

Mineral Resources



South Africa is by far the wealthiest mineral jurisdiction in the world.

The industry remains the biggest contributor to the country's gross domestic product; however unrest in the industry has led to stoppages in mining production that have hampered growth, according to figures released by Statistics South Africa and the South African Reserve Bank in July 2013.

Government's industrialisation policy calls for a paradigm shift in mineral development, strategic investment in assets to maximise long-term growth beneficiation projects, enhanced value of exports, increased sources for consumption of local content, and creation of opportunities for sustainable jobs.

In May 2013, the Department of Mineral Resources (DMR) was tasked to develop a rescue plan for the platinum and gold sectors to ensure long-term sustainability.

The platinum and gold sectors had been negatively affected by the persistent global economic market environment, which had an adverse bearing on their long-term viability.

The rescue plan is expected to enable the department to find appropriate government-wide measures for appropriate sector-wide responses, with particular focus on supply and demand side interventions to position them along a recovery path and a trajectory of long-term sustainability through the well-established tripartite structure of Mining Growth, Development and Employment Task Team.

Platinum and gold were among the largest sectors of South Africa's mining industry in terms of employment, investment and revenue generation.

In March 2013, Russia and South Africa signed a bilateral cooperation agreement on cooperation in the development of platinum group metals (PGMs), which would contribute significantly to the creation of a suite of interventions necessary to stabilise the platinum industry during the Brazil, Russia, India, China, South Africa Summit in Durban. The agreement is premised on an understanding that parties will make every effort to achieve, among others, sustainable expansion of the PGM market, create value-adding enterprises closer to production and work towards realising the potential for developing other sectors of the economy.

Legislation and policies

Some key legislation and policies relating to the DMR are the:

- Mineral and Petroleum Resources Development Act (MPRDA), 2002 (Act 28 of 2002). The promulgation of the MPRDA of 2002 in 2004

introduced a policy of equal access to South Africa's mineral resources. This democratic mineral dispensation introduced the policy of socio-economic responsibility, which was to be achieved through the application of Black Economic Empowerment (BEE) Policy by ensuring that historically disadvantaged South Africans are brought into the mainstream of mining. However, challenges experienced in implementing these policies resulted in the need to review the MPRDA of 2002. The objectives of the review are to:

- provide for a detailed consultation process
- support the beneficiation strategy
- streamline the licensing process to avoid delays and inefficiencies
- provide for enhanced punitive measures
- improve the current construct of the Act and remove ambiguities, and provide clarity on the mining of associated minerals.
- Mineral Health and Safety Inspectorate of the DMR, established in terms of the Mine Health and Safety Act, 1996 (Act 29 of 1996) as amended, which is responsible for protecting the health and safety of mine workers and people affected by mining activities.
- The Council for Geoscience (CGS) was established in 1993 under the Geoscience Act, 1993 (Act 100 of 1993).
- Geoscience Amendment Act, 2010 (Act 16 of 2010), expands the functions of the CGS by:
 - mandating the CGS to be the custodian and curator of geotechnical information; to be a national mandatory advisory authority in respect of geohazards related to infrastructure development; to undertake exploration and prospecting research in the mineral and petroleum sectors; and to add to the functions of the council
 - putting mechanisms in place to address problems associated with infrastructure development on dolomitic land
 - empowering the CGS to be the custodian of all geotechnical data to compile a complete geotechnical risk profile of the country
 - enabling the CGS to become the custodian of technical information relating to exploration and mining.
- During 2010, the DMR unveiled the revised Mining Charter 2010, which updates and expands upon a set of empowerment targets with emphasis on a target of 26% black ownership of the country's mining assets by 2014.
- The Beneficiation Strategy was approved by Cabinet in June 2011. To ensure its efficacy, certain amendments to all relevant legislation will be effected. These include the Precious Metals Act, 2005 (Act 37 of 2005), the Diamond

Amendment Act, 2005 (Act 29 of 2005), and Section 26 of the MPRDA of 2002. Five value chains were prioritised from the selected commodities in the strategy, namely:

- iron and steel: beneficiating iron ore, chrome, manganese, nickel and vanadium
- energy commodities: focusing on coal and uranium
- auto catalytic converters and diesel particulate filters: beneficiating PGM
- pigment and titanium metal production
- jewellery manufacturing: to increase the beneficiation of platinum group metals, diamonds and gold.
- Geoscience Amendment Act, 2010 (Act 16 of 2010) is aimed at refocusing the objectives of the CGS to promote the search for and exploitation of any mineral in the country and to act as a national advisory authority in the areas of geo-hazards and geo-environmental pollution.
- The draft Mineral and Petroleum Resources Development Amendment Bill, which was introduced to Parliament in May 2013. The draft Bill aims to enhance provision for the beneficiation of minerals to promote industrialisation and contribute to the nation's objectives of job creation and economic growth as envisaged in the National Development Plan (NDP).

