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ISSUE  
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2021

June 2021

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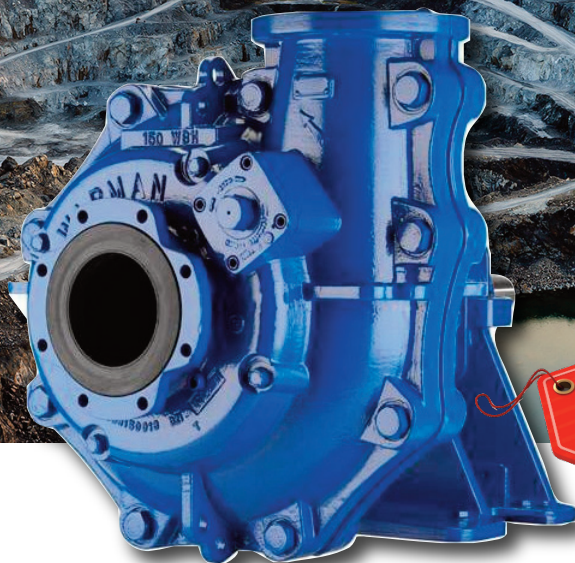
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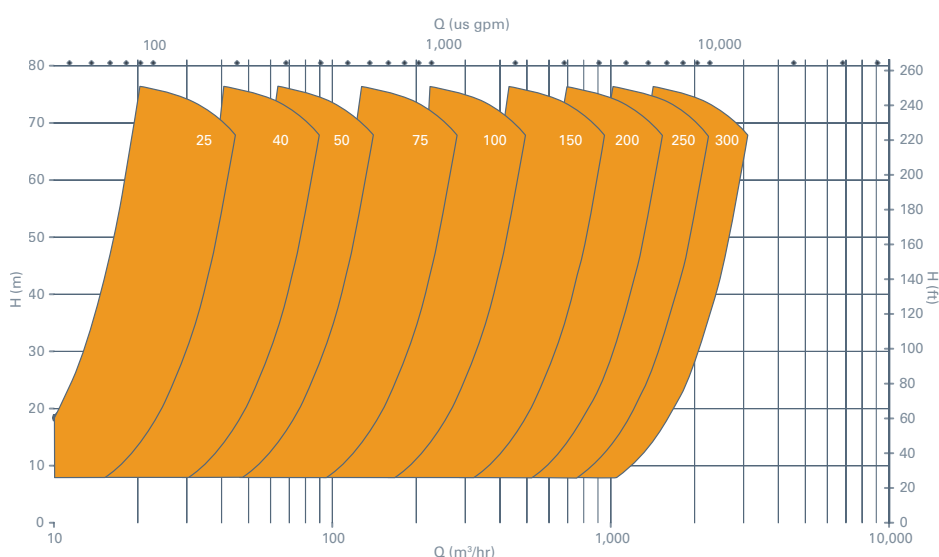
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Mining Zimbabwe is the premier source of Zimbabwe Mining News. Our core focus is the Zimbabwe Mining Industry, trends, new technologies being developed and used to improve this crucial sector, as well as new opportunities and investments arising from it. Mining Zimbabwe's sole purpose is growing and empowering the Mining Industry and highlighting all its challenges as well as putting forth expert solutions



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## Arcadia lithium mine to start production

**A**ustralia Stock Exchange-listed junior miner; Prospect Resources' Arcadia lithium project is set to begin production of the 'new oil' at its Goromonzi mine this month, it has been reviewed.

Anerudo Mapuranga

In order to spearhead its pilot plant, the company took delivery of the pre-assembled pilot plant crushing equipment last month.

Prospect has announced that it would be producing petalite, which is technical grade, and spodumene, (chemical) grade lithium samples. The company said it is expecting to begin shipping high-grade petalite to Europe by the end of June.

The company's Managing Director Mr Sam Hosack said the pilot project was an important strategy in the growth and development of the project as well as creating a strong marketing force.

"The pilot plan forms a critical part of our

project development and market integration strategies and we look forward to providing key customers with high-value petalite product to complete their qualification requirements.

"Prospect is generating spodumene samples via an experienced third party laboratory, as downstream lithium chemical customers only require 2kg spodumene samples to qualify," Hosack said.



Prospect's technical grade Petalite has a 61 per cent price premium over chemical-grade 6% Li<sub>2</sub>O spodumene concentrate<sup>3</sup>. Focused on the stable glass and ceramics market whilst taking advantage of the rising demand from the battery market.

Prospect's technical grade ultra-low iron petalite concentrate has low alkali levels that further differentiates our product. The company earlier stated that it has received subscriptions for approximately \$41.9 million new ordinary shares at \$0.155 per share to raise \$6.5 million before costs (placement), to support the progress of the Arcadia Lithium project.

Prospect states that it recognizes the rapid transition toward global adoption of electric vehicles represents a clear opportunity to advance the availability of high-quality battery-grade lithium sources and to accelerate the Arcadia Lithium Project through to development.

The funds received are to be used towards the acquisition of Farvic's 17% interest in the Arcadia Lithium Project, increasing Prospect's total project interest to 87%. The funds shall also contribute towards the progression of the project development funding process, including discussions with several potential strategic counterparties operating at various levels within the lithium-ion battery value chain; and general working capital to negotiate the best possible terms for the progression of the Arcadia project for the benefit of shareholders.

The Placement enables Prospect to complete the Farvic transaction, assess pilot plant results with customers and provide potential financiers and partners with adequate time to fully assess the Optimised Feasibility Study results.

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# HILTI ZIMBABWE: More than just tools

*With dedicated mining territory salespersons, as a start Hilti targets the mining sector of Zimbabwe with an application focused approach, where we challenge the traditional way of thinking by recommending new technology and innovative solutions.*

Hilti Zimbabwe previously under Prime Agencies is now a subsidiary of the Lighting World Group and hence is the sole distributor of Hilti in Zimbabwe. Prime Agencies is also now in the Lighting World Group, meaning our client's prospective and current still benefit from the same great service from the same account managers, Brighton Kuvarega & Prayer Marange for the mining sector and Kelvin Saunyama for the shop, construction and industry sectors.

Hilti Zimbabwe has invested in just over USD\$50000 in a new repair center, spares and equipment that was officially launched on the 19th of May 2021 together with the new shop at 65 Mutare Road, Msasa in Harare. Hilti then provides products and services across three main sectors, mining, construction & industry and finally but not least engineering.

## Mining



"The mining sector is one of the largest contributing factors to the economy of Africa, and in Zimbabwe this is no exception. Hilti's core initiatives include creating safe, productive and efficient products and solutions, three factors that are identically detrimental to every successful mining operation, which is exactly why Hilti finds significant relevance in the mining industry.

As every mine differs from the next, it is imperative that we understand the mining process of each mine before products and services are discussed. With dedicated mining territory salespersons, as a start Hilti targets the mining sector of Zimbabwe with an application focused approach, where we challenge the traditional way of thinking by recommending new technology and innovative solutions. Whether it be underground, above ground or surface plant operations, every phase of the mineral processing cycle demands an individualized approach, per relevant department, with which Hilti has vast experience due to decades of dealings with mines and mining related customers in Africa. This focus has allowed us to successfully partner with a number of mainstream gold and platinum mines in Zimbabwe to date, as well as with major global EPC's who find themselves conducting their business in Zimbabwe, and our ambition is to grow our footprint in this sector.

*Continued on next page*

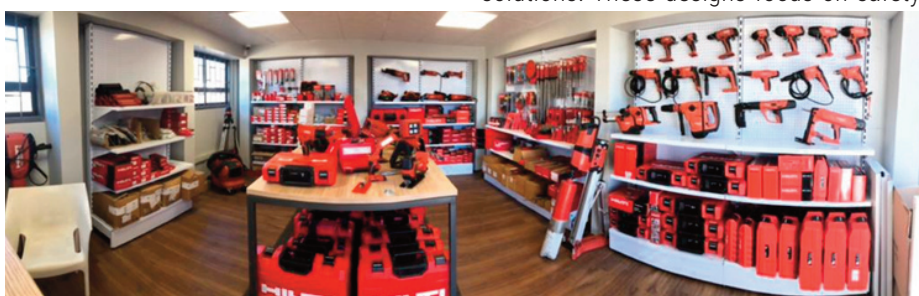




To differentiate ourselves as just another tool supplier, Hilti insists on creating strong relationships with customers and in the case of our mining customers, we insist on taking the conversation further by discussing the standards of mining operations, how they can be amended to streamline certain procedures, and how we can ensure that best practices are being implemented.

From a wide range of cordless battery-operated tools to breakers, from superior anchoring solutions to everlasting consumables, if you are part of the mining crew, engineering, maintenance, ventilation, survey or other MRM departments, Hilti has relevance to you by providing a safer and more productive shift on site."

### Building & Construction



"Hilti stands for quality, innovation and direct customer relationships. Some 30,000 employees around the world, in more than 120 countries, contribute to making work on construction sites simpler, faster and safer while inspiring customers every single day. With products, system solutions, software and services that provide clear added value.

Having roughly 250,000 individual customer contacts each day, many ideas for improvement are often developed directly on construction sites while talking to customers. If there is a challenge for which

no Hilti solution exists, one will be developed. This is why we invest approximately 6 percent of sales each year in research and development. From product development to manufacturing, logistics, sales and services, we cover the entire value-added chain. Our strategic objective is sustainable value creation through market leadership and differentiation.

*"We passionately create enthusiastic customers and build a better future"*

Our mission statement, "we passionately create enthusiastic customers and build a better future", is the compass by which we align our entrepreneurial activities and develop sustainable and innovative solutions. Hilti thereby takes equal responsibility for the health and safety of its employees and users of its products, as well as for society and the environment. In addition to the charitable Hilti Foundation, our integrated partner in issues of sustainability, the values we live by every day in our dealings with team members, partners and customers also contribute to this: integrity, courage, teamwork and commitment."

### Engineering

Hilti has realised the need for more technical support throughout Africa. In Zimbabwe we have extended our engineering services to fully support Zimbabwe. Our Hilti engineers are geared to assisting consultants with technical designs on Fasteners, Firestop, Modular Channels, and Direct Fastening solutions. These designs focus on safety,

productivity, and economical design. This is all made possible through breakthrough technology with our highest performing products, mid-range alternatives and state of the art software. The designs, reports and solutions come with a design report and fully integrate the solutions across the entire project application. In a similar way, we assist contractors save costs by recommending safe alternatives or optimizing current designs

These free value-added services provide another level of support for our customers.

Through value engineering, we are able to meet high safety and performance standards while still meeting the economic needs of the customer. From engineers to contractors and from buildings to mines, every project where concrete and steel is involved, we can provide you with safety, optimization, or productivity enhancements that your project requires.



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# Fidelity forex retention affects RioZim, miner in 10% decline

The reduction of gold foreign currency retention threshold from 70 to 60 per cent by the central bank impacted negatively on gold production by 10 per cent for diversified mining group RioZim during the first quarter of 2021 as it did not benefit from the 12 percent increase in average gold prices.

