



South Africa: from resources to riches?

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The Rainbow Nation has significant mineral resources but will have to go through transformation to make the most of them



South Africa is the world leading producer of andalusite, here mined by Andalusite Resources in the Limpopo province (picture)

South Africa remains one of the world's leading mining and mineral-processing countries and one of the strongest economies in Africa even though it was impacted by the financial crisis. The country is home to some of the world's greatest mining resources such as gold, diamonds and platinum but also industrial minerals including andalusite, chromite, graphite, wollastonite and zircon to just name a few.

Over the last few years, South Africa has achieved an average growth of 3.3%/year mainly thanks to its growing mining industry which saw a tenfold increase in terms of minerals sales from R30.9bn (\$4.4bn.) in 1987 to R300bn (\$42,8bn.) in 2008 according to the ministry of mines (*see South Africa at a glance*). Meanwhile, the country has undergone dramatic change particularly since the end of apartheid in 1994.

South Africa, which was the first African country to ever host the FIFA world cup last summer, would very much like to be in the company of the BRIC (Brazil, Russia, India, China) nations in the future.

The government has launched the Black Economic Empowerment (BEE) programme to redress the inequalities of apartheid by giving previously disadvantaged groups economic opportunities previously not available to them.

The South African rand (R), one of the most actively traded emerging market currency in the world even though having recently been quite volatile, has joined an elite club of fifteen currencies, the continuous linked settlement (CLS), where forex transactions are settled immediately.

Compared with other mineral rich countries on the continent very often affected by political instability and lack of infrastructure, "South Africa remains the safest destination for foreign investment in mining and resources" as Andalusite Resources Pty Ltd sales and marketing manager Andreas Pabst pointed out to **IM**.

It is therefore wooed by fast-developing China and India, constantly in search of new sources of raw material, in addition to Western investors, while South African stocks keep rising, thanks to leading mining companies such as Anglo American Plc.

As a consequence, the government, which focuses on strengthening its valuable mining industry, has been working on a reviewed mining charter which was launched in September this year.

"The mining industry has been and remains a critical sector in our economy. Its transformation is therefore vital for our national socio-political objectives," South Africa's Minister of Natural Resources Susan Shabangu declared.

40% boost for andalusite

South Africa is the world's largest producer of andalusite, which is used as a raw material feedstock for refractory products, with an estimated output of 245,000 tonnes in 2008. The main other producer is France with 65,000 tonnes estimated for 2007.

Despite a slowdown during the financial crisis, the refractory market is picking up slowly mainly thanks to China and India which have performed relatively strong despite the recession. This comes as good news for the andalusite industry as during the last two years, the refractory market has seen a shortage in the material and a few producers have therefore decided to extend their operations in order to meet the increasing demand as a potential alternative to Chinese bauxite for the refractory industry.

As a consequence, South Africa's andalusite production in South Africa is expected to increase by more than 40%, from the present 245,000 tpa to an estimated 350,000 tpa.

Two companies own andalusite mines in South Africa, which reports a reserve base of about 51m. tonnes of aluminosilicates ore (andalusite and sillimanite). Damrec, a subsidiary of Imerys, produces almost 80% of the andalusite in the country.

The other major South African producer, Andalusite Resources Pty Ltd, is a relative newcomer to the andalusite industry. It is the only alternative supplier of the South African material outside Damrec's subsidiaries Rhino Minerals Pty Ltd and Samrec Pty.

Andalusite Resources revealed to **IM** that it was planning to double production by 2012 at its Maroeloesfontein mine in the Limpopo province.

As a result, the company is now working on boosting its present production of 50,000 tpa andalusite (57% Al_2O_3) over the next three years to 80,000 - 100,000 tpa at its mine located about 220km north-west of Johannesburg.

Andalusite Resources had to reduce production in December last year and in January 2010 owing to some technical problems while making installations and changes in its crusher plant. But the company is now back to normal levels. "Our plans are still on track," Pabst confirmed.

