

MINESAFE 2025

MINE HEALTH AND SAFETY CONFERENCE

SAFE MINES,
HEALTHY LIVES,
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FUTURES



19-20 NOVEMBER 2025 — CONFERENCE
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**THE SOUTHERN AFRICAN INSTITUTE OF MINING AND
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FOREWORD

As an industry built on the strength, skill, and resilience of its people, mining's most important responsibility remains the protection of life. Every life lost represents a profound tragedy that must renew our determination to do better — to lead, to innovate, and to care.

This year, the South African mining industry recorded **39 fatalities**, compared to 33 during the same period in 2024. This regression reminds us that safety is not an achievement that can be claimed once, but a continuous journey requiring relentless focus, leadership, and accountability. Each number represents a colleague, a family, and a community forever changed — and each must inspire us to redouble our efforts to make 'zero harm' not just an ambition, but a lived reality.

The **MineSafe Conference** stands as a central pillar of this collective journey. It brings together all who share responsibility for the well-being of the sector — from the **Department of Mineral Resources and Energy** and the Minerals Council South Africa, to organised labour, health and safety practitioners, and the many men and women who make mining possible. It is here that we pause to reflect, to learn, and to strengthen our commitment to safer, healthier, and more sustainable mining operations.

The 2025 theme — *Safe Mines, Healthy Lives, and Sustainable Futures* — speaks directly to our shared purpose. It challenges us to expand our view of safety beyond compliance and statistics, towards a holistic culture that values health, human dignity, and environmental care as inseparable parts of sustainable performance. It calls on us to recognise that sustainable futures are only possible when every miner works in an environment that is both safe and empowering.

Over the past three decades, collaboration among industry partners has delivered remarkable progress in risk reduction, technology adoption, and health outcomes. These achievements prove that we can make lasting change when we work together. Yet, they also remind us that the journey is far from over. The task ahead demands courageous leadership, practical innovation, and an unwavering belief that every fatality is preventable.

The **Industry Awards Day**, to be held on **21 November 2025**, will celebrate individuals and organisations who have demonstrated excellence in safety, health, and sustainability. Their achievements reflect what is possible when passion and purpose align — and they serve as a powerful reminder that safe, responsible, and sustainable mining is within our grasp.

Let MineSafe 2025 be a time not only to recognise progress but to recommit ourselves to the future we all want to build — one where **every mine is safe, every worker thrives, and every community benefits**. Together, we can and must deliver on the promise of **safe mines, healthy lives, and sustainable futures**.

G. van Greunen
Chairperson: Organising Committee

Contents

Page No

Conference Chairperson's CV's	1
Keynote Presenters CV	2
The step change to zero fatalities L. McMaster	4
Legal frameworks to prevent and address gender-based violence in the South African mining industry K. Collier, S. Ngcamu	5
Real-time temperature profiling in underground mines: A proof of concept using distributed temperature sensing based on optical fibre Y. Hleta, M. Mochubele, P.D. Seroba	6
Audit of safety and health systems at room and pillar salt mine: Findings, challenges, and opportunities for improvement M.Z. Emad	7
Reducing mining health and safety risks through nonexplosive mining A.S. Macfarlane	8
Identifying safety risks and future research directions in the pursuit of zero harm in South African mines: A review of mine health & safety council initiatives L.A. Maseko	9
Assessing the applicability of a trapped miner locator system in underground mines – a response to the proposed MHSA Chapter 16 Section 16.7 amendments N.E. Mathebula, H. Sekate, P.L. Ngwenyama	10
Efficiency and sustainability: Evaluating the performance of lime-based expansive agents in hard rock mining – A field study M. Mekgwe, T. Mmola, H. Grobler	12
Eliminating fall of ground incidents in underground mines: Lessons from Australia for the Southern African mining industry A. Mapuranga	14
Beyond compliance: Addressing psychosocial risks in Southern African mining – integrating ubuntu, systems thinking, and innovative practices for a sustainable workforce A.K.B. Chigwada	15
Ground stability assessment and remediation strategies for a salt mine: A case study M.Z. Emad	16
Harmonising technology and management of change to strengthen safety culture J. Savit	18
Khumbul'ekhaya 2.0: A transformational safety & health strategy for the South African mining industry D. Naidoo	20
Vertical mine shaft rescue and recovery operation at 1289 m: A world-first success M. Fourie	21
Understanding battery chemistries, safety considerations, and suppression challenges in the mining industry A.K. Townsend, J. van Rensburg, H. Olivier	22

Contents

Page No

Lean transformation–TOC integration for human centric operational excellence: A Delphi validation	
R.C.D. Phillis, A. Botha.	23
Bridging gaps in mining safety understanding: Leveraging visual animations to overcome language and literacy barriers	
A.K.B. Chigwada.	24
Achieving Zero OLDS & TB infections in the SAMI - Is it feasible?	
N. Moyo.	25
Fuel for safety: The critical role of nutrition and hydration in mining	
D. Potter.	26
Unlocking value through in-stope areal coverage support: The Dishaba blast-on mesh success story	
S.C. Mashile, R.J. Gerber, C.L. Engelbrecht.	29
Development and impact of the missing person locator system in South African mines	
C. Marais.	31
Enhancing relationships with local communities: Recognising the significance of local communities and responding through industry best practices	
T.S. Kgarimetsa.	32
Ultra-long tunnel drive with TBM for the Woodsmith polyhalite mine Project	
D. Roos, K. B��ppler.	34

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Conference Chairperson



George Pieter van Greunen

Executive – Safety and Operational Risk
Impala Platinum

George van Greunen is an accomplished mining executive with over 21 years of experience in mine site operations, project management, and corporate functions. Thirteen of those years have been in senior leadership roles, where he has built a reputation for operational excellence, strategic foresight, and an unwavering commitment to safety.

Currently serving as Executive: Safety and Operational Risk at Impala Platinum's Rustenburg operations, George oversees sustainable safety performance across a workforce exceeding 50,000 people. His leadership continues to drive measurable improvements in health, safety, and operational risk management throughout the business.

Over the course of his career, George has gained extensive experience across production, technical services, project execution, processing, and corporate disciplines. His work spans commodities including PGMs and base metals, and diverse mining methods, ranging from tabular to massive orebody extraction.

Career highlights include:

- **Safety Leadership:** Maintaining a fatality-free record for over 18 years while holding legal appointments in complex operational and project environments.
- **Styldrift Mine Project:** Leading the R13 billion feasibility study and subsequent construction, ramp-up, and handover of one of South Africa's major mechanized underground mines.
- **Project Development and Studies:** Successfully delivered multiple trade-off and feasibility studies across large-scale underground and open-pit mining projects, demonstrating innovative design thinking, technical excellence, and sound strategic decision-making.
- **Operational Excellence:** Significantly improving production performance at multiple sites, accelerating project timelines, and presenting internationally recognized technical solutions that enhanced project viability.

George holds a B.Eng. in Mining Engineering and an MBA, and currently serves as Vice President of the Association of Mine Managers of South Africa (AMMSA). He remains actively involved in industry initiatives that promote safer, more efficient, and sustainable mining practices.

Outside of work, George enjoys an active lifestyle and spends his free time farming, mountain biking, diving, and deep-sea fishing, activities that help him stay focused and energized.

As Chairperson of MineSafe 2025, George supports the conference theme – “Safe Mines. Healthy Lives and Sustainable Futures”, and is dedicated to driving collaboration and innovation across the mining sector to achieve lasting zero harm.

Keynote Presenters



Leigh McMaster

Vice President Safety
Sibanye-Stillwater

Leigh McMaster brings 19 years of experience in the mining industry, with a career dedicated to advancing safety and risk excellence in the mining industry. Currently serving as Vice President Safety for Sibanye Stillwater's South African Region, Leigh leads strategic initiatives to embed risk awareness and safety maturity across operations. Leigh's passion lies in empowering mineworkers at various levels to take ownership of their safety journey and fostering environments where safe behaviour becomes second nature. With deep expertise in Safe Behaviour, Risk Management, and Operational Risk Management, Leigh champions the belief that behaviours and organisational culture are shaped by the enabling environment and the quality of relationships within it. Prior to joining Sibanye Stillwater, Leigh spent a decade with the Minerals Council, driving industry-wide safety improvements. Leigh holds undergraduate and postgraduate qualifications in Human Resources and Industrial Psychology, complemented by an M.Sc in Mining Engineering specialising in Mine Health and Safety.

