

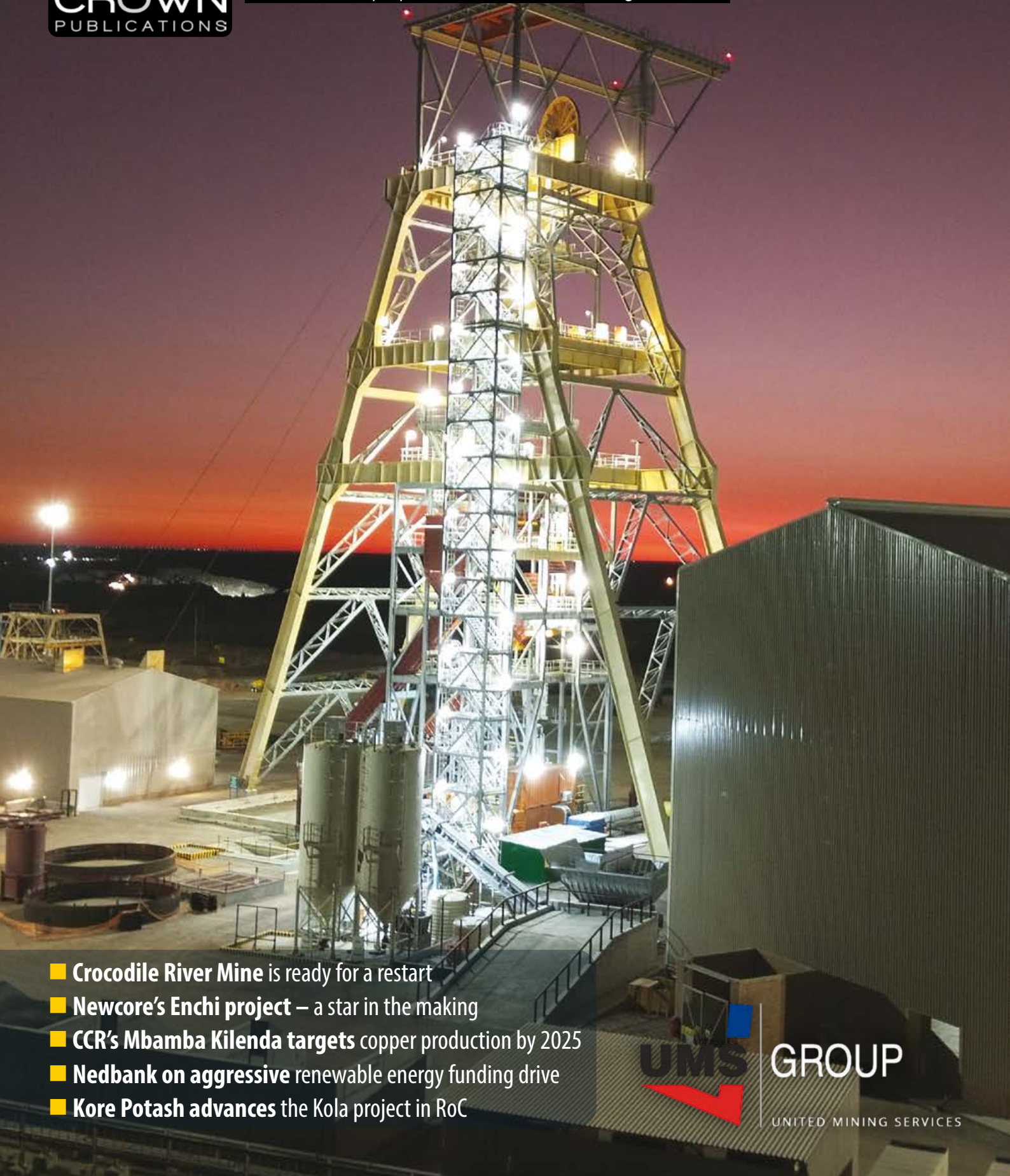
MODERN MINING

September 2022 | Vol 18 No 9



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- **Crocodile River Mine** is ready for a restart
- **Newcore's Enchi project** – a star in the making
- **CCR's Mbamba Kilenda targets** copper production by 2025
- **Nedbank on aggressive** renewable energy funding drive
- **Kore Potash advances** the Kola project in RoC



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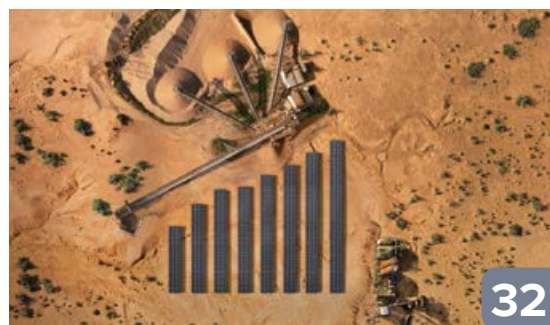
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ON THE COVER

With few new shaft projects in the country, UMS prepares for the shift in shaft sinking and looks to growing demand from the battery minerals sector. See story on page 8.

Junior miners developing a slew of new mines

Robust commodity prices have seen investors and miners alike making significant capital injections into Greenfield and Brownfield developments which, in turn, has seen a large portfolio of new developments underway. While there is certainly no shortage of gold projects being developed, particularly in West Africa, energy metals, propelled by the clean energy drive, are also in the development driving seat.

This edition of *Modern Mining* highlights the strong line-up of early-stage projects, with a number of project developers eyeing production in the next few years. This includes Australian junior miner, Predictive Discovery, which is aiming for producer status – in three years' time – from its flagship Bankan Gold Project, located close to Kouroussa, in Guinea. Gold explorer, Newcore Gold, is also keenly focused on firming up its Enchi project resource before it has to make the decision either to take the project up the value curve or off-load it to a new owner. The Enchi project is already making waves, so there will be no shortage of potential suitors, should the owners decide to put it up for sale.

Also in the race to get its project of the ground and into production is potash developer, Kore Potash, with its Kola project in Republic of Congo. The Kore Potash project is a frontrunner that is diversifying the RoC petroleum dominated economy. The country is blessed with large untapped mineral wealth including base-metals, gold, iron and phosphate deposits; however, it remains largely dependent on oil production to drive its economy. Kore Potash, which is aiming for potash production in the next three-and-a-half years, will have first mover advantage as it paves the way for other miners to enter the resource rich country.

Moving to the topic of robust commodity prices, Platinum Group Metals (PGM) miner Eastplats which, following the platinum price slide in 2011, placed its then newly developed flagship Crocodile River Mine on care and maintenance in 2013, is finally ready to restart the project. Armed with a reconfigured mine layout plan that

has been adjusted to a new mining method, the platinum producer is chomping at the bit to get its flagship operation up and running, aiming to kick-start its Crocodile River Mine underground operations in Q4 2022.

Also jockeying in the starting line-up is emerging copper producer Central Copper Resources' Mbamba Kilenda project, which is aiming for copper production in 2025. The company is currently contemplating a suitable listing domain as it upgrades its flagship project located in the Democratic Republic of Congo. The company is well advanced in its preparation for project construction next year.

Although copper had a bumpy ride in 2020, geopolitical tensions coupled with the global green energy drive has seen the commodity's fortunes turn around. According to Alana van Wouw, market analyst at Crane Ridge, the push for a lower carbon footprint underpins the transition from conventional thermal based energy sources to renewables, with copper – a key new age metal – being significant in developments related to the green economy.

On the subject of 'green', Nedbank, South Africa's first banking institution to drive the adoption of renewables, remains at the forefront of funding renewable energy projects. The banking institution's aggressive renewable energy funding drive will see South Africa and the continent benefit from a significantly reduced carbon footprint and hence a more sustainable future going forward.

Although the slew of new mining projects being developed are largely open-pit operations, our cover story, UMS Shaft Sinkers, concedes that, when compared to a decade ago, there are far fewer underground mines being developed today. According to the shaft-sinking specialist, this is due largely to the prohibitive costs related to underground mine developments. On a positive note, though, the strong demand for battery minerals is prompting a surge of studies for new shaft developments, and signals an exciting time in the industry. ■



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Rainbow Rare Earths releases report on Phalaborwa flow sheet

London-listed Rainbow Rare Earths has released an updated technical report on the processing flowsheet to extract rare earth elements from the phosphogypsum stacks at the company's Phalaborwa Project in South Africa.

The flowsheet has been developed in parallel with K-Technologies, USA (K-Tech) and represents a breakthrough in allowing for the economic extraction of rare earth

elements from phosphogypsum, which has historically proven to be challenging.

Compared to the initial processing options considered when work commenced, a number of key enhancements have been made, resulting in significant anticipated capital and operating cost savings for the Phalaborwa Preliminary Economic Assessment (PEA), which is currently being finalised.

Work is now ongoing to finalise the Phalaborwa PEA, which is expected to be completed at the end of September/early October 2022, the company said.

Rainbow and K-Tech anticipate the potential for wider application of this innovative processing flowsheet than solely the Phalaborwa Project. As a result, Rainbow and K-Tech are jointly applying for international patents. Rainbow is in the process of identifying global projects where the technology could be used to unlock further sources of rare earths from phosphogypsum.

Rainbow Rare Earths CEO, George Bennett, commented: "Working alongside our partners at K-Tech we have continually seen opportunities for refinement and optimisation as the flowsheet has developed. We anticipate that this process will continue as we progress from the PEA to PFS and BFS at Phalaborwa, alongside test work at other phosphogypsum opportunities, giving scope for both capital and operating cost reductions from the Phalaborwa PEA. We believe that this work further demonstrates Rainbow's ability to overcome the historical technical, environmental, and economic challenges related to extracting rare earths from phosphogypsum, enabling us to unlock a valuable, near-term source of permanent magnetic metals required so urgently to drive the global green energy revolution." ■



Rainbow Rare Earths has released an updated technical report.

Barrick partners to launch 10X business accelerator programme

Gold miner Barrick Lumwana, in collaboration with the Accelerated Growth for Micro, Small and Medium-sized Enterprises in Zambia (AGS) Programme and the Women's Entrepreneurship Access Center (WEAC), officially launched the 10X Business Accelerator Programme at the Lumwana Premier Resort in Manyama, Kalumbila.

The Business Accelerator Programme, to be implemented by WEAC, aims to build business capacity for local contractors in Barrick's mining supply chain and to support them in effecting their growth plans, diversifying their markets to become sustainable beyond the mine's operations.

Barrick's 10X Business Accelerator Programme is further aimed at enabling the SMEs to better position themselves for sustainable growth, including the capacity to bid for, and service larger supply tenders, the company said.

According to Barrick, a rigorous selection criterion was used and informed by the findings from a baseline survey and an Extreme Build a Business Workshop assessment. The first 15 companies were then selected to participate in the 'Mentor Driven Business' Business Accelerator Programme.

Minister of small and medium enterprises development Elias Mubanga, launched the programme and said that the Barrick 10X Business Accelerator Programme, as a private sector local supplier initiative, had the potential to stimulate local economic growth, given the significance of the mining sector in the economy and its impact on other sub sectors. ■



Barrick's Business Accelerator Programme aims to enable SMEs to better position themselves for sustainable growth.

DRDGOLD beats guidance, pays 15th consecutive dividend

Gold miner DRDGOLD has declared a final dividend – its 15th financial year of declaring a dividend consecutively – of 40 SA cents per share for the financial year ended 30 June 2022 (FY2022), making a total distribution of 60 SA cents per share for the year.

CEO Niël Pretorius, in a commentary accompanying the company's operating and financial results for the year released, says DRDGOLD generated R871.6-million in free cash flow for the year, supported by a gold price off recent highs but still robust.

He bluntly portrays a year for the company, South Africa and the world, characterised by a 'litany' of challenges less to do with Covid-19 and more to do, in South Africa, with the likes of:

- ❑ Infrastructure theft and decay – power, in particular.
- ❑ Seeming lack of concern and deployment of resources by those responsible for the protection of lives and property.
- ❑ An angry society, community violence and violent crime.
- ❑ Labour unrest.
- ❑ Deteriorating service delivery and the soaring cost of basics required by business and communities.

On a global scale, Pretorius cites the challenges posed by climate change and war. Against this background, he says DRDGOLD has held its own in FY2022.

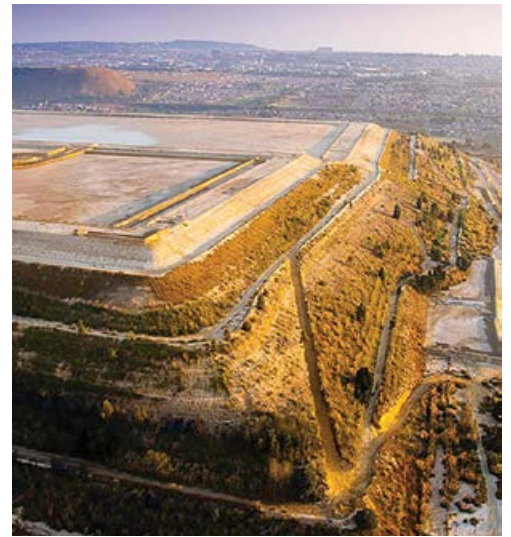
"Looking ahead," Pretorius says, "DRDGOLD remains committed to investing in the sustainability and growth of its business, growing capital investment from R584.1-million in FY2022 to about R700-million in FY2023."

Referring to the latest Fraser Institute report that flags South Africa as the fourth-worst mining jurisdiction out of 185 surveyed internationally, he says: "This

does not mean that it is impossible to thrive in this jurisdiction – it simply means that the standard of political governance is not such that it enables and promotes business."

"To do well in South Africa requires that businesses face up to the reality of their environment, 'make a plan' and build internal capacity and redundancy."