Direct competitor Damrec has also planned to increase its output by 26% within the next few years. The company has four andalusite mines in South Africa, producing about 195,000 tpa: Annesley, Havercroft and Thabazimbi in the Limpopo region (owned by Rhino), which is located about 30km from Maroeloesfontein mine.

The fourth mine, Krugerpost, owned by Samrec, is located in the Mpumalanga region, near Lydenburgh.

Damrec confirmed to **IM** that it has planned three other projects to increase andalusite by 55,000 tpa within the next five years: debottlenecking at Thabazimbi and Krugerpost and an extension at Segorong, with Rhino having finally obtained the approval from the South African government for the exploitation of its andalusite Segorong project (*IM 3 September 2009: New andalusite mine in S. Africa*).

Chromite: world leading producer

South Africa is the world's biggest producer of chromite but much of its capacity is exported and processed for the production of ferrochrome, used in ferroalloys. According to South Africa's ministry of mines, chromite production almost tripled in the country during the last 20 years from 3.8m. tonnes in 1987 to 9.6m. tonnes in 2008. The market total value was estimated at R5.5bn. in 2008.

As demand is expected to grow during the next few years, chromite producers keep developing their operations such as Amcol International Corp. which is focusing on establishing a mine to market chromite processing hub in South Africa.

The project has been boosted by Amcol's acquisition of the remaining 47% interest in Bonmerci Investments 103 Pty Ltd, which is part of a \$50m. investment that included the establishment of a chromite processing facility based at Ruighoek, from which Amcol plans to supply foundry sand to Asia, Europe and South America.

Bonmerci, which owns almost three quarters of the shares in Batlhako Mining Ltd holder of the Ruighoek Chrome

Project was subject to a 53% equity sale to global foundry supplier Amcol in February 2009.

London AIM-listed Chromex Mining Plc is also continuing to expand its chromite operations. The chrome-focused company owns two key mining assets located in the Bushveld Complex in South Africa which between them have total resources of 41m. tonnes chromite.

The Mecklenburg mine lies in the east and the Stellite mine in the west. Both are owned and operated by South African registered Chromex Mining Co, which is 74% owned by Chromex and 26% owned by their BEE partner Umnotho WeSizwe.

The company's principal operation, the Stellite mine, is currently ramping up production. It will produce approximately 20,000 tpm run of mine (ROM) in a first phase before increasing to 40,000 tpm ROM once a dense media separation circuit (DMS) is installed at the plant.

The company plans to take full operational control of the Stellite opencast chrome mine and processing plant in South Africa, moving away from the contractor-based model to process its chrome ore (*IM 18 May 2010: Change of strategy at Chromex*).

The company plans to produce foundry and chemical grades. Stellite should reach full capacity by Q1 2011 - producing approximately 500,000 tpa ROM.

Graphite back on stream

Like Mozambique, Tanzania and other southern African countries, South Africa owns graphite resources which have not yet been exploited. This is mainly owing to "low prices and political difficulties," commented Dominik G. Luh, managing director of trading company Technogرافit GmbH to **IM**.

But the country is on the way to emerge as a new graphite producer as local Jonkel Group intends to start production at the beginning of 2011, therefore becoming the country's sole miner since Germany's GK Graphite exited the business some years ago.

"Jonkel Mines has identified all graphite economic deposits here in South Africa and is working on them for future mining," Matimba Khoza, president of the group, declared to **IM**, adding that he was planning to start "on a small scale" with about 100 tpa of purified graphite.

Jonkel will produce graphite through its subsidiary Jonkelkoza Minerals and Resources (Pty) Ltd (Jonkel Mine) created a year ago in order to "exploit existing and future natural graphite opportunities".

The company owns three graphite deposits in the Limpopo province, including the Steamboat deposit which has a grade of 8.8% of 2mm disseminated flake graphite and estimated resources of 3.5m. tonnes according to the company's last feasibility study.

