill rig truck, we purchased three similar trucks for cargo, water and fuel tanker use. Like Atlas Copco, the corporate and regional folks at Iveco were more than helpful and they have supported us along the way.

Although it is still early in your operation of the drill rig, do you think you made the right decision?

Absolutely, we have drilled more in four months than we did with contractors over the previous two years and have discovered another five kimberlites since commissioning. We have a seasoned drilling crew and we operate 16 - 18 h/day. We also purchased a state-of-art Geometrics cesium magnetometer

and hired an experienced field geophysicist so that we are not dependent on geophysical contractors for our ground surveys.

We can locate a target, do a ground magnetic survey on it and drill it in a couple of weeks as opposed to the 12-month-plus time period it would have taken before and we can do it more economically as well. For us, time really is money and the more we can accomplish in the shortest time, the more efficient and productive we become!

That is all well and fine but how do you rate your chances of discovering the source of the Tsumkwe and Omatako diamonds?

We are definitely on the right track, the available evidence indicates that the source of these secondary anomalies is an economic kimberlite or kimberlites and that the source of Tsumkwe lies east/northeast of the secondary anomaly and that the source of Omatako lies southeast of the secondary anomaly. All directions lead to our licence blocks. In a summary paper written by De Beers in 1995, the company was emphatic that its earlier exploration programme and work by others since that time was complete enough for it to conclude that the source of Tsumkwe and Omatako does not lie in the ground which they had covered prior to 1983.

I can only agree with De Beers' assessment. The area covered by De Beers during this period covers most of Mt Burgess' current licence blocks and that portion of Motapa's licences that surround the Omatako anomaly itself (see licence map - CDM prospecting areas). Eight years after summarising its activities and reviewing the results of Motapa, De Beers must still hold the view that the area between the Omatako anomaly and our licence blocks is prospective as the company has recently entered into JV agreements through Namdeb with two companies adjoining our licence blocks to the west.

Our licence blocks are centered on regional topographic high elevations: the Tsumkwe and Omatako anomalies lie down slope to the west of us: we have a plethora of targets to investigate: 28 kimberlites to date have been discovered within our licence blocks and 20% of those tested are diamondiferous. I like our ground!

- A model for the possible geological development of the Omatako garnet anomaly assumes that kimberlite emplacement has occurred contemporaneous with most southern African kimberlites (i.e. during the Cretaceous). The assumption places the kimberlite volcanism as pre-Tsumkwe Formation deposition. The inference has to be made that the Omatako garnet anomaly grains has been sourced from a kimberlite located to the southeast. This kimberlite has been covered by Tsumkwe and Eisieb Formation sediments of the Kalahari. Recent aeolian dunes have masked the KIM anomaly until the development and incision of the Omatako drainage that caused the KIMs to be released into the present day surface environment."

Namibia - Thabex Exploration

In the north of Namibia, during April 2006, South African-listed Thabex Exploration announced that a subsidiary company, Minnex Exploration,

had signed a joint venture agreement with Namdeb, a De Beers subsidiary, who would be project managing the exploration of its two licences located some 30 km east of the secondary indicator mineral anomaly at Omatako. The two licences are 1 600 km² big and Minnex has defined 32 magnetic anomalies for follow-up exploration.

Namibia - Motapa Diamonds

Motapa's drill sampling of the Kalahari sandstones away from the Omatako area has shown that the garnets have been transported into the basin from the south or southeast. Furthermore, the non-kimberlitic heavy mineral suite that occurs in association with kimberlitic minerals in Kavango is of metamorphic origin, and appropriate sources (not buried by younger sediments) for these minerals are only present in the south and east of the project area.

The lack of basaltic heavy minerals in the Kavango area (surface or down-hole samples)

also supports a transport direction from the area to the south or southeast, a large proportion of which is not underlain by basalt.

After several years of detailed ground geophysical and KIM sampling work over more than 100 airborne magnetic targets, Motapa concentrated most of its 2004 and 2005 programme in diamond drill evaluation of 36 high-priority airborne magnetic targets in the south-east quadrant of its 20 900 km² licence area, some 80 km from the Omatako anomaly and 20 km east of the Sikereti kimberlites.