Rudairo Mapuranga

According to the mining group, the performances of the company's gold activities was also affected by the Covid-19 induced lockdown at the beginning of the year which extended for a two-month period following the second wave of the pandemic.

"Notwithstanding the stability of exchange rates and inflation during the period, the Central Bank cut back the Nostro retention for exports from 70% to 60%. This directly resulted in the Company's performance being adversely affected during the period. The impact of inadequate foreign currency on the Group was further worsened by a second wave of the COVID-19 pandemic which brought about the re-introduction of the lockdowns that had been relaxed in the prior year."

"The combined effect of these negative forces contributed to the 10% decline in gold production compared to the prior year's quarter and sadly, the Company did not benefit to the full extent from the 12% increase in the average gold prices which averaged US\$1 745/oz up from US\$1 562/oz recorded in the comparative period," the company said.

## Cam and Motor

According to the group, gold production at Kadoma based mine, Cam and Motor declined by 12 per cent during the first quarter of 2021 as compared to the first quarter of the previous year. The Mine obtained lower than expected average grades at One-Step Mine, whilst hauling ore to Cam & Motor Mine for processing. This was coupled with low throughput as a result of persistent plant breakdowns which were caused by the incessant heavy rains during the period.

The company said civil works for the Biological Oxidation (BIOX) Project were completed during the quarter and installations are currently underway. With the reduced retention rate, the Company's efforts to fast track the completion of this project were dampened. The Company, however, is optimistic that it will reach

financial closure with a potential financier to enable the commissioning of the BIOX Project within the planned timelines.

## Dalny Mine

The group said gold production at its Chegutu based Dalny mine declined by 20 per cent compared to the same period in 2020 due to the wet conditions from the current year's persistent rains which affected mining volumes at the Mine's open pits.

## Renco Mine

According to RioZim, the Masvingo based mine suffered from inconsistent power supply due to rain-induced power infrastructure failures which led to a 4 per cent decline in the gold produced compared to the same period in the prior year. Engagements with ZETDC on the rehabilitation and upgrading of the Renco power lines are being accelerated.

The company said it was engaging the Reserve Bank of Zimbabwe for an upward review of the Company's foreign currency retention for the Company to meet its operational requirements and successfully deliver its BIOX Plant in the set timelines.

## Invictus appoints Joe Mutizwa Deputy Chairperson

Oil and gas exploration company Invictus Energy has appointed respected Zimbabwean businessperson Mr Joe Mutizwa as a Non-Executive Director and Deputy Chairman of the Company with immediate effect the company Managing Director Scott Macmillan said.

Regererai Muchineripi

MacMillan said the appointment of Mutizwa was strategic to the growth and development of the company as it ramps up its exploration program and operations in Zimbabwe.

"We are extremely pleased to welcome Joe to the Board as Deputy Chairman. Joe is a recognised senior business executive with a distinguished track record of leading some of the country's largest businesses and advisory boards. Joe's appointment will strengthen the Invictus Board at a critical time in the Company's growth as we commence the ramp-up of exploration program and operations in Zimbabwe."

Macmillan said.

The newly appointed Deputy Chairperson said with his appointment the company was heading towards a successful journey. He said the Muzarabani project was a potential game-changer to the country's energy security.

"I am pleased to be joining the Invictus Board of Directors at a time where the company is about to embark on a very exciting journey. The Cabora Bassa project in Muzarabani if successful is a potential game changer for the country which can bring about significant economic benefits and energy security to the entire region. I look forward to supporting the Company to achieve our goals in Zimbabwe."

Mutizwa is the current chairman of Mangwana Capital, a major shareholder of the Company and is a director of the Company's 100 per cent owned local subsidiary Invictus Energy Resources Zimbabwe Pty Ltd. Joe served for ten

years as Chief Executive of Delta Corporation, one of Zimbabwe's largest listed companies before taking early retirement in 2012.

He currently sits on the Presidential Advisory Council (PAC), a body appointed by President Emmerson Mnangagwa, and is comprised of experts and leaders drawn from diverse sectors to advise and assist the President in formulating key economic policies and strategies in the country. Joe served on the board of the Reserve Bank of Zimbabwe (2015-2019) and currently chairs the boards of Star Africa Corporation Zimbabwe (ZSE: SACL), a local sugar refiner; as well as the board of the Infrastructure Development Bank of Zimbabwe (IDBZ).

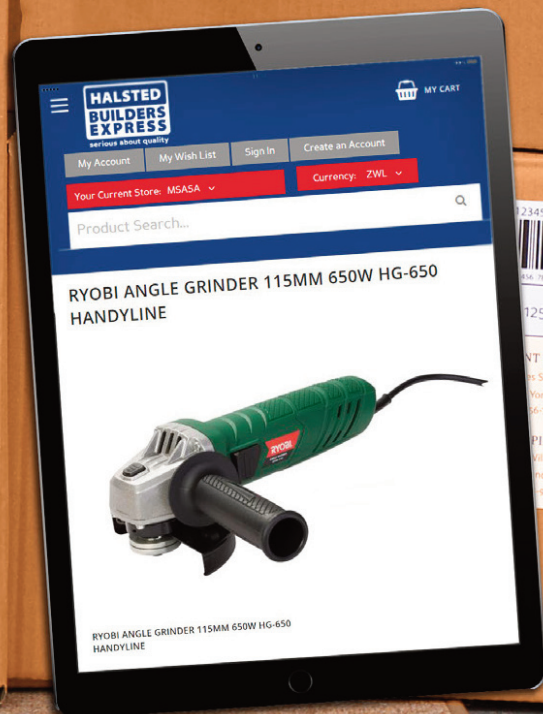
Joe has a BSc degree (with first-class honours) from The London School of Economics; an MBA from the University of Zimbabwe and an MSc from HEC – Paris and Oxford University.



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# Securing a USD12 billion industry

According to the Minister of Mines and Mining Development Winston Chitando, Zimbabwe aims to achieve a USD12 billion mining economy by 2023. To achieve this target, massive investment will be required to extract the precious minerals. Capital investment in exploration, buying extraction plant and machinery; investments in developing human resources and other operational expenses such as prospecting, registration and inspection fees, all require massive financial outlay. Once operational the mine risk exposure increases as extraction, processing and value addition activities as well as shipment of refined mineral and/or valued added products are carried out.

As Minerva Risk Advisors, drawing from our experience in the Zimbabwe Mining sector and our international links, we provide insurance solutions for greenfield projects, mine resuscitation and expansion, as well as operational mines. We have developed solutions for miners in the gold, platinum, chrome, diamond and other sectors. Minerva works with all miners, from small scale miners to mining conglomerates and our structures are designed to respond to the differences in operations and insurance requirements.

Minerva is the leading risk management

services, insurance and reinsurance brokerage, and human capital consulting firm in Zimbabwe. Our solutions are aimed at the assets, the people and any loss of profits arising from business interruption or curtailment.



During the investment stage we provide trade and political risks coverage; this will allow foreign investment into the country as investors are assured that their investment is protected. Bespoke insurance policies will then be issued once the mine starts operations with key risk covered being property damage and business interruption. For the human resource we provide personal accident coverage, pension and retirement solutions. For the minerals and value-added products, we provide coverage during processing and for transit/marine cargo and intermediate storage. With guidance from our reinsurance broking arm, we provide cost effective solutions backed by a reputable panel of international reinsurers.

In addition to the traditional risks emerging risks such as environmental impairment, cyber liability, terrorism and most recently

disease outbreaks/pandemics the mining sector is faced with a plethora of risks that can disrupt operations leading to millions of dollars in losses. Minerva leads the industry in providing solutions to emerging risks.

Every mining operation poses a different geographical and operational risk therefore Minerva Risk Management arm will provide risk assessment covering the different aspects of the mine and provide detailed reports with recommendations for improving the risk profile. Implementation of risk management recommendations will result in overall improvement of the risk and will result in massive savings in insurance premium. Most mines target zero rates for mining accidents and Minerva will actively aid in achieving this target by providing an independent 360° assessment.

Minerva Risk Solutions provides no obligation insurance portfolio reviews aimed at ensuring that portfolio coverage is adequate, and that coverage is being obtained cost effectively. This is in addition to portfolio design and structuring in line with international standards.

*For more details on what Minerva Risk Advisors can provide please contact us on the following e-mail: [info@minerva.co.zw](mailto:info@minerva.co.zw)*

## Your aspirations deserve appropriate cover.

Throughout the Mining Value Chain, mine risk exposure increases as extraction, processing, value addition activities as well as shipment of refined mineral and valued added products are carried out. This is why, in order to achieve a USD12 billion mining economy by 2023, you need insurance solutions for greenfield projects, mine resuscitation and expansion, as well as operational mines to help you achieve your goals.

**Contact us today, regardless of the scale of your operations so we can help you mitigate potential risks.**

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# Evolve or die, MMCZ handed a lifeline



MMCZ GM Tongai Muzenda

Minerals Marketing Corporation of Zimbabwe (MMCZ) has been handed a cheque to reform or face its sudden demise as the official selling and marketing point of minerals found in Zimbabwe, the central bank hinted through a press release.

Rudairo Mapuranga

Through a press statement released recently in an endeavour to make payment of statutory deductions easy for exporters of minerals the Reserve Bank of Zimbabwe (RBZ) said all commissions and royalties are no longer paid to MMCZ but to Zimbabwe Revenue Authority (ZIMRA). This means that exporters will receive their export proceeds from their customers without any deductions by MMCZ.

However, the Bank through its governor Dr John Panonetsa Mangudya said the current foreign currency retention on minerals still stands.

"The Bank has received numerous requests from mining exporters on the need to continuously improve the ease of doing business arising from complications around the payment of fees and commissions to the Minerals Marketing Corporation of Zimbabwe (MMCZ).

"To make payment of statutory deductions easy for exporters of minerals with immediate effect, all commissions and royalties that are due and deductible at the point of receipt of export proceeds will no longer be deducted by MMCZ. All applicable taxes shall now be paid to the Zimbabwe Revenue Authority (ZIMRA) in the normal manner.

"The above measures mean that exporters of minerals can export their minerals and receive their export proceeds from their customers without any deductions by



MMCZ.

"The current 60 per cent retention threshold on all export proceeds remains applicable." Dr Mangudya said.

Projections are pointing to the demise and extinction of the United States sanctions listed company whose lifeblood mainly depended on commissions paid by exporters.

MMCZ General Manager Mr Tongai Muzenda believes that the corporation is still strong and capable to carry out its mandate by even contributing to the

attainment of the US\$12 Billion mining industry by 2023.

"The MMCZ is still intact," Muzenda said.

However, to top former MMCZ Mineral Evaluator/ Gemologist Eng. Clever Sithole now based in Afghanistan the developments released by the RBZ are a sign that the corporation has been stripped of its responsibility and the day to day running of its business without commissions which lead to sudden death.

Eng Sithole said MMCZ needed to reinvent itself through innovative measures meeting miners to have a new approach to the marketing of minerals.

