



ANNUAL REPORT 2014 COUNCIL FOR GEOSCIENCE





CONTENTS



GENERAL INFORMATION

1. GENERAL INFORMATION OF THE COUNCIL FOR GEOSCIENCE	3
2. LIST OF ABBREVIATIONS/ACRONYMS	5
3. STRATEGIC OVERVIEW	8
3.1 Vision	8
3.2 Mission	8
3.3 Values	8
3.4 Strategic Outcome-Orientated Goals	8
4. LEGISLATIVE AND OTHER MANDATES	9
5. ORGANISATIONAL STRUCTURE	10
5.1 Board of Directors of the Council for Geoscience	10
5.2 Executive Team	12
6. FOREWORD BY THE CHAIRPERSON OF THE BOARD	14
7. OVERVIEW BY THE CHIEF EXECUTIVE OFFICER	18
PART B	23

1

PERFORMANCE INFORMATION

1. STATEMENT OF RESPONSIBILITY FOR PERFORMANCE INFORMATION	24
2. AUDITOR'S REPORT: PREDETERMINED OBJECTIVES	25
3. OVERVIEW OF THE PERFORMANCE OF THE COUNCIL FOR GEOSCIENCE	25
3.1 Service Delivery Environment	25
3.2 Organisational Environment	26
3.3 Key Policy Developments and Legislative Changes	26
4. PERFORMANCE INFORMATION BY PROGRAMME	27
4.1 Performance Management Criteria and Performance Targets of the Council	
for Geoscience	27
4.2 Corporate Performance Targets of the Council for Geoscience	28

4.3 Linking Performance with Budgets	34
5. SUMMARY OF FINANCIAL INFORMATION	35
5.1 Revenue Collection	35
5.2 Programme Expenditure	35
5.3 Capital Investment, Maintenance and Asset Management Plan	36
6. HIGHLIGHTS OF ACTIVITIES	38
7. DISSEMINATION OF INFORMATION	116



126

GOVERNANCE

1. INTRODUCTION	127
2. EXECUTIVE AUTHORITY	127
3. THE BOARD OF THE COUNCIL FOR GEOSCIENCE	127
4. RISK MANAGEMENT	139
5. INTERNAL CONTROL UNIT	142
6. INTERNAL AUDIT AND RISK COMMITTEES	142
7. COMPLIANCE WITH LAWS AND REGULATIONS	144
8. FRAUD AND CORRUPTION	144
9. MINIMISING CONFLICT OF INTEREST	144
10. CODE OF CONDUCT	144
11. QUALITY ASSURANCE	145
12. HEALTH, SAFETY AND ENVIRONMENTAL ISSUES	146
13. BOARD ADMINISTRATOR	147
14. PUBLIC AWARENESS	148

HUMAN RESOURCE MANAGEMENT

1. INTRODUCTION	156
2. OVERVIEW OF HUMAN RESOURCE MATTERS	156
3. PRIORITIES FOR THE YEAR UNDER REVIEW	156
4. CAREER SUPPORT AND DEVELOPMENT OF STAFF	158
5. HIGHLIGHTS OF ACHIEVEMENTS	159
6. HUMAN RESOURCE OVERSIGHT STATISTICS	160
PART E	165

FINANCIAL INFORMATION

1.3	ST	ATEMENT OF RESPONSIBILITY	166
2.	AU	DIT AND RISK COMMITTEE REPORT	167
3.	RE	PORT OF THE CHIEF EXECUTIVE OFFICER	169
4. REPORT OF THE AUDITOR-GENERAL TO PARLIAMENT ON THE COUNCIL			
	FO	OR GEOSCIENCE	171
5.	AN	NUAL FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 MARCH 2014	175
	1	STATEMENT OF FINANCIAL POSITION AT 31 MARCH 2014	175
	2	STATEMENT OF FINANCIAL PERFORMANCE FOR THE PERIOD ENDED 31 MARCH 2014	176
	3	STATEMENT OF CHANGES IN NET ASSETS FOR THE PERIOD ENDED 31 MARCH 2014	177
	4	CASH FLOW STATEMENT FOR THE PERIOD ENDED 31 MARCH 2014	178

5	NOTES TO	THE FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 MARCH 2014	179
	1	Accounting policies	179
	2	New standards and interpretations	185
	3	Property and equipment	185
	4	Intangible assets	187
	5	Inventories	187
	6	Retirement benefit	188
	7	Trade and other receivables for exchange revenue	190
	8	Cash and cash equivalents	191
	9	Trade and other payables	191
	10	Deferred income	191
	11	Accruals	194
	12	Deficit/surplus from operations	194
	13	Interest received	197
	14	Finance cost	197
	15	Reconciliation of net surplus for the period to cash generated from operations	197
	16	Acquisitions	197
	17	Contingent liability	198
	18	Taxation	198
	19	Operating lease commitments	198
	20	Financial instruments	199
	21	Foreign currency exposure	200
	22	Related-party transactions	201
	23	Irregular expenditure	201
	24	Correction of prior year errors	201
	25	Heritage assets disclosure	204



PART A GENERAL INFORMATION





1. GENERAL INFORMATION OF THE COUNCIL FOR GEOSCIENCE

REGISTERED NAME:	Council for Geoscience
PHYSICAL ADDRESS:	280 Pretoria Street Silverton, Pretoria South Africa
POSTAL ADDRESS:	Private Bag X112 Pretoria 0001
TELEPHONE NUMBER: FAX NUMBER: E-MAIL ADDRESS: WEBSITE ADDRESS: EXTERNAL AUDITORS: BANKERS: BOARD ADMINISTRATOR:	+27 (0)12 841 1911 +27 (0)12 841 1203 info@geoscience.org.za www.geoscience.org.za Auditor-General of South Africa Nedbank and ABSA in Silverton, Pretoria Nomkhosi Cele (Acting)



2. LIST OF ABBREVIATIONS/ACRONYMS

AMS	Anisotropy of Magnetic Susceptibility
ANNS	Artificial Neural Networks
ATP	Annual Technical Programme
BBBEE	Broad-Based Black Economic Empowerment
BCC	Business Continuity Committee
BGR	Federal Institute for Geosciences and Natural Resources (Bundesanstalt für Geowissenschaften and Rohstoffe)
BGSi	British Geological Survey International
BSC	Balanced Scorecard
CBD	Central Business District
СВМ	Coal-Bed Methane
CCS	Carbon Capture and Storage
CEO	Chief Executive Officer
CGS	Council for Geoscience
CO ₂	Carbon Dioxide
CO2CRC	Cooperative Research Centre for Greenhouse Gas Technologies
DBARS	Draft Basic Assessment Reports
DCP	Dynamic Cone Penetrometer
DERA	German Mineral Resources Agency (Deutsche Rohstoffagentur)
DMR	Department of Mineral Resources
DO	Dissolved Oxygen
DRD	Durban Roodepoort Deep
DWA	Department of Water Affairs
EAP	Employee Assistance Programme
EC	Electrical Conductivity
EE	Employment Equity
EEA	Employment Equity Act
EGU	Environmental Geoscience Unit
EIA	Environmental Impact Assessment
EWP	Employee Wellness Programme
FC	Fuzzy Clustering
FL	Fuzzy Logic
FMPPI	Framework for Managing Programme Performance Information



GIS	Geographic Information System
GRAP	Generally Recognised Accounting Practice
GSN	Geological Survey of Namibia
GST	Geological Survey of Tanzania
HDPE	High Density Polyethylene
НМС	Hydrological Monitoring Committee
HR	Human Resources
HSE	Health, Safety and Environment
IAEA	International Atomic Energy Agency
IC	Ion Chromatography
ICCP	Integral Coaching® Certification Programme
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
ICT	Information and Communications Technology
IGC	International Geological Congress
IHC	Inherent Hazard Classes
KOSH	Klerksdorp, Orkney, Stilfontein and Hartebeesfontein
KUP	Karoo Uranium Province
LA-ICPMS	Laser Ablation Inductively Coupled Plasma Mass Spectrometry
LG	Logistic Regression
LIMS	Laboratory Information Management System
MGGSP	Mining Governance and Growth Support Project
MHSC	Mine Health and Safety Council
MQA	Mining and Qualification Authority
MTEF	Medium-Term Expenditure Framework
NDP	National Development Plan
NEPAD	New Partnership for Africa's Development
NGD	National Geographic Database
NGG	Nuclear Geo-Hazards Group
NHBRC	National Home Builders Registration Council
NPC	Not-for-Profit Company
NSF	National Science Foundation (United States of America)
OAGS	Organisation of African Geological Surveys
ORMC	Operational Risk Management Committee
OSL	Optically Stimulated Luminescence
PAA	Public Audit Act



PCA	Principal Component Analysis
PFMA	Public Finance Management Act
PGE	Platinum-Group Element
PGM	Platinum-Group Metal
PHS	Proactive Health Solutions
PPM	Parts Per Million
PPR	Preferential Procurement Regulations
РуGMI	Python Geophysical Modelling and Interpretation
QDS	Quarter-Degree Sheet
RBM	Richards Bay Minerals
RCAs	River Catchment Areas
RDP	Reconstruction and Development Programme
REE	Rare-Earth Element
SAICE	South African Institution of Civil Engineering
SAMINDABA	South African Mineral Deposits Database
SANAS	South African National Accreditation System
SANS	South African National Standards
SCM	Supply Chain Management
SEM	Scanning Electron Microscope
SMWMP	Strategic Mine Water Management Plan
TDS	Total Dissolved Solids
ТЕМ	Time-Domain Electromagnetic
ΤΝΟ	Netherlands Organisation for Applied Scientific Research (<i>Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek</i>)
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VMS-SEDEX	Volcanogenic Massive Sulphide-Sedimentary Exhalative
WofE	Weights of Evidence
WRC	Water Research Commission
XRF	X-Ray Fluorescence



3. STRATEGIC OVERVIEW

3.1 Vision

Our aspiration is to become *Leaders in Applied Geoscience Solutions*.

3.2 Mission

- To advance the knowledge, understanding and sustainable management of the geological environment, including geohazards and mineral, energy and water resources.
- To provide timely geoscience data, information and knowledge to address the developmental priorities of the nation.
- Our public activities support evidence-based decision making and build effective public capacity in the geosciences.
- We build and maintain national geoscience infrastructure with qualified professionals.
- Our applied geoscience research is world class, locally relevant and responsive to the most important challenges facing our society.

3.3 Values

- We work together as a team across functions to solve problems, develop novel ideas that create new value for our stakeholders and to improve the organisational performance of the Council for Geoscience.
- Our targets are challenging, yet realistic, and we take ownership of our personal actions and work commitments. We hold ourselves personally accountable for achieving results.
- We consistently provide prompt and courteous services to our external and internal customers and stakeholders.
- Our focus is excellence and continuous improvement in everything we do.

