MINERAL POLICY AND SUSTAINABLE DEVELOPMENT

Mineral Economics and Strategy

Mintek’s Mineral Economics and Strategy Unit (MESU) continued to conduct regional commodity-based mineral economic studies to enhance the understanding of minerals and support the beneficiation of the minerals in South Africa. MESU has been able to respond to a wider range of project requests in areas not previously attempted, but will continue to add to the competence base of the department. MESU has continued to maintain its project load across Africa.

Regional Mineral Economics (RME)

The mineral scan assemblage has remained a key feature of the product lines, and constitutes one of the most central mineral intelligence developments to date. The ability to continuously innovate this product and achieve commercial acceptance is, however, linked to ensuring a well established staff competence to respond to an uptake of this service. The process has been further trialled in a project for the Mopani District Municipality (Limpopo Province), where the resolution has been further refined to intelligence up to “farm-level”.

The update of the renowned Profits from Processing manual, which was last issued by Mintek in 1989, was completed. This project was supported financially by the DTI, and the manual has been earmarked for inclusion in their economic affairs training programme.

Projects completed during the period under review included a coal scan of South Africa. This project has kept MESU in the forefront of coal modelling and market intelligence to support junior resource companies (JRCs). In further support of the prevailing energy security issues, MESU completed an assessment of the viability of establishing a central uranium processing plant in the Beaufort West area.

There is a general effort to extend iron ore competence in South Africa, and MESU continues to grow its internal skills base through the projects that it conducts. This year the project dealing with the characterisation of iron ore resources in South Africa also served as a platform for a postgraduate thesis.

MESU has successfully positioned itself to conduct leading edge research for other state-owned enterprises (SOEs) in

the infrastructure arena, and this year was able to leverage in excess of R1-million in earmarked funding from two SOEs. This competence will be further developed in the forthcoming year.

The Sensor Web project is aimed at making measurements and observations, mainly of an environmental nature, available via standard web services. Although potentially of major benefit for the mining sector, this is a novel approach and uptake is slow. The project was completed this year, and the emphasis will be on marketing of outputs in the next financial year. This will ideally increase market acceptance at a time when discretionary spend is in widespread decline. This project is a clear casualty of the economic slowdown.

MESU has an ongoing involvement in local economic development, and one of the RME projects looked at the utilisation of alluvial diamond resources in rural areas to support poverty alleviation efforts and enhance economic diversification.

Resource Based Sustainable Development (RBTS)

The DST has contracted MESU to develop a Mining and Geosciences Framework for research and development across Africa. This project involved conducting case study research across South Africa and four other African countries (Tanzania, Ghana, Nigeria and Zambia). This was a collaborative project with support from a peer group comprised of senior staff of the DST, the DME, CGS and CSIR.
Ongoing support was directed at beneficiation related matters. Continuing with the previous year’s focus on beneficiation within Special Economic Zones (SEZs), MESU has increased its professional offering in this area by recruiting an SEZ expert. An RME project was completed related to the relocation of parts of the platinum value chain to South Africa from their traditional northern hemisphere bases.

The RBTS team has increasingly been involved in identifying areas where technological development can become entrenched in South Africa, where it is also supported by a substantial local resource. To complement the RME study on relocating platinum value chains, the RBTS team investigated the expansion of the platinum value chain in South Africa by expanding the sidestream activities to support economic diversification.

This platinum competence being developed led to a project whereby the emergence of a junior platinum company was evaluated and its impact on the economy of a local community assessed. This commercial project enabled the company to make a decision to proceed with their community development strategy, since the socio-economic impacts were predominantly positive.

The model of economic diversification through expansion of the commodity value chain has resonated elsewhere on the continent, and the team participated in a study for the Katanga region of the Democratic Republic of the Congo, in which mining supply chains were evaluated for sustainability and as leverage for economic diversification.

MESU, with oversight from the RBTS team, has been invited to play an advisory role to the Diamond Industry Survival Working Group established by the Johannesburg-based Diamond Council of South Africa.

**Economic Support (ESU)**

The ESU team focussed on research related to the mining and minerals sector and to provide support through rigorous economic analysis to commercial clients as well as other units within Mintek. The majority of the projects resulted from foreign enquiries about the mining investment regimes across selected African countries. Seven commercial projects were conducted across Anglophone and Francophone countries, focussing on investment attractiveness for various stages of the mining value chain.

With financial support from the DTI, MESU completed and submitted two research papers to a joint DTI/African Union programme for Accelerating Africa’s Industrialisation. The areas of focus in this project were Sustainable Development and Industrial Innovation and Technology. In further support of strategy development, MESU completed a contribution to the Gauteng Long Term Development Strategy, with an emphasis on the mining sector.

The research desk for the study of China/Africa trade, investment and political relations, comprised of an internal team of MESU staff organised by the ESU section, was tasked with tracking the development of the Chinese economy and identify the linkages and opportunities for the African continent. The team, though internally funded, needs to increase its relevance and economic sustainability.

