

Botswana copper

The country has established, relatively small copper production but this is set to change with two important new mines to come on stream soon – Boseto and Ghanzi

Plant bore water drill in action at Boseto

Bamangwato Concessions Ltd. (BCL) is the most established copper producer in the country, processing copper-nickel concentrate from its Selebi-Phikwe mines. Tati Nickel Mining (a subsidiary of Norilsk Nickel of Russia) also produced copper from its nickel-copper matte. AIM-listed African Copper (ACU) is currently focused on Botswana. Its flagship project is the 100% owned, producing Mowana open-pit mine, Botswana's only pure copper mine. ACU also owns the rights to the adjacent Thakadu-Makala deposit. Both deposits are situated on the highly prospective Matsitama belt.

Last December ACU received a Mining Licence from the Botswana Government for its Thakadu copper-silver deposit some 80 km from the Mowana mine in the northeast of the country, close to Botswana's second largest city, Francistown.

The Licence has been granted on condition that the area declared as an archaeological site is restricted to underground mining processes so as to avoid disturbing the archaeological site contained within the approved mine lease area. All other areas not declared as archaeological sites or national monuments can be mined by open pit. It is anticipated that

the current interim open-pit cut design will allow for extraction of some 1.4 Mt of ore.

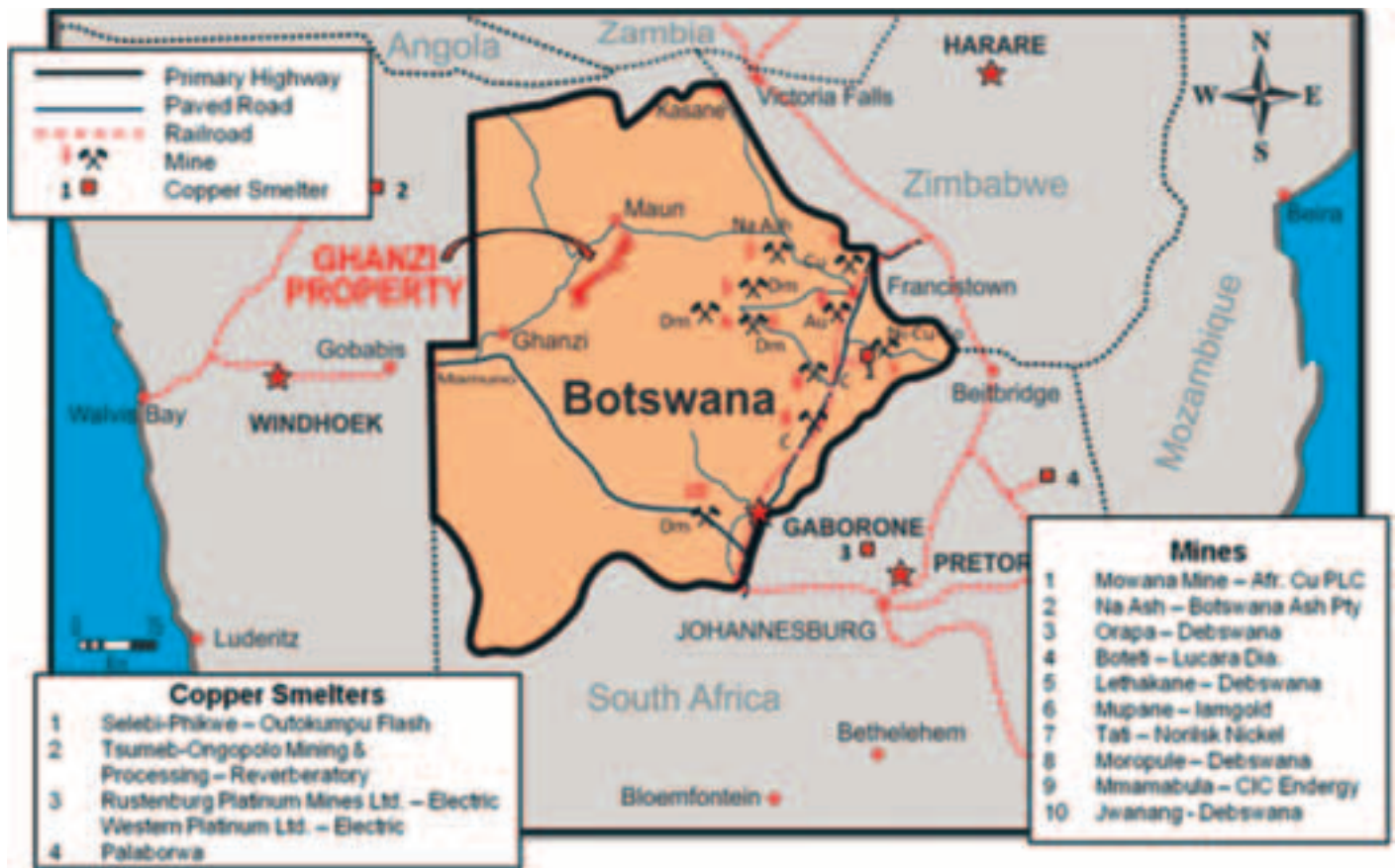
The issued Mining Licence allows full commercial mining to start while awaiting further consultations on mining out the ore reserve directly underneath the Thakadu archaeological site. Thakadu's high grade mineral reserve is being developed in an initially small scale (and relatively low cost) operation with low pre-strip mining requirements and will share the Mowana infrastructure and management.

