

## A JUNIOR EXPLORATION COMPANY IN AFRICA

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### BACKGROUND

Kalahari Mining N.L. (the company) was formed to explore for gold and base metals in southern Africa. Namibia and Botswana were selected as being stable countries with a history of dependence on, and support for, mining. From an investment perspective, both countries are in the low risk category. Both countries have prospective geological environments and have large areas of deep weathering or shallow cover where exploration techniques developed in Australia can be readily applied. Both countries have well-developed infrastructure and exploration support facilities, including good geological map coverage and comprehensive databases on previous exploration. Furthermore, English is the official language in both countries.

Namibia, especially, is under-explored. Because it was a territory administered by South Africa until independence in 1990, mineral exploration and mining was, for many years, adversely affected by international isolation, economic sanctions and the guerilla war in the northern parts of the country. ("Finding mines" meant something different then.) As a result, the exploration and mining technology being used in Australia have not been applied in Namibia. Examples include:

no application of leach-SX-EW technology in recovery of oxide and supergene copper;  
no BLEG analyses for gold;  
no RAB geochemical surveys; and  
until 1995, no high resolution aeromagnetic surveys.

Furthermore, there has been no application of new exploration models (eg, for iron oxide-copper-gold deposits).

### GEOLOGICAL OVERVIEW (BOTSWANA AND NAMIBIA)

There are several significant aspects of the geology — and hence mineral potential — of Namibia (Figure 1) and Botswana that make the countries attractive for exploration. Some of those aspects are listed here.

- Archaean granite-greenstone terranes in eastern Botswana contain deposits of gold (eg, Francistown district) and copper-nickel (Selebi-Pikwe).

- Eastern Botswana also contains early to middle Proterozoic sequences, including an extension of the Bushveld Complex.
- Early to middle Proterozoic sequences in Namibia contain deposits of copper (including the soon-to-be-developed Haib porphyry copper deposit) and gold.
- The late Proterozoic Damara Belt, occupying a large part of Namibia and extending into northern Botswana, contains deposits of copper (notably in the Tsumeb district, the Matchless Amphibolite Belt and the "Kalahari Copperbelt"), gold (Navachab), uranium (Rössing) (cf. Anderson and Nash, this volume), lead-zinc (Rosh Pinah) and other commodities.
- The undeformed Cambrian Nama Group and the Palaeozoic-Mesozoic Karoo Sequence occupy large areas. Coal is mined in eastern Botswana.
- Mesozoic intrusions include diamond-bearing kimberlites (Orapa and Jwaneng).
- Cainozoic cover is extensively developed in the Kalahari Desert and the Namib Desert.
- Coastal sediments contain extensive placer diamond deposits.

### EXPLORATION BY KALAHARI MINING N.L.

#### Corporate objectives

The company has developed a range of corporate objectives.

- Focus on southern African base and precious metals exploration and exploitation opportunities in order to establish a portfolio of significant mineral prospectivity.
- Selectively negotiate Farmout agreements on tenements held by the company and Farmin agreements on tenements held by other companies on terms and conditions that protect the company's rights and interests and that provide it with clearly defined financial benefits.
- Assess already identified base and precious metals exploration targets to establish priorities for development of one or more near-term mining projects.
- Generate operational cash flow to internally fund an aggressive ongoing exploration program.
- Produce attractive financial returns to the company's shareholders that are consistently above the financial returns achieved by like-sized mineral exploration companies.

- Be a good corporate citizen in the countries in which the company operates.

### Company strategy

The company's tenement acquisition strategy is two-fold — acquisition of advanced projects, and “grass roots” projects.

**1. Advanced projects:** base metals and gold resources already identified but considered too small for major companies, or known mineralisation with potential for upgrading.

**2. "Grass roots" projects:** regions with good potential for copper–gold deposits and, as secondary targets, base metals deposits. Areas should preferably have been flown by high resolution magnetic/radiometric surveys.

Initial seed capital was used for geological review, area selection and tenement application. Further injections of seed capital were applied to the purchase and interpretation of regional geological and geophysical data, leading to target selection.

### Summary of projects

**Ngamiland project.** In northern Botswana, a late Proterozoic copper-bearing unit, up to 20 m thick, is regionally developed over a strike length of 600 km at the base of dark-coloured siltstone and calcareous beds overlying red-coloured sandstones. Mineralisation is similar in style to the major deposits of the Central African Copperbelt. Within the mineralised zone, previous exploration has identified several higher grade deposits, containing up to 20 Mt at over 2% Cu equivalent. Exploration is still at a comparatively early stage, with drillholes in places up to 10 km apart within the mineralised zone.

There is potential for medium-scale underground mines having annual aggregate production of 1 Mt to 2 Mt of ore. There is also potential for development of medium-scale open-cut mines with annual production of around 1 Mt of ore. In the extensive unexplored portions of the tenements, there remains potential for large deposits capable of sustaining open cut mining. The company is earning a 51% interest in the tenements through exploration expenditure.