In FY2022, DRDGOLD's gold production was stable at 5 720 kg. Group operating profit was 22% lower at R1 685.1-million after accounting for cash operating cost, 13% higher at R3 463.8-million. Notwithstanding, Group cash and cash equivalents were 16% higher at R2 525.6-million, after paying cash dividends of R513.3-million. The group remains free of bank debt as at the end of the year under review. ■



DRDGOLD delivers strong results.

ASPASA releases guidelines to combat dust

The release of surface mining industry association, ASPASA's, latest dust control guideline raises interesting concerns as to whether local miners are doing enough to mitigate risks and avoid complications due to non-compliance.

A plethora of environmental and safety requirements surrounding dust generation requires mines to adopt professional management systems to ensure compliance.

The newly released ASPASA Guidelines for Dust Control, deals with broad topics surrounding dust management and lays the basis for a more comprehensive dust management plan (DMP).

The document provides guidelines on everything from roles and responsibilities of mine managers and workers, to designs for dust control and mitigation. It also outlines the responsibilities of suppliers to the industry and

identifies the types of machines available that can counter dust at the point of excavation, stockpile and transport.

Information is also provided on monitoring of dust as well as a template of a corrective action summary sheet wherever discrepancies have been recorded. The guide is available from ASPASA. "There is no place for dust in our modern mines and no shortage of solutions to monitor and overcome it when it is generated," ASPASA said. ■



ASPASA provides guidelines to combat dust.



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PNR completes purchase of Selkirk Mine in Botswana

Canadian exploration and development company, Premium Nickel Resources (PNRL), has completed the acquisition of the nickel, copper, cobalt, platinum-group elements (Ni-Cu-Co-PGE) Selkirk Mine in

Botswana, together with associated infrastructure and four surrounding prospecting licences formerly operated by Tati Nickel Mining Company (TNMC).

The company began comprehensive due diligence programmes on the Selkirk Mine in 2020 and has since continued to verify old data and collect new data, including completion of a 'concept-level' metallurgical study. The metallurgical testing carried out at SGS Lakefield, Ontario, Canada, will help to establish the company's re-development plan to produce separate copper and nickel-cobalt concentrates.

Keith Morrison, CEO, commented: "Completing the transfer of ownership of the Selkirk Mine concludes PNRL's announced asset purchases with the liquidator of TNMC in Botswana. On a voluntary basis, PNRL will move forward with completing its initial NI 43-101 technical report on Selkirk and the surrounding prospecting licenses. Concurrently, we will prioritise the prepara-

tion and exploration requirements that will support our proposed redevelopment plans for new modern operations with state-of-the-art processing and tailings management facilities. The re-development plan will encompass modern best practices, using less power, less water and assuming conservative commodity prices."

The Selkirk Mine is situated 75 km north of the 100% owned Selebi Mines. The Selkirk mining license covers about 14.6 km² and the four prospecting licenses cover 126.7 km². Production at the Selkirk Mine took place between 1989 and 2002 with Anglo American mining high grade Ni-Cu massive sulphides and producing 1 million tonnes at 2.6% Ni and 1.5% Cu. Thereafter, in 2006, LionOre Mining International published a technical report, which reported a historic indicated mineral resource estimate of 6 mt grading 1.06% Nickel and 0.36% copper at a cut-off grade of 0.75% Ni. ■



Premium Nickel Resources acquires Selkirk Mine in Botswana.

Giyani strengthens board and appoints strategic advisors



Giyani Metals is developing the K.Hill Battery Manganese project.

TSX-listed Giyani Metals has appointed Nicola Spooner to the Giyani Board of Directors. Spooner has 30 years' experience in the provision of E&S advisory services to the natural resources and clean energy sectors. She has led multiple environmental and social impact assessment and E&S due diligence assignments across the globe. Prior to joining Giyani, Spooner established the international environmental, social and governance practice for Hatch Associates (UK) and is founder of her own practice, Green Business Consulting.

She will serve as the chair of the

Corporate Governance & Nominating Committee and will join the Technical, HSE & Sustainability Committee.

Giyani also announced the engagement of HCF to provide a strategic funding review to assist the company in analysing various funding options for its flagship K.Hill Battery Manganese project.

The company is currently in discussions with a number of financial institutions with respect to the funding of the development of K.Hill and HCF will work with Giyani to review and evaluate optimal solutions for its future project funding requirements, the company said. ■



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Sibanye-Stillwater and Heraeus to develop electrolyser catalysts

Precious metals miner Sibanye-Stillwater and precious metals services and products provider Heraeus Precious Metals have agreed to collaborate on research and development of novel Platinum Group Metals (PGM) containing electrocatalysts with high activity and stability for Proton Exchange Membrane (PEM) electrolysers, utilised in the production of Green Hydrogen, amongst others. The project will be equally funded by the parties over a three-year period. The results will be mutually commercialised, and the parties will cooperate on communication and marketing of the novel catalyst.

Platinum and iridium are currently essential components of electrocatalysts for the generation of green hydrogen by means of PEM electrolysis. Iridium, however, is one of the scarcest PGMs and its limited availability is a potential constraint on the future widespread adoption of PGM PEM electrolysers. Reducing iridium loadings in PEM electrocatalysts is key to ensuring a sustainable hydrogen ecosystem, enabling PEM technology to be cost competitive to make triple digit giga-watt-scale a reality within the next decade.

Technologies that reduce or replace iridium with, for example, ruthenium, offer significant potential. The partners aim to develop a new, robust solution based on looking at the substitution of iridium with other metals, as well as developing more sophisticated metal oxide structures.

“Without cost effective PEM electrolysis

the targets for the ramp-up of the hydrogen economy cannot be achieved. We are ready to invest in a sustainable raw material strategy to make it happen,” says Heraeus Precious Metals’, Dr. Philipp Walter.

“Our objective is to ensure our metals, including PGMs, play a vital role in unlock-

ing the future green economy, including hydrogen. The partnership with Heraeus and the investment in the successful development and commercialisation of catalysts for PEM electrolysers will enable another aspect of a greener future,” says Neal Froneman, CEO of Sibanye-Stillwater. ■

Phase 1a Drilling Commences at Bengwenyama PGM Project

ASX-listed Southern Palladium commenced with its Phase 1 drilling programme at its Bengwenyama PGM project, located on the Eastern Limb of the world class Bushveld Complex, South Africa. Three drill rigs have been mobilised on-site at Bengwenyama, where the first drill rig has commenced drilling with preparations on-track for the other two rigs to commence drilling soon.

The aim of the programme is to confirm and refine the existing 3D structural model for the shallower areas on the Eastern portion of the farm Eerstegeluk 327 KT. This will be followed by the Phase 1b programme (32 drillholes), which will comprise infill drilling across a narrower drilling grid (~350m grid).

Infill drilling will improve the confidence in the grade distribution and is aimed at converting the targeted shallow portion of Eerstegeluk 327 KT to a JORC 2012-compliant Indicated Mineral Resource.

A successful resource upgrade will then form the basis of the forthcoming Mining Right application.

Commenting on Southern Palladium’s operations update, MD Johan Odendaal, said: “The commencement of Phase 1 drilling marks a major milestone for the Bengwenyama project, and we are looking forward to receiving the first core trays at our core logging facility to prepare samples for assaying.” ■



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Preparing for the shift in shaft sinking

The South African mining landscape has changed dramatically since the 1980s, both literally and figuratively. Driven by high commodity prices, up to 16 mining shafts were being sunk simultaneously across the country in the '90s and 2000s. Between the Shaft Sinkers company at the time and many of the current management team, UMS was involved with more than half of these shaft projects.

While the mining industry still contributes substantially to the country's economic production, the downswing that followed the mining peak was reflected in the number of shafts being sunk. Currently, there are few new shaft projects in the country, but demand for battery minerals is prompting a surge of studies for new shaft developments, the company reports.

"Companies looking to expand their operations or extend the productive life of ageing mines have increased their requests for shaft studies and audits," says Takalani Randima, MD of UMS Shaft Sinkers. "We have seen an increase in requests for shaft studies, and while this is an exciting time in the industry, we also have to be fully prepared for the upswing.

"A lot of shafts were sunk in South Africa 10-20

A lot of shafts were sunk in South Africa 10-20 years ago.



Currently, there are only a few new shaft projects in the country.

years ago, but as the industry slowed down, the country's shaft sinking skills moved on, emigrated or retired," says Randima. "Consequently, there is a gap between the skilled older generation, and training of the younger generation in shaft sinking and mine development."

To close this gap, UMS embarked on a drive to re-establish the best design and shaft sinking team in the country, consisting of shaft sinking experts, draughts people and engineers that can continue the company's shaft sinking and mine development legacy.

"We are actively employing younger people to close the skills gap between generations, so the skills are not lost with the 'veterans,'" says Randima. "We have created an unmatched team of people to execute projects. Between them, they have excellent design skills, can design the shafts and projects, and have shaft sinking skills with a depth of talent."

Alongside the recruitment drive, UMS has launched accredited in-house training and graduate programmes for mining and process engineers, and is collaborating with universities and other companies in the industry to promote the skills required for shaft sinking and underground mining.

"We are also committed to closing the gap on the ground by offering artisan training on site at our projects, in line with the government's focus on social and labour plans (SLPs) for the mining industry," says Randima.

Skills transfer is a key company objective in all the projects it undertakes. In Botswana, where UMS has



UMS has embarked on a drive to re-establish the best design and shaft sinking team in the country.

been contracted to engineer, design and construct the shaft sinking of new production and ventilation shafts for the Karowe Underground Mine Expansion Project, UMS has established a major training programme on site. The training facility is providing an opportunity for young people to learn from industry veterans, and for skills to be transferred from expats to the local community.

Rob Hull, COO of UMS, says that the company's experience, unique skills set and skills transfer programmes have played a major role in securing shaft projects across four continents, all of which are currently in implementation phase. These, in addition to the Karowe project in Botswana, include amongst others, a new 1 500-metre-deep shaft at a copper mine in Brazil, a deep level access shaft for a client in New Mexico, USA, and a large decline project in South Africa.

Graham Roberts, MD for UMS METS, UMS's design division, adds that operating across different continents has exposed UMS to shaft sinking trends in other countries and has provided UMS with the opportunity to learn from its international peers, particularly their approach to mechanisation, safety and working conditions.

"The way we sink shafts today is very different from how it was done a few decades ago," says Roberts. "South Africa has always been known for its mining development skills, and has now also made great strides in aligning safety standards to those of the rest of the world. We continually adopt new technologies and enhance existing technologies



Demand for battery minerals is prompting a surge of studies for new shaft developments.



The company is actively employing younger people to close the skills gap between generations.



Skills transfer is one of the company's key objectives.



UMS is embracing new technology to work smarter and safer.

and methodologies to make sinking and development safer.

“Previously, approximately 250 people would be employed per shaft, with many people working above each other on a stage to sink records of up to 240 metres per month. Now, we’re sinking closer to 60 metres per month with about 100 people on a shaft project, and people working on one activity at a time, as opposed to working simultaneously above each other.

“Although sinking has become more expensive because it takes longer to get to the orebody, we are aligned with global practices. We have fewer people on our shafts compared to previous years, but having fewer people brings more responsibilities and a

better focus. It also brings significant safety improvements as fewer people are directly exposed to the production face. We are also better utilising our resources, and embracing new technology to work smarter and safer,” says Roberts.

Randima cites the company’s recent award of the triple decline shaft project in South Africa as an example of where UMS’s expertise, skills transfer programmes and use of new technology to improve safety and efficiencies, all contributed to submitting a successful bid.

“The team really understood what the client required in terms of executing the project, and our bid focused on how UMS’s expertise matched the client’s requirements,” says Randima.

UMS is already in mobilisation stage for the five-year project, and expects to do the first blast in the fourth quarter of 2022. UMS’s scope of work includes decline development, raise boring and underground development. Mechanisation will be a key feature to increase safety and productivity.

Randima notes that technology is also featuring in other areas of mining development projects such as the use of electric trucks to reduce carbon emissions, scanning technology to check the quality of concrete support, and control system solutions to automate key control.

Hull comments that in addition to the company’s shaft sinking and underground development projects, shaft refurbishment of ageing mines is another key service offering from UMS, which requires people with a knowledge of older shafts and an understanding of original drawings and risk areas.

“Upgrading of old infrastructure is a big part of our business,” affirms Hull. “We are seeing an increase in companies approaching us with aged shafts that have not been upgraded, but who are now looking to refurbish and modernise their shafts in response to the growing demand for minerals. We are working with a number of clients in South Africa and in Europe to upgrade their shafts and get them running efficiently to prepare for the turnaround in the mining sector.”

“We have the knowledge and expertise to assess and refurbish older shafts, and we also have the skills to apply new technology where applicable. This combination allows us to identify the best fit-for-operations solution for any shaft project,” adds Randima.

“We continue to seek opportunities where our skillset matches clients’ requirements, and have the skills to deliver quality shaft and mining development projects as safely and efficiently as possible,” concludes Hull. ■

Murray Macnab, Group Executive Technical Director at UMS, weighs in on the way that shaft projects are approached at UMS, and why he is so passionate about working at the company.

Shaft Sinking, underground development and infrastructure construction continues to benefit from imported technology and purpose-developed technology to improve safety and productivity in the mining industry. Partnering with our clients and suppliers who share the same vision as UMS, which is to build mines safely, quickly and cost effectively, has helped us to remain competitive and very relevant in an ever-changing landscape. We are excited by the enthusiasm shown by our employees, suppliers and clients to embrace this new age of advanced technology, while challenging the methods of old to ultimately improve the performance of each project. A lot of lessons have been learnt and will continue to be learnt as we strive to improve the way projects are undertaken.