Mowana is located in an area which has been mined for the past 400 years. The mine was named after the spectacular Boab tree on the mine's property; Mowana meaning Boab in the Setswana language. It lies within a Paleoproterozoic sedimentary basin of the southern African Shield. The Dukwe deposit is an epigenetic quartz-carbonate vein hosted copper deposit. The mineralisation lies within a near-vertically dipping, extensive belt of the early Proterozoic Matsitama Supergroup metasedimentary rocks. Enclosed by sheared granite-gneisses and granites within the broader structural domain of the Bushman lineament. The primary sulphide consists of chalcopyrite mineralisation within a complex

assemblage of quartz-calcite veins, breccias and carbonaceous calcareous sediments developed within a limestone horizon of the Matsitama Group sediments. The near surface parts of this zone have been enriched in a supergene blanket, while the parts closest to surface have been oxidised with the development of copper-carbonates and copper-oxide minerals.

A near-surface orebody, Mowana is characterised by the mixed nature of oxide and supergene enrichment extending from surface to a maximum depth of about 70 m. With increasing depth supergene chalcocite mineralization continues and dominates with a nominal transition to Chalcopyrite-bearing hypogene mineralization at around 150 m below surface. Measured and Indicated resources amount to 87.67 Mt at 0.71% Cu.

The process plant at Mowana uses standard flotation technology and has been designed to produce saleable copper concentrates from the treatment of some 1 Mt/y of oxide, supergene and sulphide ores. Sulphide minerals are separated first, and tailings from the sulphide roughers are sent to an oxide circuit. Most other mineral species are recovered in the oxide flotation process. Concentrates are



The Fraser Institute Survey of Mining Companies: 2010 Mid-year Update, ranked Botswana eighth globally, out of 51 jurisdictions giving the country the highest score of any African nation, and second only to Chile. Transparency International ranked Botswana as Africa's least corrupt country in its 2009 review (37th worldwide, ahead of many European and Asian countries). The Economic Freedom of the World Report ranked Botswana third in Africa, 60th globally, and Heritage Foundation's 2009 Index of Economic Freedom ranked Botswana second in sub-Saharan Africa. Standard & Poor's assigned Botswana an "A/Stable/A-1" grade credit rating in 2010, one of the few countries rated in Africa, and ahead of many countries in central Europe, East Asia, and Latin America

filtered to recover excess process water, as are tailings. Tailings are dry stacked. Water recovered in the dewatering stages will be recycled to the various parts of the plant as process water.

Two companies with advanced projects, Hana Mining and Discovery Metals, will be changing the face of Botswana copper mining significantly in the near future.