The three major economic deposits happened to be on community land, so Jonkel is on a joint-venture agreement with the local community to exploit them. The process of acquiring them started in 2009 and is not yet finalised with the administration of Department of Minerals.

The plan for Jonkel Mines is to supply its sister company, Jonkel Carbons and Grafites (Pty) Ltd also created in Q1 2009, which would then process and manufacture Jonkel Mines' graphite for domestic consumption. The company cannot say yet when it will exactly start production as it is still looking for a partnership to develop the deposit.

Only one of Jonkel Carbons' two premises, Diggers Rest and Nine Pence, is operational, Nine Pence needing renovations. The plant buys raw material from other graphite producers such as Germany's SGL Carbons and China's Qingdao Hensen Graphite Co. Ltd.

Africa is pointed out by many in the graphite industry as the place to look if the sector ever needs new sources of raw material in the next decade - which has some credence owing to the increase demand for lithium-ion batteries.

However, it is likely that this new production from South Africa will not have a dramatic impact on world graphite production (1.13m. tonnes) and the country will certainly not yet compete with the world top graphite producers such as China (800,000 tpa), India (140,000 tpa), Brazil (77,000 tpa), North Korea (30,000 tpa) or Canada (27,000

tpa).

But it will make South Africa the third graphite producer of the African continent, after Zimbabwe and Madagascar, Madagascar being a major player with about 5,000 tpa (down from 15,000 tpa two years ago). But “the chances for a new producer to supply the local market are not quite positive, as you need a minimum output of 3,000 tpa to run a mine economically,” Luh underlined.

In spite of that, this new supply could yet show good growth opportunities as there is a need for graphite in South Africa, the black raw material being mainly imported from China. In 2008, domestic consumption was estimated to be over 3,000 tonnes and this amount is expected to increase in the future, owing to African developing countries’ needs for the steel industry and energy markets. The advantage South Africa has compared to the rest of the continent is that there is good infrastructure to exploit raw materials, such as well established rail, road and sea transportation.

“Africa is embarking on the industrial revolution and graphite will find its use in the steel industry and lubricants in the mining sector,” commented Khoza, pointing out that the sole country owns over fifty foundries.

Opportunities for graphite in Africa could also come from renewable energies as the continent has electricity issues and “solar panels are a quick solution”. Graphite as a source of carbon also became an additive in the chemical industry.

On an international scale, increased demand for graphite in the metallurgy industry in addition to electric cars (lithium-ion batteries) is expected within the next decade (*IM March 2010, p. 29: Graphite set to move up a gear*).

Wollastonite from 2011

After years of heavily concentrated global supply, South Africa is now following Spain to quietly emerge as a major producer of wollastonite in an industry dominated until now by only a handful of players: China, India, the USA, Mexico, and Finland (*IM November 2009: Wollastonite’s pins and needles*).

South Africa’s Namaqua Wollastonite (Pty) Ltd has revealed to **IM** that it expects to start producing 9,000 tonnes wollastonite from 2011 at its Magata wollastonite project located about 14km north east of Garies, Namaqualand, in the Northern Cape province of South Africa.

This new operation will bring the company back to its past as it used to be South Africa’s only producer as a then subsidiary of Western Investment Co. Pty. Ltd, before exiting the business in 1999.

Namaqua will then increase production “as the market allows” by commissioning plants with a similar size of the pilot plant, targeting 17,367 tonnes by 2012 and 23,316 tonnes by April 2014. The tailings from the sorting and the production plants will be sold into the construction industry.

Although the resource is “considerably larger”, a drilling programme conducted in the 1980s delineated a 3.2m. tonne resource with an average grade of 52%.

The company intends to only supply the domestic market at the moment. “We are small and will initially focus on the local market to ensure a stable business before venturing abroad,” Mari-Alet Van Der Merwe, Namaqua’s chief executive officer, explained to **IM**.

“As a consequence, the effect globally will be minimal, initially to a certain extent replacing the import of wollastonite,” she added, cautioning that “exporting in the future would not be excluded.”

