

annual report and  
financial statements

**2012**



*Your partner in unlocking mineral wealth*





MINTEK'S RESEARCH CAMPUS IN RANDBURG, which was founded in 1934 to assist the mining industry to operate more effectively and profitably, has achieved international recognition for its contributions. Our mining and minerals industry has been extremely innovative, and many notable advances in extraction, refining and manufacturing technology that originated in South Africa have impacted on the minerals industry worldwide.

**"As we forge a more progressive and transformed Mintek, we need to develop a common culture and set of values."  
-Abiel Mngomezulu, Mintek CEO**

**MINTEK VALUES**

**Creativity**

- Continuous improvement • Creativity • Creation of Shareholder Value • Not failing to try
- Innovative thinking • Individual expression • Look for opportunities and exploit these

**Teamwork**

- Common sense of purpose • Be proactive, get involved and look for integration points
- Remove barriers • Break the silos

**Results orientation**

- Do it right the first time • Pride in service, passion, discipline • Customer orientated
- Do not shift eyes from the end goal

**Respect & Dignity**

- Appreciate diversity • Listen and hear others • Welcome alternative points of view
- Recognise and respect each other's rights and dignity • Emphasise two-way communication
- Argue facts not the person

**Integrity**

- Build and earn trust • Do what we said we would do • Be authentic • Be professional
- Trust is a consequence • Encourage free respectful speech • Accept accountability for own actions
- Do the right thing even if no-one is watching • Hold genuine and timely performance conversations

Mintek works with industry and other R&D organisations to research, develop, as well as implement new and improved technologies in the minerals and metallurgical sectors. South Africa has become a world leader in this technological niche, with a successful record of technology export, and Mintek itself has become an international player in the field.

Mintek's research complex is situated in Randburg, Johannesburg, within easy reach of the O.R. Tambo and Lanseria airports.

With a total staff of about 800, Mintek employs a highly qualified and motivated workforce with a wide range of skills, including metallurgical, chemical, electronics engineers, chemists, physicists and mineralogists. Many of our engineers and scientists are recognised as leaders in their fields of specialisation.

Mintek provides world-class R&D expertise, testwork and process optimisation for the precious and base metals, ferroalloys, as well as industrial minerals sectors on an international basis. The activities range from initial investigations to process development, and the design, construction and commissioning of industrial plants. Working closely with clients, and in conjunction with engineering partners, Mintek supplies a flexible package of technology for process development and optimisation.

# Contents

## Our Mandate

Mintek's mandate is to serve the national interest through high-calibre research, development, technology transfer that promotes mineral technology, as well as fosters the establishment and expansion of small, medium, and large industries in the field of minerals and products derived from them.

## Our Vision

To be a global leader in mineral and metallurgical R&D and technology transfer.

## Our Mission

To serve our stakeholders by promoting technology, industrial growth and human development.

## Our Values

- ▶ Creativity;
- ▶ Teamwork;
- ▶ Results orientation;
- ▶ Respect and dignity, and,
- ▶ Integrity.

## Key Objectives

In order to attain its goals Mintek shall strive to:

- ▶ Research and develop efficient mineral processing technologies and value added products and services;
- ▶ Build world class R&D excellence;
- ▶ Promote the mineral-based economics of rural and marginalised communities through technical assistance and skills development;
- ▶ Research and develop green technologies and processes to mitigate the impact of mineral development on the environment;
- ▶ Ensure the short-term viability and long-term sustainability of Mintek;
- ▶ Uphold good governance;
- ▶ Enhance Mintek's visibility and credibility to all stakeholders.

### ifc<sup>1</sup> MINTEK VALUES

### flap MINTEK LOCATION

### 2 MINING VALUE CHAIN

### 3 MINTEK GLOBAL ACTIVITIES

### 4 CHAIRMAN'S OVERVIEW

4 Mintek Board

### 6 CEO'S REPORT

7 Management Organogram

### 10 PERFORMANCE AGAINST OBJECTIVES

### 14 MINTEK IN BRIEF

### 16 RESEARCH, DEVELOPMENT & TECHNOLOGY

- 16 Gold Industry
- 18 Platinum Group Metals Industry
- 19 Uranium Industry
- 19 Ferrous Metals Industry
- 20 Rare Earths and Phosphate Industry
- 20 Base Metals Industry

### 21 OPERATIONS AND DEVELOPMENT

- 21 Minstral submerged-arc furnace controller
- 21 Minfurn carbon regeneration furnace
- 21 Biomed Synthesis laboratory
- 21 New instruments for mineralogical research
- 22 Diamond provenance research
- 22 SAVMIN™ Technology
- 22 FloatStar flotation control package
- 22 Cliff's chromite project
- 23 DC arc smelting
- 23 Prototypes

### 24 BUSINESS DEVELOPMENT, MINERAL POLICY & SUSTAINABLE DEVELOPMENT

- 24 Intellectual property preservation
- 24 Rehabilitation of derelict and ownerless mines
- 24 Industry support
- 24 Support to government departments
- 24 Promotion of rural economies
- 24 Training accreditation

### 26 HUMAN CAPITAL DEVELOPMENT & MANAGEMENT

- 26 Labour relations
- 26 Partial re-employment of retrenched workers
- 27 Research workshops
- 27 Skills development
- 27 Quality and Safety
- 28 TAP programme
- 28 Mintek Values
- 28 Health
- 29 Academic Support and Training
- 29 Full-Time Undergraduates and Postgraduates
- 29 Part-Time Undergraduates and Postgraduates
- 29 Graduate and Postgraduate Internship Programmes
- 30 Science, Technology, Engineering and Mathematics (STEM) Promotion Programmes

### 31 AWARDS AND RECOGNITION

### 33 STAFF PAPERS, PUBLICATIONS AND CONFERENCES

### 38 CORPORATE GOVERNANCE

- 38 Board of Directors
- 38 Audit and Risk Committee
- 38 Internal Control
- 38 Internal Audit
- 39 Risk Management
- 39 Human Resources Committee
- 38 Technical Committee
- 39 Fraud Committee
- 39 Management
- 39 Operational Performance
- 40 Going Concern
- 40 Quality, Environment, Safety and Health (QESH)
- 40 Radiation Protection Programme

### 41 ANNUAL FINANCIAL STATEMENTS

- 42 Audit and Risk Committee Report
- 44 Directors' Responsibilities and Approval
- 45 Directors' Report
- 47 Report of the Auditor-General
- 48 Financial Statements and Notes

### ibc\* MINTEK CONTACTS

### ibc\* ACRONYMS AND ABBREVIATIONS

- <sup>1</sup> inside front cover
- \* inside back cover

# The Mining Value Chain

Technologies and services developed by Mintek

## 1. Exploration

- ▶ Geochemical sample analysis;
- ▶ Mineral/ore characterisation; and
- ▶ Certified Reference Materials.

## 2. Mining

- ▶ ASSM technology;
- ▶ ASSM training assistance; and,
- ▶ Mining inputs economic studies.

## 3. Concentration

### a. Comminution/Flotation

- ▶ Flowsheet design and optimisation, and piloting;
- ▶ Plant audits;
- ▶ Ultrafine milling; and,
- ▶ Control and optimisation strategies.

### b. Physical separation

- ▶ Bulk sample preparation;
- ▶ Gravity, magnetic, electrostatic and dense-media separation; and,
- ▶ Pneumatic jigging, and Mineral Density Separation.

## 4 a&b. Hydrometallurgy & Biotechnology

- ▶ Atmospheric and pressure leaching;
- ▶ Bioleaching (refractory gold and base metals);
- ▶ Solvent extraction and ion exchange;
- ▶ Electrowinning;
- ▶ Process simulation;
- ▶ Reagent development and evaluation;
- ▶ Gold recovery by CIP/RIP;
- ▶ Activated carbon regeneration;
- ▶ Uranium processing;
- ▶ Cyanide measurement, monitoring and auditing; and,
- ▶ Leach circuit control.



## 5. Pyrometallurgy

- ▶ Pelletisation and briquetting;
- ▶ Pre-heating and pre-reduction;
- ▶ DC arc process development and piloting;
- ▶ Modelling and simulation;
- ▶ Submerged-arc furnace (SAF) control strategy;
- ▶ Fluidised bed and condenser technologies;
- ▶ Refractories performance investigations;
- ▶ High-temperature solid state and phase equilibrium investigations; and,
- ▶ Ore, slag, matte and alloy characterisation.

## 6. Refining

- ▶ Gold refining and value-added products/chemicals;
- ▶ Pyrometallurgical refining of zinc (PWG to SHG), and off-grade ferro-alloy fines; and,
- ▶ Titanium chlorination technology.

## 7. Value Addition

- ▶ New industrial applications for gold: Catalysis; Biomedical; and Nanotechnology;
- ▶ “Smart” materials and sensors;
- ▶ PGM-based superalloys;
- ▶ Low-nickel stainless alloys;
- ▶ Jewellery fabrication;
- ▶ Gold and platinum jewellery alloys; and,
- ▶ Identification of downstream, metals-based, economic development opportunities.

## 8. General

- ▶ Ore characterisation, analytical and process mineralogy;
- ▶ Certified Reference Materials;
- ▶ Materials characterisation, testing and development;
- ▶ Engineering design, manufacturing, installation and commissioning;
- ▶ Project management services; and,
- ▶ Regional minerals-based studies.

# Mintek Global Activities

## ● Gold

- Evaluation and design of recovery circuits, carbon and resin adsorption, elution, electrowinning. Leach optimisation and heap leach bio-leaching amenability.
- Cyanide speciation monitoring, online cyanide measurement and control, cyanide destruction. Assistance with ICMI gap or full certification audits.
- Minifurn™ technology for granular activated carbon regeneration.
- Minataur™ all-hydrometallurgical gold refining process.
- New industrial uses for gold-catalysis, biomedicine, and nanotechnology.

## ● PGMs

- Design and optimisation of integrated comminution and flotation circuits.
- ConRoast smelting technology for high-chromium low-sulphur PGM materials.
- Catalyst development for automotive, fuel cell, and industrial applications.
- Novel PGM-containing alloys, and powder metallurgical processes.

## ● Ferrous Metals

- DC arc smelting processes for chromite, ilmenite, nickel laterites, magnetite, magnesium metal production, and metal recovery from slags and dusts.
- Iron ore beneficiation.
- Materials characterisation (physical, mechanical and corrosion properties), and failure investigations.

## ● Base Metals

- Bioleaching of copper, nickel, and polymetallic concentrates. Heap bioleaching of low-grade chalcopyrite-bearing materials.
- Integrated circuit design for metal recovery and purification by leaching/heap leaching, precipitation, ion exchange, and SX/EW.



## ● Industrial Minerals & Diamonds

- Physical beneficiation - comminution, flotation, gravity, dense media, electrostatic and magnetic separation, and optical sorting.
- Kimberlite indicator mineral investigations. Alluvial diamond provenance studies.

## ○ Uranium

- Ambient, pressure and heap leaching, solvent extraction, fixed bed and countercurrent (NIMCIX) ion exchange, resin-in-pulp, and ADU precipitation.
- Mintek is registered as a uranium testwork facility with South Africa's National Nuclear Regulator (NRR) and the Department of Mineral Resources.

## \* Process Control Strategies

- Advanced process control and optimisation strategies for milling, flotation, and gold leaching circuits, and submerged-arc furnaces.
- Online cyanide measurement and control.
- Heap leach operator guidance software and in-heap instrumentation.

## ▲ Equipment & Technology

- Minifurn™ regeneration furnace for activated carbon in the gold processing, water treatment, and food industries.
- Gold electrowinning cell.

- DC arc furnace.
- Atomijet™ atomiser for base and precious metals.
- SAVMIN™ process for acid mine drainage purification. Acid-base accounting.

## ■ Economic and Regional Studies

- Regional commodity-based mineral economic studies.
- Resource-based technology strategies.
- Sustainable development studies.



Mr Mohau Mphomela - CHAIRMAN OF THE BOARD, MINTEK.

## Chairman's Overview

LAST YEAR THIS TIME, we stated that Mintek seems to have weathered the storm in terms of its finances and that the worst was over. Our assertion has been vindicated as Mintek has made a remarkable turnaround and achieved impressive financial results this year. This was in spite of the operational challenges that the company was faced with during the year.

These results illustrate that the strategic review process, which continued to be implemented during the year, is bearing fruit, and so is the management's decision to focus on marketing the organisation and its innovations, products, services and technologies. The achievement of these results contributes to building the organisation's credibility and reputation.

One of Mintek-developed technologies, the ConRoast smelting technology, which is being implemented in the eastern limb of the Bushveld Complex in Mpumalanga, has contributed significantly to Mintek's finances this year through royalties paid by Jubilee Platinum, the licensee of the product until 2020. Government's intention to develop the transport infrastructure to further support mining operations around the eastern limb of the Bushveld Complex will provide additional opportunities for this technology thereby solidifying Mintek's credibility as a world-class developer of mineral processing technology.

During the year, Government also adopted its beneficiation strategy (a core Mintek competency in the mining value chain) which seeks to tackle unemployment, poverty and inequality while providing value-addition to South Africa's mineral resources. We are convinced that Mintek is well placed now to take advantage of and to be able to implement the government's beneficiation strategy to deliver on its mandate.



### Mintek Board Members 2011/12

From left:

Ms Salminah Maja - DEPUTY CHAIRPERSON OF THE BOARD, Director/Partner: Jacques Van Der Merwe Maja Inc.;

Ms Matshediso Ndlovu - Sales Manager: NPC Cimpor (Pty) Ltd.;

Ms Simangele Sekgobela - Head: Department of Agriculture & Rural Development, Gauteng;

Adv Derick Block - Independent Management Consultant.

We continue to be Government's partner of choice in the rehabilitation of derelict and ownerless mines and that has enabled Mintek to contribute to the creation of jobs in the far flung areas of South Africa. More jobs are expected to be created in the final year of the three-year contract with the Department of Mineral Resources (DMR).

Mintek's diamond provenance laboratory, which is aimed at developing a method for determining the geological source of rough alluvial diamonds, continues to make progress to find ways to distinguish the diamonds. In this regard, Mintek participated in the Kimberley Process Intersessional Meeting in Kinshasa, Democratic Republic of Congo. The fact that South Africa has been elected deputy chairperson of the process during the year 2012 – and that we are expected to assume the chair in 2013 – will hopefully boost Mintek's work on diamond fingerprinting.

Mintek continues to maintain a significant global footprint, with innovations, products, services and technologies being showcased in operations in various countries including Canada, Kazakhstan, Democratic Republic of Congo, Tanzania, Malawi, India and Brazil. In Kazakhstan, the second largest producer of ferrochrome alloys after South Africa, Mintek has been able to install a fourth Minstral instrument, our world-renowned resistance-based controller for submerged-arc ferroalloy furnaces, on the largest of the furnaces at Kazchrome's Aksu plant. This plant is one of the largest and most exclusive ferroalloy plants in the world.

In addition, research and development initiatives are being undertaken in collaboration with international institutions such as the Kutchatov Institute in Russia, Buffalo University in the United States and K.S.

Rangasamy College of Technologies in India. This is in addition to research collaborations with local institutions including the Medical Research Council (MRC), the National Institute for Communicable Diseases (NICD), the National Research Foundation (NRF), the Water Research Commission (WRC) and various other research institutions and universities. Mintek also regards participation in the European Union Framework research programmes as being a very attractive, long-term collaborative research opportunity since it provides access to an international research network and source of funding.

We therefore welcome Government's commitment to research and development in the minerals and mining industry, which is demonstrated by an increase in funding. The review of the Mineral and Petroleum Resources Development Act (MPRDA) is also a welcome development. We are hopeful that such a review will go a long way to assist in the implementation of the government's beneficiation strategy while allowing Mintek to play a significant role in the drive to unlock South Africa's mineral wealth.

Regrettably, the Board lost the services of three Board members during the year. Mr Paul White, the chairperson of the Board's technical committee passed away in November 2011 barely four months after his wife's death. Our heartfelt condolences go to his family. The Board also lost the services of Mr Mosa Mabuza and Ms Zethu Qunta, who resigned as members of the Board in February and October 2011 respectively. We acknowledge these three members' immense contribution to the fiduciary duties of the Board as well as to the overall success of Mintek during this year.

We welcome two new Board members, Ms Setepane Mohale, who replaced Mr Mabuza as a representative of the Department of Mineral Resources and Mr Imraan Patel, who represents the Department of Science and Technology.



Despite the loss of these three members' experience and other challenges, the Mintek Board continued to exercise its responsibilities effectively during the year ensuring that controls were in place for good governance. Our financial, audit, procurement and risk management processes remain sound, and, as such, we have received an unqualified audit opinion from the Auditor-General.

In conclusion, I wish to thank the Minister of Mineral Resources, the Honourable Mrs Susan Shabangu, and her deputy, the Honourable Mr Godfrey Oliphant, for their political stewardship. The Board's gratitude also goes to the CEO as well as his executive management team who, together with the rest of the staff, have steered Mintek well towards its vision to be a global leader in mineral and metallurgical innovation while ensuring that it becomes a solid and successful organisation financially. Lastly, but not least of all, I wish to thank all the Board members for their diligence, endurance and commitment in executing their task.

**Mohau Mphomela**

Chairman of the Board, Mintek

### **Mintek Board Members 2011/12**

*(continued...)*

*From left:*

*Mr Paul Streng - Independent Management Consultant;*

*Mr Imraan Patel - Deputy Director-General: Department of Science and Technology;*

*Ms Setepane Mohale - Chief Director: Department of Mineral Resources;*

*Mr Tseko Nell - Chief Economist: Department of Mineral Resources, Alternative Board Member;*

*Mr Abiel Mngomezulu - President and CEO: Mintek.*



Mr Abiel Mngomezulu - MINTEK PRESIDENT AND CEO.

## CEO's Report

MINTEK CONTINUED TO REMAIN SOLID throughout the year, in spite of various challenges and global economic uncertainties. The sacrifices we had to make and tough decisions taken during the difficult previous years have paid off much sooner than anticipated. Throughout the year, Mintek managed to record a better than budgeted for income, mainly due to unexpected work received, benefits received from prior research work in the form of licence fees and the rescheduling of contract research work. The demand for commercial work continues to be strong, a number of business units are fully booked for up to six months ahead and a number of project proposals continued to be received up to the end of the financial year. Hopefully these developments will create a pipeline of projects that are sustainable in the medium to long term.

### Financial Summary

Mintek achieved a surplus of R43-million for the financial year, a margin even higher than the record previously achieved before the global recession of 2009. This is a significant improvement compared to the surplus of R751 000 that we had anticipated for the year. It is even more impressive considering that Mintek was R2,7 million in the red at the end of the last financial year and had in the year prior to that, at the height of the global economic crisis, managed a modest surplus of only R1,4 million.

These outstanding results can be attributed to income derived from contract research work, license fees for the ConRoast technology and higher than anticipated interest earnings. The higher interest earnings resulted from larger cash reserves as well as a Mintek-wide entrenched culture of cost savings. Mintek has also generated



### Mintek Executive Managers 2011/12

From left:

Dr Makhapa Makhafola - RESEARCH & DEVELOPMENT;

Mr Peter Craven - BUSINESS DEVELOPMENT;

Adv Mamokete Ramoshaba - CORPORATE SERVICES;

Mr Alan McKenzie - TECHNOLOGY;

Mr Sakhi Simelane - FINANCE.

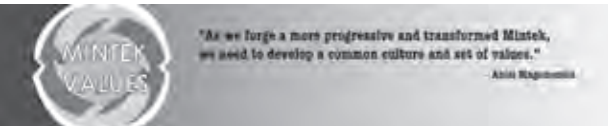
net working capital inflows of R43-million for the year under review as a result of the significant decrease in receivables from better collection strategies, which are proving to be effective, and the increase in deferred income due to payments received in advance. These funds have been placed in short-term deposit accounts in order to maximise investment income.

### Technical Highlights

Mintek is commissioning another demonstration project, at a capital cost of R44-million, in collaboration with Anglo American Platinum. Once in operation, the 12 tons per day atomiser plant is expected to run for at least 24 months at Bay 2. This project enabled Mintek to re-hire, for the duration of the contract period, 20 of the 39 workers who were retrenched as a result of the global financial slump in 2010 – as had been promised when these retrenchments were effected. Two large pilot smelting tests in Bay 1 DC arc furnace smelting facility involving the smelting of 300 tonnes and 100 tonnes of concentrate were completed.

An interesting development with the heightened gold activity in both the rest of the African continent and the rest of the world has been the sudden increase in interest in Mintek's Minataur gold refining technology. The Hydrometallurgy Division is currently exploring a number of potential business opportunities as well as the development of simplified flow sheets to provide solutions for a wider group of potential clients. Mintek will continue to explore the developing markets, especially the gold sector in West Africa, for this technology and many others developed at Mintek.

Water and energy efficiency are regarded as important industry drivers going forward. As indicated last year, as a research organisation that supplies technology, services and products and the know-how for the benefit of

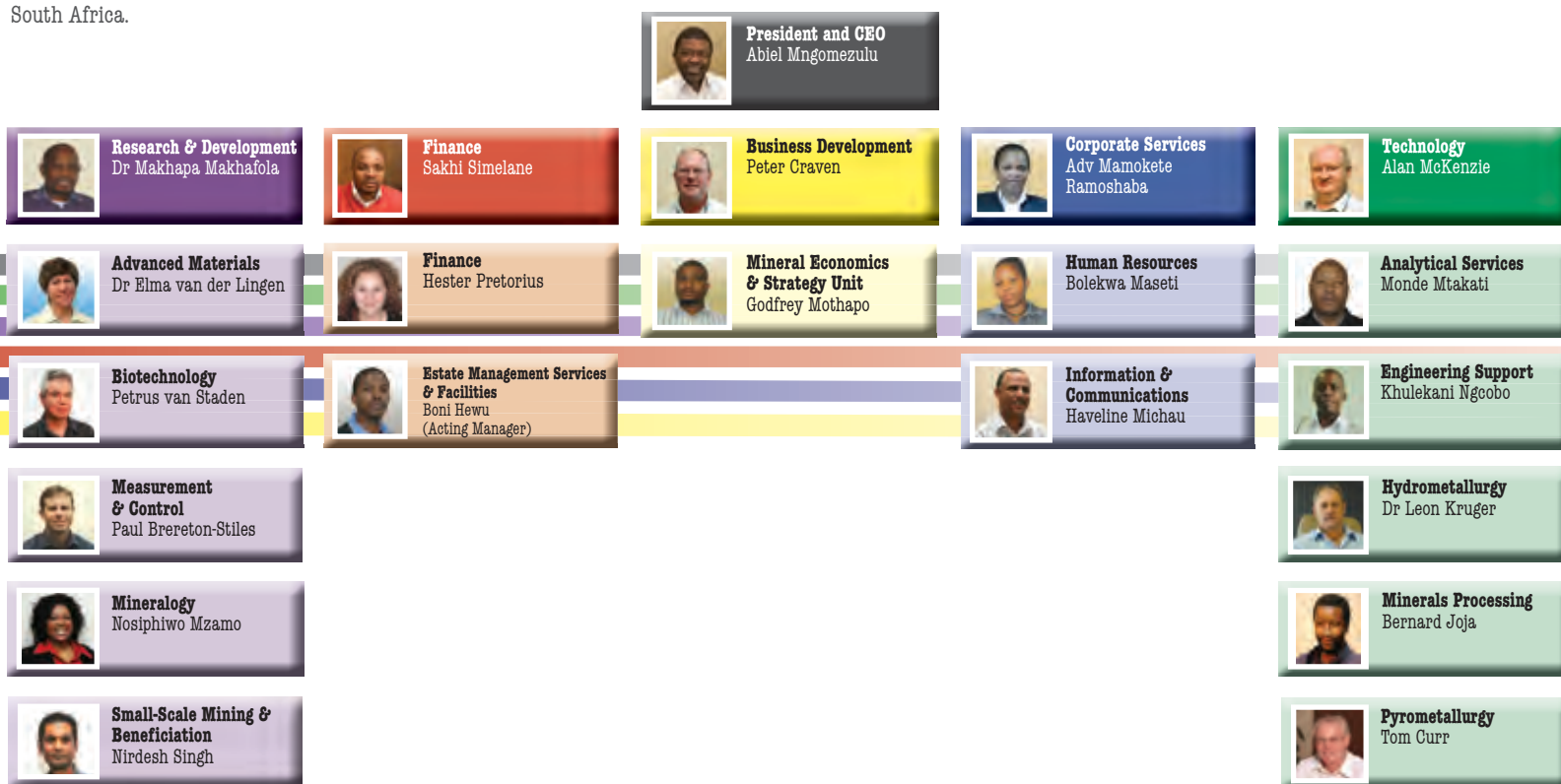




the mining and mineral processing industries, it is a Mintek imperative to come up with solutions, technologies and processes that consume less energy and water. Mintek is therefore embarking on a strategy to develop itself as a 'centre of excellence' in the area of sensor-based ore sorting. This year, Mintek undertook an extensive programme of tests using a large range of Platreef platinum group metals (PGM) samples as part of the on-going research into the use of sensor-based sorting.

Mintek has experienced a huge interest in rare earth elements (REE) test work and the first phase of a major pilot plant campaign was completed in the fourth quarter for Frontier Minerals on its Zandkopsdrift deposit. The second stage is currently in the planning stages and will be determined by the outcomes of phase 1. It is therefore gratifying that one of the five key projects that Mintek has secured as part of the R150-million medium term expenditure framework (MTEF) funding for the 2012/13 – 2014/15 period, is the commissioning of a rare earth elements pilot plant. As a result, in order to prepare for the effective application of the MTEF funding awarded to Mintek for the piloting and demonstration of Mintek's REE refining technology, the current Parliamentary Grant for rare earth elements (REE) research has been refocused on the flow sheet design for such a plant.

After re-engineering and improving its exciting SAVMIN process, Mintek has signed a memorandum of understanding with Veolia Water Solutions & Technologies to fully engineer and technically and economically evaluate the technology. The collaboration with Veolia will allow Mintek to demonstrate and potentially commercialise this technology. By so doing, Mintek hopes to play a significant role in solving a problem experienced in most mining towns and operations in South Africa.



The Measurement and Control Division (MaC) has successfully produced two new machine-vision based prototypes and has been able to overcome the key challenges of finding test sites to install device prototypes for industrial trials. At the end of the year, all MaC's current hardware developments had access to industrial test sites. Although industrial testing of prototypes developed by MaC is proceeding, challenges still remain in terms of ensuring the trials receive uninterrupted process exposure. Mintek has also completed the commissioning of the Minstral submerged-arc furnace controller at a site of a major ferroalloy producer in Kazakhstan, bringing the total at the site to four, a success which has realised foreign revenue in excess of US\$775 000 for South Africa and Mintek.

### Sustainable Development

The Small Scale Mining and Beneficiation division of Mintek, which specifically deals with the promotion of the mineral economies of rural and marginalised communities through technical assistance and skills development, was audited by the Mining Qualifications Authority (MQA) and full accreditation was extended to July 2014 for four training courses. Taking into account the challenge to secure external funding opportunities for the development of new SMME's and training of people in rural and marginalised communities, the SSMB division has completed its revised strategy that will enable it from next year to adopt a new operating structure.

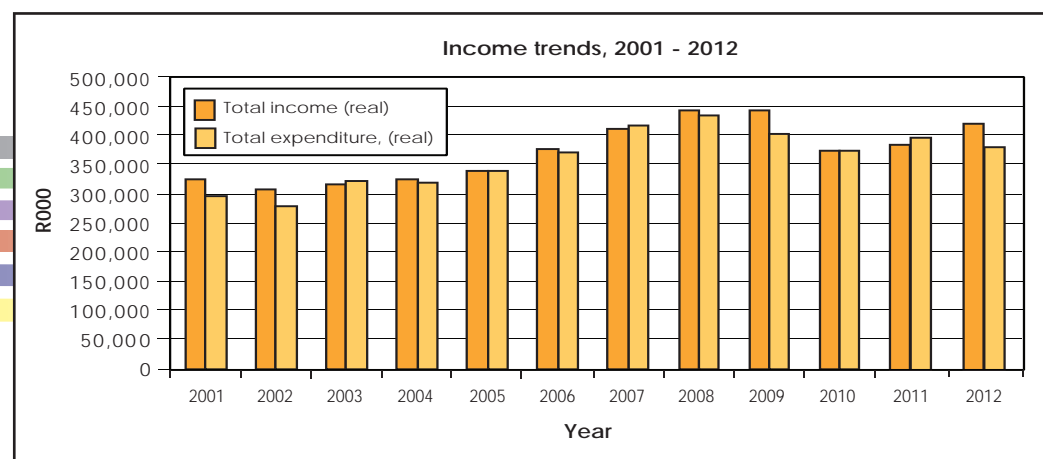
### Mintek Structure as at March 2012

The Department of Mineral Resources' (DMR) derelict and ownerless mines rehabilitation programme continued during this financial year and Mintek, together with the DMR team, reached agreement with local communities on the scope of a number of projects. For the mines rehabilitation project, 115 temporary jobs were created during the year, all within the Northern Cape Province. It is anticipated that next year a further 260 temporary jobs will be created within the Northern Cape and Limpopo Provinces. With these additional jobs and building on the experience of the concluded projects, the projects going forward are expected to be concluded by the end of the three-year contract period entered into between Mintek and the DMR.

### Energy Efficiency

In an effort to reduce our energy footprint, Mintek joined the 49M campaign, the large-scale energy-saving campaign launched by Eskom. The campaign is designed to mobilise South Africans to reduce their power consumption and in so doing to reduce South Africa's carbon footprint.

The electricity utility, together with government, business and labour partners, launched the campaign, highlighting the savings role that can be played by the country's 49-million citizens in stimulating reduction in demand of power. In support of this campaign, effort and measures to achieve an improvement in organisational energy efficiency and savings are being made. In this regard, Mintek has saved 356 kW in energy during the year as a result of the energy saving lights installation. This figure far exceeds the targeted power savings of 200 kW for the year. In addition, power factor correction has been implemented but the savings due to it have not been realised as Bay 2 was not running. However, this is expected to change with the commissioning of the atomiser plant at Bay 2.



### People

Unfortunately, during the third quarter, members of the National Union of Mineworkers (NUM) went on a three-week long protected strike due to a dispute relating to adjustment of salaries for the period 2011/12. The dispute was declared following the stalled negotiations and arbitration at the Commission for Conciliation, Mediation and Arbitration (CCMA). Members of the union accepted the original increase offered and signed the agreement with Mintek and then terminated the strike. A "no work no pay" rule was applied to the striking employees.

The strike had adverse impacts on the outputs of the Minerals Processing, Analytical Services and, to a lesser extent, Hydrometallurgy divisions resulting in backlogs during December and into January.

In recognition that organisational culture is one of the key factors and pillars that determine the success of a company, Mintek launched its values towards the end of the financial year. These values are expected to define a system of shared meaning or mindset that will distinguish Mintek from other organisations. These values will be incorporated into all Mintek's employees' performance contracts.

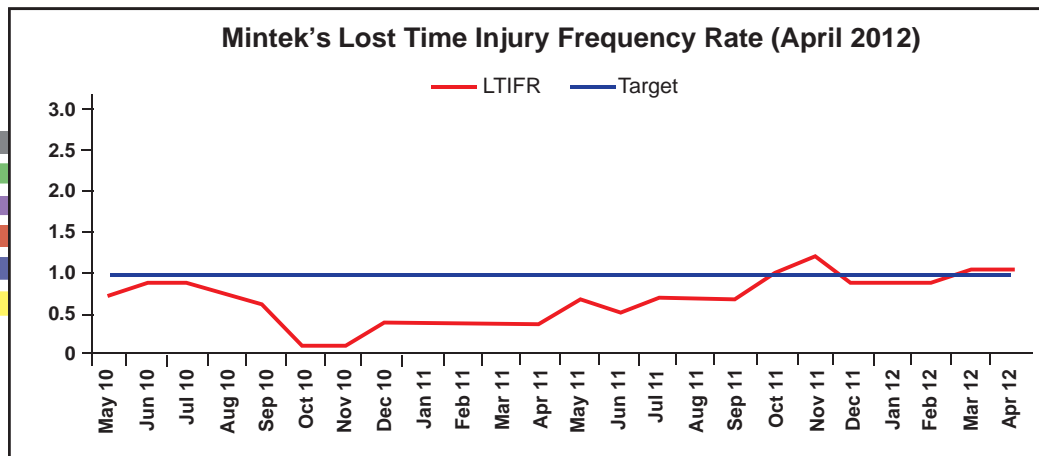
Mintek is determined to develop its new graduate, engineers and scientists as part of its skills development objective. This intervention is in response to the dearth of skills in the mining and minerals processing industries. However, it has been noted that Mintek loses many graduates on average four years after their assumption of employment at the organisation. Mintek has therefore devised a strategy to deal with these challenges, which include the Graduate Development Programme whilst continuing with interventions at high school level which encourage scholars to do Mathematics and Science.

## HIV/AIDS Interventions

In order to prevent the spread of HIV/AIDS, Mintek continues an education drive by means of outreach programmes, awareness events, and a dedicated team of peer educators and counsellors. All employees are encouraged to make use of the voluntary counselling and testing services that are provided through the Mintek Medical Clinic. During the year, the results of the third HIV/AIDS prevalence survey at Mintek, which was conducted at the end of the previous financial year, were released. The study found a stabilisation in the overall infection rate at 8.3%, and a slight decrease in HIV prevalence in the younger staff category. Currently, there are 21 known employees living with HIV/AIDS, 13 of whom are on anti-retroviral treatment (ART) and receive monthly meal supplement packs from the clinic. The remaining eight employees receive immune booster packs and food supplements monthly or as required to sustain their energy levels at work and to boost the immune system. Going forward, Mintek will intensify the ART campaign to ensure that as many employees as possible who require treatment have access to it.

## Quality, Environment, Safety and Health

Mintek unfortunately suffered a total of seven Lost Time Injuries during the year. This has unfortunately caused an increase in the Lost Time Injury Frequency Rate (LTIFR) to the Mintek target of 1. Of major concern is that most of the incidents reported were not directly related to the working environment. The Health Incident Frequency Rate (HIFR) remained at 0. The External Client Dissatisfaction Frequency Rate (CDFR), at 13, exceeds the target of 10 but is a decrease over the previous year. Significant effort continues to be expended in assessing the root causes of the dissatisfaction and we are steadily increasing the number of external clients being surveyed. Mintek remains compliant with all its ISO standards.



## In Conclusion

While the results achieved are worth celebrating, we have to remain vigilant and mindful of the global economic events, especially the ongoing Eurozone crisis, and their possible consequences to the mineral resources sector in South Africa and the world, and ultimately to us as an organisation.

For us to continue being a global player in our field of work, we have to continue concentrating on achieving maximum internal efficiencies, in particular cost control, while we continue to research and explore ways to develop new technology not only to provide the company with new revenue streams, but also to ensure that we reduce costs, increase production and enable divisions to deliver on their key mandate.