- We strive for a diverse workplace by incorporating the contributions of people from a wide variety of backgrounds, promoting an inclusive culture and demonstrating respect for the individual.
- We ensure the professional development and personal wellbeing of our staff in a learning organisation.

3.4 Strategic Outcome-Orientated Goals

The following ideal outcomes were formalised by the Board of the Council for Geoscience:

- The Council for Geoscience is a financially viable and structurally robust organisation catering for all stakeholders and utilising multiple revenue streams.
- The Council for Geoscience is responsive to the developmental needs of the country and is recognised among global leaders in the geological field because of its commitment to excellence.
- Employees view the Council for Geoscience as an organisation offering attractive career opportunities.

Strategic outcomes of the Council for Geoscience

The Council for Geoscience is confident that it has identified all the key challenges for the organisation and that the strategic objectives, measures and actions that have been put in place will lead to the achievement of its vision and mission.

The Council for Geoscience has listed the following outcomes:

Market (stakeholder/customer) perspective

- Increased customer/client/stakeholder satisfaction
- New products/services/technologies.

Economic/financial growth perspective

• Increased revenue



- Increased funding for statutory work
- Improved budget management.

Effective systems (organisational) perspective

- Improved planning and institutional reporting
- Improved business risk management and security
- Improved compliance and corporate governance
- Improved information and knowledge management
- Improved contract and project management
- Improved business processes efficiency.

World-class people perspective

- Increased access to critical/scarce skills (technical as well as managerial)
- Increased retention of critical/scarce skills
- A conducive work environment (positive culture, diversity, leadership)
- An improved employee performance culture
- A transformed Council for Geoscience.

4. LEGISLATIVE AND OTHER MANDATES

Constitutional mandate

The constitutional mandate of the Council for Geoscience is found in sections 24 and 26 of the National Constitution of the Republic of South Africa.

Legislative mandate

The principal fixed mandate and the one under which the Council for Geoscience was

established is the Geoscience Act (Act No. 100 of 1993) and the Geoscience Amendment Act (Act No. 16 of 2010). The organisation is listed as a schedule 3A Public Entity in terms of the Public Finance Management Act (Act No. 1 of 1999). The objectives underlying the establishment of the Council for Geoscience are to develop and publish world-class geoscience knowledge products and to render geoscience-related services to the South African public and industry.

The Geoscience Amendment Act (Act No. 16 of 2010) that was signed into law by the President of South Africa in December 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 that are still exempted deal with 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.



5. ORGANISATIONAL STRUCTURE

5.1 Board of Directors of the Council for Geoscience



























Board Members

- 1. Prof. P E Ngoepe Chairperson of the Board University of Limpopo
- 2. Mr M W Kota Chief Executive Officer Council for Geoscience
- 3. Mr B A Gerryts Department of Science and Technology
- 4. Prof. M A Hermanus Council for Scientific and Industrial Research
- 5. Mr M Mabuza Department of Mineral Resources
- 6. Dr H Mathe Tranter Resources (Pty) Limited
- 7. Dr J E McGill Council for Scientific and Industrial Research
- 8. Ms K R Mthimunye Bluewaves Consulting Services
- 9. Dr M Mayekiso Department of Environmental Affairs
- **10. Mr M P Nepfumbada** Department of Water Affairs
- **11. Ms S Ngxongo** Department of Human Settlements
- **12. Mr M Riba** Department of Rural Development and Land Reform

Alternate Members



Ms D Fischer (Alternate to Dr M Mayekiso) Department of Environmental Affairs



Ms R Mdubeki (Alternate to Mr M Riba) Department of Rural Development and Land Reform



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*



5.2 Executive Team



Mxolisi Kota Chief Executive Officer



Nomkhosi Cele Board Administrator (Acting)



APPLIED GEOSCIENCE CORPORATE SERVICES (Acting)



Fhatuwani Ramagwede Executive Manager

SCIENTIFIC SERVICES REGIONAL GEOSCIENCE AND MAPPING (Acting)



Gerhard Graham Executive Manager

FINANCIAL SERVICES



Leonard Matsepe Chief Financial Officer



6. FOREWORD BY THE CHAIRPERSON OF THE BOARD



Mandated by the Board, the organisation has already started to implement dramatic changes during the last quarter of the 2013/14 financial year. Converting the Council for Geoscience into the envisaged ideal organisation will be a long and arduous process; however, the Board of Directors and Management are sure of the path chosen for the organisation and are confident that the new improved Council for Geoscience will be more than a match for the short- and long-term challenges facing the organisation.

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



I consider it my duty and privilege as Chairperson of the Board of Directors of the Council for Geoscience to submit this foreword to the Annual Parliamentary Report of the organisation for the 2013/14 financial year.

This hundred and first year of the Council for Geoscience has certainly been marked by a dramatic strategic repositioning and re-alignment of the organisation, an endeavour which was initially embarked on in 2012. Changes in the functional structure and operating model were clearly needed for the organisation to successfully deal with present and predicted future challenges. During this past financial year, the Board and Executive Management have therefore engaged in developing and establishing the operational framework needed for a sustainable, strong and efficient organisation.

The role of geoscience institutions worldwide has had to adapt to the ever-growing and changing demands of the community, and the Council for Geoscience is no different. Indeed, the organisation has had to rethink entirely the role it plays in the country, the African continent and even further afield. Therefore, the organisation embarked on an extensive review process, the results of which have led to a strategic repositioning of the organisation and a new operational model being approved by the Board in November 2013. This streamlined operational model includes the centralisation of support services and transformation of the Council for Geoscience thrusts into client-focused operational units.

The financial position of the organisation is solid. In addition to the grant the Council for Geoscience receives from National Treasury, the organisation is engaged in international work, and during this reporting period it has been awarded a number of additional revenue-earning projects. Commercial revenue augments the funds of the organisation and, to some extent, subsidises the statutory work the organisation has to undertake. The Council for Geoscience earned a commercial surplus of R1.5 m for the 2013/14 financial year.

I take pleasure in reporting that the technical audit of the organisation has indicated a result of 96.83% for the performance index on the annual

technical programme (ATP). This excellent result clearly indicates that the Council for Geoscience is achieving its operational targets.

The Council for Geoscience is engaged in various key projects supported through the MTEF process, such as a project in support of stimulating investment into the minerals and energy sectors, the derelict and ownerless mines projects and the strategic mine water management project. I am pleased to report that during the period under review various levels of success were reached and progress was made on all these projects.

Commercial activities not only bring in muchneeded revenue, but also benefit the staff by fostering interaction with renowned international geoscience role players and exposure to the geology of the continent and even further afield. The Council for Geoscience has in this way also significantly enhanced its presence in Africa and is currently involved in the following projects on the continent:

- The Organisation of African Geological Surveys (OAGS), which is a NEPAD initiative. The Council for Geoscience is a key role player in this organisation, the mandate of which is to foster and sustain excellence in government-supported geoscience endeavours on the continent of Africa.
- 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 applied geosciences.
- Providing direct capacity-building support to African geological surveys through a number of programmes and interventions.

The most important geoscience event of this decade for Africa and especially for the subcontinent is the 35th International Geological Congress (IGC), to be hosted by South Africa in collaboration with other southern African countries in 2016. The Local Organising Committee is hard at work on the preparations for this prestigious event, which provides an ideal opportunity for capacity building and the



development of the geosciences in the region. The more than 6 000 expected delegates will also be afforded the opportunity to acquaint themselves with the unique geology of the subcontinent.

Another busy financial year is expected for the Council for Geoscience. The organisation will continue to implement its agreed strategic changes, all the while attending to business as usual. A strong emphasis will be placed on enhancing and expanding the marketing efforts of the Council for Geoscience to establish the organisation as the most appropriate body for any public geoscience-related queries, information and research.

The Council for Geoscience acknowledges the significant support this organisation has received from our previous Minister of Mineral Resources, Ms Susan Shabangu and I want to congratulate Advocate Ngoako Ramatlhodi on his appointment to the portfolio. I look forward to cooperating with him. In addition, the Council for Geoscience has received valued support from the Minister and the Department of Science and Technology, for which I am grateful. Achieving the goals of the organisation is not possible without such support.

The Council for Geoscience is on the verge of a complete overhaul — a daunting undertaking for any organisation. However, the Board, Management and staff are looking beyond the temporary upheaval this process entails and are looking forward confidently to the reborn organisation. The renovated Council for Geoscience is bound to play a decisive role in the future of South Africa, the continent of Africa and beyond.

Maaeys

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



7. OVERVIEW BY THE CHIEF EXECUTIVE OFFICER



The past year has certainly been momentous for the Council for Geoscience.

Mr Mxolisi W Kota Chief Executive Officer of the Council for Geoscience



As leader of the Council for Geoscience, it is my duty and privilege to submit this overview of the organisation for the period April 2013 to March 2014. The past year has certainly been momentous for the Council for Geoscience and marks the beginning of the dramatic transformation of this century-old institution into an entity equipped to face the future confidently.

Late in the second semester of 2012, the Council for Geoscience embarked on a path to bring about what can only be described as the most wide-ranging organisational changes of its more than a centurylong history. I was appointed as Chief Executive Officer in December 2012, with the express mandate of leading the repositioning strategy of the Council for Geoscience and directing the implementation of the resulting strategic changes. The objective of this entire process was to position the Council for Geoscience optimally to meet the demands and priorities of its fast-changing 21st century environment, which includes its national role and its increasing presence in the international geoscience community. A comprehensive assessment of the Council for Geoscience was done that comprised such factors as the requirements of its mandate, especially with regard to the Geoscience Amendment Act (Act No. 16 of 2010) and, most importantly, the priorities expressed by its stakeholders and clients. Additionally, the expected significant impact of the changes to the Minerals and Petroleum Resources Development Amendment Act on the organisation had to be taken into consideration.

After the review, a formal strategic planning and organisational design process was initiated, which culminated in the adoption of a new functional structure and operating model for the organisation. During its last meeting of 2013, the Board of Directors of the Council for Geoscience approved the new corporate strategy, setting the stage for the implementation, during 2014, of these radical changes. The new operating model was designed to increase the efficacy of the interface between the Executive Management and all the support functions based in the Silverton corporate centre, and the client-facing operational offices and project teams. Broadly, the objective of the new operating model is to enhance communication, sharpen personal accountabilities, expedite decision making and bring about a more effective and client-focused organisation.

Implementing these radical structural changes was not the only achievement of the Council for Geoscience during the financial reporting period; there were other key successes as well. Among these was the completion of the geological mapping of South Africa at a scale of 1:250 000 - a milestone in the mapping history of the organisation and the country. The mapping was done to an international standard, which means that the country now has access to modern regional reconnaissance geoscience maps that indicate the location of key natural resources. In addition, the organisation is at the forefront of modern technology, using not only the traditional methods of documenting geology, but also a multitude of new airborne and space-borne datasets. An MTEF funding allocation has enabled the organisation to undertake, inter alia, highresolution hyperspectral and airborne geophysics and geochemical surveys, resulting in GIS-integrated, dynamic digital geoscience maps.