Dushendra Naidoo



Head of Safety and Sustainable Development
Minerals Council

Mr. Naidoo's career began at the CSIR's Mining Technology Division as a Research Engineer where he was involved in a variety of research projects including underground mine support design, Mine Health and Safety Council projects and technology driven initiatives for over 5 years. He obtained a merit award for successful project outcomes for a mining project at the CSIR. This was followed by 5 years in the manufacturing arena at Joy Mining Machinery as a Senior Mechanical Engineer where he led aspects of a special project that involved developing a hard rock continuous cutting machine and obtained a design patent for the rock breaking system. At Thyssenkrupp Industrial Solutions he was a Lead Engineer for multi-million-rand projects for over 5 years including the design and construction of the first vertical lime kiln in Zambia. He also managed proposals for a brief period in the petrochemical department.

Thereafter he joined Fermel as a Design Office Engineering Compliance Manager where he was responsible for mine vehicle certifications, design compliance and quality assured outputs from a design team. His passion for training young engineers and design led to him winning the first phase of the Isidingo Drill Challenge that was an initiative hosted by the Mandela Mining Precinct. He spent some time at Bosch Projects in the Sugar and Industrial Department as part of a leadership team and was involved in major projects including the design of one of the largest rotary cascade sugar dryers in the world for a Client in Thailand. His technical know-how also led to him having a brief involvement in a major expansion project at Tronox Minerals Sands.

He was the Principal Adoption Specialist for the Minerals Council's MOSH Transport and Machinery Team for over two years where he was able to express his passion for engineering, safety, and the mining industry through the many safety initiatives that he is responsible for. He was promoted to the Head of Safety and Sustainable Development at the Minerals Council South Africa.

On the academic front, Mr. Naidoo holds both a Bachelors and Masters Degree in Mechanical Engineering from the University of Natal and is a certified Professional Engineer with ECSA. Recently, he obtained a Postgraduate Diploma in Management Development from GIBS. He has acquired certificates in project management, financial management, value engineering and behavioural based safety. Mr. Naidoo spent some time in Germany where he acquired specialized knowledge from experts on miscellaneous plant equipment. He is admired by his peers as being an innovative, creative lateral thinker who always believes in the power of positive thinking and exemplifies this in his work ethic and personal life.

The step change to zero fatalities

L. McMaster

Sibanye-Stillwater, South Africa

Despite significant advances in mining safety, the industry continues to face the challenge of fatal incidents. This presentation argues that the journey to 'Zero Fatalities' is not constrained by a lack of safety theory, tools, knowledge of hazards, or awareness of systemic risk factors – these are well established across the sector. The real challenge lies in bridging the gap between what is known and what is consistently practised. Drawing on operational insights and recent interventions, the presentation seeks to discuss practical focus areas for achieving a step change in fatality prevention, emphasising effective leadership, transparency, and learning.

Introduction

Mining organisations possess comprehensive risk management systems, detailed hazard registers, and a deep understanding of the systemic contributors to incidents. Yet, unwanted events persist. This presentation explores why, despite having the necessary tools and knowledge, the industry still struggles to eliminate fatalities, and what must change to achieve this goal.

Background and Context

The sector's collective experience has mapped out the majority of hazards and risks, and systemic factors are well documented. However, the translation of this knowledge into daily, risk-aware behaviours remains inconsistent. The focus must now shift from identifying risks to ensuring robust, verifiable controls, actionable leading indicators, engaged leadership, and a culture of proactive safety ownership.

Discussion

Key enablers and barriers to zero fatalities are examined through the following lenses:

- Reporting, Close-Out, and Learning: Effective incident reporting, thorough close-out, and structured learning processes are essential for continuous improvement.
- Critical Control Management: Both design and operational verification of critical controls are vital to prevent fatal events.
- Visible Felt Leadership: Leadership presence and engagement drive safety culture and accountability.
- Risk Secrecy and the Watermelon Effect: Addressing the tendency to mask underlying risks ('green on the outside, red on the inside') is crucial for genuine progress.
- Re-imagining the Hierarchy of Controls: Moving beyond traditional models to prioritise controls that are both effective and practical in the mining context.
- Leading and Lagging Indicators: Integrating high-potential hazard management and reporting with a balanced approach to safety metrics ensures focus on both prevention and learning.

Conclusion and Recommendations

Achieving zero fatalities requires relentless execution, cultural alignment, and courageous leadership. The industry must move beyond compliance to embed a zero-fatality mindset at every level. Recommendations include:

- Leadership Commitment: Visible, authentic engagement at all levels.
- Risk Transparency: Real-time risk reporting and feedback loops.
- Frontline Empowerment: Enabling workers to act on hazards without fear.
- Learning Culture: Institutionalising learning from incidents and near misses.
- Embedding effective and clear safety systems and processes

Legal frameworks to prevent and address gender-based violence in the South African mining industry

K. Collier, S. Ngcamu

Webber Wentzel, South Africa

The prevention and strong response to incidents of gender-based violence (GBV) in the South African mining environment is supported by numerous legal mechanisms which empower employers to take decisive action to protect employees. These, however, cannot be reactive and require early intervention and proactive establishment of clearly communicated policies, particularly where employers may seek to hold employees accountable for committing GBV outside of the workplace. Legal compliance, particularly under South African health and safety laws, and accountability under ESG standards requires that employers play an active role in addressing GBV. These measures include obligations outside of the workplace, through support of the state as well as community-based projects, to prevent violence but also to support victims. Our courts are increasingly grappling with the steps that employers can take following acts of GBV in the workplace, and more recently whether an employer can discipline an employee for acts of GBV that occur outside of the workplace; outside of working hours and whilst there are pending criminal proceedings. In the reported matter of *Mtsewu vs Anglo American Platinum (Dishaba Mine)* (2023) 46 ILJ 441 (CCMA) the ability of employers to take this stance was confirmed, where specific communicated, documented policies have proactively been implemented. This paper will outline the legal obligations placed on employers and the powers held by them to take decisive action to protect employees when appropriate proactive measures have been taken in the workplace.



Kate Collier

Partner, Head of Occupational Health and Safety - Webber Wentzel

Kate specialises in Occupational Health and Safety (OHS) law. She has an interest in the impact and management of workplace health and safety risks in commercial transactions including large disposals or acquisitions of businesses. Her areas of expertise include regulatory and risk management advice, accident and non-conformance investigations, occupational health and safety related disputes and regulatory inquiries, occupational health and safety business crimes and prosecutions, commercial drafting and due diligence assessments. Kate's occupational health and safety expertise has been recognised by various

international research organisations including Chambers Global, Legal 500 and Best Lawyers.



Siya Ngcamu

Partner – Employment and Employee Benefits - Webber Wentzel

Siya is a Partner in the Employment and Health and Safety practice at Webber Wentzel. He holds an LLM in Labour Law (with distinction) degree from the University of Johannesburg and an LLB (cum laude) degree from the University of Kwa-Zulu-Natal.

Siya has a wealth of experience and expertise in individual and collective labour law. He has represented clients before the CCMA, bargaining councils and the Labour Court. His expertise has been recognised by international research organisation Legal 500 as a rising star and leading associate. He has been

recognised as a leading author in the Lexology Legal Influencers Q1 2025 for Employment- Africa and Middle East.

Siya is dedicated to the eradication of harassment and gender-based violence in workplaces. He represented a mining company in a prominently known gender-based violence unfair dismissal dispute before the CCMA, which set the tone and approach for employers in dealing with gender based violence inside and outside the workplace.

Real-time temperature profiling in underground mines: A proof of concept using distributed temperature sensing based on optical fibre

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¹PositionNXT, South Africa

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In response to the September 2024 directive by the Mine Health and Safety Inspectorate in South Africa, mandating continuous monitoring of environmental conditions, specifically temperature, noise, and airborne pollutants, this study explores the viability of adopting real-time technologies as a regulatory necessity. This paper presents a proof of concept evaluating the application of Distributed Temperature Sensing (DTS), based on optical fibres, for real-time monitoring of thermal conditions in underground mining environments. The experimental results demonstrate that Distributed temperature sensing offers high-resolution, continuous dry-bulb temperature profiling with an accuracy of up to $\pm 1^\circ\text{C}$, as validated against standard thermometers over a six-hour monitoring session. Notably, DTS enables the generation of spatially rich 3D thermal maps, allowing ventilation engineers to visualise airflow patterns, temperature gradients, and potential thermal hotspots in real time. By extending temperature monitoring over several kilometres using fibre-optic cables, distributed temperature sensing significantly outperforms traditional point-based sensors in both spatial and temporal resolution. The study establishes distributed temperature sensing as a promising tool for enhancing thermal risk management, ventilation control, and regulatory compliance in underground mines.