Let me take this opportunity to thank the Minister of Mineral Resources, The Honourable Susan Shabangu and the Deputy Minister Godfrey Oliphant, for their guidance and leadership and immense contribution to the successes achieved this year. We also wish to thank Mintek's Board of Directors for their effort and availability to make this year a successful one for Mintek.

Our condolences go to Mr Paul White's family following his passing on in November. We also wish to welcome new Board members – Mr Imraan Patel and Ms Setepane Mohale – who joined the Board during the course of the year. In closing, I thank the Mintek management, staff and all stakeholders, whose sacrifices, hard work and dedication have made this another successful year during my tenure at Mintek. What a turnaround!

**Abiel Mngomezulu**

President and CEO, Mintek

# Performance Against Objectives

## 1. STAKEHOLDER PERSPECTIVE

Key Performance Area/Objective: Enhance Mintek's visibility and credibility to all stakeholders					
Programmes	Measures/Outcome	Performance Indicator	Target	Actual	Comments
<b>Integrated marketing and communication functions</b>	Annually updated marketing and communications plan approved and implemented	Annually updated marketing and communications plan approved and implemented	Updated	1	Plan approved and is being implemented.
<b>Enhancing the visibility and credibility of Mintek</b>	Evidence of enhanced Mintek visibility and credibility as a research institution	# of technical articles in credible publications	26	27	The collective target for papers and conference presentations was achieved. (Not all conferences require papers to be submitted).
		# of papers presented at conferences	39	29	
		# of conference presentations and posters	21	54	
		# of SA Patents registered	2	3	IP discoveries and patents on target. No specific technology transfers, in the form of licensing or sale, occurred. Mainly because of economic uncertainty in the world.
		# of technology transfers	3	0	
		# of discoveries (IPRA)	1	1	
	Attained annual customer satisfaction target	Annual Customer Satisfaction Rating Index	90	87	Late delivery of work on occasion remains the main contributor to client dissatisfaction. This is being addressed.
	Enhanced media exposure	# of media references for Mintek	440	545	Target met.
Enhanced relations with oversight bodies	Annual presentation to Parliament on impact of Mintek's work and role	Presented	2	One presentation each to the NCOP Select Committee and to the Parliamentary Portfolio Committee were done.	
Key Performance Area/Objective: Research and develop efficient mineral processing technologies and value added products and services					
Programmes	Measures/Outcome	Performance Indicator	Target	Actual	Comments
<b>Competitive technologies, products and services for optimal mineral resource utilisation</b>	Develop analytical and mineralogical methods and services, evidenced by reports	# of methods	10	13	Target met.
		# of samples	70,000	60,755	Lower volume of samples was compensated for by higher revenue. Less samples requiring more analysis and time, hence more revenue but less samples completed.
		Rand value (Rm)	R27.8m	R30.6m	
	Develop new technologies under Science Vote funding	# of internal reports	40	62	One of the planned technologies was not researched as the PGM R&D cluster was repriorities in favour of the Hydrometallurgy division.
		# of new technologies	5	4	
		# of prototypes evidenced by reports	4	5	
	Sales of products, plant and equipment	# of units of plant and equipment	4	2	Collectively, sales of equipment and revenue receipts on target. Demand for Minfurn furnaces (targeted under plant units) was lower than anticipated due to slow gold project market recovery.
		# of reports	10	13	
		Rand value of control system sales (Rm)	R18.0m	R25.5m	
		Rand value of CRM sales (Rm)	R3.5m	R3.7m	
Commercial investigations and feasibility studies	# of external reports	119	194	Sector recovery from the recession resulted in a high demand for service work, which Mintek was able to satisfy.	
<b>Beneficiation to value added products and services</b>	Develop applications for precious-, ferrous- and base metals in the areas of: - Biomedicine (HIV, cancer, malaria) - Catalysis (chemical processing, fuel cells, environmental) - Nanotechnology (water, health) - Physical metallurgy R&D and metallurgical industry support	# of internal reports	2	5	Beneficiation-related R&D progressed well and individual targets were exceeded.
		# of external reports	140	204	
	Develop metallurgical processes and products for base-, light- (titanium, magnesium) and ferrous metals	# of internal reports	3	2	There were delays in the equipment modification resulting in delays in testing and reporting within the current financial year.
<b>Supporting the technical requirements of emerging minerals resource companies</b>	Technical assistance	# of reports	10	8	The write-up of two reports was not completed on time.
<b>Providing mineral economic data and consulting services</b>	Mineral scans	# of reports	9	16	Target met.
		# of stakeholder workshops	1	1	

Key Performance Area/Objective: Research and develop green technologies and process to mitigate the impact of mineral development on the environment					
Programmes	Measures/Outcome	Performance Indicator	Target	Actual	Comments
Water efficient processes	Develop water efficient flow sheets to optimise water consumption and enable processing of ore bodies in water stricken areas	# of internal reports	8	5	Certain of the deliverables reported under Waste Management and Recycling below also pertain to this objective. The science vote relating to the said deliverables was also transferred.
		# of external reports	3	3	
Energy efficient processes	Develop energy efficient processes, flow sheets and control technologies that minimise energy consumption and carbon emissions	# of internal reports	10	11	Industry focus on water, energy and waste is increasing and Mintek is well positioned to support sustainable processing in general.
		# of external reports	1	1	
Waste management and recycling	Develop technologies for treating and recycling waste in order to extend mineral resources	# of internal reports	7	9	Certain of the deliverables reported under this objective also address Water Efficient Processing.
		# of external reports	1	1	
	Rehabilitate derelict & ownerless mine sites	# of sites	4	4	Target met.
Key Performance Area/Objective: Promote the mineral-based economies of rural and marginalised communities through technical assistance and skills development					
Programmes	Measures/Outcome	Performance Indicator	Target	Actual	Comments
Development of technologies and strategies relevant to rural and marginalised communities	Establish technologies and strategies relevant to small scale operators, for transfer to rural and marginalised communities	# of technologies adapted	2	2	Target significantly exceeded due to specific effort to stimulate rural business.
		# of technologies developed	2	2	
		# of feasibility reports	3	11	
Economically sustainable businesses created in rural and marginalised communities	Develop and support economically sustainable SMME enterprises	# of new businesses created	10	3	Despite efforts, as evidenced from number of feasibility reports generated and reported above, business creation was restricted due to lack of external funding.
		# of jobs created from new businesses	144	145	Target met.
		% of businesses still in existence after 1 year	73%	100%	All 4 businesses established in 2010 are still in existence.
		% of businesses still in existence after 2 years	60%	70%	32 of 46 businesses established in 2009 still in existence.
Training and skills development interventions in rural and marginalised communities	Provide accredited training in glass bead, jewellery, pottery and brick making, introduction to small scale mining.	# of people trained	300	165	Lack of external funding impacted negatively on the number of people trained.
		Maintain accreditation	Maintained	Maintained	Full accreditation extended to July 2014.
Key Performance Area/Objective: Ensure the short-term viability and long-term sustainability of Mintek					
Programmes	Measures/Outcome	Performance Indicator	Target	Actual	Comments
Improved modern facilities that reflect the image of a world class R&D organisation	Implement infrastructure modernisation according to modernisation plan	Percentage of modernisation plan targets implemented.	Wall Coating of Mintek Premises	Phases 1 - 4 complete	Target achieved
Sustainable funding model secured	A sustainable funding model agreed and implemented	Progress towards an agreed funding model and approach	Develop Model	1	Model developed

## 2. FINANCIAL AND INTERNAL BUSINESS PERSPECTIVE

Key Performance Area/Objective: Uphold good governance practices					
Programmes	Measures/Outcome	Performance Indicator	Target	Actual	Comments
<b>Enhanced fiscal discipline and the effective management of resources</b>	BEE procurement as a % of total discretionary spend	% BEE Spend of total discretionary spend	45%	36.38%	BEE % is lower than expected due to large atomiser capital project, for which non-BEE MDM are the exclusive South African contractor.
	Strengthened Internal Financial Controls	Unqualified audit	Unqualified		Improved audit as per target
		Zero Tolerance on Fraud	RO fraud	RO fraud	
	Sound Debtor Management	% Debtors write off of total revenue	<0.5%	0.2%	Target achieved due to better debt collection.
		Average Debtors Days	<75 days	63 days	
	Total Income	Rand Value (R'000)	406,688	420,886	Target exceeded.
	Net Result (surplus)	Rand Value (R'000)	751	43,437 Surplus	Target exceeded, operating expenditure lower than anticipated and better investment strategies resulting in higher than anticipated investment income.
	Optimal Return on Investment	Rand Value (R'000)	10,000	16,585	Higher returns achieved due to more reserves available for investment.
	Total Capital Expenditure	Rand Value (Including Funding) (R'000)	81,791	70,518	Capital expenditure below that predicted due to negotiated deferred payment schedule for atomiser capital project, which is to Mintek's benefit.
<b>Enhanced organisational efficiencies and energy efficiency</b>	Maintained balance between R&D and Commercial Revenue streams	Ratio of Research / Total Revenue expressed as a %	50%	59%	Target met.
	Maintained balance between TCTC Salary Bill / Total Expenditure	Ratio of TCTC Salary Bill / Total Expenditure expressed as a %	55%	66%	Improved efficiency in other cost elements resulted in increased salary %.
	Enhanced Liquidity Ratio	Liquidity Ratio	≥2.0	2.0	Target met.
	Revenue per head	Total revenue / total # of employees expressed in R/employee	R565 000	R590 000	This indicates improved efficiencies (productivity).
	Improved cash flows from operations	Cash generated from operations after working capital (excluding movements in deferred income) (R'000)	>1,000	58,390	High cash generated from operations due to high inflow of deferred income.
	Continual improvement in organisational energy efficiency - achieve energy saving initiative targets	# of kW saved in energy/power	200 kW	356kW	Savings result from energy saving light installations.
<b>Enhanced Quality, Environment and Safety</b>	QES standards maintained and enhanced	Maintain Mintek accreditation status	Maintained	Maintained	Targets were achieved except for CDFR, which continues to receive attention. Late delivery remains the main contributor to client dissatisfaction. Management is implementing measures to correct this.
		Achieved Target for fatalities	0	0	
		Achieved Target for LTIFR	≤1.0	1.0	
		Achieved Targets for CDFR	<10	13	
<b>Compliance with all national and international regulatory frameworks, and applicable standards</b>	Compliance with appropriate standards, regulations and legislation	% achievement of compliance checklist	92%	100%	Compliance with the PFMA and Treasury regulations was ensured.
<b>Enhanced business integration and organisational effectiveness programme</b>	Development and implementation of ICT Master Plan	Implementation of ICT Master Plan as per agreed milestones	Develop Plan	Phase 1 completed	Implementation of ICT Master Plan on track. Planned RIMS module was deliberately not implemented because it was established that the planned module was not suited to Mintek's needs.
		Implementation of RIMS targets	Grants and Contracts module completed		
	IP Act Compliance	% Compliance to IP Act Prescripts	90%	100%	All requirements were met.

### 3. LEARNING AND GROWTH PERSPECTIVE

Key Performance Area/Objective <b>Build world class R&amp;D excellence</b>					
Programmes	Measures/Outcome	Performance Indicator	Target	Actual	Comments
<b>Human Capital Development, Attraction &amp; Retention</b>  <b>Identify and support potential skills in the scientific and technological fields</b>  <b>Enhanced pipeline of skills available to support the Mintek Mandate</b>	Enhanced Skills Development	WSP Compliance Report	1	1	Training on target.
		Total spend on training expressed as a % of total Payroll spend	>1.50%	1.8%	
	Enhanced relationships with Institutions of Higher Education and other similar organisations.	Number of partnerships in place	10	10	Satisfactory interaction with universities.
		# of Graduate Recruitment Programmes and other Science Events	8	11	Target met.
	Science, Technology, Engineering and Maths (STEM) Promotion	Annual Minquiz competition	1	1	Target met.
	Effective Undergraduate Bursary Programme	# of bursars	80	72	Divisional needs did not require the full 80 undergraduate bursar posts.
		% Undergraduates Absorption Rate	90%	100%	
	Effective Post-graduate Bursary Programme (Masters & PhD)	# of bursars	20	20	Target met.
		% Masters Graduates Absorption Rate	100%	89%	1 of 9 was released as the Industrial partner withdrew.
		% PhD Graduates Absorption Rate	100%	50%	3 of 6 released from Bio-Med due to withdrawal of the Industrial partner.
	Work-Integrated Learning, Studentships and Internship Programmes	# of Candidates employed	45	48	28 of the 48 candidates completed their training during 2011/12. Of these, 3 (11%) were permanently employed.
		% Trainee Absorption Rate	5%	11%	
	Development Programmes for recent graduate scientists & engineers, and for training future career researchers	Graduate Development Programme	pilot	pilot	Pilot programme has been implemented.
Researcher Development Programme		pilot	replaced by EDP	EDP programme initiated. The Programme commenced in April 2012 due to process delays not anticipated previously.	
<b>Transformation of the Mintek Organisation</b>	Employment Equity Report and Plan	Report on compliance with DoL regulations	1	1	Reporting implemented (period 1 Oct 2010 to 30 Sep 2011) and targets achieved.
		Employment Equity targets achieved	80%	84%	
<b>Enhanced Performance Management</b>	Compliance with Performance Management Policy	% Performance Contracts done and signed (for each employee)	100%	100%	All Mintek employees had up to date performance contracts that were used during annual reviews.
		% Performance Assessment done and signed (for each employee)	100%	100%	
<b>Effective skills and knowledge transfer</b>	Enhanced Experience Profile of "Scientists"	Average years of experience in industry of Mintek "Scientists"	3	6	Situation improved - closing of the salary gaps for all Professionals played a key role.
		Average Age of "Scientists" at Mintek	35	34	
	Proportion of Researchers to Total Staff	Proportion expressed as a %	35%	43%	Researcher proficiency plans on track, with Master and PhD programmes receiving strong support. All targets met.
	No. of Staff enrolled for postgraduate (Masters and above) studies	# of Staff enrolled	24	46	
	% of staff with MSc & MEng	% of staff with MSc & MEng	6%	12%	
	% of staff with PhD	% of staff with PhD	6%	6%	
	Enhanced staff Retention & Succession	% Staff Turnover	10%	9.93%	Staff retention has improved generally, but Mintek continues to loose professionals.
		% Staff Turnover of Professionals	4%	4.52%	
		Status in the implementation of the Retention Strategy	In place	1	
	Enhanced Coaching and Mentoring	Status in the implementation of the Coaching and Mentoring strategy and plan	In place	In place	Staff development programmes are in place and progressing well.
	Effective Leadership Development Programme	# of employees benefiting from Leadership Development Programme	15	26	Target met.
Enhanced Employee Health and Wellness Programme	# of Employee Wellness Programme interventions	4	4	Target met.	

# Mintek in Brief

## Profiles of the operating divisions

### 1. THE ADVANCED MATERIALS DIVISION

**(AMD)** develops cost-effective metal-based materials through value-addition to South Africa's most strategic metals and minerals (precious, ferrous and base) for use in the fields of biomedical, catalysis, nanotechnology and metallurgy. AMD is a research orientated division with more than seventy per cent of the permanent staff holding post-graduate degrees.

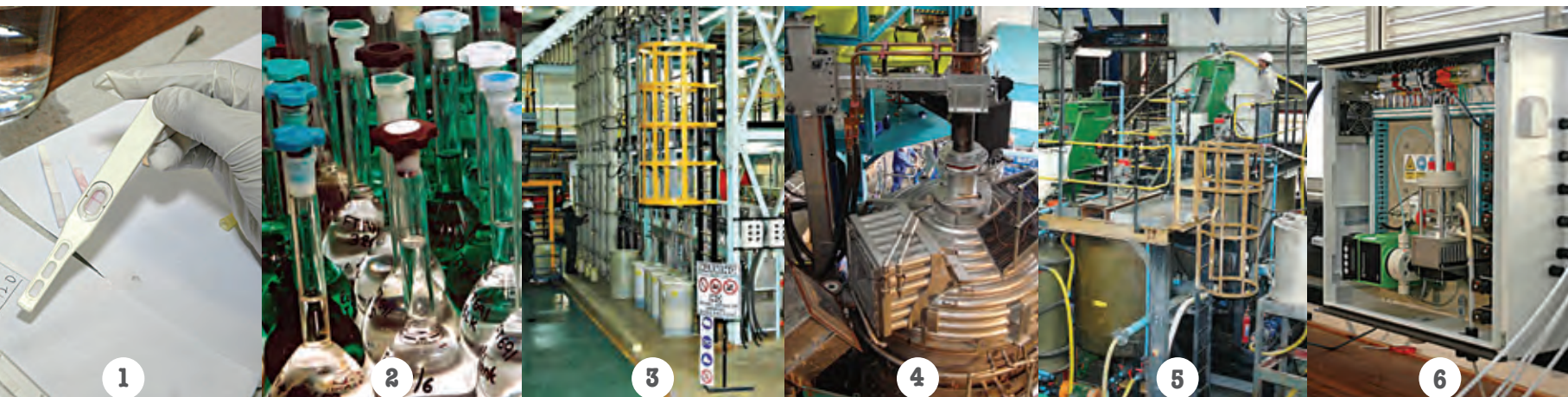
The division has strong interactions with local and international higher education institutes (HEIs), and a healthy bursary pipeline. The division's funding is primarily derived from

ores and concentrate samples to verify their amenability to bio-treatment, the generation of flow diagrams for the conceptualisation of complete processes, and the estimation of the economics of such processes. Much of BIO's commercial projects involve conventional heap leaching test work, geomechanical testing of crushed ore for heap leaching, high-temperature heap bioleaching, the gangue chemistry of heap leaching, and the modeling and simulation of the chemical and physical processes of heap leaching. Although the division has historically had a strong international focus dictated by the location

support, ESD also designs and fabricates engineered equipment and systems based on Mintek technology for external clients. ESD has the responsibility for marketing and implementing a specialised range of Mintek technologies. The division maintains a core group of specialised skills which it supplements with external resources when necessary.

### 5. THE HYDROMETALLURGY DIVISION (HMD)

develops and tests appropriate flowsheets for the recovery and refining of metals from ores and concentrates. General market developments provide the trigger for the



large governmental programmes as well as projects in collaboration with industrial partners.

### 2. THE ANALYTICAL SERVICES DIVISION

**(ASD)** provides analytical support to the other technical divisions at Mintek, as well as high calibre analytical services to external clients in the mining and minerals processing sectors. The division comprises three main service groups, based on different analytical techniques. These are the PGM Group (milling, fire assay and trace-ICP, geared around the determination of the platinum group metals), the Sample Preparation Group (including ICP-OES, ICP-MS and AAS), and the Chemistry and X-Ray Fluorescence Group.

### 3. BIOTECHNOLOGY DIVISION'S (BIO)

activities include the small-scale testing of

of sulphide ores, it has recently expanded its research activities to include topics that are of generic application and are more directly applicable to the South and Southern African needs. Such topics, which include the bioremediation of effluents from mines and processing plants and the biosynthesis of new value-added minerals products and environmentally friendly minerals processing bioreagents, allow greater interaction with other local institutions and broaden the research funding base.

### 4. THE ENGINEERING SUPPORT DIVISION

**(ESD)** primarily supports the other Mintek technical divisions by providing engineering support services which are outside the competency of the routine maintenance function. In addition to providing this internal

development work done. Currently the biggest industry demand for hydrometallurgical test work is around REE, which provides a strong stimulus for further development of novel technologies in these areas. Strategic development focuses on areas considered to be important for the future of sustainable development of South Africa's mineral wealth, for example novel rare earths recovery techniques, the recovery of uranium from low grade ores and acid mine water treatment.

### 6. MEASUREMENT AND CONTROL (MaC)

strives to assist the mineral industry in addressing the challenges of increasingly low grade and complex ores, cost effectiveness, energy efficiency, and minimising impact on the environment through the development of specialised instruments, intelligent process monitoring tools, and dynamic process



optimisation control products. MaC develops, demonstrates, and implements advanced process control technology to enhance the competitiveness and sustainability of flotation, milling, leaching and smelting processes where it is regarded as the world leader. Apart from South Africa, the division has a particularly strong presence in South America (Brazil, Chile, and Mexico), India, and Australia.

**7. THE MINERAL ECONOMICS AND STRATEGY UNIT (MESU)**

provides a selection of services to local industry and state departments, as well as to the other Mintek divisions. The knowledge and skills within the division allows MESU to also provide support services to international agencies, and where required, governments

**9. MINERALOGY (MNL)** applies the principles of mineral characterisation to understand the processing behaviour of those minerals, thus empowering metallurgists and engineers to obtain optimum recovery and grade in mineral beneficiation. Further to this, mineralogical characterisation is applied to geological exploration, mine planning and remediation efforts, such that the entire spectrum of the minerals industry is served by the discipline of applied mineralogy. The division's commercial activities focus on identifying minerals or materials, and interpreting the data with respect to evaluating a deposit, beneficiating the ore, providing vital information for process design, as well as on-going support with mineral industry trouble shooting, analysing metallurgical products, and dealing with environmental issues.

SSMB's beneficiaries include both existing and aspirant small-scale mining operators and crafters that use mineral and metallurgical resources as a raw material. SSMB supports Small, Medium and Micro Enterprises (SMMEs) in the mineral sector by identifying economically viable opportunities, providing access to appropriate technologies, and providing training and incubation.



and companies which operate elsewhere on the continent. MESU provides insight into all parts of the mining and minerals value chain and has competence in facilitating the rehabilitation of derelict and ownerless mines across South Africa.

**8. THE MINERAL PROCESSING DIVISION (MPD)**

undertakes desktop, laboratory and pilot plant scale studies to develop detailed flowsheets for the effective comminution and upgrading of ore to a concentrate or final product. The work falls into the three main disciplines, namely comminution (crushing and milling), physical separation and flotation. The work of the division can be described as falling into two main categories; feasibility tests and incremental improvements to existing plants and flow sheets.

**10. THE PYROMETALLURGY DIVISION (PDD)**

develops new and improved high temperature processes using theoretical calculations, laboratory and pilot plant equipment. A particular area of expertise is the use of DC arc furnaces for the smelting of ores and concentrates. This expertise is supported by a range of pilot plant DC arc furnaces capable of smelting at up to 3 MW continuously over periods exceeding a year and treating up to 20 000 tonnes per annum of feed materials.

**11. SMALL-SCALE MINING AND BENEFICIATION (SSMB)**

is a diverse division of multi-skilled professionals that address issues related to the small-scale mining industry. Areas covered are extractive technologies in small-scale mining, beneficiation of resources, training, sustainability and environmental matters.

# Research, Development and Technology

MINTEK PROVIDES WORLD-CLASS RESEARCH AND DEVELOPMENT (R&D) expertise, testwork, and process optimisation for the precious and base metals, ferrous metals and alloys, industrial minerals, rare metals and uranium sectors in South Africa and internationally. The activities range from initial bench-top investigations to full process flowsheet development and the design, construction, commissioning, and optimisation of industrial plants.

Mintek is strongly committed to delivering high-quality results within strict schedules. To this end, our engineers, scientists and technicians work in close liaison with clients and their engineering contractors, who are encouraged to actively participate in project planning and testwork. This interaction enables clients to discuss issues as development work moves forward, and increases Mintek's own capabilities by drawing attention to areas that require focused and applied R&D. The newly acquired knowledge is then fed back into client-oriented services.

Mintek also undertakes medium- and long-term strategic applied R&D, which is aimed at building the organisation's science and technological base and developing new technologies and products for the benefit of the mining industry. This activity is funded mainly by the State Parliamentary Grant to Mintek as a Science Council, and also through supplementary sources such as bilateral agreements and other funding and donor agencies. Most of the projects in this category are undertaken as joint ventures or in collaboration with other research institutions, universities, professional bodies and industry partners locally and internationally.

Mintek regards participation in European Union Framework research programmes as being a very attractive, long-term collaborative research opportunity – providing access to an international research network and source of R&D funding. To this end, Mintek is participating in two FP7 mineral processing project proposals.

partnership with AnGoGold Ashanti since 2000, aims to research and increase the industrial usage of gold through application of gold-based catalysts. Its focus continued to be centered on the use of gold catalysts in emission control, fine chemicals production and petrochemical applications. Significant effort has been maintained in the development of an EN403 compliant fire escape gas mask in collaboration with Mintek's commercial partner Spirotek. Capitalising on the learning gained from the EN403 mask, other types of gas masks such as wild fire gas masks, are now being targeted for development. Notable progress has been made in the scale-up of gold catalyst wash-coated ceramic monoliths. These catalysts will ultimately form Mintek's AUROLith range and will complement the existing commercial AUROLite™ catalysts that are distributed globally by United States based commercial partner, STREM Chemicals Inc. Mintek aims to attract further industrial partnership for AuTEK and much



From left:

Nanotechnology SEM

The Advanced Leach Facility (ALF), which uses a technique that forms a key part of the gold test-work service.

A scientist using handheld potentiostat for field-testing.

Mintek was successful in securing R150-million of medium-term expenditure framework (MTEF) funding, for the 2012/13 – 2014/15 period, for five key projects, namely:

- ▶ production of semi-precious gemstones in the Northern Cape;
- ▶ a rare earths element pilot plant;
- ▶ a metal atomising demonstration plant;
- ▶ a facility focusing on mining effluents;
- ▶ the upgrade of the Mintek infrastructure.

## GOLD INDUSTRY

The development of gold projects, especially in West Africa, has generated interest in the advanced diagnostic leach capability developed at Mintek. The Hydrometallurgy Division at Mintek developed the Advanced Leach Facility, which uses a technique that is now set to form a key part of the gold test-work service and the strong demand for this service means that the capacity of this facility has to be increased by 300%.

## Catalysis

Project AuTEK Catalysis, which is a public-private

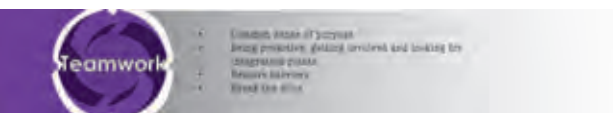
effort has been made into developing a number of value propositions. These include a proposal to convert ethanol and glycerol oxidation to value added products, which have been presented to several international and local industries. In a collaboration initiated this year, a series of catalyst supports was sent to Oak Ridge National Lab in the United States. The aim is to understand certain aspects of gold catalyst deactivation. During the year, a total of 19 kg of gold catalyst was ordered by an industrial application developer.

## Resin-in-pulp for Gold Tailings

On the back of the successful demonstration of resin-in-pulp for uranium processing, the focus of this technology has now shifted to the economically important elements of this process such as acid and ferric production as well as the maximisation of gold recovery. A particular interest is to develop more cost effective technologies that would render more South African primary uranium deposits and existing gold slimes dams economically viable.

## Nanoscience and Nanotechnology

The DST/Mintek Nanotechnology Innovation Centre



(NIC) comprises of three science councils (Mintek, Medical Research Council (MRC) and the Water Research Commission (WRC)), and three University nodes (Rhodes University, University of the Western Cape and University of Johannesburg). The NIC supports the national system of innovation and encourages the flow of technology and information among people, enterprises and institutions as key to the innovative process. The NIC addresses issues of national importance including the development of research platforms, encouraging and promoting the formation of both local and international collaborative networks, addressing human capital development and bridging the innovation chasm.

The NIC develops various nanostructured materials and use them as systems or tools for health (diagnostic and therapeutics) and water (monitoring and treatment) applications, which fit within the social cluster of the national nanotechnology strategy. During the past year, various nanostructured materials including nanofibers, nanotubes, nanocomposites and nanoparticles were produced and some were modelled in partnership with the Centre of High Performance Computing to understand their behaviour. Scaling up of gold nanoparticles reached 40L and more than 100L of gold

under the Category: Research for innovation by a team or individual in a corporate organisation or institution.

The NIC hosted a large number of visitors from overseas institutions, which includes Buffalo University (USA), Manchester Metropolitan University (UK), University of Massachusetts (USA), Oxford University (UK), University of Liverpool (UK), Universität Duisburg-Essen (Germany), and a delegation from Taiwan led by their Deputy Minister of Science and Technology. In addition, the centre hosted a high level delegation from the K.S. Rangasamy College of Technologies (KSRTC) Nano Centre in India with whom a MoU was signed for joint research on nanominerals

### Metal-based Therapies for Cancer, HIV and Malaria

The Biomed group has continued to expand research activities to other metal centers in addition to gold. Since its inception in 2002, Biomed has grown from a programme focused on gold-based therapies for cancer to a diverse research team investigating metal-based therapies for cancer and HIV.

In total, more than 100 compounds were chemically

screened in a semi-high throughput manner.

### Physical Metallurgy

The R&D activities of the Physical Metallurgy Group are classed into three broad categories, namely, the Ferrous and Base Metals Network (FMDN) of the Department of Science and Technology's Advanced Metals Initiative Programme (DST-AMI), technology assistance to the foundry industry under the DST's Technology Assistance Programme (DST-TAP) and general technology assistance to the metals-related industries carried out under the Metals Technology Centre (MTC).

Under the AMI-FMDN programme, remarkable progress was made under the Metal Dusting and Lightweight Steels sub-programmes during the past financial year. Key industry collaborators were brought into the programme such that the on-going research is optimally aligned with the pertinent materials-related challenges in both the petrochemical and transportation industries. This collaborative alignment with industry has enabled the formulation of relevant R&D projects with Higher Education Institutions (HEIs), notably, the University of the Witwatersrand, the University of Pretoria, Vaal University of Technology and the University of



nanoparticles have been shipped to Germany as part of the Organisation for Economic Co-operation and Development toxicology sponsorship programme. The Water Unit has demonstrated the capacity to develop and scale up bead filter systems for water treatment. Whereas the membrane filter systems developed by either modifying commercial membranes or those produced in-house are further optimised. The Sensors Unit filed a patent on novel fibres (LuTTPc) and the development of Measle Sensor prototype reached the proof-of-concept stage. The Biolabels group developed and tested some therapeutic systems at the pre-clinical stage, and optimised lateral flow diagnostic prototypes.

In addressing human capital development in the NIC, a total of 16 students (7 Hons, 7 MSc, 2 PhD) graduated out of the 53 students registered (7 Honours, 19 MSc, 22 PhD) and five Post-doctoral fellows. Several Mintek researchers and students received special training in the UK, USA and India towards further skills and technology development. The NIC produced during the past year 87 papers (including two book chapters) published in ISI journals. In addition, NIC researchers and students received nine international awards and the Biolabels development group was a 2011 NSTF-BHP Billiton finalist

synthesised and tested for biological activity in the past year. Of these tested compounds, eight potential HIV-1 inhibitors were identified and have undergone in-depth analysis; with one compound demonstrating useful activity against HIV-1 integrase. Based on these findings, the design of second generation compounds has been initiated and will be pursued over the next financial year.

Research aimed at cancer drug discovery within the Biomed group has focused on the modification of a promising lead inhibitor. This compound successfully reached an advanced preclinical stage of investigation through partnership with the National Cancer Institute in the United States but fell short of the exacting requirements needed to transverse further through the drug development pipeline. Over the past year, efforts were aimed at overcoming the limitations of the compound, with more work required to ensure suitability of the compound. To expedite the entire in-house drug discovery process, the Biomed group has constructed a new synthesis facility. Furthermore, a large commercial compound library was purchased to complement the automated robotic system previously acquired. Already, two biological assays have been adapted to the robotic platform, through which the compound library will be

*From left;*

*The Biomed research team investigates metal-based therapies for cancer, HIV and malaria.*

*A scientist busy in the Mintek catalysis laboratory.*

*The Nanotechnology Innovation Centre (NIC) boasts a new centrifuge machine.*

*A Biomed scientist working in the Biosafety Level II flowhood.*

Johannesburg, where papers and presentations were made at a number of local and international conferences. The AMI-FMDN programme has been extended to 2014 with a view of expanding collaborative platforms with other metals-related sectors and HEIs.

Under the DST-TAP programme, Mintek continued to work closely with foundries in order to improve their technological competitiveness. During the past year, three major outcomes were realised. Mintek hosted a well-attended five-day workshop on Metallography for the Foundry Industry. The workshop was presented by Mr George van der Voort, a world-renowned metallurgist. Secondly, Mintek was able to identify, jointly with the foundries, a number of technical areas that have the potential of being upgraded into R&D programmes. These projects are likely to be executed with the foundry industry under the auspices of the National Foundry Technology Network (NFTN) – a Department of Trade and Industry entity. The last spin-off from the DST-TAP programme is the human capital development programme linked to the DST-TAP funded foundries. This programme focused on the N.Dip, B.Tech and M.Tech students that will be placed at foundries in order to

acquire experiential training. The ultimate goal of this programme is to improve the employment opportunities of these candidates in the foundry industry, with the additional benefit of concurrently elevating the average skill levels in this industry to those approximate with their international competitors.

The MTC programme continues to make a difference in the broader metals-related industries where it continues to offer general and specialised corrosion services, such as hydrogen-induced cracking (HIC) testing. Through the MTC's service excellence in HIC testing, it has positioned itself as the sole provider of this service in South Africa. The other area where the MTC has distinguished itself is in grinding media quality control (QC) services. This service offering to the mining industry continues to grow at a rapid pace where Mintek is now offering on-going grinding media QC services to two international mining companies, in addition to the ad-hoc projects. Some of the short-term service work projects have matured into fully fledged R&D projects that are being executed jointly with industry partners. The indication is that this service will expand in the next financial year as the MTC continues to receive

of a UG2 database, which can be used to compare the performance of new ores to operations situated nearby. At the development stage is a flotation simulator, which is currently being refined for prediction of continuous flotation performance using batch data. A successful process for waste water treatment in PGM refinery flowsheet using specially adapted ion exchange fibres has been developed and Mintek is experimenting on the different commercial models for this technology.

### Flotation Testwork

Flotation testwork for the PGM and Base Metal industry has continued. With the Democratic Republic of Congo closing down on the export of unbeneficiated material, further work has been required on potential base metal upgrading options. The metallurgical testwork design is dependent on the mineralogy and processing options available. There has also been a renewed interest into the flotation of graphite, phosphate and PGM's from chromite (LG and MG reefs).

