



Council for Geoscience  
Leading Earth-Science Solutions

# Annual Report 2013

## Council for Geoscience







*Council for Geoscience*

# **Annual Report** 2013

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# INTRODUCTION

## ABBREVIATIONS

<b>ABA</b>	Acid Base Accounting
<b>AIST</b>	National Institute of Advanced Industrial Science and Technology (Japan)
<b>BCC</b>	Business Continuity Committee
<b>BGR</b>	German Federal Institute for Geosciences and Natural Resources
<b>BGS</b>	British Geological Survey
<b>BSC</b>	Balanced Scorecard
<b>CAG</b>	Colloquium of African Geology
<b>CBD</b>	Central Business District
<b>CGS</b>	Council for Geoscience
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>CTBTO</b>	Comprehensive Nuclear-Test-Ban Treaty Organisation
<b>DERA</b>	German Natural Resources Agency
<b>DMR</b>	Department of Mineral Resources
<b>DRD</b>	Durban Roodepoort Deep
<b>FWRDA</b>	Far West Rand Dolomitic Association
<b>GEM</b>	Global Earthquake Model
<b>GIS</b>	Geographic Information System
<b>GRAP</b>	Generally Recognised Accounting Practices
<b>GSN</b>	Geological Survey of Namibia
<b>HMC</b>	Hydrological Monitoring Committee
<b>IGC</b>	International Geological Congress
<b>IMS</b>	International Monitoring System
<b>IPAP</b>	Industrial Policy Action Plan
<b>ISO</b>	International Organisation for Standardisation
<b>KOSH</b>	Klerksdorp, Orkney, Stilfontein and Hartebeesfontein
<b>MHSP</b>	Mine Health and Safety Plan
<b>MTEF</b>	Medium Term Expenditure Framework

<b>NEPAD</b>	New Partnership for Africa's Development
<b>N.A.</b>	Not Applicable
<b>NDP</b>	National Development Plan
<b>NGG</b>	Nuclear Geo-Hazards Group
<b>NHBRC</b>	National Home Builders Registration Council
<b>NRF</b>	National Research Foundation
<b>OAGS</b>	Organisation of African Geological Surveys
<b>ORMC</b>	Operational Risk Management Committee
<b>PASA</b>	Petroleum Agency SA
<b>PFMA</b>	Public Finance Management Act
<b>PPRP</b>	Participatory Peer Review Panel
<b>PSHA</b>	Probabilistic Seismic Hazard Assessment
<b>RBM</b>	Richards Bay Minerals
<b>SACCCS</b>	South African Centre for Carbon Capture and Storage
<b>SAFECCS</b>	South Africa–Europe Cooperation on Carbon Capture and Storage
<b>SAMINDABA</b>	South African Minerals Database
<b>SANAP</b>	South African National Antarctic Programme
<b>SANEDI</b>	South African National Energy Development Institute
<b>SANS</b>	South African National Standard
<b>SEM</b>	Scanning Electron Microscopy
<b>SMWMP</b>	Strategic Mine Water Management Plan
<b>SGU</b>	Swedish Geological Survey
<b>TEM</b>	Time Domain Electromagnetics
<b>TOC</b>	Total Organic Carbon
<b>USA</b>	United States of America
<b>WRC</b>	Water Research Commission
<b>XRD</b>	X-ray Diffraction
<b>XRF</b>	X-ray Fluorescence

## GENERAL INFORMATION

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**Council for Geoscience**

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The Council for Geoscience was established in terms of the Geoscience Act (Act No. 100 of 1993). This Act also established the mandate and national responsibilities of the organisation. The Council for Geoscience was listed as a schedule 3A Public Entity in terms of the Public Finance Management Act (Act No. 1 of 1999), as amended by the Public Finance Management Amendment Act (Act No. 29 of 1999). The Geoscience Amendment Act (Act No. 16 of 2010) was signed into power in December 2010 and came into operation on 1 July 2012, with the exception of sections 4(c), (eA) and (f), section 5(b) and section (8).



## **ANNUAL REPORT OF THE COUNCIL FOR GEOSCIENCE FOR THE PERIOD ENDED 31 MARCH 2013**

### **Vision:**

Leading earth-science solutions

### **Mission:**

To provide expert earth-science information and services to improve the management of natural resources and the environment for a better quality of life for all

### **Values:**

- (i) Innovate and create through teamwork
- (ii) Excel through quality and performance
- (iii) Value diversity through trust and respect
- (iv) Invest in its people

### **Thrusts:**

- o Minerals Development
- o Geoscience Mapping
- o Water Resources Assessment and Protection
- o Engineering Geoscience and Physical Geohazards
- o Environmental Geoscience and Chemical Geohazards
- o Education and Information
- o Energy Geoscience

### **Focus Areas:**

- o Economic Growth
- o Africa Development
- o Innovation
- o Rural Development and Poverty Eradication
- o Regulatory Systems and Stakeholder Compliance
- o Transformation
- o Skills Development

## BOARD OF THE COUNCIL FOR GEOSCIENCE



**Prof. P E Ngoepe**

*University of Limpopo*

Chairperson of the Board



**Mr M W Kota**

*Council for Geoscience*

Chief Executive Officer



**Mr B A Gerryts**

*Department of Science and Technology*



**Prof. M M Hermanus**

*University of the Witwatersrand*



**Mr M Mabuza**

*Department of Mineral Resources*



**Dr H Mathe**

*Tranter Resources (Pty) Limited*



**Dr J E McGill**

*CSIR*



**Ms K R Mthimunye**

*Bluewaves Consulting Services*



**Mr M P Nepfumbada**

*Department of Water Affairs*



**Ms S Ngxongo**

*Department of Human Settlement*



**Mr M Riba**

*Department of Land Affairs*

## Alternate Members

### **Mr T M Gordon**

*(Alternate to Ms L D Nteo)*  
Department of Environmental Affairs

### **Ms R Mdubeki**

*(Alternate to Mr M Riba)*  
Department of Rural Development

### **Ms D Mochotlhi**

*(Alternate to Mr M P Nepfumbada)*  
Department of Water Affairs

### **Ms S Mohale**

*(Alternate to Mr M Mabuza)*  
Department of Mineral Resources

### **Mr D Sibiya**

*(Alternate to Dr J E McGill)*  
Tronox SA



## MANAGEMENT OF THE COUNCIL FOR GEOSCIENCE



**Chief Executive Officer**

**Mxolisi Kota**



**Board Administrator**

**Nomkhosi Cele** (*Acting*)

### **Strategic Services**

(in the office of the CEO)

**Nico Keyser and Maleka Monyepao**

- o Annual Technical Programme Management
- o Commercial Project Tender Management
- o Strategy Planning Cycle



### Scientific Services

Executive Manager

**Gerhard Graham**

- Geophysics – *Peter Nyabeze (Acting)*
- Information and Collections Management – *Danie Barnardo*
- Laboratory – *Thinus Cloete*
- Regional Geochemical Mapping – *Thinus Cloete*
- Seismology – *Michelle Grobbelaar*
- Spatial Data Management – *Ken Wilkinson*

### Regional Geoscience and Mapping

Executive Manager

**Gerhard Graham (Acting)**

- Central Regions – *Abraham Thomas*
- Eastern Cape – *Greg Botha*
- KwaZulu-Natal – *Greg Botha*
- Limpopo – *Nick Baglow*
- Marine Geoscience – *Luc Chevallier (Acting)*
- Northern Cape – *Luc Chevallier*
- Western Cape – *Luc Chevallier*



### Applied Geoscience

Executive Manager

**Fhatuwani Ramagwede**

- Engineering Geoscience – *Stewart Foya*
- Environmental Geoscience – *Mosidi Makgae*
- Mineral Resources Development – *Stewart Foya*
- Water Geoscience – *Fortress Netili*

### Corporate Services

Executive Manager

**Fhatuwani Ramagwede (Acting)**

- Human Resources – *Vacant*
- Marketing and Communications – *Nthombi Mdluli Jacha*



### Financial Services

Chief Financial Officer

**Leonard Matsepe**

- Information and Communication Technology – *Peter Motaung*
- Procurement and Logistics – *Michael Nkuna*
- Finances and Legal Services – *Leonard Matsepe*

## REVIEW



Prof. P E Ngoepe

### CHAIRPERSON OF THE BOARD AND THE CHIEF EXECUTIVE OFFICER OF THE COUNCIL FOR GEOSCIENCE

The Council for Geoscience (CGS) is pleased to state that for the organisation the 2012/13 financial reporting period has been a year of marked recovery from the fallout of the recent global financial crisis. The financial position of the Council for Geoscience has improved to an appreciable degree, leading, inter alia, to the Annual Technical Programme being restarted, albeit to a limited extent. In addition, the moratorium on new appointments has been lifted in some measure and the number of bursaries awarded has been increased. Moreover, the number of staff members studying towards higher degrees has increased. The culmination, and certainly the most memorable and enjoyable aspect of the past year, was celebrating the first century of existence of the Council for Geoscience and its predecessor organisations.

The financial sustainability outlook of the organisation for the foreseeable future is positive. The restrictive financial measures that had of necessity been in place since 2009/10 are slowly being relaxed to facilitate a new phase of generative growth for the organisation. The financial position of the organisation was

reversed, mainly due to augmented funding received from National Treasury for a substantial increase in the scope of the entity's support for mineral exploration. In December 2011, the Department of Science and Technology invited the Council for Geoscience to be a member of its Functional Group, tasked to consider and substantiate requests, under the Economic Competitiveness Support Package, for funding in terms of the Medium Term Expenditure Framework. The Council for Geoscience was allocated an amount of R200 million over a period of three years, which will be utilised for its programme focused on the stimulation of investment in the mineral sector as well as for the upgrading and repairs of its buildings and laboratory infrastructure.

Apart from an increase in the scope of mineral exploration work and the augmented funding from Government mentioned above, the Council for Geoscience has also been involved in a number of commercial projects. The organisation therefore is in the fortunate position to report a surplus of R18,4 million for the 2012/2013 financial year. The





Mr Mxolisi Kota

statutory programme of the organisation, which is a key component of its mandate, also provides the opportunity for young geoscientists to develop as researchers. The improved financial position enabled the organisation to partly reinstate the statutory programme and the Board and Management of the Council for Geoscience are pleased to report that the audited technical performance of the organisation for the past financial year was 92 %. This is a clear testament to the dedication of the staff and the sound management of the organisation.

During the financial period under review, the organisation experienced a change in leadership with the appointment of a new Board and a new Chief Executive Officer. The tenure of the previous members of the Board expired in September 2012 and the new Board appointed by the Minister of Mineral Resources has tenure until 2015. The priority of the new Board is to consider a long-term strategy for the Council for Geoscience to ensure that the organisation retains its relevance in the fast-evolving global environment and locally maintains the capacity to fulfil its statutory,

regulatory and societal obligations. A first meeting of the new Board was held in November 2012 and the final strategic planning report of the Board is expected by September 2013.

After a year under the guidance of an Acting Chief Executive Officer, Dr Gerhard Graham, the Council for Geoscience has welcomed a new leader, Mr Mxolisi Kota, on 1 December 2012. Mr Kota succeeds Dr Thibedi Ramontja, who had taken up the appointment of Director-General of the Department of Mineral Resources on 1 November 2011. Under the leadership of Mr Kota the Council for Geoscience will embark on the development and implementation of a strategy to place the organisation in an optimal position to fulfil its role in South Africa, Africa and the broader society.

The Minister and the Board wish to express their appreciation of the competent manner in which Dr Graham has discharged his duties as acting CEO and the valuable contributions he has made and is still making to the leadership of the organisation.

In 2012, the Council for Geoscience embarked on an endeavour to reposition and realign the organisation in terms of its business model and functions. A consultant was appointed to facilitate the process and, crucially, all levels of the organisation were involved in the assessment done. The input received as a result of the investigation during 2012 will be utilised in the long-term planning for the organisation under the guidance of the new Chief Executive Officer and the Board, with the aim of developing a roadmap for the future.

Specific sections of the Geoscience Amendment Act (Act No. 16 of 2010) were intended to extend the functions of the Council for Geoscience. Apart from acting as the custodian of all geoscience information, the organisation is now also tasked with becoming the national advisory authority on geohazards. The additional funding required for the implementation of these amendments was discussed with the Department of Mineral Resources and a formal request was submitted to National Treasury. However, as the required funding could unfortunately not be made available, the Act came into operation on 1 July 2012 subject to the exclusion of some of the more significant amendments.

The continent of Africa is widely regarded as an economic role player of growing importance in the world, in part because of the rising global demand for the abundance of mineral resources it holds. However, the continent also faces a number of environmental challenges in the quest to sustain its development and improve the living conditions of its peoples. Geoscience information and expertise are needed to address these developmental challenges and the Council for Geoscience has continued the significant contribution it has been making for the past several years on this front. The organisation is currently involved in the following projects in this regard:

- The Organisation of African Geological Surveys (OAGS), which is a NEPAD initiative. The Council for Geoscience is a key role player in this organisation, whose mandate is to foster and sustain government-supported geoscience endeavours and excellence on the African continent.
- Generating the regional and continent-wide promotional maps and other documents required to inform the decision-makers of government and industry on matters related to the geosciences.
- Providing direct capacity-building support to African geological surveys through a number of programmes and interventions.
- The 35<sup>th</sup> International Geological Congress (IGC) to be hosted by South Africa in collaboration with other southern African countries in 2016. Hosting this congress provides an ideal opportunity for capacity building and the development of the geosciences in the region and to showcase the unique geology of the African continent.

During August 2012, the Minister of Mineral Resources, the Honourable Ms Susan Shabangu, MP, led a delegation to the 34<sup>th</sup> IGC in Brisbane, Australia. The IGC is held every four years and is one of the largest general geological congresses in the world, attracting over 6 000 geoscientists. During the closing ceremony, the Minister addressed the delegates and invited them to the 35<sup>th</sup> IGC to be held from 27 August to 4 September 2016 at the International Convention Centre in Cape Town. The honour to host the 35<sup>th</sup> IGC was officially bestowed on South Africa, and the Council for Geoscience, on behalf of the host, accepted the baton for the 35<sup>th</sup> IGC. It is envisaged that a significant number of African geoscience students and practitioners will be sponsored to attend the event. A not-for-profit company, 35<sup>th</sup> ICG Foundation, was established to organise and manage the preparations for the congress.

The Council for Geoscience hosted a two-day conference on 8 and 9 November 2012, to celebrate its first century of existence. The event was attended by some 2 000 guests including representatives from Government, the international geoscience community, universities and the industry, as well as former staff members, well-wishers and friends. The Minister of Mineral Resources, as the guest of honour, opened the proceedings, congratulating the organisation on past successes, but also cautioning that its future relevance would depend on how successfully the Council for Geoscience would provide solutions to the changing needs of the community it serves.

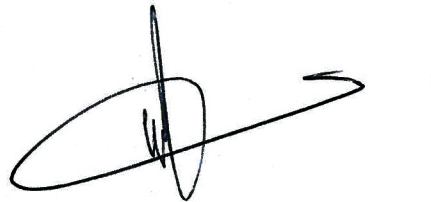
The Council for Geoscience wishes to express its appreciation to the British Geological Survey and Impala Platinum Holdings Limited for the commemorative gifts in the form of art works that were handed over to the organisation during the centenary celebrations.

The Board and Management of the Council for Geoscience sincerely appreciate and value the commitment, dedication, hard work and loyalty shown by the staff to the organisation. Staff support has assisted leadership to safely steer the organisation through the difficult years of the recent past. The leadership of the organisation recognises that successfully meeting any future challenges will depend to a great extent on the continued support, loyalty and goodwill of its staff, stakeholders and the Government.

The Council for Geoscience gratefully acknowledges the role played by the Government of South Africa and, in particular, the Department of Mineral Resources, for significantly improving the financial position of the organisation. The Board and the Executive Management wish to express their sincere appreciation and gratitude to the Ministers and staff of the Department of Mineral Resources and the Department of Science and Technology for their valued support to the organisation during the past financial year.



**Prof. P E Ngoepe**  
Chairperson: Board of the  
Council for Geoscience



**Mr M W Kota**  
Chief Executive Officer

# PERFORMANCE INFORMATION

## PERFORMANCE OBJECTIVES

### Performance Management Criteria and Performance Targets of the Council for Geoscience

In accordance with the strategy developed by Management, the organisation has adopted a Balanced Scorecard (BSC) approach to its performance measurement. The Balanced Scorecard system, which measures the performance of the organisation at corporate, business unit and individual level was approved and accepted by the Board of the Council for Geoscience. The Corporate Balanced Scorecard incorporates the current performance measures into the following evaluation perspectives:

- Stakeholder and customer satisfaction; to drive stakeholder and customer satisfaction by the development of world-class products and services
- Economic growth; to achieve sustainable revenue and profit growth
- Organisational systems; to develop and maintain effective and streamlined processes, using appropriate tools and methodologies
- Scientific excellence and human capital development; to develop a world-class geoscience organisation where our people can grow and perform.

Twelve strategic objectives have been identified in agreement with the Balanced Scorecard framework, and, as such, cover the customer, internal business process, financial, and learning and growth perspectives. The objectives are aligned with the targeted strategic outcomes of the organisation and include:

#### A. Market (Stakeholder/Customer) Perspective Objectives

- To address stakeholder needs
- To effectively promote the Council for Geoscience and disseminate strategic information

#### B. Economic and Financial Growth Perspective Objectives

- To generate revenue
- To manage overhead efficiency

#### C. Effective Systems Perspective Objectives

- To implement the Geoscience Amendment Act (Act No. 16 of 2010)
- To develop and implement effective policies and procedures
- To drive preferential procurement
- To increase organisational efficiency

#### D. World-Class People Perspective Objectives

- To attract and retain a skilled workforce
- To enhance present levels of excellence
- To build a positive organisational culture
- To reflect and embrace the diversity of South Africa.

## Corporate Performance Targets of the Council for Geoscience

In order to evaluate the corporate performance of the Council for Geoscience, the organisation has developed a range of performance indicators, which cover the entire spectrum of the activities of the organisation. The range of performance indicators, together with the performance targets for the period 2012/13, is summarised in the accompanying table.

## Corporate Scorecard for 2012/13

Market (Stakeholder/ Customer) Perspective	TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD-CLASS PRODUCTS AND SERVICES				
Strategic Objective:	To Address Stakeholder Needs				
Performance Indicator	Actual Achievement 2011/2012	Planned Target 2012/2013	Actual Achievement 2012/2013	Deviation from Planned Target to Actual Achievement for 2012/2013	Comment on Deviations
Number of Geoscience Maps, Map Explanations and Related Manuscripts Published In-house	16	46	34	(12)	The global economic downturn has affected the Council for Geoscience negatively and it had to cut back on the Annual Technical Programme and, more particularly, its mapping programme. The result is that less geoscience publications were produced. The target of 46 publications was therefore too ambitious
Customer Satisfaction Level	88.87 %	85 %	88.4 %	3.4 %	A customer satisfaction level of 88.4 % shows that stakeholders are pleased with the CGS services and products
Number of Rural Development Project Reports Completed	27	10	29	19	A growing number of small commercial projects related to rural development has contributed to the organisation surpassing the target to a large degree
Number of Regional and African Development Projects in Progress	23	22	20	(2)	Although the performance on this measure is slightly below the target, CGS involvement in 20 Regional and African Development projects is still seen as a significant contribution to the economic growth and infrastructure development in Africa
Number of Environment-related Projects in Progress	6	6	21	15	The large number of environmental projects can be attributed to more staff being appointed and available to do the work in the Environmental Geoscience and Water Geoscience Units
Annual Technical Programme Performance Index	95.4 %	85 %	91.58 %	6.58 %	The Council for Geoscience is satisfied with the overall completion of its projects and the quality of its products
Number of Seismic Stations Installed (MHSP)	New Indicator	10	2	(8)	The installation of seismic stations is part of the Mine Health and Safety Plan. During the past year, the Council for Geoscience received funding for the installation of only two stations
Strategic Objective:	To Effectively Promote the Council for Geoscience and Disseminate Strategic Information				
Performance Indicator	Actual Achievement 2011/2012	Planned Target 2012/2013	Actual Achievement 2012/2013	Deviation from Planned Target to Actual Achievement for 2012/2013	Comment on Deviations
Articles Published in the Popular Press	New Indicator	2	7	5	The Council for Geoscience celebrated its Centennial in November 2012. A new CEO was also appointed in December 2012 and these events created opportunities to publish widely in the popular press and in industry publications
Articles Published in Industry Publications	New Indicator	4	5	1	

<b>Economic/Financial Growth Perspective</b>	<b>TO ACHIEVE SUSTAINABLE REVENUE AND PROFIT GROWTH</b>				
<b>Strategic Objective:</b>	<b>To Generate Revenue</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Total Revenue	R241.4m	R223m (R296.5m)	R289.9m	R66.9m	Includes additional funding received after submission of Annual Performance Plan (MTEF)
Contract Revenue	R79.3m	R72.6m	R86.5m	R13.9m	See financial statements
Sundry Income (non-operational income)	R17.3m	R2.8m	R18.2m	R15.4m	See financial statements
Ratio of External Revenue to Total Revenue	40 %	32 %	36.11 %	4.11 %	Surpassing this indicator can be attributed to the additional R13.9m contract revenue generated
Number of Large Tenders and Proposals Submitted (>R1m)	21	30	15	(15)	The global economic recession is still negatively affecting the availability of commercially funded geoscience projects. Little funding was made available by the World Bank and other institutions for new geoscience-related projects, thus limiting the opportunity to submit tenders
Tender Success Rate	New Indicator	10 %	40 %	30 %	The Council for Geoscience was very successful in winning 40 % of the total number of large tenders and proposals submitted
<b>Strategic Objective:</b>	<b>To Manage Overhead Efficiency</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Ratio of Overheads to Total Cost	67.2 %	55 %	56.79 %	1.79 %	Target achieved
Ratio of Personnel Cost to Total Cost	59.7 %	59 %	58.91 %	(0.09 %)	Target achieved
<b>Effective Systems (Organisational) Perspective</b>	<b>TO DEVELOP AND MAINTAIN EFFECTIVE AND STREAMLINED PROCESSES, USING APPROPRIATE TOOLS AND METHODOLOGIES</b>				
<b>Strategic Objective:</b>	<b>To Implement the Geoscience Amendment Act (Act No. 16 of 2010)</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Progress according to Implementation Plan	0 %	40 %	0 %	n.a.	The Geoscience Amendment Act (Act No. 16 of 2010) came into operation on 1 July 2012, with the exception of sections 4(c), (eA) and (f), section 5(b) and section (8). The sections still excluded relate to the custody of geoscientific information, the review and evaluation of geotechnical reports, the maintenance of certain National Geoscientific Facilities and the appointment of a Geotechnical Appeal Committee. Funding is needed to implement these sections



<b>Strategic Objective:</b>	<b>To Develop and Implement Effective Policies and Procedures</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Percentage ISO Implementation in Accordance with Reference Report	90 %	100 %	0 %	n.a.	The Council for Geoscience is in the process of appointing a Quality Manager to take the ISO certification project forward. In the interim, the ISO implementation plan was put on hold
<b>Strategic Objective:</b>	<b>To Drive Preferential Procurement</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Preferential Procurement as a Percentage of Total Procurement	31.54 %	40 %	34 %	(6 %)	The nature of the services of the Council for Geoscience is such that it needs to source a large component of its equipment from international companies with no BEE shareholding. The monetary value of these acquisitions is much bigger than that of the local purchases. This prevented the Council for Geoscience from achieving the target of 40 % set for the period under review
<b>Strategic Objective:</b>	<b>To Increase Organisational Efficiency</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Number of Audit Qualifications	0	0	0	0	All PFMA regulations and deadlines were met and an unqualified audit report was obtained
<b>World-Class People Perspective</b>	<b>TO DEVELOP A WORLD-CLASS GEOSCIENCE ORGANISATION WHERE OUR PEOPLE CAN GROW AND PERFORM</b>				
<b>Strategic Objective:</b>	<b>To Attract and Retain a Skilled Workforce</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Staff Turnover	-2 %	0 %	12.29 %	12.29 %	The financial situation of the Council for Geoscience improved to such an extent over the past two years that the organisation was able to start recruiting staff again in an attempt to compensate for the staff losses of 2010 and 2011
Number of Staff Sponsored for MSc and PhD Degrees	41	35	46	11	The Council for Geoscience increased the funding available for bursaries for its permanent staff. It also lifted cost-cutting measures with regard to its technical programme. This has created opportunities for young scientists to gain higher qualifications and contributed to the increased number of staff enrolling for MSc and PhD degrees
Proportion of Scientists to Total Staff	38.87 %	44 %	41.12 %	(2.88 %)	The Council for Geoscience is finding it difficult to obtain the qualified scientists needed to fully deliver on its mandate
Proportion of Scientific Staff with MSc and PhD Degrees	53.85 %	56 %	48.92 %	(7.08 %)	The Council for Geoscience is continuously losing scientists with MSc and PhD degrees to the private sector
Protégée Satisfaction Level	91.3 %	60 %	62 %	2 %	Target achieved

<b>Strategic Objective:</b>	<b>To Enhance Present Levels of Excellence</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Number of Papers and Articles Published	81	70	115	45	The number of papers and articles published is directly linked to the number of projects with external collaborators, strategic science partnerships and international commercial projects that focus on joint research and skills development. This is creating ever more opportunities for scientists to publish their results as papers or as oral presentations at conferences, workshops, etc
Number of Projects with Intellectual Property Value	0	1	0	(1)	The Council for Geoscience was not able to register any patents during the period under review
Number of Projects with External Collaborators	45	58	45	(13)	The Council for Geoscience views collaboration with external partners as a very important strategy to build experience and improve skills. Unfortunately, the Council for Geoscience was not able to secure the required number of new partnerships during the year to meet the set target
Number of Strategic Science Partnerships	27	16	33	17	This measure is focused at strengthening geoscience research in the organisation by engaging in joint research with universities and other research organisations. It seems that there is generous funding available to encourage joint research and this is leading to more science partnerships
<b>Strategic Objective:</b>	<b>To Build a Positive Organisational Culture</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Percentage Satisfied Staff Members	71 %	65 %	71.9 %	6.9 %	Although the satisfaction level is nearly 7 % above the target, in reality it has not changed at all from that of the previous year
<b>Strategic Objective:</b>	<b>To Reflect and Embrace the Diversity of South Africa</b>				
<b>Performance Indicator</b>	<b>Actual Achievement 2011/2012</b>	<b>Planned Target 2012/2013</b>	<b>Actual Achievement 2012/2013</b>	<b>Deviation from Planned Target to Actual Achievement for 2012/2013</b>	<b>Comment on Deviations</b>
Percentage Overall Employment Equity Targets in the Organisation (White-Black)	36:64	36:64	31:69	5 %	The Council for Geoscience is satisfied with its progress relating to the White-Black equity target
Percentage Overall Employment Equity Targets in the Organisation (Male-Female)	60:40	54:46	59:41	(5 %)	The appointment of suitably qualified female staff remains a challenge

## HIGHLIGHTS OF ACTIVITIES

### National Projects

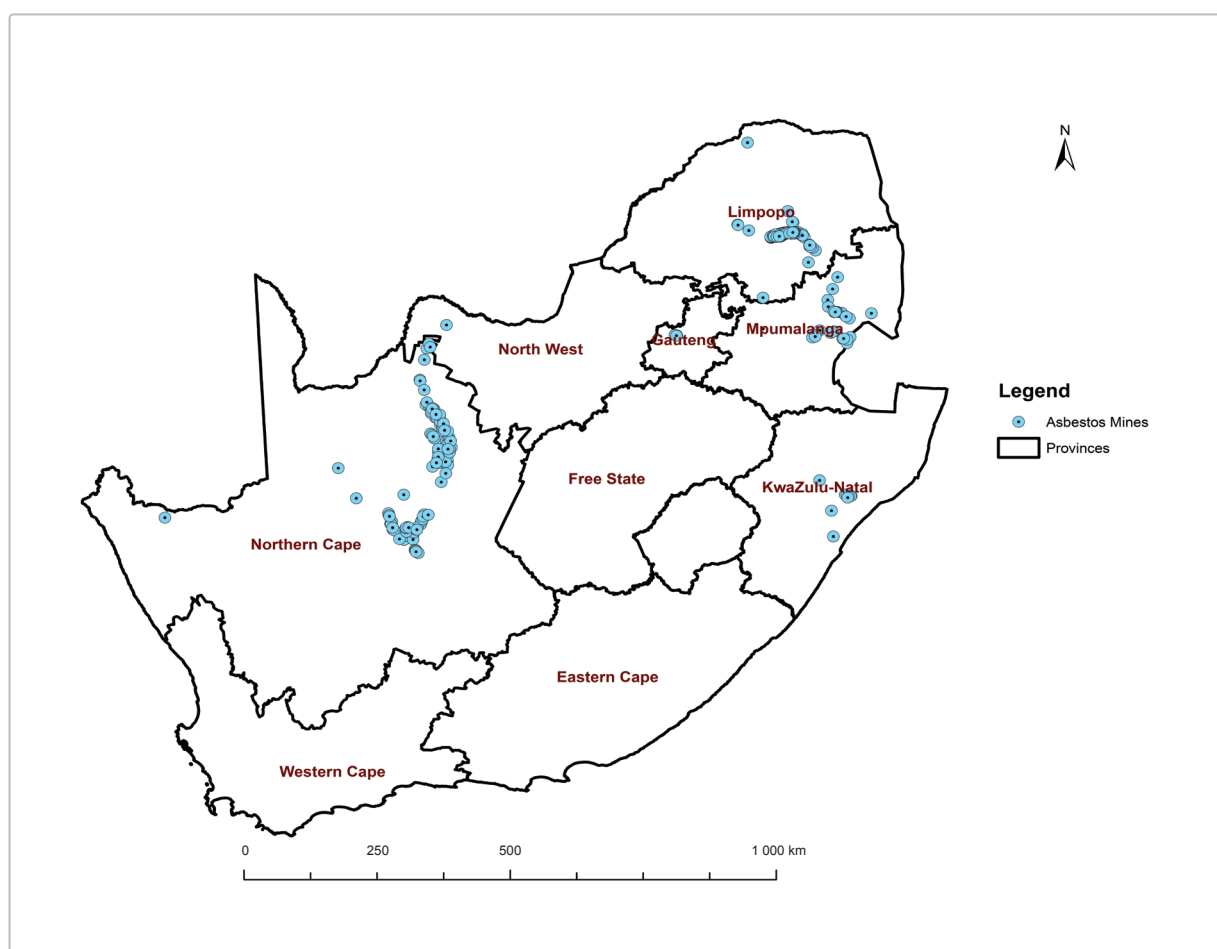
#### Management of State Contingent Liabilities with respect to Derelict and Ownerless Mines in South Africa

(Reports 2012-0215; 2013-0189)

The objectives of the project are to update, maintain and rank the information in the database and to improve its integration into the licensing system of the Department of Mineral Resources (DMR). The database should facilitate the estimation of the contingent liability of the DMR with respect to derelict and ownerless mines. In addition, rehabilitation plans and bills of quantities on identified mine sites have to be developed. A

field investigation and database ranking must be undertaken to identify priorities on a continuous basis and dangerous openings that pose an immediate threat to human safety must be closed.

In order to determine the state contingent liabilities on derelict and ownerless mines in South Africa, it is important to assess their current condition, i.e. their impact on the immediate environment, the need for mine rehabilitation and the estimated cost of the mine rehabilitation process. As the derelict and ownerless mines number about 6 000 and in view of the budget constraints, this assessment could also provide the state with a priority list of mines. The priority list is prepared by ranking the derelict and ownerless mines



Distribution of derelict and ownerless asbestos mines in South Africa.

according to criteria that incorporate measuring the impact of these mines on the immediate environment.

As exposure to the fibres of asbestos may result in lung diseases such as asbestosis, the project started off with the derelict and ownerless asbestos mines requiring immediate attention, i.e. those that have already been the subject of litigation by people experiencing health problems as a result of prolonged exposure to the mineral. The Northern Cape Province has the largest number of derelict

and ownerless asbestos mines (127), Limpopo (77), Mpumalanga (27), KwaZulu-Natal (9), Gauteng (3) and North West (1). A field visit was conducted to all six of the provinces.

The data and information collected during the course of the project were concurrently incorporated into the derelict and ownerless mines database. Twenty-three dangerous mine holes were closed during the year, seven each in the Cullinan and Giyani areas and nine in the Brakpan area.

