

ROCK *talk*

Volume 9, Issue 2 | July 2023



PRESIDENT'S CORNER

Dear SANIRE member,

My term (2021 - 2023) as president of SANIRE has now officially ended and this is my final presidential corner.

The past four years in Council, first as the treasurer / vice president for two years, then followed by another two years in the president role, although it went by quickly, was a definite worthwhile effort. I am proud of what SANIRE council has achieved.

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PRESIDENT'S CORNER

During my tenure as President there was an increase of over 200 members, for the first time ever membership surpassed 700 members. Our young members are actively participating in events such as the symposiums and the RockBowl events. The symposiums, webinars, banquet, golf days, workshops and branch events, were all well attended. For the first time ever, SANIRE issued an entirely sponsored diary in 2023. We take pride in two new awards, the Dick Stacey and Lelanie Prinsloo Technological Innovation Awards. These two awards have gained a lot of interest. Our stronger collaboration with the Minerals Council has helped industry to develop FOGAP (Fall of Ground Action Plan). On the education side, SANIRE has been leading the industry to develop, with the Minerals Council, a new set of standards to combat the fight against leaking of papers.



Left: Lizelle Prinsloo - Past President (2021 – 2023),
Right: Kevin Le Bron - President (2023 – 2025)

I am truly grateful for every single one of you who has dedicated their personal time to this industry and SANIRE, in whichever capacity you have contributed to grow this industry, uphold its standards and provide mentorship to our younger members. You are truly inspirational and I will always treasure the memories I had during my time serving as the president of SANIRE.

I wish all the best to the new president, Kevin Le Bron and the newly elected council.

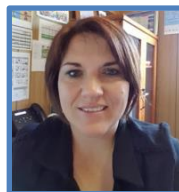
I am excited about the future of SANIRE under your leadership!

SANIRE greetings,

A handwritten signature in black ink, appearing to be 'Lizelle Prinsloo'.

Lizelle Prinsloo

SANIRE Past President 2021 – 2023)



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MEET THE COUNCIL - SANIRE NATIONAL COUNCIL 2023-2025

In May 2023, the new SANIRE council members for the 2023-2025 term were elected. On behalf of the President and Vice President, please join me in welcoming the new committee and wishing them well in their elected roles:



Kevin Le Bron – President

Kevin has spent almost 29 years working in the mining industry in various operational, research and consulting roles, after completing his B.Sc. Hons. degree in 1994. He obtained his SCO and Rock Mechanics Certificates in 1996, and the AREC in 1998. He holds a M.Sc. Eng. degree from Wits University (graduating in 2000). He obtained both the MDP (from Wits Business School) and PGCE (from Unisa) in 2005.

His experience includes numerous concept level, pre-feasibility and feasibility studies, which involved the design of mine layouts, support systems, mining strategies for both deep gold mines, shallow to intermediate mines within the BIC, massive mines (diamonds, copper, lead), underground coal and open pits (gold, coal, diamonds, heavy minerals), geotechnical instrumentation, siting and of decline and vertical shafts (geophysical and geotechnical evaluation), shaft pillar design and extraction. He is skilled in the use of various suites of numerical modelling. He has served as an examiner and Sanire Council VP. He is currently with MLB Consulting.



Obakeng Rakumakoe – Vice President

Obakeng is a registered professional mining engineer (Pr. Eng) with the Engineering Council of South Africa (ECSA), whose focus is to improve the mining culture through innovation and skills development. Over the years as a practicing mining engineer and rock engineer at some of the world's deepest mines, he has created an incubation hub for young mining graduates to develop engineering and critical thinking skills required to bring about innovation. Through his innovative thinking and approach, he has developed and implemented processes and systems that have resulted in improved efficiency and safety in the ultra-deep mining environment. While working on mining operations he continued to invest most of his time into research and development programs that can enable sustainable mining at increasing depth.

Now practicing as a mining consultant he continues to share his passion for innovation and industry culture transformation through the Minerals Council South Africa's Learning Hub MOSH FOG team. He ensures knowledge sharing by participating in industry forums having in the past served as the Chair of the MHSC Sub-committee task team on rockbursts and currently serving on the following committees and councils:

- ECSA Mining Engineering Code of Practice Work Group.
- MHSC – Safety in Mines Advisory Committee (SIMRAC)
- Mandela Mining Precinct Technical Steering Committee for Mechanized Mining Systems.
- South African Institute of Rock Engineering (SANIRE) council member.

He is focused on establishing a hub where collaborative efforts will bring about innovative and sustainable solutions.



Sifiso Mashile – Treasurer

Sifiso Mashile is currently working as a Chief Rock Engineer for Anglo Platinum Amandelbult Tumela Mine in Thabazimbi. Sifiso Mashile started his mining career in 2008 at Anglo Platinum Rustenburg Platinum Mines (RPM) as Rock Engineering Learner Official. In 2011 he completed his B-Tech Mining Engineering degree at the University of Johannesburg Cum Laude. He was appointed as a Strata Control Officer at Khomanani Shaft (RPM) in 2012, post obtaining his Strata Control Certificate. In the year 2013, Sifiso obtained his Rock Mechanics Certificate and moved to Modikwa Platinum Mine in Burgersfort where he was appointed as a Section Rock Mechanics.

Furthermore, Sifiso has also worked for Northam Platinum's Zondereinde Mine as a Senior Rock Engineer, a position he has held from 2014 until 2022. Apart from gaining invaluable experience in the bushveld complex deep level mining challenges and strategies, during this period, Sifiso has also been exposed to the initial groundwork required prior to sinking a shaft and dealing with larger diameter raise boring geotechnical requirements at depth.