### Sensor-based Sorting

Mintek undertook an extensive programme of tests



*From left:*

*Bay 2 pilot-plant furnace and drying plant being constructed to test a client's platinum smelters.*

*Uranium leach testwork.*

*The MetRIX uranium pilot-plant.*

*Platinum flotation pilot plant in Bay 4, Mintek.*

similar requests for this service from both South African and international mining companies. The MTC continues to be an appropriate training ground for new staff and interns in the Physical Metallurgy Group. The MTC provides these trainees with a unique opportunity to be exposed to a myriad of diverse metals-related projects at any given time. The interns that eventually leave Mintek upon completion of their experiential tenures continue to secure employment in some of the top companies in South Africa

## PLATINUM GROUP METALS (PGMs) INDUSTRY

### UG2 Reef Ore Characterisation

South Africa is the foremost producer of Platinum Group Elements (PGEs) in the world and this is due to a massive resource base of the Bushveld Complex. Over the last three years Mintek has carried out extensive testwork at laboratory scale for characterisation of UG2 Reef ores. To date, over 50 UG2 samples have been collected from across the Bushveld Complex and characterised at laboratory scale to determine the PGM rate of recovery. This has resulted in the development

using a large range of Platreef PGM samples as part of the on-going research into the use of sensor based sorting. This is expected to develop benchmark data for the various ore types and has significant potential to lower the cut-off grade of Platreef deposits, significantly enhancing the available resources. Water and energy efficiency are regarded as important industry drivers going forward and Mintek is embarking on a strategy to develop itself as a 'centre of excellence' in this area. Mintek regards sensor ore sorting as one of the most important future technology shifts because of the benefits it offers to more complete resource utilisation and reduced energy and water consumption. The tests are made with a view to reducing water consumption within various plant flowsheets by upfront dry waste rejection and reducing size of existing plants by reducing plant feed tonnages.

### Atomising Plant at Bay 2

Mintek is commissioning another demonstration project at a capital cost of R44-million in collaboration with Anglo American Platinum. Once in operation the 12 tonnes per day atomiser plant is expected to run for at least 24 months. The atomisation plant is a further

development of the successful ConRoast technology. Once commissioned the plant will be run in conjunction with the Bay 2 furnace and drying plant treating Anglo American Platinum's revert tailings material from the company's platinum smelters. The material will be processed on a toll treatment basis, a development which has enabled Mintek to rehire 20 of the 39 workers who were retrenched as a result of the global financial slump in 2010.

### Participation in Beneficiation Strategy

Mintek continues to participate in the Department of Mineral Resources' (DMR) beneficiation strategy of 10 identified mineral commodities and has participated in two technical reports on steel inputs (chrome, iron ore) and autocatalytic converters and diesel particulates in the platinum industry. Mintek is also engaging with Department of Trade and Industry (DTI) on project implementation and has already forwarded a list of project proposals to date to be evaluated by DTI team.

### Fuel Cell Catalysts

The HySA Catalysis Competence Centre has completed the initial phase of bench-top scale-up of fuel cell

kilogram scale preparation. The aim of the AMI-PMDN catalyst programme is to establish a competitive PGM catalysts and chemicals industry in South Africa and in this regard the DST has awarded Mintek a contract to undertake a comprehensive (in stages) market/technoeconomic/prefeasibility study.

### URANIUM INDUSTRY

It is one of Mintek's priorities to develop cost effective technologies for uranium extraction from southern African sandstone-hosted deposits, and from the existing gold slimes dams. Although South Africa holds about 7 per cent of the world's uranium resources, it only produces around 1 per cent of total global production. With over 30 years of expertise in uranium processing, Mintek is reestablishing its reputation as a world leader in uranium hydrometallurgy.

The data collected from the operation of the MetRIX resin-in-pulp (RIP) demonstration plant on a Harmony mine site in 2011 has confirmed the metallurgical performance of the RIP technology on production scale and has therefore established an important building block in a radical new approach to uranium processing.

cutting edge for testing ores for heap leaching. Mintek has signed a memorandum of understanding with the Tshwane University of Technology to collaborate in terms of data sharing for development of a mathematical model and heap leach simulation. This will also enable Mintek to diversify its activities into waste and effluent for environmental protection, in order to prevent pollution and allow for remediation. A database of potential projects has been created and a special laboratory for water analysis is being planned in an effort to develop expertise to recover water.

### FERROUS METALS INDUSTRY

African iron ore deposits have been of prime interest during the year and there was a consequent demand for testwork into such deposits. The main aim of testwork conducted to date was to characterise the samples received by size and density to determine the ultimate product yields, iron grades and recoveries expected. In addition a degree of variability between samples, regarding size distribution and iron content was established. Detailed scoping testwork was undertaken evaluating the performance of various unit operations including Jigs and Dense Medium Separators as well as



catalysts. These materials have shown parity in performance, ex situ of a fuel cell, with commercially available benchmark catalysts and are now being validated in fuel cell tests. Testing in both high and low temperature PEM fuel cell membrane electrode assemblies (MEA) is underway at the University of the Western Cape and the University of Cape Town respectively. Scale-up of PtRu/C catalyst for direct methanol fuel cells is also under development, but good progress has been made in developing the test protocols for direct methanol MEAs where Mintek has achieved the claimed peak power using commercial MEAs. This advancement provided a good benchmark for Mintek to develop direct methanol MEAs going forward. The first Mintek MEA was subsequently fabricated but significant work is still required to achieve parity with commercially available MEAs.

### PGM Catalyst Scale-up

Progress in PGM catalyst scale-up under the DST sponsored Advanced Metals Initiative (AMI) – Precious Metals Development Network (PMDN) programme has been good and several palladium based catalysts have been prepared at laboratory scale and will be taken to

The focus of the technology has now moved to economically important elements of this process such as acid and ferric production as well as the maximisation of gold recovery, while marketing the technology to prospective users for uranium processing.

On the back of the successful demonstration of the MetRIX technology, two exciting base metal resin-in-pulp process applications for dump material are currently under investigation. Provisional patent applications for uranium recovery resin-in-pulp (RIP) circuits at elevated pH, direct electro-winning of cobalt as well as the regeneration of  $Mg(OH)_2$  for base metal recovery have been made. These technologies have the potential to make significant advances in the processing of uranium and base metals. Mintek's primary goal is to develop more cost effective technologies that would render more South African primary uranium deposits and existing gold slimes dams economically viable.

In this regard, Mintek has acquired new equipment, which is expected to enhance uranium exploration as it allows for low grade uranium ore to be tested. It also enables gangue chemistry research for heap leaching. This development takes Mintek forward in being at the

*From left:*

*Uranium froth.*

*A Uranium pilot plant being constructed at Mintek.*

*Uranex leaching done at Mintek's laboratory.*

*Uranex Bahi samples.*

magnetic separation versus gravity on the fines. Further feasibility testwork for Indian iron ore has started and will be concluded in 2012/13.

## RARE EARTHS AND PHOSPHATE INDUSTRY

Immense growth in terms of phosphate activity resulted in numerous phosphate projects being secured. The predominant focus of these activities has been physical beneficiation and gangue removal for direct fertiliser application or alternatively acid production. Scoping as well as feasibility studies have been undertaken progressively leading on to bankable campaigns.

Mintek is one of the leaders in rare earth element (REE) metallurgy, having patented treatment processes for rare earths metals production and successfully run pilot plant scale operations over the last 25 years. Mintek has also developed separation and refining processes for REE salts from gypsum tailings, which were successful at pilot plant level, with the product range including high purity cerium and europium oxides (95% to 98%), neodymium oxide as well as mixtures of light, medium and heavy oxides. In light of the current market dynamics and the presence of high concentrations of

REEs at the Steenkampskraal Mine in the Western Cape and Wigu Hill in Tanzania, Mintek is presented with an opportunity to resume R&D activities related to identifying additional treatment and refining processes, broadening the product range and increasing product purities to suit market requirements.

In terms of development of rare earths refining flowsheet, Mintek is busy integrating work that was done since the 1970s to develop an integrated flowsheet. There is an enormous interest in REE work and this has put Mintek in an advantageous position to exploit the interest on REE production in South Africa. It enables the company to be a technology partner of choice for any producer of rare earths in southern Africa.

### African Hub at Mintek

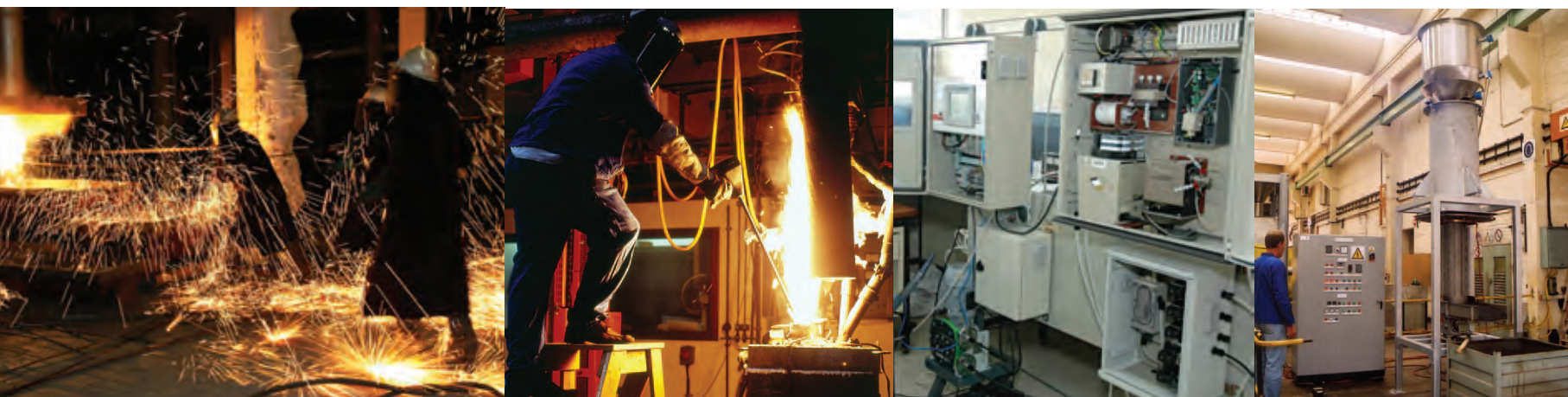
The R&D priority over the next 10 to 20 years is to establish an African 'hub' at Mintek around the refining of REEs. REEs have been afforded strategic mineral status by many countries due to their use in many high-tech 'green' technologies, their limited supply in high concentrations, and increasing concerns regarding future security of supply from China – the leading global

client is now in a position to implement the improved process on their existing plant. This technology can be applied to platinum smelters since the processes involved also emit SO<sub>2</sub>.

A process flowsheet was developed to treat a low grade nickel laterite to produce a Fe-Ni-Co alloy suitable for further hydrometallurgical refining. The critical converting step was tested in a laboratory scale induction furnace to validate the process assumptions. Good agreement with the theoretical prediction was achieved and the technical feasibility of the process was established, although further work is needed on the refractory consumption.

Mintek has also acquired a plant, which enables the organisation to offer a complete new suite of services to clients, as an extension to the current offering. This facility enables the organisation to create and test new process pathways for base metals and uranium (from gold tailings).

A two-year high-temperature heap bioleaching project undertaken for BHP Billiton Base Metals was concluded in December 2011. It was highly successful technically



From left:

*Tapping of ferrous metals.*

*DC-arc furnace.*

*The Matrix Cynoprobe is able to measure cyanide over a wide range of concentrations, including at environmental levels.*

*The Minfurn carbon regeneration furnace prototype is for investigating the effects of steam injection on enhancing the carbon regeneration and re-activation processes.*

producer of rare earth products. Due to their similarity in terms of chemical properties, particularly amongst the lanthanoid elements, the processing and refining of REEs is a highly capital- and technology-intensive activity. The industry is also characterised by long start-up times, limited recycling potential, and a very narrow/concentrated supply chain.

In essence, as general market trends provide a stimulus for hydrometallurgical test work, the interest in REE processing in Southern Africa has resulted in a major commercial and contract research work. Mintek is currently doing the process development for five major REE projects in Southern Africa.

### BASE METALS

A pilot test on the smelting of nickel calcine was successfully completed at the Bay 1 DC arc furnace. The test was aimed at achieving a reduction in SO<sub>2</sub> emissions and built on the preliminary results from an earlier test programme. At least four tests have been successfully conducted over the last three years to prove the process in terms of the environmental standards in Canada. The target SO<sub>2</sub> levels were comfortably achieved and the

in demonstrating that heat accumulation and copper extraction could be controlled within the desired range, and commercially in providing a consistent commercial revenue stream.

The mineralogical characterisation of base metal sulfide (BMS) minerals in the Bushveld Complex ores using the Smart PI™ system has been successfully achieved. Information derived includes the relative abundance of BMS minerals, their basic mode of occurrence, grain size and liberation information. The additional functionality of the Smart PI™ system provides Mintek with additional capacity for analysis of local PGM bearing ores. The Small-Scale Mining and Beneficiation (SSMB) division successfully completed its R&D projects which have led to the development of two new technologies. The first was a technique for the removal of metals such as chromium, copper and nickel from polluted water (using cellulose acetate as a membrane). These metals are emitted into the river streams by certain mining and industrial processes. The second was the development of a technique for the conversion of fluorapatite to hydroxyapatite which can be used as a supplement (fertiliser) in phosphate deficient soil.

# Operations and Development

## The Minstral Submerged-arc Furnace Controller

Kazakhstan is the second largest producer of ferrochrome alloys after South Africa, and has therefore been a prime marketing target for over a decade for Mintek's world-renowned resistance-based controller for submerged-arc ferroalloy furnaces, the Minstral. In 2009, after years of marketing and lengthy contract negotiations, Mintek commissioned the first Minstral submerged-arc furnace controller in Kazakhstan on a trial basis on a furnace at Kazchrome, a major ferro-alloy producer in Kazakhstan. The Minstral was installed on the largest of the furnaces at Kazchrome's Aksu plant. This plant has become one of the largest and most exclusive ferroalloy plants in the world. The plant's design capacity is 1-million tonnes of

June 2012. This will bring a total of Minfurn units installed on various sites across the globe to 21 since 1992 when the first one was commissioned.

The marketing of the Minfurn carbon regeneration furnace is expected to be intensified with a specific focus on application of the product in the gold sector, which is a tried and tested market in terms of this product. Even though the product can be applied to a number of sectors, currently all but one of the 19 furnaces that have been installed are in the gold sector.

## Biomed Synthesis Laboratory

During the 2011/2012 period, the Biomed group was successful in leveraging additional funds to support the research activities of the group. Specifically, funding was acquired through various sources

calculated data such as elemental chemistry, rock matrix density or grade-recovery curves, are based on hundreds of thousands of underlying individual measurements and mineral classifications.

The instrument excels at consistent and robust data acquisition from a wide variety of sample types, combined with a versatile mineral identification process and powerful, versatile data analysis and reporting functionality. Many of the acquisition and analysis routines have been inspired by standard optical petrography methods such as point counting and linear intercepts. The results are high spatial resolution petrographic images that are intuitive and readily accessible to a wide range of professions outside the laboratory. The images form the basis of subsequent image or particle-by-particle textural, mineralogical, chemical or associated data analysis.



ferroalloys per year, and employs over 6,000 people. The combined production complex includes four ferroalloy workshops and 26 electric furnaces. The largest South African ferroalloy plants typically have a maximum of six furnaces per plant. The initial trial was successful and Kazchrome subsequently purchased the controller. Soon thereafter, Kazchrome requested a further three Minstrals to fully outfit their Shop No 6, the largest and most prized smelting shop on the massive plant. In October 2011, Mintek engineers completed the commissioning of these controllers on the 63 MVA furnaces, bringing the total to four.

## Minfurn Carbon Regeneration Furnace

Mintek has successfully shipped two Minfurn carbon regeneration furnaces to Purac America and the two facilities are expected to be commissioned by

including the National Research Foundation (NRF), DST and COST D39 grants. Securing long-term investment remains a priority challenge for the group going forward. Construction of the new Biomed Synthesis laboratory has been completed and the laboratory is now operational.

## New Instruments for Mineralogical Research

The Mineralogy Division (MNL) has commissioned two new instruments at a total cost of R9-million, which are expected to improve efficiencies in the division and also reduce turnaround times, namely; a Bruker D8 Advance X-Ray Diffractometer, which was commissioned in the fourth quarter of the year at a cost of R2,5-million and a Qemscan Field electron emission gun (FEG), which was also commissioned in the fourth quarter at R6,5-million.

The Qemscan FEG's advanced software automation enables unattended data acquisition. Basic system output such as modal mineralogy, grain sizes, mineral associations, mineral liberation and 2D porosity, or

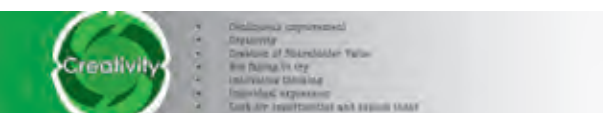
*From left:*

*Minstral submerged-arc furnace controller.*

*Minfurn carbon regeneration furnace.*

*Construction of the new Biomed Synthesis laboratory has been completed and the laboratory is now operational.*

*New instruments for the Mineralogy Division, namely a Bruker D8 Advance X-Ray Diffractometer, which was commissioned in the fourth quarter of the year and a Qemscan FEG, which was also commissioned in the fourth quarter.*



The X-ray diffractometer is also expected to provide data for many of Mintek's projects and as such, provides valuable information to complement optical and scanning electron microscopy data.

The new instrument has now been commissioned, and is currently fully utilised, has the capacity to run up to 90 samples in automated mode, with analytical times decreased to a quarter of the time taken with the old instrument. This is owed to the modern Lynxeye detector in the Bragg Brentano configuration, which allows rapid analysis of powdered samples. Data quality is also significantly improved owing to superior counting statistics with the new instrument.

In addition to the hardware, improvements have been made to the data evaluation software, with access to the latest updated PDF databases to enhance phase matching success. Two other pieces of software to be commissioned: TOPAS and POLYSNAP, will allow quantitative mineralogical offerings on selected ore types, and cluster analysis to assess

ore variability, respectively. The use of TOPAS has provided good quantitative data in the past, but was hampered by data quality and long turnaround times. The latest version of TOPAS, complemented with the updated hardware technology, opens the door to provide quantitative mineral abundance data to compete with those currently provided by automated SEM technology, and where suitably successful, will provide a cheaper, faster alternative. The use of POLYSNAP will provide rapid assessment of ore variability in terms of bulk mineralogical composition, thus empowering Mintek's internal and external clients in smart decision-making for optimal, cost-effective, metallurgical sampling.

At the Analytical Services Division (ASD), two instruments were procured, namely an inductively coupled mass spectrometer (ICP-MS), which has been commissioned and is producing good results at very low concentration levels and a radial/axial inductively coupled optical emission spectrometer (ICP-OES), which will improve turnaround times as it

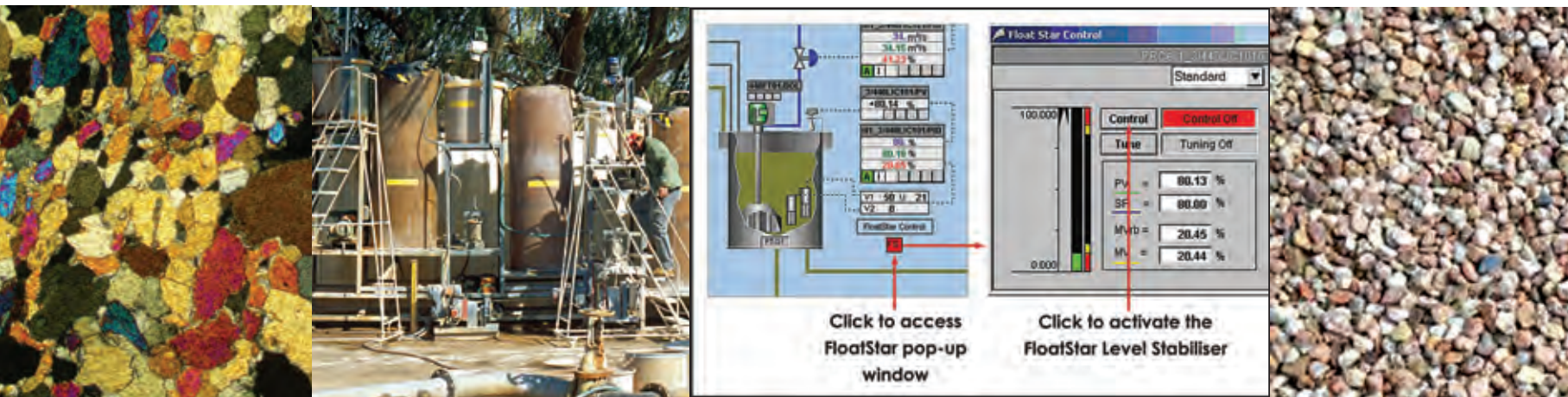
enrichment of trace elements and large platelet sizes. Unfortunately these differences and similarities are too subtle to fully distinguish the diamonds, unless more distinguishing fingerprinting features can be uncovered. Mintek participated in the Kimberley Process Intersessional Meeting in Kinshasa, Democratic Republic of Congo.

### SAVMIN™ Technology

Mintek has received funding to develop, build and test a demonstration water treatment plant using the SAVMIN™ process. A partnership agreement was signed with Veolia Water Solutions & Technologies South Africa, a commercial partner to assist with process engineering and marketing of the technology. Mintek developed the SAVMIN™ process during the 1990's for the treatment of Acid Mine Drainage and it is the recent focus on this phenomenon that stimulated the re-evaluation of this technology.

### Floatstar Flotation Control Package

Mintek's world renowned FloatStar flotation control



From left:

*Micrograph crystals*

*Mintek developed the SAVMIN™ process for the treatment of Acid Mine Drainage.*

*FloatStar schematic.*

*Crushed chromite.*

will be able to analyse both trace and minor elements simultaneously.

### Diamond Provenance Research

This research project, which is funded by the South African Diamond and Precious Metals Regulator (SADPMR) is aimed at developing a method for determining the geological source of rough alluvial diamond, based on a combination of their physical characteristics and trace element signatures. The SADPMR-Mintek Diamond Provenance laboratory opened in 2009.

In terms of diamond provenance, eight provenance regimes have been completed to date. The characterisation work that has taken place for the three diamond parcels from Jagersfontein, Orapa and Williamson has confirmed that there are some subtle differences and similarities between the parcels. Distinct similarities can be observed in terms of the morphological description of the Jagersfontein and Orapa parcels. The Williamson diamond parcel is characterised by its lack of

package scored another major achievement in 2011/12 with a very successful implementation on one of Vale's iron ore plants in Brazil. FloatStar's success in the past has mainly been drawn from its application on PGM concentrator plants, and to a lesser extent some base metal concentrators, where its stabilisation of the pulp levels in the flotation cells results in improved grades and recoveries. The success of the Vale implementation opens the door to iron ore application, moreover within one of the world's largest iron ore producers.

### Cliffs Chromite Project

Apart from the vast experience that Mintek has derived over the years in terms of South African chrome processing, Mintek was approached by Cliffs Natural Resources to conduct a bench scale study on the upgradability of a Canadian chrome deposit. The testwork programme entailed coarse and fines processing of the chromite drill cores with the ultimate aim of developing a processing flowsheet yielding optimum grade and recovery of chromite to common market specifications. Currently additional



pilot scale work is being conducted to affirm previous tests undertaken as well as to evaluate the pros and cons of various circuit configurations.

The work conducted further led to pilot metallurgical upgrade and downstream pyrometallurgical chrome smelting of 175 tonnes of chromite, benchmarked with South African chromite, about 30 tonnes in total. The report is at a bankable feasibility study level.

### DC Arc Smelting

Mintek has completed two large pilot smelting tests in the Bay 1 DC arc furnace smelting facility involving the smelting of 300 tonnes and 100 tonnes of concentrate. A two week pilot plant campaign was completed in Bay 1 during which 107 tonnes of a low-grade ilmenite were smelted to pig iron and high titania slag. The target grade of 80% TiO<sub>2</sub> was comfortably exceeded and grades of 90% were consistently achieved. The client was very satisfied with the technical outcome and the quality of the work done. The feasibility of operating a self-baking

furnace (SAF) to detect and accurately measure the individual electrode slips safely from a distance away from the harsh environment around the electrode columns. Electrode slip is a critical measurement required by furnace operators to ensure the electrodes are maintained at the correct lengths, which otherwise results in massive losses in power and poor energy efficiency of these SAF's that are used extensively throughout South Africa in the production of ferroalloys. Traditional mechanical wheel-based instruments fail frequently as a result of being burnt by flames and explosions rising up from the furnace or suffer from electrical failure as a result of being in contact with the electrode which often carries currents in excess of 100kA.

The second prototype, FloCam, remotely "watches" the levels of froth in individual flotation cells to detect whether the level of the pulp and froth in each cell is sufficient to produce concentrate. If a cell is not producing concentrate, it is effectively useless, and the efficiency of the entire flotation bank is

in certain sites only running part time, while at other sites there are on-going problems with reliability.

The Minfurn carbon regeneration furnace prototype for investigation of the effect of steam injection on enhancing the carbon regeneration and re-activation processes was finished in May 2011 and some testwork has been completed with coconut carbon, including several tests to enhance control strategy of the Minfurn. The Minfurn technology has been tested up to a stage where the control parameters are clearly defined and throughputs are better defined in terms of product delivery and costing.



electrode on a DC arc furnace was further advanced by a week-long pilot plant trial in Bay 1 which determined the baking temperature profiles and the effect of alternative fin designs. The cost of electrode paste is approximately one fifth that of graphite electrode so there are substantial cost advantages, if the technology can be successfully developed and transferred to the DC smelting industry.

### Prototypes

Exponential increases in desktop computing power together with decreases in the cost of sophisticated high resolution camera systems have opened the door to new opportunities for using machine vision in the field of process measurement and control. Mintek is taking full advantage of these advances in technology, and has successfully produced two new machine-vision based prototypes.

The first prototype, SlipCam, which was patented in October 2011, uses a remotely mounted camera to "watch" the electrodes of a submerged-arc

adversely affected. Both prototypes were successfully demonstrated on industrial sites.

The Matrix Cynoprobe is also being tested in an industrial site. This instrument is able to measure cyanide at concentrations more than an order of magnitude lower than the conventional Cynoprobe (in the parts per billion). Results to date are very promising, and correlate well with laboratory tests.

The last two years have also seen a notable progress in accelerating Mintek's existing Model Predictive Control (MPC) technology so that it can be adapted to control other large complex processes and facilitate the incorporation of Robust Non-linear MPC (RNMP), the prototype of which has been completed in the past financial year.

Although industrial testing of prototypes developed by the Measurement and Control Division (MaC) is proceeding, challenges still remain in terms of ensuring the trials receive uninterrupted process exposure. The current economic climate has resulted

*From left:*

*Self-baking electrode on a DC-arc furnace pilot plant trial in Bay 1 which determines the baking temperature profiles and the effect of alternative fin designs.*

*The SlipCam prototype uses a remotely mounted camera to "watch" the electrodes of a submerged-arc furnace (SAF).*

*The FloCam prototype remotely "watches" the levels of froth in individual flotation cells.*

# Business Development, Mineral Policy and Sustainable Development

BUSINESS DEVELOPMENT provides support to Mintek's SBUs and business programmes. Its functions encompass:

- ▶ Identification and protection of intellectual property.
- ▶ Guidance on the most effective means of commercialising Mintek's intellectual property.
- ▶ Coordination of Mintek's marketing efforts.
- ▶ Providing mineral economic data.
- ▶ Support to government agencies on mineral policy and development.
- ▶ Support to DMR on rehabilitation of derelict and ownerless mine sites.

## Intellectual Property Preservation

During the year, Mintek's policy for conforming to the Intellectual Property Rights from Publicly Financed Research and Development Act was approved by the National Intellectual Property Management Office (NIPMO). Systems for implementation of the policy were fully implemented.

## Rehabilitation of Derelict and Ownerless Mines

With its competence to facilitate rehabilitation of derelict and ownerless mines across South Africa, the Mineral Economics and Strategy Unit (MESU), within the Business Development function, is responsible for managing, on behalf of the DMR, the rehabilitation of ownerless and derelict mines.

## Promotion of Rural Economies

With its expertise in the promotion of the mineral economies of rural and marginalised communities through technical assistance and skills development in order to stimulate economic development and job creation in the areas, the Small Scale Mining and Beneficiation (SSMB) division at Mintek plays an



*From left:*

*Mintek aerial view.*

*Completed rehabilitation and vegetation establishment at Jebolo Asbestos Mine, Northern Cape.*

*Rehabilitated Lokaleng Asbestos Mine, Northern Cape.*

*Acid ground water in coal mines.*

The DMR allocated R90-million for this programme over a period of three years, ending in 2012/13. Since the inception of the project, five sites in the Northern Cape have been successfully concluded, and more work continues in Limpopo, Mpumalanga and the Eastern Cape.

## Industry Support

MESU undertook projects by the Water Research Commission to examine the usefulness of utilising Life Cycle Assessments to evaluate the sustainability of emerging industries, to assess the viability of the Berlyn Gold Mine near Graskop and the development of investment guidelines for the African Development Bank.

## Support to Government Departments

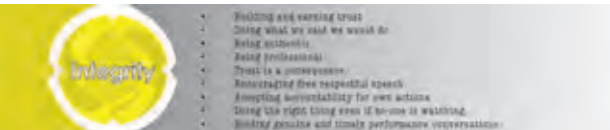
MESU participates in various government mineral beneficiation initiatives, focused on identifying and addressing incentives and impediments to increasing mineral industry downstream value-addition.

important role in fulfilling the national priorities. The programmes and projects that the division focused on during the year include:

- ▶ Pottery and ceramics
- ▶ Glass beads & Jewellery
- ▶ Technology Development
- ▶ Small scale mining training.

## Training Accreditation

SSMB was audited by the Mining Qualifications Authority (MQA) and full accreditation was extended to 12 July 2014 for four training courses, namely: Jewellery Design Level 4, Jewellery Manufacturing Level 2-4, Jewellery Setting Level 4 and Small Scale Mining. The MQA allocated Mintek a discretionary grant to conduct a jewellery learnership and consequently, a project was initiated during the year, where 15 learners were trained at the Jewellery Workshop at Mintek and another 15 learners at a site in Thabazimbi.



As part of the long term collaboration with the Department of Education in the North West province for the continued support of the eight pottery units established in 2010/11, Mintek hosted a successful workshop in April 2011 in Mafikeng. The workshop brought together the learners trained by Mintek together with other crafters, designers, specialists, funders and government departments to discuss the challenges and opportunities facing the craft and pottery sector. During the year, 47 learners were trained in Pottery Design and Manufacturing in the North West province.

Training on the Introduction to Small-Scale Mining was conducted for 20 small scale miners and community members of Riemvasmaak in the Northern Cape in September 2011. The development of the Riemvasmaak community is a high priority on the development objectives of government in its effort to stimulate economic development and job creation in the area.

learners were trained in Glass Bead Manufacturing at Sedibeng, Rustenburg and KwaZulu-Natal.

Mintek has also been appointed the project implementer for a pottery manufacturing unit that will benefit 10 disabled learners in Mandini, KwaZulu-Natal. This is in assistance of the Ikhwezi Welfare Organisation, which was appointed by the PPC Construction Industry Associations Trust as its beneficiary. An amount of R500 000 has been approved for the set-up of the unit.

In total 165 learners have been trained by this division and 145 jobs were created through small, medium and micro enterprise (SMME) development during the 2011/12 year. During 2011/12, three SMMEs were created and all three are still in existence. During 2010/11, four were created and all four are still in existence which is a 100% success rate. Prior to this, 32 of the 46 (70%) SMMEs created are still in existence.



Furthermore, in the provinces of Gauteng, Free State and the Western Cape, a total of 32 people were trained in Introduction to Small Scale Mining and the implementation of the Mogale City Pottery project has progressed smoothly since the signing of the contract with Mintek. Following the set-up of the pottery manufacturing unit at the site in Magaliesburg, learners were identified and assessed, and ten (10) have been successfully trained in basic pottery manufacturing. A service level agreement was signed with the Sedibeng District Municipality for the setting up of a community based glass beads project.

In KwaZulu-Natal eight women were successfully trained in glass bead manufacturing as part of the project funded by the Ethekewini Municipality. The project aims to empower women and Mintek continued to provide technical and marketing support to the group throughout the year. Furthermore eight

Taking into account the challenge to secure external funding opportunities for the development of new SMME's and training of people in rural and marginalised communities, the SSMB division has completed its strategy and will from the financial year 2012/13 adopt a new operating structure.

*From left:*

*Drilling activity at the Steenkampskraal Rare Earth Project, Great Western Minerals Group Ltd.*

*Acid drainage (photo courtesy of Mariette Liefferink, Federation for a Sustainable Environment).*

*Pottery training in the ceramic incubator.*

*Bead manufacturing training in Mafikeng.*

# Human Capital Development and Management

## Labour Relations

Members of the National Union of Mineworkers (NUM) went on a three-week long protected strike due to a dispute relating to adjustment of salaries in November for the period 2011/12. The dispute was declared following stalled negotiations and arbitration. Subsequent to the strike, members of the union accepted the wage offer and its officials signed the agreement with Mintek management and then terminated the strike.

As per the agreement, all employees who received performance scores of less than 3 during the year end appraisals, new recruits and employees who were not appraised at the job grading they presently occupy have received a 4% across the board increase based on the Consumer Price Index (CPIX) for the fourth quarter of the preceding financial year. Employees

Employment Equity Progress Report											
Occupational Category	Male				Female				Foreign Nationals		Total
	A	C	I	W	A	C	I	W	Male	Female	
Clerks	4				26	2	1	13			46
Craft & Related Trade Workers	18	4		6	1				1		30
Elementary Occupations	56	5		9	28	4	4	5	1		112
Senior Officials & Managers	17	1	4	27	9		3	11	4		76
Plant Operators & Assemblers	142	3		1	20				1		167
Professionals	36	4	7	19	27	1	11	13	12	9	139
Technicians & Assoc Professionals	36	2	1	12	41		3	4	1	1	101
<b>TOTAL PERMANENT</b>	<b>309</b>	<b>19</b>	<b>12</b>	<b>74</b>	<b>152</b>	<b>7</b>	<b>22</b>	<b>46</b>	<b>20</b>	<b>10</b>	<b>671</b>
Temporary Employees	27		1		31						59
<b>Total</b>	<b>336</b>	<b>19</b>	<b>13</b>	<b>74</b>	<b>183</b>	<b>7</b>	<b>22</b>	<b>46</b>	<b>20</b>	<b>10</b>	<b>730</b>



From left:  
Mintek Staff seated at the Auditorium, on Mintek Values launch day, 30 March 2012.

The group of actors used to launch the Mintek Values.

A student presentation.



who received performance scores of 3 and above but below 3,5 received a salary increase of 7% and those who received performance scores of 3,5 and above received a salary increase of 10%.

The strike had a significant impact on the output of the Minerals Processing, Analytical Services and, to a lesser extent, Hydrometallurgy divisions resulting in backlogs during December and into January. A “no work no pay” rule was applied to the striking employees.

At the beginning of the financial year, and prior to the wage negotiations, NUM’s membership had dropped to below the recognition agreement with Mintek, which requires the union’s membership to be between 45% to 50%+1 of the total workforce to be recognised as a majority union. Mintek has as per the agreement allowed the union three consecutive months to recruit and reach the recognition percentage failing which the union would no longer be recognised as a majority union.

