

Kalahari Copperbelt to get new underground mine

Given current market conditions in the resource sector, a brand new, large-scale (3,6 Mt/a) underground copper mine in Botswana's 'Kalahari Copperbelt' – which currently hosts a single mining operation – would seem an unlikely proposition. But this is precisely what US-based Cupric Canyon Capital (Cupric) is proposing. Its new Khoemacau mine will produce up to 50 000 t/a of copper (in concentrate) and is scheduled for commissioning by 2018, as Sam Rasmussen, Cupric's CEO for Africa, recently explained to *Modern Mining's* Arthur Tassell.

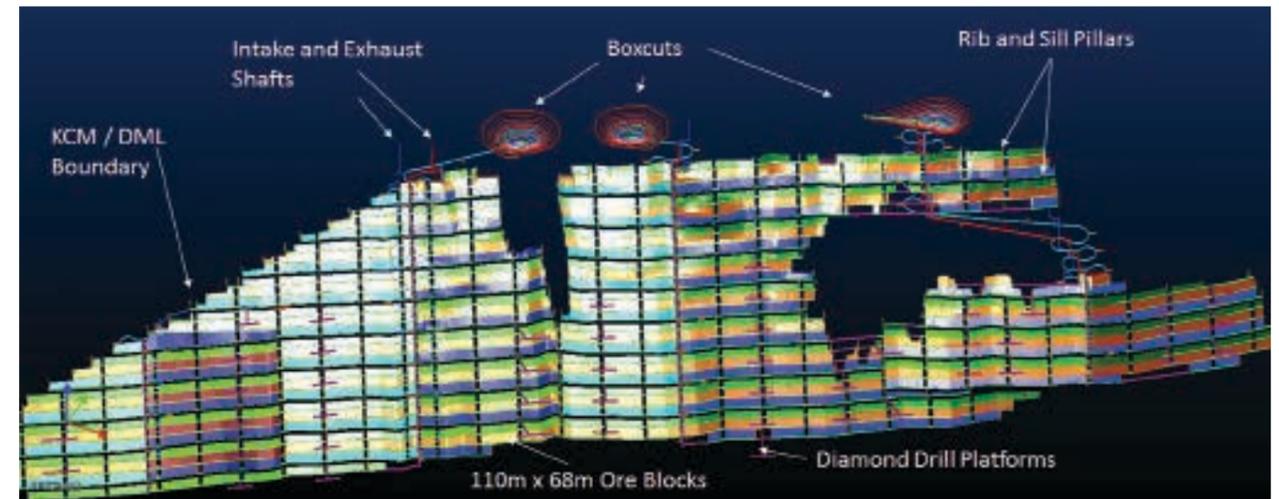
Cupric is not a particularly well-known name in Southern Africa but the company has enormous expertise in the copper mining field. It was founded in 2009 – with the backing of the Barclays Natural Resource Investments division of Barclays Bank – by a group of experienced mining executives, who were mostly from the Phelps Dodge (later Freeport-McMoRan) stable.

Cupric's aim was to target promising copper projects around the world, particularly in the Americas and Africa, and it was not too long before a series of deposits and prospects in a relatively remote part of Botswana attracted its attention. Collectively, these formed the Ghanzi project, as it was then known, of Canadian junior Hana Mining, whose extensive

tenements covering over 2 000 km² were located in the north-west of the country between the towns of Maun and Ghanzi. Impressed by the amount of copper identified in the project area, Cupric, based in Scottsdale, Arizona, made a bid for Hana in 2012 and in February 2013 announced that it had completed the acquisition of the Canadian company.

While Hana advanced Ghanzi considerably during the several years it controlled the project, carrying out extensive drilling and completing a preliminary economic assessment, Cupric has undoubtedly brought fresh energy to the development process. At the time of acquisition, Cupric's Chairman, Tim Snider, said: "We plan to utilise our expertise in development and operations, along with our considerable financial resources, to accelerate

Personnel of Cupric Canyon and Khoemacau Copper Mining at a 'turning the soil' ceremony at the site of the tailings dam.



development of the Ghanzi project with a goal of copper production within the next several years. This investment demonstrates our vision of the potential for economic development of mineral resources within the Kalahari Copperbelt."