Beneficiation strategy

The first National Jewellery Forum was held in October 2013 in Johannesburg. The forum brings together mining and jewellery manufacturing associations and government, with the view to creating entrepreneurs with the requisite skills to enable South Africa to become a global jewellery hub.

Jewellery manufacturing is one of the five key value chains identified in the Beneficiation Strategy, which when implemented, will leverage the country's precious metal and gemstone reserves to position South Africa as a thriving and globally competitive jewellery hub.

Budget and funding

The budget allocation of R1,394 billion for the 2013/14 financial year represented an increase of

The Special Presidential Package is aligned to the Mining Charter, which commits mining companies to, in consultation with stakeholders, establish measures for improving the standard of housing, including the upgrading of the hostels, converting hostels to family units and promoting ownership options. The Thusanang (help each other) project, led by Anglo American, plans to deliver more than 20 000 housing units in six different mining villages in the greater Rustenburg area. The project will go a long way to addressing the housing needs of communities surrounding several mines around Rustenburg in North West.

R218,316 million at the most testing time in the post-apartheid history of the mining industry.

The predictable regulatory framework which is in sync with the dynamic socio-economic and political landscape of the country resulted in the following milestones:

- gross fixed capital formation has increased significantly under the MPRDA of 2002 from R18 billion in 2004 to R75 billion in 2012
- foreign direct investment grew from R112 billion in 2004 to R389 billion in 2012
- employment grew from 448 909 jobs in 2004 to 518 240 in 2012.

Gross sales of primary minerals increased from R98,5 billion in 2000 to R371,7 billion in 2012, while the number of operating mines increased from 993 in 2004 to 1 579 in 2012.

This is over and above the fact that during 2012/13, 56 new mining rights were granted which have the potential to create an additional 11 052 decent and sustainable jobs and attract capital expenditure of about R7,3 billion.

The implementation of the South African Mineral Resources Administration System online was carried with the additional allocation of R3 million from National Treasury, for 2012/13 to develop a number of reporting modules, including a transformation monitoring system, appeals and the acquisition of hardware infrastructure.

Role players

Mining Qualifications Authority (MQA)

To make certain that the mining industry operates in a sustainable and competitive environment, all stakeholders in the industry need to intensify skills-development efforts.

The future of mining in the country largely depends on the successful implementation of skills development initiatives.

Particular focus is placed on artisan and artisan aid as well as other technical skills. Capacity building within the department and associated institutions has also been prioritised in respect of identified critical areas of skills shortage and necessary interventions have been introduced, which include learnership programmes and bursary schemes.

The MSA was established as a sector education and training authority and facilitates the development of appropriate knowledge and skills in the mining, minerals and jewellery sectors to:

- enable the development and transformation of the sector
- contribute to the health, safety and competitiveness of the sector
- improve access to quality education and training for all

- redress past inequalities in education and training.

The MSA is responsible for:

- developing and implementing a sector skills plan
- developing unit standards and qualifications for the sector
- establishing, registering, administering and promoting learnerships and apprenticeships
- maintaining the quality of standards, qualifications and learning
- disbursing grants from the skills-development levy.

Chamber of Mines

The Chamber of Mines of South Africa is a prominent industry employers' organisation. Its purpose is to advance, promote and protect the collective interests of its members.

Its mandate includes monitoring, investigating, analysing and considering matters of collective interest to its members and providing recommendations on the position to be taken.

Where appropriate, the Chamber of Mines represents its members and provides technical and expert assistance on matters affecting their collective interest.

For its members in the gold and coal sectors, the Chamber of Mines negotiates wages and conditions of employment with trade unions representing mining employees.

Members of the Chamber of Mines account for about 90% of South Africa's mining production by value, and employ about the same percentage of the mining industry's labour force.

Some environmental issues affect the integrity of the industry. To tackle these, the chamber has engaged in:

- liaising with biodiversity stakeholders to develop the Biodiversity Guideline that will be user-friendly for environmental managers within the mining industry
- facilitating the industry's involvement with government and other stakeholders to develop and implement the plan to manage acid mine drainage
- supporting the development of best practices for mine water management through the Department of Water Affairs, such as the draft guideline on water conservation and water demand management.

South African Diamond and Precious Metals Regulator (SADPMR)

The SADPMR regulates the diamond, platinum and gold industries and accelerates beneficiation in the jewellery industry. The SADPMR's objectives are to:

- ensure that precious metal and diamond resources are exploited and developed in the best interests of all South Africans
- promote equitable access to and local beneficiation of precious metals and diamonds
- promote the development of precious metal and diamond enterprises
- advance broad-based socio-economic empowerment
- ensure compliance with the Kimberley Process Certification Scheme (KPCS).

Its functions regarding diamonds include:

- implementing, administering and controlling all matters relating to the purchase, sale, beneficiation, import and export of diamonds
- establishing diamond exchange and export centres to facilitate the buying, selling, export and import of diamonds.

While the South African Diamond Board has an essentially regulatory role, the SADPMR has a promotional role as well.