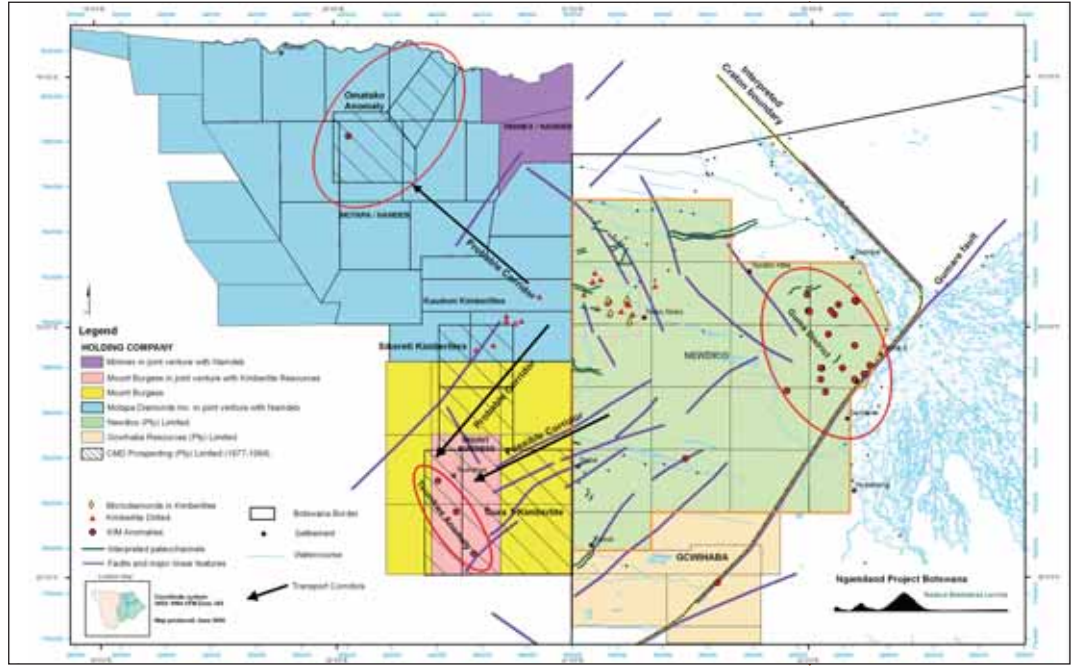
This evaluation programme resulted in the discovery of eight new kimberlites, covered by 10 - 50 m of Kalahari overburden. The new kimberlites are all classified as crater facies, and therefore not deeply eroded, with sizes interpreted from gravity profiles to be between 300 - 500 m in diameter. Kimberlite indicator mineral and petrographic analysis of the drill samples suggests that none of these kimberlites (the "Kaudom South" cluster) were the

source of the G10 garnets and macro diamonds found at Omatako.

Current status of exploration on the craton

Namibia – Mt Burgess

Mt Burgess have used ground magnetic and gravity surveys, followed by reverse circulation



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The explorers' land holdings illustrating the location of major findings.

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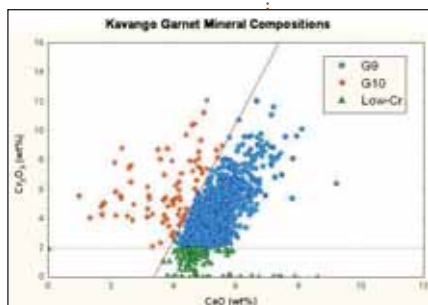
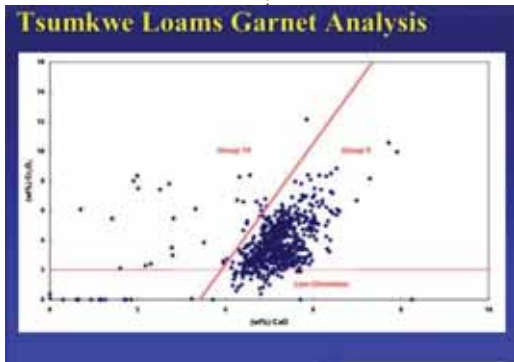
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Top: Garnet analysis from Tsumkwe loam samples.

Above: Kavango garnet mineral compositions.

drilling (approximately 840 holes) to define palaeo drainage channels that transported KIMs, principally garnet, and diamonds into the Etosha basin where they formed the extensive shoreline deposit in the Lower Kalahari beds centered on the village of Tsumkwe.