"The question is how this is going to be effective because it is a statement, not a Statutory Instrument. If it's effective, what is now the role of MMCZ? The commission was the lifeline of the corporation, without it many things are going to crumble unless the management starts thinking outside the box which I doubt," Eng Sithole said.

The MMCZ recently announced that it was rebranding with miners expecting that the rebranding was going to bring a new creature out of the organisation however, what was witnessed was the repainting and log changing of the corporation without new innovative ideas becoming to play.

The institution which is very disliked in the mining circles has been labelled as

directionless in different corridors with allegations sighting that it is harassing and mistreating its employees paying them very low salaries with about four

middle managers resigning due to high-level incompetency on the part of the management.

According to the MMCZ act, the institutions act as the sole marketing and selling agent of all minerals produced in Zimbabwe, purchase and acquire any minerals for its own account and to sell such minerals, and encourage local beneficiation and utilization of any minerals. However, miners believe that the corporation has been sleeping on duty. Little was being done to value addition and beneficiation and creation of local markets.



# Murowa Diamonds in 20 percent production decline



OUTPUT at RioZim's gem extraction associate RZM Murowa Diamonds slipped by 20 percent during the first quarter of 2021 as compared to the same quarter of the previous year due to subdued carats produced.

Anerudo Mapuranga

Diamond production was predominantly from the low-grade K2 pits which resulted in subdued carats produced. This led to production being 20 per cent below the comparative period.

According to a first-quarter report released by RioZim, RZM Murowa is focused on its plant capacitation project which will enable it to increase carats production through a 'high-volume low-grade strategy'. The company said progress on the project is, however, hampered by foreign currency challenges.

According to RioZim Limited cash flow sensitivity analysis on the Group shows that

the Company remains significantly exposed to the negative impacts of the COVID-19 pandemic. The future, therefore, remains uncertain and the Company continues to monitor the situation on an ongoing basis.

The company said it was engaging the Reserve Bank of Zimbabwe for an upward review of the Company's foreign currency retention for the Company to meet its operational requirements and successfully deliver its BIOX Plant in the set timelines.

Amid a difficult operating environment, the Group continues to formulate strategies to mitigate the adverse effects of inadequate foreign currency and the COVID-19 pandemic on our operations with a view of continued business sustenance.

The Government instituted lockdown measures at the beginning of the year which extended for two months following the second wave of the COVID-19 pandemic. However, as the Group was classified as an essential service, it continued with business

operations under the guidelines established by the World Health Organisation and Ministry of Health and Child Care.

The Group up-scaled its health and safety protocols across all its operations to curb the spread of the pandemic amongst its employees and within the communities in which the Group operates. The Group recorded a few cases amongst employees who were subsequently isolated and given the necessary home-based care and support.

"We are happy to report that all our affected employees were successfully rehabilitated and resumed their duties," the company said.

The lockdown measures were reviewed and relaxed in the latter part of the quarter. Nevertheless, the Group remains vigilant in exercising and maintaining standard health protocols to ensure the continued safety of its employees.

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# Understanding Artisanal miners as an economic tool



Williams with a Mukorokoza

"The Mukorokoza has increasingly captured the interest of the government, international organizations, and private corporations because of its growing role in the national economy and its impacts on society and the environment yet banks and micro-financing sectors have remained skeptical on this sector."

According to Wayne Williams, founder and Managing Director, of Yagden Engineering, "manufacturers of small scale mining equipment have been overshadowed by the Chinese cheap and non-durable equipment yet banks and the micro-financing sector has not yet woken up to smell the coffee in this lucrative low hanging fruit."

Asked on how this important sector could be tapped into, Williams further alluded that if Banks and the Micro-Financing sector could hold a mining indaba with the local manufacturers and come up with financing products that are tailor-made specifically for the sector then the underground wealth of this country could be tapped into for the betterment of the country.

The artisanal mining sector also provides new opportunities for private sector partnerships that seek to invest in the production of scarce resources while maintaining a supply chain that is compliant with international standards.

Williams extended that Korokoza are "the best prospectus and scanners of underground minerals for very small financial requirements," further explaining that these miners do not waste their time if there is no resource available.

Despite the fact that "these Artisanal miners labour under archaic and difficult working conditions and live in extreme poverty, often receiving less than 9% of the retail price of the stones they extract."

## FACTS

- There are approximately 100 million artisanal miners globally.
- Approximately about Plus 500 000 artisanal miners in Zimbabwe as of 2017 UNIDO report.
- Artisanal and small-scale production supply accounts for 80% of global sapphire, 20% of gold mining and up to 20% of diamond mining.

It is argued that if this sector could be formalized in the financial sector Zimbabwe will have an equitable distribution of cash as this sector deals with cash on a day to day basis.

A lack of internal controls leads to disconnected and often illegal mining and prevents miners from acquiring the licenses required to operate within the law, the equipment necessary to increase their gains, and the assets needed to diversify their livelihoods.

Yagden Engineering, located in Msasa Harare and Thorngroove in Bulawayo, are manufacturers of "hammer mills, crushers, separators, conveyor belting, Amalgam Barrels and allied products for the Mukorokoza in Zimbabwe and Africa at large."

Williams noted that "not surprisingly, miners often become incentivized to mine quickly, sell fast, and rapidly move on to new sites. These practices have devastating economic and environmental consequences, negatively impact on fidelity Gold purchases."

However, despite the negative and devastating economic and environmental consequences, Yagden Engineering fully supports the Mukorokoza as demonstrated by their commitment to this sector for the past 29 years.

According to Williams, through strengthening tenure security and clarifying property rights resource poverty and conflicts can be reduced significantly while also providing incentives for mitigating environmental impacts of this extractive sector.

"When artisanal and small-scale miners' rights to prospect and dig are formal and secure, they are more likely to sell through legal channels, enabling the government to track the origin of minerals and prevent

them from fueling conflict."

Mukorokoza or an Artisanal and Small-Scale Miner have presence in approximately 80 countries worldwide with Africa hosting the majority due to political and economic challenges in individual countries.

*Mukorokoza is a subsistence miner who is not officially employed by a mining company but works independently, mining minerals using own resources, usually by hand, and for any business, this is a low hanging fruit.*

Mukorokoza is a subsistence miner who is not officially employed by a mining company but works independently, mining minerals using own resources, usually by hand, and for any business, this is a low hanging fruit.

It is widespread in developing countries such as Zimbabwe that such a hanging fruit is not tapped into due to social, political and economic fears. Though the informal nature and on the whole un-mechanized operation generally results in low productivity, the sector represents an important livelihood and income source for the poverty affected local population. It ensures the existence of millions of families in rural areas of Zimbabwe.

"About 100 million people – workers and their families - depend on artisanal mining compared to about 7 million people worldwide in industrial mining." Extract from USAID Artisanal and small scale mining. A 2017 UNIDO report by Andrew Mambondiyana [xi] estimated that between 2012 to 2017 over 500,000 Zimbabweans were engaged in artisanal mining; whilst another UNIDO report [xii] estimated two million people were dependent on artisanal mining for their livelihood in the absence of jobs in the formal employment sector.







# EXPLORATION

key in achieving US\$12 billion mining industry

**The issuance of Exclusive Prospecting Order (EPOs) for the country to discover world-class deposits is of paramount importance for the mining industry to achieve the President's projected US\$12 billion mining annual revenue by 2023.**

**By Rudairo Mapuranga**

The mining sector truly has the potential to transform the economy which is expected to become an upper-middle-income earner by 2030, however, its major reliance on small-scale and artisanal mining will mean the vision like previously proposed blueprints will die a laughable death.

According to the US\$12 billion roadmap, gold producers are expected to reach a target of US\$4 billion while platinum and diamonds will weigh in US\$3 billion and US\$1 billion, respectively. Chrome, Nickel, and Steel are expected to generate US\$1 billion, coal and hydrocarbons are also expected to produce US\$ 1 billion. Lithium at the moment is expected to produce US\$0.5 billion while other minerals are forecast to produce US\$1.5 billion.

Without shooting down on their involvement in the resuscitation of the economy of Zimbabwe, small scale and artisanal miners cannot sustain mechanized mining of world-class operations. The country's over-reliance on micro miners becomes a headache towards the achievement of the US\$12 billion mining industry.

According to RioZim Chief Geologist Mr Patrick Takaedza, the country is not supposed to entirely depend on micro mining as artisanal miners are not capable of mining deep

with low-grade mining being of significant challenge to them.

"Exploration is a very expensive and risky business which the small-scale miners have no capacity to undertake. The big companies who have that capacity will not invest in 10ha size claims for the simple fact that such a small area will never hold significant resource to recoup investment or produce for a couple of years"

"Recent thrust in exploration is to find deposits that are subsurface without any surface expression which the small-scale miner has no capacity to find".

"Exploration diamond drilling costs approximately US\$100 per metre. This means that EPOs focus on long term sustainability of the mining industry while small scale miners are just focused on near-surface, less than 100m reefs which sooner or later will get depleted and exhausted"

"Production will need to be replaced by deeper reefs or much lower-grade deposits and neither of these are attractive to the small scale. Artisanals will never sustain the mining industry because of these two simple facts. They can't mine deep and they can't mine lower grades" Takaedza said.

Although a notion has been pushed by micro miners and prospectors to ban issuing of EPOs, the notions must not be taken with seriousness because the basic concept of growing the mining industry is through mineral exploration.

Globally, to replace minerals that the country

is mining, around 10 per cent of all capital expenditure in mining goes towards exploration, however, in Zimbabwe, it is near to 0 per cent with the Finance Ministry throwing up ridiculous budgets for exploration.

Clearly, Zimbabwe has lagged behind the rest of the world in terms of mining. The country used to be one of the largest producers of gold in Africa but currently, it is nearly close to nowhere because no new deposits are being found like in other countries in Africa.

**Can Gold Contribute \$4bn?**



The only exploration happening in Zimbabwe at the moment is a way to see if old mines can be reinvested for example Caledonia mining, a company foreseen to be at the forefront in achieving the projected gold target is exploring mining properties in Chiundura which are Connemara North and Glen Hume. Connemara North is the northern section of the currently closed Connemara mine, which was previously owned by First Quantum Minerals while Glen Hume has historically produced significant quantities of gold. The country is therefore not prepared to look for new deposits but trying to explore the viability of old mines.



According to Chamber of Mines Chief Executive Officer Mr Isaac Kwesu, the country is hamstrung by lack of exploration leading to the country failing to discover new world-class deposits.

"We have significant, extensive gold deposits in Zimbabwe, although we have not been exploring much. The country has remained largely under-explored and has not been using modern exploration techniques, thereby limiting the discovery of new, richer deposits and this tends to slow down development and growth of the gold industry to a larger extent," Kwesu said.

The production of gold has been disappointing in the past two decades with nothing there to show that the country can achieve the 100 tonnes target with gold production pick coming only in 2018 where 35 tonnes were recorded. The only serious investment for the country to achieve its target is by taking exploration have serious.

### Is the Platinum target achievable?



Zimbabwe, which has the world's third-biggest platinum group metal reserves has struggled to develop its mining potential with investors from Russia, Cyprus, Nigeria, and Kazakhstan yet to bring projects into production.