I cannot think of a better industry to be in; it’s what makes us all love our work. No two days are ever the same, and to see progress on a daily basis as the projects are built, people mature and develop, challenges are resolved and the business case is delivered for the client, is ultimately what gives us great pleasure. I can’t help thinking how lucky we are at UMS to experience this satisfaction every day. Make no mistake, mining and contracting is a tough business, but it is very rewarding when surrounded by a world-class team of professionals. ■

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The strategic supplier to the mining and quarrying industries recently developed an innovative, wireless digital management programme aimed at streamlining drilling information.

"Drilling is a crucial component of mining with clients requiring detailed information such as depth, penetration speeds, and wear and tear of equipment, among others. The new App generates this information, instantaneous providing a step-change to the traditional method of only having access to important information on a weekly basis. The move away from the conventional paper trail means that decisions related to the drilling process can be made on the turn and errors easily picked up and amended. Moreover, the information can be shared with all key stakeholders as it is generated thus allowing for speedy responses from the team," explains MD Riaan Theron.

Clients attending Electra Mining 2022 will have the opportunity to interact with the new App, which will be showcased at Beowolf Mining's Outside Stand Nr C23 (OS – C23). The company has been attending Electra Mining for the past 14 years and believes that the widely attended event offers an ideal platform to connect with both its existing client-base and potential new clients.

"Aside from the wireless App, we will be launching a range of new products related to our range of hydraulic hammers – which now offer increased efficiency and improved productivity – as well as new drill bits that have been in the test phase for the past seven months. Given that different commodities have varying types of orebodies with some, such as iron ore and manganese, requiring more robust equipment to meet the arduous operating environment, we have developed drill bits to suit the different orebody requirements," says Theron, explaining that it takes the equipment producer between 25 to 30 days to produce customised drill bits for the specific mining applications.

The new products (hammers and drill bits) have been in test phase at an iron-ore and a manganese mine in the Northern Cape. According to Theron, the products have performed significantly better than the market average.

Backed by close to two decades of industry experience Beowolf's focus of sub-contracting services to big mining projects, requiring drilling products as well as complete management systems, with infrastructure on site has seen the company growing by leaps and bounds.

"We have firm plans in place to grow the business to become a leading supplier of rock drilling tools to the African continent," he says.

Aside from its local footprint which currently accounts for the majority of revenue generation, the equipment manufacturer supplies product to Botswana, Zimbabwe and Namibia and is eager to expand into the fast-growing gold producing West African market.

In fact, the company has made great strides in laying the groundwork for partnerships with key West African mining projects and expects to sink lucrative sub-contracting deals with projects in Guinea and Burkina Faso soon, and so shift its expertise and product dominance to African markets. ■

Copper outlook: Price performance review

By Alana van Wouw – market analyst at Crane Ridge

Starting in 2020 – the copper price was directly affected as countries worldwide entered Covid induced lockdown which halted economic activity, including construction, manufacturing, and industrial production activity, across all sectors. This caused a sudden decrease in copper supply and demand that ultimately dragged the prices 27% down for the year. In July, China, the first country to emerge from lockdown, recommenced importing copper. This ultimately benefited the pricing and kept a bull trend throughout the second half of 2020, despite a second lockdown in China in the third quarter.

Moving into 2021 – the weakness of the US dollar and pessimism about the US economy's long-term outlook compared to China, UK, or Europe maintained pressure on the copper price. Growing deficits in the US, worse-than-expected labour market with millions of jobless Americans resulting in massive stimulus packages, and a high tolerance for inflation from the Federal Reserve all negatively impacted the US dollar. This weakness of the US dollar supported the prices of copper throughout 2021. Slow production recovery coupled with the above-mentioned factors gave rise to a bull run in copper pricing, ending the year near \$10 000 per ton.

In 2022 – the war in Ukraine commenced on 24th February 2022 and dealt a major shock to commodity markets, altering global patterns of trade, production and consumption in ways that will keep prices at historically high levels through to the end of 2024, according to the World Bank's latest Commodity Market outlook report. Looming recession fears are pushing copper pricing down and, topped with political unrest in Japan and the UK, we are seeing downward pressure on copper prices. The closure of the Codelco's Ventanas smelter coincided with a 7% price decline, the most since mid-June 2021.



Copper is the most common metal used in the installation of new generation, storage, and transmission for consumption.

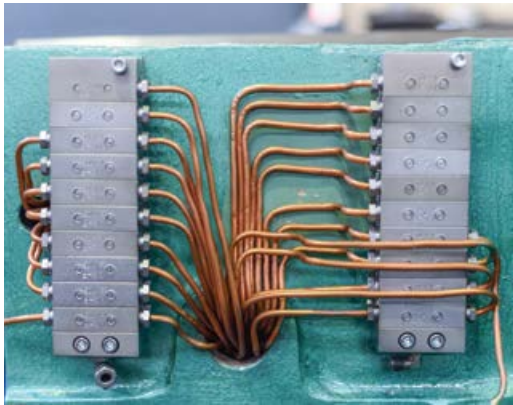
Analysts are still positive that the copper price will remain in the \$7 000 per tonne range, as this is driven by short- and medium-term future contracts. However, if you analyse the price performance it is likely that pricing may range between \$6-7 000 per tonne mark, aligning the copper in price ranges of 2017-19 prior to Covid.

Copper outlook: Demand and supply dynamics

The impact of the coronavirus pandemic affected exporting countries in 2020, with both largest producing countries, Chile and Peru, going into long and severe lockdowns. This resulted in a halt of production, with the International Copper Study Group (ICSG) reporting a 20% decrease in production in Peru during the first half of 2020. By September 2020, LME warehouse stock levels had reached their lowest levels post 2005 and this was further exacerbated in the third quarter of 2020 by strikes and labour disputes.

The supply deficit in copper eased during 2021 as countries came out of lockdown, restarted production, and economic and manufacturing activities resumed.

In February 2022, the Ukraine war put the supply of copper in deficit as the pipeline for the supply of copper was impacted by mines in Russia (7% of global supply) being under sanction threats. However, this is not the only concern as the instability has had a direct impact on the operating costs of mine operations worldwide – through a ripple effect in higher costs to produce, affected by elevated oil prices, which have increased logistics and supply chain. The knock-on effect being higher labour costs demand and strike action causing lowered global production.



High-pressure copper pipes used in hydraulic equipment.

Development of the supply of copper will depend on an investment increase in new resources. Within the Operating and Expansion category an increase in Primary Reserves and Resources has occurred, indicating that further capital and investment is required to develop this copper pipeline through feasibility studies and engineering construction. Investment in new and undeveloped resources in the junior market has again been negatively impacted.

New drilling activities in 2022 have seen promising results in Papua New Guinea, Namibia, DRC and Australia.

Copper outlook: Factors to watch

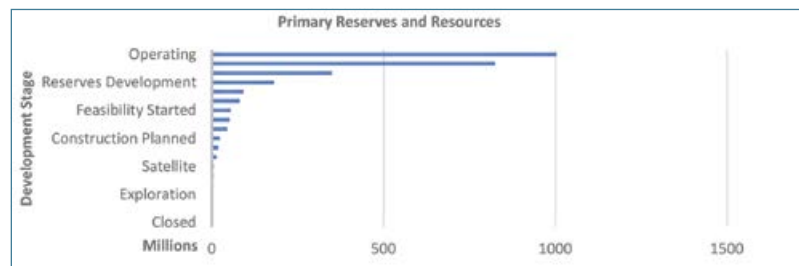
After 2020, global awareness of environmental impact resulted in a green energy focus for governments worldwide. Green energy is a transition from conventional thermal based energy resources to renewable sources. With this increased focus on climate change, governments are adopting green energy strategies for the future.

Copper is the most common metal used in the installation of new generation, storage and transmission for consumption. An example of green energy impact is the installation of charging infrastructure for Electric Vehicles (EVs) coupled with the additional copper consumed in the EVs themselves.

EV demand and sales have rapidly increased and are expected to continue to rise. The focus on green energy strategies is translating into an increased



Further capital and investment is required to develop the copper pipeline.

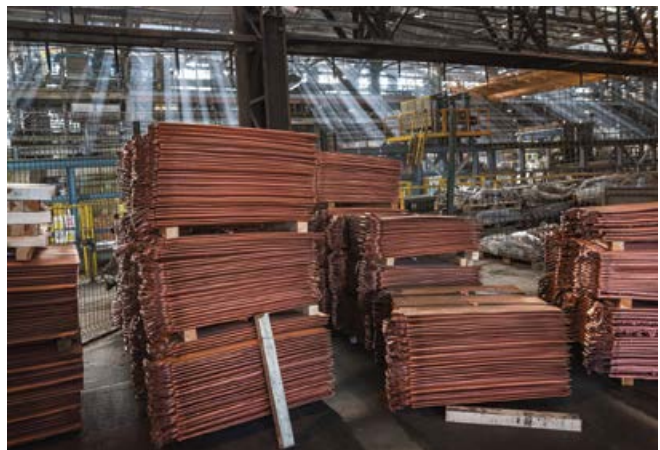


demand for copper and is likely to continue in the future.

Although recessionary fears have negatively impacted markets in the short term, this temporary downswing has been priced in and renewed global growth prospects return towards the end of 2022. Risk factors to the downside include ongoing or escalating geopolitical tension. ■

Below left: Copper smelting process.

Below: Analysts are still positive that the copper price will remain in the \$7 000 per tonne range.



CCR's Mbamba Kilenda targets copper production by 2025

Emerging copper producer Central Copper Resources (CCR) is considering a suitable listing domain as it upgrades its flagship Mbamba Kilenda project in the Democratic Republic of Congo and prepares to start building its first copper project by as early as 2023, targeting production in 2025, COO Kevin van Wouw tells *Modern Mining's* Nelendhre Moodley.

Positioned as Central Africa's only pure-play copper miner, CCR has four main assets: the Mbamba Kilenda flagship mining project; the 12 adjacent licenses encompassing the Western Congolian Belt; the Lunga project in Zambia; and the Titan Kayeye project in the DRC. All three projects have significant high-grade resource potential.

"We had completed the listing preparation on the London Stock Exchange (LSE) AIM market, but found insufficient support from institutions, owing mainly owing to ESG risks of the DRC and central Africa. We have since withdrawn the proposed listing and are evaluating Australian and Canadian Stock Exchanges as they have active listings in the DRC," says COO Kevin van Wouw.

CCR's listing ambition is underpinned by its capital raising requirements as it embarks on the development of its large scale Mbamba Kilenda project.

"Over the next number of years CCR will undertake further drilling to help us better understand the resource size which will allow us to design an appropriately sized project. We believe that the resource is significantly larger than its current status and our aim over the next year or two is to prove up the resource

To date CCR has only drilled 4,5 km of the strike and is targeting resource expansion.



COO Kevin van Wouw.

expansion potential. We are commencing fund raising for mine development and eyeing construction completion by 2024," explains Van Wouw.

However, he cautions, this timeline is largely dependent on the response of financial markets to investing in the Mbamba Kilenda project.

Currently global markets face geopolitical strain and are impacted by uncertainty, with investors reticent to part with cash. However, the company is hopeful that by the end of the year, "a clearer picture will emerge," which will encourage investors to invest in early-stage mining projects in Africa.

Mbamba Kilenda project

Located in the Kongo Central Province about 70 km south of the capital city of Kinshasa in the DRC, the Mbamba Kilenda project covers a 528 km² area and comprises 13 contiguous exploration permits along an 85 km strike length. It has a JORC Code (2012) compliant mineral resource estimate of 11,8 mt at 3,13% total copper.

"We don't have a clear picture of exactly how far the extensions to the Mbamba Kilenda orebody are and our next programme focuses on the immediately adjacent 5 km to the east and west. Our targeted drilling campaign will help this understanding, we hope to expand the resource and gain a clearer view of the size potential of the orebody extensions."

With the Mbamba Kilenda licenses

covering an extensive strike length of 85 km, the project offers great resource upside and project longevity. To date, CCR has only drilled 4,5 km of the strike where the 400 000 ton contained copper resource is stated.

“We have been investigating options to develop along strike to limit the expensive drilling required, and have undertaken an induced polarisation (IP) pilot campaign which involves charging electricity into the ground to measure its conductivity and electrical resistivity. Combined with other exploration techniques like radio-metrics and electromagnetics, these tools allow us to establish a 3D geological picture of the orebody.”

According to Van Wouw, the search is to pin-point the area where the Mbamba Kilenda fault line intersects the transition from sandstone to dolomites, which is where the mineralisation occurs.

“Using the induced polarisation technique, we are exploring 2.5 km to the east and 2.5 km west of the current resource. Using IP we are able to more accurately determine the triple junction hosting the orebody at depth,” he explains.

By specifically targeting the use of IP in this way across the area it intends to develop, CCR will significantly lower its exploration drilling costs.

If the company is able to prove its theory that the orebody extends to the east and the west of the project and contains high copper grades similar to the evaluated 4,5 km strike, there is potential for the resource to be upgraded to a 1,5 mt to 2 mt contained copper in resource, firmly positioning the company in the big league.

Coupled with upgrading the Mbamba Kilenda resource, CCR is advancing the technical aspects of its flagship project and recently turned to X-ray fluorescence (XRF) scanning – an analytical tool used to assay for metal contained.

“Companies are using XRF scanning technology in a sorting device. Using this technology, we have undertaken metallurgical test work to determine its suitability to the Mbamba Kilenda orebody and found that it works very well indeed. The original design can now be cost-effectively modified to recover copper in concentrate – this is a massive game-changer as it offers us a huge saving on both capital and operating costs. We are in the process of incorporating this technology into the work that is being managed by engineering specialist Lycopodium, which will allow us to speedily take the project through to the next phase.”

Lunga project update

Located in the highly prospective copper region of the Lunga basin, some 230 km from Lusaka, the Lunga project lies in close proximity to the Chifumpa mine, which produces high copper grade ores. The project comprises a single large-scale exploration licence covering 292 km².