### Priority for Rehabilitation of Derelict and Ownerless Asbestos Mines

	Northern Cape	Mpumalanga	Limpopo	North West	KwaZulu-Natal	Gauteng
Low	26	7	26	0	0	0
Moderate	12	7	13	0	4	0
High	9	6	7	0	2	0
Very high	19	5	6	0	0	2
No rehabilitation required	61	2	25	1	3	1

### Strategic Mine Water Management

(Report 2013-0143)

The Department of Mineral Resources has tasked the Council for Geoscience to conduct research to address the problems related to the prevention of water ingress into the underground workings of the Witwatersrand mining basins and other geographical areas. The project entitled Strategic Mine Water Management Plan (SMWMP) for the Prevention of Water Ingress into Underground Workings of the Witwatersrand Mining Basins is part of the initiative to remedy the legacy of mining in South Africa. In particular, the project seeks to arrive at solutions to decrease the risk to the state for bearing the costs of continuous pumping of water when mines close down, and to manage and control the decant of highly polluted water to the surface, with the attendant risks.

#### Predict and prevent harm to the environment

Prediction of harm to the environment is closely linked to the monitoring of the water levels,

qualities and flows within the different mining basins. This is currently being done in cooperation with the Hydrological Monitoring Committee (HMC), which reports to the Inter-Governmental Task Team on Acid Mine Drainage Management. On a more proactive level, the SMWMP includes a component that considers the potential application of passive treatment technologies in the different mining areas of the Witwatersrand. Another subcomponent is the monitoring of seismicity in the Central, West and Far West Rand basins. In this regard, a seismicity map and source parameters of seismic events located in the Central Basin were produced. Other work includes the investigation of the seismic response of the rock mass owing to the flooding of abandoned mining excavations. Structural areas in the Central Rand Basin posing significant seismic risk were identified in a way that provides for comparison with previous maximum magnitude estimations.



### **Apportion pollution sources and liabilities**

In the past, a first-order liability apportionment was undertaken for the Western Basin which relied on a simple conceptual model of water ingress and identified owners or rights-holders for all of the mine properties in the area. Subsequent legal proceedings showed that the enforcement of these liabilities was no simple matter. A study is currently underway in the Eastern Basin to apportion pollution to differing water sources and, where possible, to apportion legal responsibility for ingress.

### **Ingress prevention**

The construction of the southern portion of the Florida canal, being the section between the Main Reef Road and Fleurhof Dam, commenced in 2009 and was completed in August 2010. The construction of the northern section of the canal, between Florida Lake and Main Reef Road, was completed in February 2013 and included the construction of a pedestrian bridge over the southern section of the canal and the re-fencing of the whole canal area. Currently, handing over of the infrastructure to the Johannesburg Roads Agency is in process.

Feasibility studies for the implementation of ingress control measures in the Central Basin were conducted in three new areas of intervention. The proposed canals are the Durban Roodepoort Deep (DRD) canal, New Canada Dam canal and the Elsburg Spruit canal. The study recommended a Reno mattress design option for the three canals.

In the East Rand Basin, 14 major ingress areas have been identified. The recommendations for intervention have been compiled.



The construction of the Florida canal in Johannesburg.



Canalisation as a means of controlling water ingress.



Acid mine drainage originating from leachate from surrounding mine residue deposits feeding the Geduld Dam near Springs.



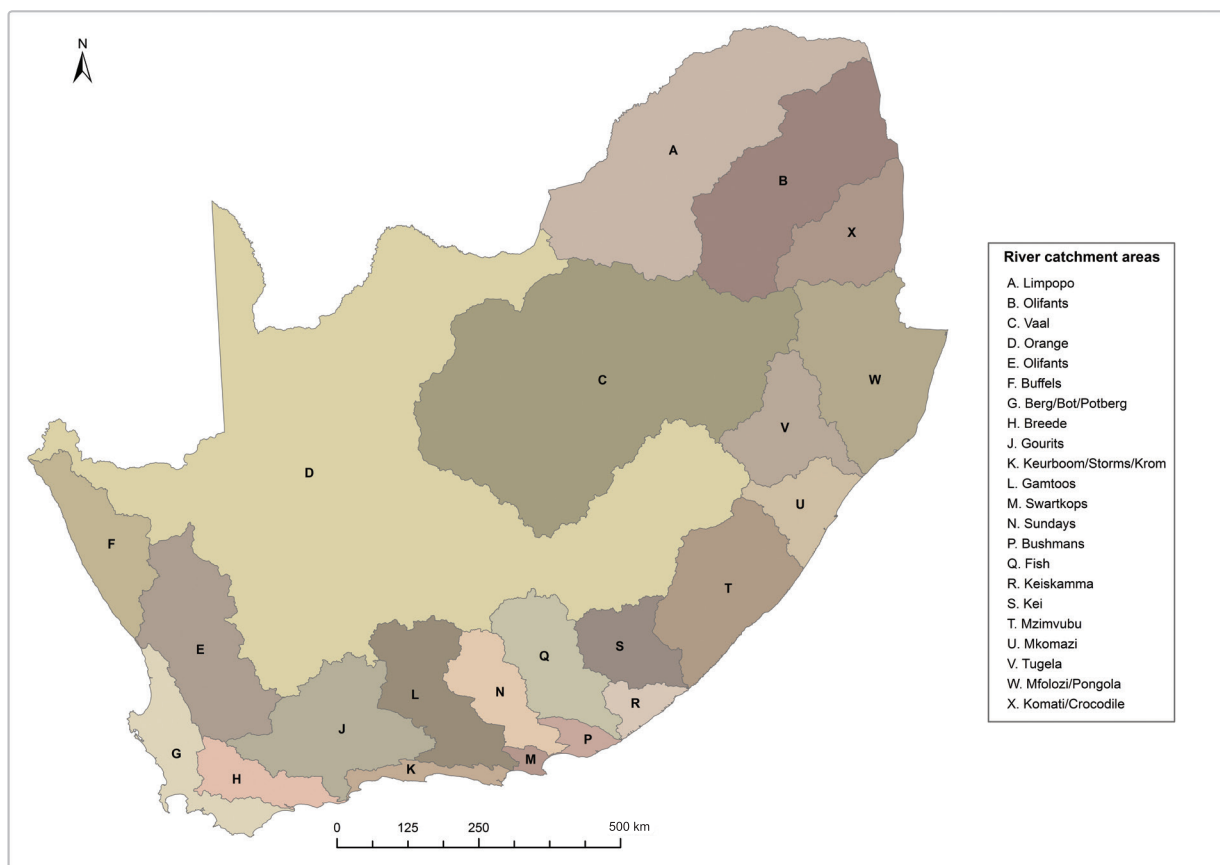
Discharge water flowing into the Blesbokspruit from an unidentified source at Largo in the East Rand Basin.

### Assessment and Remediation of the Impact of Acid Mine Drainage on the Water Resources of South Africa

(Reports 2013-0085; 2013-0053; 2013-0140; 2013-0135)

Investigations were conducted in the Olifants and Komati/Crocodile river catchments and it was found that the toxic metals As, Cr, Pb, U, Co, V, Ni, Cu, Pb, Zn, Al and Mn were present in both catchment areas.

Understanding the role of geology in the neutralisation or acid generation ability during the process is crucial. Research may include sampling of the rocks and sediments for static and kinetic tests such as ABA (Acid Base Accounting) and humidity cells or column leaching respectively, and modelling. Identifying the specific pollution sources should not be focused on gold and coal only, but should include other commodities leaching toxic metals. The study should also include an understanding of the role of the many



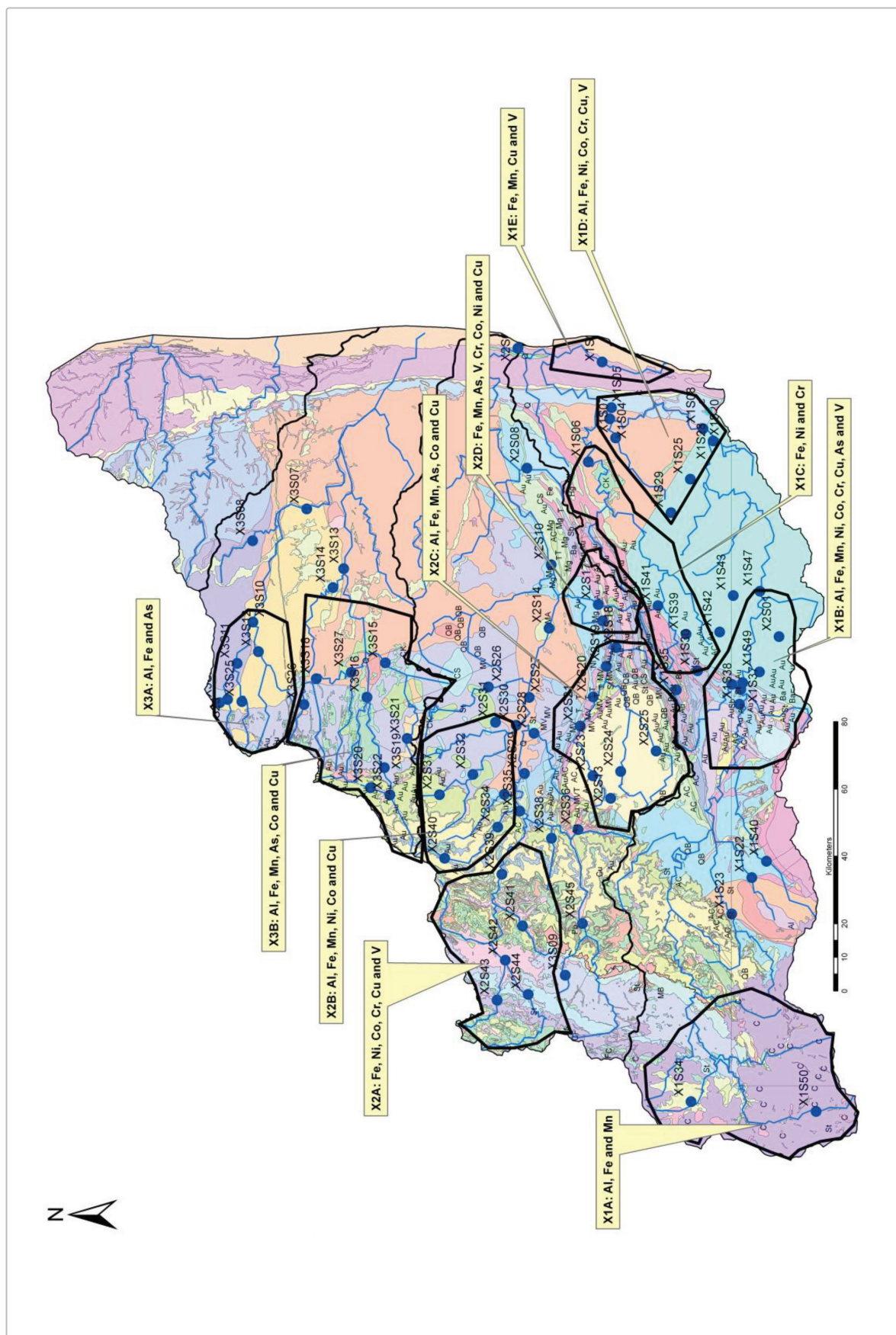
River catchment areas in South Africa.

Detailed studies at a scale of 1:50 000 on almost all the quaternary streams are recommended for the areas of concern, which include about 11 sites for the Komati/Crocodile and about 19 sites for the Olifants river catchments. Special emphasis should be placed on the environmental application, which may include element speciation by sequential extraction or any other technique suitable for all pollution-related elements. The study should include an understanding of the metal mobility under different conditions from a specific pollution source to the streams.

wetlands and structured Karoo dykes, which could act as a barrier, located within the streams of the coalfields and in other areas identifiable within the catchment.

It is recommended that sampling of the dams be done immediately as they are subjected to heavy-metal accumulation because of the continuous deposition of sediments from rivers. Numerous crocodiles were reported to have died in the Loskop Dam owing to contamination of the water by mine waste. The current study reveals that the metals concentrate within the sediments and that the crocodiles themselves can





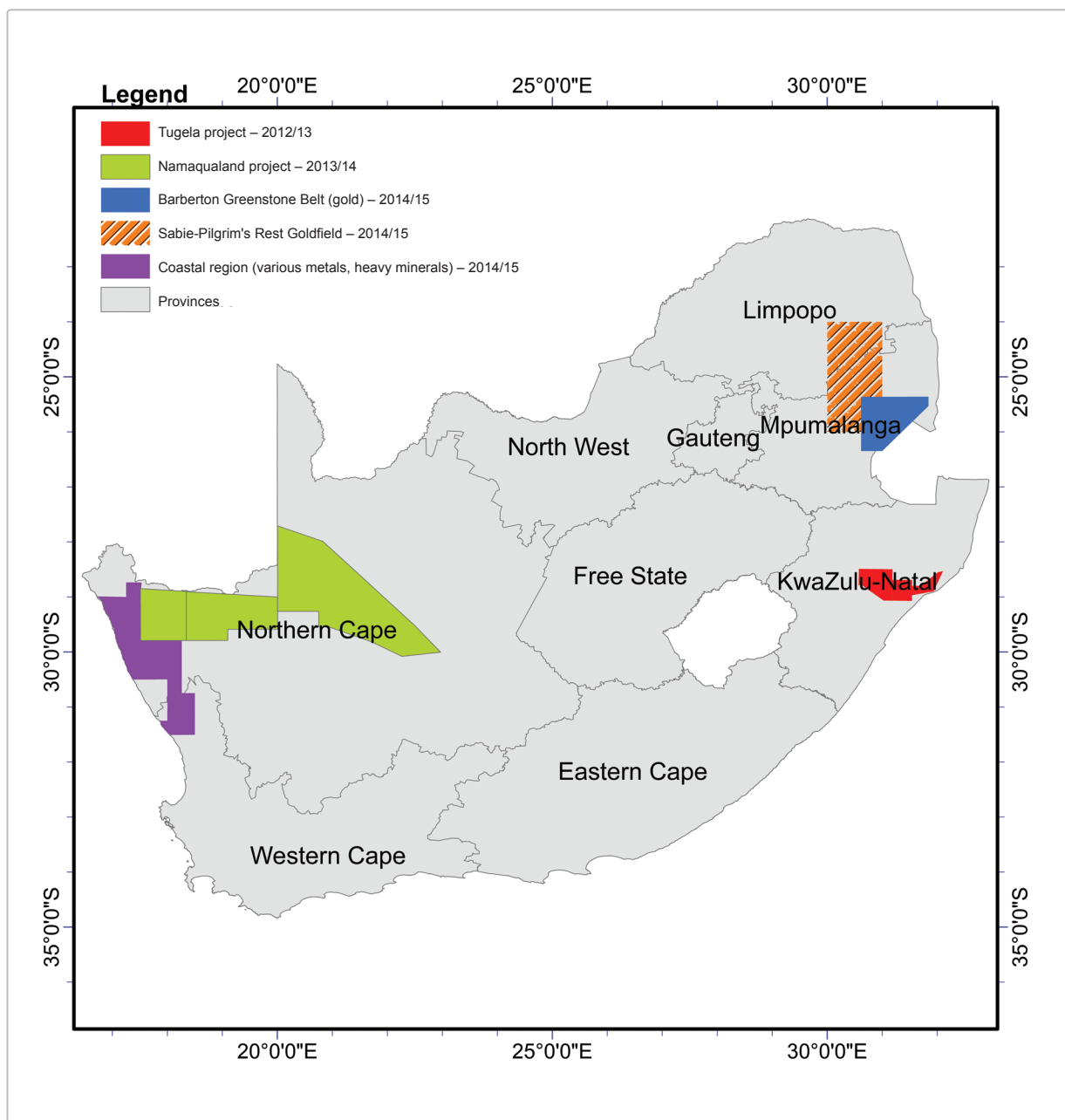
Synthetic geochemical distribution map of the Komati/Crocodile catchment.

become a pollution source since they are in constant contact with the sediments. The mines located in the Witbank coalfields release heavy metals into the rivers which are later washed by floods to be deposited in the Loskop Dam. The current study indicated no heavy-metal spark close to the Loskop Dam, but this finding will be contested once the Loskop Dam is sampled for sediments. The metals are not from the Witbank mines only, but are probably associated with the ferrochrome and ferrometal (vanadium) processing plants located in Middelburg and Emalahleni (Witbank).

## Exploration and Mining Stimulation in the Minerals and Energy Sectors

*(No report yet; data gathering surveys in progress)*

The main aim of the MTEF programme is to stimulate mining and exploration in South Africa by providing new and updated geoscience data to the public and the mining industry and by generating mineral targets using modern methods of mineral prospectivity mapping.



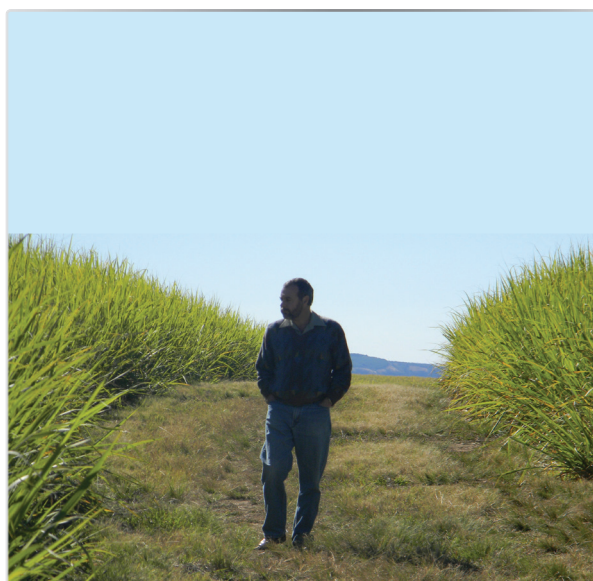
Location of the project areas for the three-year MTEF project to explore and stimulate mining in the minerals and energy sectors.

New developments include a better understanding of ore-forming processes, advanced geophysical and geochemical exploration techniques, advanced analytical techniques, remote sensing and other spectral technologies, advances in database and data capturing techniques, data processing software technologies as well as data integration, visualisation and interrogation technologies.

The Council for Geoscience has embarked on an ambitious programme to re-investigate selected mineral belts and districts by acquiring high-resolution geophysical and geochemical data. This information will be integrated with existing additional information such as remote sensing data, geological and structural maps and mineral deposit/occurrence data with the object to delineate mineral potential targets in the various mineral belts and districts. This project aims at producing mineral prospectivity maps and an accompanying comprehensive report that will be disseminated to the public and the Government.

During the first year of the three-year MTEF project entitled Exploration and Mining Stimulation in the Minerals and Energy Sectors, airborne magnetic and radiometric surveys, and airborne Time Domain Electromagnetic (TEM) and airborne soil sampling were conducted in the Tugela region of KwaZulu-Natal. To date, the airborne magnetic and radiometric survey has been completed. The Tugela region is characterised by a rough relief and swamps and frequent rains, making the airborne electromagnetic and soil sampling work extremely slow. The airborne TEM survey was completed for about 50 % of the proposed area.

The survey areas selected for the second year of the programme are in the Namaqualand region of the Northern Cape Province and the proposed activities include a desktop study of selected areas in this region, airborne magnetic and radiometric surveys, soil sampling and sample preparation and analysis of the collected soil samples.



Rugged, rolling relief and marshy valleys of the Tugela region in KwaZulu-Natal.

### Mineralisation of the Gold-bearing Quartz Veins in the Chakaskraal Goldfield, KwaZulu-Natal

(Report 2013-0163)

The Chakaskraal goldfield represents one of the only subeconomic gold occurrences in the sedimentary rocks of the Natal Group in KwaZulu-Natal. Gold

is associated with authigenic pyrite mineralisation, which is related to fluid movement and precipitation along brecciated fault zones within competent sedimentary lithologies. The gold is of epithermal origin, having been precipitated at a depth of ~1.5 km in upper Natal Group lithologies beneath Karoo Supergroup lithologies. Mineralisation is associated with a large ~5 m wide shear zone consisting of brecciated sandstone and quartz veins



at the abandoned Linton Mine. Early prospectors presumed that the gold was detrital in nature and therefore similar to that of the Witwatersrand goldfield occurrences. However, the association of gold and pyrite with conglomerate, sandstone and clay in the Chakaskraal goldfield is due either to localised fracturing or increased pore space in which authigenic pyrite could be precipitated. Mineralisation is associated with extensively altered and silicified sandstones which form the wall rock to the Chakaskraal shear zone. Relatively high

porosity within the sandstone and conglomerate, as well as open channel permeability associated with fracture arrays allow disseminated and fracture-associated precipitation of sulphides within the wall rocks. The identification of gold occurrences associated with faults in adjacent Karoo Supergroup lithologies by prospectors, as well as lode gold occurrences in the Chakaskraal goldfield, indicates that this represents an anomalous gold occurrence associated with Gondwana breakup faulting and late-stage Karoo volcanism.



The Chakaskraal goldfield in KwaZulu-Natal represents a small-scale, epithermal gold occurrence hosted in quartz veins within Natal Group sandstone, shale and conglomerate. Gold is associated with pyrite, occurring primarily in quartz veins, but is also disseminated in thin conglomerate lenses.

## Predictive Bedrock and Gold Prospectivity Mapping of the Giyani Greenstone Belt

(Report 2013-0105)

The objective of the project is to carry out predictive bedrock and gold prospectivity mapping in the Giyani greenstone belt, using and analysing multiple geoscience data sets and eventually integrating the relevant derived maps. The bedrock and gold prospectivity maps will support the exploration and mining industries, as well as junior and small-scale miners to focus on the delineated gold potential targets, thereby reducing the risk and the cost involved in blind exploration of large tracts of land. The results of this study will also positively influence the creation of jobs and poverty alleviation, and provide support in land-use planning.

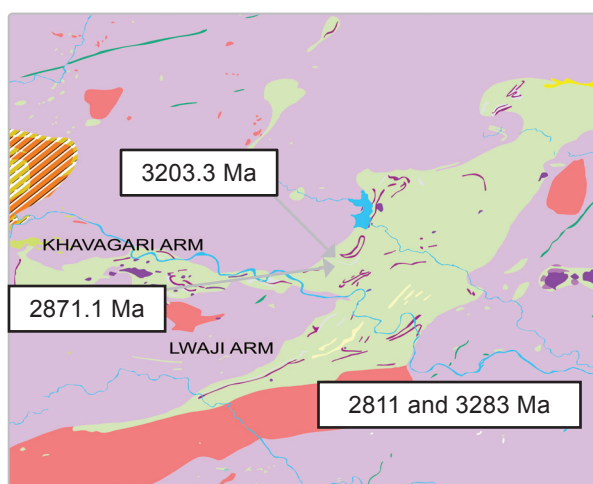
The Giyani greenstone belt is known for its gold potential. There are about 44 gold occurrences, prospects and deposits in this area. Gold mining in the greenstone belt started in the 1870s, but was suspended in the late 1990s because of lower gold prices. A recent increase in the gold price has stimulated a renewed interest in this greenstone belt and currently several parts of the area have been leased to exploration companies. A majority of the previous gold exploration endeavours used traditional methods and were unsystematic, partly because of the scarcity of rock outcrops. Previous attempts to map the greenstone belt could also not produce an accurate geological map because of

the lack of rock outcrops. Exploration in covered regions requires multiple geoscience data, including geology, geophysics, geochemistry, remote sensing and appropriate data manipulation to establish gold predictor maps and to eventually integrate the relevant data sets in order to generate potential target areas. The Council for Geoscience has conducted soil sampling (one sample per square kilometre) and high-resolution magnetic and radiometric surveys in the Giyani greenstone belt in the late 1990s. This project is thus aimed at using these and additional data sets (remote sensing and structural) and a process using modern software technology to look deeper below the regolith cover that conceals most of the underlying bedrock and gold mineralisation. To achieve this aim, a collaborative research programme between the Council for Geoscience and the Swedish Geological Survey (SGU) was established. This collaborative research programme will contribute significantly to skills training in modern methods of multiple data analysis and integration for mineral prospectivity and bedrock mapping.

Data processing and analysis have been completed and predictive bedrock mapping has shown a significant improvement compared with the original geological map. Preliminary results of the gold prospectivity mapping have successfully delineated gold potential zones. The exploration and mining companies, as well as junior and small-scale miners should focus their exploration activities in the outlined potential areas to reduce the cost and risk involved in exploration.



New predicted map



Previous map

Predictive bedrock map (left) and original geological map (right).



## Mineral Commodities in the Western Cape Province

(Reports 2012-0228; 2013-0165)

Mineral commodities in the Western Cape Province were investigated with the aim of updating the mineral commodities database and to indicate minerals which are currently economic or potentially economic for exploitation. Data were retrieved from a variety of sources, mainly published literature and maps, unpublished reports from mining and exploration companies and field observations. The database has been completed and comprises a total of 2 462 records, including working deposits, abandoned deposits and deposits never exploited. In addition, mineral occurrences are included which require further investigations such as drilling and sample analysis in order to prove or disprove their economic viability. The database has 49 fields for each record, which describe the type of commodity, mining status, locality, size, mining production, host and ore description, surface ownership, mining ownership, data references and compiler name and date of compilation.

The following minerals are present in the Western Cape: barytes, sepiolite, bentonite, fuller's earth, illite, kaolin, ball clay, brick clay, tin, copper, gold, diamonds, limestone, dolomite, granite — dimension stone, marble — dimension stone, slate — dimension stone, sandstone — dimension stone, iron, manganese, gypsum, graphite, shale gas, lignite, peat, uranium, heavy minerals, kyanite, sillimanite, molybdenum, tungsten, nickel, mineral pigment, salt, phosphate, pseudocoal, pyrophyllite, rare-earth elements, silica sand, building sand, stone aggregate and road-building material. Some of these deposits, such as barytes and kyanite, are too small or too low grade to be economically viable. The minerals kaolin, tin, gold, marble, slate, iron, lignite, mineral pigment and pseudocoal have been previously exploited, but are no longer mined owing to the depletion of reserves in the case of tin, gold, lignite and pseudocoal, or by the replacement of other minerals or sources in the case of kaolin, marble, slate, iron and mineral pigment. The minerals bentonite, ball clay, brick clay, diamonds, limestone, dolomite, granite, sandstone, manganese, gypsum, heavy minerals, salt, silica sand, building sand, stone aggregate and road-building material are currently being mined. There are sufficient resources for long-term growth of most of these commodities, except diamonds, which are largely restricted to the offshore sea floor to the north of Doring Bay, and manganese, which is mined from a small deposit near Swellendam; the other manganese deposits are

mostly depleted. Building sand in the greater Cape Town region is being depleted rapidly and another source from a more distant location or crushed rock, such as sandstone, from a closer location will be required. Shale gas is present in Karoo strata between Laingsburg and Murraysburg, but considerable exploratory investigations are needed to prove or disprove its viability. Uranium is also present in the same area, where 55 deposits have been identified, 37 of which also contain molybdenum. The resources include approximately 20 000 tonnes of uranium and 28 000 tonnes of molybdenum, but the price of these commodities has to improve before exploitation can be considered. Phosphate was mined between 1915 and 1992 and, in view of the increasing price of fertilizer, there has been recent prospecting with the aim of renewed exploitation. Fifteen deposits occur between Atlantis and Doring Bay and these have a total resource of 12.3 million tonnes of phosphate. Rare-earth elements, which are hosted in the mineral monazite, are confined to three deposits to the south of Kliprand, with the largest at Steenkampskraal expected to be exploited soon. The resource is 30 000 tonnes and the commodities are used mainly in high-strength steel, petroleum catalysts and fluorescent lights. Tungsten was mined with tin near Kuils River in the early 1900s, but the deposit has largely been depleted. However, a large deposit with ore reserves of 46 million tonnes, grading at 0.216 %  $WO_3$ , was discovered near Piketberg and is marginally economic.

In conclusion, a total of 16 mineral commodities are being mined in the Western Cape Province and another six are potentially economic. The distribution of these deposits is important to potential small-scale miners, the Department of Mineral Resources, town and rural planners, environmental organisations and botanists. In this regard, reports on the mineral resources of the greater Cape Town region and the proposed Knersvlakte National Park have been compiled.



Kraaibosch quarry near George where granite is exploited for stone aggregate.



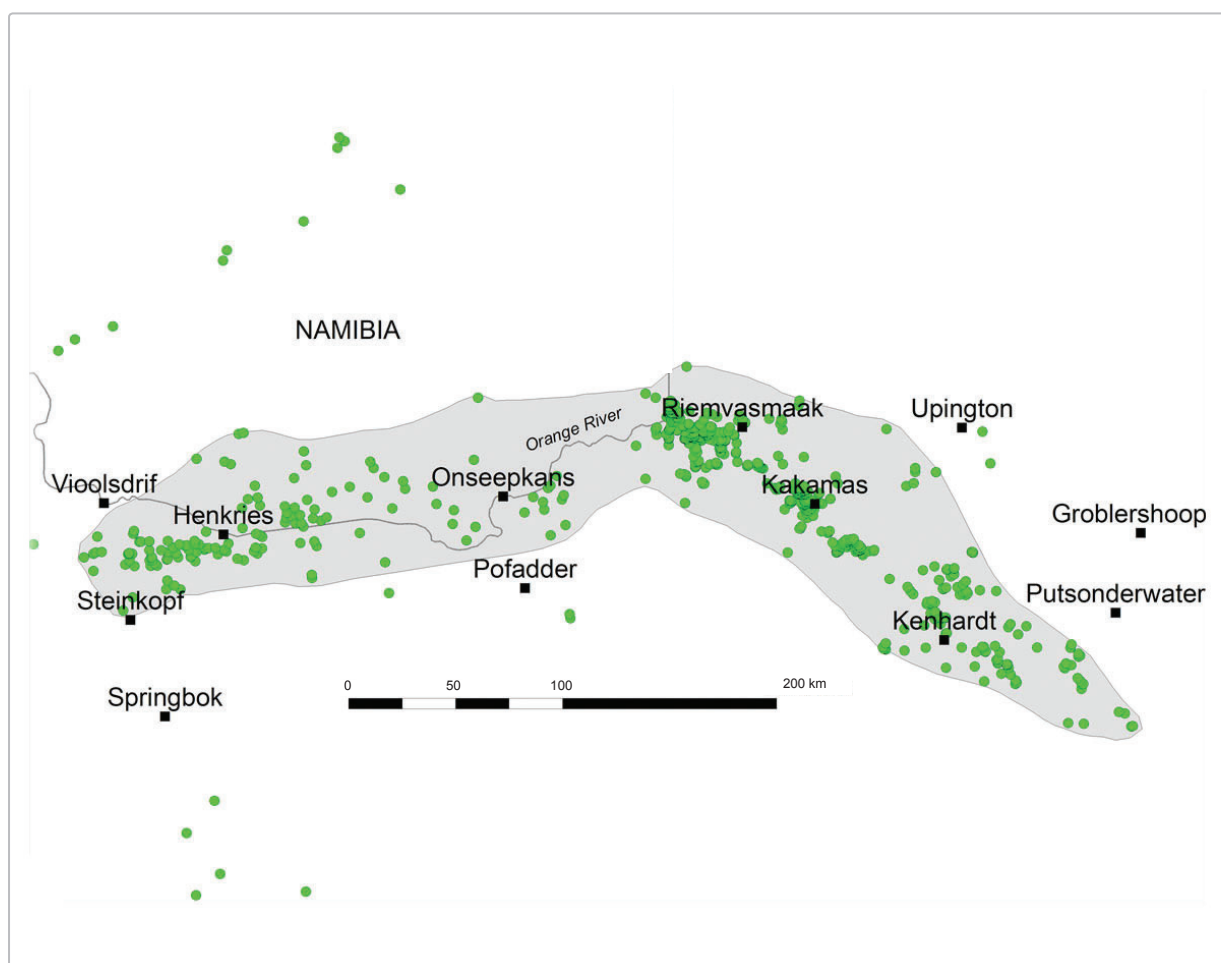
## Economic Potential of Pegmatite Deposits in the Northern Cape Province

(Report 2013-0025)

The Northern Cape pegmatite belt strikes over a total distance of about 510 km from Vioolsdrif in the west to Putsonderwater in the east and is on average about 50 km wide, partly extending into Namibia. The first pegmatite to be mined in the Northern Cape pegmatite belt for bismuth and mica was at Blesberg in 1925. Throughout the years, as the value of commodities varied, the bodies were mined for different commodities, including beryl, mica, tantalite and feldspar.

There are still vast resources of pegmatite within the Northern Cape pegmatite belt; however, they are not all economic and need to be evaluated individually. Market opportunities for pegmatite minerals are numerous, but the industry is

deterred by the replacement of traditional pegmatite resources with alternative sources and commodities. The main limiting factors for the further development of the Northern Cape pegmatite belt are poor infrastructure and distance to the markets with associated transport costs, limited domestic industries and markets, poor demand and low prices. Recommendations for the future development of the pegmatite mining industry in the Northern Cape include the replacement of traditional selective mining by a bulk mining method, value addition operations such as crushing and milling and the purification of materials to industry-specific specifications, and extension to the international market. The development of the local markets and industries should also receive attention.



Distribution of pegmatite bodies in the Northern Cape pegmatite belt.



Pegmatites at Blesberg in the Northern Cape Province.