Snider has been as good as his word. Less than two years later, Ghanzi – subsequently renamed Khoemacau, meaning 'Hills of the People' – is ready for development, with preliminary works such as camp establishment, bush clearing and access road upgrading planned in preparation for the start of construction soon after receiving the necessary mining licences. A two-year construction and commissioning phase is anticipated with the ramp-up of mining operations starting in 2017 and full production planned for 2018.

Rasmussen's involvement in the project dates back to April 2013, when he was appointed as CEO of Cupric's African operation. He, too, has a background with Phelps Dodge and Freeport-McMoRan and was GM of Freeport's Tenke-Fungurume copper mine in Katanga in the DRC (from 2006 to 2009) before moving on to become first the MD of Lundin's Zinkgruvan mine in Sweden and then GM of Los Bronces copper mine in Chile. He holds a

Bachelor of Science degree from the Colorado School of Mines where he majored in Chemical Engineering and Petroleum Refining.

Explaining what Cupric has achieved in respect of Khoemacau, he says the company's strategy is quite different from Hana's. "The focus of Hana's activities was the Banana Zone in the south-west of the tenement area and the company's preliminary economic assessment was based on developing an open-pit mine in

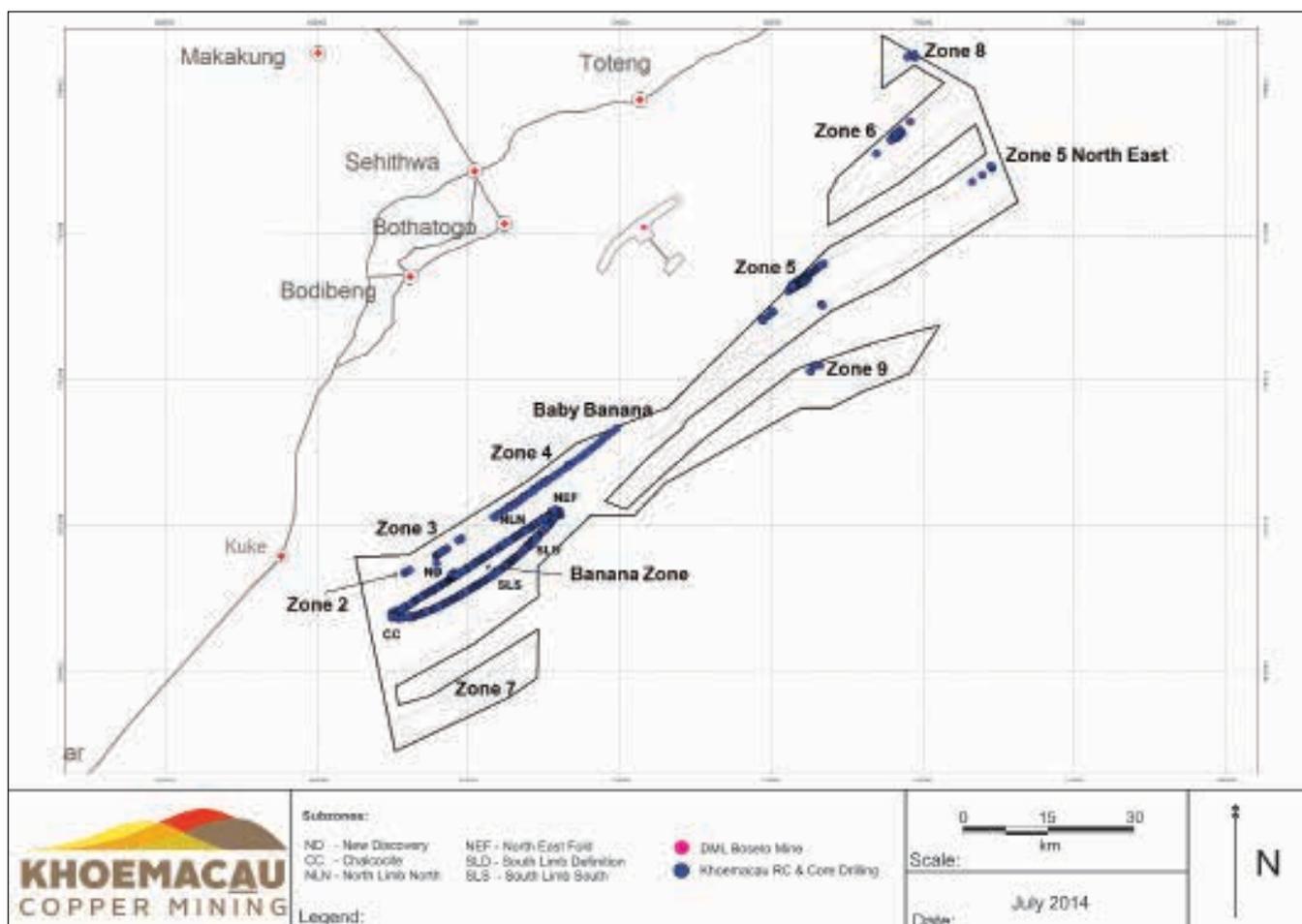
Mine design (1 000 m – 400 m asl).