CCR team busy logging core samples.

Given that the campaign of geochemical sampling and geological mapping undertaken last year revealed significantly more anomalous occurrences than initially identified, CCR’s next phase of exploration will focus on advanced geophysical techniques prior to drilling.

“The Lunga project has anomalous 500 ppm copper with coincident lead and zinc and, when compared to the average Zambian background reading of 20 ppm, this project is highly prospective,” says Van Wouw.

CCR hopes to achieve similar copper grades as its neighbour, the Chimfampa mine which contains >4% copper in oxides from its run of mine material.

“By Zambian standards, 4% copper is regarded as a high-grade deposit and having sampled outcroppings on the Lunga tenement, which delivered similar mineralisation to the Chimfampa mine, we remain extremely encouraged.”

Titan Kayeye project

CCR’s wholly-owned Titan project is located 50 km southwest of Kolwezi in the DRC, adjacent to

CCR is working on expanding the resource to gain a clearer view of the size potential of the orebody extensions.





CCR is clearing the area ahead of further geological exploration



Ivanhoe's Kamo-Kakula deposit, which is projected to be the world's highest-grade major copper mine and second largest by resources. The Titan project covers an area of 231 km².

To date, CCR has completed approximately 4 000 m of drilling on its Titan project and, given its proximity to the 40 mt Kamo-Kakula deposit, Van Wouw expects the Titan project to be similar in nature and gifted with the same high-grade resource as the Kamo-Kakula deposit.

"It is likely that we will intersect similar mineralisation on our property – all indications, including geological continuity, suggest that the mineralisation is similar to the Kamo-Kakula deposit. Due to the depth of potential mineralisation targeted, the drilling exercise is an expensive one. To this end, we are in discussion with several potential partners with a view of establishing a joint venture partnership aimed at taking the prospect up the value curve."

CCR eyes the big league

According to Van Wouw, the Kamo-Kakula project is the last major discovery made in the copper space in more than 15 years and since then few copper dollars have been spent on identifying new copper discoveries. These factors have allowed for copper fundamentals to remain attractive.

"We believe we are well positioned in the copper space as we already have a mature copper project on hand and a robust pipeline of highly prospective new ground. With only 4,5 km of Mbamba Kilenda explored, there is opportunity to develop a number of projects along its 85 km strike length. Over the next 3 – 5 years we plan to develop between 2 – 4 world-class copper projects in our identified areas of operation," says Van Wouw.

Despite having a plate full of opportunities, the company is also evaluating a line-up of potential new prospects not already in its portfolio.

"We are an experienced Central African operator equipped with the skills set to explore and apply technology to other relevant projects. Over the next few years, CCR will look at acquiring additional projects."

Copper's demand/supply fundamentals

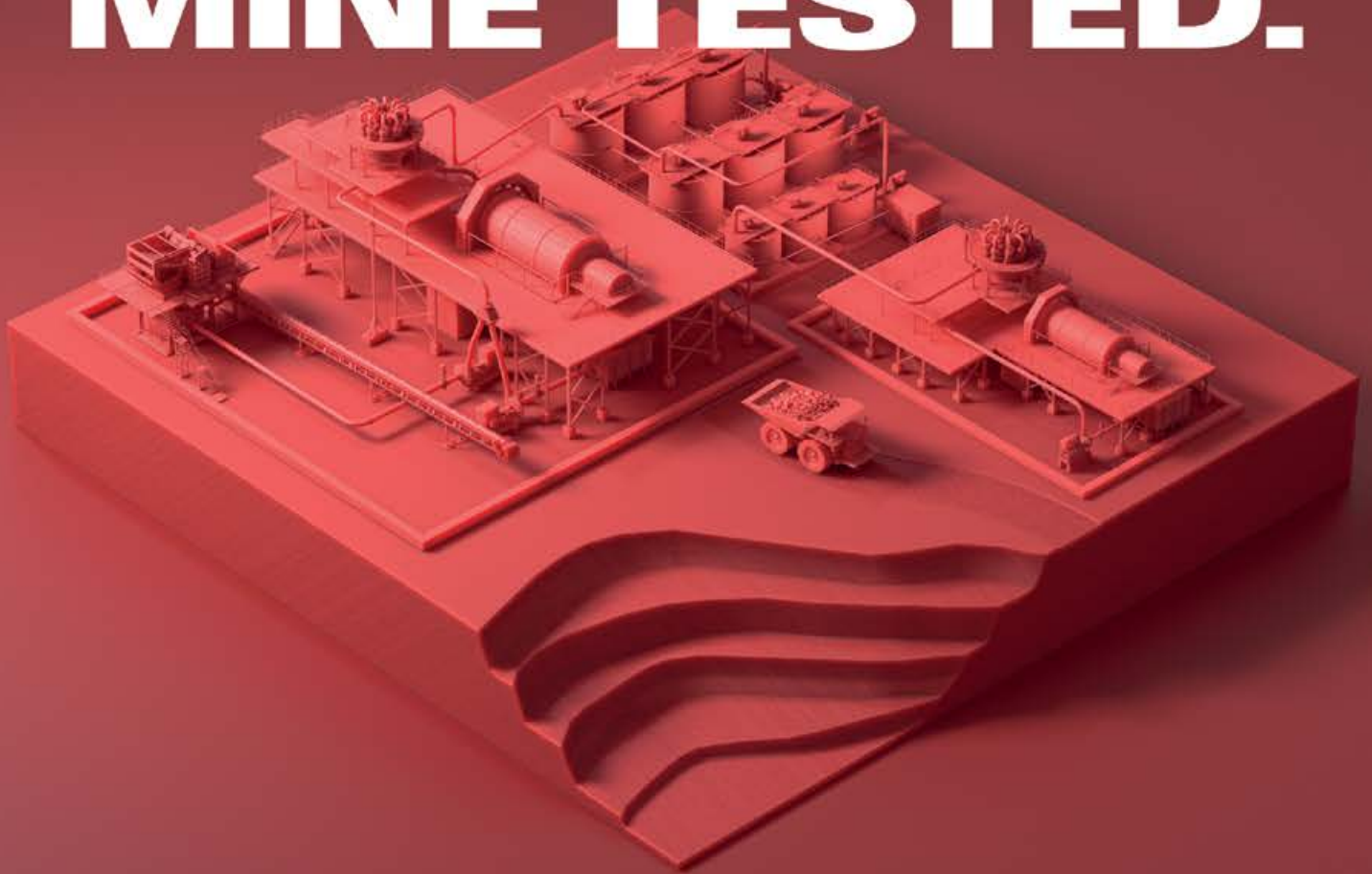
According to Van Wouw, 60% of copper produced is absorbed by global infrastructure development and, given the projected population growth and rate of urbanisation that underpins infrastructure developments, demand for copper over the next 10 – 15 years is expected to remain robust.

Coupled with this, the transition away from carbon-based energy to renewables is driving demand for the development of wind farms, solar energy projects and electric vehicles, all of which rely on copper.

Further to this, geopolitical challenges that are negatively impacting copper supply have tightened the price of copper.

"South America produces 60% of copper used globally, with North America, Asia and Africa supplying the balance of the commodity. As development of copper projects in North America requires extremely long lead-times to production, and Asia – which includes Russia and China – increasingly become consumers of their own product, expectations are that, in the near future, the Western world will turn to Africa to meet its copper growth needs. The global market currently produces 20-22 mt of copper, with demand pegged at 22 mt, thus allowing for copper to fetch attractive prices. We don't foresee the demand supply gap being closed in the next five years. Further to this, a large portion of current copper production comes from mature mines that are entering the last phase of their life of mine and producing lower copper grades. Overall, we are bullish on the future of copper," concludes Van Wouw. ■

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Predictive Discovery's Bankan Gold in the starting block

With an eye to becoming a gold producer in the next three years, gold explorer Predictive Discovery is ramping up its exploration and baseline environmental studies at its flagship Bankan Gold Project, located close to Kouroussa, 550 kms east of Conakry, Guinea's capital city. *By Nelendhre Moodley.*



CEO Andrew Pardey.

The Australian-listed junior miner is focused on firming up its 4.2-million ounce Mineral Resource Estimate (MRE) at the Bankan Gold Project, with a clear strategy of moving from explorer to gold producer in the near future.

According to MD Andrew Pardey, Bankan's updated mineral resource is only the beginning of the discovery journey. The company is aggressively exploring the broader Bankan permit, targeting new gold discoveries in new high-grade areas.

Predictive Discovery's 356 km² Bankan project, located within Guinea's Siguiri Basin, consists of two key deposits – NE Bankan and Bankan Creek – and a number of highly prospective deposits within the broader Bankan permit which have, to date, delivered highly encouraging results.

The Siguiri Basin hosts Nordgold's Lefa mine, one of the country's largest gold producers; AngloGold Ashanti's Siguri gold mine; Hummingbird Resources' Kouroussa Gold mine and Sycamore Mining's Kiniéro Gold Project.

Recent drilling efforts on the Bankan project have yielded an updated mineral resource estimate of an

inferred resource of 79.5-million tonnes at 1.63 grams per tonne of gold for 4.2-million ounces of gold.

The latest MRE focused purely on the NE Bankan deposit, which saw an increase of 18% to 3.9 million ounces of gold (inferred), from 72.3-million tonnes at 1.65 g/t. The adjacent deposit, Bankan Creek, had no further drilling and remained at 331,000 ounces from 7.2-million tonnes at 1.43 g/t, bringing the global resource at Bankan to 4.2m oz Au from 79.5 million tonnes at 1.65 gpt.

"The recent drilling initiative has increased the resource by almost 600,000 ounces, taking the project to a 4.2 moz asset and lifting the grade from 1.55 g/t to 1.65 g/t. However, the upgrade excludes PDI's deepest diamond hole at the project, which lies outside the mineral resource area and has the potential to drive further resource growth," says Pardey.

While the central portion of the NE Bankan gold deposit contains the most gold and higher-grade zones occurring in the footwall of the shear zone within the felsic intrusive, Bankan Creek, a satellite deposit located 3 km from NE Bankan, has yet to be fully explored, both at depth and along strike with

Core shed and refilling station.



further extensional drilling planned.

Currently nine drill rigs are undertaking further resource drilling, grade control and near-deposit exploration across the Bankan project area.

“Over the following months and supported by our healthy A\$57-million cash balance, we will continue to drill the current deposit to convert ounces in the Resource category from Inferred to Indicated, and undertake further resource drilling at Bankan Creek to develop our regional targets, with the goal of finding more NE Bankan-style deposits along our 35 km-long structural corridor,” says Pardey.

The company recently raised \$55-million predominantly from institutional investors through a share placement scheme and will use the cash to complete baseline environmental studies, continue drilling initiatives as well as deliver a comprehensive scoping study to the Government of Guinea, ahead of converting the current exploration license into a Convention de Base, the local term for an exploitation license.

Aligned with its strategy of becoming a gold producer, the company recently made significant changes to its core team to ensure a highly skilled and experienced group ready to take the project up the value chain.

“We recently appointed a team with significant experience in developing mines in Africa, including Pierre Louw, Marlyatou Balde, Norman Bailie and Chris Boreham,” says Pardey.

CFO Pierre Louw, a senior professional accountant with over 35 years diverse hands-on experience, has worked extensively in Africa, including Tanzania, Egypt, Zambia and South Africa, while country manager Marlyatou Balde, a Guinean national, has worked at AngloGold Ashanti, Barrick Gold, BHP Group and, most recently, as technical advisor to the Minister of Mines and Geology in Guinea. Geology manager Norman Bailie has more than 30 years’ experience in gold mining and exploration, having been the group exploration manager for Centamin and head of exploration for Cora Gold. Project feasibility manager Chris Boreham is a mining engineer with over 30 years’ experience in hard rock mining, underground and open pit mining, both as owner operator and in contract mining. Boreham has been involved in a number of successful feasibility studies across Australia, China and Africa.

Advancing environmental studies

By the end of 2023, the junior miner expects to have completed its scoping study and upgraded its current licence from exploration to exploitation.

The focus for the next 18 months remains on rapidly advancing its environmental studies aimed at identifying critical fauna and flora in its area of operation, across both wet and dry seasonal spells.

According to Pardey, the Bankan project is situated in the outer buffer zone of the Upper Niger



Cropped drilling at Bankan.

National Park, which places it close to a sensitive environmental area. Following completion of the baseline studies, the company is looking at maximising the preservation of the national park through a further delineation of the outer buffer zone.

“We are working closely with the government of Guinea to ensure that the Bankan mining area will not impact the environmentally diverse Upper Niger National Park. To ensure that the environmental impact assessments are carried out in the best possible manner, we recently appointed Australian lawyer and ESG specialist Sandra Bates and ESG manager Andre Pieters to lead the critical risk programme and community development studies. We have also appointed ESG strategist’s critical resource, and ESG specialist public relations firm Buchanan. For Predictive Discovery, it is imperative that we explore and address all environmental issues so we can carve a path to mine in the area economically and acceptably.”

The explorer continues to engage with key government stakeholder groups to ensure that it aligns with the objectives and expectations of the Ministry of Environment and Sustainable Development, and the National Parks Authority.

Mining at Bankan

According to Pardey, the Bankan project “offers a straightforward and simple” metallurgy which will allow for a conventional crushing, grinding and leaching process.

“The gold processing will be largely focused on an upfront gravity circuit, which is a more cost-effective process than relying on the use of reagents,” he says.

Although the Bankan project offers the opportunity for an open-pit operation, Pardey notes that, given its location 18 kms from the core zone of the Upper Niger National Park, the company will target a smaller surface footprint and in time expand to an underground mining operation.

The company currently employs 165 people and will, once the mine is in operation, employ close to 1 000 people. ■

“We are working closely with the government of Guinea to ensure that the Bankan mining area will not impact the environmentally diverse Upper Niger National Park.”