By administering licences and export approvals, the SADPMR ensures that local demand for diamonds and precious metals is catered for, and that there is growth in local beneficiation of diamonds and precious metals.

The Intersessional Meeting of the KPCS for Rough Diamonds under the Chair of South Africa concluded its deliberations in June 2013. The landmark meeting brought together representatives of governments, the diamond industry and civil society to discuss ways of strengthening the effectiveness of the Rough Diamond Certification Scheme to ensure that diamond trade does not finance violence by rebel movements and their allies seeking to undermine legitimate governments.

The KPCS meeting was held on the 10th anniversary after its inception, in the very town where it was initiated and named after. Technical support for KPCS compliance as well as creating public awareness of its activities were also discussed.

Recommendations emanating from the intersessional meeting were considered at the plenary meeting of the KPCS held later in 2013.

During discussions, delegates reviewed the processes and functions of the KPCS to ensure that it remains relevant and credible in curbing the illegal flow of rough diamonds.

The KPCS was held under the theme "Ten years of stemming the flow of conflict diamonds."

Council for Mineral Technology and Research (Mintek)

Mintek is the national mineral research organisation, specialising in mineral processing, extractive metallurgy and related areas. Working closely with the mineral resources industry and

other research and development institutions, Mintek provides service testwork, process development and optimisation, consulting and innovative products to clients worldwide.

Mintek is an autonomous statutory organisation that reports to the Minister of Mineral Resources.

About 30% of its annual budget is funded by the State Science Vote, with the balance provided by contract research and development, sales of products and services, technology licensing agreements, and joint-venture private sector companies.

Mintek is involved in research into the use of nanotechnology for medical applications of gold as well as giving effect to the Hydrogen Strategy, in partnership with the departments of Mineral Resources, Science and Technology and Trade and Industry.

This is intended to create future demand for gold and platinum, in keeping with the national objective of achieving 20% global market share of platinum catalysis by 2020.

Mine Health and Safety Council (MHSC)

The MHSC has managed to strengthen the tripartite relationship (organised labour, organised business and the state) which in turn helped to increase the focus on occupational health and safety in the mining sector. Achievements included the provision of seven advice reports to the Minister, namely the:

- South African Mines Reportable Accidents Statistical System Codebook
- Shaft and Winders Regulations
- Refuge Bays Regulations
- Guidelines on Code of Practice (COP) for Mine-workers Incapacity due to ill health
- Guidance note for the management of tuberculosis (TB) in the South African Mining Sector
- Guidelines on COP for Fitness to perform work on a mine
- Guidelines on Mandatory COP of Risk-based Emergency Care on a mine.

Council for Geoscience

The CGS is mandated to carry out systematic geological, geophysical, geochemical, marine geoscience, metallogenetic and engineering geological mapping of South Africa.

The CGS is also able to provide commercial geoscientific services.

The CGS participates in various Southern African Development Community (SADC) projects aimed at promoting the economic development of the Southern African sub-continent.

International cooperative projects that have been carried out, or are in progress, include geological mapping, geochemical and geophysical

surveys, and the production of maps in many countries, either on a bilateral basis or collaboratively in the SADC region.

State Diamond Trader

The State Diamond Trader achieved a profit of R5,1 million for the 2012/13 year against the budgeted profit of R11 million. Despite depressed global markets and the funding challenges of the State Diamond Trader coupled with lackluster performance by its clients, the State Diamond Trader achieved revenue of R411 462 599 in 2013/14. The State Diamond Trader has employed five trainees and appointed critical staff members in line with its revised human resources plan using its own funds. A new board was elected and in place after the lapse of the five-year term of the last board in September 2012.

African Mining Partnership (AMP)

The AMP, whose main function is to drive the New Partnership for Africa's Development (Nepad) mining initiatives, was established during the African Mining Minister's meeting in Cape Town in February 2004. South Africa, as a major role player in this body, has played an important role as the Secretariat, in hosting as well as coordinating the affairs of the AMP. The AMP merged with the African Union Conference of Ministers Responsible for Mineral Resources Development.

African Diamond Producers' Association (ADPA)

The ADPA is an intergovernmental organisation that seeks to strengthen the level of influence African diamond-producing countries have on the world diamond market.

It implements policies, strategies and laws that assist the generation of diamond profits from foreign diamond mining companies to its member states.

The ADPA has three organs, namely the Council of Ministers, Executive Secretariat and the Meeting of Experts. The Council of Ministers constitutes 18 African countries, 11 of which – including South Africa – are full members, while the remainder enjoy observer status.

For South Africa, membership of this association presents an opportunity to position itself strategically among diamond-producing countries in Africa. It could add significant

A student mining indaba was held in July 2013 at the University of the Witwatersrand. The conference aimed to give students first-hand experience of the dynamics taking place in South Africa's mining industry. The mining sector remains the backbone of South Africa's economy, contributing largely to the country's gross domestic product.

impetus to diamond beneficiation initiatives and also boost its aim of becoming the beneficiation hub and gateway to Africa.