### Shale Gas Potential of the Lower Karoo Rocks, North of Paterson in the Eastern Cape Province

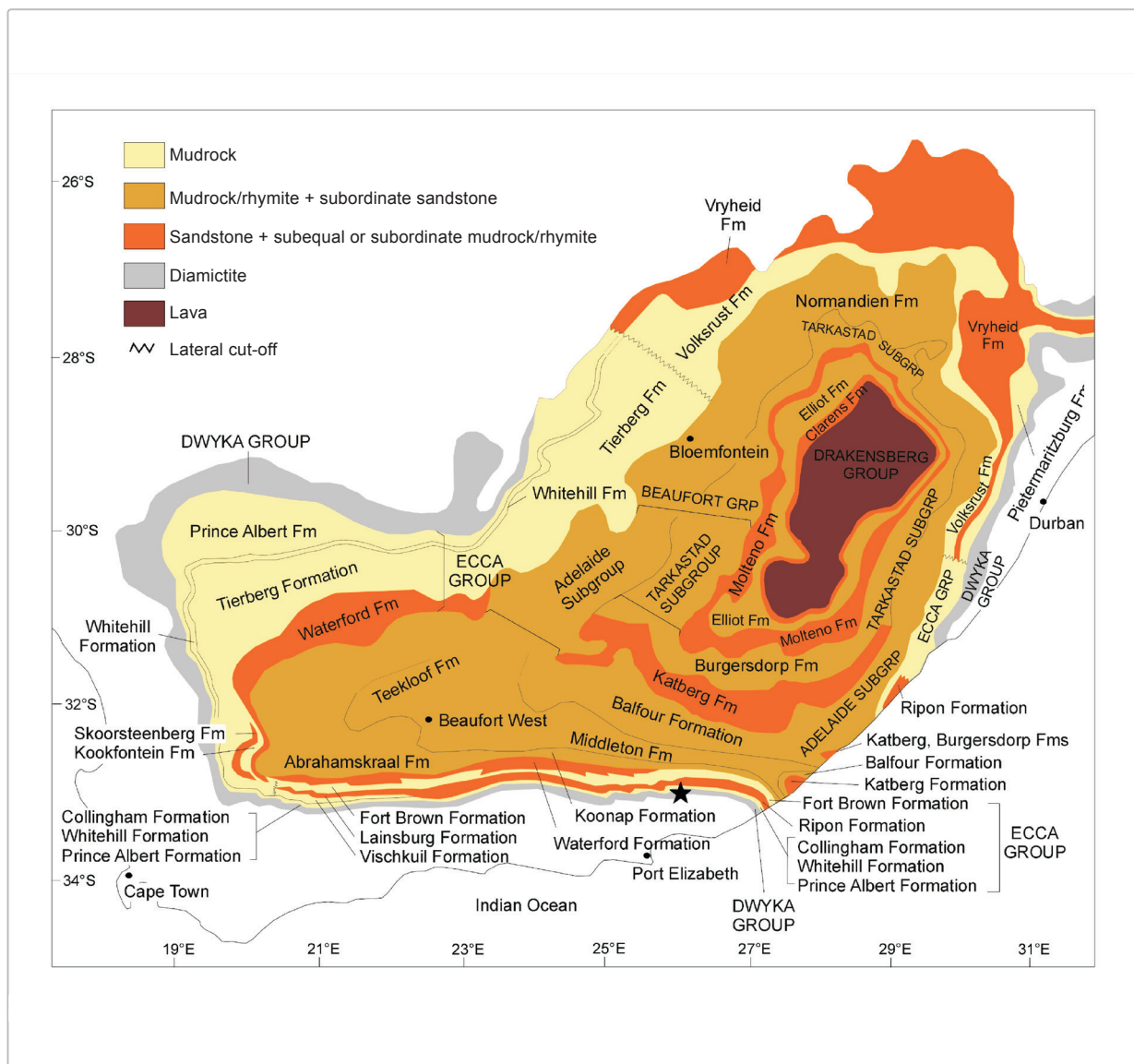
*(Report 2013-0114)*

This project aims to investigate the potential of the Karoo Basin as a geological host for shale gas. The data that were gathered on the lower Ecca Group during research will be analysed and interpreted. The focus will be on the Collingham Formation as a cap rock for shale gas, as well as the potential of the formation as a gas conduit or gas-bearing horizon.

Methodologies applied in this project include scanning electron microscopy, thin sections, XRF, XRD and possibly total organic carbon (TOC) and mercury

porosimetry. In addition, zircon will be utilised in radiometric age dating.

Field mapping is nearing completion and a log has been constructed from a borehole. Samples from field mapping and the borehole have been submitted for XRD and XRF analyses. Samples have been studied using thin sections and SEM (scanning electron microscopy). Additional samples will be submitted for TOC and mercury porosimetry analyses in due course.



Geological formations of the Karoo Basin.





Drill core and drilling operations in the Karoo Basin.



Dating of zircons from the Collingham Formation.

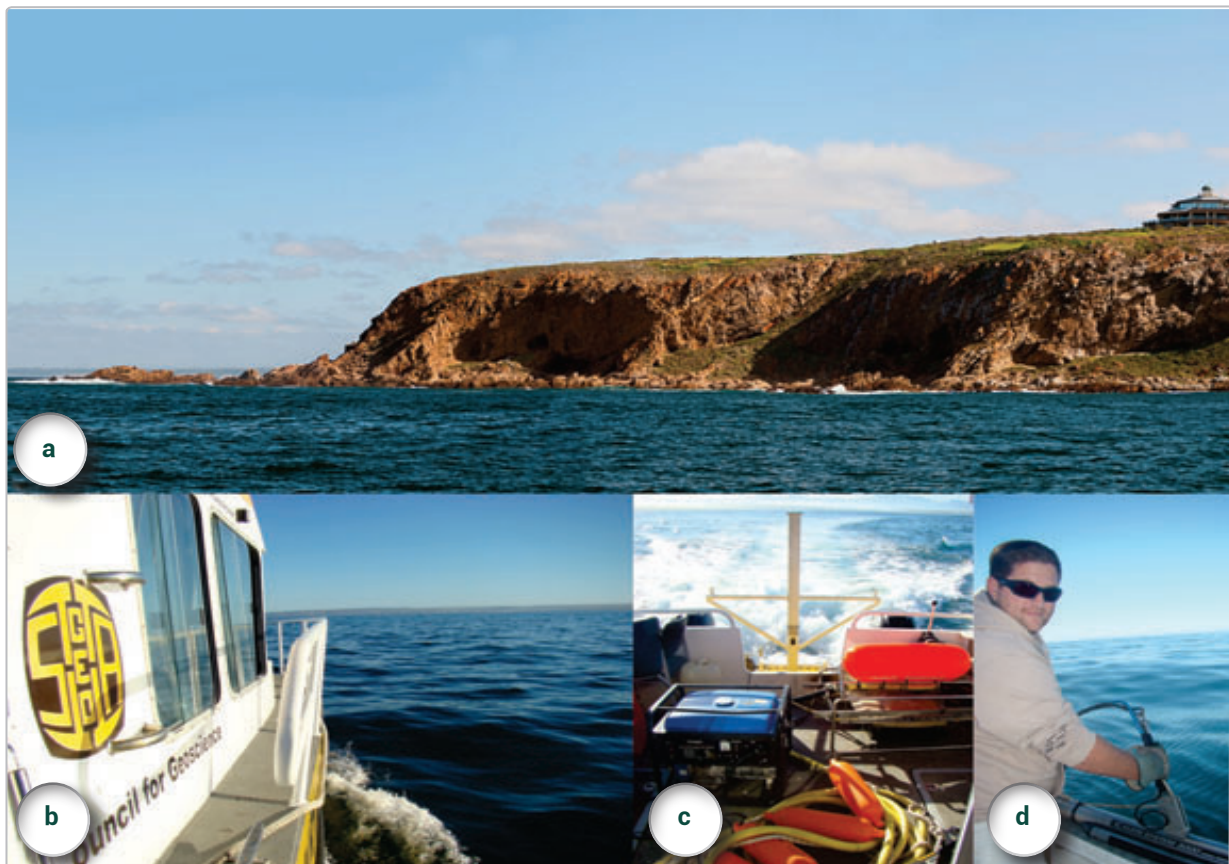
## Remote Sensing Analysis of Land Degradation and Regolith Susceptibility to Erosion on the Eastern Cape Wild Coast

(Report 2013-0147)

Land degradation has spread at an alarming rate on the Eastern Cape Wild Coast, which is regarded by many as a 'pristine' region and is listed by the World Wildlife Fund as an International Global Ecoregion of Global Significance. Communal seasonal crop and grazing lands in the area are vulnerable to severe soil erosion. Elsewhere, land degradation has been caused by illegal sand mining. The Alfred Nzo District Municipality has acknowledged the need for environmental education, training and a rehabilitation programme for erosion features. Presently, there is no predictive local-scale erosion susceptibility model for the Wild Coast which could highlight areas at risk.

A research project was initiated which aims to develop a monitoring protocol to predict erosion-susceptible areas and assess critical impacts at a local scale. This

predictive and assessment protocol can be used as a vital decision support system to aid policy makers and conservation planners. The project will involve the following: collating climatic, biophysical and socio-economic spatial thematic layers, using available aerial photographs and satellite images (LANDSAT and SPOT); mapping and the classification of eroded areas; assessing conditions that precede and follow erosion development and spread; identifying critical erosion causal factors; analysing biophysical relationships and thresholds; modelling erosion susceptibility and evaluating high-risk areas; assessing erosion patterns and predicting future scenarios for different erosion types and landforms along the Wild Coast. Research methodologies will be tested in the Xolobeni region that has been selected as the pilot study area because the area is accessible and exhibits a wide range of water- and wind-erosion landforms.



(a) The archaeological site of Pinnacle Point along the cliffy coastline of Mossel Bay. (b-d) Council for Geoscience survey vessel Geo Manzi.



## Marine Geophysical Study of the Continental Shelf off Mossel Bay

(Reports 2013-0169; 2013-0170; 2013-0171; 2013-0176)

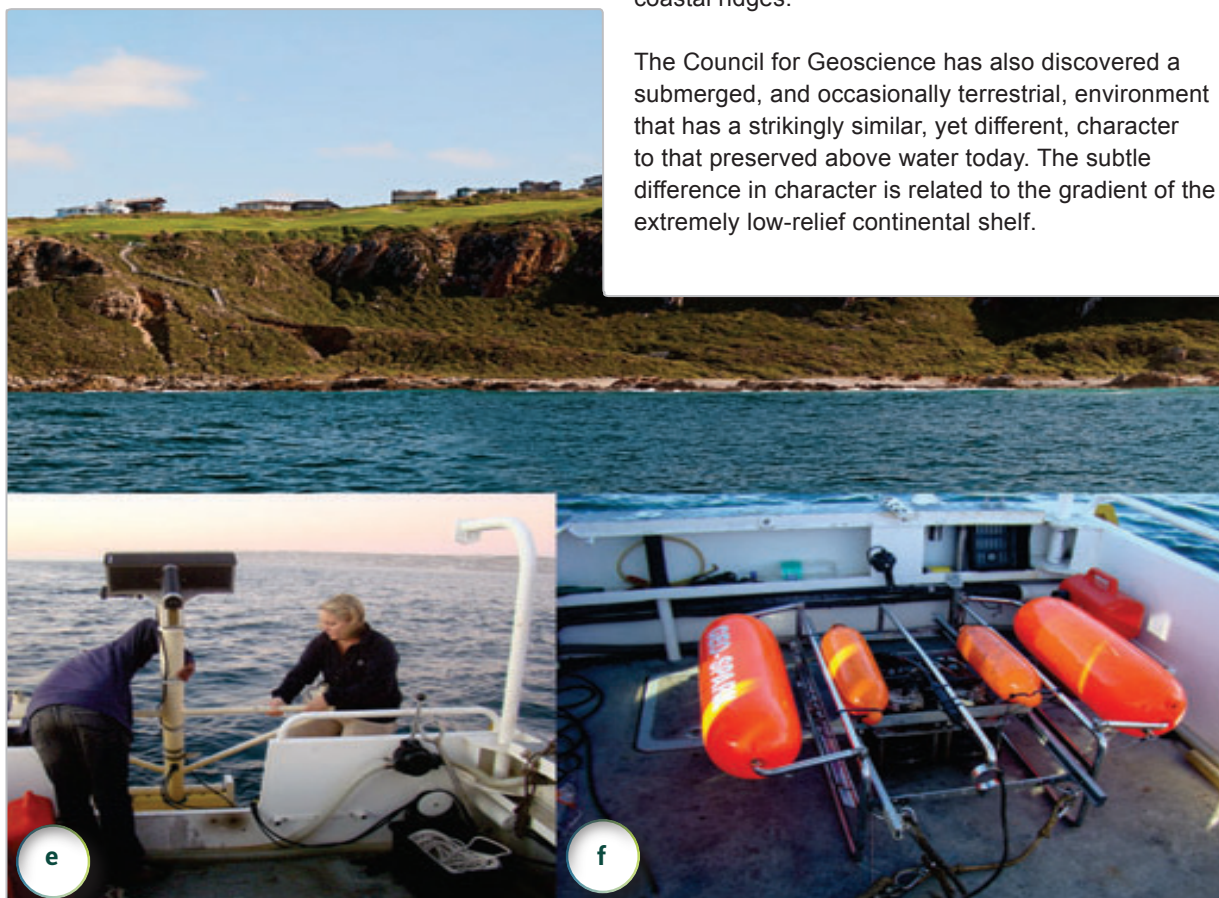
Some of the most significant palaeoanthropological sites for the study of modern human origins are present along the southern shores of the South African subregion. While today these sites are directly on the coastline, for most of their history they were set back from the coast and a large plain existed between these sites and the sea. Because the plain was used by ancient humans, a significant portion of the modern human archaeological record — and evidence of the environments that early humans evolved within — have been thought to be lost under the Indian Ocean owing to post-glacial rising sea levels. However, these data are not lost entirely because new state-of-the-art techniques allow geoscientists to study the submerged landscapes and build accurate models of their nature. This study uses these techniques to obtain the clearest understanding to date of the geological evolution, marine sedimentary processes and seismic stratigraphy of

the region offshore of Mossel Bay, along the South African southeastern coast.

The Council for Geoscience mapped 255 km<sup>2</sup> of the continental shelf using multibeam bathymetry, side-scan sonar and two subbottom profilers for the reconstruction of the drowned palaeoenvironments. By integrating each of the data sets, a high-resolution geological map of the seafloor was produced. The geological strata that have been identified will subsequently be sampled by geoscientists as the last phase of field work for the study.

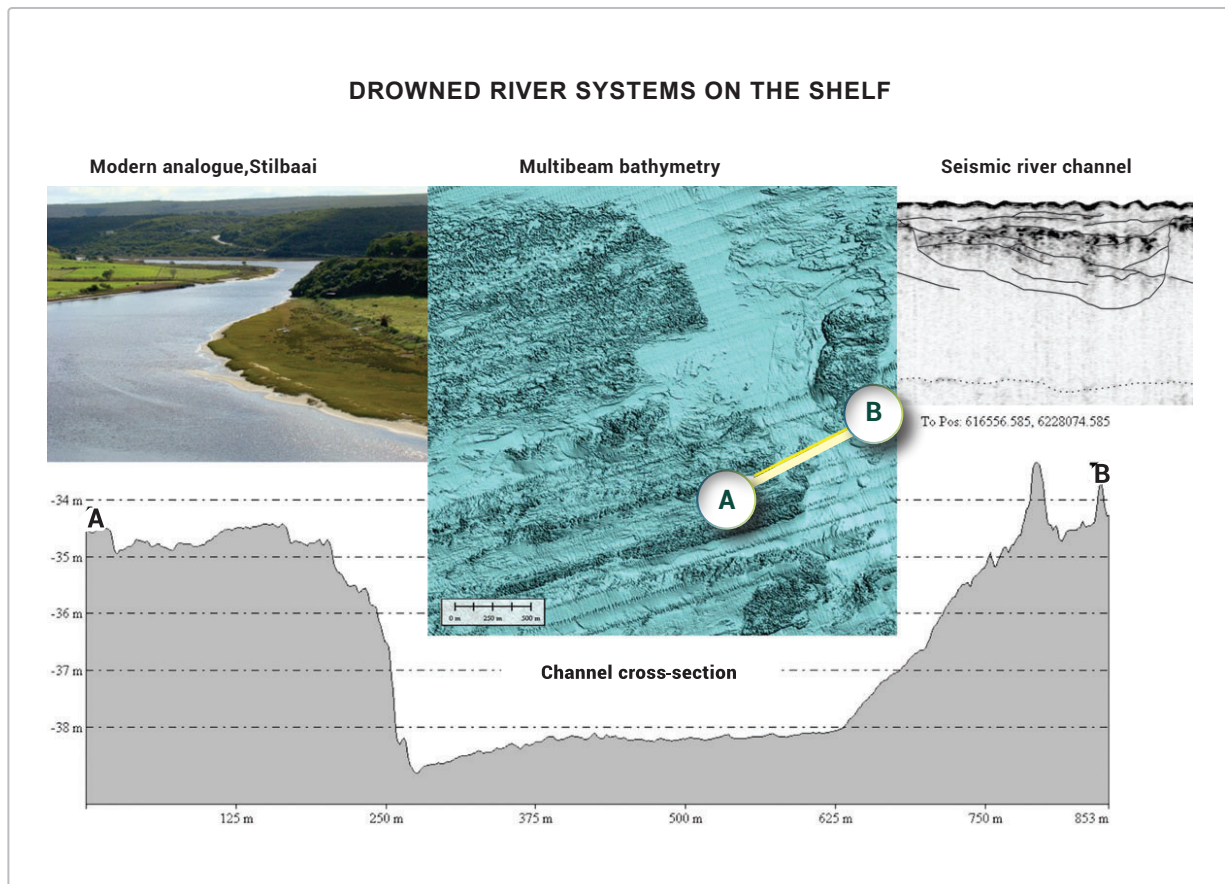
With these data, numerous features that are seen on land along the adjacent coastal plain have been identified and documented on the seafloor. Some examples include palaeoshoreline platforms and palaeoshorelines, possible alluvial plains, incised palaeochannels of rivers, a well-preserved back-barrier and estuarine environment, seafloor caves and coastal ridges.

The Council for Geoscience has also discovered a submerged, and occasionally terrestrial, environment that has a strikingly similar, yet different, character to that preserved above water today. The subtle difference in character is related to the gradient of the extremely low-relief continental shelf.



The survey vessel Geo Manzi and suite of acoustic equipment (e-f).





Submerged river on the continental shelf shown in 2D (multibeam bathymetry and a cross-section), as well as the subseafloor seismic slice. Goukou River (to left) at the southeastern coastal town of Stilbaai forms a comparable modern proxy.

## Carbon Capture and Storage

*(Report confidential; reference: Executive Manager: Scientific Services)*

The Council for Geoscience continued to be the main provider of geological information and services to the Centre for Carbon Capture and Storage (SACCCS) of the South African National Energy Development Institute (SANEDI). The Council for Geoscience has assessed the CO<sub>2</sub> storage potential of the entire country for SACCCS and continued to work on aspects of assessing the Zululand and Algoa basins. The assessments of the basins have been completed. The funds for the Zululand study originated from the Department of Energy and Climate Change of the United Kingdom Government via the UK High Commission in South Africa and the Algoa study was funded mostly through EuropeAid and SANEDI.

It was found in both projects that insufficient data

exist to complete full effective storage capacity assessments according to international criteria. The data available for the basin studies originated from earlier onshore and offshore oil and gas exploration that was carried out during the 1960s and 1970s. Means of procuring additional seismic surveying and drilling services to complete the basin assessments are being considered, especially for the Zululand project.

Conducting full basin assessments for the Zululand and Algoa basins will be directed at advancing current knowledge and understanding of CO<sub>2</sub> geological storage, in accordance with the Carbon Capture and Storage Roadmap of the Centre for Carbon Capture and Storage, towards possible test injection by 2017.

## Seismic Activity in Southern Africa

*(Reports 2012-0202; 2012-0203; 2013-0071; 2013-0072)*

A seismological station was installed in the Beaufort West area in response to the needs of Eskom to monitor seismic activity in the Western Cape Province. Funds have been made available by the National Research Foundation (NRF) to calibrate the local magnitude scale in South Africa. An article was published in the Journal of Seismology detailing the new scale.

The southern African subcontinent experienced one earthquake measuring ML 5.7 during 2012, which occurred in the Zambezia Province of Mozambique, approximately 67 km to the east of Lake Chilwa in Malawi, on 13 May 2012. No reports of damage or injuries were received.

A total of 37 earthquakes were recorded and located in Lesotho during 2012, ranging in size from ML 1.3 to 2.9.

Seismic activity in the Northern Cape Province was high during the period under review, with 187 earthquakes having been recorded, of which 113 occurred in the Augrabies area. The earthquakes appeared as a seismic swarm ranging in size from ML 0.3 to 4.1.

Ten earthquakes occurred in the Western Cape Province during the year. The largest earthquake measured 4.1 on the local magnitude scale and was located in the Leeu-Gamka area.

The Eastern Cape Province experienced three earthquakes, with the largest being a local magnitude 3.4 earthquake in the KwaDehamuzi area.

Seismicity in the Free State Province was dominated by earthquakes related to gold mining activity in the region, while 19 earthquakes were identified as being tectonic in nature.

Nine earthquakes were identified as having a tectonic origin in the Gauteng Province.

Twenty-four earthquakes were recorded in the North West Province.

The Limpopo Province has experienced diffuse tectonic seismicity and 14 earthquakes were recorded.

Earthquake activity in the Mpumalanga Province was

limited to 10 earthquakes, with the largest located in the Piet Retief area and measuring ML 5 on the local magnitude scale.

The KwaZulu-Natal Province experienced four earthquakes.

## Hazard Classification of Dolomitic Areas in the Centurion Central Business District and Surrounding Areas

*(No report; draft manuscript ready for publication)*

The greater part of land in the area to the south of Pretoria is underlain by dolomite of the Chuniespoort Group that is part of the Transvaal Supergroup. The Centurion area is known for its susceptibility to sinkhole formation and as commercial and residential developments in the Centurion CBD and surrounding areas are increasing, sinkhole occurrences are expected to rise. Sinkholes could lead to injury and damage to infrastructure which would have a detrimental economic effect on the area. The Council for Geoscience therefore needs to support the Tshwane Metropolitan Municipality in safely developing and managing the Centurion area by identifying zones with a high risk of sinkhole formation.

The main objectives of this study are to classify dolomite with regard to the risk (low to high hazard) and the occurrence of sinkholes, to compare an 'abused' land-use scenario with a better controlled and managed Centurion CBD and surrounding areas, and to make recommendations regarding the suitability of land usage, based on the hazard of sinkhole formation, as stipulated in the draft SANS 1936-1:2012 document.

Since there are no numerical limits to the Scenario of Supposition classification system that is currently used to classify dolomite land, draft guidelines for the allocation of each hazard class, based on experience, have been developed in this study.

The hazard map of the Centurion CBD area generally indicates a medium to high susceptibility to sinkhole formation, with pockets of low hazard areas. No sinkholes have occurred in the areas classified as having a low susceptibility to the formation of sinkholes, suggesting the delineation was done well. The vast majority (70 %) of the sinkholes in the Centurion CBD area occurred in areas classified as having a medium hazard for the formation of sinkholes.

In general, the majority of the Centurion CBD and surrounding areas would be suitable for most types of residential and commercial developments, with the commercial type being more suitable in the CBD area and the residential type developments towards the outskirts of Centurion.

### Fluid-Induced Seismicity in the Johannesburg Area

*(Report confidential; reference: Executive Manager: Scientific Services)*

Mining activity in the Witwatersrand region of South Africa has led to induced seismicity in the area, which has been observed since the first decade of the 20th century. ERPM Mine, the last active mine in the Central Rand goldfields, was closed down in November 2008. The shutting down of mines led to the closure of the pumping stations that had previously maintained the underground water levels in the mining areas. As a direct consequence, the water has been allowed to flood the mine voids and has also caused an increase in seismic activity.

A three-dimensional Universal Distinct Element Code was used to create models to simulate the effect of pore pressure on the mine voids and intersecting geological discontinuities. Displacements were triggered along the contacts of the geological discontinuities. Those observed in the shallow model at a depth around 600 m resulted in larger displacements compared with those observed in the deep model at 3 000 m. This was because of the lower clamping stresses that exist closer to the surface.

A probabilistic seismic hazard analysis is being performed for the Johannesburg area. Hazard maps were produced for peak ground and spectral accelerations at a return period of 475 years. Spectral acceleration values of greater than 0.2 g are anticipated and such values can lead to damage to the infrastructure in the city.

### Impact of Fault Structures on the Occurrence of Groundwater in Fractured Rock Aquifers

*(WRC-funded project in progress)*

A case study was established to study fault-controlled groundwater, including a groundwater research and monitoring site with a five-borehole network near Rawsonville, Western Cape Province. Based on the data derived from previous field work,

research in this phase is dedicated to the analysis of the field observations through borehole rock logging, groundwater observations and pumping tests. The intention is to establish a site-specific study of the groundwater conceptual model and associated hydraulic properties. Some of the pilot sites such as Alldays with the Taaibos fault in Limpopo, Ottosdal with the Kareekuil fault in North West, Oudtshoorn with the Congo fault, and Rawsonville with the Waterkloof fault have been taken into account for further research purposes.

Multiple approaches to the field observations were employed, including borehole drilling and rock logging, field geophysical surveys, field fracture measurements, identification and examination of groundwater behaviour and hydraulic tests. Associated results from these methods were analysed comparatively, from which a conceptual model was proposed. As more understanding is gained from the analytical results, it is realised that the groundwater in the fractured aquifer is actually not flowing through a geological continuum. A large variation of the aquifer responses to the pumping test shows that it is difficult to determine the hydraulic properties of the aquifer. More candidate sites will be selected for further research in an effort to solve this problem, with the intention of meeting the requirements of the project objectives and presenting more representative results.

### Hydrogeology of Groundwater in the Central Highveld

*(WRC-funded project in progress)*

The project entitled Hydrogeology of Groundwater Region 17: Central Highveld was commissioned by the Water Research Commission (WRC) in 2011. The region covers the majority of the Witwatersrand goldfield from KOSH through the Far West to the Western and Central basins and part of the Eastern Basin, where the gold-mining operation in three basins has stopped, resulting in an increasing threat of mine water-level rebounds.

This project mainly concentrates on two aspects in the description of the groundwater region by using existing data sourced from databases and previous reports. One aspect is the occurrence of groundwater controlled by natural factors and the other the impact of anthropogenic activities on the physical and chemical environments of the groundwater. Thus far, most of the data collection has been completed except for some geophysical

data that need to be captured. This study will lead to a number of products including a series of maps for the delineation of groundwater occurrences, a guideline for groundwater development studies and a guideline to indicate the need for further groundwater research in the region.

### Remediation Research for Contaminated Groundwater

*(WRC-funded project in progress)*

During the year, a memorandum of agreement was signed between the Council for Geoscience and the Water Research Commission for a three-year project entitled Groundwater Remediation Technologies Manual for South Africa – A Theoretical Treatise and Practical Guide.

One of the objectives of a remedial programme for contaminated groundwater is to attempt to restore the water quality through some technological intervention to an accepted level for use. The best result would be to restore the water to potable level for humans, usually the most stringent and expensive level to achieve by technological means. The rehabilitation of the contaminated area of an aquifer is highly dependent on its geological, geochemical, hydrological and microbiological properties and on the chemical, physical and microbiological properties of the contaminant. In many cases of groundwater contamination, restoration is so excessively expensive that cleanup will not be financially feasible.

An abundance of technologies is available in the literature for the remediation of polluted groundwater. Some of these methods are well tried, whereas many have been shown to work at laboratory and pilot-plant scale to various degrees of success.

Since there are already so many technologies for the remediation of contaminated groundwater and more still emerging but not yet fully proven or not yet widely known as applicable for specific remediation, groundwater practitioners, remedial engineers and decision-makers are faced with a bewildering choice for the selection of the appropriate technology for a particular contaminated site. Therefore, it is deemed necessary and desirable that reference documentation on technologies for the remediation of contaminated groundwater in different contexts and for different types of contaminants be drafted to facilitate decision making.

### Mineral Databases of the Council for Geoscience

#### The South African Mineral Deposits Database (SAMINDABA)

*(Report 2013-0069)*

The primary objective for SAMINDABA, the South African Mineral Deposits Database, is to capture, store and update mineral data on mines, mineral deposits and occurrences within the borders of South Africa. This database is designed to allow manipulation of data by means of intelligent queries and provides information in different formats, including draft reports, deposit profiles, graphs, resource estimations, mineral maps and DVDs. In addition, the database serves as a tool for metallogenic map making and research. The total mineral records contained in the database has now grown to 19 402 (2 738 confidential and 16 664 non-confidential records). More than 400 mineral enquiries were handled during the year from internal and external clients.

#### South African Coal Database

*(Report 2013-0060)*

The Council for Geoscience maintains a coal database in terms of current legislation. This facility enables a centralised point of collection for most of the data available on the geology of the coal deposits of South Africa.

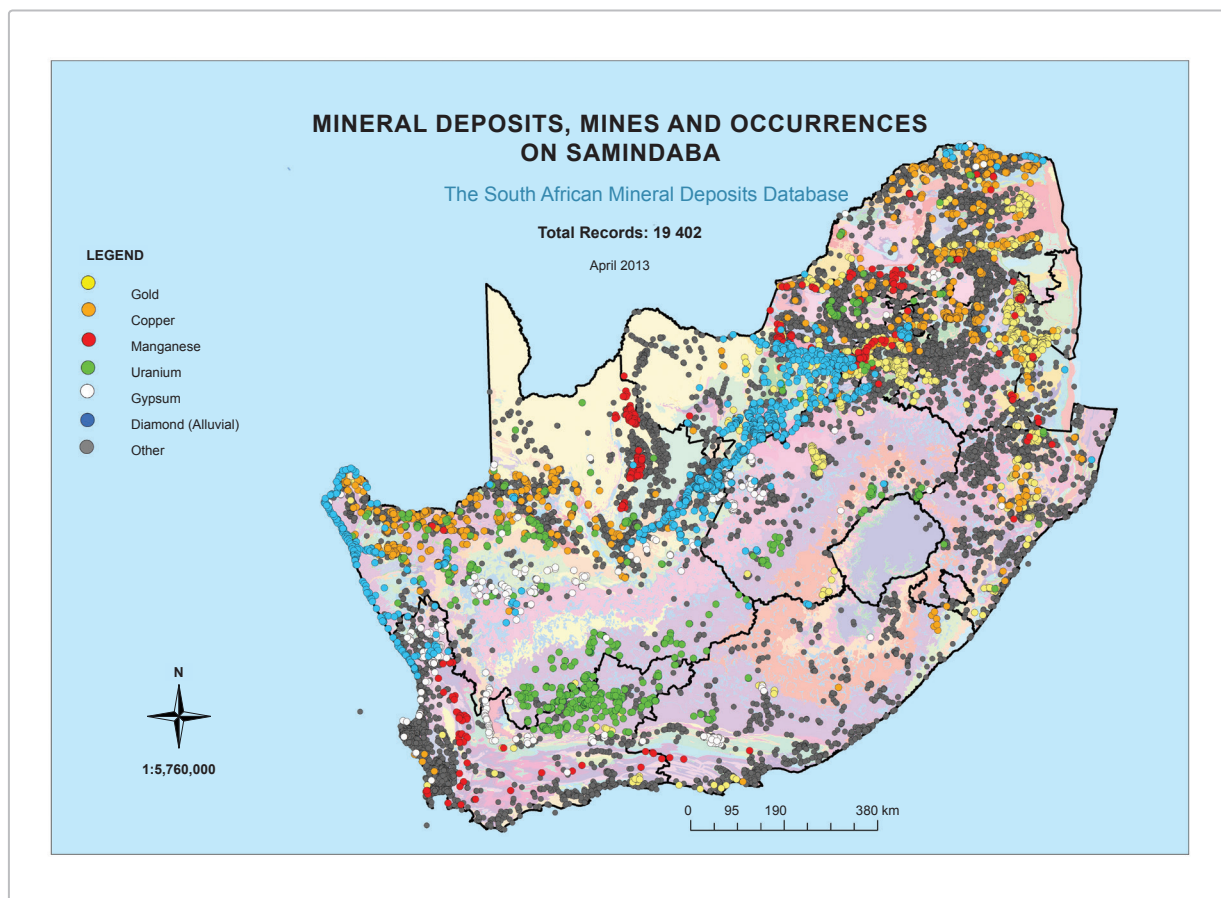
During the year, 454 logs were prepared, 681 header details were coded and captured, 1 946 lithologies for 86 boreholes were captured and 1 328 logs were electronically converted and will be loaded onto the database. The coal database now contains information on 113 970 boreholes, with 2 844 200 lithologies and 1 597 500 analyses.