CEO Luke Alexander.

Newcore's Enchi project – a star in the making

Hot on the heels of its recent resource upgrade, gold explorer Newcore Gold has completed a further \$5-million injection to firm up the resource base of the highly prospective, well-located Enchi Gold project that will take it up the value-curve. “But, will an improved value proposition be attractive enough to see the new kid on the mining block develop the project into a 5 moz asset, or is it eager to off-load the lucrative asset to a mid-tier or mining major waiting in the wings to take it off the explorer’s hands,” asks *Modern Mining’s* Nelendhre Moodley.

Located on one of Ghana’s two prolific gold producing belts, the Enchi project is situated in the southwest of the country along the Bibiani Shear Zone. Southern Ghana is considered one of the world’s most productive regions for gold discoveries, with both gold majors, Gold Fields and AngloGold Ashanti, and a host of explorers enjoying success in the area.

“The Enchi project is a 1.4-million-ounce asset in a district hosting several 5-million ounce gold deposits. The project stretches along more than 40 km of the Bibiani Shear Zone,” says Newcore’s CEO Luke Alexander.

Located on a 216 km² tenement, the district-scale Enchi project has already identified four deposits and an additional five mineralised zones and prioritised numerous targets for further investigation.

The TSXV-listed explorer recently completed a

90 000-metre drill programme that significantly expanded the mineralised footprint of the Enchi Gold project and, according to Alexander, Newcore’s multi-pronged exploration approach delivered on its goals of successfully outlining the potential resource growth along strike at all four deposits (Sewum, Boin, Nyam, Kwakyekrom).

“Our multi-pronged exploration approach delivered on the objectives we set out at the start. We outlined near surface resource expansion potential along strike at all four of our existing deposits; achieved strong results from drilling at previously drilled areas; encountered high-grade intercepts at depth, which outlined the potential for delineating underground resources, and made three new Greenfield discoveries. We have only just scratched the surface of the gold potential at Enchi. We look forward to continuing to unlock the value of Enchi through exploration. In fact, the next phase drill programme is already planned for later this year,” Alexander explains

Newcore raised \$5 million in July, increasing its cash position to \$6.5 million which will fund its next phase of drilling and resource update in Q4 of 2022. The Enchi project area is a substantially underexplored area consisting of several high priority geochemical and geophysical anomalies yet to be tested by drilling.

“Considering the positive results from the latest resource update and the large number of untested anomalies, there is excellent potential to expand the current resource,” says Alexander. “Further to this, the recently completed drilling programme identified high-grade gold zones at depth. To date, Enchi has been drilled

Right: The Enchi project is a 1.4-million-ounce asset in a district hosting several 5-million-ounce gold deposits.

Newcore Gold has completed a further \$5-million injection to firm up the resource base of the Enchi Gold project.



to an average depth of only 120 metres and a maximum depth of 300 metres”.

According to Alexander, the Enchi project is comparable to gold miner Asante Gold’s multi-million-ounce Chirano Gold Mine, located some 50 km northeast of Enchi, which hosts plunging zones of high-grade gold mineralisation with gold zones similar to Enchi. Both properties exhibit numerous targets.

Following the completion of its most recent drill programme, the explorer expects to provide an updated Mineral Resource Estimate before year-end.

Enchi – a star in the making

Develop the project or off-load it to a miner with an appetite to take it up the value chain is the big question? For Newcore Gold, which is focused on becoming a world-class, responsible gold enterprise that provides its shareholders with exceptional returns, this is not an easy one to answer.

According to Alexander, Newcore’s management and board of directors have a vested interest in the project, owning a 24% stake alongside shareholders.

“Newcore Gold consists of a highly skilled, well experienced team capable of developing the Enchi project into a world-class gold mine. Our team consists of people who have built large-scale mines in Africa, and developing Enchi into a gold producer is well within our means.”

As it stands, the Enchi PEA highlights a simple, open pit heap leach operation with the capacity to process 6,6 mtpa. The project offers an attractive low strip ratio of 2,1 to 1, strong economics, low capital intensity, an initial capital cost estimated at US\$97-million, a short payback period of 2 to 3 years and is a highly robust project with growth potential of over 104 000 ounces of annual production in the first three years of full production and peak production in year ten.

The project area is well serviced by infrastructure, including a 100 km well-developed road that passes through the Enchi project and a powerline that runs parallel to the main road, allowing the project developer to access grid power.

“Although Enchi is a near-surface oxide resource offering a multi-million-ounce opportunity, it is only once we have completed the necessary drilling to ensure resource confidence, that we will make a firm decision on whether to develop the project or not,” concludes Alexander. ■



Newcore’s management and board of directors own a 24% stake alongside shareholders.



The Enchi project is comparable to Asante Gold’s Chirano Gold Mine.

Ghana – stable jurisdiction with numerous upsides

- ❑ Ghana is regarded as Africa’s top gold jurisdiction and the continent’s largest gold producer. It is the world’s sixth largest gold producer, producing more gold per square kilometre than Nevada.
- ❑ The country’s stable, democratic government supports mining, with gold being essential to Ghana’s economy and tax base.
- ❑ Ghana offers modern infrastructure and a skilled English-speaking labour workforce.
- ❑ The country hosts a strong presence of senior gold producers with three of the top 10 major gold producers operating in-country – Newmont, AngloGold Ashanti and Gold Fields.
- ❑ Ghana produced five million ounces of gold in 2020, surpassing South Africa’s 2020 production of 3,5-million ounces.

Kore Potash advances the Kola project in RoC

AIM-listed Kore Potash's flagship project Kola Potash, which is advancing towards construction phase, is set to become one of the key greenfields projects adding diversity to the Republic of Congo's (RoC) petroleum dominated economy. The country is blessed with large untapped mineral wealth including base-metals, gold, iron and phosphate deposits, but remains largely dependent on oil production to drive its economy.



CEO Brad Sampson.

As a mining pioneer in the country, Kore Potash will have first mover advantage when it brings its Kola project into production in the next three-and-a-half years and paves the way for other miners, CEO Brad Sampson tells *Modern Mining's* Nelendhre Moodley.

Kore Potash is an advanced stage mineral exploration and development company focused on two high-grade projects in the RoC: Kola and Dougou Extension, and is positioned to be among the world's lowest-cost potash producers given its favourable location, extensive tenements and the high-grade and shallow depth of the deposits.

According to Sampson, demand for potash is underpinned by concerns around food security and continuity of supply of fertiliser to feed the world's growing population, which the United Nations has projected will increase from 7.7-billion in 2019 to 10.9-billion by the end of the century.

Sampson explains that, "Recent global events have heightened concerns for food security and continuity of supply of fertiliser to feed the world's expanding inhabitants. The dramatic increase in the potash price reinforces the need for the development of new low-cost potash production from high quality potash deposits located close to customers, such as our projects in the Sintoukola basin".

Almost 95% of the world's potash produced is used in farming to fertilise food supply.

As a source of soluble potassium, potash is vital to the agricultural industry as a primary plant nutrient.

Potash increases water retention in plants, improves crop yields, and influences the taste, texture, and nutritional value of many plants and consequently the quality of livestock which feed on the plants.

"Potash is a critical plant nutrient that enhances quality and crop yield and is essential for grass yield and high-quality feed value associated with livestock. However, aggressive agricultural practices over the years have depleted the nutritional value of the soil, leading to lower crop yields," Sampson says.

Global potash production is estimated at 70-million tonnes per annum and is currently dominated by a few producing nations with Canada, the world's largest potash producer, accounting for 32% of the world's total production, accompanied by Russia, Belarus and China, which altogether account for roughly 80% of the world's potash production.

Potash demand is forecast to grow at 2 – 3% per annum and Kore Potash is well positioned to supply into this fast-growing market.

"The drivers for potash demand will continue into the foreseeable future, which places the Kola project favourably as we target potash production by 2026," says Sampson.

Kola targets potash production by 2026

Kore Potash recently partnered with SEPCO Electric Power Construction Corporation for the construction of its US \$1.8-billion Kola project, located in the Sintoukola Basin, a globally significant potash basin in the RoC.

"The drivers for potash demand will continue into the foreseeable future, which places the Kola project favourably as we target potash production by 2026," says Sampson.

Construction completion is scheduled for 2026.





The Kola project will take 40 months to construct.

The company has inked a heads of agreement for the construction of the Kola Potash Project with the Chinese construction and engineering company and expects to receive an EPC proposal from the Dubai-based contractor by the end of August. Project construction is anticipated to commence early next year.

According to the definitive feasibility study, the Kola project will take 40 months to construct with construction completion scheduled for 2026.

Targeting a low-cost producer status, the company will produce granular Muriate of Potash (MoP) at a minimum quality of 95,3 % Potassium Chloride, in line with international standards. The project is designed as a conventional mechanised underground operation with shallow shaft access, producing 2,2 mtpa of MoP over an initial 31-year life.

“The Kola project offers attractive fundamentals as it is a shallow high-grade orebody with a low level of ore impurity (0.15 % insoluble level) and a low carbon-footprint given that ore produced will be



Kore Potash is an advanced stage mineral exploration and development.

transported via conveyor-belt directly to the processing plant. When compared to most potash projects, which are located at a depth of at least 1 km below surface, the Kola project with shaft depths of 270 m offers an appealing proposition. A further advantage is that it is designed to deliver product efficiently to the export market and negates the need for a tailing’s storage facility, thereby having a smaller mining footprint,” Sampson explains.

Ore mined from the underground operation will be transported to the process plant via an overland conveyor about 25 km long and, once processed, the MoP will be conveyor transported 11 km to the marine export facility ahead of being shipped to its final destination.

“Kola Potash is located close to the coast of the Atlantic Ocean, allowing for an easy and cost-effective final product delivery to African and South American markets.”

For the largely subsistence driven community surrounding the project, the Kola project will bring significant benefits, notwithstanding employment opportunities when the mine is in production and employing in excess of five hundred employees. It will also provide considerable revenue injection into the economy through the establishment of indirect businesses supporting the mining community.

“The Kola project will add to the country’s economic prosperity via taxes and royalties paid to the RoC government, which already has a 10% stake in the project,” concludes Sampson. ■

Almost 95% of the world’s potash produced is used in farming to fertilise food supply.





Eastplats GM Hannelie Hanson.

Crocodile River Mine is ready

Armed with a reconfigured mine layout plan that is aligned to an adjusted mining method, platinum producer Eastern Platinum mine (Eastplats) subsidiary Barplats, owner of the Crocodile River Mine (CRM), is ready to restart its flagship operation which has been on care and maintenance since 2013, GM Hannelie Hanson said during a recent media visit. By *Nelendhre Moodley*.

According to Hanson, following the platinum price slide in 2011, the miner took the decision to put its operations on hold. Over the intervening years, the operation has been upgraded, and now boasts infrastructure enhancements that target improved efficiencies, increased production and greater safety.

“Over the years,” says Hanson, “Crocodile River Mine went through a number of ownership changes and opened and closed a number of times due to the economics at the time and the problems associated with the mining method. In 2016, we had a board and shareholder change which was the start of the relationship with Union Goal and the design for the current chrome plant, which was commissioned in December 2018.”

Engineering specialist Ukwazi and South African advisory company Minxcon Group were instrumental in providing a reconfigured underground mine plan that ensures the dual listed miner comes to market with a cost-efficient operation that will be sustainable when PGM and chrome prices come off their peak.

Crocodile River Mine is set to kick-start its underground operations in Q4 2022.

The Canadian miner recently appointed Wanjin Yang as its new CEO, tasked to take the project up the value chain and deliver on the production of the precious ounces.

Eastplats is ready to restart its flagship Crocodile River Mine.



“In anticipation of mine restart, we took the initiative to improve the overall mine plan and the mining method and will equip it with a brand-new mining fleet,” says Hanson, who led the mine care and maintenance initiative a decade ago and remained on hand to ensure a smooth transition to mine resumption, by ensuring, among other things, that the necessary mining related documents were updated and the operations kept in a suitable condition.

Over the past two years, commodity prices have soared, trading at all-time highs, and platinum group metals joined the ranks of the top performers, with rhodium being one of the top earners. According to Peter Major, a director at Mergence Corporate Solutions, in just the past two years, mining houses and companies made tremendous returns from robust commodity prices with commodities such as rhodium trading at all-time highs of \$30 000/oz and palladium at \$3 000/oz.

Although most commodity prices have come off their record highs, prices remain relatively favourable, offering an opportune mine-restart time for the Barplats team which has waited close to a decade to get its PGM and chrome operation into production.

According to Hanson, while the PGM basket of prices is far from being at its best, the long-term fundamentals, driven by growing demand for clean energy, remain positive.

Located in Brits in the Northwest Province, Barplats holds a pipeline of high-quality chrome and PGM assets both on the eastern and western limbs of the Bushveld Igneous Complex (BIC).

Its flagship Crocodile River Mine (CRM) consists of the Zandfontein (operating re-mining section) and project development sections of Zandfontein Underground, Crocette and Kareespruit, located on the western limb of the BIC with its Maresburg and Kennedy Vale/Spitzkop operations situated on the eastern limb.

Producing ounces ahead of mine restart

Crocodile River has been in operation since 1987, and the Zandfontein and Crocette mines have been under care and maintenance since 2013.

However, even before the Crocodile River underground project was given the green light, the Toronto listed miner has been producing precious tons from its Zandfontein tailings, having commissioned its

for a restart

chrome recovery plant and initiated chrome re-mining in December 2018.

“In tandem with reprocessing the Zandfontein tailings, we continue to be involved in numerous project optimisation initiatives, including optimisation of the chrome recovery plant, the PGM Scavenger plant (circuit D) and the PGM main plant (circuit B). The circuit D optimisation programme and the commissioning of the PGM main plant were completed last year. We began the PGM scavenger plant operations in Q4 of 2020 and are processing tailings from the chrome recovery plant,” explains Hanson.