The organisation is engaged in various national projects in support of government initiatives, such as managing the environment with regard to the legacy of mining in the country, including acid mine drainage and derelict and ownerless mines. Moreover, we have been tasked with promoting exploration and mining investment in the minerals and energy sectors. As regards exploration and investment in the minerals sector, the Council for Geoscience has successfully concluded its project in KwaZulu-Natal and the teams have already transferred their focus to the next region, which is the Northern Cape. Another project on the natural resources of South Africa that was finalised during the reporting period is a study on the coal resources and reserves of the country. This study is the first comprehensive assessment of the coal resources and reserves of South Africa since the report of 1987 by J H Bredell. Significant changes have taken place in the industry in recent years and an updated assessment was required for the long-term national infrastructure and coal-industry planning processes of the country. The findings of the assessment are that more than 60% of the remaining coal resources and reserves are encountered in the Waterberg Coalfield. Plans are underway to publish the results of this study in due course.

Additionally, the Council for Geoscience has been involved with Eskom in its Nuclear Siting Investigation Programme since 1995. At the beginning of June



2013, the Council for Geoscience concluded the delivery of the seismic design through the submission of the final Probabilistic Seismic Hazard Analysis report for the Thyspunt site. Chapters on geology and seismic hazard for the Thyspunt Site Safety report, as well as chapters on geology and seismic hazard for the interim Site Safety reports for the remaining sites in the New Build programme were delivered to Eskom at the end of March 2014. The final Probabilistic Seismic Hazard Analysis report was successfully reviewed by an international panel of experts and is considered a gold standard for the nuclear industry.

As a role player in the wider geoscience community of the African continent, the Council for Geoscience has been particularly successful in increasing the amount of work it undertakes to support other African countries in improving their geoscience infrastructure. Such projects, funded by the respective national governments or with the financial assistance of multilateral development institutions, such as the World Bank and the European Development Fund, have already been concluded in Mozambique, Morocco and Ghana and, currently, similar projects are being executed in Tanzania, Namibia, and even much further afield in Haiti.

The Organisation of African Geological Surveys (OAGS) finalised a strategy for the sustainable strengthening of African geological surveys, which focused on natural resources governance, enforcing sustainable mineral resources exploitation, as well as preventing and mitigating natural disasters by establishing long-term strategic cooperation relationships in these areas. This strategy was adopted for implementation at the Africa Europe Business Forum and at the European Commission meeting in Brussels. During the Annual General Meeting of the OAGS in Accra, Ghana, the Council for Geoscience was elected as the permanent Secretariat to the OAGS.

Preparations for the 35th International Geological Congress are underway and a not-for-profit company was formed to take legal responsibility for the congress. The first circular for the 35th IGC was distributed to more than 8 000 recipients. The legacy programme is taking shape and is focusing on the promotion of the geoheritage of South Africa and the rest of the continent. Two of the products envisaged are a publication on the geoheritage of Africa and a special volume on the mineral resources of Africa. Efforts to secure sponsorships for the event from mining companies and other sources are in progress.

The Council for Geoscience, unfortunately, has also had to contend with a number of challenges, mainly a lack of appropriate financial and human resources. The increase in the mandate of the organisation has not been matched by a similar commitment of resources and the organisation therefore has to prioritise its geoscience programme commitments carefully, while taking into account the commercial projects the organisation is obliged to undertake to balance its books. To compound these difficulties, the lack of adequate financial resources adversely affects the recruitment, development and retention of young geoscientists by the organisation. This, in turn, unfavourably affects the human capital development objectives of the organisation, such as the transfer of skills and professional succession. Moreover, future organisational expansion to maintain state-ofthe-art science equipment may be hampered, with attendant critical knock-on effects on the research output of the organisation.

While these challenges have the potential to derail the ambitious strategic repositioning trajectory of the organisation in the medium term, they have not been sufficient to hinder the organisation from achieving its performance objectives during the reporting period.

Consequently, the Council for Geoscience has established a number of human capital development initiatives to assist in the development of applied geoscience solutions of the highest calibre in order to meet the evolving needs and requirements of our key stakeholders and improve the lives of South Africans.

To give effect to this vision, the organisation actively supports the attainment of higher qualifications through further studies, with the particular objective of creating opportunities for recently appointed young geoscientists to gain advanced qualifications. This initiative has resulted in the number of permanent staff studying towards Master's and PhD degrees increasing to 42, exceeding our target of 35. The significant increase in the number of papers and articles published to 145 has exceeded the performance target of 70, a further testament to the superlative quality of the scientific work done at the Council for Geoscience. Similarly, the demographic profile of our staff continues to show gradual improvement in agreement with national transformational objectives, with 69% black and 44% female staff members for the reporting period.

The financial position of the Council for Geoscience is steady, with current assets amounting to R242m and assets totalling R436.2m. The organisation will be able to meet its current liabilities, which amount to R96m. The financial performance of the organisation was encouraging, with a total revenue of R290.8m, representing growth of 6.7% on the previous year's figure. More funds were spent on statutory projects than in the previous financial year. A surplus of R1.5m was achieved in the period under review. The performance is expected to improve in the next financial year as the implementation of our ambitious repositioning strategy starts to bear fruit.

No successful organisation can report such positive outcomes without the collaborative effort of all its stakeholders. I would like to gratefully acknowledge the tremendous support the Council for Geoscience received from our previous Minister of Mineral Resources, Ms Susan Shabangu during her tenure of office. The Director-General, Dr Thibedi Ramontja and the staff of our line department, the Department of Mineral Resources, can always be depended on to support our organisation and I wish to thank them heartily. I also wish to extend our gratitude to the Department of Science and Technology for their input and continued support of the Council for Geoscience.

Furthermore, I take this opportunity to extend our warmest congratulations to our newly appointed Minister of Mineral Resources, the Honourable Advocate Ngoako Ramatlhodi, MP, and we look forward to receiving his input and support as we seek to align our programmes to contribute to effectively addressing the most pressing challenges facing our nation.

Above all, I wish to thank our stakeholders for their contributions in the development of our repositioning strategy. I acknowledge the encouragement of and judicious guidance by the CGS Board, especially of our chairperson Professor Phuti Ngoepe. It is with a great sense of pride that I also wish to voice my appreciation for the commitment and disciplined performance of our staff and the remarkable leadership shown by my executive team who have shouldered the extra burden of effecting the strategic organisational changes in addition to their normal, already heavy, workloads. Thank you. You are the mainstay of the Council for Geoscience.

Looking ahead, a key focus of the organisation will be on the national priorities of South Africa, such as assisting in rural development and the alleviation of poverty, remediation of environmental issues and expanding the organisation to service particular geographical areas. Specific emphasis will be placed on developing higher-resolution datasets for priority areas and on expediting the release of the 1:50 000-scale maps of the Council for Geoscience, which provide detailed geoscience information and increase our understanding of the geology of particular regions.

Looking back at the 2013/14 financial year, the Council for Geoscience has weathered another eventful period, has made bold and decisive choices and has already started to implement the sweeping changes to fashion the agile, performance-orientated and operationally efficient organisation that was initially envisaged when we started out on our repositioning process. Over the course of a hundred and one years, failure has never been an option for the Council for Geoscience. Now, with our collective organisational feet firmly planted on the bright new path we have chosen for this organisation, we firmly believe that with every passing year the Council for Geoscience can only grow in stature and become even more relevant to the national priorities of our country and to the wider geoscience community it serves.



Mr Mxolisi W Kota Chief Executive Officer Council for Geoscience





PART B PERFORMANCE INFORMATION



1. STATEMENT OF RESPONSIBILITY FOR PERFORMANCE INFORMATION

Statement of Responsibility for Performance Information for the Year ended 31 March 2014

The Chief Executive Officer is responsible for the preparation of the Council for Geoscience's performance information and for the judgements made in this information.

It is the responsibility of the Chief Executive Officer to establish and implement a system of internal controls designed to provide reasonable assurance as to the integrity and reliability of performance information.

In my opinion, the performance information fairly reflects the actual achievements against planned objectives, indicators and targets as per the strategic and annual performance plan of the Council for Geoscience for the financial year ended 31 March 2014.

The performance information of the Council for Geoscience for the year ended 31 March 2014 has been examined by the external auditors and their report is presented on page 171 to page 174. The performance information was also approved by the Board of the Council for Geoscience.

Mr Mxolisi W Kota Chief Executive Officer Council for Geoscience 28 July 2014

Prof. P E Ngoepe Chairperson Board of the Council for Geoscience 28 July 2014



2. AUDITOR'S REPORT: PREDETERMINED OBJECTIVES

The Auditor-General performed the necessary audit procedures on the performance information to provide reasonable assurance in the form of an audit conclusion. The audit conclusion on the performance against predetermined objectives is included in the report to Management, with material findings being reported under the *Predetermined Objectives* heading in the *Report on Other Legal and Regulatory Requirements* section of the Auditor-General's report.

The Report of the Auditor-General, published as Part E: Financial Information, is contained on pages 171 to 174.

3. OVERVIEW OF THE PERFORMANCE OF THE COUNCIL FOR GEOSCIENCE

3.1 Service Delivery Environment

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) and its Amendment Act (Act No. 16 of 2010). With this mandate, the Council for Geoscience follows a business model which allows for both statutory activities and activities with financial gain. The ratio between commercial and statutory revenue has varied between 30 and 50 per cent over the years and the Council for Geoscience has become increasingly reliant on the commercial income to fund the statutory activities. However, this arrangement has proven to be unsustainable, especially as some of the statutory activities were suspended since 2009 owing to the global economic downturn. Thus, it is envisaged that, in order for the Council for Geoscience to fund national projects in the future, a dedicated investment from the

government is required, such as ring-fenced funding for projects.

The statutory technical programme addressed many of the developmental needs of South Africa, as captured in the government's NDP 2030, 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 government's National System of Innovation.

The Council for Geoscience delivered on these developmental needs by releasing scientific publications and articles in the popular press in the following fields:

• Geoscience mapping:

the Council for Geoscience systematically gathered and documented geoscience information into in-house maintained databases which are, in turn, used by the other fields for their deliverables.

Minerals and energy development: the Council for Geoscience performed research and systematically gathered information on minerals and energy resources in the country in order to stimulate investment in the mining sector and to contribute towards the energy security of South Africa.

• Environment and water:

the Council for Geoscience advised on the identification, prevention and mitigation of the effects of geohazards on people and the environment, as well as assisted in the delivery of water to communities, industry and to agriculture.