Biggest copper mine

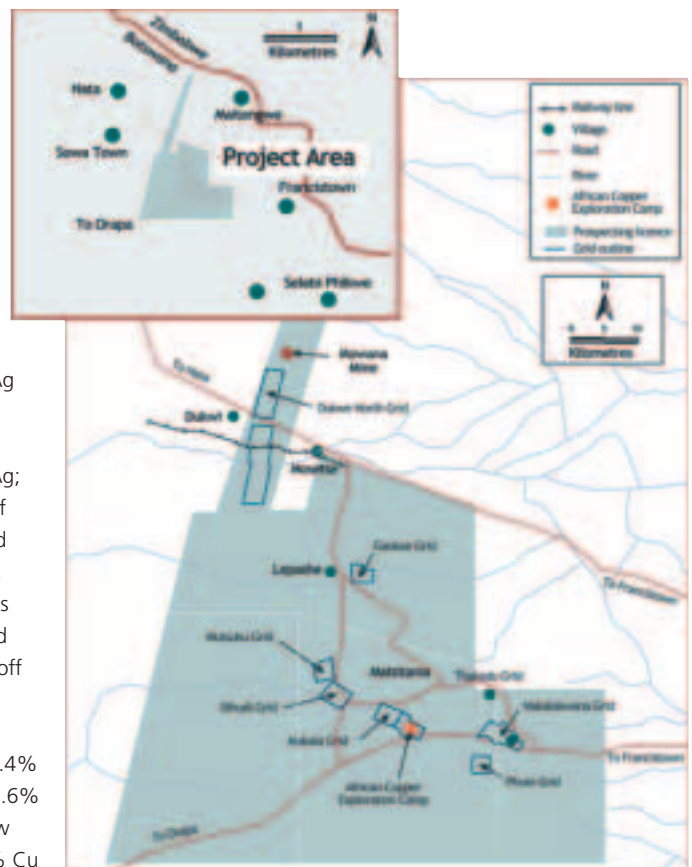
Discovery Metals is developing the Boseto copper project within its large tenement position in Botswana's highly prospective

Kalahari Copperbelt in northwest Botswana, a previously poorly explored extension of the world-renowned and lucrative Zambian Copperbelt. The prefeasibility study demonstrated Discovery Metal's plan to develop Botswana's largest copper mine is economically attractive. The extensive tenement package is held 100% by Discovery Metals.

The current mineral resources at Boseto amount to 102.8 Mt @ 1.4% Cu and 17.3 g/t Ag consisting of Indicated resources of 18.5 Mt @ 1.4% Cu and 17.8 g/t Ag; and Inferred resources of 80.3 Mt @ 1.4% Cu and 16.9 g/t Ag. The current initial reserve at Boseto is 24.1 Mt at 1.3% Cu and 16.7 g/t Ag above a cutoff grade of 0.3% Cu. This comprises high grade reserves of 21.8 Mt at 1.4% Cu and 18.3 g/t Ag to 0.6% Cu cutoff grade, and low grade of 2.3 Mt at 0.3% Cu

and 2.8g/t Ag between a cutoff grade of 0.3% and 0.6% Cu.

The Boseto bankable feasibility study was





At Boseto Discovery Metals is developing Botswana's largest copper mine



completed in Q3 2010 and production of first concentrate is planned for the first half of 2012. Discovery Metals continues to explore across the 14 prospecting licences and 1,300 km of prospective strike length in northwest Botswana and continues to generate both new discoveries and new drill targets.

In April, Discovery Metals reported construction of the mine and process plant “is well advanced [and] on schedule to start commissioning in H1/12.”

The EPC contract to construct Boseto’s 3 Mt/y processing plant and related works was awarded to Sedgman in September 2010. Activities in Q4/10 were restricted to offsite engineering and procurement (long lead time items) and onsite preparation including the access road and plant site clearing until the final key project approvals were obtained. These were obtained in December 2010 with the grant of the Boseto Mining Licence and construction work commenced on site immediately thereafter.

- The diesel power plant EPC contract was awarded and progress is on schedule
- Land allocation for the Toteng housing area by the Tawana Land Board progressed

- Ordering of mine mobile equipment (including spare parts and tyres) progressed with delivery dates on schedule so mining operations can provide ore ahead of process plant requirements.

“The DFS for underground mining of the Zeta mineral resource progressed on schedule with completion expected in the second half of 2011. Underground mining is planned to be carried out in parallel with open-pit mining, commencing in the third year of production as contained in the Boseto Development Plan.”