Keywords: Distributed temperature sensing, real time, fibre, thermal map, underground



Muthusi Marumo

Principal Technician - Mintek

Muthusi Marumo holds a National diploma in Biotechnology from University of Johannesburg (2009). Baccalaureus Technologiae (Btech) degree in Biotechnology from University of Johannesburg (2023). BSc Honours Environmental monitoring and modelling from University of South Africa (current). Over the past 15 years, I have gained considerable working experience in a mining and metallurgical research and development institution, Mintek. This experience has been developed in the areas of mineral extraction and environmental remediation. My mineral extraction experience involves project and operational management of

lab scale and pilot plant heap and tank bioleaching projects on various base metals and gold. I have played an integral role in the commissioning and operation of mine impacted water treatment plants. I have received an achievement award for my role in the successful demonstration of our Biological Sulphate Reduction (BSR) process on a mine site. I am results orientated, adaptable and good at handling and resolving problems on the spot. I consider myself pragmatic and resourceful, capable of quickly learning as I go by being practically involved in the work.



Andre Veldsman

Director - PositionNXT

Andre Has spent the last 15+ years working as a test and measurement specialist focussing on sensors and sensing technologies across industries. From measuring explosions to bottle caps, he built up invaluable experience and custom sensing solution capabilities.

Audit of safety and health systems at room and pillar salt mine: Findings, challenges, and opportunities for improvement

M.Z. Emad

King Fahd University of Petroleum and Minerals, Saudi Arabia

An independent safety and health audit of ICI Pakistan's Soda Ash Business salt mine in Matan, Punjab, was conducted by a team of mining engineering experts from UET Lahore. The audit aimed to check the integrity of the mine's operating safety systems and adherence to safety and health standards. The assessment highlighted key areas which needed immediate attention, such as ground control, mine ventilation, and training aspects. Additionally, stepwise improvements were recommended by the author to enhance safety, health and responsibility at the mining operation. The major findings showed that the mining operation has a very well documented mine safety and health system in place. The major safety lapses were in terms of design of mine layout, ground control, mine ventilation effectiveness, and use of personal protective equipment. The positive aspects in terms of mine safety were formal management frameworks, routine risk assessments, and adherence to mine safety training. The areas of improvement included enhanced coordination, implementation of mine safety policy, better engineering control in mine planning and strict enforcement of maintenance and health policy guidelines. The audit also draws attention to improving and communicating roles and responsibilities in the safety management hierarchy.

The suggestion aims at timely remedial action, continuous monitoring, and adherence to best practices to ensure long-term operational safety and regulatory compliance. The current study provides real-world insights to mining companies seeking to achieve productivity while ensuring employee safety and environmental sustainability.



Muhammad Zaka Emad

Associate Professor

King Fahd University of Petroleum and Minerals, KSA

Dr. Zaka Emad, a distinguished expert in Mining Engineering, joined the College of Petroleum Engineering and Geosciences (CPG) at KFUPM in November 2024, bringing a wealth of expertise and passion for innovation in the field. Before this, he spent a decade shaping minds at UET Lahore, focusing on underground mine design, rock mechanics, and rock fragmentation.

His impressive postdoctoral research at Creighton Mine in Sudbury, Canada, explored numerical modeling of destress blasting, while his Ph.D. work delved into the dynamic performance of cemented rockfill under blast-induced vibrations. With over 17 years of teaching and research experience, Dr. Emad is a pioneer in underground mining, excavation techniques, rock mechanics, mine safety, and numerical modeling. His commitment to advancing knowledge and solving complex challenges makes him a vital asset to the CPG and the broader mining community.

Reducing mining health and safety risks through nonexplosive mining

A.S. Macfarlane

Rock Eater (Pty) Ltd, South Africa

Despite significant improvements in mine safety performance over recent years, the target set by the industry of zero fatalities in mines by 2034 still requires significant interventions to reach that goal. This includes aspects of mine design, change management, compliance and technology development and implementation. Although incidents relating to health and safety as a result of explosives are rare these days, the residual risk of premature detonation or drilling into misfires still exists and will continue to be present until a safe and healthy nonexplosive mining method is developed and adopted. This hypothesis applies to both surface and underground hard rock mining; in both stoping and development. It also has relevance in soft rock and civil engineering niche applications. Over many years, research and development work has been funded and undertaken, producing equipment and systems that provide a cutting or breaking solution, but which generally is energy-intensive, bulky, inflexible and very high in capital cost. The paper will describe the development of a system known as 'Controlled Foam Injection' which allows rock breaking in tension, on a continuous basis. As will be shown in the paper, the system results in improved productivity, reduction in health and safety risks and reduced risks. Certain health and safety regulatory requirements may be reduced, as discussed below. The paper will illustrate the level of development, and the testwork program that has been done, that will prove the technology and result in an operationally-ready system.

Identifying safety risks and future research directions in the pursuit of zero harm in South African mines: A review of mine health & safety council initiatives

L.A. Maseko

University of South Africa, South Africa

Although efforts continue to eliminate or reduce the harm to mine workers in South African mines, there are still accidents and occupational diseases on the job. Understanding the factors that lead to hazards remains the most important part of addressing safety risks to achieve zero harm. However, there remains limited research that systemically explores these causal factors.

The main objective of this study was to assess the progress towards zero harm by analysing research output funded by the Mine Health & Safety Council. This was done to identify research areas that may need attention through the lens of system safety. This research paper was intended to help the mining industry improve occupational safety and health outcomes.

Seventy funded projects covering the following areas were evaluated: occupational health, occupational safety, human factors, technological innovations, gender and diversity, policy, and regulatory framework. The analysis revealed that progress should be measured against the gaps identified to achieve zero harm. In addition, technological advancement must be tracked considering predictive approaches, artificial intelligence, and real-time risk tools. Training has increased since the Mining Qualification Authority has contributed to skills development, but behaviour change is lagging. The need for cultural change in the workplace has been identified but has not yet been achieved.

Key identified gaps include a lack of adoption and scalability of interventions, a lag in policy application, fast technology advancement compared to updates in regulation, and a more focused inclusion of diversity in system design. These findings suggest that the integrated systems approach that involves technology, policy, and human factors must evolve together. Improved metrics are required to track the results of funded research versus implemented safety changes. A visual road map with a matrix will be required for the stakeholder to identify areas of priority.

Keywords: mine safety, mine safety education, occupational health, occupational safety, systems safety



Lucky Albert Maseko

Senior Lecturer

University of South Africa

Worked at different mining companies as a mining engineering graduate at various positions. Companies worked for include Johannesburg Consolidated mines (JCI), South Deep Project, Anglo Coal (Greenside Colliery, New Vaal Colliery) and Mpumalanga Education Department. Before joining the University of South Africa in 2006 as a lecturer where he handled a variety of modules including curriculum design work. He is currently a Senior Lecturer.

Assessing the applicability of a trapped miner locator system in underground mines – a response to the proposed MHSA Chapter 16 Section 16.7 amendments

N.E. Mathebula, H. Sekate, P.L. Ngwenyama
University of Pretoria, South Africa

Various case studies have shown that miners are not always killed during the initial event of an accident. In some incidents, miners may survive the initial accident, but remain trapped underground, thus necessitating emergency search and rescue operations to recover them. Search and rescue missions are often prolonged due to a lack of reliable data regarding the accurate locations of trapped miners, due to inadequacies in some of the available communication systems. These systems frequently fail because of their heavy reliance on infrastructure that is often damaged in these accidents. These prolonged rescue missions significantly diminish the survival chances of trapped miners.

In response to the recurring fatalities of trapped miners related to delayed rescue operations, the Department of Mineral Resources and Energy (DMRE) of South Africa proposed amendments to the Mine Health and Safety Act (MHSA) of 1996 on 3 April 2023. Chapter 16 of the proposed amendments addresses first aid, emergency response, and missing person locator systems, which would necessitate mines to implement new technology and systems. The regulations proposed that it should be mandatory for all underground mines and surface mines with a significant risk of slope failure to equip their workers with a fundamentally safe device capable of locating them in case they are missing while working or during emergencies. The device must offer real-time tracking of the last known location in the event of system damage or failure. The device must also be able to locate the missing person within 10 m in an unobstructed environment, and 30 m through solid rock (Collier, Coster & Nkosi, 2023). This paper demonstrates that Through-the-Rock (TTR) technology is the only technology that can meet the requirements specified in the DMRE's proposal.

However, when the final amendments were promulgated on 28 March 2025, the DMRE retracted some of the specific performance criteria of the technology, such as the capability to locate personnel within 10 m in an unobstructed environment and 30 m through solid rock. Instead, it stipulated that the system be capable of indicating only the miner's last known location (Le Roux and Coles, 2025). It is plausible that the DMRE's retraction of the performance requirements may have stemmed from uncertainty regarding the existence or practicality of a system with such capabilities. Although this retraction removed the immediate mandate for TTR systems, the DMRE's recognition of their potential and the necessity for infrastructure-independent technologies shows the need for this system. Accordingly, it can be reasonably postulated that as TTR technology continues to demonstrate its viability, the reinstatement of the originally proposed requirements remains a likely possibility in future amendments.