Fezekile Mosiane – Social Media, Newsletter and Website

Fezekile (Pearl) Mosiane nee` Nhlapo graduated with a Bsc. Engineering (Mining) degree from the University of the Witwatersrand in 2007. In 2008, she joined AngloGold Ashanti's TauTona Mine as a Management Trainee where she gained invaluable experience in deep level gold mining. In 2010, she obtained her Rock Mechanics Certificate and was appointed as a Senior Rock Engineering Officer in 2011. In 2012, she was transferred to the Klersdorp gold field where she gained experience in shallow and intermediate depth mining. In 2018, she obtained her advanced Rock Engineering certificate, which was followed by a Masters in Mining Engineering degree, specializing

in Rock Engineering from the University of the Witwatersand. Pearl is currently a PhD candidate with the University of Pretoria and is the examiner for the Rock Engineering paper 2 exam. She is currently employed by Assore's Dwarsrivier Chrome Mine, a shallow bord and pillar operation in the Eastern limb of the Bushveld Complex.



Jeanne Walls – Organizational Liaison

Jeanne is an experienced rock mechanics practitioner with some 25 years of experience in the mining industry, having started her career in exploration geophysics and developing into the field of rock mechanics from 2005 at Anglo American. She completed her degree in Mathematics, Physics and Geophysics through Stellenbosch and Wits' Universities, following with a Masters in engineering focused on Mining Rock Mechanics. Her project experience ranges across a broad scope of applications, having engaged in studies at an operational level and in consulting. Commodities and mining methods include a similarly wide field, including narrow vein (tabular), conventional, massive and coal mining, amongst others. Jeanne has presented training courses to

the developing industry and maintains an active investment in the fostering of well-prepared practitioners through mentoring and engagement in bodies including the SAIMM and SANIRE. A key passion remains the attention to protecting and endorsing the continued advancement for women in industry.



Thandile Dlokweni – Education Committee, Rock Engineering Practical Exams

Thandile Dlokweni is a Principal Geotechnical Engineer and Hydrogeologist at Anglo American, Kumba Iron Ore (Kumba) with over 20 years of experience in mining geotechnical engineering. He is responsible for initiating, defining and delivering technical inputs into Kumba's geotechnical engineering strategy for operations, new projects and the Thabazimbi Mine closure project. Thandile has been working for Kumba for the past 11 years having started at the Thabazimbi mine, where he managed the geotechnical engineering programme as a Senior Geotechnical Engineer and later moved to the Kumba Centurion head office into the role of Senior Geotechnical Engineer.

Before joining Kumba, he held positions with several companies, including CSIR Mining Technology, Itasca Africa, and SRK Consulting, where he worked on geotechnical engineering design projects for underground hard rock tabular mines, opencast mining operations, and engineering research. When it comes to the use of geotechnical engineering and the management of geotechnical hazards, Thandile is passionate about facilitating best practice principles, technical support, and professional development of young graduates. He is also actively involved in the South African National Institute of Rock Engineering as a Council Member in charge of the Rock Engineering Examinations Portfolio. Since 2016, he has served as an examiner and moderator for the Surface Practical, Rock Engineering Certificate, Strata Control Certificate, Surface Planning, and Portfolio exams.

Thandile holds a BSc in Civil Engineering from the University of Cape Town, Honors in Mining Engineering from the University of Pretoria and a Minerals Council Certificate in Rock Engineering, Surface Mining. He is a member of SANIRE, ECSA and SAIMM.



Glorius Nkosi – Membership

Glorious Nkosi is a Rock Engineer responsible for projects and new business development at Siyanda Bakgatla Platinum Mine (SBPM). She is a decorated product of the Anglo-American Platinum Graduate Development Program, where inception was through a Matric Learner Bursary Scheme Program, back in the days. Glorious is a SANIRE Member in good standing who holds a Master of Science in Mining Engineering (Witwatersrand), Bachelor of Science Honors in Geology (Witwatersrand), Chamber of Mines Advanced Certificate in Rock Mechanics, and a Chamber of Mines Certificate in Rock Mechanics.

The projects and new business development portfolio allows Glorious to be fully involved in all the major projects aimed primarily at expanding the SBPM business portfolio. Glorious is currently responsible for the Rock Engineering function of deepening a decline shaft system to excess both the UG2 and Merensky reefs beyond 1500mbs, the inception of a new open pit mine and a new shallow mine. One major Rock Engineering challenge SBPM is confronted with is the excessive pillar scaling at a shallow mine where a sheared layer exists on the top pillar contact, Glorious is involved in the project to look at solutions to optimize the layouts. The MSc research work opportune Glorious to deepen her knowledge in key-block analysis designs and thus, Glorious plan to publish the work done. Glorious is also appointed as a 'Change-Mindset' Champion to ensure that the current and emerging MOSH initiatives are incorporated into the SBPM code of practice for a more improved safety performance.

She has (over the years) devoted a significant amount of time into grooming and mentoring young and aspiring Rock Engineers to equip them with the necessary soft skills and technical abilities to succeed. These includes young and upcoming Rock Engineering and Mining professionals. Glorious' contribution towards SANIRE and the industry is clearly visible from her passion and involvement in the Strata Control Practical Exams within the Western Bushveld Branch and the Certificate in Rock Mechanics Practical Exams in hard rock. Her 'always-available-attitude' when summoned to assist with the preparations and/or setting and/or facilitation of exam shows her investment in ensuring that the mining industry receives a constant supply of competent Rock Engineering personnel.



Rofhiwa Phadagi – Education Committee, Strata Control Officer Practical Exams

Rofhiwa has over 15 years' experience in Mining Rock Mechanics. He started his career with AngloGold Ashanti as a Management Trainee in Rock Engineering and has since garnered experience in Chrome and Coal Mining. Rofhiwa is currently by Exxaro as a Principal Rock Engineer. His qualifications include an MEng in Civil & Environmental Engineering (Specializing in Geotech) and a Bsc (Hons) Geology, both from the University of Witwatersrand. He is registered as a Professional scientist with SACNASP. He previously served as the Chairperson of the Coal Branch.