Although an annual production of 23,000 tonnes would propel Namaqua into the circle of the world leading producers, it is therefore likely that it will not immediately allow the company to compete on the international market with world leading producers such as USA’s NYCO Minerals Inc., Wolkem India Ltd or Finland’s Nordkalk.

Namaqua’s wollastonite indeed has a high aspect ratio, but also an iron (Fe) content higher than 0.4% which with current metallurgical processes cannot be readily removed. As a result, it precludes the South African wollastonite to be sold into certain markets just like Spain’s new wollastonite producer Compani’a Mineral Ilustracion (CM).

Namaqua's wollastonite will therefore be used for its structural and friction properties in friction, construction and plastic related products where a Fe content less than 0.4 % is not required instead of traditional wollastonite markets. The largest portion of the business will be to sell off-spec wollastonite into markets that previously used asbestos as "opportunities of replacement for asbestos are endless".

Zircon expansion

South Africa is the world's second largest supplier of zircon after Australia with an output of 350,000 tpa in 2009 (31% of world production). Main producers are Exxaro Resources Plc's KZN and Namakwa Sands subsidiaries in addition to Richards Bay Minerals (RBM), a 50:50 joint venture between Rio Tinto and BHP Billiton Plc established in 1976 which dredge mines ilmenite, rutile, and zircon.

Over the last three years, South African output has remained relatively stable, fluctuating with the times rather than undergoing any significant expansions or closures.

This could change, however, with Exxaro's significant decision at the beginning of 2010 to close its KZN Sands operations over the next five years. The company cancelled all plans to develop the 5m. tpa Fairbreeze mingsands mine which would have seen a new source of zircon coming onto the market next year.

Fairbreeze was set to replace Exxaro's 9m. tpa Hillendale mine which is coming to the end of its life where the company produces titanium dioxide (TiO₂) feedstock and zircon. Instead the company has vowed to look for new high grade mingsands deposits.

However, the Rio Tinto/BHP joint-venture which will be opening its tailings plant next year should result in some increased production from Q1 2011. Output from this mine equates to 8% of global production.

Rio Tinto has invested \$158m. in a tailings treatment plant at its RBM operation in the Kwazulu-Natal province to boost zircon production. The expansion, which was approved in 2008, will improve mineral recovery and extend the operation's zircon mining life by five years. The mine has 30 years' worth of tailings, which can be processed to produce about 60,000 tonnes zircon.

50% boost in kaolin

Africa is not a major kaolin player as the continent produces only 500,000 tpa of the world's 30.6m. tpa kaolin production. According to the US Geological Survey (USGS), the main African kaolin producer is Egypt (300,000 tpa) followed by Nigeria (100,000 tpa) and South Africa.

But the country, which produced about 40,000 tonnes kaolin in 2008, could see its domestic output increase by 50% to 60,000 tpa as Seeland Development Trust expects to start producing 20,000 tpa kaolin at its Langeklip deposit in the Western Cape province from November 2011.

The deposit, a high quality kaolin and halloysite assemblage acquired in 2006 by Seeland, is located near St Helena Bay about 160km from Cape Town, in the south-west of the country.

Seeland's chairman Johan Lewin said to **IM** that the company is at present looking for a partner to exploit the deposit which shows very good potential for many markets other than coating clay.

"The kaolin is not suitable for paper coating but shows very good potential for high quality porcelain and tableware. Brightness values are high based on low iron and very low titania," independent consultant Ian Wilson explained to **IM**.

"The mix of halloysite and kaolin gives good strengths for ceramic bodies. The low trace element levels indicate good potential for pharmaceutical and perhaps food (animal and human). It is considered that this type of clay will be suitable for paint and other uses," he added.

Lewin plans to supply the domestic market in addition to potentially exporting its kaolin to China and South Korea. Exploration work is still continuing.