Platinum is earmarked to contribute US\$3 billion, an amount based on optimisation programmes of the current three producing mines – Zimplats, Unki, and Mimosa which according to experts is near to impossible. The country should invest in exploration for Platinum concession holders to start



operating by giving them economic incentives that encourage them to qualify and quantify their claims' mineral potential and mining viability.

Without looking into how platinum mines can develop, the "use it or lose it" policy will be the only achievable government policy with platinum concession holders or new players not able to explore for new deposits and mining viability.

### Is lithium target achievable?

Although Zimbabwe is one of the fifth largest lithium producers, it exports less than three tonnes of lithium per annum with only one operating mine in Bikita Minerals. Although three other projects like the Arcadia lithium project, Shamva, and Zulu expected to add into the country's productions no significant change will be recorded for the sector to fetch half a billion. Lithium exploration becomes the only viable means for the sector to contribute to the US\$12 billion mining roadmap.

### US\$1 billion Diamond production achievable?

The country has only three operating

diamond mining firms struggling to reach half a billion in revenue. One of the diamonds operating mines Murowa diamonds reportedly running out of diamonds and depleting high-grade gems.

World largest diamond producer, Russia's Alrosa is still carrying out exploration to find out the viability and richness of the diamond resource in the country.

The country should serious consider investing in the diamond industry if the US\$12 billion mark is to be achieved by 2023.

The rewards of successful exploration and development can be large if a mineral deposit is discovered, evaluated, and developed into a mine. For a mining company, successful exploration and development lead to increased profits. This means the country needs to consider seriously investing in exploration through issuing more EPOs if the country is to achieve the projected US\$12 Billion mining sector.



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# Gold Prospecting and Exploration Methods - A-Z



Prospecting and exploration that is a search for precious metals deposits, is not a simple process because big deposits were discovered a long time ago. There are several places with important content of precious metals waiting for skilled prospectors.

The large mining companies of the world are focused on big deposits and the small deposits are attractive for small miners and perhaps their interest for gold is the most valuable tool for exploring new deposits.

Gold is very widely disseminated throughout nature and may be found in any geological formation from the oldest rocks to the deposits that are still being formed, but in common with other metals, it is more likely to be found in the oldest rocks and in those places where the earth crust has undergone the most extensive changes such as elevations, folding, tilting, faults, fissuring and also volcanic action, with resulting changes in the composition and texture of the rocks.

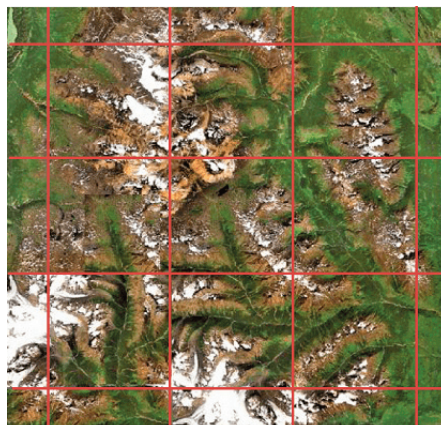
## Samples can be obtained by drilling programs

The current technology is very important in the development of new projects and exploration of new deposits begins with the

selection of a target area. This is followed by reconnaissance exploration in which satellite remote sensing; geological mapping and seismic techniques are used. In turn, this is followed by detailed geophysical studies and later, a detailed drilling, sampling, assaying and mineralogical study. Gold deposits are sought with many techniques, but they are based on geochemical studies. Commonly more than one method is employed. With these methods, the geologist is looking for anomalies. Perhaps, the most important techniques are photogeology and seismic techniques.

## Photogeology

Photogeology is a very important method of gold deposit exploration. It gives complete



information of high altitude photography and satellite photography. Images are recorded either on films or by recording the image digitally. Films used include black & white, true colour, and Infrared. In colour photos, the red areas indicate live vegetation. This makes them useful for locating outcrops in highly vegetated areas. Also least affected by fog, and is effective in a cloudy environment. It is also good for determining the moisture content of soils. The typical aerial photos are those which are taken with the camera lens vertical due to oblique photos could exaggerate the relief.

In general, photogeology involves the interpretation of an area's geology from analysis of landforms, drainage and vegetation. Basically, there are four types of information, fracture and trace analysis, fracture identification, seep detection and channel change study. When a fracture is observed in cross-section, it seems to be vertical or near-vertical breaks in the bedrock. Gold particles can be deposited into fractures. Other important information is the called lithological mapping, which involves the interpretation of surface features so that can be obtained a more exact map.

*Please turn over>>*



## Identifying areas to be prospected



The map scale towards the centre of the photo is different from the map scale toward the edges of the photo. Orthophotos are images that have the distortion rectified and can be used directly for mapping purposes. There are many applications of photogeological methods in mineral exploration work as well as in the studies of environmental geology and geologic hazards. Most importantly, they are used to make accurate topographic base maps. In mineral exploration work, accurate topographic base maps are essential for recording geological observations. Rock and soil colour changes, or colour anomalies, can be delineated and possibly investigated with ground traverses.

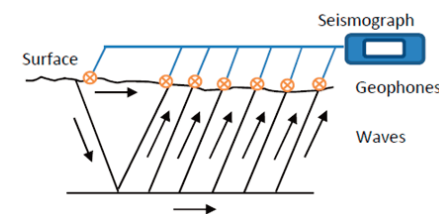
Photogeologic analysis provides data on local geology conditions which help to detect possible gold zones. Even, it is possible to get information on groundwater movement, and this is influenced by fracture traces, karst features and aquifer recharge and discharge points such as springs. It is possible to get information on lithology, alteration and structures. When the work was performed properly, there will be possible to know the structural features in a specific area, such as the direction and dip of the beds, fold direction, and fault plane dip. Colour contrasts in exposed bedrock due to changes in rock type, or lithology, and can be traced on the photograph, to map out the contact. The information can be gathered more efficiently and safely than a ground traverse, although there is no substitute for direct observations.

Photographic surveys follow specified flight routes and take the photographs at regular spacing along the path. The overlap between adjoining photos in a sequence along the line is about 55-60 %. The overlapped area is detected by the camera from two different views in two different photos. The two adjoining photos used together to

make what are called a stereo pair. The two photos can be placed side by side and observed with a stereoscope.

Once the need for Photogeologic support is identified, the place is screened for suitability. A preliminary determination is made to ensure that the site is located within the appropriate geologic terrain for the requested Photogeologic work. Government and private sources of overhead imagery are searched for available coverage and information on geology, hydrology and soils is compiled. Close contact with prospectors and gold companies assures that the results of the study will provide the information required. The results of the Photogeologic study are compiled into a bound report that includes figures, maps, and interpretation.

### Seismic Method



*Seismograph received data on waves travelling through different rock types*

Surface seismic techniques used in gold exploration are restricted to seismic refraction and seismic reflection methods. Probably, the first one is the most employed. The equipment employed for both techniques is very similar and assure the travel time of acoustic waves propagating through the subsurface. In the seismic refraction method, the travel time of waves refracted along an acoustic interface is measured. In the other technique, the travel time of a wave which reflects off an interface is measured.

The information to be obtained is dependent on the acoustic properties of the subsurface material. Specifically, their properties can identify various geological materials. In this way, the interpretation of seismic indicates changes in lithology or stratigraphy, geologic structures and water saturation zones. These techniques are commonly employed to know the depth and structure of geologic and hydrological areas.

The seismic refraction technique is a geophysical method widely used to explore the ground. Basically, seismic waves travel outward from a source and reach a detector. The detector first senses the waves that

went directly to it along the ground surface, and then it senses waves that went downward, were refracted at a deep layer, then left the deep layer and came back to the surface. Due to the waves move faster in the deep layer, they take the surface waves. At a certain distance exists a crossover point, the refracted waves reach the detector first. With this initial information, a few assumptions can be considered about the place and we can know the thickness of the surface layers and its possible composition.

The information obtained can be used to make a map on bedrock topography, determine the depth of gravel or sand, delineate perched water tables, detect subsurface caverns, identify shallow faults and fracture zones, and detect large boulders.

Seismic refraction explorations are based on the time required for a seismic wave to travel from a source to a receiving point. Basically, a sound can be used for the seismic source and twelve or more vertical geophones are used for the receiving points. The selection of the seismic source depends on the seismic line, the resolution required, and the environmental properties. A signal enhancement seismograph records signals from the geophones. By analyzing the arrival time of the seismic wave as a function of distance from the seismic source, the seismic velocities of the underlying soil/rock units and the depth to geologic contacts can be determined. The geophone spacing and the distance between the seismic source and the first geophone are designed to obtain the needed penetration and resolution. The method is usually employed in areas where seismic velocity increases or is constant with depth.

The seismic data are studied by plotting the arrival time of the wave at each geophone versus the distance from the seismic source to the geophone. These charts are commonly known as travel-time plots. The data have to be fitted with straight-line segments. Each line segment corresponds to a different stratus or layer. The reciprocal of the slope of the line is the apparent wave velocity of the layer. Current state-of-the-art analyses use forward and inverse modelling and ray tracing that seek to minimize discrepancies between field-measured arrival times and corresponding times traced through the velocity model.

*Continued on next page>*



The seismic velocity of a geologic stratus can be known by the refraction method and a relative estimate of the depth to different acoustic interfaces. Seismic refraction surveys are very useful to obtain information on depth at different locations. Refraction surveys are useful in buried valley areas to map the depth to bedrock thickness of overburden. The information obtained can be related to various physical properties of the bedrock; rock types have specific ranges of velocities. For example, dolomites and granites have different seismic velocities. A key aspect of this method is the line length to be measured. It is recommended that the distance from the seismic source to the geophone station or reception point have to be three or more times the desired depth of exploration.

### Sample Extraction



It is essential in the evaluation of a gold deposit to have, as accurately as possible, a model of the mineralized zone geometry, shape, size, quality, variability, and limits. Physical, chemical and geological characteristics may vary greatly within a single deposit and from deposit to deposit. Critical data can be collected in a variety of ways, including drilling, surface and/or underground mapping, geophysical or geochemical surveys, or studies of rock mechanics properties, mineralogical types and relations.

### Sampling

The initial prospecting work is conducted on the potential place and consists of taking samples. The first samples are grabbed as single pieces and later can be composited if were necessary in nature, lacking any definite width characteristics, but useful in identifying local mineralization and possible geochemically anomalous zones. The rock sampling can be done by regular people, but ideally, a geologist must oversee this task. It is important to determine sample station using handheld GPS devices, usually accurate to within 5-10 m. As was mentioned samples are initially grab in nature, but also, it is important to take chip samples across

structures and veins in order to determine widths of mineralization and the presence of any wall rock mineralization near these structures.

If the sampling program is detailed, the initial number of samples is more than 500 and this can be composited according to the first mineralogical assessment. For example, it is good practice to prepare at least 100 composites from grab samples in 1-4 m<sup>2</sup> areas along 50 m and spaced lines at 10 m spaced sample locations. The samples can be assayed for several elements if there is not any economical restriction, otherwise, the assays must include at least gold and silver. In this way, we can know a preliminary distribution of metals. For example, of 100 samples collected the average gold value can be 2 g/t, with 40 samples reporting more than 1 g/t gold. Usually, the silver content is higher than the gold content. If other metals were assayed, it is possible to establish a correlation between base metals and precious metals. In some places, local high sulphidation epithermal overprints within a predominantly polymetallic style hydrothermal system.