 Engineering geoscience and physical geohazards: the Council for Geoscience provided advice in order to reduce the risk to lives and

property from the effects of geohazards.

Council for Geoscience 25

The Council for Geoscience delivered on projects with a financial benefit within the same fields as mentioned above, but from the following sources:

- Agency projects: these projects were solicited from other government departments and public entities.
- **International projects:** these projects were solicited through international tenders.
- **Private sector:** these projects were solicited mainly from local South African companies.
- Multinational research funding: these projects were solicited through joint tenders with other international research institutes.

The Council for Geoscience successfully managed a number of national facilities on behalf of the country, which include:

- the national seismograph network and infrasound observatory, which monitor the earthquakes and other sonic disturbances within the country
- the national borehole core repository, which provides a comprehensive national collection of valuable geoscientific material
- the national geoscientific databases, of which the Council for Geoscience is the custodian
- the national geoscience museum, which provides information to the public
- the national geoscience library and bookshop, which provide both international and local geoscientific publications and maps to the public

 the national geoscience analytical facility, which is available for the analysis of geoscientific material.

3.2 Organisational Environment

The Board and Executive Management of the Council for Geoscience recognised that a complete review of the business model and functions of the organisation was needed in order to strategically reposition the organisation in the context of the changing political, economic, social, environmental, legislative and technological landscape. The ultimate objective of the repositioning process, which started in January 2013, is to achieve a sustainable organisation and to optimise the capabilities of the organisation to make a meaningful contribution to the developmental needs of South Africa.

However, the Council for Geoscience recognised that business as usual should continue during the repositioning process in order to meet agreed deadlines. Thus, the repositioning process has been implemented in a stepwise fashion in order to minimise the impact on delivery.

In addition to the repositioning process, an ageing infrastructure was also identified as a challenge to service delivery and thus the Council for Geoscience has embarked on a recapitalisation programme in order to effect necessary changes.

The transformation processes of the Council for Geoscience have progressed well; however, more still needs to be done. Decreasing income revenues will pose a threat to the ongoing transformation agenda.

3.3 Key Policy Developments and Legislative Changes

The Geoscience Act (Act No. 100 of 1993) was updated by the Geoscience Amendment Act (Act No. 16 of 2010), which was signed into law by the President in December 2010. The Amendment Act took effect on 1 July 2012, and



includes a more comprehensive description of the services rendered by the Council for Geoscience. The Amendment Act expands the mandate of the organisation and reflects the interaction with the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002).

4. PERFORMANCE INFORMATION

BY PROGRAMME

4.1 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 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.

Ten strategic objectives were 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 to the public.
- 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.
- 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.

4.2 Corporate Performance Targets of the Council for Geoscience

In order to evaluate the corporate performance of the Council for Geoscience (CGS), the organisation has developed a range of performance indicators which cover the entire spectrum of activities within the organisation. The range of performance indicators, together with the performance targets for the period 2013/14, is summarised in the accompanying table on pages 29 to 33.


Market (Stakeholder/ Customer) Perspective	TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD-CLASS PRODUCTS AND SERVICES								
Strategic Objective:	To Address Stal	dress Stakeholder Needs							
Performance Indicator	Actual Achievement 2012/2013	Planned Target 2013/2014	Actual Achievement 2013/2014	Deviation from Planned Target to Actual Achievement for 2013/2014	Comment on deviations				
Number of Geoscience Maps and Publications Published In-house	34	16	19	3	The global economic downturn has affected the CGS negatively and it had to cut back on the Annual Technical Programme and, more particularly, the mapping programme. The result is that fewer geoscience publications were produced than those of the previous year. Nevertheless, the target of 16 was exceeded by three.				
Customer Satisfaction Level	88.4%	85%	90.6%	5.6%	According to the customer survey, there has been a general improvement in the attitude of staff and the quality of services. The customer also saw the products and services of the CGS as good value for money.				
Number of Rural Development Project Reports Completed	29	12	29	17	A growing number of small groundwater and engineering geology investigations and mineral potential projects related to rural development contributed to the organisation surpassing the target to a large degree.				
Number of Regional and African Development Project Reports Completed	20	25	16	(9)	CGS involvement in Regional and African Development projects has declined steadily over the past two years mainly because of the completion of existing World Bank projects, as well as the lack of securing new projects.				
Number of Environment- related Project Reports Completed	21	7	23	16	The large number of environmental project reports completed can be attributed to a concerted effort by the CGS to address mining legacies of the past through MTEF- funded projects.				
Annual Technical Programme Performance Index	91.58%	85%	96.83%	11.83%	The CGS is satisfied with the overall completion of its projects and the quality of its products.				

Corporate Scorecard of the Council for Geoscience for 2013/14

Council for Geoscience



Market (Stakeholder/ Customer) Perspective	TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD-CLASS PRODUCTS AND SERVICES								
Strategic Objective:	To Address Stal	To Address Stakeholder Needs							
Performance Indicator	Actual Achievement 2012/2013	Planned Target 2013/2014	Actual Achievement 2013/2014	Deviation from Planned Target to Actual Achievement for 2013/2014	Comment on deviations				
Number of Seismic Stations Installed (MHSP)	2	10	5	(5)	The installation of seismic stations is part of the Mine Health and Safety Plan. In the past, the CGS received funding for the installation of the seismic stations. There was no funding from the MHSC during the year and the CGS decided to use its own resources to install five stations.				

Strategic Objective:	To Effectively Promote the Council for Geoscience and Disseminate Strategic Information to the Public							
Articles published in the Popular Press	7	2	3	1	The CGS managed to submit one more article to the popular press than had been planned for.			
Articles published in Industry Publications	5	4	1	(3)	The CGS did not manage to secure enough funding to publish articles in industry publications.			

Economic/ Financial Growth Perspective	TO ACHIEVE SUSTAINABLE REVENUE AND PROFIT GROWTH									
Strategic Objective:	To Generate Re	To Generate Revenue								
Total Revenue	R289.9m	R348m	R314.3m	(R33.7m)	The CGS did not reach this target owing to the lack of income on the commercial side of operations (see comment below).					
Contract Revenue	R86.5m	R79.8m	R40.5m	(R39.3m)	Securing a significant number of international projects is still a problem after the financial downturn five years ago.					
Ratio of External Revenue to Total Revenue	36.11%	23.8%	20.34%	(3.46%)	See comment above.					
Number of Large Tenders and Proposals Submitted (>R1m)	15	24	24	0	It appears that there has been a slight improvement in the global economy and that this has led to an increase in the funding available for projects.					
Tender Success Rate	40%	10%	20.83%	10.83%	The CGS was very successful in winning 20.83% of the total number of large tenders and proposals submitted.					



Strategic Objective:	To Manage Ove	ge Overhead Efficiency						
Performance Indicator	Actual Achievement 2012/2013	Planned Target 2013/2014	Actual Achievement 2013/2014	Deviation from Planned Target to Actual Achievement for 2013/2014	Comment on deviations			
Ratio of Overheads to Total Cost	56.79%	60%	53.31%	6.69%	An increase in expenditure on the MTEF projects resulted in the lower overhead costs.			
Ratio of Personnel Cost to Total Cost	58.91%	59%	51.27%	7.73%	The CGS managed to keep personnel costs down by not filling all the posts that became vacant during the past year (see staff turnover).			

Effective Systems (Organisational) Perspective	TO DEVELOP AND MAINTAIN EFFECTIVE AND STREAMLINED PROCESSES, USING APPROPRIATE TOOLS AND METHODOLOGIES								
Strategic Objective:	To Develop and	To Develop and Implement Effective Policies and Procedures							
Number of Audit Qualifications	0	0	0	0	All PFMA regulations and deadlines were met; unqualified audit report obtained.				
Number of Policies Written and/or Reviewed	New Measure	5	3	(2)	A new HR manager was only appointed late during the financial year. Thus, the HR office could only manage to obtain the approval of three policies during the shortened time available to complete the work.				

Strategic Objective:	To Drive Prefere	ential Procurem	nent		
Preferential Procurement as a Percentage of Total Procurement	34%	40%	18.03%	(21.97%)	The nature of the services of the CGS 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 caused the CGS not to achieve the target of 40% set for the period under review.



World-Class People Perspective	TO DEVELOP A WORLD-CLASS GEOSCIENCE ORGANISATION WHERE OUR PEOPLE CAN GROW AND PERFORM							
Strategic Objective:	To Attract and F	To Attract and Retain a Skilled Workforce						
Performance Indicator	Actual Achievement 2012/2013	Planned Target 2013/2014	Actual Achievement 2013/2014	Deviation from Planned Target to Actual Achievement for 2013/2014	Comment on deviations			
Staff Turnover	12.9%	0%	-2.88%	(2.88%)	The salary budget of the CGS was under severe pressure during the course of the year and the organisation decided to defer the appointment of new staff to the 2014/15 financial year.			
Number of Staff Sponsored for MSc and PhD Degrees	46	35	42	7	The CGS increased the funding available for bursaries for its permanent staff. This created opportunities for recently appointed young scientists to gain advanced qualifications which, in turn, contributed to the increased number of staff enrolled for MSc and PhD degrees.			
Proportion of Scientists to Total Staff	41.12%	45%	35.53%	(9.47%)	The CGS 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	48.92%	57%	47.22%	(9.78%)	The CGS is continually losing scientists with MSc and PhD degrees to the private sector.			
Protégé Satisfaction Level	62%	60%	-	-	The CGS discontinued the Protégé Satisfaction Survey owing to the lack of resources in the training and development section, not recruiting young scientists during the previous year, and the resignation of some of the protégés and mentors.			



Strategic Objective:	To Enhance Pre	sent Levels of	Excellence		
Performance Indicator	Actual Achievement 2012/2013	Planned Target 2013/2014	Actual Achievement 2013/2014	Deviation from Planned Target to Actual Achievement for 2013/2014	Comment on deviations
Number of Papers and Articles Published	115	70	145	75	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 more opportunities for scientists to publish their results as papers or as oral presentations at conferences, workshops, etc.
Number of Projects with External Collaborators	45	50	50	0	The CGS views collaboration with external partners as an important strategy to build experience and improve skills. The target for the year was achieved.
Number of Strategic Science Partnerships	33	20	29	9	This measure focuses on 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.

Strategic Objective:	To Build a Posit	ive Organisatio	onal Culture		
Percentage Satisfied Staff Members	71.9%	65%	72.5%	7.5%	Although the satisfaction level is 7.5% above the target, in reality it has not changed much from that of the previous year.