This paper thus aimed to assess the applicability of a TTR system and establish a framework for its optimal implementation. The advantage of this system is its independence from infrastructure and the use of electrically small antennas that use very-low-frequency magnetic induction to facilitate signal propagation through the rock and through the air without relying on fixed infrastructure. In this paper, the performance of TTR systems in varying environmental and geological conditions was examined, and the impact of electrical equipment and metal obstructions on signal reception assessed, providing the basis for guidelines for an optimal TTR system design.

The capability assessment indicated that viable application of TTR systems in underground can be achieved by equipping the system with a 4 – 6 kHz crystal oscillator for stability and accuracy, minimising antenna turns for low radiation resistance and strong near-field coupling; using omnidirectional antenna setups to ensure reliable signal reception. Calculations of skin depth showed that the transmission media's electric conductivity and magnetic permeability greatly affect signal propagation. Lower conductivity rocks such as sandstones and conglomerates, which are typical host rocks for gold and coal mines, are highly favourable for deep signal penetration of up to 60 m, while iron-bearing sedimentary rocks have the lowest skin depths due to high conductivity and magnetic permeability.

This paper provides evidence for the applicability of the TTR system for localised incidents. These include scenarios where miners could be trapped or buried in rock falls, confined in areas with poor visibility, or have fallen into a cavity such as an ore-pass. Further research is planned for testing the system underground. This paper establishes the advantages that the TTR system offers towards further enhancing rescue missions and contributing to strengthening safety measures in underground mines. The ability to save trapped miners can significantly contribute to eliminating fatalities.

Keywords: Trapped miner, magnetic induction, mine rescue, electrically small, signal propagation.

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Mr Larrance Ngwenyama

Lecturer and Researcher
University of Pretoria

Larrance completed a BEng, BEng Honours and MEng in Mining Engineering at the University of Pretoria, then joined South32, now Seriti. After having spent some time in industry, Larrance joined the University of Pretoria as Lecturer and Researcher. His field of interest is on communications systems for underground mines to aid search and rescue operations as part of his PhD studies. Other research focus areas include mechanised mining equipment applications, new technology applications, non-explosive rock breaking solutions, autonomous mining systems, opencast and underground coal mining, haul road design. He is an associate member of the South African Institute of Mining and Metallurgy (SAIMM) and is a registered professional engineer with the Engineering Council of South Africa (ECSA).

Efficiency and sustainability: Evaluating the performance of lime-based expansive agents in hard rock mining – A field study

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University of Johannesburg, South Africa

Legal constraints are inherent to a mine operation and thereby require sustainable mining practices. Expansive agents are a sustainable alternative to conventional blasting in mining, offering reduced vibration, noise, and environmental impact. These are beneficial for Klipspruit Colliery, an opencast mine based in Mpumalanga. The proximity of neighbouring communities posed a legal constraint, and risked sterilising mineral resources. To provide a potential solution, quantitative research aimed to evaluate the efficacy of a lime-based expansive chemical agent was conducted, with varying spacing and burden in the removal of the overburden constituting hard rock. The rationale for the selected methodology was to evaluate the influence of hole spacing and burden to rock fracturing. The statistical analysis suggests a negative correlation for both holes spacing and burden respectively, but no causal relationship was established. In the field study, results suggested an optimum measure of 1.2m for hole spacing and 1m for the burden.

Keywords: NERB, expansive agents, sterilisation, crack width, correlation and regression.



Melia Mekgwe

Lecturer

University of Johannesburg

Melia Mekgwe is a mining engineer with over a decade of experience in both industry and academia. She graduated from the University of the Witwatersrand in 2014 with a Bachelor of Science Honours in Mining Engineering. Thereafter, she went to work in the production department at a renowned hard-rock underground mine trading in gold. Critical field experience was gained, a deep understanding of operational safety was developed, and production efficiency. The learning transitioned to an engineering department in 2018, where she joined a massive mine in the province of Northern Cape. In the mine, she worked directly with automated systems, enforcing safety and efficiency. Currently, she works in academia and has spent over three years in the sector. In this position, she delivers quality teaching experience to the next generation of mining professionals, bridging theoretical knowledge with real-world application, drawing extensively from industry experience to enrich the learning environment.

Being in the academia sector has opened opportunities to further contribute to the industry through research and development. Areas of interest for research are: rock breaking efficiency in mining, retention of female mining engineers, and the management of dispersion of mining graduates through the mining value chain to the professional level. She is an active member and contributor to the Strategic Mineral Resource Group, one of the research centres at the institution of higher learning, dedicated to encouraging sustainability in mining through research and offering practical solutions to the complex inherent nature of the industry.

Committing to lifelong learning, Melia Mekgwe is currently finishing her master's qualification in sustainable mining with the University of Johannesburg. The research aims to support sustainability in mining through green mining. It focuses on the application and effectiveness of non-explosive rock-breaking agents in opencast mining environments, particularly within South African coalfields. This contribution extends to the professional responsibility to ensure sustainability for generations to come, operational safety, and technological advancement within the mining sector.

The versatility in her mining engineering portfolio has enabled her to acquire a comprehensive knowledge of the mining value chain. This has developed a strong professional profile that blends field experience, engineering acumen, and academic excellence. My current professional mandate is to advance mining practices through education, research, industry collaboration mentoring graduates through their transition to the industry. A reflection of her aspirations to offer a meaningful contribution to the industry.

Eliminating fall of ground incidents in underground mines: Lessons from Australia for the Southern African mining industry

A. Mapuranga

Northern Star Resources, Australia

Fall of ground (FoG) incidents continue to be one of the leading causes of injury and fatalities in underground mining operations around the world. While technology and regulation have improved significantly over the years, FoG events remain a persistent challenge, especially in regions where mechanisation and technology are still evolving. In Australia, a combination of proactive ground control measures, robust regulatory oversight, and widespread adoption of areal support systems has contributed to a noticeable decline in FoG-related incidents. This paper examines how lessons from the Australian mining industry can be adapted to help eliminate FoG incidents in the Southern African context, and how reciprocal learnings between the two regions can drive safer mining practices. Drawing on proven approaches from Australian sites, such as the standardised use of mesh in development headings and consistent classification of unsupported ground, this paper shows how such measures can enhance FoG control and management in Southern African mines. Rock engineering and geotechnical practices from both Australian and Southern African operations reveal a mix of successes, challenges, and opportunities where collaboration can drive mutual improvement and elevate global ground-control standards.



Amos Mapuranga

Senior Engineer: Geotechnical
Northern Star Resources

Amos Mapuranga Pr. Eng (ECSA), CPEng (EA) is a Chartered Professional Engineer with over 11 years of experience in the mining industry, specialising in mining, geotechnical/ rock engineering. He currently serves as a Senior Geotechnical Engineer at Northern Star Resources in Australia. Amos holds an MSc and BSc in Mining Engineering from the University of the Witwatersrand and is registered with both ECSA and Engineers Australia. He also holds the Rock Mechanics Certificate and

Strata Control Certificate, demonstrating advanced competency in underground support systems and stability design.

His previous roles include Head of Rock Engineering at Zimplats, where he led a team across five underground mines, and Mine Planning Engineer at SRK Consulting. His experience spans sublevel stoping, bord and pillar, Avoca mining methods, seismic risk management, and backfill systems.

With a strong focus on safety, innovation, and cross-functional collaboration, Amos brings a practical, results-driven approach to mining and geotechnical engineering. He is committed to driving improvements in mine safety, performance, and sustainability through technical leadership and continuous professional development.

Beyond compliance: Addressing psychosocial risks in Southern African mining – integrating ubuntu, systems thinking, and innovative practices for a sustainable workforce

A.K.B. Chigwada

ABE Risk Solutions, Australia

Mining operations across Southern Africa are entering a critical transition. While physical safety performance has improved through mechanisation, regulatory pressure, and structured safety management systems, psychosocial risks remain under-recognised and under-managed. Fatigue, mental distress, harassment, job insecurity, community pressure, and intergenerational trauma increasingly shape workforce wellbeing, stability, and productivity. These risks are no longer a ‘soft’ HR issue; they are a material business risk with direct implications for production discipline, ESG performance, and social licence to operate.

This paper proposes an integrated psychosocial risk governance model for the Southern African mining sector that combines (1) Ubuntu as a culturally grounded philosophy of collective care and accountability; (2) systems thinking, treating psychosocial harm as a product of organisational design rather than individual weakness; and (3) technology-enabled early detection and escalation. Drawing on case insights from platinum, coal, gold and diamond operations across Zimbabwe, South Africa, and Botswana, the paper demonstrates how culturally-aligned wellbeing programs and data-informed controls can reduce absenteeism, improve safety climate, and build sustainable workforce resilience. The work also situates Southern Africa in a global context by comparing emerging approaches in Australia, Canada, and Chile, where psychosocial harm is now explicitly regulated.