Other initial information to be obtained is the possible occurrence of anomalous to significant contents of precious metals in the different zones where grab samples were taken. If more information is required, part of the samples can be submitted for Whole Rock Analysis and X-Rays. It must be mentioned that samples usually vary from fresh to altered ores. The results to be obtained can confirm the existence of several populations among different rocks such as volcanic and andesite. Then, we can infer can some rock were formed or derived from the chemical reaction or weathering of other rocks. Essentially, it is possible to establish a preliminary paragenesis of the deposit.

Other points to be sampled are stream sediment. These samples have to be collected in different stations along each drainage and their positions can be determined by using a GPS. Results of the survey provide information on potential areas of anomalous base and precious metal values throughout the place. By performing statistical analysis it is possible to know what zone or zones are more important and basically the gold and silver distribution. Soils must not be overlooked. It is important to take collected samples over 2.0 km x 2.0 km areas. Samples can be taken at 40 m station along 150 m spaced grid lines, each

line approximately 2 km in length. One more time, sample stations are located using a GPS device. Results of this survey identify precious metals within the grid area.

### Trenching



Preliminary exploration can be performed by trenching. This method needs a backhoe or bulldozer, which makes it possible to observe and take bulk samples continuously across the mineralized zone. Several ore types are weathered easily at the surface and these layers have to be removed to have good information on mineralogy and lithology. Preliminary trenching and pitting may be done to provide initial information to geologists to improve the parameters estimated for this sampling program.

Normally, trenches are excavated by hand employing picks and shovels until the bedrock is visible, most the time at depths of 1 to 3 metres. Trench sampling can be carried out by channelling a sample along the floor of the trench. Each channel is between 10 to 20 cm wide and 5 to 10 cm in depth. Samples are taken for geological purposes. In this way, veins, altered zones or different mineralized zones can be sampled so that the contacts can be 2-4 cm within the sample boundaries. Sample weights are usually between four to eight kilos.

In serious and big trenching programs, bulldozers are employed to explore the different areas at different depths. That kind of equipment is easily available when is necessary to move huge tonnes of waste material to access the place. Mechanical or hydraulic rippers are employed in difficult mineralized zones. If extra depth is required, a shallow shaft is sunk at a lower cost and with less damage to the surface. The face or uphill side of the trench is a zone of geological information and sampling point due to these zones are virgin and clean of broken material. Trenching programs are useful when they are planned properly, but they could be a waste of money and time when the program was prepared without technical considerations.

*Please turn over>>*



## Drilling



If the grab sample gave interesting results, a drilling program must be planned to have a better knowledge on the deposit. The drilling program can involve one or more types of drilling, conditioned by the material to be sampled, rock environment, and the reason for the sampling. Basically, there are two types of drilling, one involves core drilling and the other one is reversed circulation.

**Core drilling** is employed for most mining companies. The main disadvantages are the cost and the time required to complete the programs, however, the information to be obtained is excellent. Essentially, it provides accurate samples of a mineral deposit, the rock types, mineral types, and rock structures. By employing this method, the core is removed from the hole. There are some variations of this technique that improve the time required to extract the core. This greatly accelerates the drilling process and improves core recovery. However, it yields a smaller diameter core. Some drilling techniques often produce poor core recovery, but with improved core barrels, a good design, the total core recovery can be improved. Disadvantages of diamond core drilling are its high cost, small size of sample and slow penetration rate. Bulk sampling for metallurgical testing or placer deposit testing is generally obtained by the drilling of large diameter holes (plus 6-inches in diameter), or by sinking winzes.

It necessary to get the right material according to the hole to be drilled

During the drilling program, the core has to be stored and extracted for geological and metallurgical purposes, which reduces cost and time.

*There are five main sizes of diamond core employed for mining projects,*

Type	Diameter mm	Cost \$US/m	Geological Studies	Metallurgical Studies
AQ	27	90-130	✓	✓
BQ	36.5	100-150	✓	✓
NQ	47.6	120-180	✓	✓
HQ	63.5	140-200	✓	✓
PQ	85	180-350	✓	✓

The cost is influenced by rock type, terrain conditions, environmental conditions, and time required to complete the program. The time depends on ore body size, diamond core diameter required, geology department and the previous information obtained at the beginning of the project. For instance, if the objective is to have complete information on mineralization and perform metallurgical tests (e.g. comminution, concentration, leaching), the time required is around eight weeks. Obviously, there are several activities involved such as mobilisation of the drill team on-site, drilling, geological mapping, core splitting, core logging, and core packing. Finally, the samples are delivered to different laboratories.

### Performing a drilling program

Reversed circulation drilling is a fast and cheap method. Unfortunately, the samples obtained provide no much information on mineralogy and the metal content can be no very reliable. Since the sample is not very deeper, information and data have to analyzed and studied carefully. A hammer transmitting its force through drill rods to a rotating drill bit which does the penetration. Air or water is circulated through the drill rods to cool the bit and carry out the rock cuttings to the collar of the hole, where they are collected and prepared for study and assay. The method works well where the wall rock is competent, dry and impermeable. It has a practical depth limit of 45 to 90 m. Metal values may be lost by seepage into the wall rock or added or diluted by caving or seepage into the drill hole. Reverse circulation of the drill water down the hole and up the drill rods greatly improves the accuracy of the sample. Sometimes, mining companies during the first months of operation employ this method to study zones that were not studied well during the exploration program. Results are different. For example, by employing a core drilling program the average gold content was 5 g/t. however, the second method on the same place gave higher values, 10 g/t. This situation creates doubt and conflict between the design criteria and the new values. For this reason, results obtained by reversed circulation need a special study and interpretation.

There is another option called **Rotary drilling**. This technique is inexpensive and fast and similarly to the reverse circulation drilling, there is some disadvantages such as samples are broken into small chips that don't show the structure of the bedrock and the samples submitted for assaying are not very realistic. Most of the rigs are truck-mounted and completely self-contained, including the air compressor. Standard tri-cone bit can drill a hole four inches in diameter and the drill cuttings are blown out of the hole with compressor air. Samples are piled on the ground in rows, each pile represents approximately 0.50 to 3.0 meters of advance and each row from 6.0 to 30.0 meters of the hole. Ideally, the sample must be collected in appropriate containers. This method is preferred by people who want to perform the sampling and logging in the same drilling hole.

Sometimes, the drilling can be performed in two parts if the first program didn't cover all the mineralized area. This additional drilling program can be complemented with geophysical methods in order to define the objectives of the program. For example, magnetic surveys identify magnetic zones that are related to silica cap areas. If the deposit presents high sulphidisation in areas far from the main orebody, extra drilling is recommended. This can occur in deposits with structural and stratigraphic control and consequently, some areas could be occulted. If the mineralization is close to the surface, at deeper areas may be or not possible to find high mineralization.



*It is important to mark all drilled points*

The drilling procedure can be designed under several considerations such as the geology team set out the holes in an area close to the drill rigs, drilling pads are done with bulldozers and the geologist oversee the work, cores are laid out for inspection, the final hole depth is decided by the geologists, hole location is recorded by GPS, and geologist performs logging and coordinate the sample storage. Other considerations depend on the drilling target.

*Continued on next page>*



## Sample Handling

There are two types of samples to be studied. The first group is formed by the grab samples taken at the beginning of the project. These samples are rock chips. These samples must be bagged and sent to the lab for assays and metallurgical tests. The second group is constituted by cores from drill holes, cut channel samples or bulk samples from trenches, or underground workings. Similarly to the first group, the samples need to be assayed and tested metallurgically. For assays, these samples must be reduced in volume and size of particles without dilution or enrichment of metal values.

### Samples must have specific codes



Field samples are sent to the sample preparation facility where the samples will be divided for geology and metallurgical information. In order to deliver the sample in the best condition to the laboratory, it is necessary to consider some factors such as use appropriate labels and names to identify the samples, define the procedure to be employed for bagging and sample collection, assure the sample preservation, manipulate the sample when is necessary, and minimize the movement of the sample in and out of the container. The storage and transportation must consider the oxidation conditions to be exposed the samples and more even if the presence of sulphides is important. Under this consideration, samples must be stored in a freezer. If the samples need to be logged and cut, they must be taken from the freezer. When the samples have to travel a long distance is good practice to wrap the samples in a bag which air was purged with nitrogen. In this way the sample will stay in an inert atmosphere and the possible risk of oxidation will be minimized.



### Cores must be stored and transported inboxes

Normally, drill core samples are split in half with a diamond core saw. One half is submitted for analysis and/ or metallurgical tests and the other half is stored. The core has to be photographed at the site, geologically logged and geotechnically logged. The core samples are selected by the geologist based on logging information and must be labelled with the right code and name. Samples range in length from 0.20 m to 2.5 m and their weight is variable, 1.5 to 6.0 kilos. The half core samples are bagged and placed in sacks, security sealed and shipped to the laboratory for sample preparation according to the testwork program.

### Assays

When the samples arrive at the laboratory for assays, they are codified according to the laboratory system and weighed. Each core sample is entirely crushed to almost 100% passing 1.7 mm (10 mesh). Samples are homogenized and one kilo is split and pulverized to approximately 90% passing 0.075 mm (200 mesh). Then, 200 to 300 grams are split. If the samples are wet, it will necessary to dry the samples without using any heating system to avoid any physiochemical change in the samples.

To control the sample preparation procedure, approximately 5 to 10% of the crushed and pulverized samples are submitted for a regular particle size analysis by using lab screens. Blank samples are included into this control so that the sample preparation procedure can be done properly. These samples can be added into the core samples at a frequency of 1 in 30.

In order to perform assays for gold and silver, 40-60 grams aliquots are taken for fire assay. This assay method employs fluxes according to the minerals present in the sample due to the fluxes are variable and there is not a unique recipe. Some assays for other elements are performed by atomic absorption. For example, we can have 1,000 to 50,000 samples to be submitted for 20-30 elements. Sometimes, assays for almost all the elements can be done by Inductively Coupled Plasma (ICP). Gold is always assayed by fire assay using 25-35 g charges.

Certificated laboratories have a quality control procedure that includes the sample to be assayed, standard, blanks and duplicate samples into every assay. For example, this procedure can consider three standards, two blanks and three repeats in every batch of 80 samples. If any discrepancy is found, the whole batch has to be re-assayed.

### Prospecting

Prospecting is to search for valuable mineral deposits and is the focus of many people around the world. Gold prospecting is a very special case due to is suitable for many speculations and potential objectives. Gold deposits are variable and the prospector needs few tools in order to detect potential mines. Modern equipment enables people to transform an obligatory task into a challenge. There is a question very important, where to look for gold? Try to answer this question is not simple, but there some clues to be considered.