Strategic Objective:	To Reflect and I	Embrace the D	iversity of South A	frica	
Percentage Overall Employment Equity Targets in the Organisation (White-Black)	31:69	34:66	31:69	3%	The CGS is satisfied with the progress made relating to the White-Black equity target.
Percentage Overall Employment Equity Targets in the Organisation (Male-Female)	59:41	55:45	56:44	(1%)	The appointment of suitably qualified female staff remains a challenge.



4.3 Linking Performance with Budgets

2013/2014				2012/2013		
Subprogramme	Budget	Actual Expenditure	(Over)/Under Expenditure	Budget	Actual Expenditure	(Over)/Under Expenditure
	R'000	R'000	R'000	R'000	R'000	R'000
Management	13 684	17 190	(3 506)	13 043	14 364	(1 321)
Internal Audit	-	-	0	-	-	0
Strategic Planning	2 895	3 174	(279)	2 824	2 932	(108)
Corporate Services	1 871	1 557	314	2 788	1 326	1 462
Administration — General	118 697	42 030	76 667	102 650	39 863	62 787
Finance	9 310	9 688	(378)	7 479	7 975	(496)
Human Resources	3 066	3 210	(144)	4 717	4 572	145
Logistical Services	6 600	7 893	(1 293)	5 159	6 182	(1 023)
Technical Services	4 026	5 211	(1 185)	4 459	4 281	178
Information Technology	8 462	7 826	636	8 130	7 879	251
Central Regions	9 008	6 790	2 218	8 264	7 181	1 083
Limpopo	4 406	4 044	362	3 748	4 071	(323)
Western Cape	15 331	16 085	(754)	12 673	13 651	(978)
Eastern Cape	2 318	2 509	(191)	2 838	2 280	558
Northern Cape	2 198	1 986	212	1 907	1 805	102
KwaZulu-Natal	3 022	3 077	(55)	2 772	2 918	(146)
Marine Geosciences	3 519	3 320	199	3 708	2 903	805
Engineering Geosciences	5 394	7 129	(1 735)	8 299	18 642	(10 343)
Mineral Resources Development	16 534	46 449	(29 915)	12 300	22 189	(9 889)
Water Geosciences	10 386	14 336	(3 950)	14 931	11 689	3 242
Environmental Geosciences	13 107	30 524	(17 417)	8 191	17 921	(9 730)
Drilling Unit	1 041	1 330	(289)	1 183	1 977	(794)
Laboratory	14 601	17 754	(3 153)	13 195	14 733	(1 538)
Geochemistry	5 240	5 743	(503)	5 205	4 363	842
Spatial Data Management	5 594	5 028	566	7 120	6 322	798
Geophysics	13 328	13 307	21	10 381	12 592	(2 211)
Seismology	18 193	18 297	(104)	12 319	19 046	(6 727)



2013/2014				2012/2013			
Subprogramme	Budget	Actual Expenditure	(Over)/Under Expenditure	Budget	Actual Expenditure	(Over)/Under Expenditure	
	R'000	R'000	R'000	R'000	R'000	R'000	
Collections Management	1 889	1 994	(105)	1 888	2 056	(168)	
Library	4 829	5 104	(275)	3 522	4 740	(1 218)	
Information Management	3 581	4 484	(903)	3 596	4 474	(878)	
Ghana	-	-	-	-	5	(5)	
IGC 2016	-	1 154	(1 154)	-	-	-	
Aircraft and Helicopter	1 110	753	357	90	599	(509)	
Eskom	3 282	3 850	(568)	7 127	6 800	327	
Total	326 522	312 826	13 696	296 506	272 331	24 175	

5. SUMMARY OF FINANCIAL INFORMATION

5.1 Revenue Collection

2013/2014				2012/2013			
Sources of Revenue	Estimate	Actual Amount Collected	(Over)/Under Collection	Estimate	Actual Amount Collected	(Over)/Under Collection	
	R'000	R'000	R'000	R'000	R'000	R'000	
Government Grant	271 232	250 345	20 887	223 006	185 241	37 765	
Commercial	79 680	40 210	39 470	72 000	87 034	(15 034)	
Publications	180	244	(64)	600	307	293	
Total	351 092	290 799	60 293	295 606	272 582	23 024	

5.2 Programme Expenditure

2013/2014				2012/2013			
Programme	Budget	Actual Expenditure	(Over)/Under Expenditure	Budget	Actual Expenditure	(Over)/Under Expenditure	
	R'000	R'000	R'000	R'000	R'000	R'000	
Annual Technical Programme	128 741	114 760	13 981	117 664	56 092	61 572	
Commercial	45 211	25 203	20 008	50 903	55 517	(4 617)	
Total	173 952	139 963	33 989	168 567	111 609	56 955	

5.3 Capital Investment, Maintenance and Asset Management Plan

Summary of payments by infrastructure projects

2013/2014				2012/2013			
Infrastructure projects	Budget	Actual Expenditure	(Over)/Under Expenditure	Budget	Actual Expenditure	(Over)/Under Expenditure	
	R'000	R'000	R'000	R'000	R'000	R'000	
Scientific Equipment	6 145	6 145	0	7 588	7 588	0	
Technical Equipment	0	0	0	0	0	0	
Audio/Visual and Photographic Equipment	529	529	0	381	381	0	
Specialised Equipment	0	0	0	0	0	0	
Office Equipment	481	481	0	875	875	0	
Computer Equipment	2 509	2 509	0	2 958	2 958	0	
Office Furniture	260	260	0	961	961	0	
Vehicles — Passenger and Light Delivery	4 179	4 179	0	4 010	4 010	0	
Vehicles — Other	191	191	0	0	0	0	
Vehicles — Boat	0	0	0	0	0	0	
Vehicles — Aircraft (Body)	0	0	0	0	0	0	
Vehicles — Aircraft (Components)	0	0	0	1 218	1 218	0	
Aircraft — Eurocopter (Body)	0	0	0	0	0	0	
Aircraft — Eurocopter (Components)	1 562	1 562	0	0	0	0	
Computer Software	2 892	2 898	0	182	182	0	
Small Assets	380	380	0	0	0	0	

36 Annual Report 2014

Summary of payments by business units

2013/2014				2012/2013			
Subprogramme	Budget	Actual Expenditure	(Over)/Under Expenditure	Budget	Actual Expenditure	(Over)/Under Expenditure	
	R'000	R'000	R'000	R'000	R'000	R'000	
Management	13 684	17 190	(3 506)	13 043	14 364	(1 321)	
Internal Audit	-	-	0	-	-	0	
Strategic Planning	2 895	3 174	(279)	2 824	2 932	(108)	
Corporate Services	1 871	1 557	314	2 788	1 326	1 462	
Administration — General	118 697	42 030	76 667	102 650	39 863	62 787	
Finance	9 310	9 688	(378)	7 479	7 975	(496)	
Human Resources	3 066	3 210	(144)	4 717	4 572	145	
Logistical Services	6 600	7 893	(1 293)	5 159	6 182	(1 023)	
Technical Services	4 026	5 211	(1 185)	4 459	4 281	178	
Information Technology	8 462	7 826	636	8 130	7 879	251	
Central Regions	9 008	6 790	2 218	8 264	7 181	1 083	
Limpopo	4 406	4 044	362	3 748	4 071	(323)	
Western Cape	15 331	16 085	(754)	12 673	13 651	(978)	
Eastern Cape	2 318	2 509	(191)	2 838	2 280	558	
Northern Cape	2 198	1 986	212	1 907	1 805	102	
KwaZulu-Natal	3 022	3 077	(55)	2 772	2 918	(146)	
Marine Geosciences	3 519	3 320	199	3 708	2 903	805	
Engineering Geosciences	5 394	7 129	(1 735)	8 299	18 642	(10 343)	
Mineral Resources Development	16 534	46 449	(29 915)	12 300	22 189	(9 889)	
Water Geosciences	10 386	14 336	(3 950)	14 931	11 689	3 242	
Environmental Geosciences	13 107	30 524	(17 417)	8 191	17 921	(9 730)	
Drilling Unit	1 041	1 330	(289)	1 183	1 977	(794)	
Laboratory	14 601	17 754	(3 153)	13 195	14 733	(1 538)	
Geochemistry	5 240	5 743	(503)	5 205	4 363	842	
Spatial Data Management	5 594	5 028	566	7 120	6 322	798	
Geophysics	13 328	13 307	21	10 381	12 592	(2 211)	
Seismology	18 193	18 297	(104)	12 319	19 046	(6 727)	
Collections Management	1 889	1 994	(105)	1 888	2 056	(168)	
Library	4 829	5 104	(275)	3 522	4 740	(1 218)	



2013/2014				2012/2013			
Subprogramme	Budget	Actual Expenditure	(Over)/Under Expenditure	Budget	Actual Expenditure	(Over)/Under Expenditure	
	R'000	R'000	R'000	R'000	R'000	R'000	
Information Management	3 581	4 484	(903)	3 596	4 474	(878)	
Ghana	-	-	-	-	5	(5)	
IGC 2016	-	1 154	(1 154)	-	-	-	
Aircraft and Helicopter	1 110	753	357	90	599	(509)	
Eskom	3 282	3 850	(568)	7 127	6 800	327	
Total	326 522	312 826	13 696	296 506	272 331	24 175	

6. HIGHLIGHTS OF ACTIVITIES

Although the business of the Council for Geoscience is dualistic in nature, entailing geoscientific research and mapping functions with respect to its statutory mandate, and providing services and products for financial gain to external clients, the Council for Geoscience sees itself as a public entity institution with the priority of delivering geoscience expertise to the South African public.

The statutory functions according to the mandate of the Council for Geoscience are, to a large extent, funded by the State and involve scientific research, the maintenance of a national capacity to acquire and curate geoscience information, and the combination of information and expertise to provide solutions to stakeholders.

The Council for Geoscience fosters scientific excellence in four functional geoscience thrusts.

- **Geoscience mapping:** The systematic gathering and documenting of geoscience information. This represents the cornerstone of all the other business thrusts.
- Minerals and energy development: To conduct research and systematically

gather information on minerals and energy resources in the country to stimulate investment in the mining sector and to contribute towards the energy security of South Africa.

Environment and water:

To systematically gather geoscience information and conduct research in order to advise on the identification, prevention and mitigation of the effects of geohazards on people and the environment, as well as to gather information on the quality and quantity of groundwater resources in order to assist in the delivery of water to communities, the industry and agriculture.

Engineering geoscience and physical geohazards mapping: To gather and analyse geoscience information to provide advice in order to reduce the risk to lives and property from the effects of geohazards.

The Council for Geoscience directs investment into building excellence in the above thrusts in order to enhance the organisation's national and international competitiveness for the areas, which will ensure world-class expertise and facilities in all these fields.