Independent consultants Mining Plus was

appointed to assist in completing the DFS. It has completed its review of previous work relating to mining and geotechnical areas of the proposed Zeta underground operations and commenced a mining method trade-off study. This study assesses various stoping and backfilling alternatives to identify a recommended mining method. Caving methods as well as methods which leave ore pillars are being evaluated.

A drilling program has confirmed the continuity of the resource planned for underground mining and improved confidence in the grade estimation of the resources at Zeta. Snowden Mining Industry Consultants is expected to provide an updated Zeta resource in Q2/2011. It is anticipated this drilling will allow some ‘Inferred’ to be upgraded to the Indicated resource category.

The last of the Zeta underground infill drilling results have been received – a 54-hole program. A review of results indicates that the average drilled thickness of the Zeta deposit beneath the planned open pit is more than 10 m, at an average grade of 1.3% Cu and 26.2 g/t Ag. Similarly, the drilled thickness of a “high grade core” to mineralisation is

Feasibility study summary

Highlight	Units	Bankable Feasibility Study	Development Plan
Evaluated operating period	Years	5	15
Annual throughput (flotation)	Mt	3	3
Annual copper production	tonnes	34,400*2	36,400*2
Silver production	Moz/y	1.0*2	1.1*2
Average C1 cash costs	\$/lb	1.28*2	1.23*2
Capital expenditure	\$ millions	175	175*1
Copper/silver price	\$/lb/\$/oz	3.00/17.00	3.00/17.00
Operating surplus	\$ millions	390	1,142
Project NPV ¹⁰	\$ millions	251	375
IRR	%	32%	32%
Payback (after production commences)	Years	1.7	2.0

*1 \$40 million funded from operating cash flow in 2012 & 2013

*2 During debt repayment period July 2012 to December 2014



estimated to be about 6 m thick, at average grades of 2.1% Cu and 43.1 g/t Ag. Preliminary results suggest that the parameters used in the Zeta Underground Mining Scoping Study are valid, although the high grade core to mineralisation, which is now recognised, creates a possibility of scheduling the mining of grades higher than the 1.4% Cu used in the scoping study.

An 11-hole drilling program to test the depth continuity of the Plutus-Petra deposit has been completed. This program was

designed to intersect mineralisation approximately 350 m below surface (previously the deepest drill hole at Plutus intersected copper-silver mineralisation at about 175 m below surface) and to identify areas with potential for underground mining.

A key goal for Discovery in 2011 is to progress the investigation of the potential for increasing production levels beyond the 3 Mt/y of ore currently planned for. In concept, the company believes, "this may be achievable by mining more underground ore in parallel with

an increased scale open pit. Ore for the latter is already delineated, but not yet scheduled for mining during the first 15 years at Boseto. Underground ore may come from Zeta only, or from Zeta and Plutus.

Ghanzi – another great

Hana Mining's Ghanzi copper-silver project lies in the centre of the Kalahari Copperbelt. The property covers 2,149 km², and contains sediment-hosted copper-silver deposits with a demonstrated cumulative tested strike length of 70 km. This favourable geology extends over an estimated strike length of 600 km. Hana Mining released results of its most recent NI 43-101 compliant resource estimate for Ghanzi on December 20, 2010, announcing an Indicated mineral resource of 762 Mlb of copper and 16 Moz of silver from 37.4 Mt at a grade of 0.93% Cu and 13.4 g/t Ag. All of the Indicated resources are from the Banana Zone. There are also Inferred resources of 5,600 Mlb of copper and 85.4 Moz of silver from 423.9 Mt. This Inferred mineral resource estimate consists of 225.4 Mt grading 0.64% Cu and 8.1 g/t Ag in the Banana Zone, 20.7 Mt grading 1.23% Cu and 8.7 g/t Ag in Zone 5, 16.7 Mt grading 0.86% Cu and 4.0 g/t Ag in Zone 6, and 161.1 Mt grading 0.45% Cu and 3.6 g/t Ag in the Chalcocite

chile



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Zone; all at a cut-off grade of 0.30% Cu. A PEA is imminent.