While this threshold was achieved prior to the negotiations, at the end of the financial year,

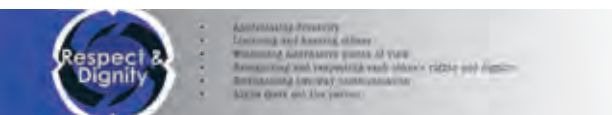


it dropped again and the union embarked on a recruitment drive and managed to recruit 57 additional members which took its representation to 41%, which again disqualifies the union to be recognised as a majority union at Mintek.

The Employee Relations unit embarked on a drive to make all employees aware of the labour relations processes and procedures within Mintek. This drive included awareness on the Code of Conduct and Business Ethics, Practical Labour Law as well as chairing and initiating disciplinary hearing.

### Partial Re-employment of Retrenched Workers

Mintek has been able to rehire 20 of the 39 workers who were retrenched in 2010, following the global financial slump in 2010. The process started unfolding as soon as Mintek signed a contract with Anglo American Platinum for a two year project at Bay 2. While this re-employment is tied to the project, it is believed that this will go a long way to alleviate the burden of unemployment to these affected workers. On the other hand, Mintek continues to search for



similar projects and if successful, priority will be given to these staff members.

### Research Workshops

Mintek successfully hosted the 4th Annual DST/Mintek Nanotechnology Innovation Centre (NIC) Workshop, an event which showcased how the programme addresses national priorities highlighted by both the national nanotechnology strategy and national research and development (R&D) strategy.

The DST/Mintek Nanotechnology Innovation Centre (NIC) is a multi-user, national research facility that is geographically spread across South Africa – comprised of Mintek and university “nodes” at the University of Johannesburg, University of the Western Cape and Rhodes University.

One of the objectives of the workshop was for researchers, students and other stakeholders to exchange information, network, share experiences and solve particular scientific and technological problems of the current work in the areas of health and water.



Mintek also successfully hosted the second annual Analytical Science Symposium in March, which was aimed at bringing analytical services users together and provide them with the forum to exchange knowledge. Presentations from experts in the analytical services sector were made to highlight how the analytical services industry has evolved to respond to the needs of modern metallurgical and geological businesses.

### Skills Development

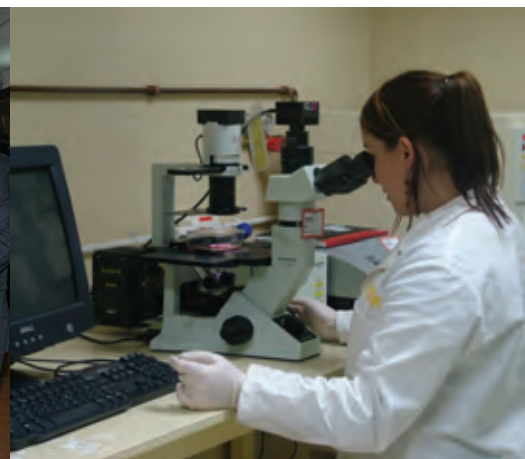
Mintek creates permanent employment for approximately 15 to 20 new graduates in terms of its in-house bursary programme for undergraduate and post-graduate studies as part of the skills development objective, especially taking into account the dearth of skills in the mining and minerals processing industries. However it has been noted that Mintek loses such graduates on average four years after their assumption of employment at the organisation. Mintek has therefore devised a strategy to deal with this challenge, which include the graduate development programme and management programmes that are currently ongoing

Employment Equity Profile in Occupational Categories				
Occupational Category	Designated Group		All Blacks	
	Target	Actual	Target	Actual
Senior Officials and Managers	68%	59%	63%	37%
Professionals	77%	66%	62%	50%
Technicians & Assoc Professionals	92%	88%	84%	76%
Clerks	90%	100%	80%	63%
Craft and related trades workers	95%	76%	89%	62%
Plant and Machine Operators	95%	99%	94%	98%
Elementary Occupations	95%	93%	93%	76%
<b>Total</b>	<b>87%</b>	<b>84%</b>	<b>81%</b>	<b>70%</b>

whilst continuing with interventions at high school level which encourage scholars to do mathematics and science.

Mintek is presently supporting the artisan development programme that is a joint government job creation initiative within the minerals and mining sectors. Under this programme, the Unemployment Insurance Fund (UIF) and MQA had an overall target

Time Injuries during 2011/12. This has caused an increase in the Lost Time Injury Frequency Rate (LTIFR) to reach the Mintek target of 1 which is unfortunate. Of major concern is that most of the incidences reported were not directly related to the working environment, for example lost time injury due to a bee sting. The Health Incident Frequency Rate (HIFR) remained at 0. The External Client Dissatisfaction Frequency Rate (CDFR), at 13,



to place 1000 learners in this programme during 2011/12 in support of the government's overall job creation strategy. Of this number, 70% must be unemployed or retrenched learners who have contributed to UIF during the previous employment. They must also meet the minimum admission requirement for N2 engineering or mathematics and science Grade 12. The remaining 30% must be unemployed learners directly from further education and training (FET) colleges.

Mintek was awarded a grant for eleven candidates. Currently, four of the candidates are unemployed and seven are employed within Mintek. The grant currently covers only the training costs for the full duration of the learnership. Mintek will continue to offer practical training to this group as a pilot with the hope of increasing the numbers of learners in the future if the current programme becomes a success.

### Quality and Safety

Mintek unfortunately suffered a total of seven Lost

*From left:*

*Distinguished guests hosted by Mintek at the 4th Annual DST/Mintek Nanotechnology Innovation Centre (NIC) Workshop.*

*Mintek also hosted the second annual Analytical Science Symposium in March, aimed at bringing analytical services users together and provide them with the forum to exchange knowledge and needs of modern metallurgical and geological businesses.*

*A Mintek Scientist in one of the research labs.*

exceeds the target of 10 but is a decrease over the previous year. Significant effort continues to be expended in assessing the root causes of the dissatisfaction and Mintek is steadily increasing the number of external clients being surveyed. Mintek remains compliant with all its ISO standards.

### TAP Programme

The Physical Metallurgy group has started interviewing and placing students for the DST's human capital development programme linked to the Technology Assistance Programme (TAP). To date, 11 students have been placed at four foundries: Thomas Foundry, Auto Cast, Prima Foundry and IPT-Pefco. It is hoped that all the envisaged 33 students will be placed by the end of April 2012. Mintek has received approval from the DST to start interaction with the South African Institute of Foundrymen (SAIF), the National Foundry Technology Network (NFTN), and University of Johannesburg's Metal Casting Technology Station (MCTS) to expand the programme.

This new expanded programme will cover the rest of the foundry industry, beyond the 27 foundries that were part of the TAP programme. The group is assisting the South African Roll Company (SARCO), and a Mintek engineer was part of SARCO's technical team that visited Taiwan to evaluate two steel mills in March.

### Mintek Values

In recognition that organisational culture is one of the key factors and pillars that determine the success of a company and that a clearly expressed and consistently-applied culture contributes to the positive image, reputation and sustainability of an organisation, Mintek launched its values towards the end of the financial year 2011/12. These values are expected to define a system of shared meaning or mindset that will distinguish Mintek from other organisations, hence they will be incorporated into all Mintek's employee performance contracts.

### Health

Mintek maintains a high level of AIDS education

participated in the study. The results of the survey – where employees were invited to voluntarily provide a saliva specimen swab for HIV antibody testing – was aimed to assess whether Mintek has been able to prevent the further spread of HIV in the company.

The campaign forms part of the comprehensive HIV prevention and care programme for the company. In overall the study found a stabilisation in the infection rate overall at 8.3%, and a slight decrease in HIV prevalence in the younger staff category. Results of the previous surveys in 2007 and 2004 indicated respectively that 7.8% and 8.7% of all permanent employees were HIV positive.

Although staff participation was lower than that of the previous surveys in 2007 and 2004, the results are still considered to be statistically representative. The study was conducted to determine the overall prevalence of HIV prevalence among permanent and contract employees as well as to determine the HIV prevalence in terms of job category, age and gender.



From left:

Mintek Staff are encouraged to make use of the voluntary counselling and testing services that are provided through the Mintek Medical Clinic.

A Candlelight Service is observed on HIV/Aids Day by Mintek.

Mintek awards undergraduate and postgraduate bursaries to students undertaking full-time studies in science and engineering disciplines.

A conference held in one of the conference rooms at Mintek.

by means of outreach programmes, awareness events, and a dedicated team of peer educators and counsellors. All employees are encouraged to make use of the voluntary counselling and testing services that are provided through the Mintek Medical Clinic. At the end of the 2010/11 financial year, Mintek conducted its third HIV/AIDS prevalence survey and 501 employees, including 78 contractors voluntarily

Currently at Mintek there is a total of 21 known people living with HIV/AIDS, 15 males and six females, who are in the HIV/AIDS Management Programme and are monitored monthly at the clinic. At least 13 of them are on anti-retroviral treatment and also receive monthly meal supplement packs from the clinic, while eight receive immune booster packs and food supplements monthly or when required to

Breakdown of staff in Occupational levels											
Occupational Levels	Male				Female				Foreign Nationals		Total
	A	C	I	W	A	C	I	W	Male	Female	
Top Management	3			2	1						6
Senior Management	4		1	5	2			2			14
Professionals, Specialists and Mid-management	43	3	10	40	29	1	14	24	16	9	189
Skilled Technical and Academically Qualified Workers	93	12	1	26	64	6	7	10	3	1	223
Semi-skilled and discretionary decision making	145	4		1	49		1	10	1		211
Unskilled and defined decision making	21				7						28
Permanent	309	19	12	74	152	7	22	46	20	10	671
Temporary Employees	27		1		31						59
<b>Total</b>	<b>336</b>	<b>19</b>	<b>13</b>	<b>74</b>	<b>183</b>	<b>7</b>	<b>22</b>	<b>46</b>	<b>20</b>	<b>10</b>	<b>730</b>

sustain their energy levels at work and to boost the immune system.

In June 2011, the Mintek Clinic held a Men's Health Day in an effort to assist men at Mintek deal with their health problems. Scores of men participated in health related activities, which included screening and test for eyes, measuring blood pressure, glucose, cholesterol, weight, body mass index (BMI) as well as consultations and tests related to sexuality and prostate cancer.

### Academic Support and Training

The activities of the Academic Support Unit within the Human Resources Division are:

- ▶ Undergraduate and postgraduate bursary programmes for full-time science and engineering students.
- ▶ Undergraduate and postgraduate bursary programmes for Mintek staff for part-time science, engineering and non-technical studies.
- ▶ Graduate and postgraduate internship programmes.

- ▶ Work-integrated learning for diploma students.
- ▶ Artisan Learnership Programme
- ▶ Science, technology, engineering and mathematics promotion programmes, including Minquiz™ – a national science competition for Grade 12 learners.
- ▶ Facilitating access to various research and development grant and infrastructure funding opportunities for Mintek's operating divisions.

### Full-Time Undergraduates and Postgraduates

Mintek continues to develop its future talent pipeline through the award of undergraduate and postgraduate bursaries to students undertaking full-time studies in science and engineering disciplines. To date 51 bursars are in the full-time bursar programme, 39 undergraduates and 12 postgraduates.

### Part-Time Undergraduates and Postgraduates

One of the challenges facing most science councils is

the ageing workforce within the science engineering and technology environment. Permanent employees are therefore encouraged to register for postgraduate studies. At least 72 staff are currently registered for part-time studies, 26 undergraduate, 34 postgraduate and 12 other (e.g. MBA).

### Graduate and Postgraduate Internship Programmes

#### ▶ DST-NRF Interns Intake

This is an annual programme facilitated by DST through the NRF. Interns continue to work on a number of technical projects throughout divisions within Mintek.

#### ▶ DST-NRF Professional Development Programme

Mintek currently hosts one candidate within the DST-NRF Professional Development Programme. The candidate within this programme is undertaking a PhD study.

#### ▶ Graduate Development/Researcher Development Programme

The Graduate Development Program (GDP) was



Bursary Trends for 2009 – 2012					
Type of studies	2009	2010	2011	2012	
Full-Time UGB	15	6	10	9	2009 to 2010 saw a decrease in the number of UGB awarded but with a fair increase in 2011. Numbers remained stable for 2012.
Full-Time PGB	4	6	5	4	A similar trend was observed for the number of PGB awarded over the past three years. 2012 will focus on increasing this number through the year.
Part-Time UGB	1	6	18	17	Staff undergraduate studies increased significantly from 1 in 2009 to 18 in 2011 and remained stable for 2012.
Part-Time PGB	2	16	12	18	An increase in staff postgraduate studies from 2 to 16 was observed from 2009 to 2010, with a slight decrease in 2011 and a stabilising in 2012.

Bursars absorbed					
Type of studies	2009	2010	2011	2012	
Full-Time UGB	8	6	10	8	An increase in the number of bursars was observed over the three year period. Though a decrease was noted in 2012 no UG bursars were released.
Full-Time PGB	4	2	2	4	A decrease from 2009 to 2010 for postgraduate absorptions was observed but remained constant to 2011. 2012 saw an increase though 4 PG bursars were released to due to the loss of industry funding on a project.

From left:

Mintek Clinic held a Men's Health Day in an effort to assist men at Mintek deal with their health problems.

Recruiting students for undergraduate and postgraduate bursary programmes for full-time science and engineering students.

End-of-year awards given to the students who have passed.

piloted in January 2012. Fourteen new graduates, along with a further two staff members, were incorporated into the programme. The commencement of the programme included a three-and-a-half month term in a "Home" division. Rotations and soft skills training will commence in the first quarter of the following financial year. The Graduate Development Programme entails a structured soft skills training programme, but the primary focus is to place scientists and engineers on a structured development programme for them to gain and upgrade their professional registration with the South African Council for Natural Scientific Professions (SACNASP) and the Engineering Council of South Africa (ECSA).

The Researcher Development Programme builds on the Graduate Development Programme and aims to fast-track the production of researchers via tailored development programmes including niche training to develop research competence. Both programmes would have strong links with the Coaching and Mentoring Programme, and aims to plug the five to 10 year experience gap.

► **Work Integrated Learning**

Mintek aimed to host 45 integrated learning trainees over 2011/2012, and the target was realised with an intake of 48 candidates.

► **Artisan Learnership Programme**

Mintek, working closely with the MQA, established an on-site Artisan Learnership Programme. The first intake sought to strike a balance between recruitment of potential apprentices from Mintek's ranks as well as recruiting from further education and training (FET) colleges. Mintek was awarded a grant for 11 learners. Four Mintek employees and four external candidates commenced with training in January 2012, with two Mintek candidates expected to participate as from the first quarter of 2012/2013.

Randburg area, Mintek's annual Minquiz National Science Competition has grown to become a major national science competition for top physical science and mathematics learners at schools in South Africa. The primary intention of this competition is to foster excellence in mathematics and physical science at schools by stimulating interest in careers in science, engineering and technology through a fun and informative curriculum-aligned competition.

**Science, Technology, Engineering and Mathematics (STEM) Promotion Programmes**

Since its introduction in 1988 to a few schools in the



From left:

Mintek offers aerobic classes, after working hours as part of the wellness programme, together with volleyball, netball and football.

In March 2012, Mintek participated in CANSA Shavathon in a show of support to cancer survivors.

Summary of Human Capital Development Programmes			
Description	Black	Fem	Total
<b>Bursars (full-time)</b>			
Undergraduate & Hons	28	20	48
Postgraduate	4	2	9
<b>Bursars (part-time)</b>			
Undergraduate	24	11	26
Postgraduate (masters)	6	6	15
Postgraduate (doctorate)	6	1	6
Other	21	15	26
Work-integrated learning	48	25	48
<b>Interns</b>			
DST/NRF PDP doctoral fellows	1	0	1
DST/NRF PDP post-doctoral fellows	0	0	0
DST/NRF interns	15	6	16
ALP Candidates	9	0	11
Scholarships - Minquiz	2	3	3
<b>Absorptions</b>			
Undergraduate bursars & Hons	9	5	11
Postgraduate bursars (masters)	1	0	1



## Awards & Recognition

DURING 2011/12 A NUMBER OF MINTEK STAFF received national and international recognition for their work. They were also recognised at Mintek for their contribution in making the organisation a research centre that can be reckoned with the best in the global R&D industry.

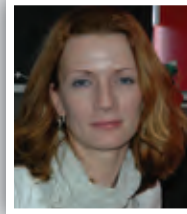
### APEX AWARDS

TWO TEAMS AND THREE INDIVIDUAL MINTEKERS received the prestigious Apex Awards for 2011 in recognition of their outstanding performance during the year, which made significant contribution to Mintek's vision to be a global leader in minerals and metallurgical research and development, and technology transfer.

The winners were recognised in three of the five categories as no awards were given for Commercialisation (income generation well above realistic budgeted targets) and Technology Transfer (when a process or product has successfully been transferred to industry).

**TECHNICAL INNOVATION (An adaptation or discovery with novel characteristics, which could ultimately lead to advantageous commercial application).**

- Hydrometallurgy Division's Olga Yahorava for development of a novel high efficiency resin-in-pulp (RIP) process for the recovery of uranium from low grade ore. She has identified that an increase in the pH during RIP recovery of uranium has the potential to significantly increase the resin efficiency, decrease silica fouling, minimise resin loss, and decrease capital and operating expenditure.



**PROCEDURAL INNOVATION (An adaptation or discovery which could accelerate, simplify, or improve quality and cost effectiveness to financial advantage either internally at Mintek, or externally. The procedural innovation category allows support divisions to also be eligible for an Apex Award).**

- Finance Division's Alet Miller for her exceptional commitment to proactively managing the pay-roll function as well as arranging on-site registration for tax with the South African Revenue Service for Mintek employees.



**DEVELOPMENT (Successful demonstration of a process or product which could lead to technology transfer, usually the result of a successful pilot plant or prototype demonstration).**

- A PYROMETALLURGY DIVISION team comprising, Isabel Geldenhuys, Hylton Gidish, Ashley Davey, Natasha Sooful, for demonstration smelting of two new chromite ores in a DC arc furnace. The team successfully completed two campaigns in Bay 1, successfully smelting a total of 260 tonnes of chromite ores from new sources.



- MINERALS PROCESSING DIVISION'S JOHNNY KALALA for provision of mill sizing consultancy services. He developed a reputation for expertise in not only the generation of mill process design data, but also the modelling and sizing of mills. A number of engineering companies are now coming to Mintek with specific requests for modelling and sizing of their mills.

**'THE IMPORTANT THING IS NOT TO STOP QUESTIONING. CURIOSITY HAS ITS OWN REASON FOR EXISTING.'**

- Albert Einstein

- A TEAM UNDERTAKING HYDROMETALLURGY'S METRIX PILOT CAMPAIGN, comprising Freddy Mathebula (centre), Richard Mashimbye (inset), Bobby Stoffel (right), Lucky Sibuye (left) for outstanding performance and commitment under extremely difficult conditions during the campaign at Harmony. The operators were always willing to go the extra mile in the face of many challenges and showed ingenuity and initiative to address problems proactively.



ADVANCED MATERIALS DIVISION (AMD) manager, Dr Elma van der Lingen scooped the Research Capacity Developer Award at the 2011 National Science and Technology Forum (NSTF) Awards. This came after van der Lingen and two research groups in her division were shortlisted for the finals of the 2011 NSTF Awards.

According to the NSTF, the nominations classify their work as an “outstanding contribution to Science, Engineering, Technology and Innovation (SETI) in South Africa”.

“The finalists selected indicate that there is recognition for researchers and their research within the



communities of the SETI fraternity across all sectors, levels, gender and race in South Africa,” the organisers say.

While the two AMD research groups – the AuTEK Biomed and Biolabels teams – did not win under the “Research leading to Innovation” category in 2011, the teams were recipients of the annual Apex Awards at Mintek in December 2010.

Through its multi-disciplinary approach involving molecular modelling, synthetic chemistry and biology, AuTEK Biomed has contributed significantly to the advancement of research in this field within South Africa.

*The two teams: Biolabels (Top right pic) and AuTek Biomed (Bottom right pic) receive their certificates from Johnny Dladla, BHP Billiton Vice President, at a plenary session prior to the awards gala dinner.*



THE MANAGEMENT OF THE HYDROMETALLURGY DIVISION (HMD) acknowledge Calvin Mokwana's dedication to his work. Since he joined the Solvent Extraction (SX) Group, he has taken charge of all the projects involving solvent extraction technology in columns such as the Bateman Pulsed Columns (BPC).

He managed the Rand Uranium project for uranium extraction using the BPC. Also, he was a chief investigator on a project that demonstrated a Japanese designed column. Mokwana has been trained in Israel at the Bateman Litwin specialised facilities in 2007.

Solvent extraction in columns is a specialised area in metal purification and he is one of the very few people who focus and specialise in this growing field of technology.

Undoubtedly Mokwana will consistently grow in his career and continue to initiate and execute more projects in this field.



ON 24 JANUARY 2012, Mintek CEO, Abiel Mngomezulu awarded some of Mintek's brightest bursars certificates and trophies to encourage them to work harder and represent the organisation well at their respective universities.

The awards ceremony was preceded by a session of presentations in which 18 students showcased results of the various projects that they undertook at Mintek during their university vacation period.

This will become a permanent feature in the Mintek annual calendar in an effort to ensure that the students not only do well academically, but also that they are well equipped with the soft skills required when they eventually join the organisation after graduating.



Khulekani Ngcobo.

DESPITE CHALLENGES ENCOUNTERED and the huge amount of engineering work that had to be completed, two Minfurn units were completed in the Engineering Support Division (ESD) for a North American operation within an “impressive” time frame.

“Gratitude to the Engineering Support, EMS and PDD teams for selflessly devoting themselves to achieve this milestone and flying the Mintek flag,” said ESD manager,

“The product that ESD has developed with this project enhances our product offering variations and significantly draws us closer to complete engineering work for the Minfurn range.”

Ngcobo also said that work on carbon testing and market intelligence is expected to enhance Mintek's business case for the use of Minfurn product ranges in the gold extraction, water purification and food industries.

“It has been disappointing that a brand like this has performed poorly in South Africa and the rest of Africa, but a strong marketing drive underpinned by the fundamentals of engineering integrity and market intelligence will see a turnaround in the next few years,” Ngcobo enthused.

According to him, the clients were satisfied that the product met their requirements and signed off the Factory Acceptance Testing.

MINTEK CONGRATULATES DEON SLABBERT from the Advanced Materials Division (AMD), who was awarded a bronze medal by the Corrosion Institute of Southern Africa's (CorrISA).

The bronze medal is awarded for exceptional and long-standing service to the Institute, and was awarded to Slabbert for his dedicated efforts towards re-establishing corrosion as a subject in tertiary and continued engineering education.

He has been associated with the Corrosion Institute for many years, culminating with a term as president from 2007 to 2009. During his term of office, Slabbert took it upon himself to canvass for support for corrosion education at tertiary level in South Africa.

“The acute lack of trained corrosion professionals is not only a South African phenomenon, but it is exacerbated by the departure of many of our talented engineers and academics to foreign pastures,” he said.

“This brain-drain coupled with the lack of corrosion related courses at universities has resulted in a generation of engineers who are released into industry with no awareness of corrosion, a problem common to virtually all disciplines of engineering.”

Slabbert has also organised several workshops and short courses on corrosion-related topics over the last few years.

Mintek also received an award at this function in recognition of its efforts to further corrosion research and capacity building in South Africa.



## Staff Papers, Publications and Conferences

THE PUBLISHING OF TECHNICAL PAPERS in internationally refereed journal enhances Mintek's reputation as a developer of high quality research, and promotes the content of those papers. Attendance at local and international conferences is required to keep abreast of technical developments globally, to identify business opportunities and also to enhance Mintek's reputation for high quality research. It is against this background that Mintek aimed to maintain a high level presence at various conferences, locally and a broad, where a range of papers and presentations were made.

- ▶ Mintek presented at the 2011 South African Institute of Mining and Metallurgy (SAIMM) conference and has co-authored a paper for the 2011 ALTA conference, in which its joint venture partner, Bateman, presented on the MetRIX resin-in-pulp technology.
- ▶ The Biomed group published six articles in peer-reviewed journals as well as chapter in a book devoted to drug discovery in Africa. The group also contributed three oral presentations and nine posters at various local and international conferences and produced two internal technical reports.
- ▶ The DST/Mintek Nanotechnology Innovation Centre (NIC) group took part in the Lab Africa Exhibition, as part of creating awareness around nanotechnology in the form of presentations and exhibited nano-products under the health and water platforms. Two world renowned researchers, Prof Paras Prasad (Buffalo University, United States) and Dr Craig Banks (Manchester Metropolitan University, United Kingdom) visited the group and gave presentations.
- ▶ Mintek hosted over 200 metallurgists, materials scientists and other professionals from the materials sector for a five-day course presented by world renowned metallurgist, George F. Vander Voort, in June. The course was presented as part of the DST-TAP programme, an initiative by the Department of Science and Technology (DST) to provide technology assistance packages (TAP) to South Africa's foundry industry and it was designed to address the shortage of skills in metallography: the MTC (Metals Technology Centre) produced 36 technical reports to support the mainly local metallurgical industry.
- ▶ Five members of the Biomed team presented at the 5<sup>th</sup> SA Aids Conference in Durban.
- ▶ Dr Louise Coney attended Kimberley Process Intersessional Meeting in Kinshasa DRC and a peer-reviewed international conference paper, which served to elevate the exposure and recognition of MNL on the subject of mineralogy applied to dense media separation (DMS) of nickel ore was presented at the Base Metals Conference, SAIMM.
- ▶ Two more peer reviewed papers, one aimed at showcasing MNL as a premier laboratory for rare earths elements (REE) mineralogy and another as a laboratory working in the field of 3D X-ray computed tomography (3D-XCT) were presented at the International Congress on Applied Mineralogy, Norway. Additional presentations were delivered at three meetings on the subjects of REE mineralogy, refractory gold ore mineralogy, 3D-XCT of uranium ores and 3D-XCT in process mineralogy, which generated significant national interest in MNL's activities. Furthermore one journal paper was published online on REE in manganese ores, based on a PhD study conducted in 2006.
- ▶ A paper was presented, on the results achieved with the Xanthoprobe instrument, at the 6<sup>th</sup> SAIMM Base Metals conference.
- ▶ The results of the FloatStar installation at the Vale Cauê iron plant (Brazil) were presented at the SAIMM Iron and Manganese conference in Muldersdrift. The paper was also accepted for publication in the SAIMM Journal in March 2012.
- ▶ The Physical Metallurgy group is assisting the South African Roll Company (SARCO), and a Mintek engineer was part of SARCO's technical team that visited Taiwan to evaluate two steel mills in March. A paper was presented at the annual NACE (formerly known as the National Association of Corrosion Engineers) conference in USA on metal dusting.
- ▶ A biochemist from the Biotechnology division contributed a chapter on Biotechnology in a recently published book, *the Handbook of Research on Biomedical Engineering Education and Advanced Bioengineering Learning: Interdisciplinary Concepts*.
- ▶ The Nanotechnology group hosted a number of visitors as part of networking, including 60 delegates attending the Plasma Conference and a student from the University of Venda. In addition, the group successfully hosted the 4th Annual NIC workshop at Mintek which saw the attendance of over 120 delegates including the Deputy Minister of Science and Technology, the Honourable Dr Derek Hanekom, as well as the Deputy Vice-Chancellors of the University of the Western Cape, University of Johannesburg and Rhodes University.
- ▶ Dr Jones Papo was invited to present a keynote address at the 2011 University of Johannesburg Metal Casting Technology Station (MCTS) Colloquium that was held at the University of Johannesburg and Mr Alain Mwamba attended a ThermoCalc and DICTRA training in Sweden and he also visited the Royal Institute of Technology. Mr. Deon Slabbert won a Bronze Medal Award at the 2011 Annual Corrosion Society.
- ▶ Biotechnology Division staff participated in the international conference on Percolation Leaching, which started with a one-day short course on the fundamentals, followed by the conference proceedings. While it offered an open international forum, it provided a very good platform for the marketing of the services and capabilities of the division in this regard with three authors having given presentations, and it facilitated meetings with the leading researchers, service providers and clients in the field.
- ▶ Abstracts submitted to the Australian ALTA Conference and the Chilean HydroProcess Conference were accepted for presentation in May and July 2012 respectively. The first research project to be undertaken under the memorandum of understanding with the Tshwane University of Technology towards the completion of an M.Tech of a TUT student has been initiated and is expected to continue into 2012/13.
- ▶ Portia Mahumapelo (SSMB) compiled a research paper and did a presentation at the 1<sup>st</sup> International Conference on Clays and Clay Minerals in Africa in Bloemfontein. She also did a presentation on Indigenous Knowledge Systems (IKS) at the 6<sup>th</sup> World Science Centre in Cape Town.
- ▶ Staff members from the Mineralogy Division (MNL) were invited onto the advisory committee for an international AutoSEM round robin organised under the auspices of International Mineralogical Association – Commission on Applied Mineralogy.
- ▶ Mintek also successfully hosted the 2<sup>nd</sup> Annual Analytical Science Symposium in March, which was aimed at bringing analytical services users together and provide them with the forum to exchange knowledge, where Analytical Services Division staff members made presentations showcasing how the analytical services industry has evolved to respond to the needs of modern metallurgical and geological businesses.
- ▶ The first set of online reference books, the McGraw-Hill Access Engineering, which includes e-books like Perry's Chemical Engineers Handbook, Chemical Process Design Handbook, Corrosion Engineering and Practical Control Engineering, has now been procured by the library and is available Mintek-wide. Researchers now have access to electronic reference books from their desktops. Updates of these e-books happen in real time and therefore researchers do not have to wait long periods for printed updates anymore. Researchers have 24-hour access to these e-books.

# MINTEK STAFF PAPERS 2011/12

**Abdellatiff M.** Review of the development work of the Mintek Thermal Magnesium Process, MTMP. The Journal of the Southern African Institute of Mining Metallurgy vol.111, June 2011. p. 393-399.

**Bada SO, Falcon LM, Falcon RMS and du Cann VM.** Qualitative analysis of fine coals obtained from tribo-electrostatic separation. The Journal of the Southern African Institute of Mining Metallurgy vol. 112, January 2012. p. 55 - 62.

**Bada SO, Falcon LM, Falcon RMS and Bergmann CP.** Feasibility study on tribo-electrostatic concentration of -105 phosphate ore. 200 FOSSIL FUEL FOUNDATION 16th Southern African Conference on Clean Coal to Clean Energy, 1-2 November 2011. Johannesburg, South Africa.

**Bada SO and Afolabi A.** Kinetics studies of adsorption and desorption of South African fly ash for some phenolic compounds. Particulate Science and Technology Journal. South Africa, 2011.

**Barnes AR and Jones RT.** Cobalt from slag: lessons in transition from laboratory to industry. 50th Conference of Metallurgists, 2-5 October 2011. Montreal, Canada. 1p.

**Bergmann C.** Density characterisation of a porous manganese ore. Iron Ore and Manganese Ore Metallurgy Conference, 5-7 September 2011, Misty Hills, Muldersdrift (ORAL PRESENTATION).

**Bushell C.** The PGM flotation predictor: predicting PGM ore flotation performance using results from automated mineralogy systems. MEI Flotation Conference, 14-17 November 2011. Cape Town (ORAL PRESENTATION).

**Cherkaev A, Basson P and Petersen J.** Mathematical and computer modelling of the chloride assisted leaching of covellite. Pore diffusion phenomena. SAIMM Percolation Leaching: The status globally and in Southern Africa Conference, 8-9 November 2011. Misty Hills, Muldersdrift (ORAL PRESENTATION).

**Chetty D, Clark W, Bushell C, Sebola PT and Hoffman J.** The use of 3D x-ray computed tomography for gold location in exploration drill cores. 10th International Congress for Applied Mineralogy. (ICAM), 1-5 August 2011. Trondheim, Norway. p.129-136.

**Coney L.** Multidisciplinary approaches to diamond fingerprinting. Geotalk. University of the Witwatersrand, 24 August 2011. Johannesburg, South Africa.

**Coney L.** Diamond discrimination: possible or not? Geotalk. University of the Witwatersrand, 2 June 2011. Johannesburg, South Africa.

**Coney, L.** Gem-Quality Diamonds: Source Discrimination. South African Journal of Geology, March 2012. p. 33-46.

**Chetty D.** 3D computed tomography: applications in process mineralogy. MINSA symposium, 19 August 2011. Pretoria West, South Africa. (ORAL PRESENTATION).

**Chetty D. and Gutzmer J.** REE redistribution during hydrothermal alteration of ores of the Kalahari Manganese Deposit, Ore Geology Reviews Journal. September 2012, Vol 47, p. 126-135.

**Coyanis M, Traut T, Mosebi S, Downer D, Coates J and Hewer R.** Design, synthesis and biological evaluation of novel 3, 4-dihydropyrimidine carboxylates. African Network for Drugs and Diagnosis Innovation. United Nations Conference Center. 24-27 October 2011. Ethiopia (ORAL PRESENTATION).

**Dimpe KM, Sikhwivhilu K, and Moutloali RM,** 2012. Catalytic Ultrafiltration Membranes Incorporating Fe-Ni Bimetallic Nanoparticles for the Degradation of Azo Dye in Water. DST/NRF Internship Programme Research Presentation Day. 24 February 2012, University of Pretoria. Pretoria, South Africa. (POSTER PRESENTATION).

**Downer D, Mosebi S, Bythling HA and Hewer R.** Exploring the interaction between HIV-1 and VPU and CD74 of the MHCII. The South African Society of Biochemistry and Molecular Biology/ Federation of African Societies of Biochemistry and Molecular Biology Conference. 29 January -1 February 2012. Drakensberg, South Africa. (ORAL PRESENTATION).

**Dyan B.** Development of p-LDH malaria kit. DST/ Mintek Nanotechnology for Development Workshop. 15 July 2011. University of Johannesburg, Gauteng.

**Fish MQ, Mosebi S, Hewer R and Coates J.** Activity of clinically relevant HIV-1 integrase mutations and their resistance to chioric acid. 5th SA AIDS Conference, 8 June 2011. Durban, South Africa. (POSTER PRESENTATION).

**Fonteh PN, Keter FK and Meyer D.** New bis(thiosemicarbazone) gold (III)c complexes inhibit replication at cytotostatic concentrations: potential for incorporation into virostatic cocktails. Journal of Inorganic Biochemistry. May/September 2011. Vol. 105 (9) p.1-37.

**Fredericks NR, McEwan L, Khumalo T, McPherson J and van der Lingen E.** Use of heterogeneous gold catalysts in wildfire gas mask application: CO and formaldehyde oxidation comparative study. CATSA Conference, 13-16 November 2011. Misty Hills, Muldersdrift, South Africa. (POSTER PRESENTATION).

**Fredericks NR, McEwan L, Khumalo T, McPherson J and van der Lingen E.** Respiratory protection for wildlands fire-fighters: extended CO protection by heterogeneous gold catalysts. Wildfire 5th International Wildland Fire Conference. 9-13 May 2011. Sun City, South Africa. (POSTER PRESENTATION).