MINERAL RESOURCES AND ENERGY

The Mineral Resources and Energy thrust of the Council for Geoscience provides precompetitive geoscience information that supports and facilitates onshore and offshore energy and mineral exploration in South Africa. The information and data form the basis for long-term investment by industry and society in the minerals and energy sectors to assure stable employment and prosperity, as well as to guide government policy on minerals development. This is achieved through integrated programmes of data gathering and assessment conducted at a national and a regional scale.

The Council for Geoscience undertakes activities of national strategic importance that support government programmes such as the NDP 2030 *(Economy and employment; Economic infrastructure; Inclusive rural economy* focus areas), the New Growth Path and the Integrated Resource Plan, which seek to eradicate poverty, to promote the creation of employment, energy security, diversification of the economy, including the promotion of the green economy, and to promote growth by identifying six priority sectors focused on infrastructure and rebuilding the productive sectors of the economy, including mining.



PROJECTS IN THE MINERALS AND

ENERGY SECTORS

The promotion of exploration and mining investment in the minerals and energy sectors

Our motivation

The Exploration and Mining Investment project funded by an MTEF allocation was developed to address and stimulate the presently declining investment into mineral exploration in South Africa. Several mineral belts and districts were identified for the project and the government has provided funding for investigations over a period of three years in the Tugela region in KwaZulu-Natal, the Namaqualand region in the Northern Cape and the Sabie–Pilgrim's Rest goldfields in Mpumalanga.

Our progress

Activities included a desktop study involving the collection, collation and synthesis of information from the literature review with the aim of understanding the geological controls of the various types of mineralisation and the associated geophysical and geochemical signatures, high-resolution airborne geophysical surveys and airborne soil sampling.

Tugela project in KwaZulu-Natal

Airborne magnetic, radiometric and time-domain electromagnetic (TEM) investigations, as well



Digital elevation model of the Giyani Greenstone Belt.



as soil sampling, were completed during the year under review. Soil sample preparation and analyses by the Analytical Laboratory of the Council for Geoscience were completed for about 8 000 samples, while analyses by a foreign laboratory for Au, Pt and REE were done. A preliminary technical report was compiled. Laboratory analysis of the remaining 3 000 soil samples is expected to be completed within four months and the final report will be submitted early in 2015.

Namaqualand project in the Northern Cape

An airborne magnetic and radiometric survey commenced in December 2013 and is expected to be completed early in the new financial year. Airborne soil sampling will commence in mid-2014 and will take about seven months to complete.

Sabie-Pilgrim's Rest goldfield

A tender evaluation of the airborne magnetic and radiometric survey will be conducted and the survey is expected to commence in June 2014.

Soil samples collected over the last few years will be analysed by an external laboratory for about 60 elements. The analysis is expected to be completed by the end of 2014.

Giyani Greenstone goldfield

A desktop study and integration of the available magnetic, geological and soil geochemical data





have been completed for the Giyani Greenstone Belt, together with the publication of a report highlighting the predictive bedrock and new gold prospectivity targets.

The future

The aim of the Exploration and Mining Investment project is to provide updated geoscientific data gathered by means of modern technologies and reports, accompanied by mineral prospectivity maps to highlight mineral target areas in the country for future mineral investment.

Mineral commodities in the Western Cape Province

Our motivation

Mineral commodities in the Western Cape were investigated with the aim of compiling and updating the database of mineral commodities and to highlight minerals which are currently or could potentially be exploited economically. The database now comprises a total of 2 463 records, representing 36 mineral commodities. These records include working deposits, abandoned deposits, deposits never exploited, and mineral occurrences, the latter requiring further investigations such as drilling and sample analysis in order to prove or disprove their economic viability.

Our progress

The database has 49 fields for each record, which describe the type of commodity, mining status, locality, size, mining production, host and ore type, surface ownership, mining ownership, data references and compiler name, and date of compilation. Twenty seven (27) of these commodities are either economically or potentially viable. The resources are large, with the exception of building sand in the greater Cape Town region which will probably be depleted within 20 years. Other minerals currently mined are limestone, dolomite, diamonds, heavy minerals, silica sand, ball clay, gypsum, bentonite, salt, granite, sandstone, kaolin, industrial sand, lignite, and manganese. Sufficient reserves of these minerals are available for at least 50 years,

IN TERMS OF MINING, CONSTRUCTION MATERIALS SUCH AS STONE AGGREGATE, BRICK CLAY, BUILDING SAND AND GRAVEL CONSTITUTED THE MAJORITY OF ACTIVE MINES IN THE WESTERN CAPE PROVINCE FOR THE YEAR 2013/14, ACCOUNTING FOR 155 (73%) OUT OF 211 MINES.

with the exception of heavy minerals, lignite, and manganese which will be depleted earlier. Deposits of phosphate in the Saldanha region, with a total resource of 100 million tonnes, tungsten at Riviera, northwest of Piketberg, with a reserve of 99 360 tonnes, and rare-earth elements at Steenkampskraal near Kliprand, with a resource of 83 600 tonnes, will almost certainly be exploited in the near future.

Uranium, shale gas, nickel, marble and sepiolite have the potential to become economically viable in the medium to long term. Uranium is present in Beaufort Group sandstone in the Karoo, northeast of Laingsburg. The deposits are relatively small, with most containing resources of less than 1 000 tonnes uranium. Some 112 deposits have been discovered, with 64 containing the by-product molybdenum. Total resources in the province are 20 000 tonnes uranium and 28 000 tonnes molybdenum, but the commodity price must rise to sustainable levels before mining can occur. Shale gas is present in Ecca Group shales in the same area northeast of Laingsburg, but considerable exploratory investigations are needed in order to prove or disprove its viability. Comparisons with the gas-



producing Barnett Shale in Texas in the USA, where the gas resource is 10 trillion cubic metres, indicate that the Ecca Group shales could hold as much as 23 trillion cubic metres of gas. Nickel is present at Hondekloof, west of Kliprand, where the ore body totals 2 million tonnes at a grade of 0.88% Ni. A feasibility study was conducted, but plans for mining were abandoned because of the high infrastructure costs and excessive transport distances to a nickel-refining plant. However, if market conditions improve, mining of the deposit may become viable. Marble was previously quarried near Vanrhynsdorp between 1918 and 1996 and, should it become viable again, there are still considerable resources to support sustainable mining over a long period. Sepiolite is a magnesium-rich smectitic clay used as an absorbant and adsorbent, a thickener in paints, sealing cements and adhesives, a sealant in dam walls and toxic waste, and as a carrier in the paper industry. Two deposits are present northwest and south of Lutzville, with inferred resources of 100 000 and 150 000 tonnes respectively. However, further exploration is required in order to determine the economic viability of these deposits.



Mineral commodities in the Western Cape Province.



SMALL-SCALE BRICK MAKING

Brick making conducted by small-scale miners at the Beaufort West municipal commonage. Alluvium is mixed with clinker and water and the sludge is placed in brick moulds. The damp bricks are dried and placed in a hollow clump for baking over a three-week period.



Alluvium excavated for brick making.

The brick clump is heated using coal dust and wood.



Alluvium railway clinker wet mixture for clay bricks.

Damp brick moulds laid out for drying.



The future

In conclusion, a total of 19 mineral commodities are being mined in the Western Cape Province and another 8 are potentially economic. Their distribution is important for potential small-scale miners, government organisations, urban 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 Biosphere Reserve have been compiled and a workshop was held on 11 March 2014.

The distribution of industrial minerals in parts of the Free State, Gauteng, Eastern Cape, North West and Mpumalanga Provinces of South Africa

Our motivation

Realising the dependency of the infrastructure programme on industrial minerals, the Council for Geoscience undertook research to

investigate and document the occurrence and distribution of industrial minerals, the geological– structural relationship that might have led to the formation of mineral deposits, and to categorise the industrial mineral deposits according to important benchmarks, critical properties and application suites.

The success or failure of the massive infrastructure plan of the government, consisting of 18 strategic infrastructure projects, depends on the availability of building and construction materials and the price, quality and timeous delivery of the raw materials. Most of these raw materials are industrial minerals such as aggregates, limestone, silica and clays. Industrial minerals are those minerals not explored or mined for their metals content, but because of their physical properties or the physical properties they impart on the material with which they are being mixed and used.

Our progress

The compilation of the Industrial Minerals Report is in progress. This report includes a



Commissioner's Salt Pan with a salt crust in the Bushmanland.



summary of the basic geological, geochemical and mineralogical properties of industrial mineral occurrences, and a map which categorises deposits according to estimates of the ore deposit size, application suites, relevant physical properties and chemical-mineralogical qualifiers. The areas concerned are parts of the Free State, Gauteng, the Eastern Cape, North West and Mpumalanga for the following industrial mineral commodities: and alusite, beryllium, bentonite, asbestos, bauxite, dolomite, limestone, magnesite, brick-making clays, fire clays, aggregates, sand, dimension stone, fluorite, gas (natural gas, helium, shale gas), gypsum, heavy-mineral sands (ilmenite, rutile), kieselguhr, lithium, peat, phosphate, pigments, pyrophyllite, REE, silica, soda

ash, talc, torbanite, uranium, vermiculite and zeolite. The bulk of the information comes from fieldwork done during the period 2005 to 2009 and is supplemented by the extensive use of old, unpublished reports of the Council for Geoscience. The occurrences of the industrial minerals were captured on the SAMINDABA Database, which was used for the compilation of maps showing the distribution of the various industrial mineral deposits.

The future

Detailed investigations of industrial mineral commodities are essential to assist the construction and mineral industries with the initial benchmarking of industrial minerals.



Mining of the pyrophyllite deposit to the east of Ottosdal.



Prospecting for strategic minerals in South Africa

Our motivation

Strategic minerals are defined here as metals critical to industry and which have a ready market either in or outside South Africa. Examples of strategic metals include, *inter alia*, copper, indium, rare-earth elements (REE), tellurium, germanium, lithium and gallium. Most of these metals are applied in green energy technologies and, should they be deployed in significant quantities, demand is likely soon to outstrip supply. Therefore, there is an urgent need to find new resources.

Sampling in the Blokspruit area in the North West Province



A) Drilling team assembling a drill rig.

- B) Core logging and soil assaying using a portable X-ray fluorescence instrument.
- C) Core trays with weathered granite and actinolitic rock.
- D) Location of borehole 7 in the study area.



Our progress

Rare-earth element resources have been the first priority for this investigation, with the focus on heavy-REE deposits because of global demand. At the moment, a potential deposit has been identified and delineated within the Blokspruit area in the North West Province. Eight boreholes have been drilled and the core has been logged, sampled and assayed for geochemical signatures. The first report, which focuses on the first five boreholes (BH 1–5), was completed and another report will be finalised, focusing on the remaining boreholes (BH 6–8). A literature review of germanium and gallium occurrences has been completed and potential targets have been delineated. The target areas include coalfields and VMS-SEDEX deposits.