Having started the tailings re-mining process in 2019, the company has, to date, re-mined around 8 mt of tailings and produced more than 2.6 mt of chrome concentrate which has been shipped to its offtake partner in China.

The miner’s PGM plant commissioning efforts, begun in December 2020, have seen the company deliver up to 900 oz per month, despite having to halt production in February and March 2021 for PGM circuit D plant optimisation and again in September 2021, when the company prepared PGM main circuit B for commissioning in October 2021.

CRM underground restart

The Crocodile River underground restart programme is a milestone in the company’s strategy as it targets Q4 2022 as its start date.

“In 2021, we recommissioned and reconfigured circuit D, enhanced the mill to improve our recovery and revised the long-term plan for the underground



mine design. That was the beginning of the journey to restart the underground mine and we are very close to having our first blast and restarting production from Zandfontein underground,” says Hanson.

Having invested over \$600-million during ‘Care and Maintenance’ for care and maintenance costs as well as infrastructure development to get the project ready, the PGM and chrome miner will be mining the UG2 chromitite layer of the Bushveld Complex, from its Zandfontein vertical shaft.

The project, which has a proven and probable mineral reserve of 1,7 m Oz 4E and a life of mine of 22 years, will deliver at an all-in sustaining cost of \$1 502/oz.

According to Hanson the mineral reserve estimation was completed using a 4E basket price of \$1 825/oz and exchange rate of 15,53 ZAR/USD. However, the miner is confident that, given its

Ukwazi and Minxcon Group were instrumental in providing a reconfigured underground mine plan.

The PGM basket of prices is being driven by growing demand for clean energy.





Above: To date, around 8 mt of tailings have been remined.

Right: The company has been optimising its chrome recovery plant, the PGM Scavenger plant (circuit D) and the PGM main plant (circuit B).



optimisation programme, it will deliver at significantly reduced operating costs.

“The planned mining layout uses the existing vertical shaft No. 3 and No. 4 declines and development ends to mine three distinct mining areas from 4 Level to 12 Level. The planned mining areas will be accessed via three planned declines. The mining strategy for the project is to steadily ramp up to a peak production rate of around 1,02-million tonnes per annum from the underground operations using a hybrid mining method. A steady ramp-up of three years has been incorporated into the mining schedule. Mining will commence with 20 000 t per month RoM for a year, followed by 40 000 t per month RoM for two years and then ramping up to steady state production of 80 000 t per month of RoM. A life of mine of around 22 years is envisaged,” explains Hanson.

Once in production, the high-grade PGM concentrate will be transported to the Impala smelter complex near Rustenburg under the off-take agreement.

A reconfigured mine plan that delivers

According to Hanson, the company requires an investment of \$25m for the start-up of the operation.

This includes a small portion for the initial new fleet, which will consist of LHDs, Dump Trucks, Drill Rigs and Utility Vehicles, all of which will come equipped with the latest proximity detection system (PDS) – a system that warns both the vehicle operator and pedestrians of imminent potential collisions.

As part of its redesign programme, Crocodile River underground operation is equipped with a fully functional underground maintenance workshop and refuelling bay to ensure that equipment is serviced onsite underground, thereby dispelling the need for relocating equipment to surface to be serviced. This offers increased efficiency and cost-effectiveness.

Aside from being equipped with an underground explosives storage facility, the miner will adopt the Vertical pumped Emulsion Delivery System to deliver explosives to the various mining levels – this method reduces logistics requirements thereby boosting safety and efficiency.

The Crocodile River’s redesigned mine will see the miner advancing in-stope drilling using a hand-held hydropower system, which is a step-change from the previously adopted hand-held system (driven by compressed air). Moreover, the redesigned mine is based on a timberless system supported by 2 m cable anchors, packs and pillars, which offers the benefits of reduced logistics, materials handling and lower cost.

“The mining process involves on-reef development which delivers a number of advantages, including reduced hoisting, cost saving and revenue generation, when compared to the previous strategy which relied on footwall development 30 m below the reef horizon. Further to this, we invested in an efficient conveyor system, chairlifts and a fully functional vertical shaft which allows us to unlock increased efficiencies, lower cost, a reduced load and haul fleet, and reduced emissions,” Hanson says.

Once in production, the mine will employ a further 1 400 people, bringing the total number of people employed at the mine to 1950.

Aside from the employment, and training and

Barplats holds a pipeline of high-quality chrome and PGM assets.






skills development initiatives that the Crocodile River Mine brings to the area, the company will also unlock numerous opportunities for SMME development through its social and labour plan. The miner is currently involved in numerous education related projects, such as refurbishing classrooms, maintaining soccer fields, and projects aligned with local municipality initiatives such as providing drinking water to the community, among others.

“We are of the view that meaningful contributions to local economic development in the communities surrounding our operation hold the most promise in providing sustainable change. As a result, we have a number of initiatives in place to progress the community surrounding the Crocodile River Mine. These include programmes aimed at training and mentoring SMMEs to help them to become standalone BEE companies able to bid for business with mines in the region. We have ringfenced certain projects that will be tendered to these companies, which will help them grow and expand,” concludes Hanson. ■

Left: More than 2.6 mt of chrome concentrate has been produced and shipped to its offtake partner in China. Right: Chrome concentrate.

Platinum mining

- ❑ South Africa has more than 80% of the world’s platinum reserves, and is the world’s largest producer of platinum group metals.
- ❑ The platinum mining sector is one of the largest components of South Africa’s mining industry in terms of both employment and export earnings.
- ❑ Six metals, all of them silvery-white in appearance, make up the suite of platinum group metals (PGMs) – ruthenium (Ru), rhodium (Rh), palladium (Pd), osmium (Os), iridium (Ir), and platinum (Pt).
- ❑ These metals occur together in PGM-bearing ore.
- ❑ PGMs are indispensable in many industrial applications including in computer hard disks, mobile phones and glass, amongst others.
- ❑ In medical applications PGMs are used in the manufacture of anti-cancer drugs, cardiac treatment, implants and dental applications.
- ❑ The durability, quality and aesthetic appeal of silvery-white platinum and palladium have for centuries contributed to its appeal in jewellery manufacture.
- ❑ China accounts for 50% of the world’s platinum jewellery offtake. Because PGMs are highly recyclable, they are used, rather than consumed.





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Shining the spotlight on safety in underground mining

Underpinned by the mining industry's drive for zero harm, companies and industry bodies are progressing the development of technologies and equipment that ensure the safety of the sector's workforce. *By Nelendhre Moodley.*

In fact, this drive for zero harm recently saw the high-risk underground mining sector, which is associated with fall of ground (FOG) incidence, record six months without a mining fatality caused by a FOG in gold and platinum mines.

According to the Minerals Council's head of safety, Dr Sizwe Phakathi, this is significant because gold and platinum mines have not had a FOG fatality-free first six months of the year in the history of South African mining. There were 11 FOG fatalities by the end of June last year.

In line with driving the agenda towards zero harm, the Mandela Mining Precinct (MMP), a public-private partnership between the Department of Science and Innovation (DSI) and the Minerals Council of South Africa, is at the forefront of identifying and steering the development of innovations related to the high-risk underground mining sector. This is according to programme manager: longevity of current mining & mechanised mining systems at the MMP, Martin Pretorius.

Given that this segment of mining is challenging and hazardous, safety remains a priority with industry going the extra mile to bring to market cutting edge technologies and methodologies that enhance safety.

According to Pretorius, the company has been partnering with product specialists to develop



Mernok's 'MAXUS' prototype with remote control.

ground-breaking equipment that is safer, increases efficiency and is environmentally friendly.

"Most of the initiatives and technology developments in underground mining are aligned with longevity of current mining (LoCM) and mechanised mining systems (MMS) programmes that include developments around the Isidingo drill challenge, remote scraper winches with proximity detection, the development of remote charging units and e-log-books for shift supervisors and autonomous mining that includes mechanical rock breaking."

Underground mining – a key economic contributor

Although underground mining is a high-risk mining environment, its value to the South African economy cannot be contested as it employs thousands of people and contributes billions of rands in revenue to both mining houses and the country's gross domestic product in the form of taxes and royalties.

Commodities mined at depth are mainly gold, platinum group metals (PGMs), coal and, to a lesser extent, chromite and manganese. The Minerals Council South Africa has pegged the overall export earnings in 2021 from PGM's at R321,3-billion and

Initial surface testing of scraper proximity prototype.



local sales registering R25,3-billion; while gold exports amounted to R93,1-billion and coal exports accounted for R63,7-billion with the addition of R86,4-billion for local coal sales.

Operating underground

Underground mining is often associated with low production efficiencies, a higher cost range and tight production cycle times. Moreover, mining at depth is associated with seismicity and increased heat levels and therefore high energy requirements for refrigeration and ventilation systems.

Gold and PGM orebodies occur in narrow reef hard rock environments, which make it a challenging environment for operating large-scale equipment. This highly labour-intensive environment necessitates the use of conventional and mechanised mining methods.

“Most commodities mined underground have extensive orebodies, with the mineral extraction process lending itself to the use of large-scale equipment, which in some areas allows for autonomous mining practices. However, the majority of mining in the hard rock environment relies on the drill and blast method for rock breaking. Softer rock areas use mechanical rock breaking equipment.”

According to Pretorius, given depleting mineral resources, miners are forced to push the boundary limits which results in an ever-increasing distance between the mine extraction area and the shaft infrastructure. The further the distance from the shaft, the longer it takes to travel and or move equipment such as drills to the work-face, with less face-time to complete the production cycle.

To address these challenges, industry bodies, in partnership with mining houses and equipment manufacturers, are developing safety interventions in line with safety, health, environment and community driven programmes.

“The industry’s holistic safety strategy encompasses environment, social and governance (ESG), carbon footprint reduction, adoption of alternative energy sources and conversion to new technology



Given depleting mineral resources, miners are forced to mine at greater depths.

enablers that help to remove people from dangerous areas. From a production point of view, the aim is to optimise shift cycles, align production cycles with equipment utilisation, and digitise and incorporate real-time monitoring. Research, development and innovation are key areas of focus.”

MMP drives innovative solutions

“The 2022/23 financial year budget programme comprises both resource extraction optimisation projects and technology application projects. The focus is to test remote control functioning prototypes and fully integrate planning systems to enhance Technology Readiness Level 8 (TRL 8), which is the final trial and testing before commercialisation of the products takes place. In this financial year, we are focused on the development of numerous projects, including two used for cleaning and sweeping systems.”

According to Pretorius, the intent of the longevity of current mines (LoCM) programme is to modernise and introduce new solutions to existing gold, chrome and platinum mines, coupled with adopting Best Practice methods and procedures.

“The aim,” he says, “is to extend current mining life through improved productivity and safety

Left: HPE’s ‘Drill Guide’ prototype.

Below: HPE Isidingo drill in action.





Industry bodies in partnership with mining houses and equipment manufacturers are progressing safety interventions.



Underground mining is a high-risk environment.

practices, leading to a 10 – 20% improvement in margin, and to reduce safety risk at the work face.

“Production improvement is achieved by developing new technological business improvement solutions for remotely operated equipment, and production optimisation within the focused areas for cleaning, support, drilling and blasting practices. The MMS Programme targets the development of automated mining systems that will allow for drilling and blasting / mechanical rock-breaking in gold and PGM narrow reef hard rock mines.”

LoCM and mechanised mining systems initiatives include:

- ❑ Isidingo drill challenge.
- ❑ Remote scraper winches with proximity detection.
- ❑ Remote charging units.
- ❑ Focus on first line supervisor compliance – e-logbook.

Mechanised mining systems (MMS) focus on mechanised mining optimisation:

- ❑ Technical design – related to rock engineering, ventilation engineering, infrastructure, equipment and energy utilisation.

- ❑ Mining optimisation – takes into account simulation models that evaluate equipment performance capability with actual result, which ultimately deliver improved blasting frequency.
- ❑ Equipment monitoring, maintenance diagnostics and replacement strategy, autonomous mining systems, and mechanical rock-breaking systems.

Isidingo Rock Drill challenge

In 2018, the MMP rolled out the Isidingo rock drill challenge, which looked to replace the outdated traditional drill technology employed in the South African gold and PGM mines. Existing drilling equipment is bulky, heavy and delivers low production efficiencies resulting in blasting every third day.

“The aim of the Isidingo drill initiative was to develop a drill to improve efficiency and safety and present an alternative power source from pneumatic drilling while concurrently creating new opportunities for local original equipment manufacturers (OEMs) to operate within the mine value-chain,” Pretorius explains.

The challenge comprised three phases, namely:

- ❑ Phase I: Concept designs and development.
- ❑ Phase II: Proof-of concept from surface testing of prototype performance.
- ❑ Phase III: Underground testing performance and further product development and improvement.

“The Isidingo drill challenge, Pretorius says, “has proved to be extremely successful with numerous equipment suppliers taking up the opportunity. In the end, three contestants were selected, of which two companies – Novatek and HPE – subsequently developed prototypes. The hand-held prototypes, developed last year, have been tested and trialled at underground operations. The performance results met the industry criteria and, to date, there has been good uptake of the drills by the mining industry.”

HPE’s advanced prototype drill is being commercialised and has received strong industry interest. Further to this, given that underground mining is associated with increased levels of seismic events, there are a variety of tracking products being developed.

“South African gold miner Harmony Gold has been collaborating with product developers to develop its own environment, equipment and people monitoring system. Real time monitoring software has been integrated into cap lamps to track the location of employees – this is especially important for pin-pointing the location of miners during occurrences of seismic events,” explains Pretorius.

The MMP’s strategy for ESG is focused around identifying alternative energy solutions to power underground plant and equipment. The drills prototypes from the Isidingo challenge, for instance, are powered by hydropower.