New mining law

South Africa launched its reviewed mining charter in September to facilitate the sustainable transformation and development of its mining industry, with emphasis on a target of 26% black ownership of the country's mining assets by 2014.

Minister of Mineral Resources Susan Shabangu said her department had concluded an assessment of the progress of the industry's transformation against the mining charter objectives as adopted in 2002.

"The observations are that growth in the mining industry has left much to be desired and transformation within the sector has been disappointingly slow," she said.

The amended code was released after an extensive period of consultation with miners. The government said it would improve transparency and help redress stark racial imbalances in the sector.

One of the main concerns is that the review of the mining code gives the ministry new powers to withdraw mining licences from companies judged to be non-compliant and some analysts believe that it could dampen foreign investment as the ministry can amend the charter as and when the need arises.

This new mining code could also see South Africa adopting a policy of nationalising mining operations in 2012, according to a senior source from South Africa's ruling party the African National Congress (ANC) despite repeated assurances from President Jacob Zuma and the ANC that it is not government policy.

The nationalisation of mines would be a source of concern for investors and miners in Africa's biggest economy, which is recovering from the global downturn, a power crunch and high electricity tariffs.

However, it is not likely to happen according to most South African miners. "I do not believe this will or can happen. It would destroy the country and convert it to a 'Zimbabwe'. There are simply too many normal people in the country to allow this to happen," explained to **IM** Andreas Pabst from Andalusite Resources.

"If wide-scale nationalisation was to happen it would devastate the economy, because it would lead to an investment exodus," he added.

Matimba Khoza from Jonkel Group confirmed to **IM** that "big companies may pull out" if that was to happen. "Investors will simply identify countries with friendlier mining laws and invest there. South Africa will suffer because the quality of life will deteriorate while the country is embedded with \$2.5 trillion worth of mineral resources," he said.

China's interest

Chinese investors have been showing a growing interest in South Africa's minerals resources during the last twelve years. On 25 August, president Jacob Zuma ended a three-day visit to China which resulted in signing trade agreements relating to minerals, environment and transportation. "South Africa's relationship with China holds much promises," commented Jennifer Cook, director of the Africa Programme at the Center for Strategic and International Studies in Washington.

Even though the Asian growing economy is at present focusing on precious metals such as gold or platinum, sources from the industry have reported that China also started to look at other minerals, such as chromite, to meet its increasing domestic demand. New joint-ventures are therefore expected within the next few years.

This is seen with a keen interest by the South African government as China could help fund projects which had been put on hold and develop infrastructure in order to get mining contracts. As an example, the two countries signed a memorandum of understanding at the beginning of September for a \$30bn. high-speed rail link between Johannesburg and Durban.

"Chinese investors are at present taking their time to study the assets in South Africa. But they are looking long term," a source explained.

Challenges

Although South Africa has good opportunities from a resources point of view, the country still has to fix a few

issues if it wants its mineral industry to continue growing steadily. Inefficient government departments, power supply and costs are often pointed out.

PricewaterhouseCoopers (PwC) mining director Hein Boegman noted that South Africa “luckily” had some of the world’s best iron ore, copper, and other resources and that it would be able to supply China with quality resources going forward. However, there are concerns about the country’s capability to stay competitive mainly owing to growing costs.

“South Africa’s mining industry is very labour intensive and it has to constantly deal with wage concerns,” Boegman said. As an example, Exxaro had to halt production in September this year as a result of an 18-day strike by workers who wanted their wages to be increased. The halt has since then been resumed when the company offered employees an 8.5% rise, up from its previous offer of 8%.

Power supply also remains a source of concern. “[It] is not reliable enough for larger projects and it has not yet been made fully clear how this problem will be tackled and by when,” Pabst explained to **IM** adding that “the neglect of such important infrastructure does not reflect well on the performance of the government and its priorities for industry and growth.”

“Our mines are super-deep and about 50% of fixed costs goes just into cooling these mines. This means that Eskom’s electricity tariff hikes will put further pressure on the country’s operating costs,” Boegman underlined.