Since gold is widely disseminated in nature, it can be found in any geological formation, from the oldest rocks to the deposits that are still in formation. However, gold can be found in old regions and places where the earth surface has experienced many changes such as elevations, folding, tilting, faults and volcanic action, with resulting modifications and alterations in metal composition and crystalline structures.

### Sequence

Geological exploration is developed by steps, starting with studies on small-scale and finishing with studies on large-scale. In this way, the prospector has to analyze progressively the territories with important potential or perspectives to find the desired metal. This consideration obliges to evaluate different places with variable interest until finding the right place so that it can be evaluated and verified as an economical resource. Each step needs more detailed studies. There are four prospecting steps: regional, identification, local, and detailed exploration.

Regional exploration considers a region determined by geological, economical and accessibility factors. The limits of this sped are not necessarily associated with geological elements.

*Please turn over>>*



Few times are carried out geochemical studies due to the main source of information are cosmic images, photogeological information and aerophysical data. The main objective is to define one or several districts within the region under study. The difference between district and region is arbitrary under special considerations. However, a district can be considered a discrete unit due to the identification and limits are conditioned by special mineralization or geological considerations favourable to find any special mineralization.

### Anomalies must be sampled

It is necessary to perform studies on active sediments present in fluvial points. Typically, one sample per five square meters can be studied. In this way, the district will be defined. The geochemical study of rocks oriented to identify mineralized and sterile zones is appropriate.

Prospecting is the first exploration oriented to study a specific district, which was defined previously. The objective is to detect potential areas and not necessarily to find a mineralized place. The areas detected will be studied in detail according to the first results. This study is designed to define anomalies in a specific district or region. In order to do this is necessary to know the work scale that allows identifying the areas with major potential.

The sampling procedure must assure a detailed geological interpretation of the place, even to get information on the location of the geological contacts. In areas where there are prominent outcrops, the samples can be taken in areas of two square kilometres. The number of elements to be studied can be selected considering the previous study (regional study).

Local exploration tries to detect geochemical answers in small areas. The objective must be selected on precision and its location has to be very exact. Although the objective is not to locate a deposit, the development of the study could identify one. The objective is to define the mineralogy associated with anomalies of specific elements or group of elements. The sampling procedure and the expected answer are related to the type of mineralization required in the study. For example, sulphide deposits produce anomalous aureoles of hundreds of meters, and narrow veins are associated with anomalies developed in dozens of meters around them.

Detailed sampling of sediments at 20-200 m intervals is useful to define the location of any anomalous object. If the drainage system is poor, rocks can be studied only if the mineralization produces an extensive dispersion system. The number of samples is based on the drainage system and could be expensive.

Once the objective was defined, the next step is to locate the mineralized zone and its extension. Normally, studies of rocks and soils are the geochemical techniques more employed during a detailed exploration. It is common to take samples of 150-400 m extensions with 30-90 m intervals. When the mineralized zone was located, samples will be taken with much more detail such as 40-90 m with 5-10 m intervals to create a map with all the mineralization. The only way to identify the mineralization and all the changes into the zone is to perform a drilling program. Sometimes, trenching is an option. When the object was identified, the exploration process continues if the previous results were acceptable.

### Lithology

This term refers to the character of a rock described in terms of its structure, colour, mineralization, grain size, and arrangement of its components. These parameters give a special characterization to the rocks contained into the deposit. For example, is the prospection team identified a hydrothermal orebody, basically, all the drill cores and outcrops around the deposit must have specific properties to this type of deposit.



### Fractures show vein orientation

Gold deposits can be located within breccias defined by multiple phases of breccias and associated to air fall pyroclastics. In this case, they could be divided into a sequence of bedded lithic, crystal and anomalous tuffs that overlie a massive basement. Basically, the host rocks are a sequence of lithic formations with fragmental texture and rapid changes during its formation. Then the prospector must be able to detect and/or identify these characteristics with information proportioned by the geologist. In this way,

these lithic zones define a stratigraphy which special orientation. For example, they could deep between 5° to 15° towards the northeast, steeping and thickening proximal to the contact with the breccias.

The rock formation can stay beneath the lithic sequence and the contact could be unconformable. Then, it can be considered a modified mineralized zone with appreciable change in its structure. Sometimes, some rock formations formed a pre-existing land surface upon which the new formation was deposited. Probably, this kind of surface is related to breccia formation. A breccia formation is identified in the drilling program and/or trenching sampling program and the rock formation may be in a large bowl-shaped depression and could be constituted by two or more phases that form a new body. For example, if there are two phases, the first one is an early formation with consistent assemblages characterized by fine-grained rocks. And the second one could have rounded particles with empty spaces formed during the cooling process. A typical example of the second phase is the presence of vughy silica.

All this information must be recorded during the core logging; otherwise, the geologist will have to spend more time than necessary identifying the rock formation.

### Structure

It is important to identify the structure because the mineralized zone has a special orientation. Sometimes is difficult to recognize the right orientation, but the initial emplacement is the first reference point due to control the alteration and mineralization. The structures are characterized by specific alterations, presence of stockworks with variable content of sulphides and brecciation. For example, some structures can be 1-3 m in width, but zones can be 30-50 m wide. This variation is an indication on the mineralogy into the deposits. For this reason, during the blasting sometimes is difficult to decide on the points to be drilled. This behaviour is explained by the presence of hydrothermal fluids with subsequent mineralization.

There are some stockworks formed in areas very close to the mineralized zone or under special circumstances formed only in specific places. For example, some siliceous zones with important content of vughy silica can be detected in areas not very close to the main structure, which can be characterized by the presence of fractured stockworks.



Certainly, this zone probably is influenced by the combination of structures and breccias with different orientation. However, mineralization is useful to detect these changes in the structures.

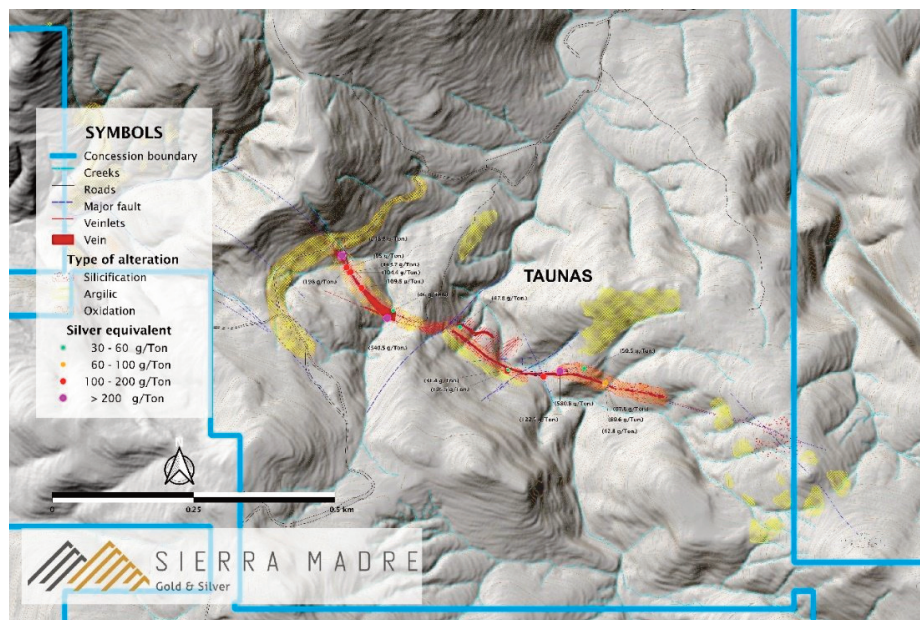
## Fractures

When are detected several fractures is important to try to determine how were formed because we can know the possible final orientation of the mineralized structures. Normally, the combination of these structures can provide the host rock into the ore body.

## Alteration

This parameter can be considered as a physical and/or chemical variation in a rock or mineral during its formation. These changes influence the type of mineralization to be found in any structure. It is important to mention that alteration or changes and mineralization and processes developed in different periods. For example, an acid fluid leaches a rock producing a rock with many holes or empty spaces (vuggy silica) and around this formation can be developed alunite and kaolinite zone.

## Indication of Vuggy Silica Formation



According to the structure sequence and location is necessary different amounts of acid leaching agent to aggressively dissolve the rocks and the acid fluid formation are formed in water-saturated places close to the structures. This creates zones with alterations into stratigraphic horizons. These zones can be characterized by containing variable amounts of different rock types whose alteration or leachability is different according to the stratigraphic horizons. In this way is expected to find zones of different level of porosity and permeability. For this reason, there are different types of vuggy silica.

It is important to establish a relationship between altered zones and stratigraphic zones due to its formation and deposition is influenced by the leaching conditions. This is totally valid for gold deposit formation and especially when there are free gold particles deposited into the empty spaces of some minerals.

## Mineralization

Alteration has influence on gold mineralization. For example, intense leaching creates pathways or routes for

metal-bearing fluids and some spaces or positions are created to host gold and heavy metal sulphides. For this reason, some underground operation can produce copper and lead concentrates with variable contents of gold. Expect to find some undesirable elements.

Ore bodies present mineralization at different depths and they are characterized by variable contents of gold. Probably, some zones have higher content than the others and they were influenced by the leaching fluids and the type of mineralized structures. For example, in some intersections, the mineralization is disseminated and distributed by stratus.

Hydrothermal fluids run along with different rock formation and produce dipping mineralization that can be detected at a variable distance from the main structures. Probably, important gold contents can be detected in some structures due to some lithologies were leached with more intensity than others. This can be explained by the stratigraphy and gold content near the surface. Then, metal content in sulphide areas is related to the degree of alteration and structure formation. *Ends//*

*Source: 911metallurgist*







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# Resource leakage and institutional development in Zimbabwe



***Public service institutions are key in the delivery of state programmes and projects as guided by national policies, strategies and goals.***

By Edmond Mkaratigwa & Dr Albert Maipisi

The tradition does not exclude Zimbabwe. Institutional development is a continuous process. It has to be so; because all institutions are established for a cause and in response to the environmental needs in which they are established. Some institutions of government are traditional and replicated in all states since the establishment of the modern state. Others are, however, offshoots in response to political, economic, technological and other socio-environmental demands of the society in which they are domiciled.

Overall, total state efficiency and effectiveness are permutated as a collective of governmentwide individual institutional efficiency and effectiveness. The individual institutions are delegated responsibility, authority and resources to achieve their targets and in so doing, national goals. Part of the Zimbabwean challenge lay within institutions individually and in their coordination where they have to work as a collective. These institutions are the tools governments need if they should achieve overall state efficiency and efficacy.

Efficiency borders around profitability tied to the ability to achieve desired goals within set timeframes and using the shortest possible route. Effectiveness implies achieving what the institution is basically

set to achieve. The soul of institutional efficiency and effectiveness combine institutional technologies as well as the technologies' flexibility, responsiveness and resilience. These technologies are the vertical, horizontal and cross-cutting systems, processes and procedures. They are all envisaged to advance the global national vision, strategy, programmes and projects. Those technologies have to be complemented by the hardware which are the ideal financial, human and social resources.