Drilling underway in the Khoemacau project area.



Core from the Khoemacau project.





this location. We've shifted the project's centre of gravity about 60 km to the north-east to what we call Zone 5 which is the site of our mine – which will be an underground operation. We certainly haven't abandoned the Banana Zone but its development, if it does take place, is some years in the future."

Interestingly, Zone 5 is situated just a few kilometres to the east of the Kalahari Copperbelt's only existing mine, Boseto. Owned by Australia's Discovery Metals, Boseto is an open-pit mine served by a plant with a nameplate capacity of 3 Mt/a. It was officially opened in 2012 but has not yet met expectations. It

produced 18 000 tonnes of copper in concentrate in the year to the end of June 2014, which is well below the production level of approximately 30 000 tonnes/annum predicted when the mine was planned.

Discovery said in early December that it was in negotiations with Cupric on the sale of Boseto to the latter. It also announced that, as part of the discussions, a US\$5 million working capital facility had been agreed with Cupric. A condition of the agreement is that it grants Cupric a period of exclusivity allowing it to complete a due diligence on the operation. Since this news was released to the market,

Khoemacau Copper Mining's tenements in Botswana. The new mine will be located at Zone 5.

The Khoemacau Copper Mining team is currently approximately 60-strong.



Discovery has also announced that it will be placing Boseto on care and maintenance within the next six months but this will not detract from its on-going discussions with Cupric.

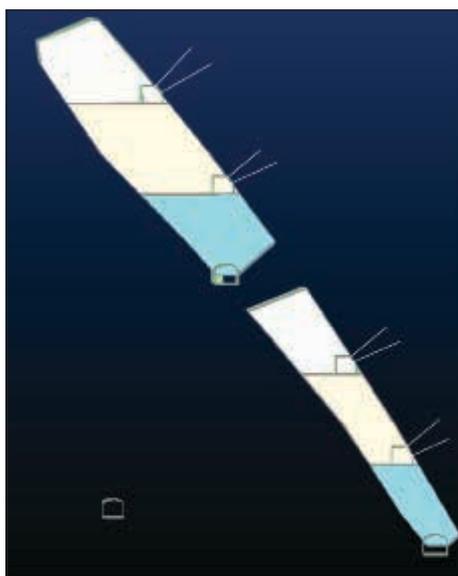
To implement Khoemacau, Rasmussen – who is based in Johannesburg – has put together a team which now consists of around 60 full time employees (who mostly work for Khoemacau Copper Mining, Cupric's subsidiary in Botswana) and which includes, as Project Manager, Rob Dey, a veteran of the South African platinum mining industry (he worked for Impala Platinum for many years and was Group Engineering Manager). The GM of the mine has also been appointed. He is Richard Boffey, whose past experience has been at mines in Australia, Papua New Guinea, Tanzania and Turkey. Prior to joining Khoemacau Copper Mining in March last year (2014) he was GM at the Efemçukuru gold mine in Turkey.

When *Modern Mining* spoke to Rasmussen recently, the project was on the brink of implementation, with a new resource statement imminent, the feasibility study in the final stages of completion and first tender documents – for example, for the mining contractor – out in the market. The application for a mining licence was submitted in September 2014 and Cupric is confident that it will be approved and issued shortly.