#### COREDATA Database

*(Report 2013-0060)*

The Council for Geoscience has built up a large collection of borehole core logs of South African geological strata over a period of more than 25 years, and is continuing to increase this collection in order to ensure that the information is managed in an easily accessible manner. The COREDATA database now contains a total of some 86 500 entries.





Total mineral records contained in the SAMINDABA database.

## Engineering Database

(Report 2013-0046)

Access to geotechnical information assists in guiding development and provides the foundation for research into issues of a geotechnical nature. The geotechnical database (ENGEODE) of the Council for Geoscience incorporates all geotechnical data submitted over the last 50 years and consists of two sets of information, namely the dolomitic and non-dolomitic databases. Owing to the growing demand from developers, consultants and the general public for this information, access to the database is being upgraded.

Capturing of report boundaries, dolomite boreholes and gravity maps into GIS commenced during 2007/08 and is continuing for new reports being submitted. The following data were captured during the year: 250 dolomite stability report boundaries, positions of 2 341 dolomite percussion boreholes, 95 geotechnical report boundaries and positions of 713 test pits.

Sinkhole events were recorded in the municipal areas of Tshwane and Ekurhuleni and the provinces of Mpumalanga, the Northern Cape and North West, which brings the total number of sinkhole occurrences in the database to 3 074.

The total number of dolomite stability reports in the system is 5 060 and that of percussion borehole positions is 40 794. Of the 10 978 reports of the non-dolomitic database, a total of 543 reports and 10 758 test pit positions have been added to the GIS database.

Telephonic and e-mail enquiries are received on a regular basis from the general public, stakeholders and developers. The digital accessibility of the information in the database makes it possible to easily provide stakeholders with the necessary information. A small map showing the position of the site in relation to the presence of dolomite and any existing reports can easily be provided. For the period under review, a total of 642 of these small maps have been created for clients.

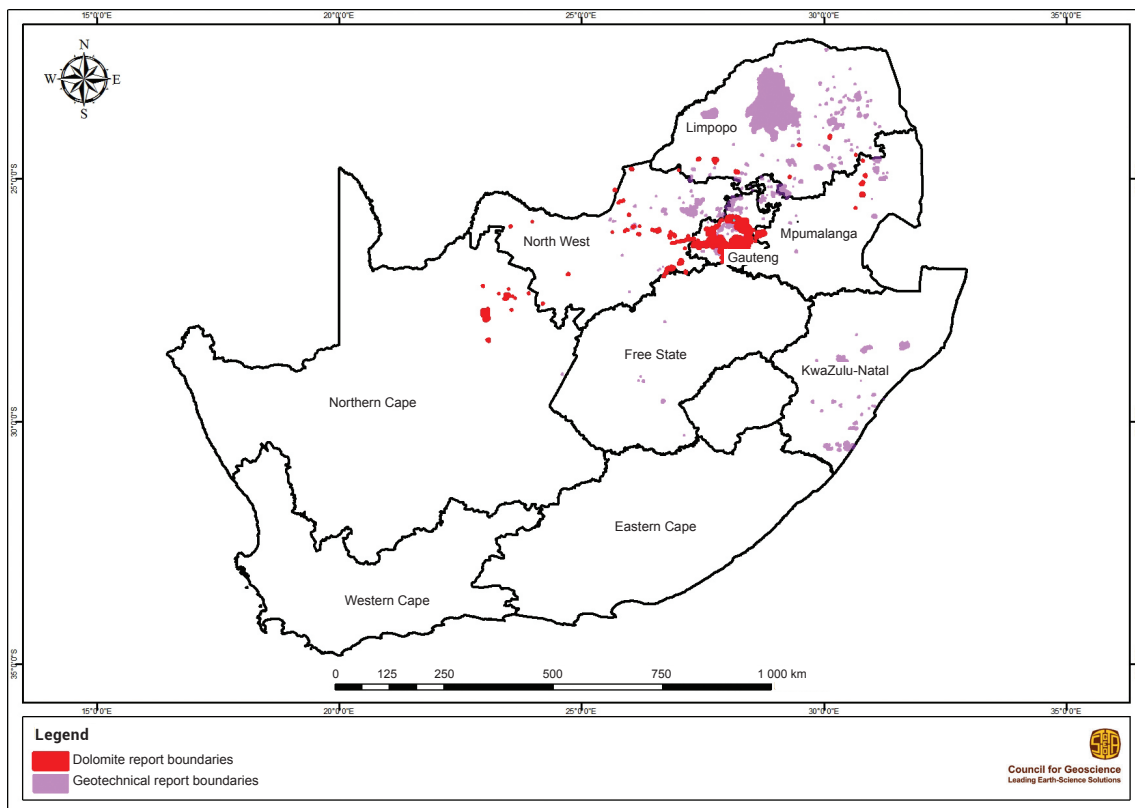


During the year, approximately 900 general database enquiries were received, requesting information and/or available data.

The importance of this database is growing as more consultants working in the industry require GIS data from the Council for Geoscience. The organisation has been involved in a number of large data

acquisition projects to date and this database has become a most useful tool for the industry.

The aim is to make the data in the ENGEODE database easily accessible through the planned Web-portal of the Council for Geoscience, once developed. This will allow a broader field of users to utilise the information stored in the database from the convenience of their offices or work sites.



The distribution of dolomite and geotechnical report boundaries as captured in the Council for Geoscience database.



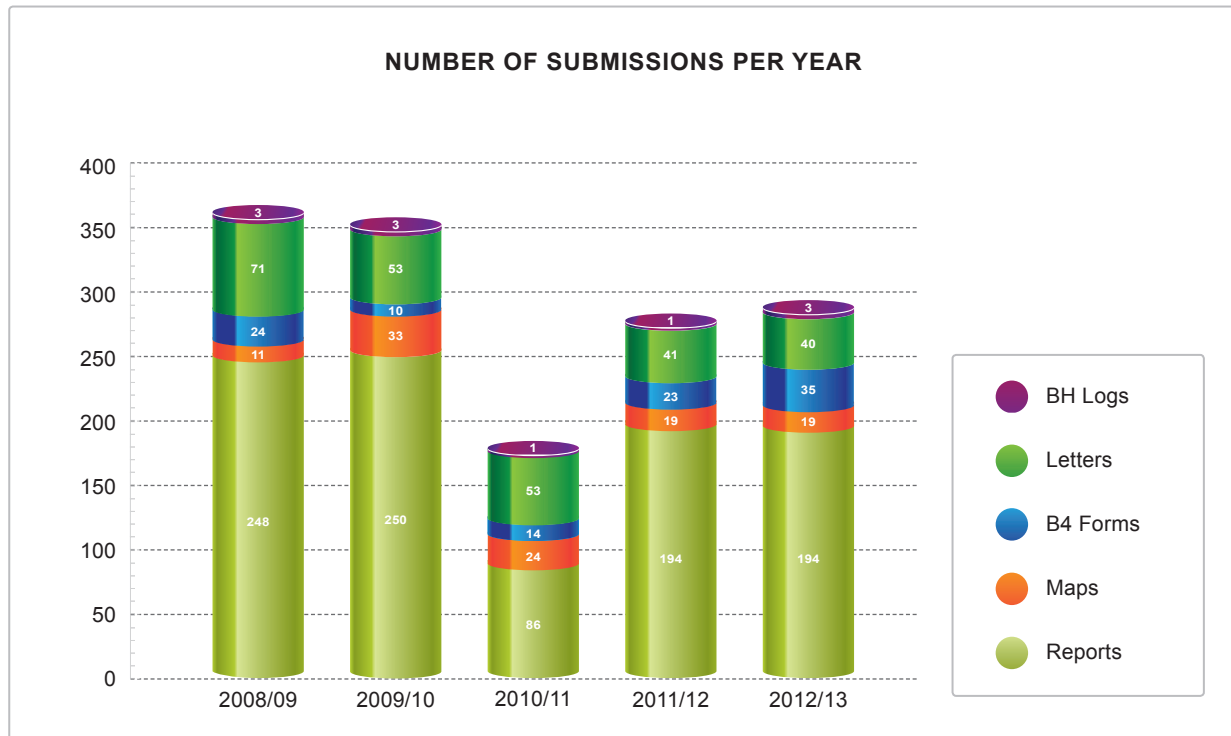
A sinkhole in Pretorius Street, Lyttelton (Tshwane Metropolitan Municipality) in November 2012.

### Engineering Advisory Role to Government and other State Institutions

*(No report; ongoing services to the public)*

An estimated 2.5 million people live on land underlain by dolomite and, to date, in excess of

R1.2 billion of property damage was caused by the instabilities of dolomite ground. Safe development is therefore crucial to the sustainability of areas underlain by dolomite. As part of the mandatory role of the Council for Geoscience, the organisation has been involved in sinkhole risk evaluation since the early 1970s to assist



Submission of dolomite stability reports to the Council for Geoscience.



local authorities to ensure safe development on dolomite.

Dolomite stability reports are submitted on a weekly basis to the Council for Geoscience for review and comment. These reports are reviewed, based on the SANS 1936 documents. The Council for Geoscience aligns itself with the SANS 1936-1:2012 document which indicates permissible land usage suitable for the eight inherent hazard classes.

A total of 291 submissions and subsequent letters of comment were issued during the year. Letters of comment were provided to the Tshwane and

Ekurhuleni Metropolitan Municipalities, Tlokwe, Merafong City, Westonaria, Delmas and Thaba Chweu (Sabie) Local Municipalities, West Rand District Municipality and the Mogale City, Midvaal, Moshaweng (Kuruman) and Randfontein Local Municipalities. Other government departments or bodies seeking advice during the year were the NHBRC, North West Province, Johannesburg Department of Housing, Far West Rand Dolomitic Association (FWRDA) and the Bombela Operating Company. Staff of the Council for Geoscience involved with evaluating the dolomite report reviews often visit some of the construction sites in order to increase their understanding of a site, i.e. the geology, the lay of the land and the size.



An engineering geologist is lowered down an auger hole during a site visit to a dolomitic area.



## AFRICA COLLABORATION

### International Geological Mapping and Capacity Building Project in Namibia

*(Report confidential; reference: Executive Manager – Regional Geoscience and Mapping)*

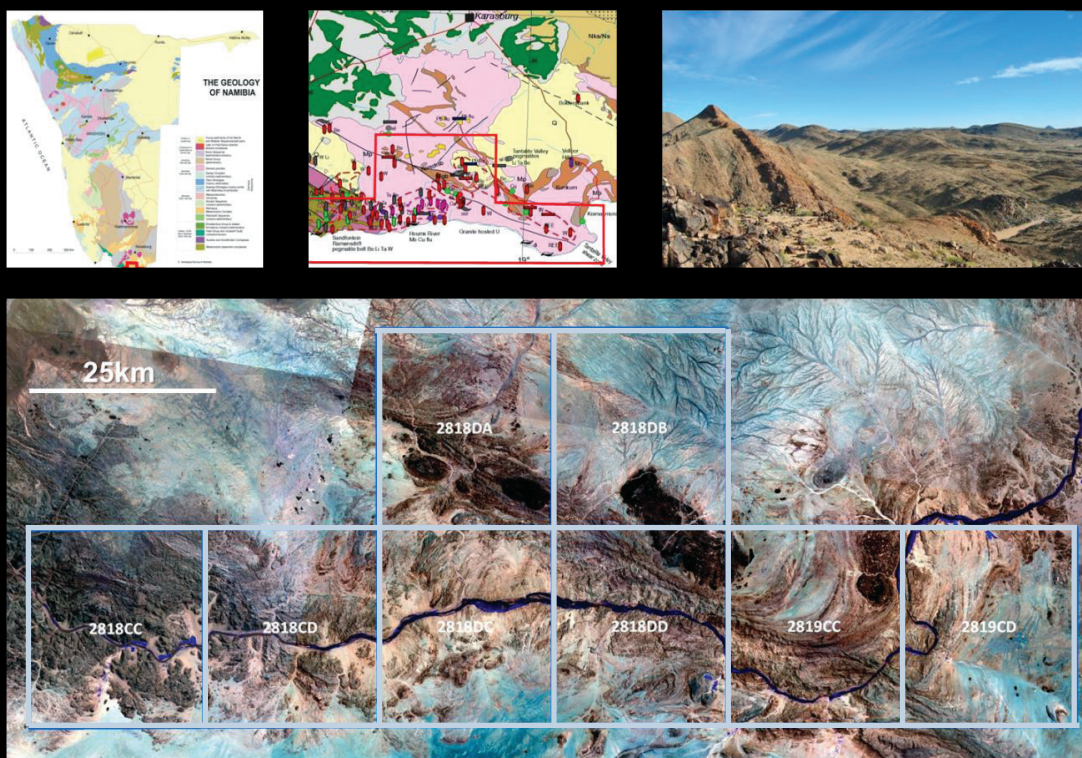
The Council for Geoscience has embarked on a new geological mapping, research and capacity building programme with the Regional Geology Division of the Geological Survey of Namibia (GSN). The project will run for 13 months until March 2014 and aims to produce five new 1:50 000-scale geological maps covering an area of ~3 000 km<sup>2</sup> along the Orange River.

The mapping is supported by modern remote sensing of high spatial resolution, multispectral satellite, airborne hyperspectral and geophysical data sets, as well as petrographic studies, geochronology and whole-rock and isotope geochemistry. The field work will be done in a cycle of four field seasons by three to

four geologists of the Council for Geoscience. As the area to be mapped is remote, field work will be done from several base and fly camps and four-wheel-drive vehicles and motorcycles will be used for transport.

In addition to the geological and geophysical surveying, the project has a capacity-building aspect with the aim of training the regional geologists of the Geological Survey of Namibia. The three-module training programme is intended to transfer mapping skills and will include a practical module with the Namibian geologists accompanying the South African geologists to do field work. The final training module comprises training in basic research methods, laboratory work, map compilation and cartography.

#### GEOLOGICAL MAPPING AND ALLIED RESEARCH IN SOUTHERN NAMIBIA



Location of new geological mapping project in southern Namibia.





Field camp in southern Namibia.



The Council for Geoscience assists with field training in Namibia.

## Seismotectonics and Seismic Hazards in Africa

*(Report 2013-0098)*

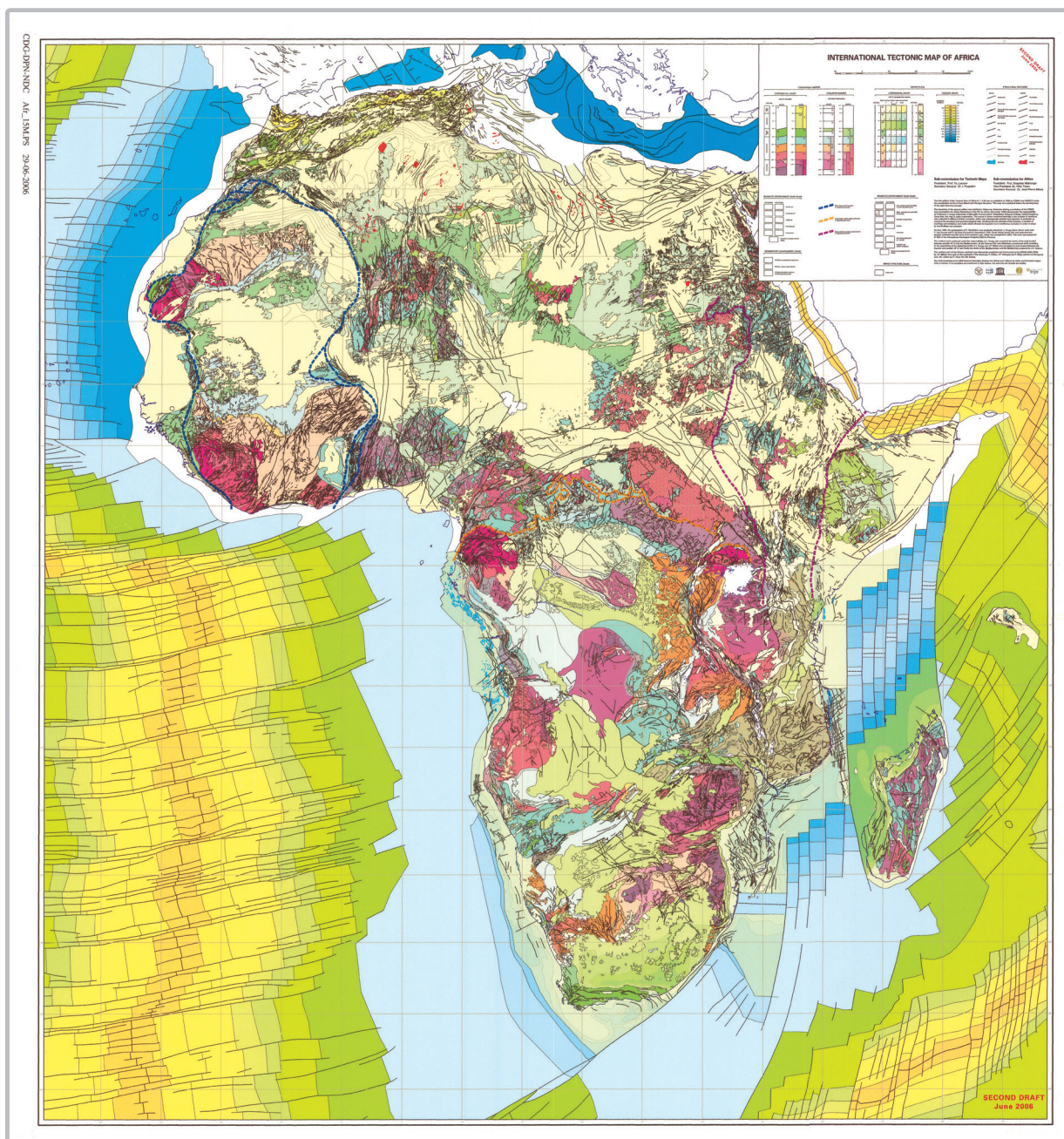
The International Tectonic Map of Africa at a scale of 1:5 000 000, prepared in the framework of the Commission for the Geological Map of the World projects, will serve as a basis for this mapping project. The preparation of the seismotectonic map will be arranged with respect to six different tectonic provinces:

- A. The East African Rift (from Malawi to Ethiopia) and Madagascar
- B. The southern African shield (including Mozambique, Namibia, Zimbabwe and Angola) and the Cape Fold Belt
- C. The northwest African Fold-and-Thrust Belt (Atlas Mountains)
- D. The northeast African tectonic zones of Libya and Egypt
- E. The Central Africa–Nigeria fault systems and the Cameroon volcanic line
- F. The Western–Central African ‘stable tectonic zones’ and related islands.

The primary objective of this project is the compilation of a database, represented by means of an ArcGIS subproject. A leaflet supplementing the map will include a detailed legend with explanations of the seismotectonic aspects of each province. A detailed study will be done of each significant historical or recent large earthquake and the resultant surface faulting and deformation. The database to be created for each seismotectonic province will serve as a basis for realistic seismic hazard assessments.

This project is primarily being conducted by a scientific and technical team of African seismologists, geologists and geophysicists in collaboration with the geological surveys and universities of each participating African country.





International 1:5 000 000-scale Tectonic Map of Africa.



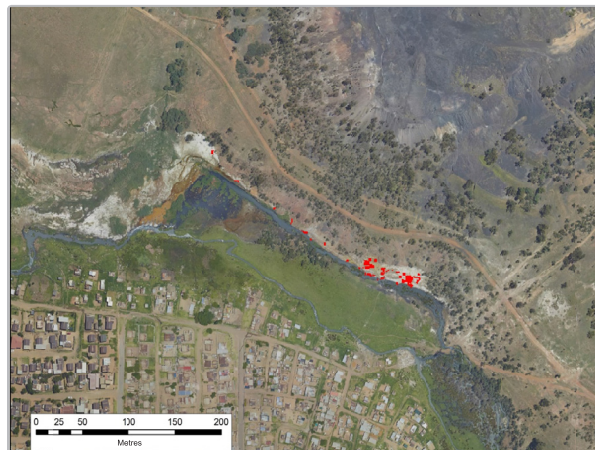
## INTERNATIONAL COLLABORATION

### Earth Observation for Monitoring and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation

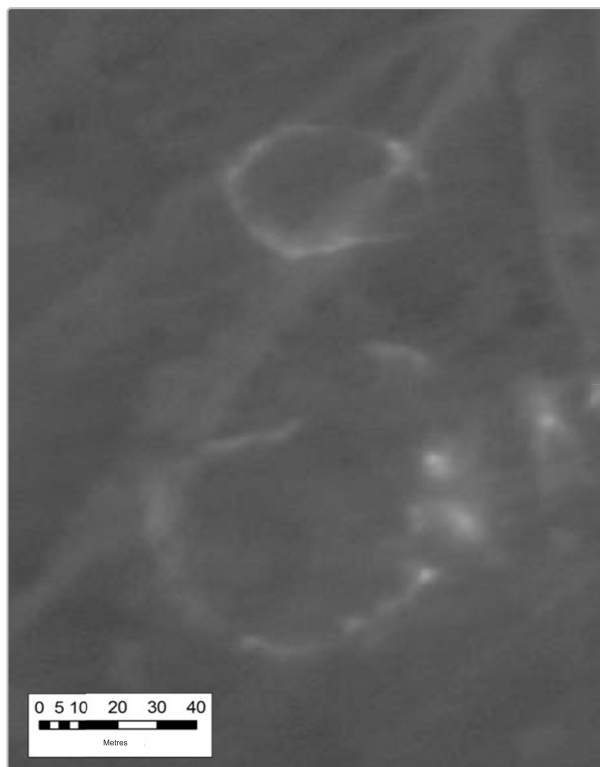
(Report 2013-0191)

The Council for Geoscience is involved in the EO-Miners FP7 project together with a number of international partners. The objective of the project is to investigate how earth observation data and tools can be used to assess and monitor environmental and social impacts in heavily mined areas, to determine whether these impacts can be identified in time to minimise or prevent their effects, and to improve the understanding of ecological and societal footprints in these areas.

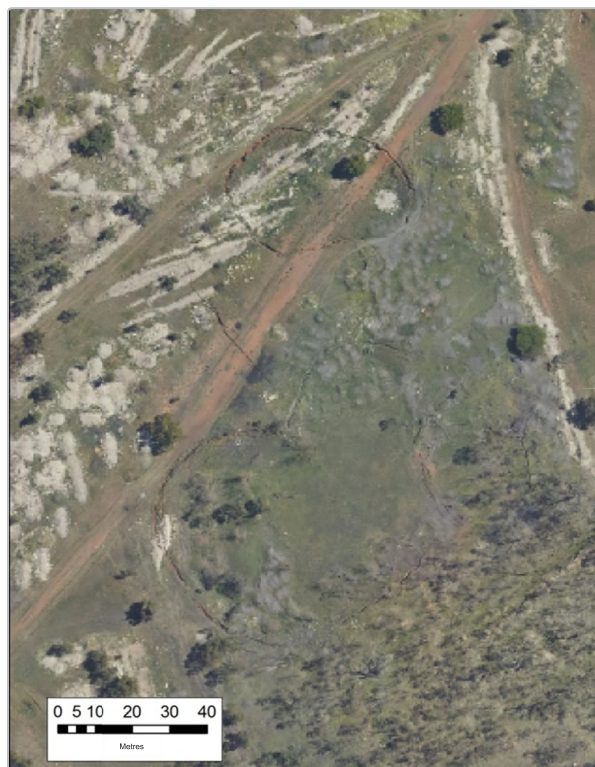
A workshop was hosted in Mpumalanga to present the findings of the EO-Miners FP7 project to date, and to obtain views on the usefulness of the tools the project has developed to assess and monitor the impacts of mining. The workshop also presented the opportunity to address the queries from the different stakeholders of the project.



Jarosite (in red), a precipitate associated with acid mine drainage, is detected by employing airborne hyperspectral survey data.



Thermal image showing heat, generated underground by the spontaneous combustion of coal, rising through cracks.



Surface cracking in an area of subsidence owing to historical underground coal mining.



Airborne thermal, hyperspectral and LiDAR surveys were flown during the financial year to allow the delineation of environmentally problematic areas at very high spatial resolution in the study area in Mpumalanga. High-resolution airborne remote-

sensing surveys were conducted to delineate problems related to mine subsidence, underground spontaneous coal combustion and the acid mine drainage related to the flooding of underground coal workings.



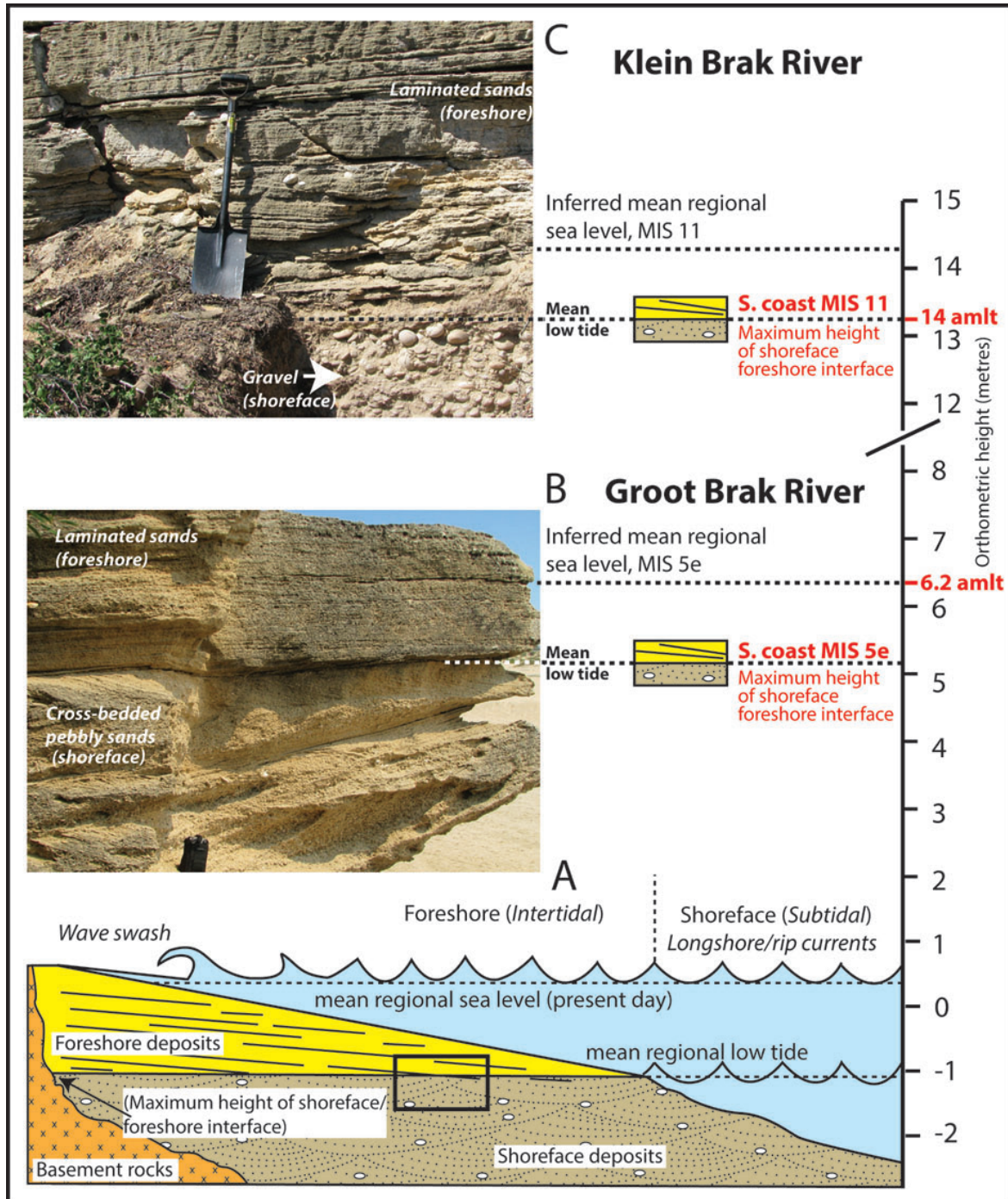
A high-resolution digital-elevation model showing subsidence owing to underground coal mining. The model was generated by using airborne LiDAR survey data.

### Climate Change and Future Sea Level Rise along the Coast of South Africa

(Roberts, D.L., Karkanis, P., Jacobs, Z., Marean, C.W. and Roberts, R.G., 2012. Melting ice sheets 400,000 yr ago raised sea level by 13 m: Past analogue for future trends. *Earth and Planetary Science Letters*, 357–358, pp. 226–237)

The Council for Geoscience, in collaboration with a scientist of the University of Arizona, is involved in an international initiative to study future sea level rise. Isotope Stage (MIS) 11 is considered the longest (~423 000 to 362 000 years ago) and warmest interglacial over the last 2.7 million years. This interglacial was the result of a specific arrangement of the orbit of the Earth around the Sun and is similar to the present orbital pattern, suggesting that MIS 11 provides an analogue for future natural climate change and sea levels. The Council for Geoscience has

determined a precise maximum elevation of +13 m in raised beaches along the southern coast of South Africa. The beach rocks were dated using a newly developed method called Thermally Transferred Optically Stimulated Luminescence. The +13 m sea level indicates the complete melting of the Greenland and West Antarctica ice sheets during MIS 11, i.e. they were totally absent, or, at the very least, greatly reduced. The data predict much higher sea levels in the future, even without the human influence on the global climate.



Ancient beach rocks indicating past high sea levels.



## Modelling Earthquake Hazard and Risk in Sub-Saharan Africa

*(No report; project in progress)*

The Global Earthquake Model (GEM) initiative has started an ambitious project to establish uniform open standards to calculate and communicate earthquake risk worldwide. To attain this goal, a global, state-of-the-art and dynamic earthquake risk model is being developed with the intent that the interfaces and tools of the model will be easy to comprehend and use by all the stakeholders of GEM. Sub-Saharan Africa is divided into four regions to simplify the compiling process of the earthquake catalogue, active-fault database and other global components of the earthquake hazard model inputs.

The long-term expected advantage of this project is a more structured approach to earthquake risk management and mitigation, which should help to reduce loss of life and infrastructure. In future, government policies for risk mitigation would therefore be founded on a wider awareness and on a sound, integrated knowledge base. Improved building construction practices and efficient risk allocation would lead to the overall reduction of losses. The aim is that major African cities will be equipped with accurate earthquake scenarios, based on the inventory of their critical buildings, to be used for planning and preparation purposes.

## Industrial Minerals Investors Handbook

*(No report; draft manuscript completed for publication)*

The project was started at the end of 2011 and is conducted by experts from the German Natural Resources Agency (DERA) at the German Federal Institute for Geosciences and Natural Resources (BGR), together with experts from the Council for Geoscience. Separate studies on a variety of natural resources will be compiled in a manual on new occurrences and deposits, with investment and supply options for German investors and purchasers in South Africa.

The first field trip took place in May 2012, when data were collected on zircon, rutile and ilmenite. During the second trip in September 2012, the team visited potential deposits of rare-earth elements and antimony in various regions of the central and northeastern parts of South Africa.

The project is proceeding well and a draft report is being compiled on the rare-earth elements, antimony and heavy-mineral deposits that were visited. The manual on the new deposits of natural resources and supply options will successively be prepared for each specific natural resource.

The studies will also point out new potential for German investors and natural resource purchasers. The opportunity for German companies created by the demand of the South African natural resources industry for German technologies and services will also be analysed.



South African and German scientists engaged in soil sampling during a field trip to the Schiel Complex in northern Limpopo.

## South Africa–Japan Strategic Minerals Programme

*(Draft prospecting report; confidential)*

The South Africa–Japan Strategic Minerals Collaborative Programme is a long-term project between the Council for Geoscience and the Japanese Geological Survey, represented by the National Institute of Advanced Industrial Science and Technology (AIST), and was initiated in 2007. To date, several geological environments in the Northern Cape, Western Cape, Limpopo and Gauteng provinces have been prospected for rare-earth minerals, with promising results for some areas.

The project aims to prospect for and evaluate the economic potential of critical metal resources in South Africa. Critical metals such as rare-earth metals, lithium and indium have important applications in

'green' industries and provide a significant opportunity for South Africa to become a major producer, processor and consumer of rare-earth metals through the manufacturing of components for renewable energy products. Locating such metal deposits will contribute to the growth of the economy of the country, in particular the 'green' economy. Growth of the economy, especially the 'green' economy, is in agreement with the identified economic plans of Government, the Industrial Policy Action Plan (IPAP), the New Growth Path and National Development Plan (NDP), and the Mineral Beneficiation Strategy.