Petrie Wessels – Education Committee, Minerals Council Exams

Petrie started his mining career in the Welkom gold mines as a learner official working himself up through the ranks to Mine Overseer level. He then moved to the Klerksdorp gold mines and whilst here, he decided to study further; he obtained a BBA degree majoring in Economics and Business Management which was followed by honours in Industrial Psychology. During this time, he made a career change and swapped his production cap for that of Rock Engineering. Following a short stint as Rock Engineer in the Klerksdorp gold mines, he moved to consulting. That was followed by being appointed as Rock Engineer at an Eastern Bushveld bord and pillar mine where he still is currently.

He moved through the ranks in the SANIRE Eastern Bushveld Branch Committee and after serving his term as branch chairperson, was co-opted in 2021 into the SANIRE Council in the education portfolio. This will be his second term in this position.



Jannie Maritz – Future Education/ISRM/MRAC/RETC

After graduating from University of Pretoria with a bachelor's degree in mining engineering, Jannie joined a major deep level gold producer where he completed all his industry competency certification for both the production and rock engineering disciplines. As shaft and section rock engineer he was typical tasked with the day-to-day operations of several shafts. His career then turned to consulting as he left the operations to pursue a steeper learning curve toward his professional registration with the Engineering Council of South Africa. Sub-contracted to an international consulting company, he joined consulting teams advising on the full mining cycle for various clients, mining various commodities and spread over several countries. He joined the University of Pretoria as lecturer in Mine Design and Rock Engineering. He was first co-opted to SANIRE national council in 2011 for the portfolio of young members and has been part of council since then. He also held the President position for the term 2017-2019.

SANIRE SYMPOSIUM – “Turning Challenges into Opportunities”



SANIRE had the opportunity and pleasure of hosting a symposium from the 22nd to the 23rd of June 2023. The SANIRE flagship event, which was attended by the who's who of the Rock Engineering fraternity integrated the young minds and older generation, who are the mainstays of the industry; and saw challenges being turned into opportunities. Seasoned speakers, young and old shared pearls of wisdom and gave insight into the solution of various problems and challenges. Coupled with the event, was the Rock Engineering Rockbowl competition which also gave young members a platform to show case their technical skills and know-how and walk away with trophies, an overseas trip and ...of course...bragging rights!!!



SANIRE SYMPOSIUM – “Turning Challenges into Opportunities”



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SANIRE SYMPOSIUM – “Turning Challenges into Opportunities”



RockBowl 2023 Winners

Join the council in congratulating **Katlego Mathibe**, 1st place (middle centre), **Cindy Mabala**, second place (bottom right) and **Thato Mashaba**, 3rd place (top left) who will be jetting off to Austria in October 2023 to attend and cheer on our very own ISRM Rockbowl 2022 champions as they defend their title, the Mzansi way.... **Way to go, you globe trotters!!!!!!**





The SANIRE Rockbowl 2023 winners, flanked by the SANIRE past president, **Lizelle Prinsloo** and incoming president, **Kevin Le Bron**

The council would like to extend their congratulations to the **Middindi consulting** team, who won the Rockbowl group finals as well as the **Free Vaal** and **AngloPlatinum** teams, who came second and third.



SANIRE BRANCHES

GAUTENG BRANCH MEETING

The SANIRE Gauteng branch held their quarterly branch meeting on the crisp 29th of June 2023 at Sibanye Stillwater Academy and are thrilled to share the success of this recent event. The event had a great turnout of over 30 attendees, following on the back of a successful first meet which was held on the 27th of March. The event featured one sponsor and four technical talks that left the audience inspired and informed.

The event started with a bang with Adelaide Moganedi, Katinka Cartes and Ohveshlan Pillay facilitating a fun, 30 seconds icebreaker which had all testing their general and rock mechanics knowledge. The game kept the crowd entertained with quite a few laughs throughout.

The first of five talks were delivered by QualiRock about their popular Safelight and Rockspy Eco monitoring devices.

The first of the technical talks was delivered by Menzi Hadebe, a master's student from the University of the Witwatersrand. He spoke about Verifying the quality and performance of grouting in grout-based support applications using novel grout sensor technology.

The last talk for the first session was done by Mauritz Uys, who is a Rock Engineering Officer at Sibanye Stillwater's Ya Rona Shaft (Driefontien 4#). He spoke about an interesting case study about WAF in an operating shaft, which brought on a few curious questions and comments.

The second last talk of the day was delivered by Sanjay Singh the Rock Engineering Manager at Harmony Gold's Kusasaletu shaft, he delivered an interesting presentation on whether one should be concerned with a steeply dipping reef in a deep-level mine.

The final talk by renowned Professor Dick Stacey with fascinating stories from his career spanning over 40 years kept the audience on the edge of their seats.

Overall, the event was a great success, and the branch is proud to have had these industry experts share their knowledge and expertise. The branch would also like to thank the event sponsors, Qualirock and Bedrock. The branch hopes that the insights gained from these talks will prove valuable to the attendees and will lead to further advancements in the field of Rock Engineering.



Photos from the SANIRE Gauteng Quarterly meeting

TECHNICAL CONTRIBUTION

Importance of Observation and the Understanding of these in Rock Engineering by Gregory C. More O’Ferrall

Over my few decades of both operational and consulting Rock Engineering experience, I have come across numerous instances where, what should be considered a fundamental skill, observational skills and the analyses of the observations has been somewhat lacking. In some instances, poor observations have been blamed on time constraints, and misinterpretations of observations have been the result of preconceptions of potential causes of observed instability.

A Rock Engineer (Mining Geotechnical Engineering, excluding tailings, is included in this term), whether working on a producing mine, or working within a consulting practice, is consulted on issues pertaining to the specialization that was gained by both Rock Mechanics education, and practical experience. Therefore, fundamental to the consultation, is the collection of relevant and appropriate data that would facilitate the determination of the root cause of an incident, and the development of a solution to minimise the risk associated with the cause of incident. Unfortunately, numerous times the collection and analysis of the data, which includes the observations, is poorly - if at all - conducted, and the Rock Engineer “shoots from the hip”. Often this results in far more serious outcomes at a future date.