Another initiative being advanced is the remote scraper cleaning with proximity detection initiative

which, to date, has led to the development of two prototypes, one by MERNOK elektronik and the other by BOOYCO Electronics.

According to Pretorius, once blasting takes place, scraper cleaning, which allows for the removal of rock, follows. The process, however, is often associated with high risk to workers when entering the scraper pathways or working in close proximity to the winch whilst in operation. Moreover, given that miners work on different levels they often cross paths with scraper cleaning equipment, which adds to the risk exposure.

To reduce associated injuries and fatalities, equipment manufacturers have developed a system to connect the control unit to the scraper winch, which enables emergency shut down when people are detected in close proximity to the winch or the scraper pathway.

“The value proposition for the development of the remote scraper cleaning unit with proximity detection is based, firstly, on allowing only certified winch operators to operate the winch, and secondly, on ensuring that the equipment switches off automatically when the sensors pick up a person in close proximity to the scraper or within the scraper pathway, or if they detect cap lamps in close proximity, thereby preventing injuries to people. The prototypes also record all activities of occurrences on a data log system and allow for the product to be linked to existing reporting systems,” Pretorius explains.

Following completion of the product design; development and testing of the prototypes is set to follow. Underground testing of the system is planned for September 2022.

Further to this, the MMP has been working with explosives manufacturers to develop remote explosives charging units. In fact, a prototype remote



charging concept has been proven on-surface and is being modified for use underground, with trial work set to commence in the first quarter of 2023.

In addition, the MMP has been collaborating with software experts to develop electronic logbooks (e-logbooks).

According to Pretorius, shift supervisors are often burdened with the cumbersome process of recapturing shift data into logbooks. In a bid to avoid replication and errors, e-logbooks, developed by three companies (Triple “M” Mining, Pivot Systems and Mineware Consulting), are able to capture data in the underground workings at one go on a digital device and allow it to be shared simultaneously with the relevant stakeholders.

“Working collaboratively with industry, we are able to develop and bring to market equipment prototypes that improve the health and safety of underground miners,” concludes Pretorius. ■

Underground mining contributes billions of rands in revenue.

MMP

The *Mandela Mining Precinct (MMP)* is a Public-Private Partnership between the Department of Science and Innovation (DSI) and the Minerals Council of South Africa.

Nedbank at the forefront of funding renewable

The strong push to meet climate change goals as outlined by the Paris Agreement sees corporates, in particular international businesses, racing to lower their carbon footprint in line with their stated objectives of achieving carbon neutrality within specified time-frames. This drive underpins the speedy adoption of renewable energy solutions by companies across the globe, especially big energy consumers such as mining houses. By *Nelendhre Moodley*.



Amith Singh.



Nivaash Singh.

Africa's mining industry hosts numerous global entities from Australia, Canada, London and USA, which have operational mines and other business interests on the continent. Front and centre to all these entities is a consistent drive for transition to cleaner energy that is supported by shareholders, investors and boards alike. A key focus area is fast-tracking renewable energy solutions such as wind, solar and hydropower to reduce their carbon footprint.

This clean energy urgency dovetails with banking and financial institution Nedbank's push for a greener planet as it remains a frontrunner in helping clients invest in green energy solutions. Nedbank plays an important role in driving sustainable

Nedbank was one of the first South African banking institutions to champion renewable energy solutions.



Nedbank is on an aggressive drive to fund clean energy projects.

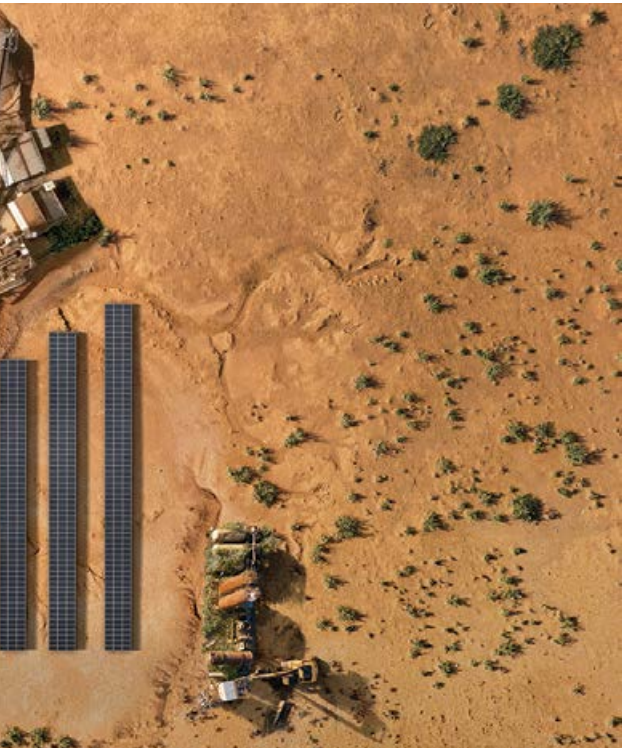
socioeconomic development for the benefit of all stakeholders, by providing capital where it is needed most. The bank's financing choices serve to enable the necessary transition to a low-carbon economy and also contribute to building climate resilience through the financing of adaptation measures. Furthermore, Nedbank adopted and published its energy policy in April 2021, which outlines the commitment of the bank, over time, aligning its business strategy, policies, mandates and incentives with the Paris Agreement.

In a bid to better understand the trends shaping the integration of renewable energy in mining operations, *Modern Mining* spoke to Nedbank's head of energy finance: Nedbank Corporate and Investment Banking Division, Amith Singh and co-head of mining and resource finance: Nedbank Corporate and Investment Banking, Nivaash Singh.

Nedbank was one of the first South African banking institutions to champion renewable energy solutions and early on signalled its intent to fund renewable energy solutions as it ceased investing in fossil fuels. Nedbank's energy policy further serves to guide its transition away from fossil fuels, while accelerating efforts to finance non-fossil energy solutions needed to support socioeconomic development and build resilience to climate change.

According to Amith Singh, Nedbank has been on an aggressive drive to offer financial solutions to both the public sector and private sector, and also the Government's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

energy projects



looking to roll out renewable energy solutions, including battery energy storage, solar PV, wind or hydropower.

“As a ‘green’ bank, Nedbank has a huge appetite for funding projects in this space and, given our expertise from both our mining and resource and energy finance specialist teams, we are able to offer holistic energy solutions to our mining clients. Where our mining team has an extensive network of clients and understands the nuances of the mining sector, the energy finance team is equipped with the expertise associated with energy related financing and technical aspects including the intricacies of power purchase agreements.”

Trends shaping the integration of renewable energy in mining operations

The trends shaping the integration of renewable energy on the local front are significantly different from those experienced across the continent, which is primarily focused on energy security while South Africa, which has at its disposal a national power source, remains largely focused on the cost of energy.

Resource rich Africa with its bounty of unexplored territory offers the opportunity to access shallow reserves and resources, and the absence of existing grid power is overcome by miners factoring the cost of self-generated power into the mine plan, explains Nivaash Singh.

“In Africa, given that the majority of mines are remotely located, often with limited or no access

to immediate energy related infrastructure, energy security is the primary objective, which often means that energy is sourced at any cost. As such, miners factor the cost of energy into the development of the mining project,” explains Nivaash Singh.

Apart from countries such as Botswana and Namibia, African countries generally don’t offer access to grid power, which means that the majority of mines in Africa rely on self-generated power. As such, solar energy solutions have become extremely popular for use during daylight hours with miners relying on diesel to power their operations for the remaining hours.

“Although diesel is considered one of the most expensive sources of power generation that leaves a huge carbon footprint, it is the easiest and quickest power source for mines in remote locations. Containerised diesel is readily available so it’s a matter of plug and play and, while solar PV is gaining in popularity, sunshine is only available during daylight hours and clear days and, as mines operate extended hours, miners are investing in a variety of energy solutions, including hybrid solutions.”

According to Nivaash Singh, most mining majors operating in Africa have already invested in some form of renewable energy initiative with the expectation that, by next year, there will be greater uptake of renewable energy initiatives by the mid-tier and junior mining sectors.

“Already the majority of mining operations in Africa have installed mobile solar panels close to the mine sites.”

Most miners operating in Africa have already invested in some form of renewable energy initiative.



Renewable energy is fed into the grid and delivered to a mine through wheeling arrangements.

South African energy landscape

Although South Africa is making strides towards a clean energy transition, its reliance on coal for base-load power means it continues to be one of the world's biggest polluters. Local power utility Eskom has outlined plans to foster a greater energy mix which includes more renewable energy projects being rolled out.

As it stands, South Africa's established energy industry means that miners have the option to wheel energy across the grid as required. However, the constrained energy system which has for years seen the country plagued by loadshedding and, more recently, Stage 6 loadshedding, talks to issues of energy security. Energy constraints, together with a significant mandate of achieving carbon neutrality, are seeing miners and consumers alike adopting renewable energy solutions.

"With South Africans affected by loadshedding and above-inflation electricity price increases, mining houses are accessing a mixture of greener, more sustainable and cost effective (i.e. lower tariffs) electricity generation options. Moreover, the government's move to allow 100 MW generation capacity, without the need for a generation licence, has seen an increasing number of mining houses move with speed to develop generation facilities or to purchase 'green' power from Independent Power Producers to supplement the current power they purchase from Eskom. This will pave the way for lowering South Africa's carbon footprint and ultimately work in favour of achieving carbon neutrality over the coming years. This transition to renewable energy is extremely encouraging," says Amith Singh.

According to Amith Singh, the amendments to Schedule 2 of the Electricity Regulation Act, which provide an exemption for generation facilities with

a generation capacity of no more than 100 MW, were positively accepted by the market evidenced by some of mines outlining their plans to develop generation facilities that are even beyond the 100 MW and willing to obtain the necessary licences.

Amith Singh adds that there are two types of renewable energy options – one option being the 'behind the meter' option which refers to renewable energy projects developed onsite that feed directly into mining operations via the mine substations, and the other option being wheeling, which refers to renewable projects connected to the grid at a different location that sells energy injected at that grid point to the mining operation at an agreed tariff.

"Renewable energy projects that are currently popular are wheeling contracted projects. These are renewable energy projects – located hundreds of kilometres away from the mine – which produce and feed renewable energy into the grid and deliver it to the mine through wheeling arrangements. As the majority of mining operations do not have access to the large tracts of land required for the roll-out of renewable energy projects or the expertise or resources for such a venture, they turn to solar PV independent power producers, often located in the Northern Cape, to generate the energy required. This power is then fed into the grid and miners reap the benefits of accessing green power. The traditional method of sourcing renewable energy sees miners opt to fund renewable energy projects from their own balance sheets, and seek out a suitable EPCM contractor to build the project which is then run by the mine itself."

With government lifting the threshold of renewable energy production to 100 MW per site, local major mining companies, such as Sibanye-Stillwater, Gold Fields and Anglo American, have been quick off the mark to roll out solar PV energy projects.

In fact, diversified miner Anglo American, which has outlined its plan to secure 100% renewable electricity supply for all its operations in South America, recently signed a memorandum of understanding with *Électricité de France* (EDF) to develop a regional renewable energy ecosystem (RREE) in South Africa, aimed at meeting the miner's operational electricity requirements through the supply of 100% renewable electricity.

The partnership will see the company implementing 3 – 5 GW of renewable electricity (solar and wind) and storage over the next decade as it targets carbon neutrality across its operations by 2040.

"Nedbank's aggressive drive to fund clean energy projects across both the country and the continent will see Africa and South Africa benefit by having a significantly reduced carbon footprint and thereby a sustainable future going forward," concludes Nivaash Singh. ■

Mining for a better society

Along with the development of the Zijin Garatau Platinum Mine, located on the Eastern Limb of the Bushveld Complex, platinum mine developer, Nkwe Platinum Limited, a wholly owned subsidiary of the Zijin Mining Group, continues to advance sustainable community development initiatives, including a training and skills development programme.

“We are committed to contributing to the local economic development of the directly-related mine communities, and have bursary and learnership programmes in place to enable employment generating opportunities,” says Mr Zhiyu Fan, MD and CEO of Nkwe Platinum Limited.

Nkwe Platinum Limited is working closely with tribal councils and community members to identify potential opportunities and, following a skills gap analysis and interview screening process, identified four members from the various communities for a skills development programme.

Lucky John Mabilu, of the Garatau Community, Morris Moima (Maandagshoek Community), Mahlatse Phillip Sepalane (Hoepakrantz Community) and Leope Albert Tau (De Kom Community) recently received training in grinding and in use of the mag base drill machine, and the cropper machine.

The skills development programme offers unemployed youth an opportunity for employment, and thereby the means to look after their families and contribute to the local economy.

According to recently trained Leope Tau, because of the high levels of poverty and unemployment, living conditions in the communities are dire.

“Since Zijin came to our communities,” he says, “there have been several work opportunities which many of our community members were able to take advantage of. I think this is a great initiative: equipping our people with the necessary skills and training to empower them. Now that I have the necessary skills-set, I am confident of a better chance of finding work.”

Sepalane says “It is tough out there, so getting this training opportunity was a blessing”.

“I was unemployed before this chance came along and, following the training, I’m now able to support my family,” says Mabilu.

Moima is confident that as the mine develops more training, skills development and employment opportunities will be offered to the community. “Mine development is still in its early stages and, as it progresses more community members will be required to work at the mine and be offered employment opportunities.”

Following the completion of the skills development programme, the candidates have been placed in related work contracts on the core shed construction project for the Zijin Garatau Platinum Mine, under the employment of Gears Technology.

Women from the communities also approached Nkwe Platinum with training programme proposals, the majority of whom were keen to pursue skills development in clothing and textiles, as well as beauty and care.