It is important to determine the strategic and critical minerals and metals need of the South African manufacturing industry with a view to ameliorating demand and supply. The importance of this strategy is justified in view of the United States of America and much of Europe already being alarmingly dependent on imports for many of their most critical industrial raw materials. For instance, it is estimated that 98 % of manganese, 97 % of cobalt, 93 % of aluminium and 91 % of chromium used in America come from foreign ores, while more than 50 % of tin, nickel, zinc and tungsten ores are also imported.

During the past financial year, drilling work was conducted in one of the promising areas for strategic minerals in the North West Province of South Africa and additional drilling work is being planned for the next financial year. If the results are encouraging and positive, and with the support of the Minister of Mineral Resources, these projects will have to be cordoned off. They will be handed over to the state mining company of South Africa to partner with a Japanese mining company in taking the project forward to the actual mining of the deposits.



## PUBLICATIONS

### Publications released during the year

- Bulletin 142: Cretaceous to Recent evolution of the Durban Bluff and adjacent continental shelf by H.C. Cawthra
- Bulletin 143: A preliminary understanding of deep groundwater flow in the Table Mountain Group (TMG) aquifer system by K.F. Netili
- Bulletin 144: Landslide classification, characterisation and susceptibility modelling in KwaZulu-Natal by R.G. Singh
- Bulletin 145: Acquisition, processing and enhancement of multi-channel radiometric data collected with ultralight aircraft-mounted detectors by H. Coetzee
- Bulletin 146: Stratigraphy and sedimentology of the Karoo Supergroup in the Gemsbok Sub-basin (Botswana and Namibia) by V. Nxumalo
- Explanation: Metallogenic Map Sheet 2628 East Rand (1:250 000). The metallogeny of the East Rand area by G. Henry and W.R. Oosterhuis
- Explanation: Metallogenic Map Sheet 2918 Pofadder (1:250 000). The metallogeny of the Pofadder area by A.L.D. Agenbacht and W.R. Oosterhuis
- Explanation: Metallogenic Map Sheet 3118 Calvinia (1:250 000). The metallogeny of the Calvinia area by D.I. Cole
- Explanation: Sheet 2528CC: The geology of the Centurion area (Scale: 1:50 000) by S.A.B. Laubscher, M. van der Neut, D. van Tonder and D. Gqiba
- Explanation: Sheet 2429BC: Geology of the Lebokwagomo area (Scale: 1:50 000) by R.W. Belcher
- Explanation: Sheet 2627BC: Geology of the Westonaria area (Scale 1:50 000) by M. van der Neut, G.J. Davids, H. Coetzee and M. Cronwright
- Explanation: Sheet 2528CD: Geology of the Rietvlei Dam area (Scale 1:50 000) by B.A. Ingram, H. Minnaar and M. Britz
- Explanation: Explanation of the engineering and geotechnical conditions for the Silverton 2528CB 1:50 000-scale map sheet by S. Ngubelanga
- Seismological Series 43: Catalogue of earthquakes in southern Africa and surrounding oceans for 2007
- Annual Report of the Council for Geoscience 2012
- Annual Technical Report of the Council for Geoscience 2012

### Popular publications

- GEOclips Volume 30. September 2012, 8 pp.
- GEOclips Centennial Volume 31. November 2012, 24 pp.
- GEOclips Volume 32. February 2013, 12 pp.

### Maps released during the year

#### 1:50 000 Geological Maps

- 2526BB Mabeskraal
- 2526BD Mabaalstad
- 3129BC Lusikisiki
- 3129CB Tombo
- 3129CC & CD Coffee Bay
- 3129DA Port St Johns
- 3129BD & 3130AC Mkambati

#### 1:250 000 Metallogenic Maps

- 2918 Pofadder
- 3324 Port Elizabeth

#### 1:250 000 Gravity Maps

- 3218 Clanwilliam
- 3226 King William's Town
- 3228 Kei Mouth
- 3318 Cape Town
- 3319 Worcester
- 3322 Oudtshoorn
- 3324 Port Elizabeth
- 3326 Grahamstown
- 3420 Riversdale

### Publications in Academic Journals and Books

- Abiye, T.A. and Leshomo, J.T., 2013. Groundwater flow and radioactivity in Namaqualand, South Africa. *Environmental Earth Sciences Journal*, DOI: 10.1007/s12665-012-2126-9
- Adomako-Ansah, K., Mizuta, T., Hammond, N.Q., Ogata, D.I.T. and Chiba, H., 2013. Gold mineralization in banded iron formation in the Amalia Greenstone Belt, South Africa: A

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- Engelbrecht, J. and Inggs, M.R., 2013. Differential interferometry techniques on L-band data employed for the monitoring of surface subsidence due to mining. *South African Journal of Geomatics*, 2(2), pp. 82–93
- Farahani, J.V., Zaré, M. and Cichowicz, A., 2012. Attenuation of high-frequency P and S waves in south and southeast Tehran using blast data, soil dynamics and earthquake engineering. *Soil Dynamics and Earthquake Engineering*, 40, pp. 99–108  
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- Chevallier, L. and Musekiwa, C., 2012. The role of dolerite and kimberlite intrusions on hydraulic fracturing and deep groundwater flow in the Western Karoo. LASI 5 Conference, The physical geology of subvolcanic systems: laccoliths, sills and dykes, Port Elizabeth, 29–30 October 2012
- Chirenje, E., Nyabeze, P. and Van Wyk, Y., 2012. The integrated use of magnetics and ERT in borehole siting at Lesedi School, Pretoria, South Africa. International Conference on Groundwater in Fractured Rocks, GwFR 2012, IAH Czech Chapter, Prague, Czech Republic, 21–24 May 2012
- Chirenje, E., Nyabeze, P., Coetzee, H. and Hobbs, P., 2013. An integrated geophysical approach to mapping acid mine drainage flow pathways at the Cradle of Humankind World Heritage Site (Sterkfontein Caves), West Rand, South Africa. 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Cichowicz, A., 2012. Estimation site amplification using seismological and geotechnical information. IMS 22nd Seminar, The Future of Monitoring the Seismic Rock Mass Response to Mining, Stellenbosch, 10–11 May 2012
- Cichowicz, A., 2012. Assessment of the dynamic response of the soil to strong ground motion at a wind farm. 15th World Conference on Earthquake Engineering (15WCEE), Lisbon, Portugal, 24–28 September 2012
- Coetzee, H., 2012. High spatial resolution remote sensing as a reconnaissance tool for the management of mining legacies. 32nd EARSel Annual Symposium, Advances in Geosciences, Mykonos Island, Greece, 21–24 May 2012
- Coetzee, H., 2012. Dealing with uncertainty in environmental management, with a focus on mine water management. AMDSA – Acid Mine Drainage South Africa Conference: The business case for managing mine water in South Africa, Sandton, 26–28 November 2012
- Coetzee, H., 2012. Life after Mining: I – Derelict and Ownerless Mines. Department of Environment Affairs' Special Mining and Environment MINMEC Meeting, Mount Grace Hotel, Magaliesburg, 3 October 2012
- Coetzee, H., 2012. Life after Mining: II – Current Mining Activities. Department of Environment Affairs' Special Mining and Environment MINMEC Meeting, Mount Grace Hotel, Magaliesburg, 3 October 2012
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## Conference Abstracts and Posters

- Adomako-Ansah, K., Mizuta, T., Hammond, N.Q., Ishiyama, D. and Matsubaya, O., 2012. Carbon-oxygen isotopic signature of carbonates from the Blue Dot gold deposit, Amalia Greenstone Belt: Implication for redox environment of gold deposition in the Amalia–Kraaipan greenstone belts of South Africa. 62nd Annual Resource Geology Conference, Tokyo, Japan, 27–29 June 2012
- Billay, A., 2012. Knowledge-driven gold prospectivity mapping Giyani greenstone belt, South Africa.

- and Environment MINMEC Meeting, Mount Grace Hotel, Magaliesburg, 3 October 2012
- Coetzee, H., 2012. Life after Mining. Mpumalanga Mining Lekgotla, Middelburg, 1–2 November 2012
- Coetzee, H., Ehrler, C., Van Tonder, D.M., Kerr, G., Fischer, C. and Hanise, B.E., 2012. Ground and airborne thermal imaging of abandoned coal mines in Mpumalanga Province, South Africa. EARSeL Annual Symposium, Advances in Geosciences, Mykonos Island, Greece, 21–24 May 2012
- Cole, J., Webb, S.J. and Finn, C.A., 2012. Reassessing geophysical models of the Bushveld Complex in 3D. Fall Meeting, American Geophysical Union, San Francisco, 3–7 December 2012
- Cole, P., 2012. Development of a 3D Potential Field Forward Modelling System in Python. Fall Meeting, American Geophysical Union, San Francisco, 3–7 December 2012
- Delpont, F., 2012. South African infrasound stations, IS47. CTBTO Infrasound Technology Workshop (ITW2012), Yuseong-gu, Dajeon, Republic of Korea, 8–12 October 2012
- Dhansay, T., 2012. Low-enthalpy geothermal energy potential of South Africa. 9th Annual Workshop, GEO-FUTURE, Inkaba yeAfrika and beyond, Potsdam, Germany, 26–30 November 2012
- Dhansay, T., 2012. Geothermal energy: A South African perspective. 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Diop, S. and Chirenje, E., 2012. Reliability of electrical resistivity tomography for geotechnical investigations in dolomitic land: A case study in Khutsong Township, Carletonville, South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Diop, S., Singh, R., Forbes, C. and Chiliza, G., 2012. An overview of landslide occurrence, inventorization and susceptibility mapping in South Africa. Understanding Risk Forum, Cape Town, South Africa, 2–6 July 2012
- Diop, S., Chirenje, E., Forbes, C. and Richardson, S., 2012. Reliability of electrical resistivity tomography (ERT) method for geotechnical investigation in dolomitic land: A case study in Khutsong Township, Carletonville, South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Eberle, D., Hutchins, D., Kahimise, I. and Negonga, M., 2013. Integrating high resolution airborne geophysical, hyperspectral and satellite data suites from the Karas region, Southern Namibia. 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Engelbrecht, J., 2012. Synthetic aperture radar data employed for the measurement of surface deformation due to mining. 2012 SASA Congress, Cape Town, 1–4 July 2012
- Foya, S., 2012. Geoscience initiatives to service the exploration and junior mining sector: Junior Mining and Exploration Conference, Newtown, Johannesburg, 6–8 November 2012
- Geissman, J.W., Gastaldo, R., Neveling, J., Prevec, R., Kamo, S., Spencer, K. and Langwenya, M., 2012. Paleomagnetism of an uppermost Permian section in the Lootsberg Pass area, central Karoo Basin: What remanence signal is recorded in the Permo-Triassic boundary sequences in the Karoo Basin? Fall Meeting, American Geophysical Union, San Francisco, 3–7 December 2012
- Grantham, G.H., 2012. Evolution of the Mozambique Belt, with specific emphasis on the southern part. 1st Geological Congress of Mozambique, Maputo, Mozambique, 21–23 November 2012
- Grantham, G.H., Macey, P.H., Roberts, M.P., Ingram, B.A., Armstrong, R.A., Eglington, B.M., Hokada, T., Shiraishi, K., Jackson, C. and Manhica, V., 2012. Neoproterozoic to Cambrian granites of northern Mozambique and Dronning Maud Land, Antarctica: timing genesis and tectonic implications. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Groenewald, C.A., Kisters, A.F.M., Macey, P.H. and Lambert, C.W., 2013. The architecture and kinematics of the deep crustal, transcurrent Pofadder Shear Zone with emphasis on the termination of a continental scale ductile shear zone, Namaqua Metamorphic Province, South Africa and Namibia. 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Hallbauer-Zadorozhnaya, V.Yu., Kozhevnikov, N.O. and Nyabeze, P., 2012. Super paramagnetic effect, provided by “red soil” in Southern Africa. Actual Problems of Actual Electromagnetic Soundings 2012 Conference, Kiev, Ukraine, 1–4 October 2012
- Hammond, N.Q., Adomako-Ansah, K., Mizuta, T., Ishiyama, D. and Ogata, T., 2012. Contrasting fluid conditions associated with gold mineralization in banded iron-formation at the Kalahari Goldridge and Amalia gold deposits, Kraaipan–Amalia greenstone belts, South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Hatton, C., 2012. Craton creation and destruction — a view from the Bushveld Complex. Workshop on Craton Formation and Destruction with special emphasis



- on BRICS cratons, University of Johannesburg, South Africa, 21–22 July 2012
- Hatton, C., 2012. Constant mantle oxygen fugacity and the evolution of the crust. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
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- Hicks, N., Viljoen, J.H.A., Cloete, M. and Davids, S., 2012. Carbon Capture and Storage in a South African context: Specific emphasis on the storage potential of the onshore Mesozoic Algoa Basin, South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Jia, H. and Lin, L., 2012. Preprocessing in ArcGIS for groundwater modeling with PMWIN. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Kenan, A., 2012. Karoo Uranium Province: A review on geology, genesis, resources and current activities. Technical Meeting on the Origin of Sandstone Uranium Deposits, A Global Perspective, International Atomic Energy Agency, Vienna, Austria, 29 May–1 June 2012
- Kenan, A., 2012. Uranium update: South Africa. 48th Joint OECD/NEA-IAEA Uranium Group Meeting, Kiev, Ukraine, 20–23 August 2012
- Lambert, C., Groenewald, C., Macey, P., Kisters, A. and Frei, D., 2013. Melt migration along transcurrent shear zones: Case study of the Pofadder Shear Zone and the Skimmelberg Pegmatite Stockwork. 23rd Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Lin, L., Netili, F. and Lin, H., 2012. Determination of Environmental Critical Level (ECL) for the management of Acid Mine Drainage (AMD) in the Central Rand Basin Goldfields, South Africa. 1st International Workshop on Acid Mine Drainage, Beijing, China, 2–4 December 2012
- Macey, P., Miller, J. and Bisnath, A., 2013. The geology of Bekodoka Inlier and the assembly of the East African Orogen in NW Madagascar. 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
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- Maré, L.P. and Zadoroshnaya, V.Yu., 2012. Geophysical properties of shale with respect to resource identification: a case study from the western Karoo Basin, South Africa. GeoShale2012 Conference, Warsaw, Poland, 14–16 May 2012
- Maré, L.P., De Kock, M.O., Cairncross, B. and Mouri, H., 2012. Magnetic evidence of variation in magma-sediment interaction across the main Karoo Basin, South Africa. LASI 5 Conference, The physical geology of subvolcanic systems: laccoliths, sills and dykes, Port Elizabeth, 29–30 October 2012
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- Mengistu, H., Yibas, B., Diop, S., Tamiru, A. and Demile, M., 2012. Investigation of phosphatic-vermiculite-heavy metal interaction and the implication to pollution of Solati River in Limpopo Province, South Africa. International Mine Water Association Annual Conference 2012, Bunbury, Western Australia, 28 September–4 October 2012
- Midzi, V., 2012. Status of seismotectonic and seismic hazard studies in South Africa. General Assembly, European Geosciences Union, Vienna, Austria, 22–27 April 2012
- Mthembi, P., Roberts, D.L. and Harris, C., 2012. Multi-proxy study of an impact crater lake deposit in southern South Africa: Implications for regional and global Neogene climate and ecosystems. 19th Biennial SASQUA Congress, Gobabeb Training and Research Centre, Namibia, 13–16 September 2012
- Mthembi, P., Roberts, D., Harris, C. and Smith, R., 2012. Paleoclimate and ecosystems of the Pleistocene in SA as archived in the Kalkkop crater lake deposit. 19th Biennial SASQUA Congress, Gobabeb Training and Research Centre, Namibia, 13–16 September 2012
- Mukosi, N.C., 2012. Importance of geoconservation in the Limpopo Province, South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Mukosi, N.C., 2013. Geoscience information in Africa: A YES Network Perspective. 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013

- Musekiwa, C., 2012. Groundwater vulnerability. 1st SA GEO (2012) Symposium, National Earth Observations and Space Secretariat (NEOSS), Cape Town, 11–13 September 2012
- Netshitungulwana, R. and Yibas, B., 2012. Stream sediment geochemistry of the Olifants catchment, South Africa: Implication for acid mine drainage. International Mine Water Association (IMWA) Annual Conference, Australia, 29 September–4 October 2012
- Neumann, F.H., Botha, G.A. and Scott, L., 2012. 18 000 years of grassland evolution in the summer rainfall region of South Africa — evidence from Mahwaqa mountain, KwaZulu-Natal. 19th Biennial SASQUA Congress, Gobabeb Training and Research Centre, Namibia, 13–16 September 2012
- Neumann, F.H., Botha, G.A. and Scott, L., 2012. Late Pleistocene and Holocene evolution of the southern African grassland biome. Annual Meeting of the Working Group of Vegetation History, Reinhold-Tüxen Society 2012, Bonn, Germany, 28 September–1 October 2012
- Ngcofe, L., 2012. A study on automated segmentation for object-based image analysis for geological mapping in the Northern Cape Province, South Africa. 4th Geographic Object-Based Image Analysis Conference, Rio de Janeiro, Brazil, 7–9 May 2012
- Nyabeze, P.K. and Gwavava, O., 2013. Results of geophysical investigations that were carried out at hot springs located in the Limpopo Province of South Africa. 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Nyabeze, P.K., Yibas, B. and Sakala, E., 2012. Investigation of contaminant plumes emanating from residual mine deposits in the Limpopo Province of South Africa, results from geophysical surveys. GeoManitoba Conference, Winnipeg, Manitoba, 30 September–3 October 2012
- Nyabeze, P.K., Gwavava, O., Sakala, E. and Sekiba, M., 2012. Hydrogeological investigations of the Soutini hot spring in the Limpopo Province of South Africa using geophysical surveys. 39th IAH Congress, Niagara Falls, Canada, 16–21 September 2012
- Oosthuizen, T. and Heath, G., 2012. Assessment of sinkhole prone land and its role in land use determination, South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Raveloson, A., Nyblade, A., Mulibo, G., Mangongolo, A. and Tugume, F., 2012. Lithospheric structure of the southern African subcontinent from surface wave tomography. Fall Meeting, American Geophysical Union, San Francisco, 3–7 December 2012
- Richardson, S. and Heath, G., 2012. The dissolution of 2600 million year old karst, Transvaal Supergroup: South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012
- Roberts, D.L. and Bateman, M.D., 2013. A Pan-African dryland during glacial periods? 23rd Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Roberts, D.L., Niederman, S. and Musekiwa, C., 2012. The age of geomorphic paleo-environmental and anthropological significance of silcretes on the South African coastal plane. 19th Biennial SASQUA Congress, Gobabeb Training and Research Centre, Namibia, 13–16 September 2012
- Roberts, D.L., Niederman, S. and Musekiwa, C., 2013. Cenozoic marine and fluvial terraces along the South African coast: High resolution crustal strain gauges for the coastal regions. TopoAfrica Workshop, George, 23–25 January 2013
- Sakala, E., Tessema, A. and Nyabeze, P.K., 2012. Regional interpretation of aeromagnetic data for groundwater exploration in Capricorn district, Limpopo, South Africa. The Fourth IASTED African Conference on Water Resource Management (AfricaWRM 2012), Gaborone, Botswana, 3–5 September 2012
- Scheiber-Enslin, S.E., Ebbing, J., Eberle, D.G. and Webb, S.J., 2012. Geophysical 3D modelling of the Karoo Basin. ASSAF 3rd Annual South African Young Scientists' Conference, Pretoria, 16 October 2012
- Scheiber-Enslin, S.E., Ebbing, J., Eberle, D.G. and Webb, S.J., 2012. Geophysical 3D modelling of the Karoo Basin. University of the Witwatersrand Interfaculty Symposium, 19 October 2012
- Scheiber-Enslin, S.E., Ebbing, J., Eberle, D.G. and Webb, S.J., 2012. Geophysical 3D modelling of the Karoo Basin. LASI 5 Conference, The physical geology of subvolcanic systems: laccoliths, sills and dykes, Port Elizabeth, 29–30 October 2012
- Scheiber-Enslin, S.E., Ebbing, J., Eberle, D.G. and Webb, S.J., 2013. Geophysical 3D modelling of the Karoo Basin, South Africa — Preliminary results. Abstract, 24th Colloquium of African Geology, Addis Ababa, Ethiopia, 8–14 January 2013
- Shabalala, A.N., 2012. Assessment of locally available reactive materials for use in Permeable Reactive Barriers (PRBs) in remediating acid mine drainage. 1st International Workshop on Acid Mine Drainage, Beijing, China, 2–4 December 2012
- Shelembe, R.P., Mouri, H. and Kramers, J., 2012. The Pilanesberg Alkaline Complex and the Rustenburg Layered Suite: possible sources of contamination of

groundwater and health impact on North West Province communities, South Africa. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012

Strachan, L.K.C., Dennis, R., Eckart, M. and Mahlangu, V.F., 2012. Towards a pollution source and liability apportionment for the East Rand Basin, Witwatersrand Goldfields, South Africa. 1st International Workshop on Acid Mine Drainage, Beijing, China, 2–4 December 2012

Tessema, A. and Chirenje, E., 2012. The relationship between lineaments and borehole yield around Vryburg and Mafikeng towns, North West Province, South Africa. International Conference on Groundwater in Fractured Rocks, GwFR 2012, IAH Czech Chapter, Prague, Czech Republic, 21–24 May 2012

Tessema, A., Chirenje, E. and Mengistu, H., 2012. The relationship between lineament intersection frequency and borehole yield in the North West Province, South Africa: results from geophysical studies. 34th International Geological Congress, Brisbane, Australia, 5–10 August 2012

Tetteh, G.M. and Hammond, N.Q., 2012. Chlorite composition and temperature constraints on the Nsuta Manganese Deposit in the Birimian of Ghana. 2nd Biennial International Mining and Mineral Conference, University of Mines and Technology, Tarkwa, Ghana, 1–4 August 2012

Vincent, C.J., Arenstein, G., Tippmann, R., Van der Spuy, D., Viljoen, J.H.A., Roos, M., Cloete, M., Beck, B., Nell, L., Arts, R., Holloway, S. and Surridge, T., 2012. The proposed CO<sub>2</sub> Test Injection Project in South Africa. 11th International Conference on Greenhouse Control Technologies (GHGT-11), Kyoto, Japan, 18–22 November 2012

Yibas, B., 2012. Management of impacts of subsidence in coal mining regions. Sino-American Technology and Engineering Conference (SATEC), China, 15 April 2012

Yibas, B., Pulles, W., Lorentz, S., Maiyana, B. and Nengovhela, C., 2012. Oxidation process and hydrology of tailings dams: Implication for acid mine drainage from TSFs management — The Witwatersrand experience, South Africa. International Mine Water Association (IMWA) Annual Conference, Australia, 29 September–4 October 2012

Zadorozhnaya, V.Yu., 2013. Different type of TEM signals along only one profile: Benefit Study for Beginners, USA. SAGEEP2013, Symposium on the application of geophysics to engineering and environmental problems, Denver, USA, 17–21 March 2013

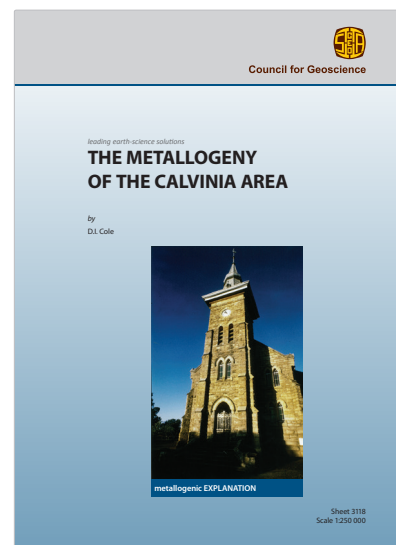
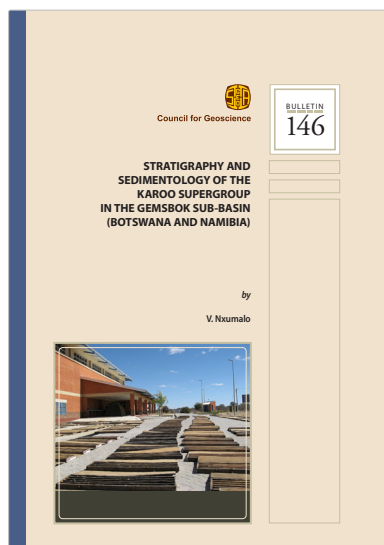
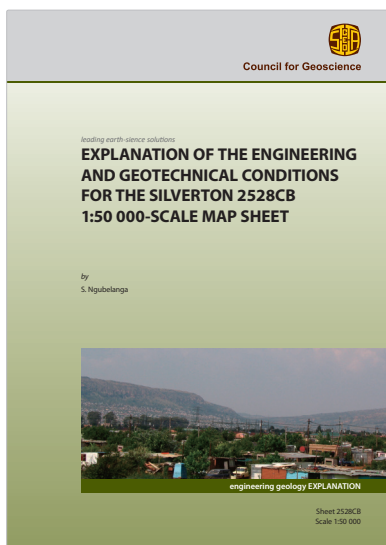
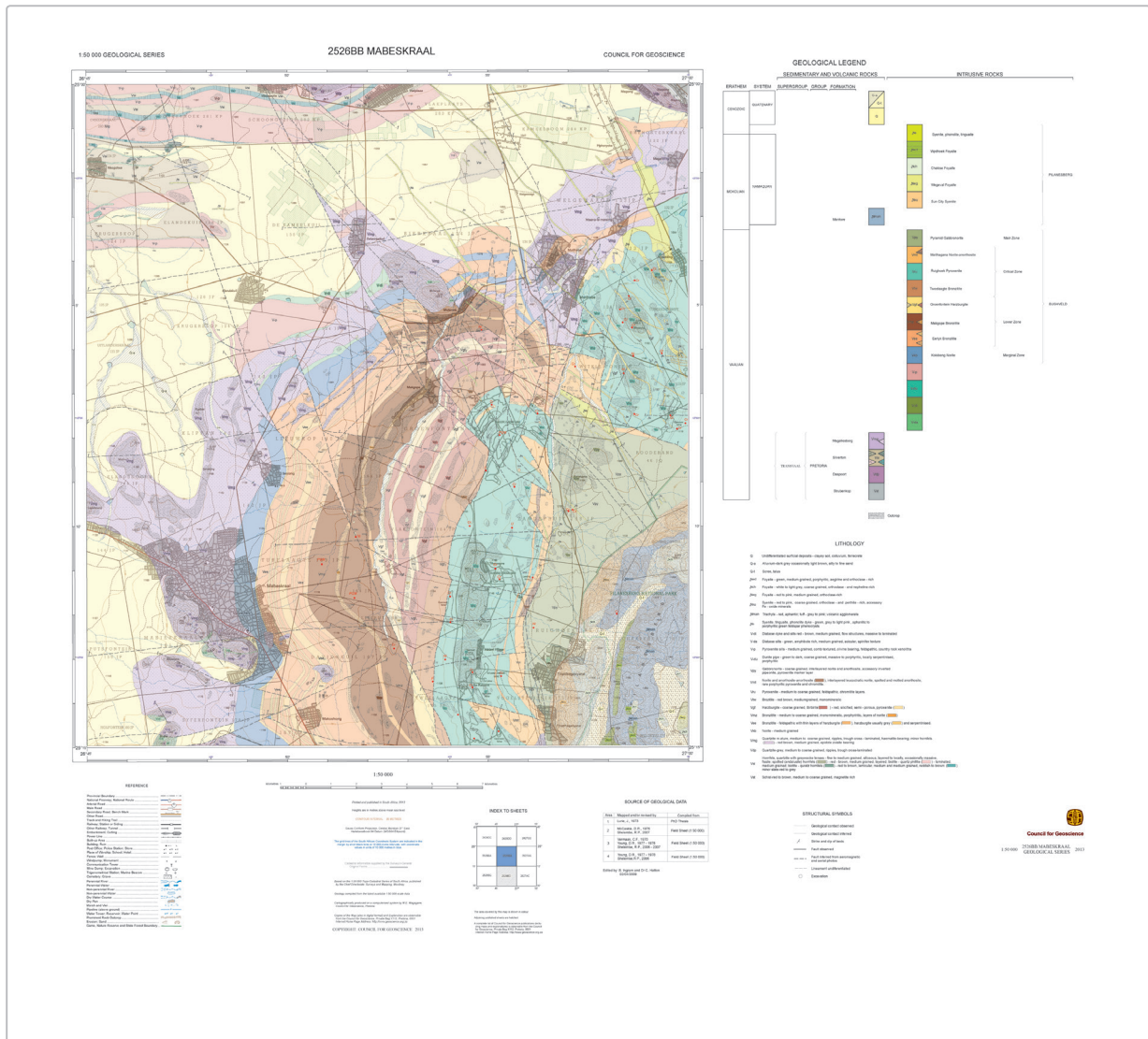
Zadorozhnaya, V.Yu., Kozhevnikov, N.O. and Nyabeze, P., 2012. Superparamagnetic effect, effect provided by “red soil” in Southern Africa. 21st EM Induction Workshop, Darwin, Australia, 25–31 July 2012

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## Popular publications

Krynauw, J., Foya, S., Naidoo, P. and Bisnath, A., 2012. Lack of updated geological information partly to blame for low levels of exploration in South Africa. Mining Weekly, 27 July 2012

Shabalala, A.N. and Combrinck, W.L., 2012. A correlation of water quality with farming activities, hydrochemical characteristics of the Bonsma Dam, KwaZulu-Natal. Water and Sanitation Africa, November/December 2012, 7(6), pp. 33–36, ISSN 1990-8857





## GOVERNANCE

### BOARD OF THE COUNCIL FOR GEOSCIENCE

The Board of the Council for Geoscience approves the mission, strategies, goals, operating policies and priorities of the organisation and monitors compliance with the policies and achievements with respect to the scientific, administrative and financial objectives.

The Board is appointed by the Minister in accordance with the provisions of Section 4 of the Geoscience Act (Act No. 100 of 1993). Other than the Chief Executive Officer, all the Board Members are non-executive members. The Board Members are continuously and actively involved in, and bring independent counsel and judgement to bear on all Board discussions and decisions. Board Members are fully conversant with their fiduciary duties as are outlined in Section 50 of the Public Finance Management Act (Act No. 1 of 1999, as amended) which, amongst others, requires them to declare their interests when a potential conflict of interest may arise. The Board meets on a quarterly basis, or as required during the course of a financial year.

#### Abridged Board Charter per PFMA and Protocol on Corporate Governance

A Board Charter was developed and established for the Board of the Council for Geoscience. The Charter defines the governance parameters within which the Board exists and sets out specific responsibilities to be discharged by the Board.

The Board is fully committed to applying the fundamental principles of good governance, transparency, integrity, accountability and responsibility in all dealings by, in respect and on behalf of the Council for Geoscience. It accordingly embraces the principles of good governance as set out in the Public Finance Management Act (Act No. 1 of 1999, as amended) and the Protocol on Corporate Governance in the Public Sector.

The Charter confirms the following with respect to the Board:

- fiduciary duties and responsibilities
- code of conduct
- appointment of committees
- governance and meeting procedures
- duty to declare conflict of interests
- responsibility for adoption of strategic plans
- monitoring of operational performance and management
- determination of policy and processes to ensure the integrity of the risk management and internal controls of the Council for Geoscience
- communications policy
- director selection, orientation and evaluation.

The Board Charter is reviewed, as and when necessary, to ensure that it remains relevant to the business objectives of the Council for Geoscience.