Projects and initiatives

With significant resources of gold, uranium, chrome, manganese, PGM, titanium minerals, vanadium, coal, limestone, vermiculite and zirconium, South African mining real estate remains attractive for development.

South Africa has significant known reserves and resources of mineral commodities, with almost 60 minerals being actively mined and prospects for exploitation of an additional two new minerals in the short to medium term. A large number of these known reserves were discovered using conventional exploration methodologies. For this reason, there still lies considerable residual potential for discovery of world-class deposits using modern exploration technology.

This is further supported by existing mining infrastructure, which enables investors to leverage maximum value from their investment while simultaneously contributing to socio-political improvement.

Shale-gas exploration

The potential of shale-gas exploration and exploitation provides an opportunity for South Africa to begin exploring the production of its own fuel and marks the beginning of the reindustrialisation of the economy.

In October 2013, Cabinet approved the gazetting of technical regulations on petroleum exploration and exploitation.

The proposed regulations prescribe good international petroleum industry practices and standards, which enhance safe exploration and production of all petroleum and will further ensure that petroleum exploration is conducted in a socially and environmentally balanced manner.

A task team was established to investigate the socio-economic and environmental impact, as well as any associated risks of shale-gas exploration and exploitation. The investigation report made specific recommendations on measures that could be taken to mitigate the environmental impact of petroleum exploitation, with specific attention to shale gas hydraulic fracturing.

The main recommendation was to ensure that South Africa's regulatory framework was robust enough to ensure that if hydraulic fracturing associated with shale-gas exploration and exploitation were approved, any resultant negative impact would be mitigated.

Also, an interdepartmental committee was put together to look at strengthening the existing regulations. A comprehensive international benchmarking exercise of well-developed jurisdictions

that have begun shale gas exploitation was also undertaken.

The technical regulations provide for the assessment of the potential impact of the proposed activities on the environment; the protection of fresh water resources and mechanisms for the co-existence of shale gas exploitation and the Square Kilometre Array project.

The South African Government would have a free-carried shareholding of 20% in entities producing shale gas in the Karoo in the future.

Stability in the mining sector

In June 2013, then Deputy President Kgalema Motlanthe asked stakeholders in the mining sector to make commitments aimed at averting a potential crisis in the mining industry. He met with trade unions, the Chamber of Mines and several government departments in Pretoria where he asked all parties to commit to bringing stability to the industry ahead of the annual wage talks.

The purpose was to look at the bold steps that needed to be taken by all the role players to stabilise the mining sector and avoid a crisis that could have a devastating impact on the economy.

Government wanted parties to give a commitment that they would conduct their business in terms of the law. The Marikana Peace Accord was brought back to the table as it was central to stability talks.

Mining companies, trade unions and government departments met in July 2013 to sign the Framework Agreement for a Sustainable Mining Industry, which is aimed at, among other things, resolving problems in the industry, rooting out unrest and restoring investor confidence in the sector.

Mine health and safety

The department continues to place particular emphasis on the health and safety of mine workers, which is crucial to the sustainability of the mining sector. As a result progress has been made in improving the record of fatalities, injuries and occupational diseases. A comparison of the years 2011 and 2012 shows a 9% improvement in fatalities in the mining industry.

The Mine Health and Safety Inspectorate of the DMR pursued a strategy to eliminate silicosis and noise-induced hearing loss, also known as occupational deafness, by 2013. The department finalised the HIV and TB Reporting Form, which it developed to report these diseases in the mines. Mining companies are expected to report on the programmes implemented in relation to HIV and TB annually to the department.

These reports provide an understanding of the particular disease burden in the mining sector, furthermore they will inform the interventions in

terms of awareness, prevention and treatment. A sizeable number of mining companies that are participating in the HIV Counselling and Testing (HCT) Campaigns and mine workers have heeded the call to test for TB and HIV.

The department, in collaboration with the MHSC, finalised the review of the Guidance Note on Management of TB in South African Mines. The guidelines on Minimum Standards of Fitness to Perform Work in a Mine, and Prevention of Flammable Gas Coal Dust Explosions in Collieries were also reviewed.

Two new guidelines were developed, namely Incapacity Due To Ill-Health and Injury Guideline as well as the Compilation of a Mandatory Code of Practice for Risk-Based Emergency Care. The Regulations on Reporting of Occupational Diseases were gazetted during 2013/14.

Illegal mining

In July 2013, the Minister of Mineral Resources requested that law-enforcement agencies conduct sting operations at several mine dumps to root out illegal mining. The department worked with local authorities to ensure that mine dumps, where illegal mining was prevalent, were claimed by the State and used for other projects such as the construction of low-cost housing.

In 2013, emergency teams had to be dispatched to disused mines and dump sites where illegal miners had lost their lives while drilling rocks underground.

The illegal activity was not only a threat to the health of the illegal miners, but also negatively affected the economy.