The work being done across Africa has increased the Mintek and MESU profile, and as a result MESU received invitations to make presentations overseas (Chile, Sweden, and London) and in Africa (the DRC and Egypt) on sponsored visits. During October, 2008 a MESU delegate accompanied the Mintek CEO to the First Meeting of African Ministers Responsible for Natural Resources in Addis Ababa, Ethiopia.

**Sustainable Development (SD)**

The applied research platforms relevant to mineral processing include energy saving, reducing water consumption, and the treatment of low-grade and complex ores – in particular PGM ores. Indications are that integrated solutions to these problems can be developed, but more understanding is required of the consumption (energy and water) along the major commodity value chains.

The project on the Olifants Water Catchment area and its impact on platinum mining (Annual Report 2008) has been extended to include water security in the mining sector. This was complemented by related work in the energy sector, where the SD team investigated models of energy efficiency at selected stages of the value chain. These projects serve a dual purpose of increasing Mintek’s profile in these areas and also to increase competence and skills amongst junior SD staff.
The SD team organised, on behalf of Mintek, the UNECA Public Private Partnership workshop, which was attended by delegates from across the continent. This role was made possible due to the standing Mintek enjoys across the continent as a credible and objective partner for both governments and industry.

MESU commenced its role as project managers for the DME’s derelict and ownerless mines programme around the rehabilitation of asbestos mines in the Northern Cape. Fieldwork was completed to establish a baseline for rehabilitation work, and this programme will flow into the next financial year. The project is designed to expose more juniors to the various aspects of project design and execution, thereby increasing MESU’s staff skills.

**Small-scale Mining and Beneficiation**

**Training**

During the period under review, 320 people from predominantly rural communities were trained in diamond evaluation and beneficiation. Mintek participated in the development of the Level 2 qualification for small scale miners, and 28 learners successfully completed a six-month course on surface mining skills. The course was run in partnership with local business-development company VPK Business Venture, who provided the business training aspects of the course. Mintek’s ASSM School was appointed as an Employment and Skill Development Agency by the Department of Labour, and finalised the pilot training of 28 learners at Rustenburg on the Business Skills programme.

The Mining Qualifications Authority (MQA) awarded Mintek two contracts as a training service provider. The first project involved training 120 learners in small scale mining, and the second 77 women learners in mining. Both projects were run in Mpumalanga, KwaZulu-Natal, the Free State and Western Cape.

**Agrogeology**

Mintek teamed up with Lyttelton Dolomite to undertake a field trial of the Biomin™ mineral-based soil ameliorant on a maize crop under centre-point irrigation at Marble Hall, Limpopo Province. Based on the results, fertiliser manufacturer Afrifert has agreed to order 40 tons of material per month to blend with their nitrogenous fertiliser. The DST has agreed in principle to fund construction of a production facility in Marble Hall, which would use municipal sewage sludge and fly ash and lime from Lyttelton’s Marble Hall operations as feedstock. A DME project that will see the large-scale application of Biomin to assist the re-vegetation of asbestos mining tailings is scheduled to begin in late 2009.

Pilot trials of the rock flour soil additive, which supplies micro-nutrients from finely ground basic igneous or volcanic rocks, were conducted with communities in Limpopo Province. A new product, Biophos, which is produced by the bio-acidulation of rock phosphates using waste material from the citrus industry, is being developed in partnership with the University of Pretoria and Moi University in Kenya.

Mintek’s Small Scale Mining and Beneficiation (SSMB) division is part of the team that is currently developing the food security strategy for the DST (soil re-mineralisation), and R70 000 in seed funding has been granted to develop a proposal around indigenous food production.

Mintek was invited by the World Bank to present on its agrominerals research programme at the organisation’s headquarters in Washington DC in September 2008. More than fifty countries were represented at the workshop, including the World Bank staff. An invited paper on rock phosphate research was presented at the Geological Society of South Africa’s annual meeting.

**iGoli**

Mintek expects to finalise an agreement with the Chilean Research Centre for Mining and Metallurgy (Centro de Investigación Minera y Metalúrgica – CIMM) to implement the iGoli mercury-free gold recovery process in Chile in 2009. It is envisaged that staff will visit the country to train informal gold miners in the process, and if the project is a success the CIMM will assist Mintek in transferring the technology to other Latin American countries. The process was also demonstrated for small-scale miners operating in the Moto gold belt in the north-eastern DRC.
A manually operated centrifugal separator, which not only has the potential to increase the productivity and efficiency of ASM gold miners but also constitutes an environmentally friendly method of recovering other heavy minerals, has been developed to prototype stage. A demonstration-scale unit, with a throughput of about 0.5 tons an hour, is expected to be available for on-site testwork in the second half of 2009.