The argument is simple and urgent: psychosocial risk management must move from reactive wellness initiatives to a strategic, auditable, leadership-owned control framework. A mine that protects the mind secures its legacy.

Keywords: Psychosocial Risks, Ubuntu, Systems Thinking, ISO 45003, Mining, Southern Africa, Mental Health, Human Factors, ESG, Workforce Resilience



Abednego Kholwani Bayne Chigwada

Executive Director
Abe Risk Solutions

Dr Abednego KB Chigwada is an accomplished Environmental, Health, Safety, and Risk Executive with over 25 years' experience spanning mining, manufacturing, government, and essential services across Southern Africa and Australia. He holds a PhD in the Management of Technology and Innovation, with research focused on human factors and operational performance in high-risk environments. Dr Chigwada has led transformative WHSE programs in mining giants such as Zimplats and Rio Tinto Zimbabwe, embedding critical risk management frameworks and psychological safety practices. As a Fellow of the Australasian Institute of Mining and Metallurgy and a Certified Risk Management Professional, he is passionate about integrating systems thinking and indigenous philosophies like Ubuntu to advance sustainable safety cultures. Dr Chigwada is currently a senior advisor and trainer, supporting organisations to build resilient, high-performing workforces grounded in wellbeing and shared purpose.

Ground stability assessment and remediation strategies for a salt mine: A case study

M.Z. Emad

King Fahd University of Petroleum and Minerals, Saudi Arabia

This paper shows a detailed safety audit of Haroon Mine, an underground rock salt extraction site located in the central salt range near the Pir Khara region of Punjab, Pakistan. The audit was requested by the mine engineers to investigate repeated ground failures in the mine's main adit, which posed great operational and safety hazards. A team of engineers carried out a site visit and a detailed assessment of structural issues, followed by proposing remediation actions aligned with international mine safety protocols.

The audit showed many critical geotechnical and hydrological risks associated with the mine which threaten the long-term stability of the locality. The major problem was the undercutting of salt pillars by uncontrolled groundwater seepage in the entries at lower levels. Dissolution of salt lead to weakening of the load-bearing pillars of the mine, resulting in a 600 feet long crack in the main tunnel and ground collapse in lower openings. The mine generally relies on experience-based practices and was happy with not supporting the strata until this happened.

One of the major problems was the absence of a mine planning section and a hydrogeological monitoring section, which made the mine vulnerable to fresh water seepage into the mine and other foreseen circumstances. Also, it was found that the sump was made within the production area without proper pillar lining and evaluation of geological aspects which also led to an increased risk of failure. During the visit some strengths with reference to mining geotechnics were noted as well, which include design of pillars using an empirical design method with conservative extraction ratio and a dewatering system. The mine dewatering system comprised of a pump and was activated in reaction to an event only. No formal ground control plan or water management strategies were in place. To address these shortcomings, the paper recommends a three-tiered corrective strategy:

- 1) Drainage of existing level and sump as an immediate action followed by reinforcement of pillars using backfill and fibre bolts.
- 2) Medium term action is to design a new sump and pump sytem which is in compliance with standards of lining and pumping the ingress water. This will be followed by detecting water ingress areas and sealing them.
- 3) Long-term action is to adapt 3D mine planning methodology for the mine incorporating geology, geotechnical and hydrogeological planning and design. The findings of the visit highlighted that groundwater ingress data is essential for the stability of the salt mine.

Keywords: Mine Safety Audit, Ground Control, Ventilation Systems, Safety Management, Occupational Health, ICI Pakistan.



Muhammad Zaka Emad

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Dr. Zaka Emad, a distinguished expert in Mining Engineering, joined the College of Petroleum Engineering and Geosciences (CPG) at KFUPM in November 2024, bringing a wealth of expertise and passion for innovation in the field. Before this, he spent a decade shaping minds at UET Lahore, focusing on underground mine design, rock mechanics, and rock fragmentation.

His impressive postdoctoral research at Creighton Mine in Sudbury, Canada, explored numerical modeling of destress blasting, while his Ph.D. work delved into the dynamic performance of cemented rockfill under blast-induced vibrations. With over 17 years of teaching and research experience, Dr. Emad is a pioneer in underground mining, excavation techniques, rock mechanics, mine safety, and numerical modeling. His commitment to advancing knowledge and solving complex challenges makes him a vital asset to the CPG and the broader mining community.

Harmonising technology and management of change to strengthen safety culture

J. Savit

Hexagon, USA

Long hours, repetitive tasks and operating heavy machinery are the norm in mining; so, too, are fatigue and distraction. Tackling both is not just important, it is essential for ensuring safety and productivity. A safe mine is a productive mine.

Fatigue, especially, is a silent threat lurking in workplaces across the globe, contributing to an estimated 20% of all workplace incidents and costing employers \$135 billion annually, according to the National Institute for Occupational Safety and Health (NIOSH). The reality is likely higher as we have yet to fully embrace the human factors that influence behaviour.

Some 21% of people in mining and quarrying occupations experienced harm at work in the last two years, third only to fishing and construction, according to the latest Lloyd's Register Foundation World Risk Poll Report.

Underground mining has its own complexities, and they are only increased by risks posed by fatigue and distraction. As mines push deeper beneath the surface for deposits, the need for better communication and collaboration increases.

To improve safety in open pit and underground mines, a unified, accessible platform with layered systems for collision avoidance, operator alertness, personal protection, and vehicle intervention is important.

Technology is just one layer of mine safety. Change management and data insights are also significant. Even when solutions are integrated, operators must still be engaged and re-engaged in a cycle of continuous improvement.

Mining operations can be likened to a precisely coordinated performance, where each piece of heavy equipment operates in harmony under the guidance of its operator. Every movement must be deliberate and carefully calculated. A lapse in vigilance or situational awareness by the operator can lead to consequences ranging from minor disruptions to catastrophic outcomes. Recognising this dynamic provides an opportunity to design safety systems that not only enhance protection but also serve as tools for optimising production.

Hexagon partners with multiple mining companies in the pursuit of zero harm. It has achieved particular success in helping mines to transition from OEM and third-party services to in-house support and maintenance, embedding skill sets for locals at site level.

In this way it has helped to train and educate employees with skills and best practices through partnership. This paper will explore the intersection of technology and trust as it relates to management of change and the strengthening of safety culture.



Joshua Savit

Principal Advisor - Safety
Hexagon

Josh Savit, Principal Advisor at Hexagon, has over 17 years of experience in the Environment, Health, and Safety (EHS) field, with a specialized focus on the mining industry. Since joining Hexagon in April 2019, Josh has been at the forefront of developing innovative methodologies and technologies to enhance fatigue monitoring and operator safety.

His expertise lies in behavioural-based safety strategies and fatigue education, which have proven instrumental in fostering effective labour-management communication and driving the adoption of safety management systems. By integrating these systems into workplace operations, Josh has helped organizations establish a strong foundation for safety-driven production, ensuring both employee well-being and operational efficiency.

Khumbul'ekhaya 2.0: A transformational safety & health strategy for the South African mining industry

D. Naidoo

Minerals Council, South Africa

South Africa's mining sector is undergoing a profound safety transformation, driven by the launch of Khumbul'ekhaya Version 2.0. This paper will unpack how the strategy has evolved into a leadership-led movement that is reshaping safety culture, operational discipline, and wellbeing across the industry.

Anchored in five execution pillars: Visible Felt Leadership, Critical Control Management, Data 4.0, Mental Health & Fatigue Management, and Innovation & Shared Learning, Khumbul'ekhaya 2.0 is delivering measurable impact. The paper will highlight key outcomes and the way forward with implementation.

Through real-world examples from CEO-led site engagements and cross-company collaboration, the paper will demonstrate how authentic leadership and inclusive platforms are accelerating the adoption of leading practices. It will also explore how digital tools and wellness integration are enabling proactive risk management. The framework encompasses thought-leading pillars and actions to accelerate a step-change in the industry's safety & health performance in line with the Mine Health & Safety Milestones that were formalised in 2024.

This is more than a strategy, it is a collective commitment to zero harm. The paper will inspire attendees to lead with purpose, engage with empathy, and ensure that every mineworker returns home safely.