**Ekujja project.** The Omitiomire copper deposit has an inferred resource of 7.9 Mt at 0.9% Cu. Primary mineralisation is as disseminated chalcocite in bands of amphibole–epidote–magnetite schist within middle Proterozoic metamorphic rocks. The style of mineralisation is not certain — perhaps metamorphosed stratabound copper mineralisation or possibly a skarn deposit. Previous drilling on the property

focused on a small high grade core in primary copper mineralisation. There has been little drilling in the up-dip area where oxide and supergene mineralisation might be expected. The resource remains open up-dip and to both the north and south. The company sees potential for at least a 15 Mt resource. A possible open-pit, acid-leach SX-EW operation is being considered. The two EPLs surrounding the Omitiomire deposit have potential for further discovery. The tenements have recently been covered by an airborne electromagnetic (EM) and magnetic survey.

**Gorob project.** The tenement at Gorob contains a cluster of eight known copper(–silver–gold) deposits, three of which may be of sufficient size to exploit. Mineralisation is Besshi-type massive sulphide chalcopyrite–pyrite–pyrrhotite–magnetite bodies within the late Proterozoic Matchless Amphibolite Belt. An oxide zone extends to about 30 m depth. The deposits were drilled 25 years ago, but updated resource estimates have not yet been produced. A large exploration tenement has excellent potential for discovery of additional deposits and several priority drilling targets have been identified. A recent airborne magnetic and EM survey may provide additional targets for follow-up drilling.

**Kamanjab project.** The area contains widespread copper and gold occurrences, apparently in an eroded middle Proterozoic magmatic arc setting. The region has recently been flown by a high resolution magnetic/radiometric survey. Magnetic and geochemical anomalies provide targets for early exploration.

**Khan Valley project.** The area contains known copper–gold occurrences of skarn, vein stockwork and shear-related styles in middle to late Proterozoic sequences invaded by early Palaeozoic intrusions of granite to diorite composition. A number of operating and dormant gold and base metal mines (including the large Navachab skarn gold mine) lie within or near to the company's tenements. Review of geology and previous exploration, together with interpretation of newly available airborne magnetic/radiometric data, have resulted in a large number of priority targets to be tested in follow-up exploration.

**Okaserawe project.** The tenement surrounds an old gold mine, with mineralisation apparently similar in style to the deposits of the Pine Creek Geosyncline (Australia). The host rocks are late Proterozoic slate invaded by early Palaeozoic granite. The tenement covers a north-trending fold system controlling the known mineralisation. The tenement has recently been flown by a high resolution magnetic/radiometric survey and specific targets have been identified for follow-up exploration.

**Dordabis project.** Middle to late Proterozoic sequences occupy a complexly thrust-faulted terrane. The area contains known copper-silver deposits. Coincident gravity and magnetic anomalies, with associated copper occurrences, provide priority targets. Other untested geochemical and geophysical anomalies are known. Parts of the tenements have recently been flown by a high resolution magnetic/radiometric survey.

**Warmbad project.** The project contains six large tenements in a very under-explored region of early to middle Proterozoic sequences. The varied geological terrains within the tenements have good potential for a range of base and precious metal target types, including granite-related copper-gold, Broken Hill-type lead-zinc-silver, and nickel-copper-platinum in basic-ultrabasic bodies. One tenement is along strike

from the major Haib porphyry copper-gold deposit. Known mineralisation, magnetic anomalies, geochemical anomalies and large zones of alteration provide exploration targets.

### **The company's present position**

**Tenements.** The company has 25 tenements (covering over 20 000 km<sup>2</sup>), either granted or under application, in Namibia (Figure 1) and is earning an interest in four tenements (covering 4 000 km<sup>2</sup>) in Botswana. Four properties have identified copper resources requiring infill and extension drilling to confirm and expand the resources.

There have been delays in granting of tenements in Namibia. The Ministry of Mines and Energy is aware of the problem and has taken steps (including a computerised tenement registration and monitoring system) to rectify it.

**Infrastructure.** An operating office has been established in Windhoek (Figure 1), staffed by a resident General Manager, a project geologist and an administrative/logistical support officer. Contract geologists, specialist consultants and an assay laboratory are available in Namibia. Australian consultants also provide advice on the projects. The company is currently gearing up for field work.

**Capital.** The company is raising capital for exploration through private placements and joint ventures. The intention is to raise additional capital through a public share offering in one to two years.

Kalahari Mining N.L. has acquired a number of advanced copper projects, i.e. properties with known copper deposits which have the potential to be rapidly moved towards resource status and feasibility study. In particular there are opportunities for early development of open-cut - leach - SX - EW operations.

In the longer term, the company sees both Botswana and Namibia as having excellent discovery potential for new copper and gold deposits. In particular, there has been little previous exploration for certain types of deposits (such as iron oxide-copper-gold deposits) which are being actively sought in comparable geological terrains in Australia. In order to exploit its expertise in regional geological/geophysical interpretation and targetting, the company has established a large tenement position in geologically favourable areas which have been recently covered by high resolution airborne magnetic - radiometric survey.

Both Botswana and Namibia have favourable operating regimes in terms of infrastructure, attractiveness to foreign investment, and exploration support facilities.

## **ACKNOWLEDGMENTS**

This paper is published with the permission of the Board of Directors of Kalahari Mining N.L.

## **REFERENCE**

Anderson, H. and Nash, C., 1997. Integrated lithostructural mapping of the Rössing area, Namibia, utilising remotely sensed data. This volume,

## **CONCLUSION**

Figure 1. Regional geology of Namibia. Exploration tenements held by Kalahari Gold & Copper (Pty) Ltd - a subsidiary of Kalahari Mining N.L. - are also shown.