#### Composition of the Board

The composition of the Board during the first part of the 2012/13 financial year until 30 September 2012 was as follows:

**Prof. P E Ngoepe** (Chairperson)  
*University of Limpopo*  
Re-appointed on 1 October 2009

**Dr G Graham**  
(Acting Chief Executive Officer)  
Appointed on 1 November 2011

**Mr I Abader**  
*Department of Environmental Affairs*  
Appointed on 1 August 2011

**Prof. J M Barton Jr**  
*Geological Society of South Africa*  
Re-appointed on 1 October 2009

**Dr D G Clarke**

*Department of Rural Development and Land Reform*  
Re-appointed on 1 October 2009

**Mr K Hodges**

*Industrial Development Corporation*  
Re-appointed on 1 October 2009

**Ms S Mohale**

*Department of Mineral Resources*  
Appointed on 1 October 2011

**Ms K R Mthimunya**

*Bluewaves Consulting Services*  
Appointed on 1 October 2009

**Mr M P Nepfumbada**

*Department of Water Affairs*  
Appointed on 1 October 2009

**Mr M Smith**

*Xstrata Coal*  
Re-appointed on 1 October 2009

**Alternate Members**

**Mr W Kleynhans**

*Industrial Development Corporation*  
Alternate to Mr K Hodges  
Appointed on 1 October 2009  
Resigned on 9 May 2012

**Ms D Mochotlhi**

*Department of Water Affairs*  
Alternate to Mr M P Nepfumbada  
Appointed on 1 October 2009

**Mr D Mthembu**

*Department of Environmental Affairs*  
Alternate to Mr I Abader  
Appointed on 1 August 2011

**Mr M Riba**

*Department of Rural Development and Land Reform*  
Alternate to Dr D G Clarke  
Re-appointed on 1 October 2009

**Dr C B Smith**

*Chamber of Mines*  
Alternate to Prof. J M Barton Jr  
Appointed on 1 October 2009

The Board term ended on 30 September 2012.  
Six board members were re-appointed for the new term. The composition of the new Board for the latter period of the financial year starting on 1 October 2012 was as follows:

**Prof. P E Ngoepe** (Chairperson)

*University of Limpopo*  
Re-appointed on 1 October 2012

**Mr M W Kota**

(Chief Executive Officer)  
Appointed on 1 December 2012

**Dr G Graham**

(Acting Chief Executive Officer)  
Appointed from 1 November 2011 to  
30 November 2012

**Mr B A Gerrits**

*Department of Science and Technology*  
Appointed on 1 February 2013

**Prof. M M Hermanus**

*University of the Witwatersrand*  
Appointed on 1 October 2012

**Mr M Mabuza**

*Department of Mineral Resources*  
Appointed on 1 October 2012

**Dr H Mathe**

*Tranter Resources (Pty) Limited*  
Appointed on 1 October 2012

**Dr J E McGill**

*CSIR*  
Appointed on 1 October 2012

**Ms K R Mthimunya**

*Bluewaves Consulting Services*  
Re-appointed on 1 October 2012

**Ms L D Nteo**

*Department of Environmental Affairs*  
Appointed on 1 October 2012  
Resigned on 28 February 2013

**Mr M P Nepfumbada**

*Department of Water Affairs*  
Re-appointed on 1 October 2012

**Ms S Ngxongo**

*Department of Human Settlement*

Appointed on 1 October 2012

**Mr M Riba**

*Department of Land Affairs*

Re-appointed on 1 October 2012

**Alternate Members**

**Mr T M Gordon**

(Alternate to Ms L D Nteo)

*Department of Environmental Affairs*

Appointed on 1 October 2012

**Ms R Mdubeki**

(Alternate to Mr M Riba)

*Department of Rural Development*

Appointed on 1 October 2012

**Ms D Mochotlhi**

(Alternate to Mr M P Nepfumbada)

*Department of Water Affairs*

Re-appointed on 1 October 2012

**Ms S Mohale**

(Alternate to Mr M Mabuza)

*Department of Mineral Resources*

Re-appointed on 1 October 2012

**Mr D Sibiya**

(Alternate to Dr J E McGill)

*Tronox SA*

Appointed on 1 October 2012

**Appointment of Board Committee Members**

The term of office of the previous committee members ended on 30 September 2012, along with the termination of tenure of the Board members.

New members were incorporated in the Audit and Risk, Finance, Technical, and Personnel, Remuneration and Transformation Committees as from 1 October 2012.

**Audit and Risk Committee**

Mr S Xulu – Chairperson

Mr M Mabuza – DMR Representative

Ms K R Mthimunya – Member

Mr M P Nepfumbada – Member

Ms L D Nteo – Member

(Resigned on 28 February 2013)

Ms B Tema – Member

**Finance Committee**

Ms K R Mthimunya – Chairperson

Mr T M Gordon – Member

Mr M W Kota – Chief Executive Officer

Mr K Mkwana – DMR Representative

Ms D Mochotlhi – Member

**Technical Committee**

Dr J E McGill – Chairperson

Prof. M M Hermanus – Member

Mr M W Kota – Chief Executive Officer

Dr H Mathe – Member

Ms S Mohale – Member

Ms S Ngxongo – Member

**Personnel, Remuneration and Transformation Committee**

Ms L D Nteo – Chairperson

(Resigned on 28 February 2013)

Mr M W Kota – Chief Executive Officer

Ms R Mdubeki – Member

Ms S Mohale – Member

Mr D Sibiya – Member

## BOARD MEETINGS 1 APRIL 2012–31 MARCH 2013

MEMBERS	2012				2013	Meetings attended
	32.45	26 July	30 August	22 November	28 February	
Prof. P E Ngoepe	Present	Present	Present	Present	Present	5
Mr M W Kota (Appointed on 1 December 2012)	Not a member	Not a member	Not a member	Not a member	Present	1
Dr G Graham	Present	Present	Present	Present	Not a member	4
Mr I Abader	Apology	Apology	Present	Not a member	Not a member	1
Prof. J M Barton Jr	Present	Present	Present	Not a member	Not a member	3
Dr D G Clarke	Present	Present	Present	Not a member	Not a member	3
Mr B A Gerrits (Appointed on 1 February 2013)	Not a member	Not a member	Not a member	Not a member	Notification of appointment not yet delivered	0
Prof. M M Hermanus (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Present	Present	2
Mr K Hodges	Present	Present	Present	Not a member	Not a member	3
Mr M Mabuza (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Apology	Apology	0
Dr H Mathe (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Present	Present	2
Dr J E McGill (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Present	Present	2
Ms S Mohale (Alternate to Mr Mabuza as from 1 October 2012)	Present	Present	Apology	Present	Apology	3
Ms K R Mthimunye	Present	Apology	Present	Present	Present	4
Mr M P Neftumbada	Apology	Present	Present	Apology	Present	3



## BOARD MEETINGS 1 APRIL 2012–31 MARCH 2013

MEMBERS	2012				2013	Meetings attended
	24 May	26 July	30 August	22 November	28 February	
Ms S Ngxongo (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Apology	Apology	0
Ms L D Nteo (Appointed on 1 October 2012) (Resigned on 28 February 2013)	Not a member	Not a member	Not a member	Present	Present	2
Mr M Riba (Alternate to Dr Clarke) (Appointed as full member on 1 October 2012)	Main member present	Main member present	Main member present	Apology	Apology	0
Mr M Smith	Present	Apology	Present	Not a member	Not a member	2
Mr T M Gordon (Alternate to Ms Nteo) (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Main member present	Present	1
Mr W Kleynhans (Alternate to Mr Hodges)	Main member present	Main member present	Main member present	Not a member	Not a member	0
Ms R Mdubeki (Alternate to Mr Riba) (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Present	Present	2
Ms D Mochothi (Alternate to Mr Nephumbada)	Apology	Main member present	Main member present	Present	Main member present	1
Mr D Mithembu Alternate to Mr Abader	Apology	Apology	Main member present	Not a member	Not a member	0
Mr D Sibiya (Alternate to Dr McGill) (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	Present	Main member present	1
Dr C B Smith (Alternate to Prof. Barton)	Main member present	Main member present	Main member present	Not a member	Not a member	0

## Audit and Risk Committee

The Audit and Risk Committee of the Council for Geoscience evaluates the annual internal and external audit plans, the internal and external audit reports and the financial statements. The Audit and Risk Committee also assesses the effectiveness of the internal audit function and the risk mitigation procedures which are in place.

In addition, the Audit and Risk Committee, from time to time, assesses its mandate and charter in order to attend to emerging risks.

The composition of the Audit and Risk Committee as at 31 March 2013 was:

**Mr S Xulu (Chairperson)**  
**Mr M Mabuza**  
**Ms K R Mthimunye**  
**Mr M P Nepfumbada**  
**Ms L D Nteo (Resigned on 28 February 2013)**  
**Ms B Tema**

## AUDIT AND RISK COMMITTEE MEETINGS 1 APRIL 2012–31 MARCH 2013

Members	2012			2013	Meetings attended
	16 May	23 July	16 August	14 February	
Ms N G Jiyane	Present	Present	Apology	Not a member	2
Mr M Mabuza	Not a member	Not a member	Not a member	Apology	0
Ms S J Mbongo	Apology	Apology	Absent	Not a member	0
Ms K R Mthimunye	Present	Present	Present	Present	4
Mr B Nemagovhani	Present	Apology	Present	Not a member	2
Mr M P Nepfumbada	Apology	Present	Present	Apology	2
Ms L D Nteo (Resigned on 28 February 2013)	Not a member	Not a member	Not a member	Present	1
Ms B Tema	Not a member	Not a member	Not a member	Present	1
Mr S Xulu	Not a member	Not a member	Not a member	Present	1

## Finance Committee

The Finance Committee of the Council for Geoscience addresses a range of corporate financial issues of the organisation such as the recommendation for the approval of the Budget, the recommendation for major capital expenditure, the writing off of bad debts and assets and any other financial matters referred to the Committee by the Board for recommendations.

The composition of the Finance Committee as at 31 March 2013 was:

**Ms K R Mthimunye (Chairperson)**  
**Mr T M Gordon**  
**Mr M W Kota**  
**Mr K Mkwana**  
**Ms D Mochotlhi**

## FINANCE COMMITTEE MEETINGS 1 APRIL 2012–31 MARCH 2013

Members	2012			Meetings attended
	16 May	23 July	16 August	
Dr D G Clarke*	Apology	Apology	Apology	0
Mr T M Gordon (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	0
Dr G Graham**	Apology	Present	Present	2
Mr M W Kota (Appointed on 1 December 2012)	Not a member	Not a member	Not a member	0
Mr K Mkwanazi (Appointed on 1 October 2012)	Not a member	Not a member	Not a member	0
Ms D Mochotlhi	Apology	Apology	Present	1
Ms K R Mthimunya	Present	Present	Present	3
Ms I Tshifura*	Present	Apology	Present	2

\* Member until 30 September 2012; \*\* Member until 30 November 2012

## Technical Committee

The Technical Committee of the Council for Geoscience attends to the annual scientific and technical programme of the organisation, evaluates the scientific and technical output, oversees the annual technical audit and recommends on such scientific and technical matters as are referred to it by the Board.

The composition of the Technical Committee as at 31 March 2013 was:

**Dr J E McGill (Chairperson)**  
**Prof. M M Hermanus**  
**Mr M W Kota**  
**Dr H Mathe**  
**Ms S Mohale**  
**Ms S Ngxongo**

## TECHNICAL COMMITTEE MEETINGS 1 APRIL 2012–31 MARCH 2013

Members	2012	2013	Meetings attended
	9 May	13 February	
Prof. J M Barton Jr	Present	Not a member	1
Dr G Graham	Present	Not a member	1
Prof. M M Hermanus	Not a member	Present	1
Mr W Kleynhans	Present	Not a member	1
Mr M W Kota	Not a member	Present	1
Ms P Maruping	Apology	Not a member	0
Dr H Mathe	Not a member	Present	1
Dr J E McGill	Not a member	Present	1
Ms S Mohale	Present	Present	2
Ms S Ngxongo	Not a member	Apology	0
Mr M Smith	Apology	Not a member	0

## Personnel, Remuneration and Transformation Committee

The Personnel, Remuneration and Transformation Committee determines the human resources strategies and policies of the Council for Geoscience. The Committee approves the remuneration structure and salary changes in the organisation and evaluates and makes recommendations on the payment of production bonuses. The Committee also decides upon the remuneration of the Executive Management.

The composition of the Personnel, Remuneration and Transformation Committee as at 31 March 2013 was:

**Ms L D Nteo (Chairperson – Resigned on 28 February 2013)**  
**Mr M W Kota**  
**Ms R Mdubeki**  
**Ms S Mohale**  
**Mr D Sibiya**

## PERSONNEL, REMUNERATION AND TRANSFORMATION COMMITTEE MEETINGS

### 1 APRIL 2012–31 MARCH 2013

Members	2012			2013	Meetings attended
	9 May	14 August	12 September	13 February	
Mr I Abader	Apology	Present	Apology	Not a member	1
Prof. J M Barton Jr	Present	Present	Present	Not a member	3
Dr G Graham	Present	Present	Present	Not a member	3
Mr M W Kota	Not a member	Not a member	Not a member	Present	1
Ms R Mdubeki	Not a member	Not a member	Not a member	Present	1
Ms S Mohale	Not a member	Not a member	Not a member	Present	1
Ms L D Nteo (Resigned on 28 February 2013)	Not a member	Not a member	Not a member	Present	1
Mr M Riba	Present	Apology	Apology	Not a member	1
Mr D Sibiya	Not a member	Not a member	Not a member	Present	1



## REPORT OF THE AUDIT AND RISK COMMITTEE

### Responsibilities

The Board of the Council for Geoscience has the overall responsibility to ensure that the organisation has and maintains effective, efficient and transparent systems of risk management and internal controls. The responsibility to ensure the adequacy and effectiveness of these systems is delegated to the Audit and Risk Committee. The Audit and Risk Committee is an advisory committee of the Board, with an oversight role that is independent and objective.

The Audit and Risk Committee has adopted formal terms of reference, which have been confirmed by the Board through its charter, and is satisfied that it has discharged its duties and responsibilities as set out in the charter. In performing its responsibilities, the Audit and Risk Committee has reviewed the following:

- The functioning of the internal control systems
- The functioning of the internal audit programme
- The risk areas of the operations of the entity to be covered in the scope of the internal and external audits
- The reliability and accuracy of the financial information provided to Management and other users
- The accounting or auditing concerns identified as a result of the internal or external audits
- The compliance by the entity with legal and regulatory provisions.

### Governance

The Board appointed the following members to the Audit and Risk Committee:

Mr S Xulu – Chairperson  
 Mr M Mabuza  
 Ms K R Mthimunye  
 Mr M P Nepfumbada

Ms L D Nteo (Resigned on 28 February 2013)  
 Ms B Tema

The Audit and Risk Committee met four times during the period under review.

### Internal Control Systems

The members of the Audit and Risk Committee are of the opinion that the system of internal controls is adequately designed to cover organisational, financial and operational risks. The control system provides reasonable, but not absolute, assurance that the assets of the organisation are safeguarded, transactions are authorised and recorded properly, and that material errors and irregularities are either prevented or detected timeously. These controls are monitored throughout the organisation by Management and employees with the necessary segregation of authority and duties.

The Operational Risk Management Committee, which reports to the Audit and Risk Committee on a quarterly basis, continuously evaluates and monitors the effectiveness of all internal control systems in respect of all areas of risk that have been identified.

Having reviewed the effectiveness of the system of internal controls of the organisation, and based on detailed reports provided by the internal auditors, the members of the Audit and Risk Committee are not aware of any significant weakness or deficiency in the system of internal controls of the organisation.

### Internal Auditing

Internal auditing was outsourced during the period under review and provides a supportive role to Management and the Audit and Risk Committee to achieve their objectives by identifying and evaluating significant exposures to risk and contributing to the empowerment of risk management and control systems.

The internal audit function is responsible for independently and objectively evaluating the system of internal controls of the organisation at a detailed level and to bring any significant business risks and exposures to the attention of Management and the Audit and Risk Committee through the provision of comprehensive internal audit reports.

## Financial Statements

The Audit and Risk Committee has reviewed and discussed the financial statements of the Council for Geoscience for the year ended 31 March 2013 with the Auditor-General and the Accounting Officer. The Audit and Risk Committee has also reviewed the management letter of the Auditor-General and the responses of Management thereto. The members of the Audit and Risk Committee are of the opinion that the financial statements comply, in all material respects, with the requirements of the Public Finance Management Act (Act No. 1 of 1999, as amended) and the South African Statements of Generally Recognised Accounting Practices (GRAP). The Audit and Risk Committee agrees that the adoption of the going-concern premise is appropriate in preparing the annual financial statements.

The Audit and Risk Committee, by way of round-robin on 30 July 2013, recommended the adoption of the annual financial statements by the Board of the Council for Geoscience.

Approved by:



**Mr S Xulu**

Chairperson: Audit and Risk Committee

31 July 2013  
Pretoria

## EXECUTIVE REPORT

### Mandate of the Council for Geoscience

The Council for Geoscience is mandated to gather, compile, interpret and disseminate geoscience knowledge for South Africa, as provided for by the Geoscience Act (Act No. 100 of 1993). This Act was updated by the Geoscience Amendment Act (Act No. 16 of 2010), which was signed into law by the national President in December 2010. The Amendment Act took effect on 1 July 2012. The Geoscience Act (1993) was amended to update the information contained in the Act and to include a more comprehensive description of the services rendered by the Council for Geoscience, to expand the mandate of the organisation and to reflect the interaction with the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002).

The mandate of the organisation in terms of the Geoscience Act (Act No. 100 of 1993) includes the following:

- a) The systematic reconnaissance and documentation of the geology of the surface of the earth and continental crust, including all offshore areas within the territorial boundaries of South Africa.
- b) The compilation of all geoscience data and information, particularly the geological, geophysical, geochemical and engineering-geological data in the form of maps and other documents, which are placed in the public domain.
- c) Basic geoscience research into the nature and origin of rocks, ores, minerals, geological formations, the history and evolution of life and the formation of the earth with a view to understanding the geological processes of the past and present and to compile and publish such research findings nationally and internationally to contribute to the understanding of the earth, its evolution and its resources.
- d) The collection and curation of all geoscience data and knowledge on South Africa in the National Geoscience Repository. This repository houses a large and growing collection of geoscience information on all the countries of the African continent. This information also includes data received from mining companies, universities and research institutions worldwide. Public access to all geoscience information is subject to existing legislation, arranged through the mandate of the Council for Geoscience.
- e) The rendering of geoscience knowledge services and advice to the State to enable informed and scientifically based decisions on the use of the surface and the resources of the earth, within the territory of South Africa.
- f) The management of a number of national geoscience facilities on behalf of the country; these include the National Seismograph Network, an Infrasound Observatory, the National Borehole Core Repository, the National Geoscience Museum, the National Geoscience Library and the National Geoscience Analytical Facility.
- g) As part of its seismological monitoring function, the Council for Geoscience contributes to the verification of global compliance to the ban on underground, underwater and upper atmospheric nuclear explosions in terms of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), by making data available from seismic recording stations located on South African territory.
- h) The provision of geoscience data and products to external clients, both nationally and internationally. These services are to be rendered on a full cost-recovery basis.

In addition, the Geoscience Amendment Act (Act No. 16 of 2010) mandates the Council for Geoscience to:

- (a) Be the custodians of geotechnical information;
- (b) Be a national advisory authority in respect of geohazards related to infrastructure and development;
- (c) Undertake reconnaissance operations,

prospecting research and other related activities in the minerals sector and to provide for matters connected therewith.

## Legislative and Corporate Governance Requirements

The Council for Geoscience was established in terms of the Geoscience Act (Act No. 100 of 1993). This Act also established the mandate and national responsibilities of the organisation. The Council for Geoscience was listed as a schedule 3A Public Entity in terms of the Public Finance Management Act (Act No. 1 of 1999), as amended by the Public Finance Management Amendment Act (Act No. 29 of 1999). The Geoscience Amendment Act (Act No. 16 of 2010) was approved during 2010 and signed into power in December 2010.

The Geoscience Amendment Act (Act No. 16 of 2010) came into operation on 1 July 2012 subject to the exclusion of the following sections because the necessary funding could not be made available:

- **Section 4(c):** to serve as the national custodian of geotechnical information, prospecting information and all other geoscientific information relating to the earth, the marine environment and geomagnetic space, all of which shall be lodged with the Council for Geoscience.
- **Section 4(eA):** to review and evaluate all geotechnical reports in respect of geohazards that may affect infrastructure and development, at prescribed tariffs.
- **Section 4(f):** develop and maintain the National Geoscientific Library, the National Geoscientific Information Centre, the National Borehole Core Depository, the National Geophysical and Geochemical Test Sites, the National Geoscience Museum, the National Seismological Network and the National Geoscience Analytical Facility.
- **Section 5(b):** by the addition after subsection (2) of the following subsection: “(3) All geotechnical reports pertaining to infrastructure and development shall be submitted to the Council in the prescribed manner”.
- **Section 8:** the appointment of a geotechnical appeal committee.

## Financial Overview

The Council for Geoscience survived the impact of the global economic crisis as it has, for the second year in a row, made a commercial surplus after experiencing a loss of R22m in 2009/10. The organisation made a net surplus of R18.4m for the year ended 31 March 2013. This is a result of commercial activities that earned revenue to the amount of R86.5m, with direct project costs contained at R56m.

Government grant transfers amounted to R223m of which R144.6m was baseline funding and R78.4m was ring-fenced funding for the Derelict and Ownerless Mines project, the Water Ingress (Acid Mine Drainage) project and for the Building and Laboratory Infrastructure project. R56m was spent on direct statutory projects costs. This was a vast improvement from the R21m of the previous year.

The administration costs in the year have also, as expected, increased due to the increased number of employees necessary for the ring-fenced funding projects, at a cost of R11.5m, extraordinary building maintenance costs to the amount of R3.5m and the resumption and expansion of activities that were suspended or cut back during the economic recession. These include costs such as conference fees, travelling, training, new bursaries and additional software license costs.

The Council for Geoscience invests its commercial surpluses in replacing infrastructure and equipment. In the year under review, an amount of R20.5m was spent in this regard — R3.6m was spent on computer equipment, R2.3m on aircraft components, R0.9m on office furniture, R9.6m on equipment and R4m on vehicles. There is a need to invest more in this area given the importance of advanced scientific equipment and technologies in research.

A Supply Chain Management Section has been established under the CFO division. This section provides an appropriate procurement and provisioning system which is fair, equitable, transparent, competitive and cost effective and is established in accordance with Section 54 of PFMA Act 1 of 1999 (as amended by Act 29 of 1999).

The Council for Geoscience obtained an unqualified audit opinion from the Auditor-General for the year ended 31 March 2013.



## Appointment of new Chief Executive Officer

The Board of the Council for Geoscience, in consultation with the Minister of Mineral Resources, appointed a new Chief Executive Officer, Mr Mxolisi Kota, with effect from 1 December 2012.

## Centenary Celebrations

The Council for Geoscience reached a significant milestone on 1 August 2012, with the organisation officially a hundred years old. A two-day conference was hosted on 8 and 9 November 2012 to celebrate the century of geological excellence of the Council for Geoscience and its predecessor organisations. An open invitation had been extended and the event was well attended by some 2 000 guests. Representatives from Government, the international geoscience community, universities and the industry, as well as former staff members, well-wishers and friends joined in the celebrations. The proceedings were officially opened by the guest of honour, the Honourable Ms Susan Shabangu, Minister of Minerals and Energy. The event was the ideal showcase opportunity for the organisation, with business units mounting poster and other displays and, the main focus of the event, the lectures on the diverse functions and projects of the organisation that were held in the Auditorium.

## Overview of Business Operations

The financial situation of the Council for Geoscience was reversed during the 2012/2013 period and excellent progress was made in achieving the targets of and improving the performance for the reinstated Annual Technical Programme. The technical audit for the period indicated a performance of 92 %. Some key highlights of the Annual Technical Programme are briefly discussed on the following pages.

*Management of state contingent liabilities with respect to derelict and ownerless mines in South Africa.* The organisation assists in this programme by developing a comprehensive spatial database and rehabilitation plans and by site investigations. A priority was 244 derelict and ownerless asbestos mines and four coal mines in Mpumalanga requiring urgent rehabilitation. A list of other dangerous openings was compiled and a total of 23 dangerous openings were closed.

*Strategic mine water management project.* This project investigates the environmental impact of past and current mining activities. In cooperation with the

Hydrological Monitoring Committee, the Council for Geoscience is engaged in the prediction of harm to the environment by monitoring water levels and water quality and flow within mining basins. Characterisation of mine residues that act as ingress points is done to quantify and propose solutions to the problem. The water sources and impacted areas of the country have been classified into 13 geo-environmental provinces. A process of canalisation of natural water courses was initiated on the Witwatersrand and 14 major areas of ingress have been identified in the East Rand Basin. A situational analysis was done to prioritise areas for ingress reduction measures. In the Free State–Evander goldfields, a start was made to develop a groundwater model for mine water rebound after closure of the mines and cessation of pumping. The impact of acid mine drainage on the catchment areas in the Olifants and Komati/Crocodile rivers was assessed. A draft national strategy document on the management of mine residue deposits was submitted to the Department of Mineral Resources. In the East Rand Basin, the organisation is involved in a project to apportion pollution sources and liabilities and all the groundwork for a preliminary conceptual model was done.

*The Nuclear Geohazard Programme for Eskom.* Excellent progress was made with regard to the Probabilistic Seismic Hazard Analysis (PSHA) for the proposed nuclear site at Thyspunt, Eastern Cape Province. The draft PSHA final report was delivered to the Participatory Peer Review Panel (PPRP) on 11 February 2013. The final report is scheduled for submission to Eskom on 1 June 2013.

*The promotion of exploration and mining investment in the mineral and energy sectors.* The programme entails comprehensive data generation for mineral target selection. Studies were conducted in the Tugela area (KwaZulu-Natal) to assess the potential for gold, base metals, rare-earth elements and other commodities. Survey areas have also been selected in the Northern Cape Province and the investigation includes a desktop study of the selected areas in the Namaqualand region, airborne magnetic and radiometric surveying, soil sampling, sample preparation and an analysis of the collected soil samples. Various desktop studies have been undertaken in the goldfields of Barberton and the Sabie–Pilgrim’s Rest area. Field surveys are expected to start soon and a comprehensive report is expected during the next financial year.

The Council for Geoscience has also conducted statutory projects to stimulate exploration investment

in South Africa, including predictive mineral and gold potential mapping in the Giyani greenstone belt and the preparation of a guidebook for investors for several strategic minerals.

*Mine health and safety research project.* This project aims to address the recommendations of the Presidential Mine Health and Safety Audit of 2008 by increasing the density of the national seismograph network in mining areas and creating a database for data received from national and mining networks. Phase 1 of the project was concluded in March 2013. Twenty-five seismological stations were installed and the data from these stations are being streamed in real time to the Council for Geoscience offices in Pretoria. A new proposal has already been submitted for the second phase.

*Shale gas and hydraulic fracturing.* The Council for Geoscience is a member of the Working Group in support of the Ministerial Task Team investigating shale gas production and hydraulic fracturing in South Africa. A report by the Working Group was submitted to Cabinet during the reporting period.

*ISO standardisation.* The process of developing and implementing ISO standards had to be postponed; however, the intention is to resume the accreditation programme during 2013/2014.

*Upgrading of the buildings and the laboratory infrastructure.* The Council for Geoscience has received an MTEF allocation of R10 million to be utilised for much-needed repairs, maintenance and upgrading of the D-Block building.

*Skills development.* The training of young geoscientists in practical mapping has continued, with the introductory module for the 2012 intake of the Field Mapping School held in October 2012. A total of six trainees were accommodated.

*Marine geological mapping.* The Marine Geoscience Unit has developed two projects aiming to address some of the major issues offshore of the South African coast. The surveys entail research within and adjacent to Table Bay, as well as the economic development of the near-shore coastal areas (engineering, harbour and wind farms).

In terms of international collaboration, the Council for Geoscience reports the following for the period under review:

*Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO).* The Council for Geoscience operates and

maintains the South African primary seismic and infrasound stations, part of the International Monitoring System (IMS), and an auxiliary seismic station at the South African Antarctic base. The organisation assists with the other station at Sutherland.

*South Africa–Europe Cooperation on Carbon Capture and Storage (SAfECCS) and the Zululand Basin assessment.* Studies continued to assess the capacity of the Zululand and Algoa basins for effective CO<sub>2</sub> storage, crucial to establishing a Roadmap for Carbon Capture and Storage for South Africa. However, for both basins there were insufficient data to complete an effective CO<sub>2</sub> storage capacity assessment and further field work is needed. It is envisaged that geological investigations will be extended to assess the capacity of offshore basins.

*EO-MINERS.* This is a European Union project investigating the use of earth observation techniques for the management of the social and environmental impacts of mining. The Council for Geoscience is one of thirteen partners focusing on three study sites in South Africa (Mpumalanga), Kyrgyzstan and the Czech Republic.

*National Research Foundation (NRF) research projects.* The Council for Geoscience was involved in a number of international research projects funded by the National Research Foundation, including geophysical data integration technologies for earth system modelling and resource management; evaluation of the contamination of feedlots by applied geophysics; development of an analytical correlation of the electrical and hydraulic properties of aquifers, and correlating specific rock units and tectonic events between central Mozambique and western Dronning Maud Land (Antarctica).

*Rwanda geological mapping and mineral resource assessments.* Geological and geochemical sampling and ground geophysical surveys were carried out in Rwanda. Field work was done and multiple geophysical survey techniques were applied to the investigation of various mineral deposits. Potential mineral target zones were identified, where follow-up soil sampling at a 50 m grid was performed.

*Southern Cape Quaternary palaeoenvironments.* This study focuses on the palaeoenvironments in which early humans lived during past lowered sea levels. The study, led by scientists at Arizona State University, is funded by the National Science Foundation (USA) and a grant has been awarded by the National Geographic Society for the offshore component of the project.

**Palaeoclimate: Inkaba yeAfrika.** The Council for Geoscience has embarked on major collaborative projects on global climate change and palaeo-environments. The Inkaba yeAfrika project aims to study the palaeoclimate in South Africa in collaboration with the Potsdam Research Centre in Germany.

**Namibia and Tanzania international mapping projects.** The Council for Geoscience is engaged in new geological mapping, research and capacity building in collaboration with the Geological Survey of Namibia. The product expected from this programme is five new 1:50 000-scale geological maps, covering an area of ~3 000 km<sup>2</sup> along the Orange River. The project also entails the training of selected GSN staff. The organisation is also a partner in a project in Tanzania, managed by BGS International and funded by the World Bank. The geological mapping component involves ten 100 000-scale sheets, revision mapping of seven 100 000-scale sheets and the compilation of two 1:500 000-scale sheets. The project commenced with initial remote sensing and is due for completion at the end of 2014.

## Highlights of Financial Results

	2013 R'000	2012 R'000
Government grant allocated	223 006	154 405
Conditional grant deferred	(37 765)	(9 667)
Government grant recognised	2 666	2 665
Contracting revenue	86 161	78 692
Publication revenue	306	673
Other operating income	15 565	14 673
Total revenue	289 939	241 441
Total expenses	271 572	214 889
Surplus for the year	18 367	26 552

## Financial and Operational Factors

### Post-balance-sheet events

No material facts or circumstances have arisen, between the date of the balance sheet and the production of this report, which will affect the financial position of the Council for Geoscience as is reflected in the financial statements.

## Losses Incurred or Recovered

### Material losses incurred

The Board of the Council for Geoscience has developed a Materiality and Significance Framework for the organisation. The Board has approved that any expenditure in excess of approximately one per cent of the annual operating expenditure budget, which is an amount of R890 000 for 2011/12, and/or the writing off and disposal of any asset in excess of approximately two per cent of the value of property and equipment as indicated in the annual financial statements of the year 2010/11, which is an amount of R7 300 000 individually or in aggregate, would be deemed material and significant. The Council for Geoscience has thus accepted the above-mentioned threshold figures of materiality for its financial framework.

## Strategic Objectives

During the period under review, the Council for Geoscience has managed to overcome the strained financial situation it endured for the past number of years. This successful reversal of its finances is due mainly to the effective short-term strategy the organisation had put in place to effect an immediate change to the situation. Therefore, the strict cost-saving measures in force since 2009 were eased towards the end of 2011 and in 2012. However, the organisation realises that a medium- to long-term strategy to maintain its sustainability and relevance, in order to enable delivery on Government objectives and outcomes, is urgently required. The Board of the organisation, in collaboration with the Chief Executive Officer, is engaged in developing this long-term strategy.

The strategic objectives of the Council for Geoscience are grouped according to the four perspectives of the Corporate Balanced Scorecard, which are discussed under the section on Performance Objectives.

### A. Market (Stakeholder/Customer)

#### Perspective Objectives

- To contribute towards the economic growth of South Africa and to serve stakeholders

### B. Economic and Financial Growth

#### Perspective Objectives

- To generate revenue
- To manage overhead efficiency

### C. Effective Systems Perspective Objectives

- To develop and implement effective policies and procedures
- To drive preferential procurement
- To implement a corporate planning and reporting procedure

### D. World-Class People Perspective Objectives

- To attract and retain a suitably skilled workforce
- To build a positive organisational culture
- To reflect and embrace the diversity of South Africa.

The basis for the selection of projects for the statutory programme of the organisation is mainly the obligation to assist in the addressing of the developmental needs of South Africa. These needs are indicated in the Medium Term Strategic Framework of Government for 2009 to 2014, the Stakeholders' declaration on Strategy for the Sustainable Growth and Meaningful Transformation of South Africa's Mining Industry of the Department of Mineral Resources, the Grand Challenges of the Department of Science and Technology and the National System of Innovation of the Government. The developmental needs considered in the strategy of the Council for Geoscience are grouped according to the following focus areas:

- Economic Growth
- Rural Development and Poverty Eradication
- Increasing Innovation
- Skills Development
- Expediting Transformation
- Development of Africa
- Addressing Stakeholder Needs and Regulatory Requirements.

The Council for Geoscience strives to attain its objectives by continuously improving and enhancing the quality of its geoscience research, products and services. The strategic research priorities of the organisation are based on the following seven scientific and business thrusts:

- **Geoscience mapping:** The systematic gathering and documenting of geoscience information. This represents the cornerstone of all the other business thrusts.