Vertical mine shaft rescue and recovery operation at 1289 m: A world-first success

M. Fourie

Mines Rescue Services, South Africa

Mines Rescue Services South Africa recently completed a world-first vertical mine shaft rescue and recovery operation, involving the successful rescue of 246 individuals and the recovery of the remains of 78 others. This operation took place in the ultra-deep mines of South Africa, which posed unique challenges due to the extreme depths and complexities involved, both in physical mining conditions and dealing with illegal mining. The operation required a combination of advanced technologies, specialised capabilities, and incident management skills. The lessons learned from this mission, starting from the initial notification to the conclusion of the recovery phase, are invaluable. These insights can significantly enhance the capabilities of mines in both the management and prevention of similar occurrences. The success of this operation hinged on a highly coordinated approach to incident scene management, the deployment of specialised rescue teams, and the use of cutting-edge equipment and methods not frequently applied in mine rescue operations. We hope this paper will contribute to the ongoing improvement of emergency preparedness, response strategies, and overall health and safety in the mining industry.



Mannas Fourie

Chief Executive Officer

Mines Rescue Services South Africa

JAW “Mannas” Fourie serves as Chief Executive Officer of Mines Rescue Services South Africa since 2017. With more than three decades in the mining industry, he has extensive Executive experience in high-risk mining operations, emergency management, and technical leadership. His career spans deep level gold mining, where he advanced from Miner to Executive, managing large scale mining operations under complex and hazardous conditions. A former Mines Rescue Team Member and Captain, he brings practical expertise in underground emergencies like fires, gas explosions, and critical rescue and recovery missions.

His deep understanding of Mine Rescue operations laid a strong foundation for his current leadership at Mines Rescue Services South Africa, where he is responsible for developing advanced emergency response strategies and supporting rescue operations for the South African Mining industry and Internationally. This experience underpins his current work in developing emergency response strategies for underground and surface operations.

He serves on the Council of the Association of Mine Managers of South Africa, the Mines Rescue Services South Africa Board and the Board of the International Mines Rescue Body.

Understanding battery chemistries, safety considerations, and suppression challenges in the mining industry

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Social media often generalises lithium-ion batteries (LIBs) as a single, inherently dangerous category, not distinguishing between the various chemistries and their safety indices. There are several widely used and emerging lithium-ion cell chemistries; each with a preferred application, based on its individual characteristics and different thermal reactivity. As the application of batteries in the mining industry broadens, it is imperative to understand how these chemistries differ, specifically in terms of the hazard associated with each. With the growing public concern vs the potential benefits each lithium-ion chemistry offers, it was deemed necessary to conduct in-depth research into all major chemistries. This included a focused evaluation of a preferred type, aimed at understanding the safety characteristics and how they compare to the batteries currently used in mining operations. To support this research, a full-scale test was conducted at the CSIR Kloppersbos Explosion Research Facility. During the tests both lead-acid and lithium-ion phosphate batteries – along with their locomotive systems – were subjected to extreme heat conditions via exposure to open flames. The objective was to rigorously assess the behaviour of the batteries (and their control systems) under thermal runaway scenarios. It was also necessary to evaluate the effectiveness of any existing mitigation systems as well as potentially suitable chemical fire suppression products. It was found that with correct construction and chemistry selection the lithium-ion phosphate batteries performed significantly better than existing lead acid systems – showing less reactivity, exhibiting self-extinguishing behaviour and a safer environment for emergency response control.

Keywords: Lithium-ion, thermal runaway, crystal lattice structure, battery-electric locomotive, underground mining, lithium-ion batteries



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Ashleigh is currently a Lecturer in the Faculty of Engineering at North-West University. She began her career at Anglo American Platinum before transitioning to Sibanye Stillwater during her undergraduate studies. Upon completing her degree, she joined Sibanye Stillwater full-time as a Junior Engineer and was later promoted to Superintendent: Projects. In this role, she led multiple initiatives focused on battery and hydrogen substitution technologies in the mining sector.

She continues to consult part-time for Sibanye Stillwater, where she contributes to ongoing battery-related projects, including co-authoring the company's internal standard for lithium-ion battery procurement and implementation. Her most recent work involved the comparative safety testing of lithium iron phosphate and lead-acid batteries in underground locomotive applications.

Currently pursuing her PhD, her research focuses on enhancing the performance of lithium-ion batteries.

Lean transformation –TOC integration for human centric operational excellence: A Delphi validation

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This paper is presented in partial fulfilment of the requirements of a PhD research thesis. It presents a comprehensive validation of an integrated Lean Transformation–Theory of Constraints (LT–TOC) model, combining theoretical analysis with empirical insights from a Delphi study. Lean Transformation (LT) and the Theory of Constraints (TOC) are two pivotal continuous improvement paradigms with complementary strengths and limitations: LT fosters long term cultural change but can be slow to show results, whereas TOC yields rapid gains but lacks a sustainment mechanism. The integrated LT–TOC model merges these strengths, delivering early credibility through quick wins and ensuring long term sustainment through structural and cultural change. To evaluate the model’s coherence and practicality, a Delphi method was employed with a panel of 33 global experts spanning inventors (methodology creators), application experts (industry practitioners), and implementation consultants. Quantitative consensus and qualitative insights were gathered in round 1. The results show an overwhelmingly positive expert consensus (96% agreement) on the model’s validity, obviating the need for additional Delphi rounds. Experts concurred that Lean and TOC together create a synergistic improvement lifecycle, while highlighting considerations for sequencing and cultural adaptation. The findings indicate that the integrated LT–TOC approach bridges the gap between rapid adoption and sustainable continuous improvement and aligns with Industry 5.0’s human centric ethos. This research contributes an empirically validated framework and practical guidance: leverage TOC’s quick results to “cross the chasm” of workforce adoption then consolidate gains via Lean’s infrastructure for lasting transformation.

Keywords: Lean Transformation; Theory of Constraints; Dynamic Equilibrium; Genius Multipliers; LT–TOC integration; Delphi study; Innovation adoption–diffusion; Industry 5.0



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As a registered ECSA Engineer (Pr. Eng.) & Certified Director with IODSA, Dr. Rudy Phillis is a registered TOCICO Implementation Expert, and a Lean Competency System – Certified Gold practitioner.

He leads enterprise turnarounds as well as large electric power projects that lift safety, throughput, and cost performance. His three-decade career spans mine/general manager roles, senior engineering leadership and entrepreneurial appointments.

He obtained a PhD in Technology & Innovation Management in 2006, and is reading towards a second PhD, this time in Industrial Engineering, which he plans to conclude in 2026 (a mere 2-decades later). Incidentally, he also holds two Mine Manager tickets, for Coal & Metalliferous Mining.

Recognition: He is privileged to have surpassed a 1.5 million fatality-free shifts milestone. And recently, as the Barloworld Power leadership team, received Barloworld’s Global 2024 Innovation Award.

Bridging gaps in mining safety understanding: Leveraging visual animations to overcome language and literacy barriers

A.K.B. Chigwada

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The mining industry continues to experience persistent safety and communication challenges, particularly across multilingual and low-literacy workforces where conventional, text-based safety communication often fails to achieve understanding and behavioural compliance. Workers frequently misinterpret safety procedures not because of negligence, but due to barriers in language, literacy, and cultural relevance. This gap in comprehension has contributed to recurring incidents, inconsistent hazard awareness, and limited engagement with formal safety systems.

This paper explores how visual animation-based safety communication can bridge these understanding gaps by translating complex technical information into intuitive, accessible, and cultural resonant visual formats. Drawing comparative insights from Southern African mines and leading global operations such as BHP (Australia) and Vale (Brazil), the paper introduces the Visual Safety Systems Framework (VSSF). This framework integrates human-factors theory, indigenous philosophy, and technological innovation to enable inclusive, high-impact safety learning.

Empirical evidence from case studies across Zimbabwe, South Africa, Botswana, and Australia demonstrates measurable improvements in hazard recognition, compliance, and safety culture following the adoption of visual training tools. The findings confirm that visual communication not only enhances learning outcomes but also fosters a shared safety culture grounded in inclusivity and psychological safety. The paper concludes with strategic recommendations for institutionalising visual safety systems within corporate training policies, regulatory frameworks, and international mining standards.



Abednego Kholwani Bayne Chigwada

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Dr Abednego KB Chigwada is an accomplished Environmental, Health, Safety, and Risk Executive with over 25 years' experience spanning mining, manufacturing, government, and essential services across Southern Africa and Australia. He holds a PhD in the Management of Technology and Innovation, with research focused on human factors and operational performance in high-risk environments. Dr Chigwada has led transformative WHSE programs in mining giants such as Zimplats and Rio Tinto Zimbabwe, embedding critical risk management frameworks and psychological safety practices. As a Fellow of the Australasian

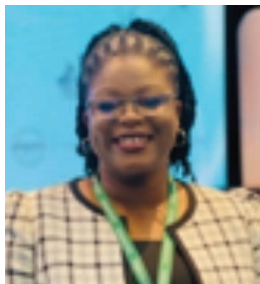
Institute of Mining and Metallurgy and a Certified Risk Management Professional, he is passionate about integrating systems thinking and indigenous philosophies like Ubuntu to advance sustainable safety cultures. Dr Chigwada is currently a senior advisor and trainer, supporting organisations to build resilient, high-performing workforces grounded in wellbeing and shared purpose.