The company has subsequently enrolled them into



Nkwe Platinum continues to progress sustainable community development initiatives.



Leope Albert Tau; Mahlatse Phillip Sepalane; Lucky John Mabilu and Morris Moima received training.



Above: As the mine develops there will be more training, skills development and employment opportunities offered.



Right: Training was given in grinding, use of the mag base drill machine and the cropper machine.

SETA-accredited training courses in these two specialisations. A total of 24 women are currently receiving a three-month training programme in the specialisation of their choice.

To ensure fairness of access to opportunities for all mine-affected communities, a pro-rata system linked to the population size of each community was used.

“Nkwe Platinum Limited, under the Zijin Mining Group, continues to drive its vision of mining for a better society, adhering to the values of ‘Harmony brings about Wealth’ and improving the livelihoods of the communities surrounding the mine,” concludes Mr Fan. ■

Meeting mining's challenges with video surveillance

By Marcel Bruyns, Sales Manager, Axis Communications Africa



Marcel Bruyns.

In terms of tough working environments, there aren't many as challenging as mining and the overriding priority for operators of mines is the safety of their employees. Considering that South Africa has some of the deepest mines in the world, and an historically poor safety record, many mine operators have become increasingly focused on the goal of zero injury or loss of life.

While mining fatalities in South Africa have declined steadily to record lows over the past decade, the country saw an 18% increase in 2020 driven by accidents related to falling rocks and transportation, and 2021 may prove even worse.

As well as affecting employee safety, incidents can also be costly as they initiate operation stoppages. Mining operations can also be disrupted by equipment failure, with post-incident repairs and replacements again causing costly downtime. Thus, any opportunity for proactive maintenance should be welcomed.

Video surveillance – and evermore intelligent related technologies – is now being applied to every aspect of mining safety, while also being used to improve operational efficiency and enhance the security of mining operations from the perimeter to the rock face.



AXIS 18016 LVE network video intercom.

Poor visibility in mining: dealing with darkness and dust

Poor visibility can be a common mining challenge, but technologies designed to deal with low-light or even near darkness



AXIS P1467-LE Bullet camera.



are now commonplace in surveillance cameras.

For example, advance IR solutions allow images to be captured in complete darkness, with cameras using integrated IR illumination. Technologies that provide full-colour, high-resolution video in extremely low light also exist – and a wide dynamic range can deliver detailed images in challenging lighting conditions where scenes include both very bright and dark areas.

In the context of mining, light isn't the only thing that can affect visibility. With tons of earth being excavated, moved and processed, an inevitable by-product of the mining process is dust. This affects visibility and has implications for the mining operation as a whole.

Monitoring dust clouds is important for a number of reasons. Mining operations have a responsibility to surrounding communities. Dust clouds created and blown towards houses, schools and businesses cause more than simple annoyance – they pose a genuine risk to the community's health and the environment. And, in an environment where heavy machinery and vehicles are commonplace, the effect of dust on operators' visibility can create an additional hazard.

Cameras equipped with deep learning-based analytic applications can now detect and monitor a much greater variety of objects, including dust clouds, allowing for the proactive warning of local communities and workers and/or remedial action to be taken.

Managing the risks of mining machines

An additional safety risk posed in the mining industry, which can be compounded by poor visibility, comes from the sheer size of the machinery used in mining operations. The risks of operating such huge machinery relate to the safety of mine employees and the implications of accidents between vehicles and machinery – which could cost millions of rands and bring mining operations to a halt.

As such, the use of onboard cameras – ruggedised to deal with the nature of mining – is increasingly common to aid operators and drivers



AXIS Q1951-E Thermal camera.

with awareness and safety. In addition to visual cameras, onboard cameras equipped with thermal imaging can be an invaluable aid when visibility is obscured by dust. Body-worn cameras also have potential here, particularly for training and post-incident investigation.

Innovative applications of video analytics in mining

Recent years have seen a huge rise in the capabilities of video surveillance analytics, with use cases in almost every industry sector, including mining. With deep learning now available in surveillance cameras, object recognition capabilities are becoming more accurate. In mining, these could be employed to ensure that workers are wearing the correct personal protective equipment before entering the mine or when moving around the site.

In addition, people counting analytics shows great potential in ensuring that certain areas of the mine don't become dangerously overcrowded, with ruggedised door stations, intercoms and network audio speakers used for communication and alerts.

Beyond safety: operational efficiency and security in mining

While safety is, rightly, the number one priority for mine operators, video surveillance has an important role to play in two other key areas: operational efficiency and security.

Mining is a connected process and any interruption will have costly knock-on effects. Prevention is always better than cure, and proactive maintenance ahead of failure is optimal. For instance, conveyor belts are critical for removing soil, rock and minerals from the mining face, and any belt failure will immediately stop operations. Video cameras placed at key points along conveyor belts can be linked to load sensors – an overloaded conveyor belt is more prone to tearing – alerting operators when load levels exceed limits and allowing visual verification. However, creating high-quality images in situations where there is movement of structures, and vibrations, can be a real challenge. In these conditions, image stabilisation technology will ensure consistently clear videos. Temperature reading cameras can also be used to monitor, for example, electrical cables and substations, giving early warning of potential issues and automatically tripping the



AXIS Q8752-E Bi-spectral PTZ Camera with thermal detection and visual verification.

system and shutting down equipment down before catastrophic failure occurs.

Perhaps regarded as the more traditional role of surveillance cameras, security remains a critical area of focus for mining operators. Mining sites can be huge, with perimeters that are impossible to monitor physically. Powerful pan, tilt and zoom (PTZ) video surveillance and thermal cameras play an essential role in accurately identifying breaches of the perimeter, reducing false alarms and prompting appropriate responses. When combined with network audio speakers, the ability of operators to engage intruders directly with live audio warnings (even if operators are kilometres away) is a highly effective deterrent to criminal activity.

The right camera in the right place at the right time, with no barriers

The multiple functions and formats of modern video surveillance cameras, allied to thermal, low-light capabilities and smart analytics, mean that there is a solution for every aspect of a mine's operations. And it's not only the functionality that is designed for the unique demands of the mining sector. Ruggedised cameras and those using stainless steel casings can withstand the rigours of mining operations themselves and the harsh weather conditions often found in locations where mining takes place.

Finally, in specifying a solution, it's important that potential issues with technical infrastructure don't prohibit mining operators from seeing the benefits of modern surveillance technology. In environments where bandwidth and storage are limited, video compression technology come to the fore, preserving the detail of video footage while lowering bandwidth and storage needs by an average of 50%. And where integration between devices and control systems is critical, using products based on open standards delivers additional advantages.

Ultimately, in meeting the safety, operational and security needs of the mining sector, video surveillance plays a more comprehensive and connected role than ever before. Are you extracting its full potential? ■



High-end outdoor-ready laser focused quick zoom network camera.

BBE completes refrigeration and air-cooling system for VUP

Mine Ventilation and Cooling Systems specialist BBE Projects was contracted to design, supply, construct and commission a turn-key air-cooling system for the Venetia Diamond Mine, which is currently approaching the final stages of its transition from open pit to underground mining.

The underground infrastructure comprises two vertical shaft systems for personnel transport, ore transport, routing of services, lateral

access levels on 54, 94, 100 and 103 level, and shaft bottoms at 107 level. In addition, the need for cooling was identified as part of the ventilation and occupational hygiene planning for the underground mine. In order to construct an adequate cooling and ventilation system, the mine engaged the services of specialised and experienced consulting engineers who are focused on mine ventilation, refrigeration and cooling.

BBE Consulting, a company of the BBE Group, has been involved in the Venetia Underground Project (VUP) since the Pre-Feasibility phase, and has been able to deliver the air-cooling system relatively quickly – from submitting a bid to contracting for the project. Despite the outbreak of the Covid-19 pandemic, work continued and the air-cooling system is currently in the final stages of being commissioned.

The air-cooling system has been built to be extended with the addition of a third refrigeration machine as cooling demand increases. The plant building has a space provision, and the concrete shell for a third condenser cooling tower was constructed with the intention of equipping mechanicals and electricals at a later stage, as the mine develops. ■



BBE completes refrigeration and air-cooling system for VUP.

FUCHS shows confidence in Africa with new office complex and warehouse

A 30% increase in production volumes and a 70% increase in sales over a six-year period was the main reason behind FUCHS LUBRICANTS SOUTH AFRICA developing a two-phase expansion project, the company said.

MD Paul Deppe said the project was testament to the confidence the German parent company had in the Southern African market. “Our sustained growth trajectory in South Africa will require increased capacity in future. What we have achieved to date is evidence of our long-term vision for the region.”

The project was first envisioned five years ago, with a project management team assembled in 2018 to thrash out the specifications for a planned new warehouse and lubes plant.

“It was a fantastic partnership at the end of the day that allowed us to realise a project of this scale and complexity.” ■



FUCHS new office complex and warehouse.

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MTRA promotes virtual reality for engineering training

New ground is being broken at the Murray & Roberts Cementation Training Academy (MRTA), where virtual reality (VR) tools are helping learners in engineering fields to understand schematics and diagnose faults on trackless mining machinery.

According to Tony Pretorius, education, training and development (ETD) executive at Murray & Roberts Cementation, the MRTA is probably leading the way in this respect.

“We are pioneering the use of VR to split circuits in trackless mining machinery, allowing our engineering learners to read schematics and identify components,” says Pretorius. “They can also use the VR platform to identify the flow of hydraulics and perform fault diagnosis.”

Looking at a real machine, he notes that it is difficult for learners to physically see the components making up the different circuits – such as the steering and brakes circuit and the drilling and drivetrain circuit. In the VR space, these circuits can be split from each other – with the schematic represented on the actual equipment.

“By hovering over a particular component on your machine, the VR platform will highlight that component on the schematic – allowing the learner to see a complex schematic on the machine itself,” he says. “This makes it much easier for learners to understand what they are looking at, as a valve on a schematic looks very different to a real valve, for instance.”

This greatly improves the level of comprehension, creating a firmer foundation for the learning journey into the maintenance of mechanised equipment, he says. Already, there have been better results from the learners moving into the practical workshop phase of the course, the company said.

After completing this phase of their training, the learners move into Murray & Roberts Cementation’s rebuild workshops to gain further workplace integrated experience as they progress toward applied competence. Pretorius notes that various original equipment manufacturers are involved at this stage to facilitate specific hi-tech training on their machinery. ■



Virtual reality is proving its value in the engineering courses at the MRTA.

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CDE celebrates 30 years in business

Throughout 2022, CDE, a leading supplier of sand and aggregate wet processing solutions for the waste recycling and natural processing sectors, is celebrating its 30th year in business.

It comes as the company reveals that its

wet processing technologies have, over the past three decades, facilitated the diversion of over 100 million tonnes of construction, demolition and excavation (CD&E) waste from landfill globally.

The family-owned business has been



CDE celebrates 30 years in business.

at the leading edge of innovation in the materials processing industry since it was founded in 1992 by company Chairman Tony Convery.

Since its inception, CDE has successfully delivered over 2 000 proven solutions in over 100 countries, and to this day the Convery family is central to the day-to-day operations of the global firm and the strategic direction of its promising future.

Convery said: “When CDE was established three decades ago I was confident that we had something new to offer and that we could be a force to drive meaningful change in the industry. In our relatively short history, we’ve made significant advancements, driven innovation through our technologies, achieved great success, and built a solid reputation for expert engineering that delivers for our customers. Under the direction of our senior leadership team and with the support of the next generation of the Convery family who are already rooted in the business, I’m in no doubt that CDE has a prosperous future ahead of it.”

Today, CDE employs a global skilled labour workforce of over 500 people, including over 120 engineers with a combined 1000+ years of industry experience. ■

Weba drives sustainable development

Manufacturer of bespoke transfer chute systems Weba Chute Systems continues to take the lead in transformation, skills development and corporate social investment (CSI). The recent B-BBEE Acquiscent Award from the B-BBEE Commission is testament to the company’s commitment to sustainable economic and social develop-

ment, says Denise Abrahams, director of marketing and CSI.

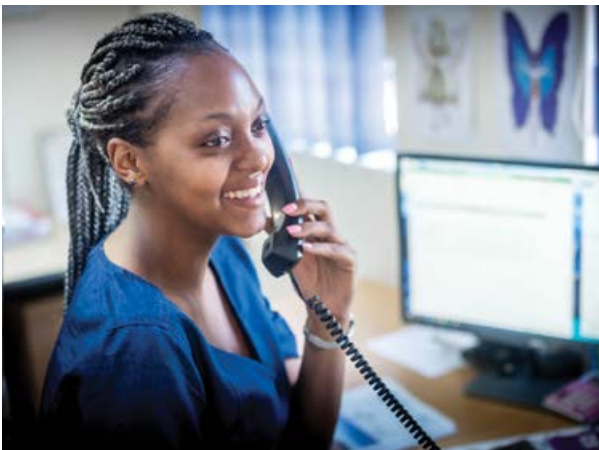
For its transformational strides, Weba Chute Systems won the B-BBEE Acquiscent Award at the B-BBEE Commission’s annual conference held on 1 April 2022, becoming the only private company to be acknowledged at the event.

This category recognised that the entity had adhered to the advice of the B-BBEE Commission and had taken significant effort to comply to the B-BBEE Act.

Weba Chute Systems sees skills development as an essential means of bridging the widening skills gap and has introduced a number of training programmes for its employees.

In future, more support will be directed towards mining communities. “For example, last year we provided masks and sanitisers to schools in the min-

ing communities where we have our chutes installed. It is in the interests of Weba Chute Systems to be a good corporate citizen, taking sustainable development as the starting point, and continuing to drive efforts to unify economic, social and environmental development,” the company said. ■



Mpho Mphuthi, receptionist at Weba Chute Systems who is currently attending the Weba SA Leadership Support Programme.

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