- **Minerals development:** To do research and systematically gather information on mineral occurrences in the country with the object to stimulate investment in the mining sector.
- **Environmental geoscience and chemical geohazards:** To systematically gather geoscience information and do research in order to advise on the identification, prevention and mitigation of the effects of geohazards on people and the environment.
- **Engineering geoscience and physical geohazards:** To gather and analyse geoscience information to provide advice with the purpose of reducing the risk of the effects of geohazards to lives and property.
- **Water resources assessment and protection:** To do research and render services for optimising the quality and quantity of groundwater resources to assist in the delivery of water to communities, industry and agriculture.
- **Education and information:** To facilitate the release of geoscience knowledge and information to the public.
- **Energy geoscience:** To contribute towards the energy security of South Africa.

The successful achievement of the above is highly dependent on the critical success factors that are essential for the organisation to achieve long-term sustainable success.

The critical success factors are:

- Adequate and competent scientists
- A content workforce (high staff morale)
- The transfer of knowledge, skills and expertise to young scientists
- An integrated approach to service delivery
- The retention of experienced scientists
- Appropriate financial backing
- A workable balance between statutory and commercial work
- A structure that supports the strategy of the organisation
- A strategic place/brand within the national priorities framework.



## Future Outlook

This successful reversal of the strained financial situation that the Council for Geoscience endured since the latter part of 2009 is due mainly to the effective short-term strategy the organisation had put in place to effect an immediate change to the state of affairs. However, the organisation realises that a medium- to long-term strategy to maintain its sustainability and relevance and enable delivery on Government objectives and other stakeholder outcomes is needed now.

The business model and functions of the organisation need a complete overhaul in order to reposition and realign the Council for Geoscience to effectively cope with future challenges, anticipated as well as unexpected. It is crucial that a proactive approach is adopted to ensure that the activities of the organisation are sustained during times of dire financial need.

The recent global economic downturn has brought the realisation that the organisation has to adopt a balanced approach to all stakeholders, i.e. statutory and commercial. All stakeholders should be serviced in equal measure to ensure that all avenues of possible revenue for the organisation are kept open. Concentrating on a particular stakeholder to the detriment of others poses the risk that the organisation has no recourse should work from a preferred stakeholder dwindle.

The complete and comprehensive review of the business model and processes of the Council for Geoscience has already commenced and will be continued in the next financial period as part of the long-term strategy planning for the organisation. The process to define the new strategy is expected to conclude in September 2013 and after receiving approval by the Board, and ultimately the Minister of Mineral Resources, the strategy will be implemented systematically throughout the organisation.

In view of its improved financial situation, the Council for Geoscience is in a better position to lend support in terms of geoscience research and knowledge to the national imperatives of Government in addressing the challenges facing the country. These imperatives include addressing rural development, poverty alleviation and the exploitation of mineral resources, thus enhancing business opportunities and skills development.

As a result of the augmented funds received from National Treasury, the organisation has already

partly reinstated the statutory research programme and will continue to endeavour to widen the scope of this programme in future. The aim is to increase the map coverage of the country and, in the process, improve the geoscience-related services to various stakeholders. This endeavour should lead to a variety of programmes in the near future on integrated geoscience mapping, targeting mineral resources, groundwater resource assessments, skills development, marine resource mapping, geochemical mapping, geophysical mapping, the exploration for geothermal energy potential, geo-environmental modelling and geohazard mapping.

The Council for Geoscience will continue to play a vital role in advising Government on the environmental challenges facing the country as a legacy of past and present mining activities. The most important challenges are the acid mine drainage and water ingress issues, not only in the Witwatersrand Basin, but also increasingly in other mining areas. With regard to the gold mining areas on the Witwatersrand, the Council for Geoscience is involved in the project *A Strategic Mine Water Management Plan for the Prevention of Water Ingress into Underground Workings of the Witwatersrand Mining Areas*.

Regarding acid mine drainage, the organisation continues its essential role by means of the project *The Assessment and Management/Remediation of the Impacts of Acid Mine Drainage (AMD) from Abandoned Mines on the Water Resources of South Africa*.

The organisation is also involved in and will continue a project on the rehabilitation of ownerless and abandoned mining areas and the closing of mine holes and openings posing danger to the public.

The country needs to identify geologically suitable areas for the storage of carbon dioxide, as part of its commitment to reduce the effect of greenhouse gases. The organisation will continue its important studies with the aim of establishing a Roadmap for Carbon Capture and Storage for South Africa, which aims to achieve CO<sub>2</sub> test injection by 2016.

South Africa has a growing need to generate clean energy and in this regard the Council for Geoscience should continue to be instrumental in studies to assess the probabilistic seismic hazards for proposed nuclear sites.

The staff of the Council for Geoscience is the most important asset of the organisation. Therefore, the retention and promotion of staff are viewed as a

critical component in the successful operations of the organisation. The moratorium on new appointments was lifted in some measure and the expectation is that more positions will be filled in future, alleviating the present heavy workload of some professional staff members. In addition, the number of bursaries awarded has been increased and more staff is supported to study towards higher degrees.

The broadened scope of the mandate of the Council for Geoscience will effect changes in the activities and focus of the organisation. As soon as the required funding is available, these changes can be implemented.

Since the appointment of the new Chief Executive Officer, Mr M W Kota, the Council for Geoscience has embarked on a period of significant change which should lead to a more dynamic, responsive and performance- and results-oriented organisation. Realising the vision of the repositioning strategy for the organisation will demand hard work, a disciplined performance and a united resolve. However, the envisioned Council for Geoscience should be an organisation that every staff member will be proud to be associated with and the preferred geoscience institution of every stakeholder.

## CORPORATE GOVERNANCE

### Fraud and Corruption

The general fraud and corruption risks facing an organisation include personnel risks, management risks, cultural risks, structural risks, business risks and computer risks.

The Council for Geoscience has a legal responsibility in terms of the Public Finance Management Act (Act No. 1 of 1999, as amended), to take all appropriate steps to prevent unauthorised, irregular, fruitless and wasteful expenditure and losses resulting from any criminal conduct.

### Code of Conduct

The Council for Geoscience has developed and adopted a Code of Conduct and a Code of Ethics for the Board, Executive Management and the staff. These codes are linked to the values of the organisation and require all employees to maintain the highest ethical standards.

### Health, Safety and Environmental Management

The Operational Risk Management Committee (ORMC), which functions at executive level, takes responsibility for occupational health and safety issues in the organisation. The role of the ORMC is to identify and monitor significant risk elements that could have an effect on the operations of the Council for Geoscience.

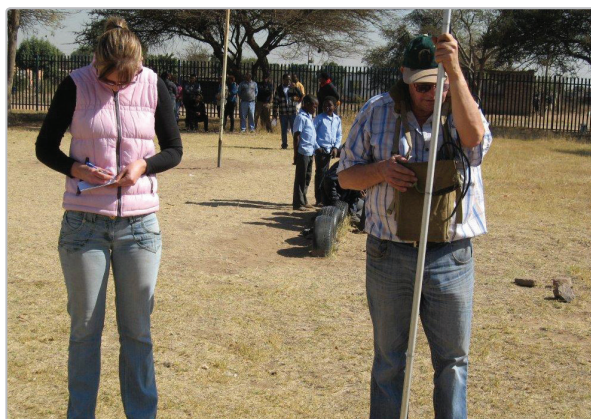
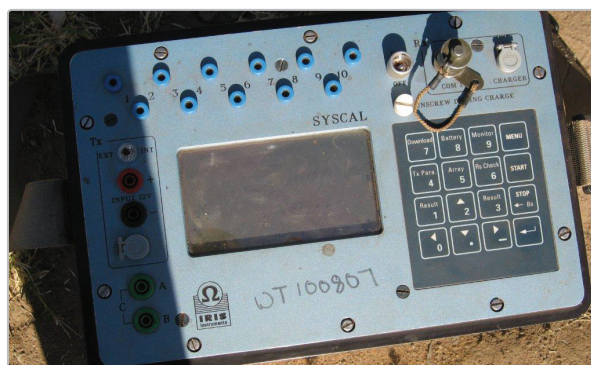
The ORMC is supported through a Business Continuity Committee (BCC). The mandate of the BCC is to ensure that all risks which may disrupt the operations of the organisation are highlighted and addressed in time. The Business Continuity Committee is mandated to:

- o Ensure that the Council for Geoscience complies with the Occupational Health and Safety Act (Act No. 85 of 1993)
- o Anticipate clearly and comprehensively all forms of crisis situations
- o Develop strategies and procedures to address the risks
- o Monitor the implementation and effectiveness of the countermeasures instituted.

## SOCIAL RESPONSIBILITY

### Nelson Mandela International Day

As part of the celebrations for Mandela Day, the Council for Geoscience conducted surveys to locate a site for a borehole at Namo Primary School in Soshanguve, Tshwane Metropolitan Municipality. The school required a new borehole to augment its daily water needs. A team from the Council for Geoscience carried out ground surveys using resistivity, gamma spectroscopy and magnetic methods to map subsurface water-bearing structures. The borehole water will also be used to irrigate the vegetable garden, which is part of a project that is being spearheaded by a non-profit organisation to provide food to disadvantaged children.



The Council for Geoscience conducted surveys to locate a borehole at a primary school.

### Food Packing Initiative

On 16 November 2012, the Nuclear Geo-Hazards Group (NGG) of the Council for Geoscience reached out to a charity organisation by packing meals for families for the school holidays. One way of improving the standard of education of the children of South



Africa is through feeding schemes and by packing 9 782 meals, the target of the charity organisation for December 2012 could be reached.

## SPONSORSHIPS

The Council for Geoscience sponsored the photography on the occasion of the Minister of Mineral Resources delivering her Budget Vote Speech, as well as 300 toiletry bags for cabinet members and 300 USB flash drives.

Twenty learner bursary holders of the Department of Mineral Resources attended the Budget Vote Speech, with the Council for Geoscience sponsoring the accommodation of these learners.

## EDUCATION AND TRAINING

The Council for Geoscience participated in the MTN National Science Week which took place at the National Institute for Higher Education, Kimberley, from 30 July to 4 August 2012. This annual event aims to advance public awareness, appreciation and engagement in science, engineering and technology in South Africa. Individuals were shown how to use a variety of geological equipment such as the stereoscope and microscope, while an interactive periodic table of elements and their geological origin attracted much attention. Individuals were informed about a wide range of minerals and the requirements for a successful earth-science career were explained to them.

A representative from the Council for Geoscience spent the day with the top Grade 11 Mathematics and Science learners from eight Western Cape Schools to promote the job opportunities available at the organisation. The career day was hosted at the Cape Academy for Mathematics and Science in Constantia, Cape Town, in partnership with the Department of Mineral Resources. Other leaders in the minerals sector, such as the Petroleum Agency SA (PASA) and Richards Bay Minerals (RBM) of South Africa assisted in the presentations to over 180 students. The presentations emphasised the excellent opportunities for learners studying for a science degree. In addition, the growth of the economy based on the youth and their endeavours was also highlighted.



National Science Week in Kimberley.



Learners at the National Science Week.



Field School participants preparing base maps to utilise during field mapping.





CGS Field School in the Richtersveld.



Field School participants with their trainers at the Orange River in the Northern Cape Province. The Pofadder Shear Zone in the background is a significant geological feature that can be traced across the river into Namibia.

In October 2012, a Field School was held for six graduate interns of the Council for Geoscience, drawn from the Limpopo, Eastern and Western Cape regional offices and the Central Regions and Mineral Resources Development Units. An initial short course on remote sensing and GIS techniques was conducted at the Bellville regional office, with the purpose of each trainee developing both hard and digital copies of a standard base map and map overlays to be utilised in the field. Thereafter, the trainees moved to a Northern Cape community conservation area in the Richtersveld, where they were exposed to field mapping in a practical hands-on approach. Topics covered included logistics and planning, collecting relevant data, sampling, plotting and interpreting data, and report writing.

## Conferences, Exhibitions and Tours

During the period under review, the Council for Geoscience mounted exhibitions on the following occasions:

- DMR Budget Vote Speech, May 2012
- 34<sup>th</sup> IGC in Brisbane, Australia, August 2012
- Centennial Celebrations at the Head Office in Silverton, November 2012
- OAGS Conference in Niger, December 2012
- CAG 24, Ethiopia, January 2013
- Mining Indaba, February 2013

### *Career expositions, exhibitions and other events*

- Learners' Focus Week, July 2012
- Pink Minerals Exhibition for Cancer Awareness, October 2012
- Umwenda Exhibition, Limpopo, November 2012

### *Educational tours*

- Spatial Data Workshop, May 2012
- Visit of the University of Mafikeng, September 2012
- Visit of the University of Limpopo, September 2012

### *Delegations*

- Sudanese delegation, July 2012
- Ecuadorian delegation, September 2012

## COUNCIL FOR GEOSCIENCE CENTENNIAL CELEBRATIONS

On 8 and 9 November 2012, the Council for Geoscience celebrated its centenary with a series of talks which reviewed the wide-ranging activities of the organisation over the last hundred years. The celebrations were attended by the Minister of the Department of Mineral Resources, the Honourable Ms Susan Shabangu, and by the newly appointed CEO of the Council for Geoscience, Mr Mxolisi Kota. The two-day conference clearly showed that although mapping remains the core function of the Council for Geoscience, its activities have diversified immensely. Especially over the past number of years, the organisation has aligned its functions to include engagement in the environmental sustainability, social upliftment and poverty alleviation initiatives of





The Minister of the Department of Mineral Resources was welcomed at the Head Office in Silverton.



The new CEO, Minister of Mineral Resources and Chairperson of the Board at the centenary of the Council for Geoscience.

Government. These activities were well showcased during the two-day celebratory event by lectures in the auditorium and displays in the foyer of the building. The wide range of work done by the organisation was depicted, affording prospective geoscience students an indication of the career opportunities available at the Council for Geoscience. The open invitation attracted some 2 000 guests from the geoscience community, government and the public.

A special centenary volume of the GEOclips newsletter was issued and the Mail and Guardian newspaper carried a supplement to commemorate the occasion. In addition, a book on the history of the organisation is being compiled and will be published later.



Celebrating a century of geological excellence.

# HUMAN RESOURCE MANAGEMENT

## HUMAN RESOURCES OVERVIEW

The Council for Geoscience acknowledges that its people are vital to the success of the organisation as they determine the efficaciousness of the organisation achieving sustainable success.

To this end, the organisation strives to employ adequate and competent scientists through a robust recruitment drive. The bursary programme ensures that the organisation continues to have a pool of scientists who are well trained and developed for future growth. During the period under review, the Council for Geoscience employed and trained 19 interns through the MQA Internship programme.

In its endeavours to ensure a content workforce, the organisation annually conducts a staff satisfactory survey and addresses leadership issues within the organisation.

Performance management is crucial to the Council for Geoscience as it ensures the successful achievement of the strategic research priorities of the organisation. The organisation has a structured performance management system which is sustained by quarterly reviews.

The success of the Council for Geoscience as a research institution depends on the state of health of its employees. In order to enhance productivity and wellbeing, the organisation has a programme of Employee Wellness in place.

During the period under review, the Council for Geoscience reviewed and implemented six policies, which include the mobile device, procurement, protective clothing, subsistence and travel allowance, recruitment, selection and procedures and the job grading policies.

### Interns of the Council for Geoscience

Name	Business Unit	Gender	Race
N P Mkhize	Engineering Geoscience	Female	African
B C Msane	Engineering Geoscience	Male	African
P P Msomi	Engineering Geoscience	Female	African
S B M Nkosi	Engineering Geoscience	Male	African
S V Nyathi	Engineering Geoscience	Male	African
R Lusunzi	Environmental Geoscience	Male	African
M G Modiba	Environmental Geoscience	Female	African
A N van Averbek	Environmental Geoscience	Male	Coloured
M A Mbongonya	Geophysics	Male	African
M N Mdemela	Geophysics	Female	African
P D Mulaudzi	Geophysics	Male	African
M G Sandane	Geophysics	Male	African
T C Maja	Limpopo	Female	African
P M Manhlwa	Mineral Resources Development	Female	African
Z V Mulibana	Mineral Resources Development	Female	African
L Mutele	Mineral Resources Development	Male	African
S P Tjale	Mineral Resources Development	Female	African
A Mgwaza	Procurement	Female	African
V F Mahlangu	Water Geoscience	Female	African

## Bursars of the Council for Geoscience

The Council for Geoscience has a group of sixteen bursars, studying at various institutions in the geosciences.

Name	Race	Gender	Qualification	Year of study	Institution
M Hakundwi	African	Male	BSc Geology	MSc	UWC
H Mosavel	Indian	Female	BSc Geology	MSc	UWC
T Mosehla	African	Male	BSc Geology	MSc	UWC
S S Nethenzheni	African	Male	BSc Geology	MSc	UWC
B L Pharoe	African	Male	BSc Geology	MSc	UFS
M C Buthelezi	African	Female	BSc Geology	Honours	WITS
S W Daggart	White	Male	BSc Geology	Honours	US
D F Mahlangu	African	Male	BSc Geology	Honours	WITS
B Lutsinge	African	Female	BSc Geology	3rd year	UP
C Romer	White	Female	BSc Geology	3rd year	UKZN
R C Sebola	African	Male	BSc Geology	3rd year	US
K R Gona	African	Female	BSc Geology	2nd year	UWC
M Smith	White	Female	BSc Geology	2nd year	US
C W Gelderblom	White	Male	BSc Geology	1st year	NWU
L G Fisha	African	Male	B Tech	4th year	VUT
O A Makgae	African	Male	B Tech	4th year	TUT

WITS – University of the Witwatersrand; NWU – North-West University; UWC – University of the Western Cape; UP – University of Pretoria; UFS – University of the Free State; UKZN – University of KwaZulu-Natal; US – University of Stellenbosch; TUT – Tshwane University of Technology; VUT – Vaal University of Technology.

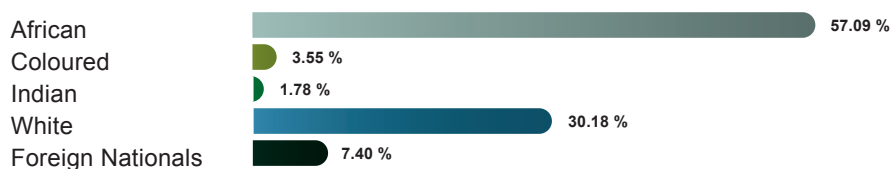
## Transformation

The Council for Geoscience adheres to equal opportunity and affirmative action principles, as promulgated in the Employment Equity Act (Act No. 55 of 1998).

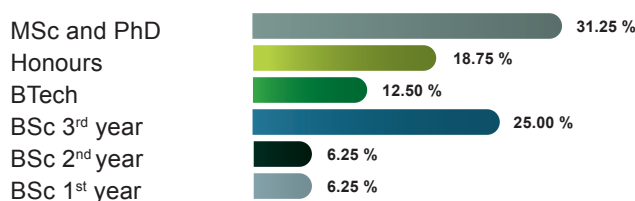
The Personnel, Remuneration and Transformation Committee of the Board of the Council for Geoscience is responsible for monitoring and evaluating progress on transformation and skills development.

The accompanying tables illustrate the demographic composition of the staff and the qualifications of the Council for Geoscience bursars.

### Overall Staff Profile as at 31 March 2013



### Overall Qualifications of Bursary Students as at 31 March 2013





## FINANCIAL INFORMATION

### STATEMENT OF RESPONSIBILITY

#### Council for Geoscience

#### Responsibility of the Board for the Annual Financial Statements

The Board members are responsible for the monitoring, preparation and the integrity of the financial statements and related information included in this annual report.

For the Board to discharge its responsibilities, Management has developed and continues to maintain a system of internal controls. The Board has the ultimate responsibility for the system of internal controls and reviews its operation primarily through management structures.

The internal controls include a risk-based system of internal accounting and administrative controls designed to provide reasonable, but not absolute, assurance that assets are safeguarded and that transactions are executed and recorded in accordance with generally accepted business practices and the policies and procedures of the Council for Geoscience. These controls are implemented by trained and skilled personnel, with an appropriate segregation of duties, and are monitored by Management. These include a comprehensive budgeting and reporting system operating within strict deadlines and an appropriate control framework.

The Board is accountable for the process of risk management and the system of internal controls for the Council for Geoscience. This process is regularly reviewed for effectiveness and for establishing appropriate risk and control policies, and communicating these throughout the organisation. There is an ongoing process for identifying, evaluating and managing the significant risks faced by the organisation. The process has been in place for the period under review, up to the date of approval of the annual report and financial statements.

There is an adequate system of internal controls in place to mitigate any significant risk faced by the organisation to an acceptable level. This system is designed to manage, rather than eliminate, the risk of failure and to maximise the opportunities to achieve business objectives.

There is a documented and tested process in position that will allow the organisation to continue its critical

business processes in the event of a disastrous incident impacting on its activities.

The external auditors are responsible for reporting on the financial statements. These financial statements are prepared in accordance with South African Statements of Generally Recognised Accounting Practices and incorporate disclosure in accordance with the accounting philosophy of the company. The financial statements are based on appropriate accounting policies that are consistently applied and supported by reasonable and prudent judgements and estimates.

The Board members believe that the organisation will be a going concern in the year ahead; for this reason they continue to adopt the going-concern basis in preparing the financial statements of the Council for Geoscience.

The Board members are not aware of any matter or circumstance arising since the end of the financial year, not otherwise dealt with in the annual financial statements of the Council for Geoscience, that would affect the operations of the organisation or the results of its operations significantly.

The annual financial statements for the year 2012/13 were approved by the Accounting Authority in terms of section 51(1)(f) of the Public Finance Management Act (Act No. 1 of 1999, as amended) on 30 July 2013 and are signed on its behalf by:



**Prof. P E Ngoepe**  
Chairperson: Board of the  
Council for Geoscience



**Ms K R Mthimunye**  
Chairperson of the  
Finance Committee

31 July 2013  
Pretoria

# REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE COUNCIL FOR GEOSCIENCE

## REPORT ON THE FINANCIAL STATEMENTS

### Introduction

1. I have audited the financial statements of the Council for Geoscience set out on pages 92 to 119, which comprise the statement of financial position as at 31 March 2013, the statement of financial performance, statement of changes in net assets and the cash flow statement 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 financial statements

2. The board of directors which constitutes the accounting authority is responsible for the preparation and fair presentation of these financial statements in accordance with South African Standards of Generally Recognised Accounting Practice (SA Standards of GRAP) 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 the accounting authority determines is necessary to enable the preparation of 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 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 financial statements are free from material misstatement.
4. An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the 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 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 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 financial statements present fairly, in all material respects, the financial position of the Council for Geoscience as at 31 March 2013, and its financial performance and cash flows for the year then ended in accordance SA Standards of GRAP 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 corporate scorecard as set out on pages 18 to 22 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*.
10. The reliability of the information in respect of the selected objectives is assessed to determine whether it adequately reflects the facts (i.e. whether it is valid, accurate and complete).

### Additional matters

11. Although no material findings concerning the usefulness and reliability of the performance information were identified in the corporate scorecard, I draw attention to the following matters below.

### Material adjustments to the corporate scorecard

12. A material misstatement in the corporate scorecard was identified during the audit, which was corrected by management.

### Compliance with laws and regulations

13. 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. My findings on 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 are as follows:

### Annual financial statements, performance and annual report

14. The financial statements submitted for auditing were not prepared in some material respects in accordance with the requirements of section 55(1) of the PFMA. Material misstatements of capital and current assets identified by the auditors were subsequently corrected, resulting in the financial statements receiving an unqualified opinion.

### Procurement and contract management

15. Awards were made to bidders who did not submit a declaration on whether they are employed by the state or connected to any person employed by the state, which is prescribed in order to comply with Treasury regulation 16A8.3.

### Asset management

16. Proper control systems to safeguard and maintain assets were not implemented, as required by section 51(1)(c) of the Public Finance Management Act.

### Internal control

17. I considered internal control relevant to my audit of the financial statements, corporate scorecard and compliance with laws and regulations. The matters reported below under the fundamentals of internal control are limited to the significant deficiencies that resulted in the findings on the corporate scorecard and the findings on compliance with laws and regulations included in this report.

### Leadership

18. Management did not adequately develop and monitor the implementation of action plans to address internal control deficiencies.
19. Management has not exercised adequate oversight responsibility regarding financial reporting and compliance and internal controls related to the management of assets.

### Financial and performance management

20. Management did not design adequate systems for proper record keeping in a timely manner to ensure that complete, relevant and accurate information is accessible and available to support financial and performance reporting.

*Auditor-General*

Pretoria  
31 July 2013



AUDITOR - GENERAL  
SOUTH AFRICA

*Auditing to build public confidence*



# FINANCIAL STATEMENTS OF THE COUNCIL FOR GEOSCIENCE FOR THE PERIOD ENDED 31 MARCH 2013

## 1 STATEMENT OF FINANCIAL POSITION AT 31 MARCH 2013

	Notes	2013 R'000	2012 R'000
<b>Assets</b>			
<b>Non-current assets</b>			
Property and equipment	2	190 729	185 173
Intangible assets	3	2 587	2 966
<b>Current assets</b>			
Inventories	4	5	5
Trade and other receivables	6	45 847	33 980
Cash and cash equivalents	7	207 418	173 393
<b>Total assets</b>		446 586	395 517
<b>Net assets and liabilities</b>			
<b>Net assets</b>			
Accumulated surplus		245 962	227 595
<b>Non-current liabilities</b>			
Post-employment benefit liabilities	5	14 382	10 065
Government grant	8	80 343	83 009
<b>Current liabilities</b>			
Trade and other payables	9	10 829	9 124
Deferred income	10	86 100	58 274
Accruals	11	8 970	7 450
<b>Total net assets and liabilities</b>		446 586	395 517

## 2 STATEMENT OF FINANCIAL PERFORMANCE FOR THE PERIOD ENDED 31 MARCH 2013

	Notes	2013 R'000	2012 R'000
<b>Revenue</b>	12	274 374	226 768
<b>Cost of commercial projects</b>	12	(55 517)	(47 822)
<b>Cost of statutory projects</b>	12	(56 092)	(21 021)
<b>Gross surplus</b>		162 765	157 925
Other operating income	12	6 310	9 537
Administrative expenses		(159 203)	(140 432)
Other operating expenses	12	(748)	(5 870)
Interest received	13	9 255	5 197
<b>Surplus from operations</b>		18 379	26 357
Finance cost	14	(12)	(10)
<b>Net surplus for the year</b>		18 367	26 347

### 3 STATEMENT OF CHANGES IN NET ASSETS FOR THE PERIOD ENDED 31 MARCH 2013

	Notes	Accumulated surplus R'000	Total R'000
<b>Balance at 31 March 2011</b>		201 248	201 248
Net surplus for the period		26 552	26 552
<b>Balance at 31 March 2012</b>		227 800	227 800
Effect of correction of error	26	(205)	(205)
<b>Balance at 31 March 2012 as restated</b>		227 595	227 595
Net surplus for the period		18 367	18 367
<b>Balance at 31 March 2013</b>		245 962	245 962

## 4 CASH FLOW STATEMENT FOR THE PERIOD ENDED 31 MARCH 2013

	Notes	2013 R'000	2012 R'000
<b>Cash inflow from operating activities</b>		55 048	43 700
Cash receipts from customers		259 841	217 751
Cash paid to suppliers and employees		(214 036)	(179 238)
Cash generated from operations	15	45 805	38 513
Interest received	13	9 255	5 197
Finance cost	14	(12)	(10)
<b>Cash outflow from investing activities</b>		(21 023)	(9 225)
Acquisition of:			
Property and equipment	16.1	(20 564)	(7 949)
Intangible assets	16.2	(473)	(1 827)
Proceeds on disposal of property and equipment		14	551
<b>Net increase in cash and cash equivalents</b>		34 025	34 475
<b>Cash and cash equivalents at beginning of period</b>	7	173 393	138 918
<b>Cash and cash equivalents at end of period</b>	7	207 418	173 393



## 5 NOTES TO THE FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 MARCH 2013

### 1 Accounting policies

#### 1.1 Basis of preparation

##### Statement of compliance

1. The financial statements have been prepared in accordance with the Standards of Generally Recognised Accounting Practices (GRAP) including any interpretations, guidelines and directives issued by the Accounting Standards Board.

The financial statements have been prepared on a historic cost basis and accounting policies are consistent with prior years.

2. The cash flow statement was prepared in accordance with the direct method.
3. Specific information has been presented separately on the statement of financial position such as:
  - (a) receivables from non-exchange transactions, including taxes and transfers;
  - (b) taxes and transfers payable;
  - (c) trade and other payables from non-exchange transactions.

Paragraphs 11 to 15 of GRAP 1 have not been implemented because the budget reporting standard has not been developed by the local standard setters and the international standard is not effective for the current financial year. Although the inclusion of budget information would enhance the usefulness of the financial statements, non-disclosure will not affect the objective of the financial statements.

#### 1.2 Revenue recognition

Revenue comprises the revenue from non-exchange transactions recognised as income in the current year, contract income and sales of publications.

##### 1.2.1 Recognition of income

The Council for Geoscience measures revenue at the fair value of the consideration received or receivable. Revenue is recognised only when it is probable that the economic benefits associated with a transaction will flow to the Council for Geoscience, and the amount of revenue and associated costs incurred or to be incurred, can be measured reliably.

##### 1.2.2 Revenue from non-exchange transactions

The Council for Geoscience received grants in the form of assets and baseline allocation from government departments.

Revenue from non-exchange transactions is recorded as deferred income when it is received. It is then recognised as income on a systematic basis over the period intended to match this revenue with the related costs. The conditions for the use of each revenue from non-exchange transactions are stated in each contractual agreement.

### 1.2.3 Revenue from exchange transactions

Revenue from exchange transactions comprises sales and contracts as follows:

#### Sales revenue

Sales revenue represents the invoiced value of goods and service supplied by the Council for Geoscience. This revenue is recognised when the revenue recognition criteria are met.

#### Contract revenue

Revenue from contracts is recognised by means of progress payments over the duration of the contracts. Revenue from contracts in progress is recognised when the revenue criteria are met. When the outcome of a contract can be estimated reliably, revenue is recognised by reference to the stage of completion of the contract activity and cost-based contract.

### 1.3 Interest received

Interest is recognised on a time proportionate basis with reference to the principal amount receivable and the effective interest rate applicable.

### 1.4 Property and equipment

The cost of an item of fixed assets is recognised as an asset when:

- o it is probable that future economic benefits associated with the item will flow to the Council for Geoscience;
- o the cost of the item can be measured reliably.

Property and equipment is deemed to be cash-generating assets.

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

Fixed assets are carried at cost less accumulated depreciation and any impairment losses.

Day to day expenses incurred on property and equipment are expensed directly to surplus and deficit for the period.

Where an asset is acquired at no cost, or at a nominal cost, its cost is its fair value as at date of acquisition.

Major maintenance that meets the recognition criteria of an asset is capitalised.

Depreciation is provided on all fixed assets other than freehold land to write down the cost less residual value by equal installments over their average useful lives, as follows:

Land	Not depreciable
Buildings	30 years
Motor vehicles	5 to 8 years
Equipment	5 to 7 years
Aircraft and helicopter – Body	15 years
Aircraft and helicopter – Components	Useful hours per Civil Aviation Authority Regulations
Boat	10 years
Office furniture	20 years
Computer equipment	6 years
Specialised equipment	15 years

The depreciation charges for each period are recognised in the statement of financial performance, unless they are included in the carrying amount of another asset. The average useful lives and residual values are reviewed on an annual basis and changes are reflected as change in accounting estimates on a prospective basis.

## 1.5 Intangible assets

An intangible asset is recognised when:

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

Intangible assets are deemed to be cash-generating assets.

Capitalised computer software is carried at cost less accumulated amortisation and less accumulated impairment losses. Computer software is tested annually for impairment or changes in estimated future benefits. Amortisation is provided to write down the intangible assets to their residual on a straight-line basis, being two and five years.

## 1.6 Translation of foreign currencies

### Foreign currency transactions

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

### At each balance sheet date:

- o foreign currency monetary items are translated using the closing rate.

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 annual financial statements are recognised in the statement of financial performance in the period in which they arise.

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

## 1.7 Research and development

Expenditure on research activities is recognised as an expense in the period in which it is incurred.

An internally generated intangible asset arising from research and development is recognised as part of intangible assets only if all of the following conditions are met:

- o An asset is created that can be identified;
- o It is probable that the asset created will generate future economic benefits;
- o The development cost of the asset can be measured reliably;
- o It is technically feasible to complete the intangible asset so that it will be available for use or sale;
- o The ability to use or sell the intangible asset;
- o It is the intention to complete the intangible asset so that it will be available for use or sale.

Where no internally generated intangible asset can be recognised, development expenditure

is recognised as an expense in the period in which it is incurred. Internally generated assets are amortised on a straight-line basis over their useful lives.