This article will hopefully provide some of the simpler instances where either the observations, the misinterpretation, or both have occurred. It is acknowledged, that I have been guilty of this in the past, and it is only in hindsight that I realised the importance of taking time to make (and record) detailed observations (which includes measurements!!) and then make the time to develop theories as to the likely cause/s of the observed rock mass deformation. In other words, “listen to the rock, it is telling you a story”. The comments made in this article are purely my personal opinion, and therefore others involved in these instances may have formed opinions different to these. Regardless, what I’m hoping to get across is that time must be budgeted for to conduct thorough observations and make informed hypotheses pertaining to root causes of rock-related incidents.

Case 1

A, underground room and pillar platinum mine in Southern Africa was experiencing localised falls of ground, particularly from the pillar walls. Initial observations made by mine personnel attributed these to the steep joints within the pillar-forming material. During a subsequent inspection, one of the personnel conducting the inspection identified that some pillars were punching into the footwall ( Figure 1).

Despite this observation, and the fact that the “stable pillar system” was unstable, the “solution” posed to the mine site was to ensure discipline of pillar cutting. This recommendation was based on the fact that pillar cutting was poor at the time of the inspection and was potentially the cause of the pillars “yielding”. Approximately three years after these observations, a large portion of the mine experienced pillar failure that resulted in a stoppage of production for a number of years, and a mine reconstruction cost of \$99.8 million. During the three years post the inspection, the mining height and room width was increased, and it could not be determined if there was a proposed change in the design of pillar dimension.

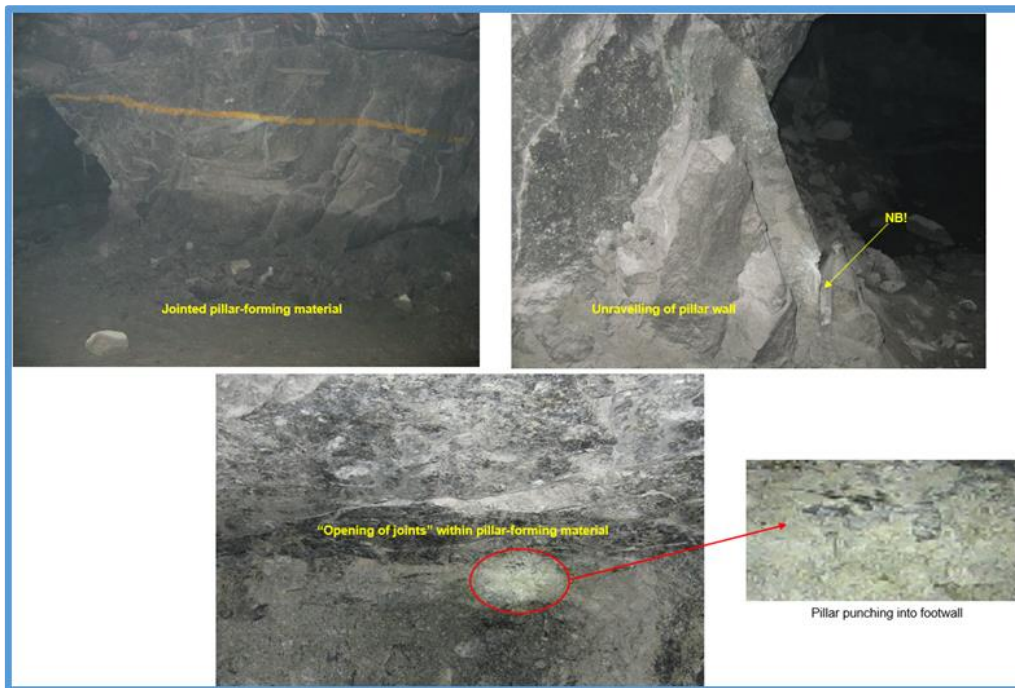


Figure 1: Pillar-forming material unravelling and footwall punching.

Case 2

An underground pseudo room and pillar diamond mine in North America was experiencing numerous falls of ground in the rooms. The Rock Engineering team was conducting weekly falls of ground inspections where the inflatable friction anchors and wire mesh screen failed, resulting in stoppages within the rooms and subsequent rehabilitation of the localised instability. In most cases, either the failed tendons, or the broken wire mesh screen, was corroded, and the root cause of these instabilities was concluded to be a loss of support resistance and/or areal coverage due to corrosion of the ground support elements (Figure 2).

During 2015 and based on my experience of shear parting effects on pillars in the Southern African platinum and chrome mining industry, shear planes were identified in the kimberlite pillars (Figure 3). The Rock Engineering team at the mine site had never been exposed to the “yielding” of supposed stable pillars, and therefore did not identify the fact that the stable pillars were yielding. In a few cases, the pillars had punched into the footwall (something also never having been observed in the careers of the Rock Engineers on site, and therefore not identified).



Figure 2: Typical falls of ground in the rooms



Figure 3: Yielding mechanisms of the pillars
(Sliding along shear planes or punching into footwall)

Based on the observations following that “Wow moment”, it was identified that all the pillars on the mine were yielding, and the falls of ground from the hangingwall in the rooms was actually due to the deformation taking place between the yielding pillars (Figure 4). The fact that most of the inflatable ground support tendons had corroded, did not assist the wire mesh screen in retaining loose blocks caused by the yielding/deforming rock mass.



Figure 4: Deformation of room hangingwall

The mine closed approximately three months after the yielding pillars were identified. This is most likely more related to economics, however the fact that the yield/deformation in current workings may well have been one of the major contributing factors to the decision taken.