Nevertheless, Boegman noted that mining and operating costs would most probably play a significant role in commodity prices going forward.

Another point is the black economic empowerment component of 26% equity shareholding. Pabst believes that it “needs to be priced into any investment decisions, as most companies that want to invest will find themselves in the position where they will not be paid any or at least much below value for those shares.”

Outlook

South Africa’s mining industry seems to have a bright future ahead thanks to its massive mineral resources. The country is the centre of attention of investors, particularly Asian ones, and many mineral expansions are planned for the next few years.

As underlined by the ministry of mines, there are still more than 300 years of profitable mining left in South Africa alone and although mining opportunities in other African countries sometimes seem more promising, the country still appears as a free-risk investment compared to the rest of the continent. “Mining in South Africa can become a win-win for investors,” believes Pabst.

However, South Africa will still have to first overcome its issues in order to continue its development. Times have changed and unions have become more difficult to deal with. Good technical mining experts will also have to be trained instead of being sourced abroad.

The necessary BEE programme will have to be enforced in an economically viable way to meet its 2014 deadline. Then, the department of mineral resources will also have to consider the ambiguities in the reviewed mining charter and to drastically improve internal service delivery internally, implementation capacity and to apply the law impartially and diligently. Otherwise, “doing business in South Africa’s mining industry might well become more difficult,” warned Pabst.

South Africa at a glance

President: Jacob Zuma

Capital: Pretoria

Largest city: Johannesburg

Population: 49.1m.

GDP growth: 3.1%

GDP: \$275bn.

Inflation: 5.7%

Languages: 11 official languages including English, Afrikaans, Sesotho,

Setswana, Xhosa and Zulu

Main industries (% world production)

- Platinum: 1st producer (77%)
- Gold: 3rd producer (11%, 13% reserves)
- Diamond: 4th producer (5%)
- Iron ore (2%)
- Nickel (2%)

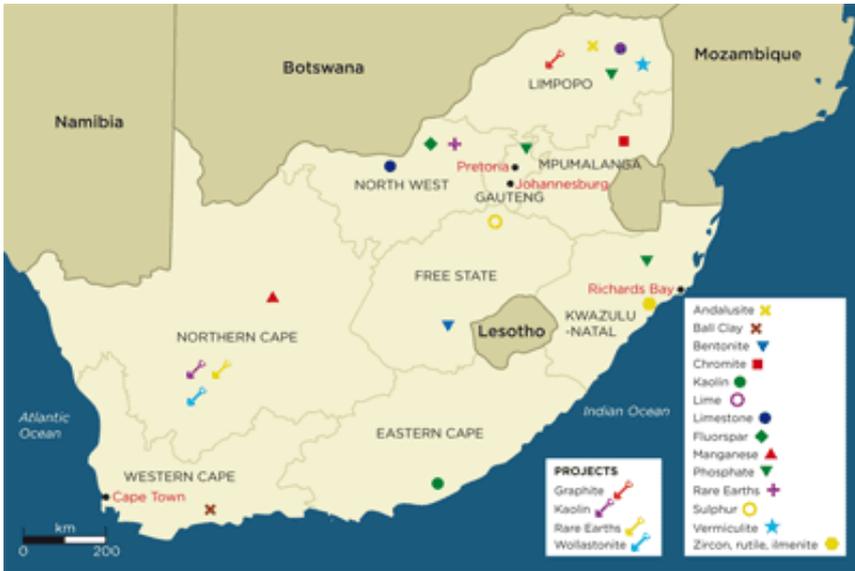
Share of world IM production

- Kyanite and other materials (55%)
- Chromium (45%)
- Vermiculite (39%)
- Zirconium (30%)
- Manganese (21%)
- Rutile (20%)
- Ilmenite (19%)
- Fluorspar (6%)
- Aluminum (2%)
- Phosphate rock (1%).