A 2010 study found that R6 billion was being lost to illegal mining annually.

Integrated licencing

The construct of the Mining Regulatory Framework is fragmented and has been identified as one of the binding constraints to the growth and competitiveness of the South African mining sector. The departments of mineral resources, water affairs and environmental affairs have agreed on the modalities of integrating the time frames and processes of environmental authorisation and water-use licensing for prospecting and mining operations.

The modalities include the departments implementing the National Environmental Management Act, 1998 (Act 107 of 1998) for the industry to be regulated by a single environmental piece of legislation.

Processes of environmental authorisation will be contained within the same time frames that apply to prospecting and mining authorisations, and the process of approving water use licences will also be finalised within the same time frames.

This represents a significant improvement in service delivery, both in terms of certainty regarding security of tenure when mining or prospecting rights are issued and in terms of improved turnaround times resulting from the processes being finalised in parallel rather than sequentially as was previously the case.

Job creation and sustainable development

Economic distress in the industry resulted in large scale retrenchments. As a result job creation targets were not achieved.

Following the review of the 2004 Mining Charter, which is subject to a 10-year review time frame, the DMR embarked on a process of reviewing and amending the 2004 Mining Charter to strengthen and sharpen its efficacy in driving transformation and competitiveness in the mining sector.

The implementation of the mining charter has been given 10 years to effect transformation. In view of this window the department conducted a baseline assessment of compliance by the mining industry with the Mining Charter and produced a preliminary report in 2009.

A second assessment report, which is due by 2014, has to be produced as a continuation of the initial assessment to ensure that the department quantifies the compliance levels over the 10-year window.

The socio-economic challenges brought about by communities living close to mining operations has necessitated departmental review of levels of compliance with the Mining Charter.

Rehabilitation of mines

The mine rehabilitation programme has had a positive effect on communities where the projects are including economic growth owing to sourcing labour and material locally. The programme also results in improved health and well-being of communities. The rehabilitation programme reduces the risk of asbestos fibres from historical asbestos mine sites that human and animal being exposed to.

By March 2013, the department had rehabilitated 13 mine sites.

A total of 284 jobs were created as part of the programme, which was 24 jobs more than initially projected for the year. The job creation element of the rehabilitation programme is one of the key requirements for all the rehabilitation projects.

The second Annual Mining Lekgotla was held in August 2013. It provided another opportunity for the key role players in the mining industry to continue engaging in finding lasting solutions to the challenges affecting this sector. Government also continues to support the framework agreement and its implementation for a sustainable and stable mining sector.

This contributes to some of the priorities of the NDP.

A report by actuarial scientists on the estimated State liability for the rehabilitation of derelict and ownerless mines commissioned by the department is under consideration.

The recommendations will assist the department in planning the rehabilitation programme, with a lucid indication of the resource requirements.

An annual review of the liability has also been completed. Both the initial report and the review report confirm the need for fiscal support to the department for rehabilitation work.

Acid mine drainage (AMD)

By November 2013, significant progress had been made towards addressing the critical challenge of AMD. The decanting of AMD in Gauteng into the environment and water courses is a result of mining activities over more than 150 years.

An Inter-Ministerial Committee (IMC) on AMD was set up and co-chaired by the ministers of water and environmental affairs and mineral resources and included the ministers of finance, science and technology and national planning.

An intergovernmental task team was set up to ensure the programme of addressing AMD was underway and that progress was reported to the IMC, and thus to Cabinet.

Also, a task team of scientists and professionals in the water sector, namely the Team of Experts, under the leadership of the CEO of the CGS, was put together with tight timelines to advise the inter-governmental task team and the IMC.

The report recommended the implementation of emergency works to contain AMD at a pre-determined level to ensure that ground and surface water is protected, as well as preventing other AMD-associated environmental and socio-economic effects. The IMC reported in November 2013 that the surface decant of AMD into the environment had been eradicated.

In the Central Basin, work towards the construction of an AMD pump station, neutralisation plant, as well as waste and neutralised water pipelines at the former East Rand Proprietary Mines (South-west Vertical Shaft) commenced in January 2013. Civil works, which started in December 2013, were at an advanced stage of development.

In the Eastern Basin there is a projection for infrastructure development similar to the one at the Central Basin. The bid was awarded by December 2013 with the project commissioning envisaged for December 2014.

The Team of Experts also compiled a long-term feasibility study towards the concrete management of the AMD.

In September 2013, Rand Water chairperson in water utilisation, Professor Jannie Maree, received a United States patent for an acid mine water treatment process, the magnesium-barium-hydroxide (MBO) process, which removes metals and sulphate from mine water. It offers South Africa a technically sound and cost-effective solution for the acid mine water problem. Removing metals and sulphate with the MBO process could produce water that contained levels low enough to be acceptable as drinking water.