The feasibility study has been undertaken in-house but with key contributions from Mining Plus, an Australian consultancy which has prepared the mine design, and Sedgman (based in Australia but with an office in Centurion, Pretoria), which has designed the plant. Sedgman was responsible for the plant design at the neighbouring Boseto mine and was also the EPCM contractor for the construction of that facility.

The feasibility study has demonstrated that the Khoemacau project is viable as a 3,6 Mt/a (10 000 t/d) copper – and silver – producing operation commencing in sulphide material and with recovery via conventional milling and froth flotation processing. It will exploit the resource at Zone 5. Copper is the driver of the project with silver expected to contribute only around 10 % of Khoemacau's revenue stream. The final product of the mine will be a high-grade concentrate of approximately 40 % copper with relatively low impurity levels which will be shipped to smelters either in the region or overseas for final processing. The plant is expected to recover 85,4 % of the copper in the ore and 75 % of the silver.

Says Rasmussen: "We did trade-off studies to determine whether to go the open-pit or



- Sublevel open stoping (panel retreat) selected
- SL caving considered but MSST too strong to cave reliably
- Top-down method ensures early ore supply
- 3 x 22 m sublevels
- 110 m along strike
- 10 m rib and 10 m sill pillars
- Cablebolting of mid-span drives
- +95 % recovered from lowest level (haul truck accessible)
- <20 % remote loading
- Up to three stopes actively producing
- 8 700 tpd from stopes, 1 300 tpd from development
- 3,6 Mtpa



Proposed mining method for the Khoemacau mine.

underground mining route and there is no doubt that the underground option is far superior, despite the higher capex involved and the fact that it will take us up to 18 months to reach the orebody. Militating against an open-pit solution is the very high strip ratios involved – at least 11 to 1 is the best case. As our mining method, we've chosen sublevel open stoping, which is successful at mines around the world. Some of our neighbours have material that demands sub-level caving; however, our rock is very competent and sublevel open stoping is ideal.

"The mine will have three independent declines, each with a capacity of 3 500 t/d and each with multiple working faces – which will give the opportunity to blend generated ore and optimise the concentrate quality to minimise smelter penalties. The maximum depth of mining operations initially will be about 600 m but we will hit mineralisation at around 300 m. The three declines will be sufficient for the initial years of mining and a vertical shaft might be a possibility later in the mine life."

The plant will be very similar to the facility at Boseto and will include primary crushing in a single-toggle jaw crusher, secondary and tertiary crushing in cone crushers (three in total) and a single stage of ball milling. The ball mill operates in closed circuit with

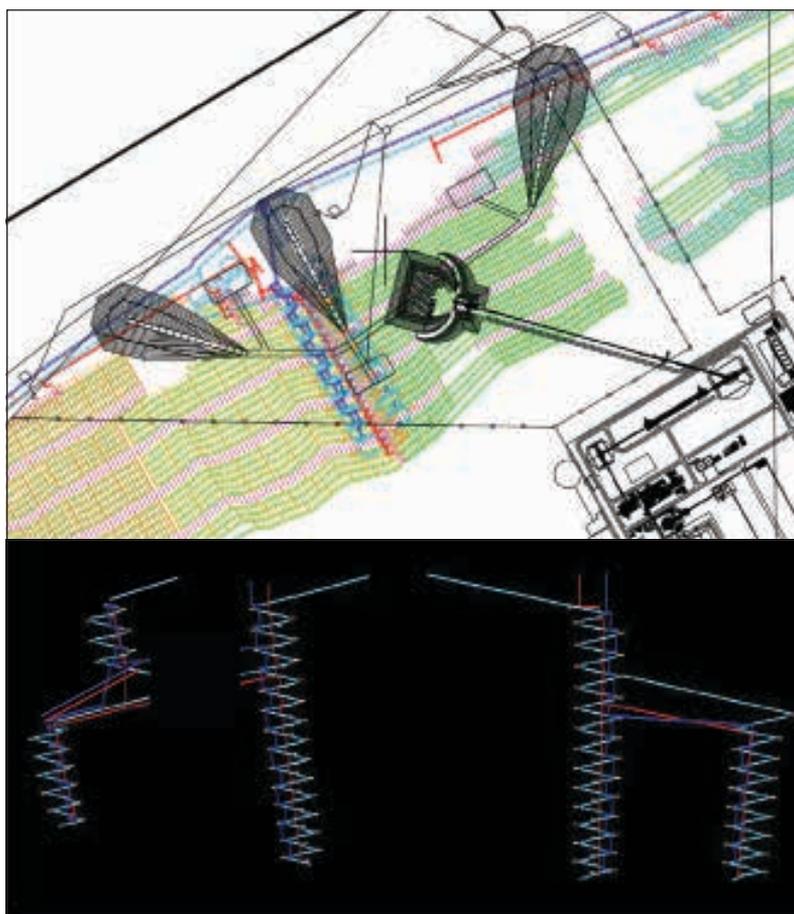
classification hydrocyclones mounted in a cluster. Circulation load to the ball mill is targeted at 250 % with cyclone underflow returning to the ball mill. Cyclone overflow reports to a rougher flotation feed surge tank. Flotation feed is pumped to the rougher circuit whereby the concentrate reports to a dedicated concentrate product circuit for upgrade into final product. Regrinding of rougher concentrate and cleaner flotation processes are used to further upgrade the rougher concentrate into high grade copper concentrate.