**Geldenhuis J and Jones RT.** What scale should your smelting testwork be done at and what do you get for the money you spend? Base Metals Conference, 18-22 July 2011. Phalaborwa, South Africa. (ORAL PRESENTATION).

**Gericke M.** Review of the role of microbiology in the design and operation of heap bioleaching. SAIMM Percolation Leaching: The status globally and in southern Africa, 8-9 November 2011. Misty Hills, Muldersdrift. (ORAL PRESENTATION).

**Gericke M, Seyedbagheri A, Neale JW and van Staden PJ.** Advancement in the approach to research and design of heap bioleaching processes. International Biohydrometallurgy Symposium, 18-22 September 2011. Changsha, China. (ORAL PRESENTATION).

**Gericke M, Neale J, van Staden P.** The application of bioleaching processes in the minerals industry: current developments and future outlook. 1st European Applied Biotechnology Conference. 25-29 September 2011. Berlin, Germany. (POSTER PRESENTATION).

**Ghorbani Y, Mainza AN, Kalala JT, Becker M and Franzidis JP.** Use of x-ray computed tomography to quantify the difference in cracks and pores of sphalerite ore particles when comminuted using an HPGR and cone crusher for heap leach feed reparation. Fifth International Autogenous and Semi-Autogenous Conference. 25 -28 September 2011, Canada.

**Govender D.** Improving the accuracy of Fe ore analysis by WD-XRF. Iron Ore, Manganese Ore Metallurgy Conference. The Southern African Institute of Mining and Metallurgy, 5-7 September 2011. Misty Hills, Muldersdrift. (ORAL PRESENTATION).

**Govender Y and Gericke M.** Evaluation of Strategies for Cr (VI) removal from Industrial effluents. South African Society for Microbiology Conference. 6-9 November 2011. Cape Town, South Africa. (ORAL PRESENTATION).

- Gryffenberg, L.** An overview of the mineralogical changes in a refractory gold sample subjected to crushing, oxidation and leaching. Minsa Symposium, 19 August 2011. Pretoria West, South Africa. (ORAL PRESENTATION).
- Harris RA and van der Walt H.** Simulated absorbance of 11-aminoundecanoic acid to stabilise Fe<sub>3</sub>O<sub>4</sub> nanoparticles. Journal of Molecular Structure, 2011.
- Harris RA.** Monte Carlo Simulations nanoparticles stabilised with sebaccic acid and 1, 10 decanedioil surfactants. SAIP Conference. Saint George Hotel. 12-15 July 2011. Pretoria, South Africa. (ORAL PRESENTATION).
- Hashmi SA, Riedel D, Grundl M, Wittel B, Foll A, Lubkoll J, Traut T, Hewer R, Rominger F, Frey W and Bats WJ.** Bio-conjugates of enantiomerically pure organopalladium compounds by metal-assisted positional selective transesterifications at palladium enolates. Chemistry: a European Journal. May 2011. Vol. 17 (23), p. 6407-6414.
- Hewer R, Papathanassiou PM, Mphahlele M and Coates J.** Inhibition of HIV-1 reverse transcriptase by gold complexes. 5th SA AIDS Conference. 8 June 2011. Durban, South Africa. (POSTER PRESENTATION).
- Islam RUI, Witcomb MJ, Scurrell MS, van Otterlo W, van der Lingen E and Mallick K.** Metal polymer hybrid material as a catalyst for the Heck coupling reaction under phosphine free conditions. Synthetic Communications: an international journal for rapid communication of synthetic organic chemistry, 2011. Vol. 99999 (1), p.1-20.
- Jonck J, Slabbert GA and Kerr JC.** The use of microscopy to solve metallurgical problems related to manufacturing. 49th MSSA Conference. Microscopy Society of Southern Africa Conference. CSIR International Convention Centre. DST/CSIR nanotechnology Innovation Center. 5-9 December 2011. Pretoria, Gauteng, South Africa.
- Jones RT.** Smelting applications of DC arc furnaces. Fray International Symposium: Metals and Materials Processing in a Clean Environment, International Symposium on Sustainable Non-Ferrous Smelting in the 21st Century. 27 November – 01 December 2011. Cancun, Mexico. (ORAL PRESENTATION).
- Kalala JT, Dong H and Hinde AL.** Using piston ide press to predict the breakage behaviour of HPGR. 5th International Autogenous and Semi-Autogenous Conference. 25-28 September 2011. British Columbia, Canada. (ORAL PRESENTATION).
- Kapito A, Stumpf W and Papo MJ.** On the development of bainitic alloys for railway wheel applications. The Southern Institute of Mining and Metallurgy. Advanced Metals Initiative. ZrTa New Metals Network Student Conference, 12-14 October 2011. (ORAL PRESENTATION).
- Kapito A, Stumpf W and Papo MJ.** On the development of bainitic alloys for railway wheel applications. The Southern African Institute of Mining and Metallurgy. Advanced Metals Initiative. ZrTa Metals Development Network Student Conference, 12-14 October 2011. Mount Grace Country House & sPa, Magaliesburg, Johannesburg. (ORAL PRESENTATION).
- Kapito A, Stumpf W. and Papo MJ.** Bainite as an alternative microstructure for railway wheel applications. Microscopy Society of Southern Africa MSSA, 06 – 09 December 2011. CSIR Convention Center, Pretoria, Gauteng.
- Keter F and Darkwa J.** Perspective: the potential of pyrazole based compounds in medicine. Biometals Journal, 2012. Vol 25(1), p. 9-21.
- Fonteh PN, Keter FK, Meyer D.** New bis (thiosemicarbazone) gold (III) complexes inhibit HIV replication at cytostatic concentrations: potential for incorporation into virostatic cocktails. The Journal of Inorganic Biochemistry, 2011. Vol 105(9), p. 1173-1180.
- Frankline K, Keter FK, Delia T, Tetyana P, Skepu A. and Tshikhudo RT.** Therapeutics & Toxicology: Activities of Biolabels group at Mintek. 4th DST/MINTEK annual NIC workshop. 22-23 November 2011. Johannesburg, South Africa. (ORAL PRESENTATION).
- Knights BDH.** Performance improvements provided by Mintek's FloatStar Advanced Control System on reverse flotation of iron ore. Iron Ore and Manganese Ore Metallurgy Conference. Southern African Institute of Mining and Metallurgy, 5-7 September 2011. Muldersdrift, South Africa. (ORAL PRESENTATION).
- Knights BDH.** Performance improvements provided by Mintek's FloatStar advanced control system on reverse flotation of iron ore. Journal of the Southern African Institute of Mining and Metallurgy. Iron Ore and Manganese Ore Metallurgy Conference. Southern African Institute of Mining and Metallurgy, 5-7 September 2011. Muldersdrift, South Africa. Conference proceedings, p. 85 - 94.
- Knights BDH, Satyro JC, Dias RA and de Araujo Freitas AG.** Performance improvements provided by Mintek's FloatStar. Advanced Control System on reverse flotation of iron ore. Southern African Institute of Mining and Metallurgy Journal. 03 March 2012. vol. 2 (3), p. 203-209.
- Knight JW and Knights BDH.** Industrial trial of Mintek's xanthoprobe at the Eland Platinum concentrator. The Southern African Institute of Mining and Metallurgy. 6th South African Base Metals Conference. 18-21 July 2011. Conference proceedings, p. 87 – 97.
- Kotze M and du Preez R.** pH profile control in a Bateman pulsed column: application to stripping of uranium. ISEC2011. Proceedings of the 19th International Solvent Extraction Conference. 3-7 October 2011. Sheraton Santiago Hotel, Chile. (ORAL PRESENTATION).
- Kriel FH, Frenandes MA and Coates J.** {u-1,2-Bis[bis(4-methoxyphenyl)-1,2-diethyl-hydrazine-k2P :P ']}bis[chloridogold(I) tetrahydrouran disolvate. Acta Crystallographica Section E. 2011. E67. m1426.
- Kruger L and du Preez R.** Mintek and the rare earth buzz in Southern Africa. Kores Invitational Seminar on Rare Earths, 8 October 2011. Seoul, South Korea. (ORAL PRESENTATION).
- Lombard A.** Rare earth elements: seeing is believing. MINSAs Symposium, 19 August 2011. Exxaro Corporate Center. Pretoria West, Gauteng. (ORAL PRESENTATION).
- Lombard A.** Rare earth mineralogy and metallurgy response. GSSA DPP Rare Earths Symposium, 20 May 2011. Melrose, Johannesburg, South Africa. (ORAL PRESENTATION).
- Lopis A.** Model development for molten state Al and Ti metals. CHPC National Meeting. CSIR International Convention Center. 7-9 December 2011. Pretoria, South Africa. (ORAL PRESENTATION).
- Mahumapelo MP.** Evaluation of clay from Lerata Bonono pottery. 1st International Conference on Clays and Clay Minerals in Africa and 2nd International Conference on Geophagia in Southern Africa (1st ICCCM and 2nd ICGSA), 19-21 October 2011. Bloemfontein, South Africa. p.153-161.
- Mallick K.** In situ polymerisation and composite formation (IPCF): an important route for the tailoring of advanced synthetic materials. 11th International Conference on Frontiers of Polymers and Advanced Materials. University of Pretoria, 22-27 May 2011. Pretoria, South Africa. (ORAL PRESENTATION).
- Mashazi P, Mugadza T, Sosibo N, Mdluli P, Vilakazi S and Nyokong T.** The effect of carbon nanotubes on the electrocatalysis of hydrogen peroxide by metallo-phthalocyanines. Talanta, 2011. Vol. 85, p.2202-2211.
- McKenzie A.** Mintek's participation in European technology platform on sustainable mineral resources. South Africa European Union. Kruger National Park. 15 September 2011. Limpopo, South Africa. (ORAL PRESENTATION).

**Mills KC, Lang Y and Jones RT.** Estimating the physical properties of slag. The Journal of the Southern African Institute of Mining and Metallurgy. vol 111, October 2011. p.649.

**Moema JS, Stumpf WE and Papo MJ.** Effect of chromium addition on the abrasive wear behaviour of Austempered Ductile Iron (ADI). Microscopy Society of Southern Africa Proceedings. vol. 41. DST/CSIR Nanotechnology Innovation Centre. National Centre for Nanostructured Materials. 5-8 December 2011. Pretoria, South Africa.

**Moema JS, Motadi MR, Kapito A and Papo M.** On the laboratory production and thermo-mechanical processing of Class B alloy used for rail wagon wheels. Southern African Institute of Mining and Metallurgy. ZrTa New Metals Development Network Conference. 12-14 October 2011. Magaliesburg, South Africa. (ORAL PRESENTATION).

**Moema JS, Motadi MR, Kapito A and Papo MJ.** On the laboratory production and thermo-mechanical processing of class B alloy used for rail wagon wheels. The Southern African Institute of Mining & Metallurgy. Advanced Metals Initiative. ZrTa New Metals Development Network Student Conference 2011. 13-14 October 2011. Magaliesburg, South Africa. Conference proceedings, p.1-10.

**Mosebi S, Fish MQ, Hewer R and Coates J.** Development of novel assays important for the identification of authentic HIV-1 integrase inhibitors. 25th Anniversary Symposium of the Protein Society. 23-27 July 2011. Boston, Massachusetts. (POSTER PRESENTATION).

**Mosebi S, Coates J and Hewer R.** HIV-1 integrase: an important therapeutic target for HIV drug development. 5th SA AIDS Conference. 8 June 2011. Durban, South Africa. (ORAL PRESENTATION).

**Mphahlele MK, Mosebi S, Papathanasopoulos MA, Laguna A, Coates J and Hewer R.** Enhanced HIV type-1 integrase strand transfer activity induced by an Ag(II) complex. 5th SA AIDS Conference. 8 June 2011. Durban, South Africa. (POSTER PRESENTATION).

**Mphahlele MK, Mosebi S, Papathanasopoulos MA, Laguna A, Coates J and Hewer R.** Enhanced HIV type-1 integrase strand transfer activity by silver-based compounds. COST D39 Metallo Drug Design in Action. Royal College of Surgeons in Ireland, 5-6 July 2011. Ireland. (POSTER PRESENTATION).

**Mphahlele M, Papathanasopoulos MA, Coyanis M, Mosebi S, Traut T, Modise R, Coates J and Hewer R.** Modification of HIV-1 reverse transcriptase and integrase activity by gold (III) complexes in direct biochemical assays. Bioorganic & Medicinal Chemistry Journal, 2012. Vol. 20(1), p. 401 - 407.

**Mulaudzi FML.** Material selection for metal dusting environments. 5th Annual Corrosion Control Conference. Convention Dynamics Centre. 25 May 2011. Isando, South Africa. (ORAL PRESENTATION).

**Mulaudzi FML, Cornish LA, Slabbert GA and Papo MJ.** A study of metal dusting on alloys 602CA and 800. ZrTa. New Metals Development Network Conference. Advanced Metals Initiative, 12-14 October 2011. Magaliesburg, South Africa. Conference proceedings, p.1-21.

**Mulaudzi FML, Cornish LA, Slabbert GA, Papo MJ and Zhang J.** Microstructural investigation of metal dusting on alloys 602CA and 800. Microscopy Society of Southern Africa vol 14. CSIR Convention. Centre. 06-9 December 2011. Pretoria, South Africa. (ORAL PRESENTATION).

**Mwaba LA, Cornish LA and van der Lingen E.** Microstructural, mechanical and oxidation properties evolution of  $\gamma$ -Ti-Al compound with addition of precious metals. Advanced Metals Initiative. ZrTa2011 New Metals development Network Conference, 12-14 October 2011. Magaliesburg, South Africa. Conference proceedings, p.1-17.

**Neale JW, Gericke M and Ramcharan K.** The application of bioleaching to base metal sulphides in Southern Africa: prospects and opportunities. The Southern African Institute of Mining and Metallurgy. 6th South African Base Metals Conference. 18-21 July 2011. Phalaborwa, South Africa. (ORAL PRESENTATION).

**Pillay J.** Monolayer protected gold nanoparticles self-assembled networks as platforms for probing the electron transfer dynamics. University of Bath, 6 September 2011. Claverton Down Bath, United Kingdom. (ORAL PRESENTATION).

**Pillay K, Becker M, Chetty D and Thiele H.** The effect of gangue mineralogy on the density separation of low grade nickel ore. The Southern African Institute of Mining and Metallurgy. 6th Southern African Base Metals Conference, 18-20 July 2011. Phalaborwa, South Africa. Conference proceedings, p.493-509.

**Raphulu M, Gqogqa Moma J, Ntho T, McPherson J, Patrick G, Louis C, Delannoy L and van der Lingen E.** The effect of Fe on the activity and stability of Au/FeOx-TiO2 catalysts for CO oxidation. Catalysis Society of South Africa (CATSA), 13-16 November 2011. Muldersdrift, South Africa. (POSTER PRESENTATION).

**Reisner D, Brauer S, Zheng W, Vulpe C, Bawa R, Alvelo J and Gericke M.** Bionanotechnology. Biomedical Engineering Education & Advanced Bioengineering Learning: Interdisciplinary Concepts. IBI Global, 2012. P.436-489. (Book Chapter)

**Reynolds QG.** Advances in the understanding of DC plasma arc behaviour. 3rd International Round Table on Thermal Plasmas for Industrial Applications, 31 October - 04 November 2011. Muldersdrift, South Africa. (ORAL PRESENTATION).

**Reynolds QG, Reddy BD.** Some aspects of dynamic computational modelling of direct current plasma arc phenomena. IV International Conference on Computational Methods for Coupled Problems in Science and Engineering. 20-22 June 2011. Kos, Greece. (ORAL PRESENTATION).

**Robertson SW, Pj van Staden and S. Seyedbagheri.** Advances in high temperature heap leaching of refractory copper sulphide ore. SAIMM Percolation Leaching: The status globally and in Southern Africa. 8-9 November 2011. Muldersdrift, South Africa. (ORAL PRESENTATION).

**Sikhwivhilu K, Moutloali RM and Tshikhudo RT.** Catalytic microfiltration membranes with Fe-Ni bimetallic nanoparticles for the reductive degradation of methyl orange dye in water. Water Institute of Southern Africa Membrane Technology Conference. 11-14 September 2011. Umhlanga, Kwa-Zulu Natal, South Africa. (ORAL PRESENTATION).

**Sikhwivhilu K, Kama D.V. and Moutloali RM,** 2011. Iron-based Catalytic Microfiltration Membranes for Degradation of Azo Dye in Water. DST/Mintek NIC workshop. 22-23 November 2011. (ORAL PRESENTATION).

**Sikhwivhilu K, Moutloali RM and Tshikhudo RT.** Methyl orange degradation by Fe-Pd and Fe-Ni nanoparticles immobilised on polyacrylic acid PVDF composite membranes. International Water Association: Nano and Water Conference, 15-18 May 2011. Monte Verita, Ascona, Switzerland. (ORAL PRESENTATION).

**Slabbert D.** The left leg of the copson curve IIR: corrosion control. 5th Annual Corrosion Control Conference. Convention Dynamics centre. 24-27 May 2011. Isando, South Africa. (ORAL PRESENTATION).

**Sosibo NM, Mdluli PS, Mashazi PN, Dyan B, Revaprasadu N, Nyokong T, Tshikhudo RT, Skepu A and van der Lingen E.** Synthesis, density functional theory, molecular dynamics and electrochemical studies of 3-thiopheneacetic acid capped gold nanoparticles. Journal of Molecular Structure 2011. Vol. 1006, p. 494-501.

**Thompson W, Lombard A, Santiago E and Singh A.** Mineralogical studies in assisting beneficiation of rare earth element minerals from carbonatite deposits. 10th International Congress for Applied Mineralogy (ICAM). 1-5 August 2011. Trondheim, Norway. Conference proceedings, p.665-672.

**Thompson W, Lombard A, Santiago E and Singh A.** Mineralogical studies in assisting beneficiation of rare earth element minerals from carbonitite deposits. 10th International Congress for Applied Mineralogy Conference. 1-5 August 2011. Trondheim, Norway. Conference proceedings, p.665-672.

**Traut T, Kriel FH, van Zyl WE and Williams BG.** Chlorido {N-(2-(diphenylphosphanyl)-1(pyridin-2yl) methanamine)P} gold (I). Acta Crystallographica Section E.m1625 p.1-8.

**Traut T, Coates J, Williams DBG and Hewer R.** Design and synthesis of pyrrole-carbaldehydes as HIV-integrase strand transfer inhibitors complexes. 4th International Conference on Antiviral Research (ICAR). 8-11 May 2011. Bulgaria. (ORAL PRESENTATION).

**Traut T, Hewer R, Coates J and Williams DBG.** Pyrrole - carbaldehyde inhibitors of HIV-1 integrase: a medicinal chemistry approach. 5th SA AIDS Conference. 07 -10 June 2011. Durban, South Africa. (ORAL PRESENTATION).

**Tshikhudo RT.** Unlocking the potential of nanoscience and technology through computational modelling. CSIR Conference. 07 December 2011, Pretoria. South Africa. (ORAL PRESENTATION).

**Tshikhudo RT.** The importance of three way partnerships in nanotechnology. Annual Symposium of the Science Councils and Statutory Bodies Sector of the NSTF: Collaboration of Science Councils with Industry and Higher Education around Commercialisation, 22 - 23 September 2011. Benoni, South Africa. (ORAL PRESENTATION).

**Tshikhudo RT.** Gold nanoparticles based point of care diagnostics. UK Colloids: an International Colloid and Surface Science Conference. 04 – 06 July 2011. London. United Kingdom. (ORAL PRESENTATION).

**Tshikhudo RT.** Nano diagnostics. Lab Africa Exhibition. 7-9 June 2011. Randburg, Gauteng, South Africa. (POSTER PRESENTATION).

**Van der Merwe W and Breuer P.** Cyanide analysis for complex cyanide solutions. COM Conference of Metallurgists. 02 – 05 October 2011. Hilton Bonaventure Hotel, Montreal, QC. (ORAL PRESENTATION).

**Van der Walt H, Chown L, Sosibo N and Tshikhudo R.** Investigating the stabilisation effect of carboxylic vs hydroxyl groups of Fe<sub>3</sub>O<sub>4</sub> and Fe<sub>3</sub>O<sub>4</sub> @ Au nanoparticles. 11th International Conference on Frontiers of Polymers and Advanced Materials. University of Pretoria. 22- 27 May 2011. Pretoria, South Africa. (ORAL PRESENTATION).

**Van Rensburg SJ.** Comparing refractory gold ore pre-oxidation options using Mintek's advanced leach facility. World Gold Conference. 3rd International Conference. 2-5 October 2011. Montreal, QC. p.263-275.

**Van Rensburg SJ.** Career journey. Gold processing and Environment. University of Johannesburg. 08 February 2012. Johannesburg, South Africa. (ORAL PRESENTATION).

**Van Rooyen M, Mashai P and Lydall M.** Thorium: SA's most underestimated energy resource? The Southern African Institute of Mining and Metallurgy. Thorium & Rare Earth Conference, 21-22 February 2012. Cape Town, South Africa. (ORAL PRESENTATION).

**Van Staden, PJ.** Opening address: Percolation leaching in southern Africa. SAIMM Percolation Leaching: The status globally and in Southern Africa, 8-9 November 2011. Misty Hills, Muldersdrift. (ORAL PRESENTATION).

**Van Staden PJ.** Materials flow management for heap (bio) leaching. Mining Magazine Congress Conference, 24-25 October 2011. Emperors Palace, Johannesburg. (ORAL PRESENTATION).

**Vilakazi S, Pillay J and Dyan B.** Characterisation and electro catalytic properties of carbon nanotube gold nanoparticle hybrid. 43rd IUPAC World Chemistry Congress. 46th IUPAC General Assembly, 70th CQPR Annual Conference and Exhibition. 30 July – 05 August 2011. San Juan, Puerto Rico. (ORAL PRESENTATION).

**Whiteley C, Govender Y, Riddin T and Rai M.** Enzymatic Synthesis of Platinum Nanoparticles- Prokaryote and Eukaryote Systems. Metal Nanoparticles in Microbiology Journal, 2011. Berlin, Heidelberg, 2011. p. 103–134. (Book Chapter).

**Zhou Y-G, Rees NV, Pillay J, Tshikhudo R, Vilakazi S and Compton RG.** Gold nanoparticles show electro-activity: counting and sorting nanoparticles upon impact with electrodes. Chemm Communication Journal, 2012. vol 48. p. 2.

# Corporate Governance

MINTEK IS COMMITTED TO THE PRINCIPLES OF OPENNESS, INTEGRITY AND ACCOUNTABILITY in its dealings with all stakeholders. It endorses the Code of Corporate Practice and Conduct as set out in the King Reports and the Public Finance Management Act, and believes that the primary objective of the corporate governance system is to ensure that both the Board and Management carry out their responsibilities ethically and effectively.

## Board of Directors

Mintek's Board of Directors consisted of one executive member and nine non-executive members at the beginning of the financial year who were independently appointed by the Minister of Mineral Resources in terms of the Mineral Technology Act No. 30 1989 (the Mintek Act). Board members, excluding the Chief Executive Officer, hold office for a maximum of three years, but are eligible for re-appointment. The current Board has been in office since March 2010 and will complete its term in 2013. The Board members are appointed based on their business acumen, experience and knowledge as well as other skills. Mintek has a Board Secretariat that is responsible for ensuring that Board procedures are followed in line with the various corporate governance frameworks. During the financial year, the composition changed due to the passing away of one member, the resignation of one member, the appointment of the DST representative and the replacement of the previous DMR representative by another DMR representative.

Attendance of Board Members at Board Meetings						
Name	27/05/2011	29/07/2011	25/11/2011	25/11/2011*	05/01/2012*	26/01/2012
Mr. Mohau Mphomela (Chairperson)	Y	Y	Y	Y	Y	N
Mr. Abiel Mngomezulu (Ex-officio & CEO)	Y	Y	Y	Y	Y	Y
Ms. Salminah Maja (Deputy Chairperson)	N	Y	Y	Y	Y	Y
Ms. Joy Ndlovu	Y	N	N	N	Y	Y
Adv. Derick Block	Y	Y	Y	N	Y	Y
Ms. Zethu Qunta**	N	Y	N/A	N/A	N/A	N/A
Ms. Simangele Sekgobela	Y	N	N	N	Y	N
Mr. Paul Streng	Y	Y	Y	Y	Y	Y
Mr. Paul White***	Y	Y	N/A	N/A	N/A	N/A
Mr. Imraan Patel****	N/A	Y	N	N	Y	Y
Ms. Setepane Mohale*****	N/A	N/A	Y	N/A	Y	Y
Mr. Tseko Nell (Alternate to Ms. Mohale)	N	Y	Y	Y	N/A	Y

N = Absent with apology N/A = Not Applicable

\*Special Board Meetings

\*\*Member resigned from the Board on 04 October 2011

\*\*\*Member passed away on 10 November 2011

\*\*\*\*Member appointed on 01 January 2011

\*\*\*\*\*Member appointed on 01 November 2011

The Board considers Mintek's annual financial statements to be a fair representation of its financial position at year-end in terms of the South African Statements of Generally Accepted Accounting Practice (GAAP).

## Audit and Risk Committee

The Audit and Risk Committee (Committee) has seven members consisting of three Board members, one member representing the DMR, two Independent members and Mintek's CEO as well as the Representative of the Auditor-General as a standing invitee. Due to the resignation of one of the Committee members (who was a DMR appointment) during the year, an interim member was appointed by the Committee. The Committee operates in terms of a formal charter and assists the Board in fulfilling its responsibilities in respect of financial and risk matters. It also ensures that the appropriate accounting policies, internal controls and compliance with laws and regulations are in place. Both the internal and external auditors have unrestricted access to the Committee.

During the past year the Committee considered various reports from the internal auditor, while the audit report on the annual financial statements from the external auditor was considered by the Board. The Auditor-General once again expressed an unqualified audit opinion on Mintek's annual financial statements for the year ended 31 March 2012.

Attendance of Audit Committee Members at Audit and Risk Committee Meetings				
Name	20/05/2011	22/07/2011	28/10/2011	20/01/2012
Mr. Paul Streng (Chairperson)	Y	Y	Y	Y
Mr. Abiel Mngomezulu (Ex officio)	Y	Y	Y	Y
Ms. Salminah Maja	N	N	N	Y
Ms. Zethu Qunta*	N	Y	N/A	N/A
Ms. Simangele Sekgobela	N	N	N	Y
Mr. Edson Ragimana (DMR representative)	N	N	N	Y
Dr. Jan Bredell (Independent member)	Y	Y	Y	Y
Ms. Doris Dondur (Independent member)	Y	Y	Y	N
Ms. Setepane Mohale (Interim member)**	N/A	N/A	N/A	Y

N = Absent with apology N/A = Not Applicable

\*Member resigned from the Board on 04 October 2011

\*\*Member was appointed Interim member on 26 November 2011

## Internal Control

Mintek maintains internal controls and systems, designed to provide reasonable assurance as to the integrity and reliability of its financial statements and to safeguard, verify and maintain the accountability of assets. The effectiveness of these controls is monitored by the internal auditors, who report to the Audit and Risk Committee. The Audit and Risk Committee requested management to review and evaluate Mintek's existing internal controls to further identify areas that can continually be improved upon.

## Internal Audit

Mintek's independent Internal Audit (IA) function assists the organisation to accomplish its objectives by adopting a systematic, disciplined approach to evaluating and improving the effectiveness of risk management, control and governance. The IA function has direct access to the Audit and Risk Committee and regular meetings are held with the Chairperson of the Audit and Risk Committee.



Results Orientation  
 - The strength lies in the team  
 - Vision to achieve, passion to succeed  
 - Leadership is essential  
 - Not satisfied here from the end goal.



## Risk Management

The Risk Management Committee continually reviews the risk management process, internal controls, and significant risks facing the organisation. The Committee provides the Audit Committee with a risk assessment report at appropriately scheduled intervals. Meetings are held on a quarterly basis or as required, and Mintek's Risk Plan and Risk Management Framework are updated as required. Mintek utilises the services of insurance brokers on an annual basis to analyse and assess the risks associated with its assets, which are insured, together with public liability and professional indemnity, for the risk assessed.

Attendance of Committee Members at Corporate Risk Management Meetings				
Name	28/06/2011	21/09/2011	08/12/2011	22/03/2012
Mr. Abiel Mngomezulu – CEO	Y	Y	N	Y
Dr. Roger Paul – Chairperson and GM: Business Development*	Y	Y	N/A	N/A
Mr. Paul White – Mintek Board member**	Y	N	N/A	N/A
Mr. Sakhi Simelane – GM: Finance	Y	Y	N	N
Adv. M Ramoshaba – GM: Corporate Services	Y	Y	Y	Y
Mr. Peter Craven – GM: Technology and later Business Development (Became Chairperson after Dr. Roger Paul retired)	Y	N	Y	Y
Dr. Makhapa Makhafola – GM: R&D	Y	N	Y	Y
Ms. Hester Pretorius – Finance	Y	Y	Y	Y
Ms. Makgomo Umlaw – Human Resources***	Y	Y	N/A	N/A
Mr. Muzi Ntombela – Site & Security****	Y	Y	Y	N/A
Mr. Elias Lesunyane – Security	N	Y	Y	Y
Mr. Mpho Mathose – Internal Audit	Y	N	Y	Y
Mr. Leon Swanepoel – QESH	N	Y	Y	Y
Mr. Hennie Venter – Information Technology and QESH	Y	Y	N	Y
Mr. Alan McKenzie – GM: Technology*****	N/A	N/A	N	Y

N = Absent with apology N/A = Not Applicable  
 \*Member's contract ended on 30 September 2011  
 \*\*Member passed away on 10 November 2011  
 \*\*\*Member resigned on 13 November 2011  
 \*\*\*\*Member resigned 31 December 2011  
 \*\*\*\*\*Member appointed as GM: Technology on 01 October 2011

## Human Resources Committee

The Human Resources (HR) Committee consists of four Board members and the CEO. The Committee reviews and determines the remuneration and terms of employment for Mintek, and as part of this process, gives consideration to the annual review of remuneration packages based on independent surveys. The Committee also looks into HR policies, internal controls, circumstances, conditions and activities that affect material changes to policies and procedures and conditions of service for all employees in compliance with demands and vested interests of Mintek's stakeholders. The Mintek Board ratifies the decisions of the HR Committee.

Attendance of Human Resources Committee Members at Human Resources Committee Meetings				
Name	05/05/2011	28/07/2011	03/11/2011	18/01/2012
Ms. Salminah Maja (Chairperson)	Y	Y	Y	Y
Mr. Abiel Mngomezulu (Ex officio & CEO)	Y	Y	Y	Y
Adv. Derick Block	Y	N	Y	Y
Ms. Joy Ndlovu	Y	Y	Y	N
Mr. Paul White*	Y	N	Y	N/A

N = Absent with apology N/A = Not Applicable  
 \*Member passed away on 10 November 2011

## Technical Committee

The Technical Committee consists of four Board members, the CEO, an alternate member and another recently appointed alternate member to fill the position left vacant by the passing away of the Committee Chairperson. The main purpose of the Technical Committee is to assist the Board in discharging its duties relating to the legal mandate of Mintek in as far as its core business is concerned. It provides a forum for discussing technical issues for developing relevant recommendations for consideration by the Board in informing strategy development and implementation within Mintek. Furthermore, the Committee is set up to advise on utilisation of expertise, project proposals and financing thereof, looking into various co-operative and related strategies and the possible expansion of Mintek business within the said mandate. In addition to the above, the Committee must ensure that there is compliance with any other function or responsibility as may be prescribed by relevant legislation and in line with national priorities.

Attendance of Technical Committee Members at Technical Committee Meetings				
Name	21/04/2011	21/07/2011	20/10/2011	18/01/2012
Mr. Paul White (Chairperson)*	Y	Y	Y	N/A
Mr. Abiel Mngomezulu (Ex officio & CEO)	Y	Y	Y	N
Ms. Simangele Sekgobela	Y	N	Y	Y
Adv. Derick Block (Alternate member)**	N/A	N/A	N/A	Y
Mr. Imraan Patel (DST Representative & Interim Chairperson after P White)	Y	N	N	Y
Mr. Tseko Nell (DMR alternate to S Mohale)	N	Y	Y	N

N = Absent with apology N/A = Not Applicable  
 \*Member passed away on 10 November 2011  
 \*\*Member appointed as Alternate Committee member on 25 November 2011

## Fraud Committee

Mintek has adopted a fraud prevention plan that incorporates principles contained in the Public Sector Anti-Corruption Strategy, which focuses particularly on creating awareness and promoting ethical business conduct. The Fraud Committee, which consists of standing members with roles in Finance and Security as well as a neutral Chairperson, is tasked with an ongoing review of the effectiveness of internal controls to combat fraud.

## Management

Mintek is managed by a Chief Executive Officer assisted by five General Managers. This team makes up Mintek's Executive Management Committee and meets on a weekly basis to review strategic and operational issues.

Executive Management is supported by fifteen formally appointed Divisional Managers who are in charge of Mintek's operating divisions and centralised support functions.

## Operational Performance

Mintek reports to the Department of Mineral Resources (DMR) and is also accountable to the Department of Science and Technology (DST) for its technology-related Research and Development (R&D) activities. Various Key Performance Indicators (KPIs), encompassing financial, organisational, innovation and learning, human resources and transformation perspectives, provide Mintek with a basis for evaluating its activities in the identified key performance areas.

Each KPI is supported by a set of identified measures, that provide a more specific and consistent base from which to assess progress. There is also a framework for peer review should the need arise.

While Mintek's Executive Committee meets on a weekly basis, the Management Committee convenes on a monthly basis where both the business plans and

financial results are presented. The budget for the current year is reviewed in September by executive management in order to keep track of and ensure overall sound financial management.

### Going Concern

The Mintek Board reviewed the Entity's financial budgets for the period from 1 April 2012 to 31 March 2013 and is satisfied that adequate resources exist to continue business for the foreseeable future.

### Quality, Environment, Safety and Health (QESH)

During August 2011, Mintek's QESH management systems underwent a combined surveillance audit against the requirements of ISO 9001:2008 (Quality), ISO 14001:2004 (Environmental Management) and OHSAS 18001:2007 (Safety and Health). Mintek has once again satisfied the requirements to be certified by the accredited independent external auditors as meeting the requirements of quality (ISO 9001), environmental management (ISO 14001), and safety and health (OHSAS 18001).

The next re-assessment audit, for ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 will take place in May 2012. Re-assessment audits are performed on a three-yearly basis for certification renewals.

The Lost Time Injury Frequency Rate (LTIFR) remained below the target of 1 for nine months of the year but increased to 1.2 in November due to two injuries in October and one in November 2011. It decreased to below one again in December 2011.

The Environmental Incident Frequency Rate (EIFR), Health Incident Frequency Rate (HIFR) and The Public Dissatisfaction Frequency Rate (PDFR) were zero throughout the year.