Share of world IM reserves

- Zirconium (27%)
- Manganese (19%)
- Rutile (18%)
- Fluorspar (18%)
- Phosphate rock (10%)
- Ilmenite (9%)
- Nickel (5%)

South Africa's main minerals production



South Africa’s main mineral production (2008)

Minerals	Total production ¹ (tonnes)	Reserve (tonnes)	Major operating companies	Location of main facilities	Annual capacity ² (tonnes)
Andalusite	247,000	13m.	Barroo Pty Ltd (Imvungu, 2006)	Barroo mine near Thabazimbi Annesburg mine at Barroo Havercroft mine at Imvungu Ruggerosi mine, near Ladysburg	120,000 20,000 200,000 20,000
			Andalusite Resources (Pty) Ltd (African Mineral Trading and Exploration (Pty) Ltd)	Marepoort mine, near Thabazimbi	20,000
Chromite	9,562 (chromium, gross weight)	1,57m (chromium, ore)	Hydrus Pz (Pty) Ltd and Hymys Resources Ltd (2008)	Hydrus mine in Bushbuck Hydrus mine in Bushbuck Thomson mine in KwaZulu Helderberg mine at Swartkops Patrol mine Helderberg mine at Swartkops	120m 120m 100m 100,000 250,000 144,000
			Samsonor Chrome Ltd (Kamoa Group Ltd, 2009)	Eastern Chrome mines in Swartkops Valley, Mpumalanga province ¹	0m.
			Western Chrome mines in Northern province ¹	1.8m.	
			Wolpe Fluorspar Mine (Pty) Ltd (subsidiary of Atlas Copco)	Wolpe mine, 250km west of Johannesburg	180,000
Phosphate rock	2.1m.	4.1m. (concentrate)	Phosphate Development Corp. Ltd (Foskor Ltd) Industrial Development Corp. (2009)	Foskor mine and plant at Palafranca	380,000
			Foskor Ltd	Plant at Gribben Plant at Gribben Plant at Gribben	30,000 17,000 200,000
Sulphur	157,000		Sand Ltd	Plant at Swartkops and Secunda	220,000
			Richard Bay Minerals (The Tinto Pz. Co.) (BHP Billiton Ltd 2009)	Open cast operation, near Richard Bay	120m. ^{**} (market: 220,000 ^{**} rutile)
Titanium	0m.	244m.	Namakwa Sands Ltd (Anglo Operations Ltd, subsidiary of Exxaro Resources, 2009)	Mine near Brand-se-Bed and mineral separation plant at Kekenasap	540,000 ilmenite; 13,000 rutile
			Exxaro Resources Ltd	Hilensdale mine near Richard Bay	500,000 ilmenite; 20,000 rutile; 2,000 ilmenite
			Richard Bay Iron and Titanium (Pty) Ltd / Richard Bay Minerals (The Tinto Pz.)	Smelter at Richard Bay	1,000; 10,000
Titanium slag			Namakwa Sands Ltd	Smelter at Vanderberg, Saldanha Bay area	300,000
			Highveld Steel and Vanadium Corp. Ltd	Steel plant at Witbank	40,000
			Exxaro Resources Ltd Ltd	Empangeni smelter near Richard Bay	250,000
Wolframite	100,000	0m.	Robbervale Mining Co. Ltd	Robbervale mine and plant at Palafranca	200,000
			Tinto (Pty) Ltd / Richard Bay Minerals	Open cast mine near Richard Bay	300,000 zircon concentrate
Zircon	200,000	14m.	Namakwa Sands Ltd	Mine near Brand-se-Bed and mineral separation plant at Kekenasap	120,000 zircon concentrate
			Exxaro Resources Ltd	Hilensdale mine near Richard Bay, KwaZulu Natal Province	40,000 zircon concentrate

* Total for South Africa; ** Capacity of operation

1 Not operating in 2008; 2 Most of Foskor’s phosphate output is from phosphate concentrates supplied by the neighbouring Palabora copper mine.

Source: South Africa’s Ministry of Mines, USGS 2008, IM