The rougher tailings are pumped to the tailings thickener before being pumped to the tailings storage facility. The final concentrate reports to the concentrate thickener with the thickener underflow being pumped to the filter feed tank. The concentrate in this tank is pumped to a pressure filter in a batch operated manner.

The tailings storage facility will be developed as a single compartment ring dyke type storage facility. The footprint is 210 ha with a final vertical height of 32 m.

As regards bulk services, water will be supplied from a nearby wellfield which has already been permitted for 12 000 m³/d, which is more than sufficient as the maximum demand of the plant will be 10 000 m³/d. According to Cupric, the wellfield can be doubled without negatively affecting the aquifer. Electricity supply is a bit more problematic. Says Rasmussen: “We have a commitment from the Botswana Power Corporation (BPC) to connect us to the grid by July 2018 and our intensive discussions with the Corporation have left us confident that this date will be met. Clearly though there is a gap between the initial commissioning and ramp-up of the mine and the connection to the grid, so we’ll be starting up on diesel gensets which will have a combined capacity of 22 MVA.”

Looking a decade ahead, Rasmussen says that once Zone 5 tonnages start to reduce, Cupric will look at mining the Banana Zone. The particular area of interest in the Banana Zone is a sub-zone known as NE Fold, which hosts sufficient resources to continue to provide feed to the Zone 5 plant. “Whether mining will be by open-pit or underground methods will be determined in the light of economic conditions at the time and the normal trade-off studies,” he says. “Whatever the case, we will truck the ore to the concentrator at Zone 5.” He adds that Cupric is continuing its exploration on the six prospecting licences it has in Botswana – which extend over a distance of nearly 100 km on a SW to NE axis (see map) – and is optimistic that further satellite deposits with the



potential to feed the plant will be identified.

The company has also taken out licences in neighbouring Namibia in the Gobabis area. “The Kalahari Copperbelt extends into Namibia, hence our interest in that country,” states Rasmussen. “We’ve already identified similar mineralisation at similar grades to what we’re getting in Botswana, although the amount of sand cover is much higher. The distance to our plant means that if we do find economic deposits in this area, then we’re looking at a new standalone operation.”

As a final comment on the new Khoemacau mine, Rasmussen makes the point that Cupric is building in a downturn. “Most other mining companies are currently cutting back on capital expenditure and new projects in response to softening resource prices,” he observes. “But one can argue a different approach. Once commodities recover, everyone will be scrambling to build new mines whereas Cupric and Khoemacau will be ready – depending on when exactly the recovery comes – to take full advantage of renewed demand. We will also have benefited from having implemented our project during a period when prices from suppliers and contractors are competitive and lead times on equipment short. Overall, we believe our strategy is the correct one.” ■

Mine access. The mine will have a three-decline system growing to four as the strike extends. The declines will be 5,8 m high by 5,5 m wide and capable of accepting 60-t class haul trucks.