A groundwater quality assessment indicated that the overall groundwater quality underlying the site is good with no significant impact from any potential contamination sources.

### Radiation Protection Programme

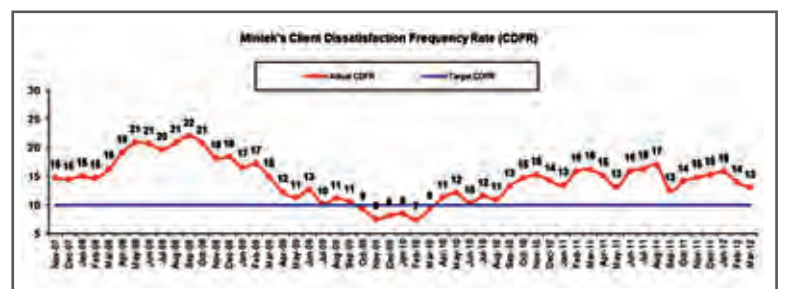
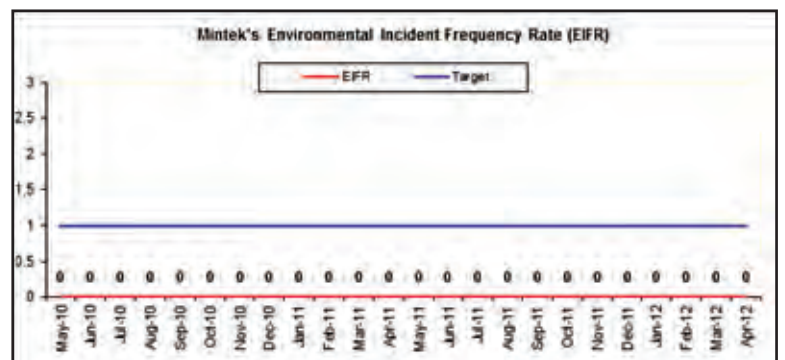
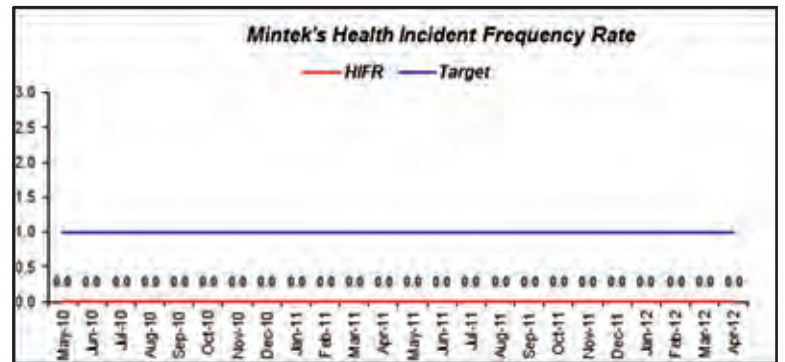
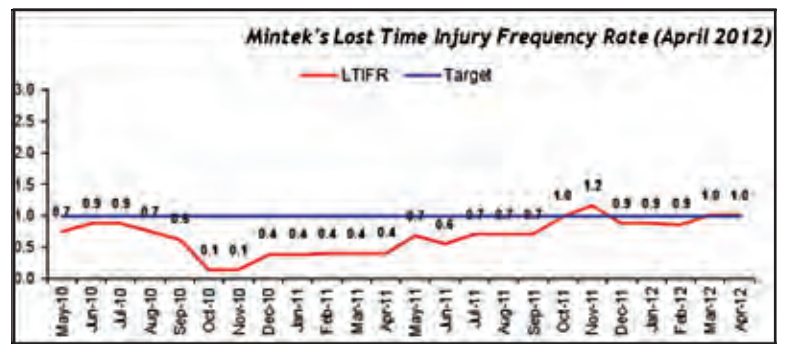
Mintek is registered as a Uranium and Thorium test work facility with the National Nuclear Regulator (NNR) and the Department of Energy (DoE).

Mintek has been issued with the following authorisations from the Department of Energy:

- ▶ exportation of Uranium and Thorium.
- ▶ importation of Uranium and Thorium.
- ▶ possession of Uranium and Thorium.
- ▶ acquisition, processing, use and transportation of Uranium and Thorium.

The Radiation Protection Programme (RPP) has been incorporated as part of the overall Safety, Health, and Environment programme, and an internal audit schedule has been implemented to ensure that the RPP remains relevant and is updated as approved by the NNR.

During April 2011, Mintek's CDFR increased to 15, thus not meeting the target of <10 anymore. The main causes of client dissatisfaction was due to invoicing and ordering related administrative issues, as well as not meeting delivery deadlines on certain projects. Every client survey that indicated a measure of client dissatisfaction was analysed by the Business Unit involved and the necessary corrective action taken. By the end of the year the CDFR had dropped to 13.



# Annual Financial Statements and Notes

FOR THE YEAR ENDED 31 MARCH 2012

## GENERAL INFORMATION

<b>Country of incorporation and domicile</b>	South Africa
<b>Mintek Directors</b>	M Mphomela (Chairperson) MA Mngomezulu (President and CEO) N Qunta (Resigned 04 October 2011) P Streng D Block P White (Deceased 10 November 2011) S Sekgobela S Maja (Deputy Chairperson) J Ndlovu M Mabuza (Resigned 31 October 2011) T Nell (Alternate to S Mohale) S Mohale (Appointed 01 November 2011) I Patel
<b>Mindev Directors</b>	SA Simelane RL Paul GL Rapoo MA Mngomezulu M Mphomela
<b>Registered office</b>	200 Malibongwe Drive, Randburg 2194, South Africa
<b>Business address</b>	200 Malibongwe Drive, Randburg 2194, South Africa
<b>Postal address</b>	Private Bag X3015, Randburg 2125, South Africa
<b>Bankers</b>	Absa Bank Limited
<b>Auditors</b>	Auditor-General South Africa

## Contents

AUDIT AND RISK COMMITTEE REPORT	42
DIRECTORS' RESPONSIBILITIES AND APPROVAL	44
DIRECTORS' REPORT	45
REPORT OF THE AUDITOR-GENERAL	47
STATEMENTS OF FINANCIAL POSITION	48
STATEMENTS OF COMPREHENSIVE INCOME	49
STATEMENTS OF CHANGES IN EQUITY	50
STATEMENTS OF CASH FLOWS	51
ACCOUNTING POLICIES	52
NOTES TO THE FINANCIAL STATEMENTS	56

# Audit and Risk Committee Report

Report of the Audit and Risk Committee – as required by Treasury Regulations 27.1.7 and 27.1.10 (b) and (c) issued in terms of sections 51(1)(a)(ii) and 76(4)(d) the Public Finance Management (PFMA) Act 1 of 1999, as amended by Act 29 of 1999.

## 1. Audit and Risk Committee members and attendance

The audit and risk committee consists of the members listed hereunder. During the financial year under review the audit and risk committee met four times and appropriate feedback was provided to the relevant Accounting Authority on matters that are within the mandate of the audit and risk committee.

Audit and Risk committee member's name	Qualification	Board /Audit & Risk /Independent member	Number of meetings attended
Mr Paul Streng	B.Com, B.Acc Chartered Accountant (SA)	Board member	4 out of 4
Dr Jan Bredell	MSc, DSc Pr. Sci. Nat.	Independent member	4 out of 4
Doris Dondur	CA (SA) MBA	Independent member	3 out of 4
Ms S Maja	LLB, B.Iuris.	Board member	1 out of 4
Mr E Ragimana	B.Com Acc., CIA	Audit & Risk Committee member	1 out of 4
Ms S Sekgobela	MSc, Honours B.Com, B.Com	Board member	1 out of 4
Ms Z Qunta	MA, MBA	Board member	1 out of 2
Ms S Mohale	MSc, BA	Board member	1 out of 1

In addition to the above, the audit and risk committee also had a separate closed session with the Auditor-General.

## 2. Audit and Risk Committee Responsibility

The MINTEK audit and risk committee wishes to report that it has complied with its responsibilities arising from section 51(1)(a) as well as with Treasury Regulations 27.1.7 and 27.1.10 (b) and (c) issued in terms of sections 51(1)(a)(ii) and 76(4)(d) of the Public Finance Management Act 1 of 1999, as amended by Act 29 of 1999. The audit and risk committee also wishes to report that it has adopted formal terms of reference.

The audit and risk committee is able to report that external audit, which is performed by the Auditor-General, is independent of MINTEK.

The audit and risk committee has discharged all its responsibilities as contained in this audit and risk committee charter.

## 3. Effectiveness of internal control

The PFMA 38(1)(a)(i) and 51(1)(a)(i) states that the accounting authority must ensure that the entity has maintained an effective, efficient and transparent system of financial and risk management and internal control.

The system of internal control and the concomitant control environment within MINTEK were reasonably effective as the various reports of the Auditor-General and Internal Audit will attest.

The audit and risk committee wishes to report that partial compliance with legal and regulatory provisions and the policies and procedures of MINTEK occurred during the financial year under review, despite concerted efforts, compliance with certain aspects of the Mineral Technology Act still poses practical challenges and that as a result, proposed amendments to this Act are being prepared.

## 4. Governance of risk

The PFMA 38(1)(a)(i) and 51(1)(a)(i) states that the accounting authority must ensure that the entity has maintained an effective, efficient and transparent system of financial and risk management and internal control.

The audit and risk committee has the responsibility to ensure that a risk management process is in place at MINTEK and as such can report that risks are being appropriately managed within MINTEK.

Additional information regarding the risk events and their effect on this annual report are detailed elsewhere in the annual report.

## 5. Internal audit

The audit and risk committee is responsible for ensuring that the MINTEK, internal audit function is independent and has the necessary resources, standing and authority within MINTEK to enable it to effectively and efficiently discharge its duties. Furthermore, the audit and risk committee oversees cooperation between the internal and external auditors, and serves as a link between the accounting authority and these functions.

The audit and risk committee also considered and recommended the internal audit charter for approval by the accounting authority during the year under review.

## 6. Whistle blowing

The audit and risk committee receives and deals with any concern or complaints, whether from within or outside of MINTEK, relating to the accounting practices and internal audit of MINTEK, the content or auditing of MINTEK's financial statements, the internal financial controls of MINTEK and related matters.

## 7. The quality of management and monthly/quarterly reports submitted in terms of the PFMA

The audit and risk committee reports that, during the year under review, they were presented with regular monthly or quarterly management reports to enable them to:

- Monitor the integrity, accuracy and reliability of the financial position of MINTEK;
- Review the management accounts of MINTEK to provide the accounting authority with an authoritative and credible view of the financial position of MINTEK;
- Review the disclosure in the financial reports of MINTEK and the context in which statements on the financial health of MINTEK are made; and
- Review all material information presented together with the management accounts.

## 8. The quality of budgets submitted in terms of the PFMA.

The audit and risk committee reports that, during the year under review, they were regularly presented with a budget to enable them to:

- Review and ensure that the annual budgets of MINTEK are balanced, credible and realistic against the approved business plans; and

- ii. Monitor and periodically review the implementation of the approved budget of MINTEK by the accounting authority.

## 9. Evaluation of financial statements

The audit and risk committee, at its meeting held on 18 May 2012 resolved to recommend the approval of the annual financial statements to the accounting authority. The audit and risk committee wishes to indicate that it performed a review on the annual financial statements focusing on:

- i. Significant financial reporting judgments and estimates contained in the annual financial statements;
- ii. Clarity and completeness of disclosure and whether disclosures made have been set properly in context;
- iii. Quality and acceptability of, and any changes in accounting policies and practices;
- iv. Compliance with accounting standards and legal requirements;
- v. Significant adjustments and/or unadjusted differences resulting from the audit;
- vi. Reflection of unusual circumstances or events and management's explanation for the accounting treatment adopted;
- vii. Reasons for major year-on-year fluctuations;
- viii. Asset valuations and revaluations;
- ix. Calculation and levels of general and specific provisions;
- x. Write-offs and reserve transfers; and
- xi. The basis for the going concern assumption.

## 10. Conclusion

The audit and risk committee concurs with and accepts the conclusions and the unqualified audit opinion of the Auditor-General on the annual financial statements and is of the view that the audited financial statements be accepted and read together with the report of the Auditor-General.



Adv D Block  
for the Audit and Risk Committee  
27 July 2012

### Audit and Risk Committee members:

Mr P Streng (Chairperson)  
Mr A Mngomezulu  
Ms D Maja  
Mr E Ragimana  
Ms S Sekgobela  
Ms Z Qunta  
Ms S Mohale  
Dr J Bredell  
Ms D Dondur

## Directors' Responsibilities and Approval

THE DIRECTORS ARE REQUIRED IN TERMS OF THE PUBLIC FINANCE MANAGEMENT ACT to maintain adequate accounting records and are responsible for the content and integrity of the financial statements and related financial information included in this report. It is their responsibility to ensure that the financial statements fairly present the state of affairs of the group as at the end of the financial year and the results of its operations and cash flows for the period then ended, in conformity with South African Statements of Generally Accepted Accounting Practice and are based upon appropriate accounting policies consistently applied and supported by reasonable and prudent judgements and estimates. The external auditors are engaged to express an independent opinion on the financial statements.

The directors acknowledge that they are ultimately responsible for the system of internal financial control established by the group and place considerable importance on maintaining a strong control environment. To enable the directors to meet these responsibilities, the directors set standards for internal control aimed at reducing the risk of error or loss in a cost effective manner. The standards include the proper delegation of responsibilities within a clearly defined framework, effective accounting procedures and adequate segregation of duties to ensure an acceptable level of risk. These controls are monitored throughout the group and all employees are required to maintain the highest ethical standards in ensuring the group's business is conducted in a manner that in all reasonable circumstances is above reproach. The focus of risk management in the group is on identifying, assessing, managing and monitoring all known forms of risk across the group. While operating risk cannot be fully eliminated, the group endeavours to minimise it by ensuring that appropriate infrastructure, controls, systems and ethical behaviour are applied and managed within predetermined procedures and constraints.

The directors are of the opinion, based on the information and explanations given by management, that the system of internal control provides reasonable assurance that the financial records may be relied on for the preparation of the financial statements. However, any system of internal financial control can provide only reasonable, and not absolute, assurance against material misstatement or loss.

In the opinion of the directors the group has adequate resources to continue in operational existence for the foreseeable future. This opinion is based on the 2013 budget and the current financial position of the group.

The external auditors are responsible for independently reviewing and reporting on the group's financial statements. The financial statements have been examined by the group's external auditors and their report is presented on page 47.

The financial statements set out on page 48 to 69, which have been prepared on the going concern basis, were approved by the directors on 27 July 2012 and were signed on their behalf by:



**M Mphomela**  
Chairperson



**MA Mngomezulu**  
Chief Executive Officer/President

# Directors' Report

THE DIRECTORS OF MINTEK take pleasure in submitting their 2011/2012 report together with the Annual Financial Statements as at 31 March 2012. The Mintek Group's Annual Financial Statements comply with South African Statements of Generally Accepted Accounting Practice (GAAP) and the PFMA.

## Nature of the business

Mintek was established by the Mineral Technology Act 30 of 1989 (Mintek Act) and is listed as a national government business enterprise in schedule 3B of the Public Finance Management Act (PFMA), 1999, as amended.

Mintek is South Africa's national mineral research organisation, established to ensure the sustainability and growth of the minerals industry through technology development and transfer.

In terms of the Mintek Act, Mintek's main mandate is to promote mineral technology and to foster the establishment and expansion of industries in the field of minerals and products derived therefrom through research.

To give effect to its mandate set out in the Mintek Act, the directors and executive management have identified the following key objectives:

- Enhance Mintek's visibility and credibility to all stakeholders;
- Research and develop efficient mineral processing technologies and value added products and services;
- Research and develop efficient mineral processing technologies to mitigate the impact of mineral development on the environment;
- Promote the mineral-based economies of rural and marginalised communities through technical assistance and skills development;
- Ensure the short-term viability and long-term sustainability of Mintek;
- Build world class R&D excellence; and,
- Uphold good governance practices.

Mindev (Proprietary) Limited is a subsidiary 100% owned by Mintek and was dormant in the current year.

Details of Mintek's investment and financial interest in Mindev is disclosed in note 4 of the Annual Financial Statements.

## Financial results

The financial results for the year ended 31 March 2012 are detailed in the annual financial statements set out in pages 48 to 69 of the annual report. The year under review is covered fully in the Chairman's and the Chief Executive's reports and the financial review below.

## Audit and Risk committee report

The report of the Audit and Risk Committee for the year ended 31 March 2012 is set out in detail on page 42.

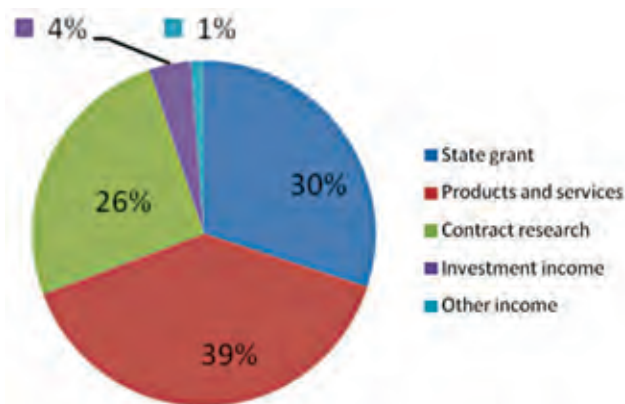
## Financial performance

### Review of Income and Expenditure

The local economy showed signs of a slow recovery in 2011 but was impacted by the economic uncertainty in the developed economies of Europe and the USA. Notwithstanding the slow economic recovery, Mintek achieved significantly improved results when compared to previous financial periods.

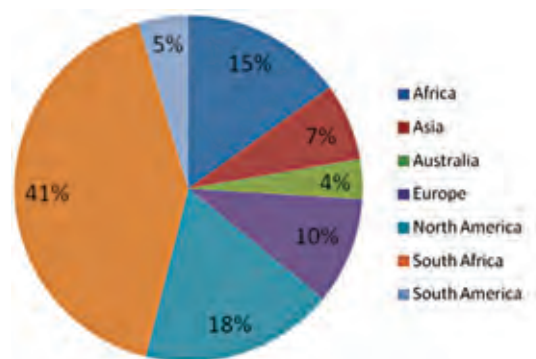
Mintek group revenue increased by 17% compared to the prior year, passing the R400 million mark. The growth arose largely from the commercial activities of Mintek. International revenue grew by a remarkable 74% in the F2011/2012. Products and services revenue grew by 42% as a result of strong growth in the mineral processing, pyrometallurgy and hydrometallurgy fields where several large pilot plant campaigns were conducted by our highly skilled workforce. Revenue from analytical services remains unchanged from the previous year's performance because of the competitive nature of that business which resulted in lower margins.

The graph below indicates revenue sources:



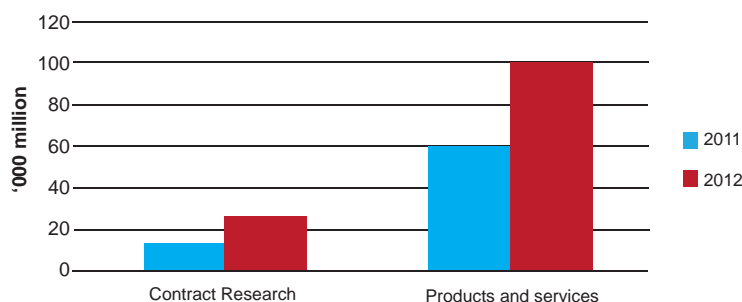
Group commercial revenue is generated primarily in South Africa, USA, UK and Canada. Revenue derived from foreign customers relates mostly to pilot plant work but, in the case of the UK, it was specifically the ConRoast Process licence fee income.

## Distribution of Revenue: Continents



Licence fees received from commercialisation of the ConRoast process contributed significantly to revenues for the year under review. The Government grant, on the other hand, decreased by 2% in the baseline allocation over the Medium Term Expenditure Framework (MTEF). In the 2012/13 budget cycle, however, a significant amount was allocated to Mintek over the MTEF for project-specific allocation, such as environmental technologies, rare earth pilot plant research work, establishment of a Northern Cape semi-precious gemstone facility, enhancement of the atomiser facility and the rehabilitation of ownerless and derelict mines.

## International Revenue Sources



Investment income continues to be a strong source of revenue for Mintek despite lower interest rates and increased working capital requirements, arising from the Bay 2 capital project. The interest income for the period under review is R15,7m (F2011: R14,5m) which is 8,2% higher than in F2010/2011. This has been made possible by an increase in advance receipts, improved cash flow management and investment activities. However, these activities cannot be leveraged any further and nominal interest rates are expected to remain at current levels during F2012/2013, interest received is not therefore expected to grow beyond current levels in the next financial year.

In addition to the above, the weakening of the Rand against the US Dollar during the reporting period had a R2,7m positive impact on our finances compared to the R2,2m loss in the previous financial year.

#### ► Expenditure

Although Mintek has seen a significant growth in commercial income, it exercised considerable control over limiting its increase to 4.4% compared to the 17% increase in revenue during this financial year.

The depreciation charge decreased by R12,8m following a review of the useful life and residual value of property, plant and equipment in line with the requirements of SA GAAP.

#### ► Review of Operations

Interest in rare earth elements (REE) processing continued to present a focus of interest in Southern Africa and therefore resulted in a major commercial, contract research as well as Parliamentary Grant work. The Hydrometallurgy Division has submitted provisional patent applications for uranium recovery resin-in-pulp (RIP) circuits at elevated pH, direct electrowinning of cobalt as well as the regeneration of Mg(OH)<sub>2</sub> for base metal recovery. These technologies offer the potential for significant advances in processing of uranium and base metals. The co-operation agreement with Veolia Water Solutions & Technologies on the SAVMIN technology to treat acid mine drainage, has been finalised and a memorandum of understanding between the two institutions was signed in January 2012. The preliminary process design has been completed and it currently being designed. Mintek engineers completed the commissioning of the Minstral submerged-arc furnace controller at a site of a major ferroalloy producer in Kazakhstan, bringing the total at the site to four, a success which has realised foreign revenue in excess of US\$775 000 for South Africa and Mintek.

The construction of the metal alloy atomising facility, which will be coupled to the DC furnace is well underway. This facility will create the largest atomising facility in the world.

#### ► Review of the Financial Position

There has been a 23% increase in the Mintek asset base from the previous financial year. This is largely attributable to the expansion of the Bay 2 facility, laboratory equipment acquisitions and the review of the useful life of property, plant and equipment that resulted in the reversal of R12,8m worth of depreciation.

Equity increased by R43,4m being the surplus that Mintek achieved this year.

The effect of the receipt of funds in advance is evident in the increase in the deferred income balance of 16% compared to the previous period.

#### ► Cash flow

Mintek's financial position remain strong. The group has minimal liabilities and is cash positive. Mintek's operations generated a strong cash flow which has been used to finance working capital and capital expenditure requirements, necessitated by the organic growth or revitalisation required in certain divisions.

Cash retained from operations grew to R88.6 million for the group, R41,8 million higher than the previous financial year. This is due to better management of working capital and improved collection processes.

This current status supports Mintek's continued business activities and expansion in certain areas. However Mintek will continue to exercise caution with such investment, given the uncertainty and volatility of the current economic conditions.

### Outlook

The outlook for F2012/2013 is very positive with several projects already signed up and a strong pipeline for the remainder of the next financial year. The completion and commissioning of the atomiser facility, expected just before the end of the first quarter of the financial year, will enable the Bay 2 facility to operate for the remainder of the financial year, significantly boosting the cash generating capacity of Mintek. The operation of this facility will result in a large increase in Mintek's electricity consumption which, due to the ever-increasing electricity rates, will be monitored closely to ensure optimal use of this precious commodity. In addition to this, the MTEF projects will commence and significant revenue will be derived from these activities. The attraction and retention of highly-skilled resources remains an issue for concern in the future.

### Judicial Proceedings

Apart from two awards against Mintek by the CCMA, the directors are not aware of any significant judicial proceedings against Mintek, except for those as disclosed in note 24 of the Annual Financial Statements.

### Human Capital Development

Mintek remains committed to human capital development to address the current shortage of skills and increase the level of knowledge, skills, competencies and attributes of our employees thereby leading to employees' satisfaction and performance as well as its competitive advantage.

### Post financial year-end Events

The directors are not aware of any material post financial year-end events.

### The Group Directors Of Mintek As At 31 March 2012

<b>Mintek Directors</b>	Mr M Mphomela – Chairperson
	Mr MA Mngomezulu – President and CEO
	Mr P Streng
	Adv. D Block
	Ms S Sekgobela
	Ms S Maja – Deputy Chairperson
	Ms J Ndlovu
	Mr I Patel
	Ms S Mohale
	Mr T Nell (Alternate to Ms S Mohale)

<b>Mindev Directors</b>	Mr MA Mngomezulu - Chairperson
	Mr SA Simelane - Executive
	Dr RL Paul
	Mr GL Rapoo
	Mr M Mphomela

The Board secretary is Adv M Ramoshaba, and the business and postal addresses are as follows:

200 Malibongwe Drive	Private Bag x3015
Randburg	Randburg
2194	2125

### Auditors

The Auditor General of South Africa will continue in office in accordance with section 4 of the Public Audit Act, and will conduct audits in terms of section 8(2) of the Public Finance Management Act No.1 of 1999.



# Report of the Auditor-General

## REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON COUNCIL FOR MINERAL TECHNOLOGY (MINTEK).

### REPORT ON THE CONSOLIDATED FINANCIAL STATEMENTS

#### Introduction

1. I have audited the consolidated and separate financial statements of MINTEK and its subsidiaries set out on pages 48 to 69, which comprise the consolidated and separate statement of financial position as at 31 March 2012, the statement of comprehensive income, statement of changes in equity and the statement of cash flows for the year then ended, and the notes comprising a summary of significant accounting policies and other explanatory information.

#### Accounting authority's responsibility for the consolidated financial statements

2. The accounting authority is responsible for the preparation and fair presentation of these consolidated and separate financial statements in accordance with South African Standards of Generally Accepted Accounting Practice (SA Standards of GAAP) and the requirements of the Public Finance Management Act of South Africa, 1999 (Act No. 1 of 1999) (PFMA), and for such internal control as management determines is necessary to enable the preparation of consolidated and separate financial statements that are free from material misstatement, whether due to fraud or error.

#### Auditor-General's responsibility

3. My responsibility is to express an opinion on these consolidated and separate financial statements based on my audit. I conducted my audit in accordance with the Public Audit Act of South Africa, 2004 (Act No. 25 of 2004) (PAA), the *General Notice* issued in terms thereof and International Standards on Auditing. Those standards require that I comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the consolidated and separate financial statements are free from material misstatement.
4. An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the consolidated and separate financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the consolidated and separate financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the consolidated and separate financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the consolidated and separate financial statements.
5. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my audit opinion.

#### Opinion

6. In my opinion, the consolidated and separate financial statements present fairly, in all material respects, the financial position of MINTEK as at 31 March 2012, and their financial performance and cash flows for the year then ended in accordance with SA Standards of GAAP and the requirements of the PFMA.

### REPORT ON OTHER LEGAL AND REGULATORY REQUIREMENTS

7. In accordance with the PAA and the *General Notice* issued in terms thereof, I report the following findings relevant to performance against predetermined objectives, compliance with laws and regulations and internal control, but not for the purpose of expressing an opinion.

#### Predetermined objectives

8. I performed procedures to obtain evidence about the usefulness and reliability of the information in the performance against objectives report as set out on pages 10 to 13 of the annual report.
9. The reported performance against predetermined objectives was evaluated against the overall criteria of usefulness and reliability. The usefulness of information in the annual performance report relates to whether it is presented in accordance with the National Treasury annual reporting principles and whether the reported performance is consistent with the planned objectives. The usefulness of information further relates to whether indicators and targets are measurable (i.e. well defined, verifiable, specific, measurable and time bound) and relevant as required by the *National Treasury Framework for managing programme performance information*.

The reliability of the information in respect of the selected programmes is assessed to determine whether it adequately reflects the facts (i.e. whether it is valid, accurate and complete).

There were no material findings on the performance against objectives report concerning the usefulness and reliability of the information.

#### Compliance with laws and regulations

10. I performed procedures to obtain evidence that the entity has complied with applicable laws and regulations regarding financial matters, financial management and other related matters. I did not identify any instances of material non-compliance with specific matters in key applicable laws and regulations as set out in the *General Notice* issued in terms of the PAA.

#### Internal control

11. I considered internal control relevant to my audit of the financial statements, annual performance report and compliance with laws and regulations. I did not identify any deficiencies in internal control which we considered sufficiently significant for inclusion in this report.

Auditor-General

Pretoria

31 July 2012



**STATEMENTS OF FINANCIAL POSITION AT 31 MARCH 2012**

Figures in Rand (s)	Note(s)	MINTEK GROUP		MINTEK	
		2012	2011	2012	2011
<b>Assets</b>					
<i>Non-Current Assets</i>					
Property, plant and equipment	2	257,264,383	208,615,438	257,264,383	208,615,438
Intangible assets	3	3,147,243	2,948,386	3,147,243	2,948,386
Investments in subsidiaries	4	-	-	100	100
		<b>260,411,626</b>	<b>211,563,824</b>	<b>260,411,726</b>	<b>211,563,924</b>
<i>Current Assets</i>					
Inventories	5	5,466,901	5,722,346	5,466,901	5,722,346
Current tax receivable		502,469	502,469	-	-
Trade and other receivables	6	45,739,490	43,914,841	45,739,490	43,914,841
Short term investments	7	274,493,109	246,809,439	274,493,109	246,809,439
Cash and cash equivalents		30,806,130	20,702,546	30,806,130	20,702,546
		<b>357,008,099</b>	<b>317,651,641</b>	<b>356,505,630</b>	<b>317,149,172</b>
<b>Total Assets</b>		<b>617,419,725</b>	<b>529,215,465</b>	<b>616,917,356</b>	<b>528,713,096</b>
<b>Equity and Liabilities</b>					
<b>Equity</b>					
Reserves		131,591,356	132,945,675	131,591,356	132,945,675
Retained income		276,328,093	231,536,476	276,328,093	191,561,711
		<b>407,919,449</b>	<b>364,482,151</b>	<b>367,944,684</b>	<b>324,507,386</b>
<b>Liabilities</b>					
<i>Non-Current Liabilities</i>					
Retirement benefit obligation	8	28,286,244	28,287,105	28,286,244	28,287,105
<i>Current Liabilities</i>					
Loans from group companies	9	-	-	39,472,396	39,472,396
Trade and other payables	10	64,090,001	35,007,518	64,090,001	35,007,518
Deferred income	11	116,811,875	100,870,259	116,811,875	100,870,259
Provisions	12	312,156	568,432	312,156	568,432
		<b>181,241,032</b>	<b>136,446,209</b>	<b>220,686,428</b>	<b>175,918,605</b>
<b>Total Liabilities</b>		<b>209,500,276</b>	<b>164,733,314</b>	<b>248,972,672</b>	<b>204,205,710</b>
<b>Total Equity and Liabilities</b>		<b>617,419,725</b>	<b>529,215,465</b>	<b>616,917,356</b>	<b>528,713,096</b>

**STATEMENTS OF COMPREHENSIVE INCOME FOR THE YEAR ENDED 31 MARCH 2012**

Figures in Rand (s)	Note(s)	MINTEK GROUP		MINTEK	
		2012	2011	2012	2011
<b>Continuing operations</b>					
Revenue	13	398,970,138	337,160,039	398,970,138	337,160,039
Other operating income	14	5,166,614	6,342,094	5,166,614	6,342,094
Surplus/(deficit) on exchange differences		2,664,002	(2,192,525)	2,664,002	(2,192,525)
Investment income	15	16,584,981	16,324,384	16,584,981	16,324,384
Employee costs		(248,087,824)	(227,157,971)	(248,087,824)	(227,157,971)
Operating expenses		(80,349,728)	(79,976,062)	(80,349,728)	(79,976,062)
Finance costs	16	(2,678,886)	(3,534,993)	(2,678,886)	(3,534,993)
Auditors remuneration	17	(2,301,239)	(1,651,364)	(2,301,239)	(1,651,364)
Fees for services	18	(47,276,003)	(39,300,384)	(47,276,003)	(39,300,384)
Depreciation, amortisation and impairments	19	(13,048,603)	(12,424,447)	(13,048,603)	(12,424,447)
Reassessment of assets useful lives	19	12,832,877	-	12,832,877	-
Surplus on sale of assets		161,022	265,324	161,022	265,324
Actuarial Gains		799,947	3,423,769	799,947	3,423,769
<b>Surplus/(deficit) before taxation</b>		<b>43,437,298</b>	<b>(2,722,136)</b>	<b>43,437,298</b>	<b>(2,722,136)</b>
Taxation	20	-	662,775	-	-
<b>Surplus/(deficit) for the year</b>		<b>43,437,298</b>	<b>(2,059,361)</b>	<b>43,437,298</b>	<b>(2,722,136)</b>
<b>Other comprehensive income:</b>					
Gains and losses on property revaluation		-	24,485,158	-	24,485,158
<b>Total comprehensive income</b>		<b>43,437,298</b>	<b>22,425,797</b>	<b>43,437,298</b>	<b>21,763,022</b>

**STATEMENTS OF CHANGES IN EQUITY FOR THE YEAR ENDED 31 MARCH 2012**

<b>Figures in Rand(s)</b>	Revaluation reserve	Retained income	Total equity
<b>MINTEK GROUP</b>			
<b>Balance at 31 March 2010</b>	<b>109,358,306</b>	<b>232,698,048</b>	<b>342,056,354</b>
Changes in equity			
Total comprehensive income for the year	24,485,158	(2,059,361)	22,425,797
Depreciation on revaluation of buildings	(897,789)	897,789	-
Total changes	23,587,369	(1,161,572)	22,425,797
<b>Balance at 31 March 2011</b>	<b>132,945,675</b>	<b>231,536,476</b>	<b>364,482,151</b>
Changes in equity			
Total comprehensive income for the year	-	43,437,298	43,437,298
Depreciation on revaluation of buildings	(1,354,319)	1,354,319	-
Total changes	(1,354,319)	44,791,617	43,437,298
<b>Balance at 31 March 2012</b>	<b>131,591,356</b>	<b>276,328,093</b>	<b>407,919,449</b>
<b>MINTEK</b>			
<b>Balance at 31 March 2010</b>	<b>109,358,306</b>	<b>193,386,058</b>	<b>302,744,364</b>
Changes in equity			
Total comprehensive income for the year	24,485,158	(2,722,136)	21,763,022
Depreciation on revaluation of buildings	(897,789)	897,789	-
Total changes	23,587,369	(1,824,347)	21,763,022
<b>Balance at 31 March 2011</b>	<b>132,945,675</b>	<b>191,561,711</b>	<b>324,507,386</b>
Changes in equity			
Total comprehensive income for the year	-	43,437,298	43,437,298
Depreciation on revaluation of buildings	(1,354,319)	1,354,319	-
Total changes	(1,354,319)	44,791,617	43,437,298
<b>Balance at 31 March 2012</b>	<b>131,591,356</b>	<b>236,353,328</b>	<b>367,944,684</b>

**STATEMENTS OF CASH FLOW FOR THE YEAR ENDED 31 MARCH 2012**

Figures in Rand(s)	Note(s)	MINTEK GROUP		MINTEK	
		2012	2011	2012	2011
<b>Cash flows from operating activities</b>					
Cash receipts from customers		416,946,963	385,296,486	416,946,963	386,005,016
Cash paid to suppliers and employees		(342,614,764)	(351,974,019)	(342,614,764)	(352,682,549)
Cash generated from operations	21	74,332,199	33,322,467	74,332,199	33,322,467
Interest received		15,718,249	14,556,425	15,718,249	14,556,425
Provision utilised		(1,395,594)	(1,053,229)	(1,395,594)	(1,053,229)
Finance costs		(12,332)	(44,594)	(12,332)	(44,594)
<b>Net cash from operating activities</b>		<b>88,642,522</b>	<b>46,781,069</b>	<b>88,642,522</b>	<b>46,781,069</b>
<b>Cash flows from investing activities</b>					
Additions to property, plant and equipment	2	(70,482,066)	(62,575,991)	(70,482,066)	(62,575,991)
Additions to intangible assets	3	(36,330)	(1,212,571)	(36,330)	(1,212,571)
Funding received towards purchasing of property, plant and equipment	2	21,058,125	59,416,858	21,058,125	59,416,858
Funding received towards purchasing of intangible assets	3	-	410,736	-	410,736
Increase in investments		(27,683,670)	(23,921,419)	(27,683,670)	(23,921,419)
<b>Net cash from investing activities</b>		<b>(77,143,941)</b>	<b>(27,882,387)</b>	<b>(77,143,941)</b>	<b>(27,882,387)</b>
<b>Cash flows from financing activities</b>					
Long-term creditor payments		-	(422,532)	-	(422,532)
Post-retirement health care - settlement		(1,394,997)	(1,534,126)	(1,394,997)	(1,534,126)
<b>Net cash from financing activities</b>		<b>(1,394,997)</b>	<b>(1,956,658)</b>	<b>(1,394,997)</b>	<b>(1,956,658)</b>
<b>Total cash movement for the year</b>		<b>10,103,584</b>	<b>16,942,024</b>	<b>10,103,584</b>	<b>16,942,024</b>
Cash at the beginning of the year		20,702,546	3,760,522	20,702,546	3,760,522
<b>Total cash at end of the year</b>		<b>30,806,130</b>	<b>20,702,546</b>	<b>30,806,130</b>	<b>20,702,546</b>

## 1. Presentation of Financial Statements

The financial statements have been prepared in accordance with South African Statements of Generally Accepted Accounting Practice, the Public Finance Management Act and Treasury Guidelines. The financial statements have been prepared on the historical cost basis, and incorporate the principal accounting policies set out below. They are presented in South African Rand.