The future

Detailed core logging and geochemical correlation with depth have shown that there is a substantial core loss from the top weathered portion of the deposit, and the loss is concluded to have had an effect on the grade estimation with depth. Thus, for the next financial year, trenching has been proposed over drilling, and grade estimation will be done from a bulk sample. In addition, a detailed geometallurgical study will be done with the aim of predicting a recovery approach. With regard to germanium and gallium, sampling will be undertaken in several coal power stations and coalfields, and a few samples will be taken from VMS-SEDEX deposits. Subsequently, a coalfield with considerable concentrations of these elements will be studied further.



Inventory of the uranium resources of South Africa

(Reports 2014-0170; 2014-0171; 2014-0187)

Our motivation

South Africa has been an important player in the international market since uranium production first commenced in the country in 1952. South Africa has steadily and consistently been producing uranium since then, albeit at a lower level in recent years.

The major part of the nation's uranium resources is hosted by quartz-pebble conglomerate and derived tailings dams, with significant amounts of resources hosted by sandstone, coal, carbonaceous shale and surficial deposits. The other deposit types do not make a contribution to the present national uranium resource inventory, as they currently do not have a reasonable and realistic potential for eventual economic extraction.

Our progress

In order to meet the electricity demand and avoid additional power shortages while reducing carbon emissions, South Africa's state-owned utility Eskom solicited bids for a fleet of up to 12 reactors in 2007. However, the process was put on hold owing to the financial downturn of the following year. In 2010, the South African Government approved the Integrated Resource Plan that envisages nuclear generating capacity increasing from 1.8 GWe at present to about 9.6 GWe by 2030, with the first units online by 2025. The government reconsidered this nuclear development plan following the Fukushima accident in Japan but, after reassessing the safety of the Koeberg nuclear facilities, announced that nuclear power remains a necessary and increasingly important component of the energy strategy, despite the financial difficulties. Furthermore, global nuclear capacity is expected to increase from the current 344 GWe to 574 GWe by 2030, despite nuclear phaseout policies being implemented by countries such as Germany, Belgium and Switzerland. The commitments to nuclear energy of countries

EIGHT OUT OF THE THIRTEEN DEPOSIT TYPES DEFINED BY THE INTERNATIONAL **ATOMIC ENERGY AGENCY (IAEA) FOR URANIUM ARE FOUND IN SOUTH AFRICA, NAMELY QUARTZ-PEBBLE CONGLOMERATE.** SANDSTONE, LIGNITE AND COAL, BLACK SHALE AND SURFICIAL. **INTRUSIVE. GRANITE-RELATED AND** PHOSPHATE DEPOSITS.

such as China, India, Brazil, Russia and the United Kingdom, among others, contribute to this increase in the planned nuclear energy capacity. Therefore, the uranium demand is expected to increase in the future, which will, in turn, have a positive effect on future uranium prices.

The future

Against this backdrop, it was seen as necessary for the national uranium resource inventory to be estimated. The inventory will assist the government in policy planning through adequate knowledge of the uranium supply capacity of the country.

Currently, the project team is estimating amounts of uranium below the "resource" level for the Springbok Flats Basin, Karoo Uranium Province and the Namaqualand surficial deposit.



OUR URANIUM OCCURRENCES

The Witwatersrand Basin contains about 84% of the total uranium resources in South Africa, in both the *in situ* and the tailings resources. Approximately 50% of the total resources are in the Witwatersrand underground operations, 34% in their associated tailings facilities, 12% in the Springbok Flats Basin, 3% in the sandstone-hosted deposits of the Karoo Basin and less than 1% in the Namagualand surficial deposit.

The planned and existing nuclear reactors of South Africa (9.6 GWe) will require about 2 000 tonnes of uranium (~2 360 tonnes of U_3O_8) for production. The uranium requirements for these reactors over their entire life will be less than 120 000 tonnes (~142 000 tonnes of U_3O_8). The total uranium resources of South Africa are about 676 200 tonnes of U_3O_8 . Therefore, South Africa has enough uranium to meet the local demand by the planned and existing nuclear energy plants in the country, and to contribute to the global uranium supply.



Major uranium deposits in South Africa.





Proportions of uranium resources per deposit.



A grade-tonnage curve of the uranium resources in the Namaqualand surficial deposit.



DETAILED EXPLORATION IN THE SPRINGBOK FLATS COALFIELD

Determining the distribution, type and content of uranium and the feasibility for extraction

(Report 2014-0151)

Our motivation

The Springbok Flats Coalfield in South Africa is believed to host vast amounts of high-quality coal. Previous studies have shown that some of the coal deposits are closely associated with uranium, meaning that the coal is not suitable for combustion unless the uranium is extracted during beneficiation. Whereas the uranium resources in the Springbok Flats Coalfield have never been exploited, the inferred uranium resources have been estimated at 84 000 tonnes, making the Springbok Flats the second largest uranium field in South Africa, after the Witwatersrand Basin. However, not much is known about the distribution, concentration, form, origin and extractability of uranium in the Springbok Flats Coalfield.

Uranium is an increasingly important fuel, being used in nuclear power stations, where carbon dioxide emissions that contribute to global warming are negligible, in contrast to coalpowered stations. This study intends to focus on the uranium content present in the Springbok Flats Coalfield and how South Africa can benefit from both coal and uranium for power generation. The project will contribute towards achieving the objectives of the Minerals Beneficiation Strategy (2011) of South Africa through scientific



Geological map showing the location of the Springbok Flats Coalfield (red outlined area), 95 km to the north of Pretoria and 50 km to the southwest of Polokwane.



understanding of the relationship between coal and uranium in the Springbok Flats Coalfield, together with its type, content and feasibility for extraction. The geoscience information gathered from this project will also contribute strongly towards the implementation of the proposed Integrated Energy Planning strategy of government, and will contribute towards ensuring the energy security of the country.

Our progress

Natural outcrops of the Karoo Supergroup are extremely scarce in the Springbok Flats Coalfield. Therefore, the main focus of investigation for the year was on drilling five deep boreholes of between 315 and 458 m across the coalfield, and on extracting solid rock core from the subsurface. The entire stratigraphic succession of the Karoo Supergroup was intersected during drilling, including the coal zones. Borehole core logging has been completed and zones with a high radiation have been analysed, using a GR-110 scintillometer. Coal zones have been sampled for uranium analysis.

The future

Sampling of uraniferous mudstones, sandstones and conglomerates will commence in the new financial year. Coarse-grained sandstones will also be sampled for detrital zircon age dating and petrography. Coal zone samples that have been collected will be sent to different laboratories, together with mudstones, sandstones and conglomerates, for uranium analyses. Geological sections throughout the Springbok Flats Coalfield will be constructed and coal zones with uranium mineralisation will be modelled. The data gathered in this project will also be interpreted and incorporated for a doctoral dissertation.



Borehole drilling in the Springbok Flats Coalfield.



A) Coal with bright and moderately bright bands and lenses of pyrite.

- B) Coal with bright calcite cleats and lenses of mudstone.
- C) Newly drilled borehole core of the Springbok Flats Coalfield.
- D) Coal zone of the Ecca Group rocks in the Springbok Flats Coalfield.



Extraction of uranium from coal

(Report 2013-0088)

Our motivation

The Springbok Flats Coalfield in Limpopo overlaps the districts of the Waterberg and Polokwane. Uranium is hosted by coal in the Late Permian uppermost part of the Hammanskraal Formation within the Springbok Flats Basin. The uppermost part of the Hammanskraal Formation consists of interbedded carbonaceous shale and coal and is formally known as the Coal Zone. Only the Coal Zone in the central and northeastern part of the basin is significantly mineralised. The ore bodies contain between 0.16 and 1 kg U/t over a 1 m width and were delineated in a 1 000 km² block in the central part, and in a 600 km² block in the northeastern part of the basin. The uranium in the Springbok Flats is disseminated throughout the coal and carbonaceous shale, with uranium phases having grain sizes of less than 20 microns. The coal seam in the Springbok Flats Coalfield has an average thickness of 5-8 m extending up to 12 m. The coal comprises bright coal with a low ash content, which is a good coking coal for exporting, as well as for the metallurgical industries. The Springbok Flats Coalfield has never been mined because of the presence of uranium in the coal.

The rationale behind this study was to assess the chemical and mineralogical characteristics of the Springbok Flats Coal Zone and to extract the uranium from the coal. The chemical characteristics will be studied by proximate and ultimate analyses, which are the basic accepted characterisation techniques for determining the quality of coal. The mineralogical characteristics of the Springbok Flats Coalfield will be studied by X-ray fluorescence (XRF) and inductively coupled plasma mass spectrometry (ICP-MS) to determine the inorganic component of coal and to quantify the amount of uranium hosted in the coal zone. An instrumental neutron activation analyser will be used to assess the isotope type of the uranium being hosted in the Springbok Flats Coalfield. Thereafter, borehole samples that consist of high amounts of uranium concentration will be selected and an extraction/leaching process will take place. The extraction process will be

conducted under various mediums, namely an acid and basic extraction/leaching medium will be assessed to determine a medium that produces high concentrations of uranium, as well as a method that consumes less liquid.

Our progress

Proximate analysis showed that three out of the five drilled boreholes have some good coal quality characteristics. The coal characteristics were measured on the basis of volatile matter, fixed carbon and ash content. BH2 is observed to have a good coal quality, followed by BH3 and BH4. It should be noted that if BH2 were to be mined, washing the coal for a better yield of coal quality should be considered. It should be noted that BH2, BH3 and BH4 are in the central region of the map, dominated by the Rooiberg Group and Rashoop Granophyre Suite. Boreholes BH1 and BH5 are in the Lebowa Granite Suite. When examining the borehole data from the coal database of the Springbok Flats, the proximate analysis results are compatible with those from the database.

Further chemical analyses will have to be conducted to fully understand the chemical composition of these boreholes. These are ultimate analyses to determine the actual fixed carbon and sulphur content, the calorific value to determine the heating energy contained in these coals, and coal petrography to determine the vitrinite reflectance, as well as the maceral content of the Springbok Flats coals.

Borehole BH1 has a uranium variation of 2.3 ppm to 34.1 ppm. BH2 has a uranium concentration varying from 1.6 ppm to 107.7 ppm, followed by BH3 with a uranium concentration variation of 2.2 ppm to 145.9 ppm. BH4 has a uranium concentration varying from 1.8 ppm to 34.4 ppm and BH5 varies from 1.4 ppm to 10.7 ppm. It was noted that the first upper 1 m of the coal zone has high amounts of uranium in all the drilled borehole samples, except for BH5.