The following two cases are examples of, due to insufficient and relevant geotechnical data being made available to the design engineer, common erroneous recommendations made in the final design stage before the mine is constructed. In this case, the assessment of geotechnical data from field and laboratory strength, geotechnical logging of recovered drill core, and geologic data was used for design purposes. However, the design engineer based final stability assessments on analyses of numerical model outputs, potentially without consideration of how the rock mass would likely deform over time. Nevertheless, as with all design, monitoring of the implementation of the design needs to be conducted, and designs updated/amended where the expected design performance is not what is being observed.

Case 3

The orebody in an underground copper and nickel mine in South America was designed to be extracted using longhole stoping on a primary and secondary extraction. Stopes were planned to be 20m wide, 30 - 60 m high and 30 - 50m long (depending on the hangingwall lithology). This would've resulted in the secondary stopes (which would be the pillars left between primary stopes) being 20m wide, 25m high and 40m long. As the only strength tests of the orebody would've been obtained from core samples from the surface-collared geology drillholes, it is likely that very little of the recovered core was made available for strength testing (the majority of it would've been retained for assay purposes). Sparse data from two drillholes, and a single deflection, was used to determine Q-values, which were used in empirical charts for stope dimension determination. Rock strengths were estimated using field strength estimates (excluding the Point Load Test)

The pillar-forming material varied from fine-grained material to coarse-grained sulphides, and the distribution of these was unknown (Figure 5). As such, the strength of the orebody used for the pillar design, and hence input into numerical analyses, was likely very optimistic. However, the pillar design was based purely on a pillar width to height ratio ($w:h$), recommending that the $w:h$ ratio should not be less than 0.5:1.

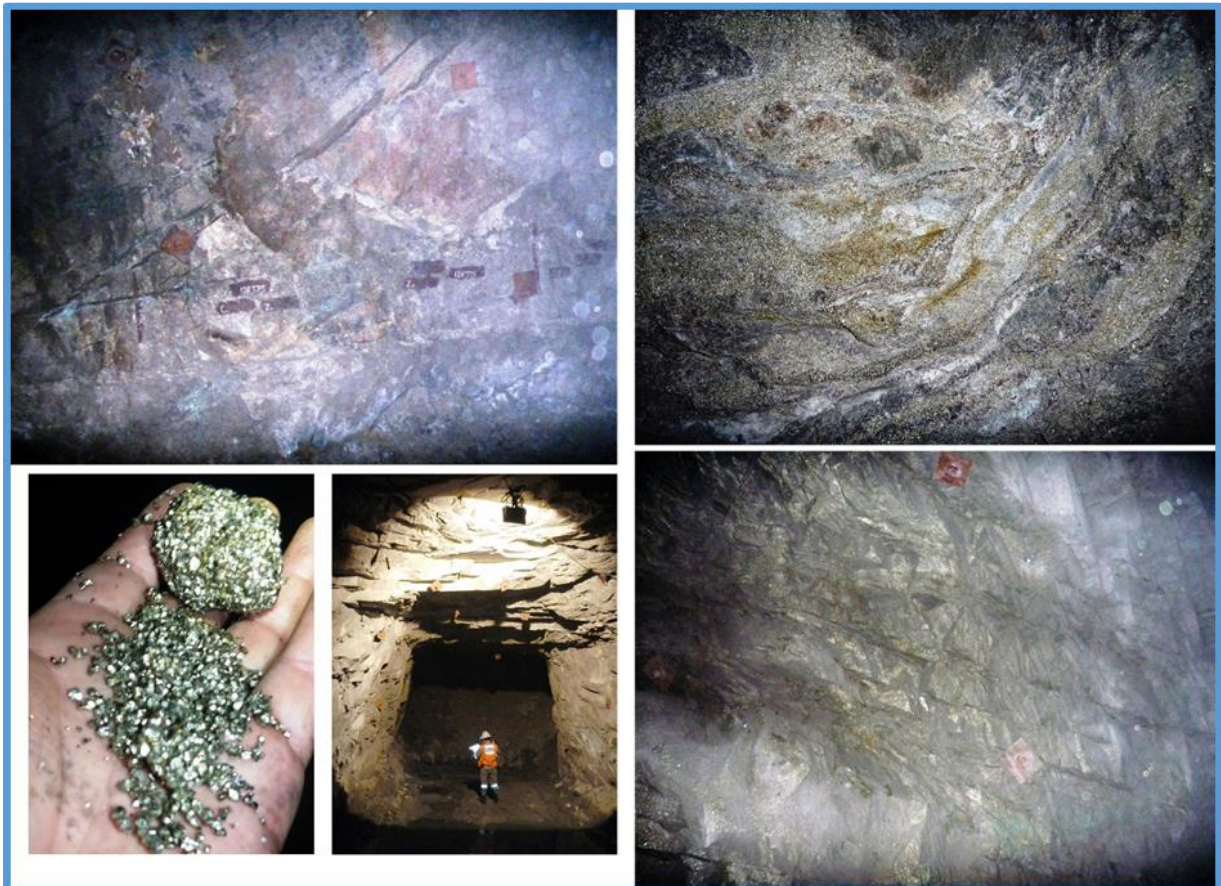


Figure 5: Different pillar-forming material competence

Unfortunately, the backfilling of primary stopes was not being done in a timely manner, which resulted in a 30m high primary stope unravelling to a height of 210m (Figure 6), with more sloughage occurring on a continual basis. The unravelling sterilised numerous levels due to the main roadways being intersected, and eventually resulted in a glory hole on surface. Production personnel were continuously loading the failed material, as it was ore, which reduced any potential confinement that the failed material could've provided to the stope walls.

When the chimney failure commenced, ore samples from four drillholes were sent for triaxial tests so that the mine's Rock Engineer could conduct a Phase 2 assessment of the influence of this "chimney failure" on neighbouring orebodies. The average result of the uniaxial compressive strength was used in the numerical model inputs.