Resources

South Africa's mineral wealth is typically found in the following well-known geological formations and settings:

- the Witwatersrand Basin yields some 93% of South Africa's gold output and contains considerable uranium, silver, pyrite and osmiridium resources
- the Bushveld Complex is known for PGMs (with associated copper, nickel and cobalt mineralisation), chromium and vanadium-bearing titanium-iron ore formations as well as large deposits of industrial minerals, including fluorspar and andalusite
- the Transvaal Supergroup contains enormous resources of manganese and iron ore
- the Karoo Basin extends through Mpumalanga, KwaZulu-Natal, the Free State as well as Limpopo, hosting considerable bituminous coal and anthracite resources
- the Phalaborwa Igneous Complex hosts extensive deposits of copper, phosphate, titanium, vermiculite, feldspar and zirconium ores
- kimberlite pipes host diamonds that also occur in alluvial, fluvial and marine settings
- heavy mineral sands contain ilmenite, rutile and zircon
- significant deposits of lead-zinc ores associated with copper and silver are found in the Northern Cape near Aggeneys.

Gold

South Africa dominated global gold production in the 20th century. There are 35 large-scale gold mines operating in South Africa, including the record setting TauTona mine, which extends 3,9 km underground. TauTona means "great lion" in Setswana.

Cape Town hosts the annual Indaba Mining Conference, one of the largest gatherings of mining stakeholders, which attracts nearly 10 000 people representing more than 1 000 companies.

In 2013, South Africa had fallen from being the world's biggest gold producer to the number six position with a mere 6% contribution to total global gold production, despite still having an abundance of gold reserves in the ground.

Mining Weekly Online reported in October 2013 that the negative factors affecting South African gold mining included falling gold prices, rapidly escalating input costs, declining grade, falling productivity and illegal strike action.

In the first quarter of 2013, more than 60% of the gold sector was either marginal or loss-making on cash cost basis using the price of R401 000/kg and excluding capex.

Coal

The coal sector is important for the South African economy. The accelerated demand for coal, accompanied by an increase in international coal prices, has invariably changed the buying patterns and structure of the local coal export industry. The emergence of the export market for lower-grade coal has presented government with a challenge in that it has constrained the availability of coal that was historically sold to Eskom.

In the national energy plan, coal remains an important component of the country's future energy mix and requirements. Government resolved that certain minerals such as coal should be declared strategic national resources, based on the balance of evidence. The findings of the coal resources and reserves report concluded by the CGS were released in mid-2013.

Platinum group metals

Platinum, palladium, rhodium, osmium, ruthenium and iridium occur together in nature alongside nickel and copper. Platinum, palladium and rhodium, the most economically significant of the PGMs, are found in the largest quantities.

The remaining PGMs are produced as co-products. South Africa is the world's leading platinum and rhodium producer, and the second-largest palladium producer after Russia. South Africa's production is sourced entirely from the Bushveld Complex, the largest known PGM-resource in the world.

Platinum

Platinum mining in South Africa is supported by the country possessing over 80% of the world's

Transnet Freight Rail (TFR) introduced a 200-wagon train service named Shongololo (millipede) on its export coal line that will run directly from Richards Bay Coal Terminal (RBTC) to mines in Mpumalanga. This gives Transnet the capacity to exceed 81 million tonne a year. Decreasing the handling processes of trains will allow for higher reliability, which will mean improved sustainability and service predictability. The new service is expected to increase weekly railed export coal capacity from 1,4 million tonne per week to a potential capacity of 1,85 million tonne per week, which would be a 30% increase in current capacity. TFR is poised to deliver for the coal sector, both domestic and export, in excess of two million tonne per week – which is an annualised delivery of 96 million tonnes.

platinum group metal reserves. The Merensky Reef, stretching from southern Zimbabwe through to the Rustenburg and Pretoria regions, is the centre of platinum mining in South Africa, playing host to companies such as Rustenburg Platinum Mines and Bafokeng Rasimone Platinum Mines.

Amplats is the industry leader in the mining, marketing, and distribution of platinum. Amplats produces 40% of the world's total platinum group metals.

Other key platinum mining companies in South Africa include BHP Billiton and Impala Platinum.

Platinum mining in South Africa is growing. The establishment of projects such as the R7,1 billion Twickenham Expansion Project, 100 km south-east of Polokwane, will see the production of 250 000 t/m pure platinum.

The well-underway Impala Platinum No. 20 Shaft Project, which is geared to produce 185 000 ounces of platinum a year from 2013 on the Bushveld Complex.

Palladium

South Africa is the world's second-largest palladium producer. All of South Africa's production is sourced from the Bushveld Igneous Complex, which hosts the world's largest resource of PGMs. Palladium and platinum is more abundant than any of the other PGMs.

Ferrous minerals

South Africa is the largest producer of chromium and vanadium ores and a leading supplier of their alloys. It is also a significant producer of iron and manganese ores, and a minor producer of ferrosilicon and silicon metal. Ferrous minerals are produced from some 32 mines and 23 ferroalloys smelters. The Minister of Mineral Resources unveiled the R1 billion expansion project at BHP Billiton's Metalloys manganese smelter in Meyerton, south of Johannesburg, in March 2013.