These accounting policies are consistent with the previous period.

For purposes of these financial statements, all references to 'Company' refers to Mintek, the public entity.

### 1.1 Basis of consolidation

The consolidated financial statements incorporate the financial statements of the company and all entities, controlled by the company.

Control exists when the company has the power to govern the financial and operating policies of an entity so as to obtain benefits from its activities.

All intra-group transactions, balances, income and expenses are eliminated in full on consolidation.

### 1.2 Property, plant and equipment

The cost of an item of property, plant and equipment is recognised as an asset when:

- ▶ it is probable that future economic benefits associated with the item will flow to the company; and
- ▶ the cost of the item can be measured reliably.

Property, plant and equipment are initially measured at cost.

Costs include costs incurred initially to acquire or construct an item of property, plant and equipment and costs incurred subsequently to add to, replace part of, or service it. If a replacement cost is recognised in the carrying amount of an item of property, plant and equipment, the carrying amount of the replaced part is derecognised.

Land and buildings are carried at revalued amount, being the fair value at the date of revaluation less any subsequent accumulated depreciation and subsequent accumulated impairment losses. Revaluations are made with sufficient regularity such that the carrying amount does not differ materially from that which would be determined using fair value at the end of the reporting period.

When an item of property, plant and equipment is revalued, any accumulated depreciation at the date of the revaluation is restated proportionately with the change in the gross carrying amount of the asset so that the carrying amount of the asset after revaluation equals its revalued amount. Any increase in an asset's carrying amount, as a result of a revaluation, is recognised to other comprehensive income and accumulated in the revaluation surplus in equity. The increase is recognised in other comprehensive income to the extent that it reverses a revaluation decrease of the same asset previously recognised in the Statement of Comprehensive Income.

Any decrease in an asset's carrying amount, as a result of a revaluation, is recognised in the Statement of Comprehensive Income in the current period. The decrease is recognised in other comprehensive income to the extent of any credit balance existing in the revaluation surplus in respect of that asset. The decrease recognised in other comprehensive income reduces the amount accumulated in the revaluation surplus in equity.

The revaluation surplus in equity related to a specific item of property, plant and equipment is transferred directly to retained earnings when the asset is derecognised.

The useful lives of items of property, plant and equipment have been assessed as follows:

Item	Average useful life
Buildings	50 years
Plant and machinery	5 - 10 years
Furniture and fixtures	5 - 10 years
Motor vehicles	5 years
Office equipment	5 - 10 years
IT equipment	3 - 5 years

The residual value, useful life and depreciation method of each asset are reviewed at the end of each reporting period. If the expectations differ from previous estimates, the change is accounted for as a change in accounting estimate.

The depreciation charge for each period is recognised in the Statement of Comprehensive Income unless it is included in the carrying amount of another asset.

The gain or loss arising from the derecognition of an item of property, plant and equipment is included in the Statement of Comprehensive Income when the item is derecognised. The gain or loss arising from the derecognition of an item of property, plant and equipment is determined as the difference between the net disposal proceeds, if any, and the carrying amount of the item.

### 1.3 Intangible assets

An intangible asset is recognised when:

- ▶ it is probable that the expected future economic benefits that are attributable to the asset will flow to the entity; and
- ▶ the cost of the asset can be measured reliably.

Intangible assets are initially recognised at cost.

Expenditure on research (or on the research phase of an internal project) is recognised as an expense when it is incurred.

Intangible assets are carried at cost less any accumulated amortisation and any accumulated impairment losses.

Gains or losses arising from derecognition of an intangible asset are measured as the difference between the net disposal proceeds and the carrying amount of the asset and are recognised in the statement of comprehensive income when the asset is derecognised.

Amortisation is provided to write down the intangible assets, on a straight-line basis, to their residual values as follows:

Item	Useful life
Computer software	3 - 5 years

### 1.4 Investments in subsidiaries

In the Mintek financial statements, investments in subsidiaries are carried at cost less any accumulated impairment.

The cost of an investment in a subsidiary is the aggregate of:

- ▶ the fair value, at the date of exchange, of assets given, liabilities incurred or assumed, and equity instruments issued by the company; plus
- ▶ any costs directly attributable to the purchase of the subsidiary.

An adjustment to the cost of a business combination contingent on future events is included in the cost of the combination if the adjustment is probable and can be measured reliably.

### 1.5 Financial instruments

#### Classification

The group classifies financial assets and financial liabilities into the following categories:

- ▶ Financial assets at fair value through the Statement of Comprehensive Income - held for trading
- ▶ Held-to-maturity investment
- ▶ Loans and receivables
- ▶ Financial liabilities measured at amortised cost.

Classification depends on the purpose for which the financial instruments were obtained/incurred and takes place at initial recognition. Classification is re-assessed on an annual basis, except for derivatives and financial assets designated as at fair value through the Statement of Comprehensive Income, which shall not be classified out of the fair value through the Statement of Comprehensive Income category.

#### Initial recognition and measurement

Financial instruments are recognised initially at cost when the group becomes a party to the contractual provisions of the instruments.

The group classifies financial instruments, or their component parts, on initial

recognition as a financial asset or a financial liability in accordance with the substance of the contractual arrangement.

For financial instruments which are not at cost through the Statement of Comprehensive Income, transaction costs are included in the initial measurement of the instrument.

**Subsequent measurement**

Financial instruments at cost through the Statement of Comprehensive Income are subsequently measured at fair value, with gains and losses arising from changes in fair value being included in surplus or deficit for the period.

Loans and receivables are subsequently measured at amortised cost, using the effective interest method, less accumulated impairment losses.

Held-to-maturity investments are subsequently measured at amortised cost, using the effective interest method, less accumulated impairment losses.

Gains and losses arising from changes in fair value are recognised in other comprehensive income and accumulated in equity until the asset is disposed of or determined to be impaired.

Financial liabilities at amortised cost are subsequently measured at amortised cost, using the effective interest method.

**Derecognition**

Financial assets are derecognised when the rights to receive cash flows from the investments have expired or have been transferred and the group has transferred substantially all risks and rewards of ownership.

**Impairment of financial assets**

At each reporting date the group assesses all financial assets, other than those at fair value through the Statement of Comprehensive Income, to determine whether there is objective evidence that a financial asset or group of financial assets has been impaired.

For amounts due to the group, significant financial difficulties of the debtor, probability that the debtor will enter bankruptcy and default of payments are all considered indicators of impairment.

Impairment losses are recognised in the Statement of Comprehensive Income.

Impairment losses are reversed when an increase in the financial asset's recoverable amount can be related objectively to an event occurring after the impairment was recognised, subject to the restriction that the carrying amount of the financial asset at the date that the impairment is reversed shall not exceed what the carrying amount would have been had the impairment not been recognised.

Reversals of impairment losses are recognised in the Statement of Comprehensive Income except for equity investments classified as available-for-sale.

Impairment losses are also not subsequently reversed for available-for-sale equity investments which are held at cost because fair value was not determinable.

Where financial assets are impaired through use of an allowance account, the amount of the loss is recognised in the Statement of Comprehensive Income within operating expenses. When such assets are written off, the write-off is made against the relevant allowance account. Subsequent recoveries of amounts previously written off are credited against operating expenses.

**Loans to/(from) group companies**

These include loans to and from the holding company and the subsidiary.

Loans to group companies are classified as loans and receivables.

Loans from group companies are classified as financial liabilities measured at amortised cost.

**Trade and other receivables**

Trade receivables are measured at initial recognition at fair value, and are subsequently measured at amortised cost using the effective interest rate method. Appropriate allowances for estimated irrecoverable amounts are recognised in the Statement of

Comprehensive Income when there is objective evidence that the asset is impaired. Significant financial difficulties of the debtor, probability that the debtor will enter bankruptcy or financial reorganisation, and default or delinquency in payments are considered indicators that the trade receivable is impaired. The allowance recognised is measured at the carrying amount.

The carrying amount of the asset is reduced through the use of an allowance account, and the amount of the deficit is recognised in the Statement of Comprehensive Income within operating expenses. When a trade receivable is uncollectable, it is written off against the allowance account for trade receivables. Subsequent recoveries of amounts previously written off are credited against operating expenses in the Statement of Comprehensive Income.

**Trade and other payables**

Trade payables are initially measured at fair value, and are subsequently measured at amortised cost, using the effective interest rate method.

**Cash and cash equivalents**

Cash and cash equivalents comprise cash-on-hand and demand deposits, and other short-term highly liquid investments that are readily convertible to a known amount of cash and are subject to an insignificant risk of changes in value. These are initially and subsequently recorded at fair value.

**Derivatives**

The Group does not use derivative financial instruments including forward rate agreements and forward exchange contracts to hedge exposure rate and foreign fluctuations. It is the Group's policy not to hedge its exposure from foreign currency fluctuations, as it does not consider the impact to be significant. It is the policy of the Group not to trade in derivative financial instruments for speculative purposes.

**1.6 Investments**

Investments consist of short-term money market instruments initially recorded at cost, which is fair value of the cash placed with the institution. These investments are held-to-maturity financial assets. Interest is accrued using the effective interest rate method and included in the statement of comprehensive income on an accrual basis.

**1.7 Taxation**

**Current tax assets and liabilities**

Current tax for current and prior periods is, to the extent unpaid, recognised as a liability. If the amount already paid in respect of current and prior periods exceeds the amount due for those periods, the excess is recognised as an asset.

Current tax liabilities/(assets) for the current and prior periods are measured at the amount expected to be paid to/ (recovered from) the tax authorities, using the tax rates (and tax laws) that have been enacted or substantively enacted by the end of the reporting period.

The company is exempt from paying Income Tax in terms of section 10(1) cA(i) of the Income Tax Act no.58 of 1962, but registered for VAT. Mindev is registered for Income Tax.

The tax currently payable is based on taxable profit for the financial year. Mindev's liability for current tax is calculated using tax rates that have been enacted or substantively enacted by the balance sheet date.

**1.8 Irregular, fruitless and wasteful expenditure**

Irregular expenditure means expenditure incurred in contravention of, or not in accordance with, a requirement of any applicable legislation, including:

- ▶ The Public Finance Management Act; or,
- ▶ Any provincial legislation providing for procedures in that state owned entity.

Fruitless and wasteful expenditure means expenditure that was made in vain and could have been avoided had reasonable care been exercised. All irregular, fruitless and wasteful expenditure is charged against income in the period in which they are incurred.

**1.9 Financing costs**

Financing costs are recognised in the statement of comprehensive income in the period in which they are incurred.

### 1.10 Leases

A lease is classified as a finance lease if it transfers substantially all the risks and rewards incidental to ownership. A lease is classified as an operating lease if it does not transfer substantially all the risks and rewards incidental to ownership.

#### Finance leases – lessee

Finance leases are recognised as assets and liabilities in the statement of financial position at amounts equal to the fair value of the leased property or, if lower, the present value of the minimum lease payments. The corresponding liability to the lessor is included in the statement of financial position as a finance lease obligation.

The discount rate used in calculating the present value of the minimum lease payments is the company's incremental borrowing rate.

The lease payments are apportioned between the finance charge and reduction of the outstanding liability. The finance charge is allocated to each period during the lease term so as to produce a constant periodic rate on the remaining balance of the liability.

#### Operating leases - lessor

Operating lease income is recognised as an income on a straight-line basis over the lease term.

Initial direct costs incurred in negotiating and arranging operating leases are added to the carrying amount of the leased asset and recognised as an expense over the lease term on the same basis as the lease income.

Income for leases is disclosed under other operating income in the statement of comprehensive income.

#### Operating leases – lessee

Operating lease payments are recognised as an expense on a straight-line basis over the lease term. The difference between the amounts recognised as an expense and the contractual payments are recognised as an operating lease asset. This liability is not discounted.

### 1.11 Inventories

Inventories are measured at the lower of cost and net realisable value on the weighted average cost method.

Net realisable value is the estimated selling price in the ordinary course of business less the estimated costs of completion and the estimated costs necessary to make the sale.

The cost of inventories comprises of all costs of purchase, costs of conversion and other costs incurred in bringing the inventories to their present location and condition.

The cost of inventories of items that are not ordinarily interchangeable and goods or services produced and segregated for specific projects is assigned using specific identification of the individual costs.

When inventories are sold, the carrying amounts of those inventories are recognised as an expense in the period in which the related revenue is recognised. The amount of any write-down of inventories to net realisable value and all losses of inventories are recognised as an expense in the period the write-down or loss occurs. The amount of any reversal of any write-down of inventories, arising from an increase in net realisable value, are recognised as a reduction in the amount of inventories recognised as an expense in the period in which the reversal occurs.

### 1.12 Impairment of assets

The group assesses at each end of the reporting period whether there is any indication that an asset may be impaired. If any such indication exists, the group estimates the recoverable amount of the asset.

Irrespective of whether there is any indication of impairment, the group also:

- ▶ tests intangible assets with an indefinite useful life or intangible assets not yet available for use for impairment annually by comparing its carrying amount with its recoverable amount. This impairment test is performed annually.

If there is any indication that an asset may be impaired, the recoverable amount is estimated for the individual asset. If it is not possible to estimate the recoverable amount of the individual asset, the recoverable amount of the cash-generating unit to which the asset belongs is determined.

The recoverable amount of an asset or a cash-generating unit is the higher of its fair value less costs to sell and its value in use.

If the recoverable amount of an asset is less than its carrying amount, the carrying amount of the asset is reduced to its recoverable amount. That reduction is an impairment loss.

An impairment loss of assets carried at cost less any accumulated depreciation or amortisation is recognised immediately in the Statement of Comprehensive Income. Any impairment loss of a revalued asset is treated as a revaluation decrease.

An impairment loss is recognised for cash-generating units if the recoverable amount of the unit is less than the carrying amount of the units. The impairment loss is allocated to reduce the carrying amount of the assets of the unit in the following order:

- ▶ first, to reduce the carrying amount of any goodwill allocated to the cash-generating unit; and,
- ▶ then, to the other assets of the unit, pro rata on the basis of the carrying amount of each asset in the unit.

The company assesses at each reporting date whether there is any indication that an impairment loss recognised in prior periods for assets may no longer exist or may have decreased. If any such indication exists, the recoverable amounts of those assets are estimated.

A reversal of an impairment loss of assets carried at cost less accumulated depreciation or amortisation other than goodwill is recognised immediately in the Statement of Comprehensive Income. Any reversal of an impairment loss of a revalued asset is treated as a revaluation increase.

### 1.13 Share capital and equity

An equity instrument is any contract that evidences a residual interest in the assets of an entity after deducting all of its liabilities.

### 1.14 Employee benefits

#### Defined contribution plans

Payments to defined contribution retirement benefit plans are charged as an expense as they fall due.

Payments made to retirement benefit schemes are dealt with as defined contribution plans where the group's obligation under the schemes is equivalent to those arising in a defined contribution retirement benefit plan.

For defined contribution plans, the Group pays contribution to privately administered pension insurance plans on a contractual basis. The Group has no further payment obligations once the contributions have been paid. The contributions are recognised as employee benefit expense when they are due.

#### Defined benefit plans

Actuarial valuations are conducted on an annual basis by independent actuaries separately for each plan.

Actuarial gains and losses are recognised in full in the reporting period it relates to and is the excess over the greater of the present value of the past service obligation at the reporting period before deducting the present value of assumed assets at the same date.

Valuations of these obligations are carried out annually by independent, qualified actuaries using the appropriate mortality tables, long-term estimates of increases in medical costs and appropriate discount rates.

Consideration is given to any event that could impact the funds up to the end of the reporting period where the interim valuation is performed at an earlier date.

Past service costs are recognised immediately to the extent that the benefits are already vested, and are otherwise amortised on a straight line basis over the average period until the amended benefits become vested.

The liability recognised in the balance sheet in respect of the defined benefit pension plans is the present value of the defined obligation at the balance sheet date less the fair value of plan assets, together with adjustments for unrecognised past-service costs. The defined benefit obligation is calculated annually by independent actuaries using the projected unit credit method.



Prepaid contributions are recognised as an asset to the extent that a cash refund or a reduction in the future payment is available.

The Group has an obligation to fund the medical aid benefits of all its past employees and dependents of past employee who retired or were in the employment of the Group prior to 31 December 1999. The plan liability is unfunded and fully provided for in the financial statements. The Group uses the projected unit credit actuarial method to determine the present value of its past service cost. General increases to medical aid contributions were estimated taking into account the projected future changes in the cost of medical services resulting from both inflation and specific changes to medical costs.

#### 1.15 Provisions and contingencies

Provisions are recognised when:

- ▶ the group has a present obligation as a result of a past event;
- ▶ it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation; and,
- ▶ a reliable estimate can be made of the obligation.

The amount of a provision is the present value of the expenditure expected to be required to settle the obligation.

Where some or all of the expenditure required to settle a provision is expected to be reimbursed by another party, the reimbursement shall be recognised when, and only when, it is virtually certain that reimbursement will be received if the entity settles the obligation. The reimbursement shall be treated as a separate asset. The amount recognised for the reimbursement shall not exceed the amount of the provision.

Provisions are not recognised for future operating losses.

If the company has a contract that is onerous, the present obligation under the contract shall be recognised and measured as a provision.

After their initial recognition contingent liabilities recognised in business combinations that are recognised separately are subsequently measured at the higher of:

- ▶ the amount that would be recognised as a provision; and
- ▶ the amount initially recognised less cumulative amortisation.

Contingent assets and contingent liabilities are not recognised. Contingencies are disclosed in note 24.

#### 1.16 Government grants

Government grants are recognised at fair value when there is reasonable assurance that:

- ▶ the group will comply with the conditions attaching to them; and,
- ▶ the grants will be received.

Government grants are recognised as income over the periods necessary to match them with the related costs that they are intended to compensate.

A government grant that becomes receivable as compensation for expenses or losses already incurred or for the purpose of giving immediate financial support to the entity with no future related costs is recognised as income of the period in which it becomes receivable.

Government grants related to assets, including non-monetary grants at fair value, are presented in the statement of financial position by setting up the grant as deferred income or by deducting the grant in arriving at the carrying amount of the asset.

Grants related to income are presented as a credit in the Statement of Comprehensive Income (separately).

Where a loan is received from government at below market interest rate, the difference between the fair value of the loan and the amount received is recognised as a government grant.

#### 1.16 Revenue

Revenue from the sale of goods is recognised when all the following conditions have been satisfied:

- ▶ the Group has transferred to the buyer the significant risks and rewards of ownership of the goods;

- ▶ the Group retains neither continuing managerial involvement to the degree usually associated with ownership nor effective control over the goods sold;
- ▶ the amount of revenue can be measured reliably;
- ▶ it is probable that the economic benefits associated with the transaction will flow to the Group; and,
- ▶ the costs incurred or to be incurred in respect of the transaction can be measured reliably.

When the outcome of a transaction involving the rendering of services can be estimated reliably, revenue associated with the transaction is recognised by reference to the stage of completion of the transaction at the end of the reporting period. The outcome of a transaction can be estimated reliably when all the following conditions are satisfied:

- ▶ the amount of revenue can be measured reliably;
- ▶ it is probable that the economic benefits associated with the transaction will flow to the Group;
- ▶ the stage of completion of the transaction at the end of the reporting period can be measured reliably; and,
- ▶ the costs incurred for the transaction and the costs to complete the transaction can be measured reliably.

When the outcome of the transaction involving the rendering of services cannot be estimated reliably, revenue shall be recognised only to the extent of the expenses recognised that are recoverable.

Service revenue is recognised by reference to the stage of completion of the transaction at the end of the reporting period. Stage of completion is determined by the actual costs in relation to the plan cost of a project.

Service fees included in the price of the product are recognised as revenue over the period during which the service is performed.

Contract revenue comprises:

- ▶ the initial amount of revenue agreed in the contract; and
- ▶ variations in contract work, claims and incentive payments:
  - to the extent that it is probable that they will result in revenue; and
  - they are capable of being reliably measured.

Revenue is measured at the fair value of the consideration received or receivable and represents the amounts receivable for goods and services provided in the normal course of business, net of trade discounts and volume rebates, and value added tax.

Interest is recognised, in the Statement of Comprehensive Income, using the effective interest rate method.

#### 1.18 Translation of foreign currencies

##### Foreign currency transactions

A foreign currency transaction is recorded, on initial recognition in Rand, by applying to the foreign currency amount the spot exchange rate between the functional currency and the foreign currency at the date of the transaction.

At the end of the reporting period:

- ▶ foreign currency monetary items are translated using the closing rate;
- ▶ non-monetary items that are measured in terms of historical cost in a foreign currency are translated using the exchange rate at the date of the transaction; and
- ▶ non-monetary items that are measured at fair value in a foreign currency are translated using the exchange rates at the date when the fair value was determined.

Exchange differences arising on the settlement of monetary items or on translating monetary items at rates different from those at which they were translated on initial recognition during the period or in previous financial statements are recognised in profit or loss in the period in which they arise.

Cash flows arising from transactions in a foreign currency are recorded in Rand by applying to the foreign currency amount the exchange rate between the Rand and the foreign currency at the date of the cash flow.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>MINTEK GROUP and MINTEK</b>						
	<b>2012</b>			<b>2011</b>		
	<b>Cost/ Valuation</b>	<b>Accumulated depreciation</b>	<b>Carrying value</b>	<b>Cost/ Valuation</b>	<b>Accumulated depreciation</b>	<b>Carrying value</b>
<b>2. Property, plant and equipment</b>						
Land	91,747,897	-	91,747,897	91,747,897	-	91,747,897
Buildings	86,635,700	(18,630,246)	68,005,454	85,547,329	(15,767,809)	69,779,520
Plant and machinery	38,326,218	(27,724,707)	10,601,511	37,952,849	(27,388,410)	10,564,439
Furniture and fixtures	4,718,354	(2,442,355)	2,275,999	3,890,526	(2,004,401)	1,886,125
Motor vehicles	990,581	(765,928)	224,653	990,581	(935,762)	54,819
Equipment	194,028,795	(143,984,117)	50,044,678	158,711,523	(126,784,316)	31,927,207
Capital assets under construction	34,364,191	-	34,364,191	2,655,431	-	2,655,431
<b>Total</b>	<b>450,811,736</b>	<b>(193,547,353)</b>	<b>257,264,383</b>	<b>381,496,136</b>	<b>(172,880,698)</b>	<b>208,615,438</b>

<b>MINTEK GROUP and MINTEK - 2012</b>								
<b>Reconciliation of the carrying value of property, plant and equipment</b>	<b>Opening balance</b>	<b>Additions</b>	<b>Disposals</b>	<b>Funded Assets</b>	<b>Transfers</b>	<b>Adjustments</b>	<b>Depreciation</b>	<b>Total</b>
Land	91,747,897	-	-	-	-	-	-	91,747,897
Buildings	69,779,520	-	-	-	1,148,279	-	(2,922,345)	68,005,454
Plant and machinery	10,564,439	363,847	(33,255)	-	-	1,300,637	(1,594,157)	10,601,511
Furniture and fixtures	1,886,125	689,940	(44,772)	-	302,498	139,325	(697,117)	2,275,999
Motor vehicles	54,819	-	-	-	-	189,638	(19,804)	224,653
Equipment	31,927,207	35,111,269	(818,965)	(21,058,128)	1,157,473	10,630,453	(6,904,631)	50,044,678
Capital assets under construction	2,655,431	34,317,010	-	-	(2,608,250)	-	-	34,364,191
<b>Total</b>	<b>208,615,438</b>	<b>70,482,066</b>	<b>(896,992)</b>	<b>(21,058,128)</b>	<b>-</b>	<b>12,260,053</b>	<b>(12,138,054)</b>	<b>257,264,383</b>

<b>MINTEK GROUP and MINTEK - 2011</b>									
<b>Reconciliation of the carrying value of property, plant and equipment</b>	<b>Opening balance</b>	<b>Additions</b>	<b>Disposals</b>	<b>Funded Assets</b>	<b>Transfers</b>	<b>Revaluation</b>	<b>Adjustments</b>	<b>Depreciation</b>	<b>Total</b>
Land	83,944,108	-	-	-	-	7,803,789	-	-	91,747,897
Buildings	53,680,864	113,714	-	-	768,538	16,681,369	-	(1,464,965)	69,779,520
Plant and machinery	13,003,563	-	(9,849)	-	-	-	(104,015)	(2,325,260)	10,564,439
Furniture and fixtures	1,592,834	709,360	(1,634)	-	7,653	-	90,995	(513,083)	1,886,125
Motor vehicles	132,181	-	-	-	-	-	-	(77,362)	54,819
Equipment	38,304,898	59,100,593	(116,240)	(59,416,858)	195,850	-	385,750	(6,526,786)	31,927,207
Capital assets under construction	975,148	2,652,324	-	-	(972,041)	-	-	-	2,655,431
Finance lease assets	217,332	-	(10,942)	-	-	-	-	(206,390)	-
<b>Total</b>	<b>191,850,928</b>	<b>62,575,991</b>	<b>(138,665)</b>	<b>(59,416,858)</b>	<b>-</b>	<b>24,485,158</b>	<b>372,730</b>	<b>(11,113,846)</b>	<b>208,615,438</b>

**Other information**

Funding received during the current financial year for the purchase of assets is R21,058,125 (R59,051,842 for 2011).

Fully depreciated assets and funded assets with a total acquisition value of R107,640,958 (2011 - R99,722,873) are still in use. These assets are recorded at R1 in the asset register.

Mintek reassessed the useful life of all zero value assets due to the fact that they are still in use and has future economic value. The useful lives were extended based on the assumptions that IT equipment and furniture and fittings will be replaced in the next two years due to a revitalisation plan. Equipment has proven to last longer than originally anticipated and based on the fact that Mintek is not in a position to replace all old equipment in the foreseeable future, the useful life was extended by three years. The original acquisition value for these assets were R27,199,497 and the resultant depreciation write back was R12,832,877, of which R11,759,802 relates to property, plant and equipment and R1,073,075 relates to intangible assets (refer to note 19).

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>Figures in Rand(s)</b>	<b>MINTEK GROUP</b>		<b>MINTEK</b>	
	<b>2012</b>	<b>2011</b>	<b>2012</b>	<b>2011</b>
<b>2. Property, plant and equipment (continued)</b>				
<b>Carrying value</b>				
Land	91,747,897	91,747,897	91,747,897	91,747,897
Buildings	68,005,454	69,779,520	68,005,454	69,779,520
Plant	10,601,511	10,564,439	10,601,511	10,564,439
Equipment	50,044,678	31,927,207	50,044,678	31,927,207
Vehicles	224,653	54,819	224,653	54,819
Furniture and fittings	2,275,999	1,886,125	2,275,999	1,886,125
Capital work in progress	34,364,191	2,655,431	34,364,191	2,655,431
	<b>257,264,383</b>	<b>208,615,438</b>	<b>257,264,383</b>	<b>208,615,438</b>
<b>Freehold land and buildings at costs:</b>				
Land and buildings original cost	11,759,900	11,759,900	11,759,900	11,759,900
Revaluation until 31 March 2006	75,373,132	75,373,132	75,373,132	75,373,132
Revaluation 31 March 2008	49,324,836	49,324,836	49,324,836	49,324,836
Additions and transfers 2009	3,068,180	3,068,180	3,068,180	3,068,180
Additions and transfers 2010	12,401,768	12,401,768	12,401,768	12,401,768
Additions and transfers 2011	882,252	882,252	882,252	882,252
Revaluation 31 March 2011	24,485,158	24,485,158	24,485,158	24,485,158
Additions and disposals 2012	1,088,371	-	1,088,371	-
<b>Revaluation at cost</b>	<b>178,383,597</b>	<b>177,295,226</b>	<b>178,383,597</b>	<b>177,295,226</b>
Directors' valuation	178,383,597	177,295,226	178,383,597	177,295,226

Portion 175 and portion 226 of the farm Klipfontein, 203-IQ Johannesburg, with buildings thereon and the sectional title of units at Malanshof Heights located at Erf 560 Malanshof. The value of the land and building complexes were estimated at R158,859,898 by Resurgent Projects (Pty) Ltd, an independent valuator, during the financial year ending 31 March 2011.

The latest valuation report was issued on 25 May 2011. The key assumptions used were that the value of the property be based as sale of vacant land and buildings for rental investment using various rental income figures for different areas of the Mintek property. These calculated rentals were then capitalised at 13%.

The estimated useful lives of depreciable property, plant, equipment and vehicles are as follows:

Buildings	50 years
Plant	5 - 10 years
Equipment	5 - 10 years
Vehicles	5 years
Furniture and fittings	5 - 10 years

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>MINTEK GROUP and MINTEK</b>						
<b>Figures in Rand(s)</b>	<b>2012</b>			<b>2011</b>		
<b>3. Intangible assets</b>	Cost /Valuation	Accumulated amortisation	Carrying value	Cost /Valuation	Accumulated amortisation	Carrying value
Computer software	7,784,771	(4,637,528)	3,147,243	7,748,441	(4,800,055)	2,948,386

**Reconciliation of intangible assets - Mintek Group and Mintek- 2012**

	Opening balance	Acquisitions	Disposals	Adjustments	Amortisation	Total
Computer software	2,948,386	36,330	1	1,073,075	(910,549)	3,147,243

**Reconciliation of intangible assets - Group and Mintek - 2011**

	Opening balance	Acquisitions	Disposals	Funded Assets	Amortisation	Total
Computer software	3,457,152	1,212,571	-	(410,736)	(1,310,601)	2,948,386

Funding received during the current financial year is R0 (2011:R410,736)

The estimated useful lives of amortisable intangible assets are as follows: 3 - 5 years

<b>Figures in Rand(s)</b>	<b>MINTEK GROUP</b>		<b>MINTEK</b>		
	<b>2012</b>	2011	<b>2012</b>	2011	
<b>4. Investments in subsidiaries</b>	<b>Held by Mintek</b>	<b>% holding</b>	% holding	<b>Carrying amount</b>	Carrying amount
Mindev (Pty) Ltd		100%	100%	100	100

Mindev is engaged in the commercialization of Mintek's patents and technology through the identification of suitable partners to advance such interests by way of direct investment in equity and through joint ventures.

Mintek holds 100% of the issued share capital of Mindev (Propriety) Limited. The carrying amounts of the subsidiaries are shown net of impairment losses.

**5. Inventories**

Consumables	3,565,074	3,354,975	3,565,074	3,354,975
Finished goods	1,137,934	2,322,749	1,137,934	2,322,749
Work-in-progress	765,478	44,622	765,478	44,622
	5,468,486	5,722,346	5,468,486	5,722,346
Provision for obsolete inventories	(1,585)	-	(1,585)	-
	<b>5,466,901</b>	<b>5,722,346</b>	<b>5,466,901</b>	<b>5,722,346</b>
Carrying value of inventories carried at fair value less costs to sell	5,466,901	5,722,346	5,466,901	5,722,346

Consumables are held in stock for daily business requirements. Finished goods relate to products manufactured by the MAC division.

**6. Trade and other receivables**

Trade receivables	27,650,265	29,528,087	27,650,265	29,528,087
SARS - VAT	735,600	-	735,600	-
Prepayments	2,348,693	4,154,278	2,348,693	4,154,278
Unearned interest on fair value debtors (discounting)	88,678	74,739	88,678	74,739
Project work-in-progress	14,825,494	10,008,397	14,825,494	10,008,397
Other receivables	348,618	450,665	348,618	450,665
Less: Provision for impairment	(257,858)	(301,325)	(257,858)	(301,325)
	<b>45,739,490</b>	<b>43,914,841</b>	<b>45,739,490</b>	<b>43,914,841</b>

Project work-in-progress relates to projects where work has been executed, but not yet billed.