Allegorically, the state is the big wheel made up of small wheels and together those small wheels make up the overall voyage a success. For the small wheels to fit into the big wheel, values have to be shared at all levels, while synergies are promoted and implemented throughout the system. There should be no room for individualism and the silo mentality since a shared vision towards the fulfilment of the common agenda have to benefit all. Finances are the oil of state efficiency but even so, a cultured human resource and a culture of tapping into



*Hon Edmond Mkaratigwa*

organizational social networks strengthen institutions for their purpose.

There is continuous talk and action against corruption and indeed the state has to actually respond and prove its responsiveness. State efficiency is still to be achieved and some efforts are already in place while others are underway. Checks and balances are key and both manual and electronic systems have to be harnessed in that direction.

Mines and mineral development remain a key cog for national development and state efficiency in the Zimbabwean context. Institutions whose roles converge in the sector have to be institutionally efficient and effective. Otherwise, the totality of their institutional gaps contributes negatively or positively to the overall efficiency and effectiveness level of institutions charged with the responsibility for mines and minerals sector development and the global sector efficiency ranking.

The environment in which institutions exist change with time; hence, the need for continuous improvement. Gaps will continue to exist; they also have to be closed and they do not always require finances to have them addressed. Sometimes, they need a dedicated human resource as well as strengthened networks within those institutions which have to form part of the overall state system.

These issues apply to the Ministry of Mines and Mining Development. The centrality of this sector in unlocking national aspirations cannot be overemphasized. Such institutions that underpin sectoral success have to move in line and in response to national and international demands. Institutional development is therefore continuous and not a one-off endeavour.

Bureaucracy is viewed as rigid but in its rigidity, adjustments are always being made, otherwise, the institutions will impact overall state efficiency. Legal adjustments are critical in that respect. Legal adjustments guarantee certainty of the steps taken towards strengthening the institutions. Those positive shifts further guarantee enforcement certainty. There are new advances in knowledge and shifts in societal values which are among the reasons there is a need to equally regenerate institutionally.



Most institutional weaknesses are found at points of convergence with other complementary institutions. At those points of convergence, responsibility is sometimes not well defined, with implications of having no man's lands. Resource allocation further creates gaps mostly because responsible departments are usually not prepared to commit extra resources where their responsibility is loosely delegated. They optionally use the resources where their

responsibility is fully delegated and that temptation is influenced by the principle of accountability that follows that of responsibility. Policies can also overlap. Overlaps can lead to conflicts among departments and institutions. That can further lead to other institutional gaps relative to what the state requires to achieve.

Vices to state efficiency adapt to existing

frameworks while development and growth bring to the fore new approaches. Addressing those changes strengthens institutional efficiency. For every profit, however, there is a need for capital investment. State efficiency has to be invested in and the state institutions have to be developed to remain positively contributing to overall state efficiency in a given context. Continuous objective analysis is critical and state institutions maintenance alone may not suffice. Institutional development that moves from a lower state departmental capacity to a higher capacity that closes old and new gaps towards improved efficiency is always a necessity.

*[Edmond Mkaratigwa<sup>1</sup> (Ph.D. Candidate of Energy, Innovation and Sustainable Technologies and Chairperson of the Parliamentary Portfolio Committee on Mines and Mining Development) & Albert Maipisi<sup>2</sup> (Ph.D. in Disaster Management and Public Administration)] - Published ideas are entirely views of authors and cannot be attributed to their current positions.*



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# How gold is smuggled from Zimbabwe



A report by the International Crisis Group last year estimated that cash-strapped Zimbabwe is losing at least US\$1.5 billion annually through the smuggling of gold, mainly to traders in Dubai and South Africa.

By Dumisani Nyoni

The figure is, however, higher than the government's estimates of US\$1.2 billion a year lost through the illicit gold trade.

Zimbabwe boasts vast gold reserves, and the sector accounts for 60% of Zimbabwean exports.

Roughly 40 000 small-scale miners are registered in Zimbabwe, employing on average at least 10 workers each, according to the Zimbabwe Miners Federation (ZMF).

However, gold smuggling to other countries, particularly South Africa and the United Arab Emirates, is choking the sector.

For instance, just recently, a 33-year-old Zimbabwean man was arrested at O.R. Tambo International Airport in Johannesburg on May 8 with smuggled gold worth R11 million (about US\$730,000).

Tashinga Masinire flew into one of Africa's busiest airports with 23 pieces of gold which he did not declare, and when challenged "he did not have any permit or licence to be in possession to transport gold."

But how is this precious metal leaving the country?

A new report titled: Illicit gold markets in east and southern Africa by the Global Initiative Against Transnational Organized Crime (Global Initiative) has tried to answer this question.

The report notes that smugglers are hiding smaller quantities of gold in clothing and headdresses, while larger amounts are stowed away in car glove compartments, spare wheels and any other parts of a vehicle that can be modified for smuggling purposes.

"Similarly, in Southern Africa, gold is easily smuggled from Zimbabwe into South Africa. Porous land borders make it easy for criminal groups to cross into South Africa where laundering opportunities and transport services are more readily available," the report reads in part.

"While there are informal border crossings, the official Beitbridge border post remains a preferred route for gold smugglers. Smaller quantities of gold are hidden in clothing and headdresses, while larger amounts are stowed away in car glove compartments, spare wheels and any other parts of a vehicle that can be modified for smuggling purposes."

In both east and southern Africa, Global Initiative said trucking is a popular way to smuggle large gold shipments.

On the Zimbabwe-South Africa border, both bus drivers and truckers are reported to smuggle gold.

On the Democratic Republic of Congo (DRC)-Uganda border, gold is hidden in trucks that can bypass COVID-19 restrictions to deliver 'essential goods'. Bars weighing between five and 20 kilograms are stuffed underneath truck cabins, inside battery compartments and emptied gasoline tankers.

"As a result, some major buyers have invested in both gold and trucking. For exam-

ple, certain major gold dealers in Harare have invested in the gas business, enabling the use of gas haulage trucks with secret compartments to smuggle gold into South Africa," it said.

On the borders, there appears to be a lack of capacity and will to stop gold smuggling.

For example, in Zimbabwe, only luggage is subject to scans by customs officials so travellers without luggage are unlikely to be searched, the report says.

The report also reveals that larger smuggling operations will also involve collusion between criminal actors and border officials.

"In Southern Africa, Johannesburg is the regional gold magnet, although there are reports that significant and increasing amounts of gold are being exported directly from Harare to Dubai and other international destinations," it said.

## QUICK FACT

*On the Zimbabwe-South Africa border, both bus drivers and truckers are reported to smuggle gold.*

"In Johannesburg, locally produced gold and imports from neighbouring countries, especially Zimbabwe, is traded and laundered. Some is laundered into formal supply chains through local refineries."

Similarly, Global Initiative says in Zimbabwe smuggling gold out of Harare's airport is suspected of being done by powerful gold dealers and political elites.

It was reported that individuals moving gold as jewellery will make at least one to two trips each month, the report says.

The report notes that gold mined in Zimbabwe is moved to the trading hubs of Harare and Bulawayo before it is smuggled or exported out of the country. While Bulawayo's reach is limited to gold mined in areas close to the town, Harare attracts gold from across the country.

Bulawayo buyers are generally less well-resourced and lack the US dollar buying power of their Harare competitors, it said.

Miners or buyers may also take gold directly to South Africa, especially from Matabeleland province in the south. Nearly 40% of gold mined in Matabeleland is believed to be smuggled directly to South Africa, it said.

In 2015, the Reserve Bank of Zimbabwe (RBZ) reported that the border was contributing to "... the most [gold] leakages that the country has ever experienced."

The ease in which gold can be moved over the border makes it difficult to catch smugglers, Global Initiative says.

"It is reported that a smuggler will only be caught if the police have received a tip-off but they can easily pay a bribe to allow them to continue across the border."

In other instances, the report revealed that gold is moved to South Africa through Botswana to avoid the heavily congested Beitbridge crossing.

South Africa's strict lockdowns in response to COVID-19 have forced smugglers from Zimbabwe to increase their use of the Botswana route to come into South Africa.

A significant and growing amount of gold is also believed to be flown out of Harare airport to international transit and destination hubs, particularly the UAE, China and India and, to a lesser extent, Russia.

This route is suspected to be used by more powerful gold dealers and political elites.

"Indian buyers are allegedly the most likely to smuggle gold in this manner. There are also small gold flows between Zimbabwe and Mozambique in border regions, but the direction of the flows is unclear," the report says.

### Smuggling is rife.

Gold buyers interviewed by the Global Initiative revealed that they were selling between 10% and 30% of their gold to the Fidelity Printers and Refiners (FPR) only to maintain their gold licences, with the rest being sold on the illicit market.

Major foreign buyers, often from South Africa, partner with Zimbabwean dealers to buy large quantities of gold on the illicit market, the report says.

### Recommendations

As part of the recommendations to curb smuggling, the report suggests that criminal investigations should target the activities of key actors in the illicit gold trade, including senior government officials.

"This could include increased support for financial intelligence units and financial

investigations. By providing information and support, foreign governments and international law enforcement bodies can support efforts to identify and prosecute key individuals, companies and financial institutions linked to or involved in the illicit gold trade," it said.

"This can lead to improved reporting on suspicious transactions and knowledge of laundering methods and flows."

It also said law enforcement, including customs officials, can also target enforcement activity at major transit points.

Because international airports are key bottleneck points in supply chains, effective policing there will have a significant impact on illicit gold flows, it said.

"In addition, smugglers tend to favour major border crossings when moving large amounts of gold. Targeting key road border crossings may therefore also reduce the ease with which gold is smuggled out of source countries."

"Private sector actors, in particular refinery and smelter-level programmes, should strive to responsibly source gold from source countries, as opposed to refusing to source product from high-risk areas or disengaging from artisanal and small-scale gold mining (ASGM) entirely," the report says.

Global Initiative said sourcing gold directly from source countries has the benefit of improving downstream knowledge of supply chains as well as establishing responsible sourcing practices, thereby also supporting the sustainable development of the sector.

It said increasing the number of ASGM sourcing options will help to grow and regularize responsible ASGM gold supply.

"This will require developing flexible and tailored solutions on the ground. This can include securing individual supply chains and increased acceptance of sourcing gold from mines that are in the process of achieving certification or meeting due diligence requirements," it recommended. "The transnational nature of illicit gold markets requires cooperation between law

enforcement, customs services and other relevant bodies to combat criminality. In both source and destination countries, competent authorities need to be adequately staffed, funded and trained. Communication strategies between government bodies at the national level are also needed to close coordination gaps."

Global Initiative also recommended that enforcement should also focus on transit and trade hubs, particularly the strengthening of enforcement controls at airports.

"Land borders are difficult to police, while the geographically remote and dispersed nature of ASGM makes it a challenge to regulate mine sites. This means enforcement efforts must look further downstream to transit and trade hubs for solutions."

"This could include assistance to airlines to better enable them to detect smuggled gold, possibly in partnership with international trade organizations," it said.

The Centre for Natural Resource Governance says poor gold prices offered by FPR were fueling smuggling. Hence, to curb smuggling, the issue of gold prices should be addressed.