It is the largest new investment in the manganese industry in the country and supports government's drive to increase the beneficiation in South Africa.

The furnace is designed to produce 120 000 kt of high-carbon ferro manganese a year, and includes improvements to ensure increased reliability, availability and also improved pollution control during the production process.

In July 2013, the Sibanye Gold Mine on the West Rand handed over new two-bedroom modern family units at the Tswelopele and Lehae Parks complexes to 100 families from the Libanon village. The handover of the family units is part of a bigger housing project – worth R200 million – that has so far provided 812 family units at various mining communities in the Westonaria area.

Copper

Palabora, a large copper mine, smelter and refinery complex managed by the Palabora Mining Company at the town of Phalaborwa in Limpopo is South Africa's only producer of refined copper. Producing about 80 000 t per year, it supplies most of South Africa's copper needs and exports the balance.

Useful byproduct metals and minerals include zirconium chemicals, magnetite and nickel sulphate as well as small quantities of gold, silver and platinum. Palabora's large block cave copper mine and smelter complex employs approximately 2 200 people. Palabora also owns a nearby vermiculite deposit, which is mined and processed for sale worldwide. Vermiculite is a versatile industrial mineral.

Manganese

South Africa has significant proven manganese reserves, but exploitation of the mineral has not reflected its development potential.

Diamonds

South Africa, the site of the biggest diamond discovery, plans to process a greater proportion of its gems locally to keep more profit in the country.

Government wants to cut and refine 70% of the diamonds mined in South Africa by 2023. Only 4% were processed locally.

Industrial minerals

There are some 680 producers of industrial minerals in South Africa, of which almost half are in the sand and aggregate sector.

There are some 153 producers of clays (brick-making and special), 40 limestone and dolomite, 79 dimension stone, 28 salt and 20 silica producers. Bulk consumption of industrial minerals is realised in the domestic market, as most are low-priced commodities and sold in bulk, making their economic exploitation highly dependent on transport costs and distance to markets.

Mineral Regulation

The Mineral Regulation Branch was created following the promulgation of the MPRDA Act of 2002. Chief directorates have been created under the Mineral Regulation Branch for the following regions:

- northern
- central
- western
- coastal.

Each chief directorate is responsible for overseeing the activities performed by the Directorate Licensing and Legal Compliance in the three regional offices or directorates.

The functions of the Mineral Regulation branch are to:

- administer the MPRDA of 2002 and other applicable legislation to ensure the granting of prospecting and mining rights in terms of the Act
- promote mineral development including urban renewal, rural development and BEE
- address past legacies with regard to derelict and ownerless mines and enforce legislation regarding mine rehabilitation by means of regulated environmental management plans
- coordinate and liaise with national, provincial and local government structures for efficient governance.

Geology

South Africa has a long and complex geological history dating back more than 3 700 billion years. Significant fragments of this geology have been preserved, and along with them mineral deposits.

The preservation of so much Archaean geology, dating back more than 2 500 million years, has resulted in the Archaean Witwatersrand Basin, as well as several greenstone belts, being preserved.

Barberton mountain land

This beautiful and rugged tract of country with some of the oldest rocks on Earth is found south of Nelspruit, Mpumalanga.

The greenstone formations represent the remains of some of the earliest clearly decipherable geological events on the Earth's surface.

Silica-rich layers within the greenstone have revealed traces of a very early life form – minute blue-green algae.

Granites surround the formations and gneisses that are more than 3 000 million years old. Gold, iron ore, magnesite, talc, barite and verdite are mined in the area.

Witwatersrand

The geology and gold mines of the Witwatersrand (Ridge of White Waters) are world famous.

More than 50 055 t of gold have been produced from seven major goldfields distributed in a crescent-like shape along the 350-km long basin, from Welkom in the Free State in the south-west, to Evander in the east.

The geology of the region can be seen at many outcrops in the suburbs of Johannesburg. The sequence is divided into a lower shale-rich group and an upper sandstone-rich group. The latter contains the important gold-bearing quartz-pebble conglomerates.

Bushveld Complex and escarpment

The Bushveld Complex extends over an area of 65 000 km² and reaches up to 8 km in thickness. It is by far the largest known layered igneous intrusion in the world and contains most of the world's resources of chromium, PMGs and vanadium.

The impressive igneous geology of the Bushveld Complex can best be viewed in Mpumalanga, in the mountainous terrain around the Steelpoort Valley. The imposing Dwars River chromitite layers, platinum-bearing dunite pipes, the discovery site of the platinum-rich Merensky Reef, and extensive magnetite-ilmenite layers and pipes near Magnet Heights and Kennedy's Vale are in this area.

The Great Escarpment of Mpumalanga is one of South Africa's most scenic landscapes. This area features the Bourke's Luck Potholes, which have become a major tourist attraction.