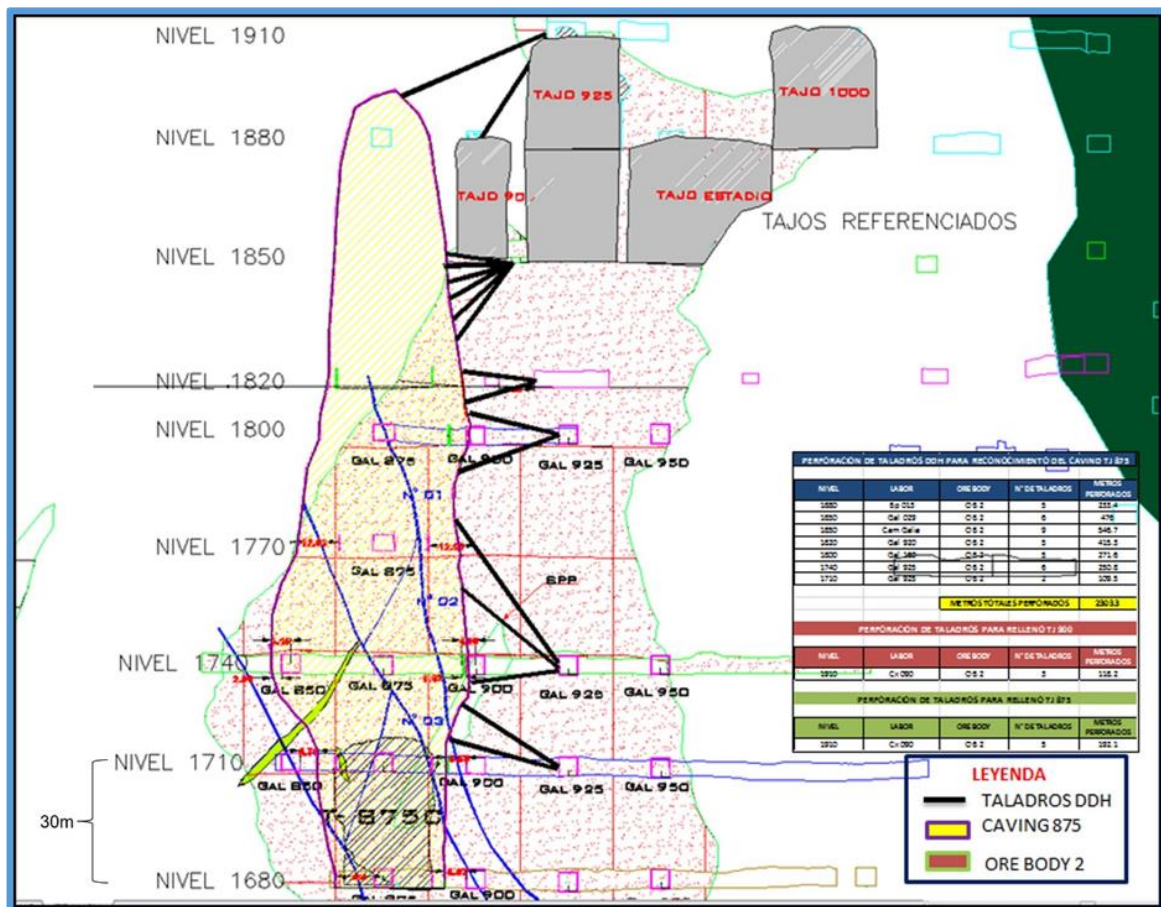


Figure 6: Chimney failure in a primary stope back (hangingwall)

Despite the availability of the laboratory-conducted material strengths, the pillar design was not revisited. Failure of the pillars (i.e., what would've been secondary stopes) commenced due to backfilling of the primary stopes not being done in a timely manner (the pastefill plant was not fully operational). This led to underground production being stopped and the underground mine redesigned.

Case 4

The final example is of a surface mine in Southern Africa. The final design of the pit was based off photographic geotechnical logging of core from fourteen oriented drillholes. Rock mass parameters were based on results of RocScience's RocLab output, with strengths for the various lithologic units being estimated by persons on site using field strength estimate techniques, and values for the other inputs into RocLab based on the dropdown menus within the tool.

The dip of foliation/bedding in the footwall of the pit varied between 35° and 40°, and the bench face/batter angle was recommended to be 50°. The depth of weathering was estimated to vary between 3m and 53m, and therefore for slope design purposes, the uppermost 48m was assumed to be weathered. The batter angle in the uppermost 48m was recommended to be 50°, bench heights of 12m and catch berms of 8m wide. Foliation/bedding dip varied from 35° to 40°. Batter angles of 60° and bench heights of 24m were recommended for depths below 48m below topography. Hydrogeologic data was limited at the time the final design was conducted.

Despite there being numerous instances of minor instability of the benches/walls, the following figures are indicative of the types of failure that have occurred at the mine. The foliation/bedding dips towards the North, hence resulting in potential instability on the South wall. Fortunately, the mine experienced small-scale instability associated with the dip of the foliation/bedding being shallower than the recommended batter angle, and hence the batter angle was flattened to that of the foliation.

However, what was not identified for kinematic stability analyses during the final design, and possibly because none of the oriented drillholes intersected these joints, was the effect of steeply-dipping joints striking in an EW direction. These joints form detachment planes, which together with the joints and effect of the blast vibrations and gases loosening the foliation, results in bench-scale failures (Figure 7).



Figure 7: Typical failures in the South Wall

The underestimation of the depth of weathering, the effect of relic structures and groundwater, resulted in two large-scale failures; one in the footwall and the other in the hangingwall (Figure 8). In both cases, the steep batter angle, the weight of saturated saprolite (effect of ground- and surface- water) and the presence of relic structures, were possibly the trigger mechanism in the initial instability.



Figure 8: Multi-bench failure in weathered material

The ramp access at the footwall collapse was blocked for a few months whilst the sloughed material was removed and a buttress constructed. There was initially minimal disruption to production in the case of the hangingwall failure, with a rope shovel having unintentionally being moved from the toe of the failure approximately 30 minutes before the main slough occurred (this instability was noticed a few months before, and daily visual inspection of tension cracks was being done by the Rock Engineering team). Unfortunately, no attempt had been made to depressurize the wall until after the failure occurred.