**Age analysis**

The following is an age analysis of trade receivables at balance sheet date:

0-30 days	23,012,428	24,758,849	23,012,428	24,758,849
31-60 days past due	3,604,375	1,753,317	3,604,375	1,753,317
61-90 days past due	170,405	931,097	170,405	931,097
90+ days past due	863,057	2,084,824	863,057	2,084,824
	<b>27,650,265</b>	<b>29,528,087</b>	<b>27,650,265</b>	<b>29,528,087</b>

The age analysis reflects the categories of overdue debtors.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

Figures in Rand(s)	MINTEK GROUP		MINTEK	
	2012	2011	2012	2011
<b>6. Trade and other receivables (continued)</b>				
<b>Fair value of trade receivables</b>				
Trade and other receivables	45,739,490	43,914,841	45,739,490	43,914,841
In terms of IAS 39 outstanding customer invoices are discounted throughout the year to show the deemed interest that Mintek has forfeited. A basis rate of prime interest rate less 5% has been used due to the fact that this is a fair representation of the interest that Mintek earns through fixed term deposits.				
<b>Provision for impairment</b>				
Included in the trade receivable balance are debtors which are past the original expected collection date at the reporting date, with a carrying amount of R775,604 (2011:R2,714,596) for which the company has not provided as there has not been a significant change in credit quality and the amounts are still considered recoverable. The company does not hold any collateral over these balances. The average age of outstanding balances is 65 days (2011: 93 days). A summarised age analysis of due debtors is set out below.				
The ageing of amounts due but not impaired is as follows:				
60 - 90 days	170,405	931,097	170,405	931,097
More than 90 days	605,199	1,783,499	605,199	1,783,499
	<b>775,604</b>	<b>2,714,596</b>	<b>775,604</b>	<b>2,714,596</b>
<b>Trade and other receivables impaired</b>				
As of 31 March 2012, trade receivables of R50,434 (2011: R3,544,737) of which R46,284 (2011: R1,933,713) was provided for in the prior year were impaired and written-off. The amount of the provision was R257,858 as at 31 March 2012 (2011:R301,325). The ageing of these trade receivables is as follows:				
More than 90 days	257,858	301,325	257,858	301,325
<b>Reconciliation of provision for impairment of trade receivables</b>				
Opening balance	301,325	2,335,888	301,325	2,335,888
Provision for impairment	257,858	301,325	257,858	301,325
Amounts written off as uncollectable	(46,284)	(1,933,713)	(46,284)	(1,933,713)
Amounts settled	(255,041)	(402,175)	(255,041)	(402,175)
	<b>257,858</b>	<b>301,325</b>	<b>257,858</b>	<b>301,325</b>
In determining the recoverability of a trade receivable, the company considers any change in the credit quality of the trade receivable from the date credit was initially granted up to the reporting date. Accordingly, the directors believe that there is no further credit provision required in excess of the provision for doubtful debts. The maximum exposure to credit risk at the reporting date is the fair value of each class of receivable. The group does not hold any collateral as security.				
<b>Currencies</b>				
<b>The carrying amount of trade receivables are denominated in the following currencies</b>				
Rand	26,881,880	27,134,267	26,881,880	27,134,267
USD	126,863	551,429	126,863	551,429
GBP	-	6,597	-	6,597
EUR	89,972	225,696	89,972	225,696
AUD	551,550	1,610,098	551,550	1,610,098
	<b>27,650,265</b>	<b>29,528,087</b>	<b>27,650,265</b>	<b>29,528,087</b>
<b>7. Short term investments</b>				
Short term investments - Current Portion	274,493,109	246,809,439	274,493,109	246,809,439

Investments in short-term fixed deposits are held with various reputable financial institutions at market value and interest has been earned at prime overdraft rates less a varied percentage over the year.

Fixed investments held with various financial institutions are partly earmarked for the financing of Mintek's liabilities.

A cession of R 2,436,636 (2011: R2,154,481) is held over these investments. Refer to note 24.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

Figures in Rand(s)	MINTEK GROUP		MINTEK	
	2012	2011	2012	2011
<b>8. Retirement benefits</b>				
<b>Carrying value</b>				
Post-retirement medical aid	26,800,000	26,933,679	26,800,000	26,933,679
Pension benefit liability	1,486,244	1,353,426	1,486,244	1,353,426
	<b>28,286,244</b>	<b>28,287,105</b>	<b>28,286,244</b>	<b>28,287,105</b>
Number of employees	127	135	127	135

**Post-retirement medical benefits**

Medical cover is provided through a number of different schemes. Post-retirement medical cover in respect of qualifying employees is recognised as an expense over the expected remaining service lives of the relevant employees. Mintek has an obligation to provide medical benefits to certain pensioners and dependents. These liabilities have been provided for in full, calculated on an actuarial basis. These liabilities are unfunded. Periodic valuation of this obligation is carried out by an independent actuaries every year, the latest one being 31 March 2012.

The amounts included in the balance sheet arising from Mintek's obligation in respect of post-retirement medical benefits are as follows:

Present value of obligations as at 31 March 2012	26,800,000	26,933,679	26,800,000	26,933,679
--	------------	------------	------------	------------

Fixed investment held with various financial institutions is partly earmarked as financing for post-retirement medical aid liability. Mintek has not assigned a specific fund to hedge the post-retirement medical aid liability.

**Movement in the net liability recognised in the statement of financial position**

Net-past service benefit liability: Beginning of the year	26,933,679	29,300,000	26,933,679	29,300,000
Interest costs	2,300,000	2,700,000	2,300,000	2,700,000
Contributions paid to service providers	(105,917)	(112,782)	(105,917)	(112,782)
Net actuarial gain	(932,765)	(3,419,413)	(932,765)	(3,419,413)
Settlements	(1,394,997)	(1,534,126)	(1,394,997)	(1,534,126)
<b>Net-past services benefit liability: End of the year</b>	<b>26,800,000</b>	<b>26,933,679</b>	<b>26,800,000</b>	<b>26,933,679</b>

**Key assumptions**

Expected rate of return on assets	8.50 %	9.20 %	8.50 %	9.20 %
Expected increase in salaries health care costs	6.60 %	7.30 %	6.60 %	7.30 %

**Amounts recognised in the Statement of Comprehensive Income are as follows:**

Current costs	2,300,000	2,700,000	2,300,000	2,700,000
---------------	-----------	-----------	-----------	-----------

**Benefits paid**

Contributions paid	105,917	112,782	105,917	112,782
Expected average remaining life of employees (years)	22	25	22	25

The results are dependent on the assumptions used. The table below shows how the past service cost as at 31 March 2012 would be impacted by changes to these assumptions.

**Sensitivity analysis on past service cost**

Discount rate increased by 1% p.a.	23,300,000	22,300,000	23,300,000	22,300,000
Discount rate decreased by 1% p.a.	31,200,000	30,200,000	31,200,000	30,200,000
Subsidy inflation increased by 1% p.a.	31,200,000	30,300,000	31,200,000	30,300,000
Subsidy inflation decreased by 1% p.a.	23,200,000	22,200,000	23,200,000	22,200,000
Retirement age 58	29,700,000	28,600,000	29,700,000	28,600,000

**Pension benefit liability**

Pension benefits are provided to members of the Mintek Retirement Fund (MRF).

Movement in the net-liability recognised in the balance sheet

Employer liability at beginning of year	1,353,426	1,245,000	1,353,426	1,245,000
Actuarial loss	132,818	108,426	132,818	108,426

<b>Net employee liability at end of year</b>	<b>1,486,244</b>	<b>1,353,426</b>	<b>1,486,244</b>	<b>1,353,426</b>
--	------------------	------------------	------------------	------------------

Current cost	132,818	108,426	132,818	108,426
--------------	---------	---------	---------	---------

At inception of the Fund a Retirement Reserve was allocated to certain members which will become payable at the time of the member's death or withdrawal. The employer also funds a minimum guaranteed pension for a member who entered the fund as at 1 January 1995. For purpose of calculating the valuation, investment returns are expected to exceed salary increases by 3%.

These payments are made from within the MRF and Mintek has no direct control over it.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

Figures in Rand(s)	MINTEK GROUP		MINTEK	
	2012	2011	2012	2011
<b>9. Loans from group companies</b>				
<b>Subsidiaries</b>				
Mindev (Pty) Ltd				
The loans granted are unsecured and do not have fixed repayment terms.				
The carrying amount of the loan to Mintek is denominated in Rands.	-	-	39,472,396	39,472,396
<b>10. Trade and other payables</b>				
Trade payables	24,120,735	16,933,039	24,120,735	16,933,039
SARS - VAT	-	891,888	-	891,888
Other payables	5,442,833	4,793,468	5,442,833	4,793,468
Salary provision	18,168,528	-	18,168,528	-
Accrued leave pay	9,163,832	8,977,123	9,163,832	8,977,123
Accruals	7,227,622	3,437,805	7,227,622	3,437,805
Unpaid interest - creditors	(33,549)	(25,805)	(33,549)	(25,805)
	<b>64,090,001</b>	<b>35,007,518</b>	<b>64,090,001</b>	<b>35,007,518</b>
<b>Fair value of trade and other payables</b>				
Trade and other payables	64,090,001	35,007,518	64,090,001	35,007,518
In terms of IAS 39 outstanding supplier invoices are discounted throughout the year to show the deemed interest that Mintek has forfeited. A basis rate of prime interest rate less 5% has been used due to the fact that this is a fair representation of the interest that Mintek earns through fixed term deposits.				
<b>11. Deferred income</b>				
Deferred income	93,356,963	85,951,848	93,356,963	85,951,848
Advance client billing (Unearned income)	23,454,912	14,918,411	23,454,912	14,918,411
	<b>116,811,875</b>	<b>100,870,259</b>	<b>116,811,875</b>	<b>100,870,259</b>

Deferred income arises as a result of contracts undertaken for several government departments and institutions in respect of amounts received in cash not yet accounted for as revenue.

Advance client billing income arises as a result of contracts undertaken in terms of commercial work where invoices are raised based on work that has not been done. The quantum of costs incurred provides the basis for the level of revenue recognised in the period.

**12. Provisions**

**Reconciliation of provisions - Group and Mintek - 2012**

	Opening balance	Additions	Reversed during the year	Total
Product warranties	568,432	1,139,319	(1,395,595)	312,156

**Reconciliation of provisions - Group and Mintek - 2011**

	Opening balance	Additions	Reversed during the year	Total
Product warranties	364,538	1,257,123	(1,053,229)	568,432

The provision for product warranties arises from Mintek recognising its probable liability for meeting its obligation in terms of products and services as stipulated in its contracts with its customers.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>Figures in Rand(s)</b>	<b>MINTEK GROUP</b>		<b>MINTEK</b>	
	<b>2012</b>	2011	<b>2012</b>	2011
<b>13. Revenue</b>				
Rendering of services	398,970,138	337,160,039	398,970,138	337,160,039
<b>Components of revenue</b>				
Government grants	126,262,095	128,702,236	126,262,095	128,702,236
State Grant	146,452,632	145,473,684	146,452,632	145,473,684
Prior year carry-over	5,975,582	-	5,975,582	-
<b>Less:</b>				
Portion of grant utilised to acquire fixed assets and set-off against infrastructure improvements	(18,816,416)	(10,795,866)	(18,816,416)	(10,795,866)
Portion of grant carried over for committed fixed asset purchases and expenses	(7,349,703)	(5,975,582)	(7,349,703)	(5,975,582)
Other revenue streams	272,708,043	208,457,803	272,708,043	208,457,803
Products and services	165,314,040	116,319,477	165,314,040	116,319,477
Contract research	107,394,003	92,138,326	107,394,003	92,138,326
	<b>398,970,138</b>	<b>337,160,039</b>	<b>398,970,138</b>	<b>337,160,039</b>
<b>14. Other operating income</b>				
Other income	5,166,614	6,342,094	5,166,614	6,342,094
<b>Components of operating income</b>				
Library services	80,903	42,670	80,903	42,670
Breach of contract (employees)	259,870	367,114	259,870	367,114
Breach of contract (bursary/learnerships)	-	12,332	-	12,332
Bad debts recovered	1,160,560	-	1,160,560	-
Sundry income	1,437,479	3,304,635	1,437,479	3,304,635
Rental income - properties	2,227,802	2,615,343	2,227,802	2,615,343
	<b>5,166,614</b>	<b>6,342,094</b>	<b>5,166,614</b>	<b>6,342,094</b>
<b>15. Investment income</b>				
Short term deposits	15,713,960	14,519,715	15,713,960	14,519,715
Bank balances	2,029	2,345	2,029	2,345
Interest charged on trade and other receivables	-	14,370	-	14,370
Fair value interest on debtors	866,732	1,767,959	866,732	1,767,959
Loans to employees	2,260	19,995	2,260	19,995
	<b>16,584,981</b>	<b>16,324,384</b>	<b>16,584,981</b>	<b>16,324,384</b>
Total interest income, calculated using the effective interest rate, on financial instruments not at fair value through the Statement of Comprehensive Income amounted to R15,713,960 (2011: R14,519,715).				
Interest income on impaired financial assets amounted to R0 (2011: R14,370) .				
<b>16. Finance costs</b>				
Finance leases	-	36,673	-	36,673
Trade creditors	12,332	7,921	12,332	7,921
Fair value interest on creditor	366,554	790,399	366,554	790,399
Retirement benefits	2,300,000	2,700,000	2,300,000	2,700,000
	<b>2,678,886</b>	<b>3,534,993</b>	<b>2,678,886</b>	<b>3,534,993</b>



**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>Figures in Rand(s)</b>	<b>MINTEK GROUP</b>		<b>MINTEK</b>	
	<b>2012</b>	2011	<b>2012</b>	2011
<b>17. Auditors' remuneration</b>				
External audit fees	2,142,489	1,571,370	2,142,489	1,571,370
Other audits	158,750	79,994	158,750	79,994
	<b>2,301,239</b>	<b>1,651,364</b>	<b>2,301,239</b>	<b>1,651,364</b>
<b>18. Fees for services</b>				
Outsourced services	47,276,003	39,300,384	47,276,003	39,300,384
<b>Components of fees for services</b>				
Technology services	18,320,584	14,205,881	18,320,584	14,205,881
Facility management	5,352,029	6,596,134	5,352,029	6,596,134
Legal fees	2,546,647	2,112,487	2,546,647	2,112,487
Contract services	17,536,994	14,667,302	17,536,994	14,667,302
Other	1,412,063	401,453	1,412,063	401,453
Professional consultancy	2,107,686	1,317,127	2,107,686	1,317,127
	<b>47,276,003</b>	<b>39,300,384</b>	<b>47,276,003</b>	<b>39,300,384</b>
<b>19. Depreciation, amortization and impairments</b>				
Depreciation, amortisation and impairments	13,048,603	12,424,447	13,048,603	12,424,447
<b>Components of depreciation, amortization and impairments</b>				
Buildings	2,922,345	1,464,965	2,922,345	1,464,965
Plant	1,594,157	2,325,259	1,594,157	2,325,259
Equipment	6,904,631	6,526,788	6,904,631	6,526,788
Vehicles	19,804	77,361	19,804	77,361
Finance lease assets	-	206,390	-	206,390
Furniture and fittings	697,117	513,083	697,117	513,083
Computer software (intangible assets)	910,549	1,310,601	910,549	1,310,601
	<b>13,048,603</b>	<b>12,424,447</b>	<b>13,048,603</b>	<b>12,424,447</b>
Reassessment of assets useful lives	(12,832,877)	-	(12,832,877)	-

Mintek reassessed the useful life of all zero value assets due to the fact that they are still in use and has future economic value. The useful lives were extended based on the assumptions that IT equipment and furniture and fittings will be replaced in the next two years due to a revitalisation plan. Equipment has proven to last longer than originally anticipated and based on the fact that Mintek is not in a position to replace all old equipment in the foreseeable future, the useful life was extended by three years. The original acquisition value for these assets were R27,199,497 and the resultant depreciation write back was R12,832,877 (refer to note 2).

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

Figures in Rand(s)	MINTEK GROUP		MINTEK	
	2012	2011	2012	2011
<b>20. Taxation</b>				
<b>Major components of the tax (income)/expense</b>				
<b>Current</b>				
Local income tax - recognised in current tax for prior periods	-	(662,775)	-	-
<b>Reconciliation of the tax expense</b>				
Reconciliation between applicable tax rate and average effective tax rate.				
Applicable tax rate	28.00 %	28.00 %	-	-
No provision for income tax was made for Mintek during the current financial year as Mintek is exempt in terms of section 10(1)(CA)(i) of the Income Tax Act, No. 58 of 1962; and Mindev is a dormant company. Tax provisions and liabilities.				
<b>21. Cash generated from operations</b>				
Surplus/(loss) for the year	43,437,298	(2,722,136)	43,437,298	(2,722,136)
<b>Adjustments for:</b>				
Depreciation and amortisation	13,048,603	12,424,447	13,048,603	12,424,447
Loss on sale of assets	896,992	138,665	896,992	138,665
Actuarial gains	(905,864)	(3,423,769)	(905,864)	(3,423,769)
Interest received	(16,584,981)	(16,324,384)	(16,584,981)	(16,324,384)
Finance costs	2,678,886	3,534,993	2,678,886	3,534,993
Provision for impairment	-	(2,034,563)	-	(2,034,563)
Provisions raised	1,139,319	1,257,123	1,139,319	1,257,123
Fair value adjustment - trade receivables	866,732	1,767,959	866,732	1,767,959
Fair value adjustment - trade payables	(366,554)	(790,399)	(366,554)	(790,399)
Assets adjustment	(13,333,129)	(372,730)	(13,333,129)	(372,730)
<b>Changes in working capital:</b>				
Decrease in inventories	255,445	816,525	255,445	816,525
(Increase)/decrease in trade and other receivables	(1,824,648)	18,362,448	(1,824,648)	18,362,448
Increase/(decrease) in trade and other payables	29,082,484	(3,813,013)	29,082,484	(3,813,013)
Increase in deferred income	15,941,616	24,496,665	15,941,616	24,496,665
Decrease in staff loans	-	4,636	-	4,636
	<b>74,332,199</b>	<b>33,322,467</b>	<b>74,332,199</b>	<b>33,322,467</b>

**22. Insurance and Risk Management**

The insurance and risk management policies adopted by Mintek are aimed at obtaining sufficient cover at the minimum cost to protect its asset base, earning capacity and legal obligations against acceptable losses.

All property, plant and equipment are insured at current replacement value. Risks of a possible catastrophic nature are identified and insured at acceptable risks.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>Figures in Rand(s)</b>	<b>MINTEK GROUP</b>		<b>MINTEK</b>	
	<b>2012</b>	2011	<b>2012</b>	2011
<b>23. Commitments</b>				
<b>Authorised capital expenditure</b>				
<b>Authorised and contracted for</b>				
• Property, plant and equipment	40,332,700	8,340,058	40,332,700	8,340,058
This committed expenditure relates to property, plant and equipment and will be financed by existing cash resources, and funds internally generated.				
<b>Operational expenditure</b>				
Contracted for	26,100,270	2,224,493	26,100,270	2,224,493
<b>Operating leases for vehicles – as lessee (expense)</b>				
<b>Minimum lease payments due</b>				
- within one year	411,504	72,938	411,504	72,938
- in second to fifth year inclusive	468,967	-	468,967	-
	880,471	72,938	880,471	72,938
<b>Operating leases for office equipment</b>				
<b>Minimum lease payment due</b>				
- within one year	260,106	414,262	260,106	414,262
- in second to fifth year inclusive	192,962	839,621	192,962	839,621
	453,068	1,253,883	453,068	1,253,883

**24. Contingencies**

Mintek has disputed employment termination contracts with former employees, the aggregate of which is not expected to exceed R4,371,139. None of these cases are considered probable.

Cessions in favour of Absa Bank for R2,436,636 (2011: R2,154,481) to meet requirements for credit card and other banking facilities has been registered.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

Figures in Rand(s)	MINTEK GROUP		MINTEK	
	2012	2011	2012	2011
<b>25. Related parties</b>				
<b>Controlling entity</b>				
The Group comprises of Mintek and its wholly owned subsidiary Mindev (Proprietary) Limited. Mindev is engaged in the commercialisation of Mintek patents and technology through the identification of suitable partners. The Group, in the ordinary course of business, enters into various sale and purchase transactions with related parties.				
None of the directors, officers or major shareholders of the Mintek Group or, to the knowledge of Mintek, their families, had any interest, direct or indirect, in any transactions which has affected or will materially affect Mintek or its investment or subsidiary.				
<b>Related party transactions</b>				
Related party transactions exist within the Group. During the year all sales transactions were concluded at arm's length.				
Details of material transactions with related parties not disclosed elsewhere in the financial statements are as follows:				
<b>Loan accounts - Owing to related parties</b>				
Mindev (Pty) Ltd	-	-	39,472,296	39,472,296
<b>Amounts included in Deferred Income regarding related parties</b>				
Department of Mineral Resources	29,877,886	22,108,121	29,877,886	22,108,121
Mining Qualification Authority	3,405,409	3,710,865	3,405,409	3,710,865
Department of Science and Technology	51,572,201	53,114,027	51,572,201	53,114,027
Department of Trade and Industry	-	400,000	-	400,000
National Research Foundation	8,230,915	6,618,834	8,230,915	6,618,834
Minquiz Sponsorship	194,634	-	194,634	-
<b>Amounts included in Trade receivables regarding related parties</b>				
Mining Qualification Authority	13,806	-	13,806	-
Water Research Commission	150,000	-	150,000	-
Department of Science and Technology	13,157	329,538	13,157	329,538
<b>Sales to related parties</b>				
Department of Mineral Resources	18,546,025	9,326,367	18,546,025	9,326,367
Department of Science and Technology	47,621,239	32,942,428	47,621,239	32,942,428
Water Research Commission	150,000	-	150,000	-
National Research Foundation	2,047,825	664,380	2,047,825	664,380
Department of Trade and Industry	400,000	-	400,000	-
Minquiz Sponsorship	78,173	165,000	78,173	165,000
Mining Qualification Authority	1,931,504	8,434,106	1,931,504	8,434,106
CSIR	29,144	1,218,143	29,144	1,218,143
North West Department	-	648,096	-	648,096
National Lottery Board	-	493,358	-	493,358

**Relationships**

Subsidiary:	Mindev (Pty) Limited
Parent National Department:	Department of Mineral Resources
Other Government Science Departments:	Department of Science and Technology and its Entities
Other Government Departments and Entities:	Department of Trade and Industry and its Entities Department of Higher Education and Training and its Entities Department of Water and Environmental Affairs and its Entities North West Department of Education

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>Figures in Rand(s)</b>	<b>Basic salary</b>	<b>Performance bonus and other expenses</b>	<b>Total</b>
<b>26. Board members and executive management remuneration</b>			
<b>2012 Executive Management</b>			
Mr MA Mngomezulu	1,835,238	8,244	1,843,482
Dr RL Paul (Retired 30/09/2011)	776,173	20,522	796,695
Mr AD McKenzie (Appointed 01/10/2011)	583,886	16,492	600,378
Mr P Craven	1,179,001	7,307	1,186,308
Mr SA Simelane	1,223,492	1,004	1,224,496
Adv M Ramoshaba (Appointed 01/05/2011)	1,041,822	1,203	1,043,025
Dr M Makhafola (Appointed 16/05/2011)	999,690	12,093	1,011,783
	7,639,302	66,865	7,706,167

	<b>Entity</b>	<b>Fees for services as directors</b>	<b>Other expenses</b>	<b>Total</b>
<b>2012 Non-Executive Board members</b>				
Mr M Mphomela	Independent Management Consultant	110,912	6,748	117,660
Ms N Qunta (Resigned 04/10/2011)	ZBQ Consulting	9,217	871	10,088
Mr P Streng	Independent Management Consultant	102,462	8,555	111,017
Adv D Block	Independent Management Consultant	64,411	2,754	67,165
Mr P White (Deceased 10/11/2011)	Venmyn Techno Consulting Firm	66,795	5,809	72,604
Mr S Sekgobela	Agriculture and Rural Development, Gauteng	3,709	402	4,111
Ms S Maja	Jacques Van Der Merwe Maja Inc	88,551	4,456	93,007
		446,057	29,595	475,652

<b>Figures in Rand(s)</b>	<b>MINTEK GROUP</b>		<b>MINTEK</b>	
	<b>2012</b>	2011	<b>2012</b>	2011
<b>Expenditure incurred by the Board</b>				
Travel	155,540	-	155,540	-
Strategic planning	144,000	-	144,000	-
Legal fees	49,528	-	49,528	-
Independent committee members - fees and travel costs	35,865	-	35,865	-
	384,933	-	384,933	-

This is the first year that this disclosure has been made with regards to expenditure incurred by the Board and therefore there are no comparatives available.

Messes. I Patel, M Mabuza, T Nell and GL Rapoo and Ms. S Mohale and J Ndlovu were not paid any directors' emoluments during the year under review as they are serving government employees except for Ms J Ndlovu who is employed in the private sector and her employer has requested that no emoluments be paid for her services as director.

The following director was appointed during the financial year; S Mohale. The following directors terminated their services during the financial year; N Qunta, P White (deceased) and M Mabuza.

**NOTES TO THE ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2012**

<b>Figures in Rand(s)</b>	<b>Basic salary</b>	<b>Performance bonus and other expenses</b>	<b>Total</b>
<b>2011 Executive Management</b>			
Mr MA Mngomezulu	1,690,673	5,372	1,696,045
Dr RL Paul	1,501,568	6,858	1,508,426
Dr M Motuku (Resigned 31/10/2010)	890,864	12,477	903,341
Mr P Craven	1,091,079	2,202	1,093,281
Mr SA Simelane	1,127,115	-	1,127,115
Ms S Bopape (Terminated 13/12/2010)	831,938	218	832,156
	<b>7,133,237</b>	<b>27,127</b>	<b>7,160,364</b>

	<b>Entity</b>	<b>Fees for services as directors</b>	<b>Other expenses</b>	<b>Total</b>
<b>2011 Non-Executive Board members</b>				
Mr M Mphomela (Chairperson)	Rand Merchant Bank	65,188	1,305	66,493
Ms N Qunta	ZBQ Consulting	42,072	7,503	49,575
Mr P Streng	Independent Management Consultant	64,668	5,506	70,174
Adv D Block	Masana Technologies (Pty) Ltd	63,056	1,745	64,801
Mr P White	Venmyn Techno Consulting Firm	85,756	4,166	89,922
Ms S Sekgobela	Mugamusi Consulting	62,251	1,942	64,193
Ms S Maja	Jacques vd Merwe Maja Inc	72,470	3,264	75,734
		<b>455,461</b>	<b>25,431</b>	<b>480,892</b>

All non-executive directors were appointed to the Mintek Board on 1 March 2010.

Messrs. I Patel, M Mabuza, T Nell and GL Rapoo and Ms S Mohale were not paid any directors' emoluments during the year under review as they are serving government employees. Ms J Ndlovu's employer requested that no emoluments be paid for her services as director.

Figures in Rand(s)	MINTEK GROUP		MINTEK	
	2012	2011	2012	2011

**27. Financial Instruments**

**Foreign currency risk**

The Group undertakes certain transactions in foreign currencies, hence exposures to exchange rate fluctuations arise. The Group does not enter into forward foreign exchange contracts to buy and sell amounts of various currencies at predetermined exchange rates, as foreign currency amounts are not significant in relation to Mintek's income. As a matter of principle, the Group does not enter into currency exchange contracts for speculative reasons.

**Credit risk management**

Financial assets that could subject the group to credit risk consist principally of bank balances and cash, deposits, trade and other receivables, and short-term investments. The Group bank balances and short-term investments are placed with several financial institutions with at least BBB credit ratings as rated in terms of the Fitch Global Rating system. The Group reviews its trade and other receivables at each balance sheet date to ensure adequate allowances for doubtful receivables or loan write-offs are made, the level of this provision is disclosed in note 6. Credit risk with respect to trade receivables is limited to the large number of customers comprising the Group's customer base and their dispersion across different industries and geographical areas. Accordingly the Group does not have significant concentration of credit risk.

The Group considers its short-term investments to be secured and readily available as cash should the need arise for the conversion of the investments.

The carrying amounts of financial assets included in the balance sheet represent the Group's exposure to credit risk in relation to these assets. The Group does not have any significant exposure to any customer or counter party.

**Liquidity risk**

Prudent liquidity risk management implies maintaining sufficient cash resources to meet cash flow requirements. Management monitors forecasts of liquidity reserve on the basis of expected cash flow. Analysis of the various requirements is disclosed in note 7 of the financial statements.

**Fair values**

As at 31 March 2012 the carrying amount of bank balances and cash, deposits, trade and other receivables, trade and other payables, contracts in progress, advances received and short-term borrowings approximated their fair values due to the short-term nature of these assets and liabilities.

The group does not hedge foreign exchange fluctuations.

**Interest rate risk**

The valuation of interest rate exposure and investment strategies is done on a regular basis. The risk arises from substantial interest-bearing assets at variable interest rates. To minimise exposure to this risk, the Group uses a mixture of variable and fixed interest rates.

**28. Fruitless, wasteful and irregular expenditure**

No fruitless, wasteful and irregular expenditure was identified during the current financial year.





## Contacts

Office	Contact Person	Tel. No.
CEO's Office	Ms Lentheng Letsholo	011-709 4900
Internal Auditor	Mr Mpho Mathose	011-709 4796
External Auditors	Auditor General (AGSA)	012-426 8000
GM's Secretary	Ms Christa Scheepers	011-709 4908
GM's Secretary	Ms Evah Motsego	011-709 4906
Switchboard		011-709 4111
General Managers	Contact Person	Tel. No.
Business Development	Mr Peter Craven	011-709 4934
Research and Development	Dr Makhapa Makhafola	011-709 4485
Corporate Services	Adv Mamokete Ramoshaba	011-709 4680
Technology	Mr Alan McKenzie	011-709 4736
Finance	Mr Sakhi Simelane	011-709 4328
Divisions	Contact Person	Tel. No.
Advanced Materials	Dr Jones Papo	011-709 4489
Analytical Services	VACANT	011-709 4601
Biotechnology	Mr Petrus van Staden	011-709 4205
Engineering Support	Mr Khulekani Ngobo	011-709 4094
Estate Management Services	Mr Boni Hewu	011-709 4781
Finance	Ms Hester Pretorius	011-709 4698
Human Resources and Training	Ms Bolekwa Maseti	011-709 4373
- Bursars and SET promotions	Dr Judy Coates	011-709 4490
Hydrometallurgy	Dr Leon Kruger	011-709 4656
Information and Communications	Mr Haveline Michau	011-709 4256
- Communications	Mr Lesego Mashigo	011-709 4251
- Conferences and Events	Ms Zinhle Dennison	011-709 4321
- Library	Ms Manil Moodley	011-709 4277
Information Technology	Mr Hennie Venter	011-709 4103
Measurement and Control	Mr Paul Brereton-Stiles	011-709 4355
Minerals Economics and Strategy Unit	Mr Godfrey Mothapo	011-709 4304
Minerals Processing	Mr Bernard Joja	011-709 4296
Mineralogy	Ms Nosphiwo Mzamo	011-709 4163
Pyrometallurgy	Mr Tom Curr	011-709 4610
Quality	Mr Hennie Venter	011-709 4103
Safety, Health and Environment	Mr Leon Swanepoel	011-709 4747
Small-Scale Mining and Beneficiation	Mr Nirदेश Singh	011-709 4335

## Acronyms and Abbreviations

AMD	Advanced Materials Division
AMI	Advanced Metals Initiative
ASSM	Artisanal and Small-Scale Miners/Mining
ASD	Analytical Services Division
BDD	Business Development Division
CCMA	Commission for Conciliation, Mediation and Arbitration
CDFR	Client Dissatisfaction Rate
DG	Designated Group
DMR	Department of Mineral Resources
DoL	Department of Labour
DoE	Department of Energy
DRC	Democratic Republic of Congo
DST	Department of Science and Technology
DTI	Department of Trade and Industry
ECSA	Engineering Council of South Africa
EIPFR	Environmental Incident Frequency Rate
ESD	Engineering Support Division
FET	Further Education and Training
FMC	Full Mill Charge
FMDN	Ferrous and Base Metals Development Network
GAAP	Generally Accepted Accounting Practices
GDP	Graduate Development Programme
GM	General Manager
HEI	Higher Education Institute
HIC	Hydrogen-Induced Cracking
HIV	Human Immunodeficiency Virus
HMD	Hydrometallurgy Division
HR	Human Resources
HRTEM	High-Resolution Transmission Electron Microscope
HySA	Hydrogen South Africa
IA	Internal Audit
IFRS	International Financial Reporting Standards
IKS	Indigenous Knowledge Systems
KPI	Key Performance Indicator
LED	Local Economic Development
LTIFR	Lost-Time Injury Frequency Rate
MBT	Marked Ball Test
MESU	Mintek's Mineral Economics and Strategy Unit
MgO	Magnesium oxide
MOU	Memorandum Of Understanding
MQA	Mining Qualifications Authority
MPD	Minerals Processing Division
MRC	Medical Research Council
MTC	Metals Technology Centre
MTEF	Medium Term Expenditure Framework
MW	Megawatts
NEF	National Empowerment Fund
NCI	National Cancer Institute
NDA	National Development Agency
Necsa	South African Nuclear Energy Corporation
NFTN	National Foundry Technology Network
NGP	New Growth Path
NIC	Nanotechnology Innovation Centre
NIOSH	National Institute of Health
NNR	National Nuclear Regulator
NRF	National Research Foundation
NSTF	National Science and Technology Forum
NUM	National Union of Mineworkers
OECD	Organisation for Economic Co-operation and Development
OHSAS	Organisation for Health & Safety
PFMA	Public Finance Management Act
PGMs	The Platinum Group Metals (platinum, palladium, ruthenium, rhodium, iridium and osmium)
PMDN	Precious Metals Development Network
POC	Point Of Care
PPD	Pyrometallurgy Division
QESH	Quality, Environment, Safety and Health
R&D	Research and Development
RIP	Resin-In-Pulp
RPP	Radiation Protection Programme
RPDP	Research Professional Development Programme
SACNASP	South African Council for Natural Scientific Professions
SADPMR	SA Diamond And Precious Metals Regulator
SE	Secondary Electron (image)
SEDA	Small Enterprise Development Agency
SSMB	Mintek's Small-Scale Mining and Beneficiation division
TIA	Technology Innovation Agency
TiCl <sub>4</sub>	Titanium Tetrachloride
WIL	Work Integrated Learning



**ISO 9001** QUALITY MANAGEMENT SYSTEM  
**ISO 17025** TESTING AND CALIBRATION LABORATORY  
**ISO 14001** ENVIRONMENTAL MANAGEMENT SYSTEM  
**OHSAS 18001** OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM

RP108/2012

ISBN: 978-0-621-40794-5

Mintek, A Global Leader in Mineral and Metallurgical Innovation.  
 Mintek Annual Report 2012  
 Compiled by the Information and Communications Division, Mintek.  
 Printed by Ultra Litho (Pty) Ltd.



200 Malibongwe Drive, Strijdom Park, Randburg, South Africa.  
Private Bag X3015, Randburg 2125, South Africa.  
Tel: +27 (0)11 709 4111 Fax: +27 (0)11 793 2413 [www.mintek.co.za](http://www.mintek.co.za)