## 1.8 Deferred income

Deferred income is recognised using the accrual basis and accounted for in the statement of financial position in the period in which it satisfies the revenue recognition criteria.

## 1.9 Retirement benefit costs

### *Short-term employee benefits*

The cost of short-term employee benefits (those payable within 12 months after the service is rendered, such as bonuses, paid vacation leave and sick leave) is recognised in the period in which the service is rendered and is not discounted.

The expected cost of compensated absences is recognised as an expense as the employees render services that increase their entitlement or, in the case of non-accumulating absences, when the absence occurs.

### *Defined contribution and defined benefit plans*

The Council for Geoscience operates both a defined contribution pension and provident fund and a defined benefit plan in respect of post-retirement medical-aid contributions. For the defined benefit plan, the defined benefit obligation and the related current service cost is determined by using the projected unit credit method. The defined benefit plan is subject to an annual actuarial valuation. The qualifying plan asset of this scheme is held and administered by Momentum Group Limited.

The actuarial gains or losses are further limited to the extent that the net cumulative unrecognised actuarial gains or losses (before recognition of that actuarial gain or loss) exceed the unrecognised part of the transactional liability. Payments to defined contribution retirement benefit plans are charged to the statement of financial performance in the year to which they relate.

## 1.10 Provisions and contingent liabilities

Provisions are recognised when:

- o the entity has a present obligation as a result of a past event;
- o it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation;
- o 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.

## 1.11 Financial instruments

### *Initial recognition*

The entity classifies financial instruments, or their component parts, on initial recognition as a financial asset, a financial liability or an equity instrument in accordance with the substance of the contractual arrangement.



Financial assets and liabilities are recognised on the entity's statement of financial position when the Council for Geoscience becomes party to the contractual provisions of the instrument.

Financial assets and liabilities are recognised initially at fair value.

### ***Derecognition of financial instruments***

The entity derecognises a financial asset only when the contractual rights to the cash flows from the asset expire; or it transfers the financial asset and substantially all the risks and rewards of ownership of the asset to another entity.

The entity derecognises financial liabilities when the obligations of the entity are discharged, cancelled or when they expire.

### ***Impairment of loans and receivables***

Financial assets are assessed for indicators of impairment at each balance sheet date. Financial assets are impaired where there is objective evidence that, as a result of one or more events that occurred after the initial recognition of the financial asset, the estimated future cash flows of the investment have been impacted.

The carrying amount of trade receivables is reduced through the use of an allowance account (bad debt provision). When a trade receivable is considered uncollectible, it is written off against the allowance account. Subsequent recoveries of amounts previously written off are credited against the allowance account. Changes in the carrying amount of the allowance account are recognised in surplus or deficit.

### ***Financial assets carried at amortised cost***

Loans and receivables are measured at amortised cost less any impairment losses recognised to reflect irrecoverable amounts. Impairment is determined on a specific basis, whereby each asset is individually evaluated for impairment indicators. Write-offs of these assets are expensed in surplus or deficit.

### ***Cash and cash equivalents***

Cash and cash equivalents are short-term, highly liquid investments that are readily convertible to known amounts of cash. Cash and cash equivalents are measured at fair value.

### ***Financial liabilities carried at amortised cost***

Trade and other payables are initially measured at fair value, and are subsequently measured at amortised cost.

## **1.12 Inventories**

Inventories are recorded at lower of cost or net realisable value.

## **1.13 Operating leases**

Leases of assets under which all the risks and rewards of ownership are effectively retained by the lessor are classified as operating leases. Lease payments under an operating lease are recognised as an expense on a straight-line basis over the lease term.

Any contingent rents are expensed in the period they are incurred.

## 1.14 Impairment

The entity assesses at each balance sheet date whether there is any indication that an asset may be impaired. If there is any indication that an asset may be impaired, the recoverable amount is estimated for the individual asset. The recoverable amount of an asset is the higher of 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 recognised immediately in surplus or deficit.

At each reporting date the entity assesses impairment losses recognised in prior years for continued existence or decreases. If such indication exists, the recoverable amounts of those assets are estimated. The increase in the carrying amount of an asset attributable to a reversal of an impairment loss does not exceed the carrying amount that would have been determined had no impairment loss been recognised for the asset in prior periods. A reversal of an impairment loss of assets carried at cost less accumulated depreciation or amortisation is recognised immediately in surplus or deficit.

## 1.15 Critical accounting estimates and judgements

### *Provision for bad debts*

Past experience indicates a reduced prospect of collecting debts over the age of two years. Debtor balances older than two years are regularly assessed by management and provided for in accordance with the policy.

### *Provisions*

Provisions were raised and management determined an estimate based on the information available and in accordance with the policy.

### *Property and equipment*

Management has made certain estimations with regard to the determination of estimated useful lives and residual values of items of property and equipment.

### *Leases*

Management has applied its judgement to classify all lease agreements the entity is party to as operating leases, as they do not transfer substantially all risks and rewards to the entity. Furthermore, as the operating lease in respect of premises is only for a relatively short period of time, management has made a judgement that it would not be meaningful to classify the lease into separate components for the land and for the buildings for the EVN Africa current lease, and the agreement will be classified in its entirety as an operating lease.

## 1.16 Sources of estimation uncertainty

There are no key assumptions concerning the future and other key sources of estimation uncertainty at the balance sheet date that could have a significant risk of causing material adjustment to the carrying amounts of assets and liabilities within the next financial year.

## 2 Property and equipment

2013	Land R'000	Buildings R'000	Equipment R'000	Office furniture R'000	Aircraft and boat R'000	Motor vehicles R'000	Computer equipment R'000	Total R'000
Gross carrying amount	18 231	135 348	108 374	2 048	22 662	12 140	20 008	318 811
Accumulated depreciation at the beginning of the period	-	(26 392)	(74 726)	(512)	(7 947)	(7 597)	(15 675)	(132 849)
Accumulated impairment at the beginning of the period	-	(629)	(160)	-	-	-	-	(789)
<b>Opening net carrying amount at 31 March 2012</b>	18 231	108 327	33 488	1 536	14 715	4 543	4 333	185 173
Movements during the period:								
Acquisitions	-	-	9 617	976	2 339	4 057	3 575	20 564
Disposals	-	(629)	(456)	19	(182)	(5)	(82)	(1 335)
Disposals – Cost	-	(629)	(1067)	(14)	(1 121)	(47)	(617)	(3 495)
Disposals – Depreciation	-	-	611	33	939	42	535	2 160
Depreciation	-	(4 674)	(6 229)	(136)	(627)	(1 352)	(1 444)	(14 462)
<b>Closing net carrying amount at 31 March 2013</b>	18 231	103 653	36 580	2 395	16 245	7 243	6 382	190 729
Gross carrying amount	18 231	134 719	116 924	3 010	23 880	16 150	22 966	335 880
Accumulated depreciation	-	(31 066)	(80 344)	(615)	(7 635)	(8 907)	(16 584)	(145 151)
Accumulated impairment	-	-	-	-	-	-	-	-

## Property and equipment (continued)

2012	Land R'000	Buildings R'000	Equipment R'000	Office furniture R'000	Aircraft and boat R'000	Motor vehicles R'000	Computer equipment R'000	Total R'000
Gross carrying amount	18 231	135 348	105 487	2 045	19 255	12 383	19 003	311 752
Accumulated depreciation at the beginning of the period	-	(21 719)	(68 653)	(416)	(7 310)	(6 506)	(14 906)	(119 510)
Accumulated impairment at the beginning of the period	-	(629)	-	-	-	-	-	(629)
<b>Opening net carrying amount at 31 March 2011</b>	18 231	113 000	36 834	1 629	11 945	5 877	4 097	191 613
Movements during the period:								
Acquisitions	-	-	2 887	3	3 407	-	1 652	7 949
Disposals	-	-	-	-	-	(96)	(77)	(173)
Depreciation	-	(4 673)	(6 073)	(96)	(637)	(1 238)	(1 339)	(14 056)
<b>Closing net carrying amount at 31 March 2012</b>	18 231	108 327	33 488	1 536	14 715	4 543	4 333	185 173
Gross carrying amount	18 231	135 348	108 374	2 048	22 662	12 140	20 008	318 811
Accumulated depreciation	-	(26 392)	(74 726)	(512)	(7 947)	(7 597)	(15 675)	(132 849)
Accumulated impairment	-	(629)	(160)	-	-	-	-	(789)

The transfer of the following land and buildings as stipulated under section 26 of the Geoscience Act (Act No. 100 of 1993) has not yet been completed.

Location	Fair value
474 Carl Street, Town Lands 351JR, Pretoria West	R2 800 000
280 Pretoria Street, Silverton, Pretoria	R94 000 000

The fair value of these properties has been included in the carrying amount of land and buildings as at 31 March 2013. This fair value was based on a valuation done in 2007 by ACI Property Valuers and Appraisers (Pty) Ltd and was deemed cost at initial recognition. The building is being depreciated on a straight-line method.

Details regarding land and buildings are kept at the Council for Geoscience head office and will be supplied upon written request.



### 3 Intangible assets

	2013 R'000	2012 R'000
<b>Computer software</b>		
Gross carrying amount	16 014	14 187
Accumulated amortisation	(13 048)	(8 510)
<b>Opening net carrying amount at 31 March</b>	2 966	5 677
Movements during the period:		
Acquisitions	473	1 827
Disposals	(3 256)	-
Disposals - amortisation	278	-
Impairment	2 965	(2 965)
Amortisation	(839)	(1 573)
<b>Closing net carrying amount at 31 March</b>	2 587	2 966
Gross carrying amount	13 231	16 014
Accumulated amortisation	(10 644)	(13 048)

### 4 Inventories

The Council for Geoscience is a custodian of scientific information and produces publications in the form of books, maps and map explanations, etc. These publications are distributed to the public free of charge or at a nominal charge.

Over the years, with changes in technologies, these publications were being improved and, as such, older versions became outdated. As a result, remaining quantities have accumulated. To date 1 243 publication titles have been printed.

Publication inventories	5	5
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## 5 Retirement benefit

	2013 R'000	2012 R'000
<b>5.1 Post-retirement medical-aid fund</b>		
The Council for Geoscience has made provision for the medical-aid fund covering substantially all its employees. All eligible employees are members of the defined benefit scheme. To improve management of this defined benefit scheme the Council for Geoscience established a qualifying plan asset in October 2010 which is held and administered by Momentum Group Limited and evaluated annually as at 31 March.		
<b>The amount recognised in the statement of financial performance is determined as follows:</b>		
Current service costs	256	284
Interest charge	1 777	1 678
Expected return on planned assets	(943)	(942)
Actuarial (gain)/loss recognised	6 027	(281)
Recognition of loss on asset realisation	(2 801)	-
	4 316	739

<b>The amount included in the statement of financial position arising from Council for Geoscience obligation in respect of PRMC is as follows:</b>		
Present value of fund obligations	26 226	21 155
Fair value of planned assets	(11 845)	(11 090)
Liability recognised in statement of financial position	14 381	10 065

<b>Movement in net liability during the period is as follows:</b>	2013				2012			
	Liability	Planned asset	Unrecognised actuarial gain	Net	Liability	Planned asset	Unrecognised actuarial (loss)/gain	Net
Liability at beginning of period	21 155	-	-	21 155	19 775	-	-	19 775
Value of planned assets at beginning of period	-	(11 090)	-	(11 090)	-	(10 449)	-	(10 449)
Value of unrecognised actuarial gain/(loss) at beginning of period	-	-	-	-	-	-	-	-
Interest charge/ expected return of planned asset	1 777	(943)	-	834	1 678	(942)	-	736
Contributions received	-	(2 801)	-	(2 801)	-	(55)	-	(55)
Current service costs	256	-	-	256	284	-	-	284
Benefits paid	(1 399)	1 399	-	-	(1 573)	1 573	-	-
Actuarial loss/ (gain) recognised on curtailment	4 437	1 590	-	6 027	991	(1 217)	-	(226)
Closing balance	26 226	(11 845)	-	14 381	21 155	(11 090)	-	10 065

## Retirement benefit (continued)

### 5.2 Pension and provident fund benefits

The Council for Geoscience and its employees contribute to a defined contribution plan. The assets of the scheme are held separately from the Council for Geoscience in funds under the control of trustees. The total cost charged to income of R7 140 361 (2012: R6 319 727) represents equal contributions of 7.5 % by the employer and employee.

2013	2012
R'000	R'000

## 6 Trade and other receivables

Trade receivables	22 825	23 781
Contract customers	22 868	10 009
Other receivables	1 933	1 656
Prepaid expenses	228	169
Personnel debt	51	100
	47 905	35 715
Less – Provision for bad debts	(2 058)	(1 735)
	45 847	33 980
An amount of R11 448 860 was reclassified from contract customers to trade receivables on the 2012 figures.		
Provision for bad debts		
Opening balance	1 735	1 188
Movement	323	547
Closing balance	2 058	1 735

#### Fair value of trade and other receivables

Fair values of trade and other receivables are determined at a price charged at transaction date and impaired when indicators of impairment are present. At period end there were no differences between the book value and the fair values of trade and other receivables because of the short-term maturity.

## 7 Cash and cash equivalents

Cash and cash equivalents at the end of the period are represented by the following balances:		
Cash at bank	10 189	24 628
Call accounts	197 229	148 765
Cash and cash equivalents at the end of the period are represented by the following balances:	207 418	173 393
There is no difference between the fair value of cash and cash equivalents and their book value.		

2013	2012
R'000	R'000

## 8 Revenue from non-exchange transactions

Carrying amount at the beginning of period	83 009	85 674
Recognised as income	(2 666)	(2 665)
Carrying amount at the end of period	80 343	83 009

## 9 Trade and other payables

Trade payables	9 107	4 502
Other payables	1 722	4 622
	10 829	9 124

### Fair value of financial instruments

Fair values of trade and other payables are determined at a price charged at transaction date and impaired when indicators of impairment are present. At period end there were no differences between the book value and the fair values of trade and other payables.

## 10 Deferred income

10.1	Contamination of the groundwater in the Witwatersrand area Deferred income arising as a result of an agreement entered into with the Department of Mineral Resources to develop and implement various measures to mitigate the effect of mining-induced contamination of the groundwater in the Witwatersrand area.		
10.1.1	Nedbank Investment Acc. 03/7881543469/001		
	Carrying amount at the beginning of period	1 009	973
	Interest earned	35	36
	Carrying amount at the end of period	1 044	1 009

10.1.2	Nedbank Investment Acc. 03/7881543469/006		
	Carrying amount at the beginning of period	14 149	13 634
	Amounts used during the period	(4 490)	-
	Interest earned	365	515
	Carrying amount at the end of period	10 024	14 149



## Deferred income (continued)

		2013 R'000	2012 R'000
<b>10.1.3</b>	<b>Nedbank Investment Acc. 03/7881543469/007</b>		
	Carrying amount at the beginning of period	29 242	32 744
	Amounts used during the period	(9 692)	(4 614)
	Interest earned	704	1 112
	Carrying amount at the end of period	20 254	29 242
<b>10.2</b>	<b>Deferred income arising as a result of an agreement entered into with the Department of Mineral Resources to develop and implement the closing of mine holes.</b>		
	Carrying amount at the beginning of period	66	1 682
	Amounts used during the period	-	(1 672)
	Interest earned	2	56
	Carrying amount at the end of period	68	66
<b>10.3</b>	<b>Deferred income arising as a result of an agreement with the Department of Mineral Resources in terms of the Sustainable Development Through Mining project.</b>		
	Carrying amount at the beginning of period	858	826
	Interest earned	29	32
	Carrying amount at the end of period	887	858
<b>10.4</b>	<b>Deferred income arising as a result of a contract entered into with the European Commission for Earth Observation and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation.</b>		
	Carrying amount at the beginning of period	660	660
	Amounts received	711	-
	Carrying amount at the end of period	1 371	660
<b>10.5</b>	<b>Deferred income arising as a result of an agreement with the Department of Science and Technology in terms of a Scoping Study for a National Mineral Resources Assessment.</b>		
	Carrying amount at the beginning of period	-	498
	Amounts used during the period	-	(523)
	Interest earned	-	25
	Carrying amount at the end of period	-	-

## Deferred income (continued)

		2013 R'000	2012 R'000
<b>10.6</b>	<b>Deferred income arising as a result of an agreement with the Department of Cooperative Governance and Traditional Affairs for establishing a South Africa Tsunami Early Warning System.</b>		
	Carrying amount at the beginning of period	171	171
	Amounts used during the period	(171)	-
	Carrying amount at the end of period	-	171
<b>10.7</b>	<b>Deferred income arising as a result of an agreement with the Department of Science and Technology in terms of the Earth Observation and Geohazards Assessment.</b>		
	Carrying amount at the beginning of period	982	982
	Amounts received	3 500	-
	Amounts used during the period	(982)	-
	Carrying amount at the end of period	3 500	982
<b>10.8</b>	<b>Deferred income arising as a result of an agreement with the Department of Science and Technology to study the Witwatersrand Central Basin Mine Water Apportionment.</b>		
	Carrying amount at the beginning of period	1 386	1 386
	Carrying amount at the end of period	1 386	1 386
<b>10.9</b>	<b>Deferred income arising as a result of an agreement entered into with the National Research Foundation.</b>		
	Carrying amount at the beginning of period	60	55
	Amounts received	50	5
	Carrying amount at the end of period	110	60
<b>10.10</b>	<b>Deferred income arising as a result of pre-funding for the Uganda Project.</b>		
	Carrying amount at the beginning of period	24	240
	Amounts used during the period	-	(216)
	Carrying amount at the end of period	24	24

## Deferred income (continued)

		2013	2012
		R'000	R'000
10.11	<b>Deferred income arising as a result of an agreement entered into with the Department of Mineral Resources to develop and implement various measures to mitigate the effect of mining-induced contamination.</b>		
	Carrying amount at the beginning of period	9 667	-
	Amounts received	78 381	16 893
	Amounts used during the period	(40 616)	(7 226)
	Carrying amount at the end of period	47 432	9 667
		86 100	58 274

11	<b>Accruals</b>		
	<b>Accruals for leave pay</b>		
	Carrying amount at the beginning of period	7 450	6 927
	Provision current period	1 958	1 289
	Amounts used during the current period	(438)	(766)
	Carrying amount at the end of period	8 970	7 450
	The leave pay provision relates to the estimated liabilities as a result of leave days due to employees.		

12	<b>Deficit/surplus from operations</b>		
	Operating deficit/surplus is arrived at after taking the following items into account:		
	<b>Revenue</b>		
	Government grant	223 006	154 405
	Conditional grant deferred	(37 765)	(9 667)
	Government grant recognised	2 666	2 665
	Contracting revenue	86 161	78 692
	Publication revenue	306	673
		274 374	226 768
	Work in progress of contract revenue is included in the contracting revenue at an amount of R24 307 (2012: R4 940). Work in progress of contract cost is included in cost of contracts and amounts to R23 818 (2012: R 4 640). The net surplus included in net surplus for the year amounts to R489 (2012: R309).		

	<b>Cost of contracts</b>		
	Direct cost	34 744	32 640
	Personnel expenditure	20 773	15 182
		55 517	47 822

## Deficit/surplus from operations (continued)

		2013 R'000	2012 R'000
	<b>Cost of statutory projects</b>		
	Direct cost	24 016	5 477
	Personnel expenditure	32 076	15 544
		56 092	21 021

	<b>Other operating income</b>		
	Foreign currency gains	1 799	5 649
	Profit on disposal of fixed assets	14	551
	Sundry income	4 497	3 337
		6 310	9 537
	<b>Administrative expenses include</b>		
	Audit fees	1 484	2 173
	o Current period	284	666
	o Prior period	784	784
	o Internal audit	114	723
	o Fee for other services	302	-
	Bad debts written off	11	1 690
	Provision for bad debts	323	547
	Depreciation – on owned assets	14 462	14 056
	o Buildings	4 674	4 673
	o Equipment	6 229	6 073
	o Office furniture	136	96
	o Motor vehicles	1 352	1 238
	o Aircraft	627	637
	o Computer equipment	1 444	1 339
	Amortisation – intangible assets		
	o Computer software	839	1 573
	Rentals in respect of operating leases		
	o Land and buildings	435	380
	o Photocopying machines	1 605	1 693



## Deficit/surplus from operations (continued)

		2013 R'000	2012 R'000
	<b>Other operating expenses</b>		
	Net loss on disposal of equipment	559	177
	Impairment of assets	-	3 125
	Foreign currency losses	189	2 568
		748	5 870
	Staff costs	159 972	128 352

	Included in staff costs are:		
	Defined benefit plan expense for the post-retirement medical-aid fund	4 316	739
	Current service cost	256	284
	Interest cost	1 777	1 678
	Expected return on plan assets	(943)	(942)
	Recognised actuarial loss	3 226	(281)
	Defined contribution plan expenses for the pension and provident fund	7 140	6 416

### Emoluments

Senior management	2012/2013			
	Pensionable salary R	Provident fund contributions R	Other contributions R	Total R
Ramontja T*	-	-	334 317	334 317
Kota M W	701 258	42 075	36 852	780 185
Matsepe L D	1 206 210	73 053	191 166	1 470 429
Ramagwede L F	1 287 496	83 967	179 512	1 550 975
Graham G	1 292 845	78 619	487 313	1 858 777
Mabuza M	975 445	56 034	545 590	1 577 069

2011/2012				
	Pensionable salary R	Provident fund contributions R	Other contributions R	Total R
Ramontja T*	1 154 487	68 857	253 630	1 476 974
Matsepe L D	1 060 705	64 093	110 509	1 235 307
Ramagwede L F	1 240 931	80 462	133 115	1 454 508
Graham G	1 246 788	75 337	273 446	1 595 571
Zawada P K	646 865	44 360	117 378	808 603

\*CEO until 31 October 2011

M W Kota is the Executive Board Member and CEO.

## Deficit/surplus from operations (continued)

Board emoluments	2013 R	2012 R
<b>Non-executive Board Members</b>		
Ngoepe P E	232 501	153 696
Barton J M (Jr)	131 824	83 234
Smith M	29 862	30 748
Mthimunye K R	108 316	64 415
Mathe H	16 838	-
Sibiya D	9 678	-
Hermanus M M	22 971	-
McGill J E	29 267	-
	581 257	332 093

Details regarding the service contracts of Board Members:

Board Members representing government departments are not included above as they received no emoluments.

The current term of office of the non-executive Board Members expires on 30 September 2015.

		2013 R'000	2012 R'000
<b>13</b>	<b>Interest received</b>		
	o Interest income on call accounts	8 254	4 488
	o Interest income on current accounts	1 001	709
		9 255	5 197

<b>14</b>	<b>Finance cost</b>		
	Interest	12	10

<b>15</b>	<b>Reconciliation of net surplus for the period to cash generated from operations</b>		
	Net surplus for the period	18 367	26 347
	<b>Adjustments for</b>		
	Interest	12	10
	Depreciation on property and equipment	14 462	14 056
	Amortisation – intangible assets	839	1 573
	Impairment of assets	-	3 125
	Government grant recognised	(2 666)	(2 665)
	(Net proceeds) on disposal of fixed assets	(14)	(551)
	Net loss on disposal of fixed assets	559	173

## Reconciliation of net surplus for the period to cash generated from operations (continued)

		2013 R'000	2012 R'000
	Increase in provision for bad debts	323	547
	Interest earned	(9 255)	(5 197)
	Provision for post-retirement medical-aid benefits	4 317	739
	Operating cash flows before working capital changes	26 944	38 157
	<b>Working capital changes</b>		
	Increase in provision for accumulated leave pay	1 520	523
	Decrease in trade and other receivables	(12 190)	(6 899)
	Decrease in trade and other payables	1 705	2 309
	Increase in deferred income	27 826	4 423
	Cash generated from operations	45 805	38 513

<b>16</b>	<b>Acquisitions</b>		
<b>16.1</b>	<b>Property and equipment</b>		
	Equipment	9 617	2 887
	Office furniture	976	3
	Aircraft and boat	2 339	3 407
	Motor vehicles	4 057	-
	Computer equipment	3 575	1 652
		20 564	7 949

<b>16.2</b>	<b>Intangible assets</b>		
	Computer software	473	1 827

<b>17</b>	<b>Contingent liability</b>		
<b>17.1</b>	<b>Bank guarantees</b>		
	Performance bonds and bid bonds issued for contract work to various financial institutions	578	591
		578	591

<b>18</b>	<b>Taxation</b>
	No provision for income tax was made as the Council for Geoscience is exempted in terms of section 10(1)(Ca)(i) of the Income Tax Act.

		<b>2013 R'000</b>	<b>2012 R'000</b>
<b>19</b>	<b>Operating lease commitments</b>		
<b>19.1</b>	<b>Lease of office space</b>		
	At reporting date, the outstanding commitments under non-cancellable operating leases which fall due are as follows:		
	Up to 1 year	425	399
	Total lease commitments	425	399
	The Council for Geoscience is leasing office premises from EVN Africa for a period of 1 year with an extension option, effective from 1 April 2013, for average lease payments of R35 454 (VAT inclusive) per month.		

<b>19.2</b>	<b>Lease of office printing equipment</b>		
	The operating lease between Xerox and the Council for Geoscience runs from 1 July 2012 to 30 June 2015. At the reporting date, the outstanding commitments under non-cancellable operating leases which fall due are as follows:		
	Up to 1 year	1 495	1 495
	2 to 5 years	1 495	2 990
	Total lease commitments	2 990	4 485
	<b>Contingent rentals are determined as follows:</b>		
	Black and white prints/images made in excess of 100 000 per month are charged at R0.10 and colour prints/images made in excess of 30 000 per month are charged at R0.75 (VAT inclusive) per copy.		
	All prints/images below 100 000 and 30 000 for black and white and colour respectively are included in the fixed monthly rental of R124 605 (2012/13) and R124 605 (2011/12).		

<b>20</b>	<b>Financial instruments</b>
	Financial instruments consist of cash and cash equivalents, investments with financial institutions, trade and other receivables and trade and other payables.
<b>20.1</b>	<b>Credit risk</b>
	Financial assets, which potentially subject the Council for Geoscience to concentrations of credit risk, consist principally of cash, short-term deposits and trade receivables. The cash equivalents and short-term deposits of the Council for Geoscience are placed with reputable financial institutions. Trade receivables are presented net of the allowance for doubtful debts. Credit risk with respect to trade receivables is limited because of the large number of customers being dispersed across different industries and geographical areas. Accordingly, the Council for Geoscience has no significant concentration of credit risk.  The carrying amounts of financial assets included in the statement of financial position represent the entity's exposure to credit risk in relation to those assets.  Trade and other receivables are controlled by well-established policies and procedures which are reviewed and updated on an ongoing basis. The Council for Geoscience does not have any significant exposure to any individual customer or counterparty.

## Financial instruments (continued)

<b>20.2</b>	<b>Interest rate risk</b>		
	The entity's exposure to interest rate risk and the effective interest rates on the financial instruments at reporting date are:		
	31 March 2013		
		Weighted average effective interest rate %	Weighted average effective interest rate %
	<b>Assets</b>		
	Cash	3.20 %	3.70 %
	Call accounts	5.26 %	5.46 %
	<b>Investments</b>		
	The risk is perceived to be low because:		
	<ul style="list-style-type: none"> <li>Funds are only invested with approved financial institutions according to the policy of the Council for Geoscience, as was approved by the Board.</li> </ul>		
	<ul style="list-style-type: none"> <li>Investments are only reinvested or invested with Executive Management approval.</li> </ul>		
<b>20.3</b>	<b>Foreign currency risk</b>		
	The Council for Geoscience undertakes certain transactions denominated in foreign currencies, hence exposures to exchange rate fluctuations arise. It is not policy for the Council for Geoscience to take out cover on these outstanding foreign currency transactions because these transactions take place on an ad-hoc basis. The Council for Geoscience exposure at 31 March 2013 is disclosed in note 21.		
<b>20.4</b>	<b>Airborne operations risk</b>		
	Risk in respect of the airborne operations of the Council for Geoscience has been identified and transferred to third parties, namely insurance and an external operator.		

<b>21</b>	<b>Foreign currency exposure</b>						
				2013 R'000			2012 R'000
		Exchange rate	Foreign amount	R-value	Exchange rate	Foreign amount	R-value
<b>21.1</b>	<b>Trade receivables</b>						
	Foreign currency						
	Euro	R 11.58079	€ 215	R 2 487	R 10.00480	€ 215	R 2 149
	US\$	-	-	-	R 7.49290	\$ 198	R 1 487
<b>21.2</b>	<b>Banks</b>						
	Foreign funds						
	Moroccan Dirham	R 1.05737	DH 7 760	R 8 204	R 0.90967	DH 7 009	R 6 383
	Euro	R 11.58079	€ 29	R 344	R 10.00480	€ 161	R 1 610



		2013 R'000	2012 R'000
<b>22</b>	<b>Related-party transactions</b>		
	During the period, the following related-party transactions took place between the Council for Geoscience and the Department of Mineral Resources:		
	Deferred income	32 276	45 324
	During the period, the following related-party transactions took place between the Council for Geoscience and the Department of Science and Technology:		
	Deferred income	3 500	-
	Refer to note 10 for further details regarding deferred income transactions.		
	The Council for Geoscience offers geoscience services to government departments.		
	Government grants		
	Revenue	223 006	154 405
	Emoluments are also related-party transactions, please refer to note 12.		

<b>23</b>	<b>Reconciliation between budget and statement of financial performance</b>		
	Net surplus per the statement of financial performance	18 367	26 347
	<b>Adjusted for:</b>		
	Grant deferred	35 909	9 667
	Revenue	(16 014)	(16 961)
	Operating income	(11 516)	(5 909)
	Interest paid	(1)	3
	Surplus/loss on assets scrapped	558	(551)
	Demolishing of building	3 455	-
	Decreases in provisions	323	547
	Bad debts	11	1 308
	Foreign exchange	(1 609)	(3 082)
	Depreciation	114	29
	Personnel expenditure	12 567	3 999
	Direct projects costs – Commercial Local	3 765	10 412
	Direct projects costs – Commercial Foreign	861	2 325
	Direct projects costs – Statutory	(36 018)	(27 751)
	Overheads	(10 772)	(383)
	Net surplus/deficit per approved budget	-	-

		2013 R'000	2012 R'000
<b>24</b>	<b>Irregular expenditure</b>		
	Opening balance	-	281
	Add: Irregular expenditure – current year	-	544
	Irregular expenditure awaiting condonation	-	825
	Analysis of expenditure awaiting condonation per age classification		
	Current year	-	544
	Prior year	-	281
	Total	-	825
	<b>Details of irregular expenditure (not condoned)</b>		
	Incident	Disciplinary steps taken.	
	Tender awarded without a valid tax clearance certificate	An investigation was conducted and the senior procurement officer responsible was found negligent and was given a warning. No financial loss was incurred.	

<b>25</b>	<b>Correction of fundamental error</b>		
<b>25.1</b>	<b>Correction of inventory</b>		
	<p><b>Nature</b></p> <p>Over the years the Council for Geoscience has printed and collected publication titles in the form of Maps, Map Explanations and Books. These publications are kept in stores and were never recognised as inventory in terms of GRAP 12 until the current period. A resolution was taken by the Board to dispose of excessive publications.</p> <p><b>Effect</b></p> <p>Effect of error on current year assets and prior year accumulated surplus is as follows:</p> <p>Correction of error</p>	-	5

		2013 R'000	2012 R'000
25.2	<b>Correction of prior year depreciation error</b>		
	<p><b>Nature</b></p> <p>The Council for Geoscience has outsourced the operation and maintenance services of its aircraft. During the 2011/12 financial year, the service provider was changed and in the process the log books were misplaced and management could not determine the hours flown to calculate the depreciation on aircraft components.</p> <p><b>Effect</b></p> <p>Effect of error on current year assets and prior year accumulated surplus is as follows:</p> <p>Correction of error</p>	(266)	-

25.3	<b>Correction of prior year staff debt error</b>		
	<p><b>Nature</b></p> <p>This amount was received in the reported year as settlement of a bursary debt from an ex-employee. A debt was not raised in the 2011/2012 financial statements when the acknowledgement of debt form was signed, and was only raised in the reported year.</p> <p><b>Effect</b></p> <p>Effect of the prior year error accumulated surplus is as follows:</p> <p>Correction of error</p>	(61)	-

26	<b>Heritage assets disclosure</b>		
	<p><b>Nature</b></p> <p>The Council for Geoscience has the following different classes of heritage assets not yet disclosed in the financials:</p> <ul style="list-style-type: none"> <li>- Diamond and gold sample collections</li> <li>- Library books, maps and publications</li> <li>- Museum collections</li> </ul> <p><b>Effect</b></p> <p>These collections have a potential of becoming heritage assets, however, they have not yet been recognised in the reported year as management is still in the process of consulting with geological experts concerning measurement criteria of these collections.</p>		







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