Lesson to be learnt

The cases mentioned in this article are typical examples of what is most-likely a common occurrence in most operations. Initial Rock Engineering designs are generally conducted with extremely little relevant, and good quality, geotechnical data. Generally, the final design is documented in a Mine Design report, and recommendations made to collect additional data and reevaluate the recommended design. These designs must be evaluated once the mine is constructed, and potentially amended once more data is obtained or if the design is not performing as expected.

In the cases above, except for the South Wall in Case 4, the original mine design was not amended. The design performance was not reflected in the as-built excavations; e.g., the pillars were yielding instead of being stable, the stope hangingwall (back) unravelled to surface, and the deeply-weathered slopes sloughed. The onset of the instability was recognised and reported, however in some of these cases a redesign was not conducted. There may be a number of reasons that led to the redesign not being done, which unfortunately turned out to be very costly.

The South African mining industry has the unique advantage that South Africa offers a mining-specific Rock Mechanics training program. The certificates of competence test the candidates' ability to observe, appraise, and communicate potential risks associated with rock mass behaviour. This learning/training opportunity does not exist outside of South Africa. It is up to an individual to further their knowledge by reading technical papers/books, attend ad hoc Rock/Soil Mechanics courses/seminars, and hopefully receive mentorship from experienced Rock Engineers either within their organization or within their professional network.

Unfortunately, with the decentralisation of Rock Engineering Departments over the past few decades, Rock Engineers appear to be working in isolation from their peers. In a centralised Rock Engineering department, the Rock Engineer would have easy access to peers who may have either more, or varied, experience to them, and issues identified could be more readily discussed. The expectation of the Rock Engineer, in many cases, is that of an expert in the field of Rock Mechanics pertaining to the operation on, or consulting practice in, which they are working. The Rock Engineer has both the professional and moral duty to work within their level of competence. Often the Rock Engineer may observe instances for the first time (as in the North American case where pillar yield had never previously been observed by the Rock Engineering team members), and therefore may not identify the significance of the “unusual event”.

I encourage all practicing Rock Engineers, whether working on operations or in a consultancy, not to rush when conducting inspections in the workplace. Take your time, write down notes, take measurements, inspect a larger area around the “point of interest” to potentially identify the “larger picture” that may have contributed to the incident. The data collected, which includes observation notes, should then be meticulously examined to enable a better understanding of the observations made. If uncertainty prevails, there is a wealth of knowledge in technical papers, textbooks, and within SANIRE.

Do not feel overwhelmed by the often-self-perceived expectation that you are supposed to know everything. As Dr. Evert Hoek mentioned in his seminar as a part of RocScience's "Africa Geotechnical Legends" seminar series describing Design Challenges, Disasters and Lessons in Rock Engineering (February 2022): *“If you need to consult someone with more experience than you have, get them to help you as early as possible to define what the problem is, rather than leaving it for later when they can only help determine what the problem was”.*



Name	Surname	Email	Branch
Louis	Lochner	Louis.lochner@Harmony.co.za	Free Vaal Branch
Ross	van Heerden	Ross.vanHeerden@Harmony.co.za	Gauteng Branch
Gunther	Betz	Gunther.Betz@norplats.co.za	Eastern Bushveld Branch
Billy	Mashiatshiti	billy.mashiatshiti@angloamerican.com	Northern Cape Chairperson
Hlomani	Mthombeni	Hlomani.Mthombeni@sibanyestillwater.com	Western Bushveld
Nyandano	Netshivhazwaulu	Nyandano.netshivhazwaulu@seritiza.com	Coal Fields

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THE NEXT ROCK Star

ROCK STAR OF THE QUARTER



Full Name: Timukelani Sammy Mlondobozi
Company/Organisation: Impala Platinum
Designation: Rock Engineering Officer
Date and Place of Birth: 23 November 1992, Tzaneen, Limpopo
Education: BSc. Mining Engineering (Wits)
First Job: Mining Engineer in Training (Graduate)
Philosophy of Life: "When you take care of things, they last"
Favourite Food/Drink: Rump steak and Castle lite
Favourite Sport: Motorsport and Cricket

Q. Where is your favourite hangout spot?

It's a secret, not necessarily anything naughty, I just go to this place whenever I want to slow down and recoup.

Q. What motivates you to get out of bed in the morning?

The hope for a new day, with new possibilities. Of course, that's after my third alarm.

Q. What is your favourite quote (why)?

Not word for word, but it goes like "The Wright Brothers only succeeded with their invention because they deviated from their inspiration(birds)", it reminds me of thinking outside the box in instances when I need a solution.

Q. What is your personal song (why)?

I listen to diverse music and it's really difficult to choose one song, so I'll say "Asa – Bibanke", I've liked this song through different stages of my life.

Q. What is your favourite movie?

New releases do not have the same bang as movies released before the streaming age, so I'd say Forrest Gump and The Great Gatsby

Q. If the story of your life were to become a biopic, what would the title be?

Easy and Fast.

Q. If the story of your life were to become a biopic, which famous actor or actress would play you?

Denzel Washington, a very good actor.

Q. What is the best vacation you've been to or plan on going to?

So far, I've enjoyed domestic destinations more than international ones, maybe because of the homely feel. I've enjoyed the West Coast.

Q. Do you have a favourite newspaper, blog?

Twitter and Reddit.

Q. What is your favourite hobby?

Listening to podcasts.

Q. What is your greatest fear?

Death of loved ones, one thing that you can never be prepared for.

Q. What is your hidden talent?

Braai master, probably due to my patience – so the firewood gets to burn to perfection before I place the meat on the braai stand.

Q. What is the one thing that very few people know about you (e.g I was Mrs Candy high school when I was 12 years old)?

Textbook example – I was selling stuff when growing up, from candy to peanuts.