Drakensberg Escarpment and Golden Gate Highlands National Park

The main ramparts of the Drakensberg range, reaching heights of more than 3 000 m, lie in KwaZulu-Natal and on the Lesotho border. These precipitous mountains are the highest in southern Africa and provide the most dramatic scenery.

They were formed by the partial erosion of a high plateau of basaltic lava, which is more than 1 500 m thick, and covers the Clarens sandstones. Prior to its erosion, the continental basalt field covered significantly more of the continent.

The uKhahlamba-Drakensberg Park, which covers 243 000 ha, has been declared a world heritage site. More than 40% of all known San cave paintings in southern Africa are found here.

The scenic Golden Gate Highlands National Park in the Free State features spectacular sandstone bluffs and cliffs. The sandstone reflects a sandy desert environment that existed around 200 million years ago. Dinosaur fossils are still found in the area.

Karoo

Rocks of the Karoo Supergroup cover about two-thirds of South Africa and reach a thickness of several thousand metres. The sedimentary portion of this rock sequence reveals an almost continuous record of deposition and life, from the end of the Carboniferous into the mid-Jurassic periods, between 300 million and 180 million years ago.

Karoo rocks are internationally renowned for their wealth of continental fossils, and particularly for the fossils of mammal-like reptiles that show the transition from reptiles to early mammals, and

for their early dinosaur evolution. During this long period of the Earth's history, southern Africa was a lowland area in the centre of the Gondwana supercontinent.

Initially, the prehistoric Karoo was a place of vast glaciation. It then became a shallow inland sea, before this was replaced by huge rivers, with lush flood plains and swampy deltas, which dried out to form a sandy desert. Finally, vast outpourings of continental basaltic lava accompanied by the break-up of Gondwana occurred.

Diamond fields

Kimberlite is the primary host-rock of diamonds and was first mined as weathered "yellow ground" from the Kimberley mines, starting in 1871 at Colesberg kopje, now the site of the Big Hole of Kimberley. At increasing depths, less-weathered "blue ground" that continued to yield diamonds was encountered.

The discovery of kimberlite-hosted diamonds was a key event in South Africa's economic and social development, and paved the way for the later development of the Witwatersrand goldfields.

The Orange and Vaal rivers' alluvial diamond fields and the rich West Coast marine diamond deposits all originated by erosion from primary kimberlite pipes.

Meteorite impact sites

Impacts by large meteoritic projectiles played a major role in shaping the surface of the Earth. The Vredefort Dome is the oldest and largest visible impact structure known on Earth and is a World Heritage Site. It lies some 110 km south-west of Johannesburg, in the vicinity of Parys and Vredefort in the Free State and North West.

About 40 km north of Pretoria is the small bowl-shaped Tswaing meteorite-impact crater. Just 1 km in diameter, this is one of the best-preserved and accessible impact craters of its kind on Earth. It was created about 220 000 years ago when a meteorite of about 50 m wide slammed into the Earth, and is one of the few impact craters containing a crater lake.

Pilanesberg

The Pilanesberg Complex and National Park in North West is a major scientific attraction which includes a number of unique geological sites.

The complex consists of an almost perfectly circular, dissected mountain massif some 25 km in diameter, making it the third-largest alkaline ring complex in the world. The geology reflects the roots of an ancient volcano that erupted some 1,5 billion years ago. The remains of ancient lava flows and volcanic breccias can be seen.

The dominant feature of the complex is the concentric cone sheets formed by resurgent magma that intruded ring fractures created during the collapse of the volcano. There are old mining sites for fluorite and dimension stone, and a non-diamond-bearing kimberlite pipe in the region.

Cradle of Humankind

This World Heritage Site extends from the Witwatersrand in the south to the Magaliesberg in the north, and is considered to be of universal value because of the outstanding richness of its fossil hominid cave sites.

The Sterkfontein area near Krugersdorp is the most prolific and accessible fossil hominid site on Earth. It comprises several scientifically important cave locations, including Sterkfontein, Swartkrans, Drimolen, Kromdraai, Gladysvale and Plover's Lake, all of which have produced a wealth of material crucial to palaeoanthropological research.

Table Mountain and the Cape Peninsula

Table Mountain is South Africa's best known and most spectacular geological feature, comprising a number of major rock formations.

The earliest of these are the deformed slates of the Malmesbury Group, which formed between 560 million and 700 million years ago.

Coarse-grained Cape granite intruded about 540 million years ago. The Table Mountain Group, which started forming about 450 million years ago, consists of basalt, reddish mudstone and sandstone that is well exposed along Chapman's Peak.

Overlying this is the light-coloured sandstone that makes up the higher mountains and major cliff faces of the Cape Peninsula, as far south as Cape Point.

Much younger sandy formations make up the Cape Flats and other low-lying areas adjacent to Table Mountain. The Table Mountain Group continues further inland across False Bay in the strongly deformed Cape Fold Belt.



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