This systematic exploration programme led to Mt Burgess' discovery, in late 2001, of the Gura 1 para-kimberlite some 50 km southeast of Tsumkwe and the nearby Nxa-on kimberlite in 2002. Neither of these kimberlites are diamondiferous.

Botswana – Tsodilo Resources

Tsodilo Resources Ltd is the current licence holder of some 21 000 km² of the Botswana sector of

the craton and have extended exploration beyond the initial kimberlite discoveries of the Ashton/Reunion joint venture.

The extent of the Nxau Nxau kimberlite field continues to expand, with 28 kimberlites found to date of which 20% of those tested carry micro diamonds.

Some 100 km due east, in the Guma District, a widely dispersed KIM trail on the edge of the Okavango basin continues to be investigated by detailed magnetic and gravity surveys while several singleton KIM grains from the southern Gcwihaba licences have also been followed up.

Remote sensing and geophysical studies have outlined several possible stream transport corridors to explain the secondary KIM (G10 garnet) and diamond anomalies in Namibia.

The intensified search for the source of these anomalies is being conducted on two fronts – the drill evaluation of both geophysical and KIM sampling anomalies and the drill evaluation of transport corridors and paleo drainage channels.

Tsodilo has acquired an in-house drilling capacity since the use of contract drilling companies has become prohibitively expensive and availability of rigs is very low. This new drill capability should greatly increase the flow of geological data, a vital ingredient in the exploration mix.

Drill evaluation of magnetic, gravity and KIM-in-soil anomalies within the greater Nxau Nxau district has defined 28 kimberlites to date, the majority of which are classified as crater facies with thick intersections of crater sediments and subordinate kimberlite intersections, which seems to indicate that these are not deeply eroded and may be relatively young in age, perhaps Upper Cretaceous (80 - 90 mybp) and linked to

the rifting associated with the formation of the Etosha basin in the west and the onset of the Lower Kalahari deposition.

All of these crater facies kimberlites are predominantly ilmenite rich/garnet poor tuffisitic kimberlites and vary in size from roughly 1 ha to more than 100 ha (A37) as interpreted from drilling and gravity surveys.

In late 2004, Tsodilo drilled the A15 anomaly and intersected very weathered kimberlite immediately below the Kalahari overburden. This kimberlite is distinctly different from previously found kimberlites, both because it is more deeply weathered and eroded and could therefore represent an older generation of kimberlite intrusion, but also because of the very different indicator mineral content.

Further drilling of A15 in 2005 and mineral chemistry studies of the garnet and chrome diopside populations were encouraging, because the chemistry closely resembles that of the diamond producing Canadian Jericho and Russian Arkhangelsk kimberlites. Despite its promising chemistry, the A15 sample submitted for micro diamond analysis was negative.

Remote sensing studies have suggested various "transport corridors" where streams drained the pre-Kalahari land surface and transported KIMs and diamonds to both the Omatako and Tsumkwe secondary deposits.

An analysis of the surface magnetic component also suggests the location of remnants of palaeo drainage channels on the pre-Kalahari land surface that could have been feeder streams to the Tsumkwe and Omatako anomalies. Both of these interpretations will be tested by drilling to bedrock during the 2006 and 2007 exploration campaigns.

Tsodilo intends to continue with drill evaluation of targets defined within the Nxau Nxau cluster as its first priority, and then evaluate the Guma District anomalies before testing of the paleo drainage channel interpretations.

A low altitude, closely spaced, airborne magnetic survey using state-of-the-art gradient array sensors, is also scheduled for the 2006/07 campaign. This survey of the dolerite dyke swarm area immediately south of the Nxau Nxau kimberlite cluster is designed to distinguish the subtle magnetic response of kimberlites from the intense magnetic signature of the dolerite dykes.

Comments James Bruchs, president and CEO of Tsodilo, "All the diamond explorers on this southern portion of the Congo craton are highly motivated to find the kimberlite or kimberlites that must exist here which sources the G10 garnet and macro diamonds found at Tsumkwe and Omatako.

"Results suggest that there are at least two generations of kimberlite within the Nxau Nxau cluster and after consideration of all the facts, we believe that our persistent and systematic exploration approach will be rewarded with a major discovery." □

* Cover sponsored by Tsodilo Resources