Achieving Zero OLDS & TB infections in the SAMI - Is it feasible?

N. Moyo

Minerals Council, South Africa

This paper on achieving Zero tuberculosis (TB) infections in the South African Mining Industry (SAMI), explores strategies and best practices for zero TB infections in this industry. The goal of achieving zero TB infections in the SAMI is ambitious but not unattainable. Several key strategies must be employed to reach this target, including robust screening programs, effective treatment protocols, and comprehensive education and awareness campaigns. Collaboration between government agencies, healthcare providers, and the mining industry is crucial to address the unique challenges faced by miners, such as high exposure to silica dust and living conditions that may foster the spread of TB. The paper also delves into the prevalence of occupational lung diseases (OLDs), which are a significant health concern in the mining sector. Miners are at a higher risk of developing OLDs due to prolonged exposure to dust and other hazardous substances. The co-existence of TB and OLDs poses a compounded health challenge, making the fight against TB infections even more critical. Addressing OLDs alongside TB requires a comprehensive approach that includes improving workplace safety standards, regular health screenings, and providing appropriate medical interventions. By mitigating the risk factors associated with OLDs, we can create a healthier work environment that supports the overall goal of reducing TB infections. It covers the current state of TB in the mining sector, challenges and opportunities in TB control, and best practices in TB management. The paper emphasises the importance of collaboration between various stakeholders, including the public and private sectors, to improve the health of employees and communities. Key topics include the integration of TB and HIV management programs, preventative practices, infection control measures, early detection and treatment, community engagement, and cross-border health strategies. Emphasising the importance of regular health check-ups, the paper also suggests the implementation of mobile clinics to reach remote mining areas. By providing accessible healthcare services, miners can receive timely treatment and reduce the risk of TB transmission. Furthermore, the paper highlights the significant impact of nutrition and overall well-being on TB prevention. Proper nutrition and a healthy lifestyle can strengthen the immune system, making miners less susceptible to infections. Initiating programs that promote balanced diets and physical fitness can play a vital role in reducing TB cases. In conclusion, the paper underscores the necessity of continuous monitoring and evaluation of the strategies implemented. Adopting a data-driven approach will allow stakeholders to identify areas for improvement and adapt their methods accordingly. With dedicated efforts, achieving zero TB infections in the SAMI is within reach.



Nothando Moyo

Deputy Head of Health

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Dr. Nothando Moyo is an Occupational Health Medical Practitioner with over 18 years of specialised experience in Occupational Health and policy development. She has served as Chair of the Northern Cape Mine Managers Association (NCMMA) Wellness Stream and previously held the role of President at the Mine Medical Practitioners Association (MMPA). Dr. Moyo holds a Master of Business Administration from Wits Business School, a Postgraduate Diploma in Occupational Medicine from the University of Pretoria, and an MBChB (Cum Laude) in Medicine and Surgery from Medunsa. She demonstrates a strong commitment to health

and wellness and is also active as a golfer, runner, motivational speaker, and wellness advocate.

Fuel for safety: The critical role of nutrition and hydration in mining

D. Potter

Omega EHS Consulting, South Africa

Did you know?

More than half of underground miners start their shifts already dehydrated. Research shows that as little as a 2% loss of body water can reduce alertness, slow reaction time, and impair short-term memory. In an environment where a single lapse can lead to a life-threatening incident, hydration and nutrition are not wellness extras — they are essential tools of survival.

The Silent Risk in Mining Operations

South Africa's mines operate under some of the toughest environmental and physical conditions on earth. Evidence shows that many miners are nutritionally and physiologically under-prepared for the demands of their shifts.

The Mine Health and Safety Council (MHSC) and the Department of Mineral Resources and Energy (DMRE) recognise this risk. The Code of Practice for Thermal Stress requires mines to assess, monitor, and manage both heat and hydration. These regulations are not theoretical — they exist because the consequences of neglect are measurable and often fatal.

What the data tells us

A landmark study by Brake and Bates (2013) on underground miners found that 58% of workers were dehydrated both before and after their shifts, with some approaching clinical dehydration. Similar results have been seen in South African studies, where heat exhaustion and heat cramps were repeatedly traced to inadequate fluid and electrolyte replacement.

According to the DMRE's 2021/22 Mine Health and Safety Inspectorate Annual Report, three miners died from heat-related illnesses in that year alone — a number that doubled from the year before. The Minerals Council South Africa has since identified thermal stress as a continuing health and safety hazard, particularly in deep-level mining. These are not isolated incidents; they reveal systemic weaknesses in how we fuel and support the mining workforce.

Nutrition and the mind: Why it matters

Dehydration and poor nutrition don't just make workers tired — they impair the brain's ability to function effectively. Studies in occupational physiology show that even mild dehydration can affect attention span, coordination, and decision-making. In high-risk environments, that means slower reactions, poorer judgement, and a higher chance of mistakes.

Malnutrition — especially deficiencies in iron, magnesium, and B-vitamins — further compounds the risk. Iron deficiency alone can reduce aerobic capacity and endurance by up to 30%, leaving workers physically drained halfway through their shifts. A fatigued or nutritionally-depleted worker cannot remain vigilant for long.

Imagine a driller operating heavy machinery at the end of a long night shift, having eaten a high-sugar meal and drunk little water. His blood sugar spikes and crashes, his focus fades, and his judgement slips — and in mining, that split-second matters.

Open-Cast vs Underground challenges

In open-cast operations, workers experience direct sun, heat, and dust. Although water access is easier, electrolyte loss can still cause dizziness, nausea, and muscle cramps — signs of hyponatremia, where drinking plain water fails to replace salts lost through sweat.

In underground environments, high humidity and heat from machinery and rock make dehydration an ever-present threat. While ventilation and work-rest cycles help, they cannot compensate for inadequate hydration or poor nutrition. Many miners still enter the cage with a single bottle of water, unaware that they may lose two to three litres of fluid during their shift.

When chronic conditions meet poor nutrition

Many miners live with diabetes or hypertension, conditions increasingly common in South Africa's workforce. For a diabetic miner, a sugary juice instead of a low-GI snack can trigger glucose spikes and sudden fatigue. For a hypertensive miner on diuretics, fluid loss accelerates electrolyte imbalance. Without proper hydration and tailored meal plans, these workers are at higher risk of collapse, heat stroke, or cardiac strain.

The South African Society for Endocrinology, Metabolism and Diabetes (SEMDSA) recommends controlled, low-GI carbohydrate intake and consistent hydration for physically active diabetics — yet most mine-provided lunch packs are still high in refined carbs and sodium. While practical, they are not physiologically suited for long shifts under heat stress.

A path forward: From compliance to culture

The science is clear: nutrition and hydration directly influence health, safety, and performance. But the solution lies not only in policy — it lies in culture. Mines that have successfully reduced heat-related incidents share five key practices:

1. Hydration mapping: Cool water points and electrolyte stations in all working areas.
2. Education: Toolbox talks on recognising early signs of dehydration and fatigue.
3. Screening: Simple urine colour or specific gravity checks before shifts.
4. Nutrition redesign: Lunch packs and canteen menus built around low-GI, protein-rich, and mineral-dense foods.
5. Accountability: Supervisors trained to identify and act on signs of heat or nutrition-related fatigue.

Conclusion: Fuelling the body, protecting the mind

Nutrition and hydration form the invisible scaffolding that holds up every other safety system in mining. Engineering controls and PPE can only protect workers if the person inside is physiologically fit to face the shift.

As South Africa's mining sector strives toward the zero harm goal, it must place nutrition and hydration at the centre of its safety framework. The data is clear, the regulations are in place, and the cost of neglect is measurable — in accidents, health crises, and lost human potential.

If we can design safer machinery and smarter systems, we can also ensure that every miner begins the day fuelled, hydrated, and mentally ready for the job — because in mining, safety starts with the person.

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Dr Douglas Michael Potter (Doug)

Director

Omega EHS Consulting

Dr Doug Potter — Fatigue Management Specialist

Dr Doug Potter is a respected leader in fatigue management, human performance, and occupational health across high-risk industries such as mining, transport, and heavy manufacturing. With over 30 years of experience, he has dedicated his career to helping organisations understand and manage fatigue in a way that keeps people safe, alert, and productive.