Recent infill drilling has extended copper-silver mineralisation by 300 m down dip at the Northeast Fold. In April Hana announced its most recent drilling results from the completion of five infill diamond drill holes in the Banana Zone. The drilling was carried out within the Northeast Fold area (between sections 69850 to 70525 on the North Limb) to assist Hana's technical team in the design and modelling of potential Banana Zone pits and to convert a substantial amount of the NI 43-101 compliant resources within this area into Measured and Indicated (M&I), from the Inferred category. The drilling was also carried out to assess the underground mining potential at the Northeast Fold.

These results are from new holes and are in addition to those used in the most recent NI 43-101 compliant Inferred mineral resource calculation. The mineralisation remains open at depth.

Highlights include intercepts of 0.61% Cu and 8.0 g/t Ag over 13.3 m (including 2.38% Cu and 43.0 g/t Ag over 2.20 m) in hole HA-255-D, 1.00% Cu and 21.0 g/t Ag over 5.13

m (including 1.21% Cu and 25.0 g/t Ag over 3.9 m) in hole HA-254-D and 0.44% Cu and 2.0 g/t Ag over 9.0 m (including 1.51% Cu and 6.0 g/t Ag over 2.1 m) in hole HA-252-D.

The following engineering and consultation activities are ongoing to fulfill the goal of completion of a PEA in May 2011:

- The design and cost estimations of the grinding mill/processing plant has essentially been completed
- Modelling of open-pit and underground mining operations continues and is close to being completed
- Drilling is continuing at the Banana Zone (three core drills) and Zone 5 (one RC drill). More drills are expected to be mobilised.

Hana Mining's CEO and Chairman, Marek Kreczmer, noted that "drilling results continue to prove that copper-silver mineralisation at the Banana Zone remains open at depth. Based on these results, we believe that that entire Banana Zone is open at depth and therefore, with deeper drilling, the resource base could increase considerably. The most recent drilling results also demonstrate that there could be enough deep copper-silver mineralisation to support underground mining operations at the Northeast Fold and possibly within the rest of the Banana Zone."

The Banana Zone exhibits certain areas of higher grade copper and silver mineralisation, particularly between sections 49700 to 52000 on the North limb and sections 63000 to 71000 on both the North and South limbs, which represent an opportunity to locate starter pits and mine initial tonnages at higher than average grades. These higher grade pockets tend to be well within open-pit depth

parameters and represent opportunities to improve early cashflow and overall returns in development.

The project will benefit from proposed rail and power infrastructure expansions, along with proximity to local population centres and workforce. A feasibility study is currently underway (funded by the World Bank and the governments of Botswana and Namibia) to support completion of a rail line link that would connect Botswana with the Namibian port of Walvis Bay, on the Atlantic coast. The closest existing railhead to port is at Gobabis, in Namibia, some 550 km from Hana's property. Namport is expanding port facilities at Walvis Bay, with ore and concentrate shipments from the region as one of the expansion targets.

Construction has begun on the 600 MW expansion of the government-owned, coal-fired Moropule power plant, having secured \$825 million project funding in May 2009. The Ghanzi project is currently accessed by the paved Trans-Kalahari highway, which passes within 15 km of the property.

<http://www.hanamining.com/s/Home.asp>
<http://www.discoverymetals.com.au/irm/content/home.html>

Without doubt Botswana copper miners, like their Zambian and DRC counterparts, have started evaluating alternative export routes for their commodities (and import routes for their consumables and equipment). Traditional routes via the port of Durban tend to be congested and with the planned increase of tonnages from countries like Botswana, Zambia and DRC, mining companies have found an effective and safe alternative in the Port of Walvis Bay. Africa Union Cargo (AUC) says it "is ideally positioned to take full advantage of increased cargo from and to Botswana going via the Trans-Kalahari Corridor. AUC Cargo has recently completed the development of a container and cargo handling terminal, strategically located within the secure area of the Port of Walvis Bay, less than 1 km from the quay side. The initial development of 10,000 m² is fully fenced and secured in order to handle high value commodities, such as copper." The site has been built new as a greenfield development, with the concrete foundation withstanding axle loads of 100t, therefore allowing AUC to use reach stackers and full stack containers five high. AUC also operates a catwalk with plug points for 48 reefer containers. Work on the second phase of another 20,000 m², including a warehouse development, on adjacent ground, also inside the Port of Walvis Bay, has started, and is expected to complete in 2012. **IM**