### Chikonzero Chaita musoro uteme

As has always been our stance the common denominator on smuggling is pricing. Smuggling is a problem not going away due to vast amounts smuggling rings make more than they make from selling to FPR. To remedy the situation

1. FPR should buy at rates that make it senseless for one to consider smuggling.
2. Fast track the issuance of Mining Titles to Artisanal Small-scale Miners
3. Ensure cash is always, always readily available when miners submit their gold.

Like Legendary music icon once sang "Wongorora chikonzero chaita musoro uteme," Zimbabwe's focus should be on why smuggling is favoured despite risk of incarceration & only then can smuggling be tamed.





# Is it Employee Welfare or Paternalism?



The mining industry in Zimbabwe is and has always been labour intensive and over the years, the management of labour has evolved from the Personnel management approach to the strategic human resource management approach.

By The Professor

Historically, It is without doubt that the mining industry adopted a traditional approach to managing people at the workplace and its main objective was to manage employees in line with the organisational goals and objectives. This approach was dubbed Personnel management and emphasised on rules and regulations, efficient management of employees, labour relations, discipline, good communication and employee welfare. However, this traditional approach of managing employees was routine and predictable and concealed systematic autocracy from the employer. The majority of the workforce was predominantly migrant labour from neighbouring countries such as Malawi, Zambia and Mozambique.

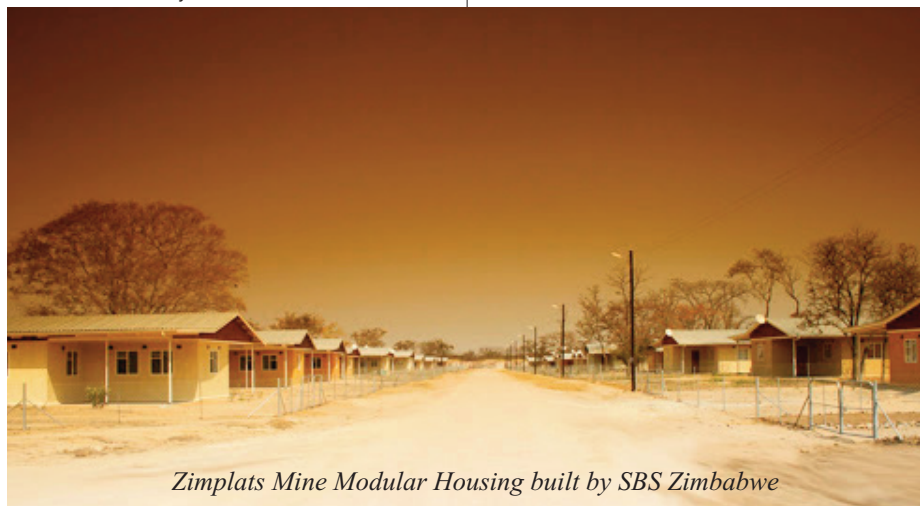
The main focus is on the employee welfare or Paternalism approach in managing employees at the workplace. The mining industry has been at the apex in the employee welfare fraternity for many years. In most mining companies in Zimbabwe, there was a fully funded, well-resourced welfare department that ensured all the physiological and psychological needs of employees were met. The company would ensure their employees enjoy free accommodation, water, electricity,

education and food hampers. Depending on the grades, senior employees would be accommodated at the low-density area and junior or lower-level employees would be accommodated at the high-density area. The welfare system was designed to ensure that the employees were well catered for and every need is well looked after.

The system also allowed local organised leadership through "Elders" that will represent different ethnic groups in the community. The elders would coordinate the activities of other community members and they would work with the Community officers. If there is a funeral in the community the company would provide food, transport, firewood and other funeral benefits. It was norm and practice that if a father dies during service, the eldest son would "automatically" replace him at work depending on the level of skill. In some cases, if the breadwinner passes on during service, the family of the deceased would be

relocated to another house and would not be chased away. The organisation ensured continuity and job security for the family. It was difficult for non-skilled employees from outside the community to get a job in most mines. The schools were fully resourced and the teachers were well-motivated, enjoying almost similar benefits to a mine employee. No school fees would be required and the top students were offered education bursaries up to tertiary level.

The footprints of the welfare system in mines was visible in the support of sporting activities, especially soccer and athletics. The companies would ensure that the sporting teams perform at the highest levels and become the flagship of the organisation. For example Rio-Tinto, Mhangura, Hwange, How mine etc, dominated the elite local premiership.



*Zimplats Mine Modular Housing built by SBS Zimbabwe*



The system had a consistent supply of talent from schools around the community, young boys and girls would be employed by the company soon after graduating from secondary school.

However, one may argue that most big mines could afford to fund the welfare system because they enjoyed huge production profits and to this day some big mines are still offering lucrative welfare packages. The question is that, is it 'Employee Welfare or Paternalism? As defined by the Websters dictionary (2010), Paternalism is the principle or system of governing or controlling a country, group of employees, etc. in a manner suggesting a father's relationship with his children. The employment relationship is a father and children relationship, where the children look up to the father for every need. The children

won't dare to cross the lines marked by the father, because the consequences are dire. The employee will enjoy all the benefits from the employer only if they are disciplined, loyal and obedient. Arguably, a number of mine employees are bitter when they are out of employment, either by retirement or dismissal, because they won't be prepared to face the harsh reality of paying utility bills. Unlike their senior management counterparts, most low-level employees do not own personal houses or immovable properties and this has led to stress and despair when they retire and have nowhere to go and become destitute.

In conclusion, it is the writers view that the welfare system in the mining industry pauperised and blinkered most employees as compared to other sectors in the country. In most big mines, Paternalism is well

packaged in the welfare system in order to preserve the prerogative of management. However, the honours is upon the employer to act as a loving and caring father and encouraging its employees to prepare for life after work. Pre-retirement and investment seminars should be organised for employees and retirees. Salary based loans should be advanced to employees in order to build their own houses. The employer may engage local authorities for land to secure residential stands for the employees and assist in building houses. Employees should remain as the flagship of the organisations even when they retire from work, thus it is important to preserve the integrity organisation through employees and retirees.

## How financial institutions can support the gemstone industry?



The Zimbabwean semi-precious or coloured gemstone industry has been dormant with small scale and artisanal miners now determined to bring back this essential sector to life. The most critical element is for the financial institutions to support the industry by promoting more exports of semi-precious products both raw and processed.

Rudairo Mapuranga/ Privelage Chinembiri Moyo

We believe that most financial institutions have excess local Zimbabwe dollar currency which can be transformed and invested in the production of the semi-precious mineral convertible to foreign currency as semi-precious stones are sold in forex both locally by fly in buyers and through exports.

### Operation costs

Most of our miners can only afford the regularization of their discoveries and a handful cannot afford formalization hence the need for financial institutions to come in and support.

Just like any other production by small scale and artisanal miners, food, transport, consumables, government fees and labour which are all paid in local currency are a requirement which financial institutions are capable of financing using their local reserves.

Budgets requirement for the above is not in big sums as compared to the operation of chrome mining and other related minerals, due to near-surface deposits across the country.

Mining operations in the semi-precious and gemstone sector is achievable even by subsistence farmers as most deposits were

discovered during land preparations hence the need for less capital injection to have meaningful production on the ground ready for market. Many subsistence farmers do have various pieces of gem-quality stones which they picked during farming preparations.

### Training

Most local miners are not exposed to foreign markets hence lack of product specifications required by various gemstones consumers.

Vocational training is a requisite to safeguard financial institutional investments in the production of gemstones as miners will be fully equipped with the correct mining and extraction methods of the stones. The extraction of gemstones unlike other minerals is not violent therefore do not require the use of explosives but other methods like diamond wire and expansion powder maybe be implored.

Miners also need to be taught about the handling of semi-precious stones, as some would be embedded in muddy and wet environment and as such do not require to be exposed directly to the sun or its light. Most semi-precious and gemstones do lose their defined colour after extraction due to exposure to the sun therefore proper storage is of major significance.

Various markets have different product specification requirements for instance China has an appetite for bigger stone sizes that can be used by many of their industries



as compared to the European market which only requires the best quality regardless of size. Miners, therefore, need to understand the grading and classification process of their produce depending on their intended markets. At this stage valuation of the stones at the mine before the market is of great importance.

Zimbabwe through the financial institutions need to invest in a credible gemology centre to assure foreign cargo of true value and quality of semi-precious and gemstones.

### Machinery and tools

Since our minerals are near to the surface some do require the use of yellow machinery to remove the overburden as well as to create road access to extraction points, as such local miners cannot afford the hours required to hire for the development of the mine site. However, a short period of machinery hire is required as the rest is manual by pick and shovel since most pits are less than three metres deep.

Due to our poor road networks as well as mine locations the use of tractors in the transportation of the stones from the mines is vital to cut costs as trucks will load at accessible points like highways, townships and growth points.

### Local and export markets

For a quicker return for the financial institutions' investments, raw exports at this stage are important to build a cash flowing base through local sales as well as good quality stones exports which are on-demand world over.

Some of the semi-precious stones are used in their raw form locally in the construction industry as decorative finishes on properties like restaurants, office parks and shopping malls in the form of wall cladding, flooring, and standalone stone figures et cetera.

If more of the semi-precious stones are used locally in the construction industry the value of properties will increase due to the rarity of the material used, financial institutions will therefore benefit handsomely from this development. Currently, granite is the only stone frequently used in the construction industry yet they are many more semi-precious stones that are not being supported at their mining stage till to the market therefore financial institutions need to explore these available avenues.

As far as export is concerned, Financial institutions need to support this industry by following up the entire process till the repatriation of funds back to Zimbabwe through their linkages in business as this brings about the ease of doing business.

### Beneficiation

As financial institutions support the mining production of semi-precious stones the downstream benefits will be for cutters to easily access the raw material at cheaper prices as well as cutting down on production cost.

Currently, this sub-sector of cutters and polishers is facing a huge shortage of raw material as no meaningful mining is taking place. In Mozambique, there are more than a thousand cutters and polishers per given area pushing miners to produce more for local consumption. Due to the organisation of the Mozambiquan semi-precious stone

industry, a minimum of three foreign buyers fly in per flight every day creating more demand and appetite.

For Zimbabwe to attract more value from the processed semi-precious stones and gemstones latest and trending machinery and technology is critical as we are competing with developed and developing countries who are in the same line of business-like UAE, India, Afghanistan, South Africa, China and European countries.

It is high time Zimbabwean cutters and polishers become innovative in their designs and styles of their finished products in form of jewellery to attract a bigger and better market, it is therefore of importance for financial institutions to come on board and assist in the growth of the sector.

Zimbabwe needs to adopt the latest technology of marketing of both raw and finished products as due to the effects of the Covid-19 pandemic online marketing has been on the rise globally. It's also important for our local miners to have access to foreign markets, exhibitions and conferences being held across the globe to have a full understanding of the entire industry.

Privelage Chinembiri Moyo is a candidate for Zimbabwe Miners Federation Secretary for Semi-Precious and Gemstones.



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