Q. What's your most memorable facepalm moment? Texting a wrong person about

Yho! Long story. I still feel the emotions from thinking about it.

Q. If you could interview one person (dead or alive) who would that be (why)?

My grandmother, she had a resilient character and I always found it fascinating.

Q. If you could only drink one beer/cocktail for the rest of your life, what would it be?

Castle Lite 😊

Q. If you were an animal what would you be (why)?

Buffalo, quite strong and an organised herd.

Q. If you were on death row, what would your last meal be?

Fire cooked oxtail and mashed potato

Q. What do you want to be remembered for?

I want to be remembered for who I was, I cannot live this long to leave a deformed character as a legacy.

Q. If you were stuck on an island what three things would you bring?

Family (I know it sounds wrong, but I'll need them), Toolbox and Food.

Q. If you were a rockstar, what would your stage name be?

"Timu" 😊

Q. Growing up, what was your dream career?

Doctor – the usual, until I realised my fear of blood.

Q. Why did you choose Rock Engineering as a career?

As a mining engineering graduate, I knew which fields within the mining industry I was interested in, and which ones were not on my list. During rock engineering departmental exposure whilst doing my graduate development programme, my interest was confirmed, and it has been like that ever since.

Q. What are 3 words to describe Rock Engineering?

Rocks shouldn't fall.

Q. What do you find the most challenging of Rock Engineering?

People who do not understand rock engineering concepts trying to solve rock engineering issues.

Q. What do you like most about Rock Engineering?

Seeing a solution work for each stakeholder, because in most instances we have to fulfil more than one set of needs.

Q. What are some areas that you believe will become of increasing importance in the near future of the rock engineering discipline?

Research and Product innovation, these areas have slacked during the past few decades, and technological advancements will make it easier and cheaper to develop solutions for dealing with rock engineering challenges.

Q. What is your view on the current spike on Fall of Ground Fatalities over the past two years?

I think this is a multi-dimensional issue, I think it has to do with the human discipline in executing and enforcing rock engineering measures that are already in place to reduce hazards in working places and increasing hazards that are associated with mining at greater depth.

Q. What solutions do you propose to reduce the Fall of Ground Fatalities?

The competence of the people that are at the working place should be improved to enable better identification and addressing of hazards.

Q. Who is your role model/mentor? What is the best advice you have ever been given?

As the saying goes "It takes the whole village to raise an African child", It's impossible to mention only one individual because I have learned, been inspired and been assisted by a lot of people throughout my journey in life.

Q. What advice would you give to someone who wants to choose Rock Engineering as a career?

To be frank, a career in the mining industry is not for everyone. However, if you've found your feet in the industry then a Rock Engineering career is very interesting and fulfilling, with a dose of stress on those long days.



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SANIRE CALENDAR

Visit <https://www.sanire.co.za/news/events-calendar> for updated up-coming events.

August 2023	
Thursday 17 August 2023	Eastern Bushveld Branch Meeting :: Branch Meetings
Friday 18 August 2023	EASTERN BUSHVELD BRANCH ANNUAL GOLF DAY :: Council Meetings
Thursday 31 August 2023	SANIRE AGM :: SANIRE Symposiums and Conferences
October 2023	
Tuesday 03 October 2023 02:30pm - 05:30pm	Strata Control Met. :: Exam Dates
Tuesday 03 October 2023 02:30pm - 05:30pm	Strata Control Coal :: Exam Dates
Tuesday 03 October 2023 02:30pm - 05:30pm	RMC Paper 1 :: Exam Dates
Wednesday 04 October 2023 02:50pm - 05:50pm	RMC Paper 2 :: Exam Dates
Thursday 05 October 2023 02:30pm - 05:30pm	RMC Paper 3.1 :: Exam Dates
Thursday 05 October 2023 02:30pm - 05:30pm	RMC Paper 3.2 :: Exam Dates
Thursday 05 October 2023 02:30pm - 05:30pm	RMC Paper 3.3 :: Exam Dates
Thursday 05 October 2023 02:30pm - 05:30pm	RMC Paper 3.4 :: Exam Dates
Monday 09 October 2023 - Friday 13 October 2023	ISRM - Austria :: International Symposiums and Conferences
Wednesday 18 October 2023	Council meetings - Western Bushveld :: Council Meetings

INVITATION TO THE SANIRE EASTERN BUSHVELD BRANCH
Technical visit
in collaboration with Council roadshow

17 August 2023

Location: Booysendal Mine:
Time: 06h30

RSVP: 31 July 2023 to Gunther.Betz@norplats.co.za

Only 20 spots available
Please indicate if you will be requiring PPE

	Activity
1	Welcoming
2	Meeting
3	Presentations: 1. Herman Meyer: HRD Rockdrill 2. Wynand Greyling: Rockfall and slope stability solutions for open pit mining 3. Kevin Le Bron: Council discussion
4	Networking
5	Lunch

INVITATION TO THE SANIRE EASTERN BUSHVELD BRANCH
ANNUAL GOLF DAY
18 August 2023



Venue: **Highland Gate Golf and Trout Estate**

Format: **Two ball scramble drive, best score to count (IPS)**

RSVP for Golf: 30 June 2023 to Benjamin.smit@norplats.co.za

Four Ball Cost (including carts, halfway lunch and dinner): **R5000**

Water Point Sponsor Cost: **R3500** (R1500 corkage fee for own liquor otherwise bar price from club and orders need to be placed by 30 June 2023)

Advertising Stands: **R5000 per 3m x 3m stand**

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EDITORS CORNER

Did you know?

Hot water freezes faster than cold water!!



This may seem counterintuitive, but it's called the Mpemba effect. Scientists now believe this is because the velocities of water particles have a specific disposition while they're hot that allows them to freeze more readily. If proven correct, this finding could also be applied to everyday things, like cooling down electronic devices, according to research out of Universidad Carlos III de Madrid....I bet you did not know that 😊



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