Throughout his career, Dr Potter has focused on how physiology, psychology, and operational demands come together to influence human performance. His research and on-the-ground experience explore how factors such as sleep, shift work, and environmental stressors affect alertness, decision-making, and safety outcomes. He is known for turning scientific knowledge into practical, site-ready strategies that strengthen safety culture and improve both wellbeing and performance.

As a passionate educator and change leader, Dr Potter has developed and delivered fatigue awareness and leadership training programs across Southern Africa. His sessions are engaging, evidence-based, and tailored to the realities of demanding operational environments. By equipping supervisors and managers with the skills to identify and manage fatigue early, he helps organisations build stronger, more proactive safety systems from the ground up.

Dr Potter is also deeply committed to promoting the connection between nutrition, hydration, and alertness. He believes that healthy eating and proper hydration are essential not only for keeping employees safe and focused but also for driving productivity and operational efficiency. In his training, he highlights how balanced nutrition and regular hydration are as vital to fatigue prevention as adequate rest. His holistic approach helps companies recognise that a well-nourished and hydrated workforce performs better, makes safer decisions, and adds measurable value to the business.

Beyond the mining sector, Dr Potter's expertise supports industries such as logistics, transport, and manufacturing—where fatigue and human performance play a critical role in safety and reliability. His multidisciplinary background, combining physiology, behavioural science, and risk management, allows him to design tailored solutions that fit the specific needs of each organisation.

At the heart of Dr Potter's work is a simple belief: people are an organisation's greatest asset. His mission is to ensure that every employee goes home safe, healthy, and alert—while helping companies build the kind of workplace where wellbeing and performance go hand in hand. Through his ongoing consulting and research, Dr Doug Potter continues to shape the future of healthy employees as an essential part of safe, sustainable, and high-performing operations.

Unlocking value through in-stope areal coverage support: The Dishaba blast-on mesh success story

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Falls of Ground (FOG) remain one of the most significant safety risks in underground mining. At Dishaba Mine, a comprehensive program was undertaken to enhance workplace stability through the introduction of permanent blast-on-mesh. The initiative followed a phased roll-out between 2022 and 2023, supported by structured stakeholder engagement, benchmarking, and intensive crew training. The blast-on-mesh system provides immediate full areal coverage support at the advancing stope face, reducing exposure of crews to unsupported ground and enabling safer re-entry after blasting.

Results to date indicate a step-change in FOG performance, with zero recorded incidents in the first 210 days of 2025 compared to eight events in 2024. Production performance also improved, achieving a 30% reduction in lost blasts attributable to bad ground. The initiative further delivered secondary support efficiency gains, allowing specialist crews to focus on long-term infrastructure while production crews handled on-reef support.

This case study demonstrates how a technically sound and operationally practical support innovation underpinned by leadership commitment, multidisciplinary collaboration, and effective change management can simultaneously advance safety, improve productivity, and enhance the overall extraction ratio. The Dishaba experience highlights the critical role of embedding permanent areal support systems as a standard practice for managing geotechnical risk in the platinum mining sector.

Keywords: Blast-on-mesh, fall of ground, rock support, mining safety, productivity improvement



Sifiso Mashile

Chief Rock Engineer
Valterra Platinum

Sifiso Comfort Mashile is an accomplished mining professional and Rock Engineer with more than 15 years of experience in underground mining operations and geotechnical engineering. He currently serves as the Chief Rock Engineer at Valterra Platinum's Amandelbult Dishaba Mine, where he oversees Rock Engineers across multiple shafts with complex geological conditions.

Academically, Mashile is distinguished by a BTech in Mining Engineering and a National Diploma in Mining Engineering, both obtained Cum Laude from the University of Johannesburg. Sifiso is a registered Engineer with ECSA, holds a Postgraduate Qualification in Business Management, and is currently completing his MSc in Rock Engineering at Wits University.

Beyond his operational and technical leadership, Mashile has made a significant impact in the professional community. He is currently the Vice President for the South African Institute of Rock Engineering (SANIRE). An prior to this role, between 2021 and 2024 he served as Treasurer of SANIRE, where he has successfully managed organizational finances, strengthened financial governance, and supported initiatives that promote technical knowledge-sharing and professional development across the industry.

Throughout his career, Mashile has combined technical expertise with leadership, mentorship, and a commitment to safety. He has mentored Strata Control Officers, Rock Engineers, and graduate professionals who have gone on to hold senior industry roles. His leadership philosophy emphasizes collaboration, sustainable practices, and the pursuit of innovation to improve mining efficiency and safety. As both a practitioner and industry leader, he continues to shape the future of Rock Engineering in South Africa while advancing the values of professional excellence, financial stewardship, and community growth.

Development and impact of the missing person locator system in South African mines

C. Marais

A&R Group, South Africa

Protecting lives in the mining industry requires effective emergency procedures. A critical aspect of emergency preparedness and response is to locate and rescue missing persons after a major incident. Technology that enables the rapid location of missing persons is essential to the success of the rescue efforts.



Charl Marais

Managing Director
A&R Group

Charl Marais is the Managing Director of A&R Group, bringing over 15 years of experience in engineering, technology, and business leadership within the mining industry. He combines deep technical expertise with strategic insight to drive innovation and operational excellence that safeguards lives and enhances performance. Charl's leadership philosophy is built on respect, accountability, and teamwork, fostering loyal, high-performing teams. Passionate about technology and people development, Charl continues to advance A&R Group's mission to deliver world-class safety and automation solutions for the global mining sector.

Enhancing relationships with local communities: Recognising the significance of local communities and responding through industry best practices

T.S. Kgarimetsa

Valterra Platinum, South Africa

The mining industry continues to play a significant role in contributing to modern society in many ways and is expected to continue making a significant contribution to society. There is, however, limited literature on the industry's best practices to enhance relationships with local communities. Whilst the legislature provides guidelines in terms of minimising any potential harmful impacts and providing positive impacts through social labour plans, amongst others, the legislature does not provide industry best practices on how to develop and enhance relationships with local communities. The diverse definitions of a local community, the rightful structures within communities and the role of other interested structures in wider communities further extends the complexity of the subject. Notwithstanding the intra- relationship challenges within communities and complex interpretation of customary law, the topics of heritage and culture are growing substantially across the mining world. It becomes complex, because most mining organisations, particularly in developing countries, are struggling to operate at a best cost competitive position when compared to the world index. The cyclical nature of commodity prices also makes the sector further vulnerable. As a result, the operational stability through harmonious relationships with key stakeholders, including communities, remains a significant enabler for an investable mine. In this paper, a wealth of knowledge is shared on recommended industry practices that could yield harmonious relationships with communities, looking at the various case studies and multiple literature in the industry.

Keywords: Local community, Mining Impacts, Social Compact, Sustainable Goals



Samuel Kgarimetsa

Experienced Strategic Leader
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September 2022 – To date

Anglo American - General Manager Corporate Affairs & Sustainability,
Mining industry

May 2017 – August 2022

Anglo American - Supply Chain Management, Mining industry

April 2016 – April 2017

Macsteel - General Manager Procurement & Logistics, Steel Manufacturing industry

September 2014 – March 2016

Anglo American - Supply Chain Management, Mining industry

January 2006 – August 2014

Sasol - Operations Manager, Petrochemical Industry

Through the above, I have extensive experience in strategic planning, team leadership, and operational excellence. Consistently drives business growth and enhances process efficiency through a forward-thinking approach. Proven ability to cultivate collaborative environments that inspire innovation and achieve measurable results while fostering a culture of continuous improvement. Strong commitment to leveraging expertise to contribute to organizational success and elevate team performance. Passionate about aligning strategic initiatives with business objectives to create sustainable value and competitive advantage.

Ultra-long tunnel drive with TBM for the Woodsmith polyhalite mine Project

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¹Herrenknecht, South Africa

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A new polyhalite fertiliser mine is currently being developed in the UK by Anglo American Crop Nutrients. The project includes the construction of a Mineral Transport Tunnel almost 37 km long to house a conveyor belt that will move polyhalite from the production shaft at the mine to a materials handling facility at the port. The project sets a new standard in terms of an ultra-long tunnel drive and sustainable, environmentally-friendly and efficient material transport. The paper highlights in particular the 5.94 m diameter TBM in use for the construction of the ultra-long tunnelling section.

Danie Roos

Business Development Manager South Africa
Herrenknecht AG

Danie is a Mining Engineer who graduated from University of Pretoria and also did a MBL through Unisa. After completing university, he worked as a post graduate at Gold Fields where he gained experience in production on a gold mine. Danie then joined the planning department and became Senior Mine Planner at West Driefontein Gold Mine. After 8 years on Gold Fields Danie worked for consulting engineers before joining Sandvik. At the beginning of 2013 Danie joined Herrenknecht as their representative in Africa for Mining and Traffic tunnelling.