A method of recovering base metals such as copper and nickel from the iGoli process effluent by ion exchange and precipitation has been developed with the aim of enhancing the marketability and profitability of the process. Field tests are planned to determine the economic benefits of the additional process steps. Extensive investigations have also been carried out into the use of the process for refining gold scrap as well as recycling PGMs from spent autocatalysts. In the latter case, recoveries of up to 85% have been obtained, and the technology could be implemented at the small industrial scale by the end of financial 2009.

Mineral-based craft sector

Four new glass-bead businesses were started with funding from the North West Department of Education. These enterprises will continue to receive technical support to promote their sustainability. Equipment and training were provided to two Seda-funded projects – a marble and granite stone-carving project in Polokwane and a pottery project in Bronkhorstspruit. Three feasibility studies, for a jewellery project in Atteridgeville, a slate project in KwaZulu-Natal, and a clay project in the Eastern Cape, which were funded by the DME through the Council for Geoscience, were completed. The Timbita ceramics incubator has been contracted by the National Lottery Board to set up four pottery unit in 2009 – two in Limpopo and one each in Qua-Qua and the Eastern Cape.

Mintek has compiled a draft strategy for ceramics that is intended to assist the establishment of a more diversified and viable craft sector, and position the informal pottery craft sector as a driver of economic growth and poverty alleviation, primarily in the rural areas of South Africa. The strategy incorporates the promotion of clay beneficiation, as well as enhancing the skills of traditional crafters by introducing contemporary ceramic techniques. Training would be delivered in line with the MAPPP-SETA Craft Production skills programme.

SSMB representatives attended the technology transfer workshop organised by the South African Research and Innovation Management Association (SARIMA) in Stellenbosch in the Western Cape in November 2008, and Mintek has been requested to give input into discussion topics for the next workshop. Mintek also participated in the 1st West Africa Mining and Energy Summit in November 2008, where a paper on the Artisanal and Small Scale Mining (ASM) sector was presented. The executive committee of the International Agrogeology Association has invited the division to be part of the organising committee for the 2010 Beijing Agrogeology conference. SSMB continues to be an adviser to the DST National Indigenous Knowledge Systems Office (NIKSO) on food security, jewellery and pottery issues.

Kgabane Jewellery

The function of Kgabane is to develop and support the indigenous second economy jewellery sub-sector that will be the driver of job creation, economic development and sustainable small and micro enterprises (SMEs) in rural and poor communities.
Kgabane achieves its objectives through a number of programmes, which focus on:

- Skills transfer/training;
- Production support;
- Business mentoring; and,
- Marketing support.

In the 2008-2009 financial year, the Kgabane Rural Development Programme made some notable progress in the business incubation of five of its rural small-scale jewellery manufacturing enterprises, in the North West, Limpopo, Northern Cape and Mpumalanga provinces and in the continued partnerships with Shanduka Coal, Xstrata Coal, and recently with BHP Billiton. At these sites, forty beneficiaries are benefiting from the Kgabane Rural Development Programme in terms of skills transfer and enterprise development (production support and marketing support). In addition, over 20 manufacturing groups throughout the country were given support to enable them to continue with their business of jewellery making, where 200 people are involved.

Following over three years of research and development by an independent jewellery company and mining houses; a low-cost, electricity-free mass production technology was piloted by Kgabane at one of the rural production sites. This technology will see the production capacity of rural producers multiply by 600-fold, to the extent that they will be able to compete favourably on the mass and export markets.

The long-anticipated Northern Cape gemstone cutting and polishing project got underway with funding from the Small Enterprise Development Agency (SEDA) and in partnership with the Northern Cape Economic Affairs Department. The aim of the project is to create self-sustainable small businesses in gemstone processing, with the initial roll-out in Prieska This is the start of the diversification of the Kgabane rural development offering.

Another long-anticipated project, the Gold Zone jewellery incubator, at the Rand Refinery, was rolled out in partnership with a number of other stakeholders; with Kgabane contributing close to R1 00 000 raised from the Ekurhuleni Municipality. Renovation of the building was completed, and the process of recruiting beneficiaries started. The incubator will provide an enabling environment to aspiring business owners who wish to be successful in the jewellery industry.

The development of the marketing strategy continued, with Kgabane taking part in ten local exhibitions and one international one in Las Vegas. Print media promotions continued to be distributed to boutique jewellery shops. However, sales were disappointingly slow due to the economic downturn.

Unfortunately, Kgabane and Foschini could not conclude the agreement that would have seen Kgabane showcasing ranges of jewellery at selected stores. As a result of the economic downturn and consequent decline in retail sales, the company felt that it could not take on board any new brands at present. However, both Foschini and Kgabane intend to maintain their relationship with a view to re-launching the project when the business climate improves.

From May 2009, Kgabane will be merged with Mintek’s SSMB division to take advantage of the potential synergies available in area of small-scale jewellery manufacturing and training.