The uranium concentration is low in borehole samples that have a high ash content and high in borehole samples that have moderate amounts of both fixed carbon and volatile matter. This was



observed in BH5 for both the upper and lower coal zones. The uranium concentration in BH5 is observed to be at a maximum level of 10.7 ppm and the maximum ash content is 79%. BH1, BH2, BH3 and BH4 were observed to have a high concentration of uranium when compared with BH5, which had two coal seams. It should be noted that BH2, BH3 and BH4 had good quality coal compared with BH1 and BH5. With increasing metamorphism of coal (degree of maturity/rank), the capacity to adsorb and absorb radioactive elements, such as thorium and uranium, falls in the order of peat-lignite-bituminous coals-anthracite. The reason is a consistent decrease in the number of coordinating humic groups capable of binding thorium and uranium.

The future

It was noted that the coal zone of BH2 has good quality coal in terms of a better content of volatile matter, fixed carbon and ash. BH1 and BH5 had a high ash content and this resulted in a poor quality coal. Therefore, it may be concluded that the BH1 and BH5 coal zones had carbonaceous shale instead of coal.

ICP-MS and XRF revealed that the coal zones of BH1, BH2, BH3 and BH4 had a high amount of uranium concentration compared with BH5. The maximum uranium concentration was observed to be 199 ppm with XRF, and 149 ppm with ICP-MS.



Location of the boreholes drilled in the Springbok Flats Coalfield.

56 Annual Report 2014

Platinum-group elements in the Merensky Reef, Eastern Bushveld Complex

(Report 2014-0184)

Our motivation

The Critical Zone of the Bushveld Complex, which hosts the Merensky and UG2 Reefs, carries the world's largest platinum-group element (PGE)bearing ore bodies. Most studies on the Merensky Reef have concentrated primarily on the western limb of the intrusion, where mining operations yield exposures over many tens of kilometres of strike. Information on the reef from the eastern limb is sparse because platinum exploration and mining only commenced there recently. Merensky Reef samples from Two Rivers Platinum Mine in the Eastern Bushveld Complex were studied under a standard reflected microscope and a scanning electron microscope (SEM) to determine the sulphide mineral assemblage and the characteristics of the platinum-group minerals associated with the ore.

Our progress

The current result indicates base-metal sulphides, pyrrhotite, pentlandite and chalcopyrite as the

principal sulphide phases in the Merensky Reef at the Two Rivers Platinum Mine. Varieties of platinum-group minerals were identified and grouped into three main populations: PtTeBi alloys, PGE sulphides, and PGE arsenides. The PtTeBi alloys form the dominant population of the PGM (55%), followed by PGE sulphides (33%), PGE arsenides (10%) and PGE other metal alloys (2%). The grain sizes range from less than 5 to 142 µm, with an average of 30 µm. There is a strong association of most PGM with the sulphides, typically chalcopyrite. The close association of the PGM within sulphides and at the margins of the sulphides indicates that the PGM were derived from a sulphide melt.

Laser ablation inductively coupled plasma mass spectrometry (LA-ICPMS) analyses on sulphides indicate significant concentrations of platinumgroup element (Pt, Pd, Rh, Ru, Ir, and Os) concentrations, but typically palladium (Pd) in pentlandite, with little to no concentrations of the PGE in the other sulphides.

The future

Similar studies will be undertaken on other parts of the Bushveld Complex such as the Platreef, which forms the northern section of the complex.



UG2 Reef, Two Rivers Platinum Mine, Eastern Bushveld Complex.

Avoidance areas for the prospecting of black granite dimension-stone deposits in three large Eastern Cape sills: Butterworth, Kentani/Dakeni and Komga

(Reports 2014-0085; 2014-0086; 2014-0087; 2014-0088)

Our motivation

Dolerite of the Drakensberg Group is one of the most overlooked resources in the Eastern Cape Province. Although traditionally exploited in the province as high-bulk lowvalue aggregate destined for the construction industry, these same deposits are used as dimension stone in a different value chain to command a higher income per unit volume. Apart from the homogeneous texture that governs aesthetic qualities in dimension stone, both products have essentially similar strength requirements, translating into similar exploration parameters.

Our progress

Historically, the Bojeni–Willowvale area has proven to be suitable for black granite, described as capable of producing "Transkei Black", a dimension stone equivalent to Belfast and Zimbabwe black granite. "Transkei Black" may be even superior in the recovery of large blocks in comparison with Belfast Black located further north. The reason is that this area boasts some of the thickest Eastern Cape dolerite sills.

The incidence of thick voluminous sills and a major magma entry point into the subcontinent at Mazeppa Bay (through east-west-trending gap dykes) could be ideal formative conditions for widely jointed black granite deposits. Colossal heat flow accumulation during magma intrusion and a slow cooling rate could manifest in a solidified mass with a very low incidence of jointing, translating into widely spaced joints or large block sizes. The suitability of the area for "Transkei Black" is apparent from eight known concession areas, exploration attempts, or current mining rights.



The future

This investigation builds upon available exploration information in terms of identifying avoidance areas that contain closely spaced jointing patterns. Using the exclusion principle provides an indication of areas where joint spacing is potentially suitable for the extraction of large "Transkei Black" blocks. These large blocks command the highest prices, especially as an export product. In addition to income, the further delineation of potential dimension stone deposits could lead to local development and industry, both of which are vital in impoverished areas such as the Wild Coast. Additionally, a contribution could be made to existing spatial development plans and initiatives.





Manual — Industrial Minerals of South Africa

Our motivation

The project is part of a cooperation agreement between the Council for Geoscience and the German Mineral Resources Agency (DERA). The project started in 2011 and is conducted by experts from DERA at the Federal Institute for Geosciences and Natural Resources (BGR), together with geoscientists from the Council for Geoscience. Separate studies on the different 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.

Our progress

Numerous administrative issues regarding the first part of the manual, including antimony, heavymineral deposits and rare-earth elements (REE) had to be cleared up during 2013. DERA has since indicated that it wishes to compile a more detailed second report on chrome and platinum compared with the first part of the report. The first field trip of 2013/14 to selected fluorspar, chrome and platinum mines took place from 14 to 27 November 2013. Samples taken during the field trip were prepared and dispatched to Germany.

The future

The project is in progress and a digital version of the report has been compiled on the rareearth elements, antimony and heavy-mineral deposits. The manual on the new deposits will successively be prepared for each specific natural resource. The study will continue in 2014/15, with the commodities chrome, platinum and fluorspar to be investigated.

The studies will also indicate new potential for German investors and natural resource purchasers. DERA intends to technically support and assist German companies interested in becoming involved in the South African mining sector. The demand for German technologies and services for the South African natural resources industry, as an opportunity for German companies, will also be analysed.



Visit to an open-cast platinum operation on the Platreef near Mokopane.





South African and German scientists on a field visit to the Zaaiplaats Fluorspar Mine.

The role of geophysical techniques in

mineral exploration

Geophysical characterisation of strategic minerals in the Bushveld granites

(Report 2014-0123)

The basis for the study is the great potential for mineralisation in the Bushveld granites that still has not been realised, because of the focus on the mafic phase of the complex. The mafic phase is host to vast platinum, chromium and vanadium deposits, as well as other commodities. The Bushveld granites are host to a number of polymetallic mineral deposits, which include rare-earth elements, fluorite, molybdenum, base metals, gold, silver, uranium, thorium, tin and tungsten. These deposits tend to occur localised on a small scale and are ideal for small-scale mining by local communities.

Geophysical characterisation of energy minerals in the Springbok Flats Basin

(Report 2014-0124)

In recent years, South Africa has faced a power crisis as the demand for power has far exceeded supply. Therefore, the Department of Energy has sought ways to address the shortfall. The exploration for uraniferous coal and coal-bed methane (CBM) in the Springbok Flats Basin is therefore of strategic importance. **Geophysics** is applied to societal needs, such as mineral resources, mitigation of natural hazards and environmental protection. Geophysical survey data are used to analyse potential mineral deposits, locate groundwater and assess sites for environmental remediation. The identification and assessment of potential sources of energy minerals to meet energy shortages are crucial and will also facilitate potential growth for the industry. Geophysical studies to fully explore uranium/coal/CBM resources to meet future increased demands for uranium are being undertaken. Geophysical techniques are used as a complementary data set to aid in the understanding of the distribution and genesis of the uraniferous coal deposits and structures favourable for the storage of coal-bed methane.

Our progress

Assimilation of knowledge

South African Mineral Deposits Database (SAMINDABA)

(Report 2014-0153)

Our motivation

The objective of the South African Mineral Deposits Database (SAMINDABA) project is to capture, store and continually update mineral data on mines, mineral deposits and mineral occurrences within the borders of South Africa. Access to this information by means of intelligent queries in different formats such as draft reports, deposit profiles, graphs, resource estimations, mineral maps and digital metallogenic maps assists in guiding development and provides the basis for research to data users, both nationally and internationally. Numerous mineral resource appraisals, reports, maps and mineral datasets have emanated from this database. These activities furnish the government and the mining industry with mineral resource information and advice for informed decision making regarding mineral policy and development issues, and for the promotion of economic geological activity. The sterilisation of mineral deposits can also be prevented during the planning of permanent surface structures such as townships, dams, roads, pipelines and railway lines.

The capturing of new mineral records and updating of existing records are continuing mainly from current research work, reports from government, published literature and maps, unpublished reports and maps from mining and exploration companies, and fieldwork/observations. During the year, new database records have been captured and a number of old database records have been updated and checked, providing for both internal and external enquiries on the mineralisation of South Africa and relevant products. The total mineral records contained in the database have grown from 19 402 to 57 409. These entries include mines, mineral deposits, target/potential areas and occurrences. In 2013. 30 delineated mineral potential areas were added and the database now contains 179 delineated mineral potential areas.

Telephone, e-mail and one-on-one customer enquiries are received on a regular basis from the private sector, small-scale miners, government, regional and town planners, communities and the general public, and approximately 800 mineral enquiries were handled during the year. Geological and mineralogical explanations were also supplied to clients.

The future

SAMINDABA forms part of the corporate modular database of the Council for Geoscience, called GEODE. It is a database of strategic importance as it plays an important role in stimulating and



guiding mining in South Africa by providing mineral occurrence information and by processing this information in relation to geology. The SAMINDABA Database will form part of the planned GEODATA portal, which will provide the technology infrastructure required to make data contained in the various databases accessible to internal users and users outside the organisation.



The increase in mineral deposit data enquiries from 2005 to 2014.



Total mineral records contained in the SAMINDABA Database.



South African Coal and COREDATA Databases

(Report 2014-0031)

Our motivation

In terms of current legislation, the Council for Geoscience maintains a Coal and a COREDATA Database. Both databases are part of the corporate database GEODE and interface with other systems, allowing easy access to users.

This facility enables a centralised point of collection for most of the data available on the geology of the coal deposits of South Africa. The availability of this information in electronic format makes it easy for the information to be disseminated in a user-friendly format, enabling further research work on the geology of the coal deposits, as well as facilitating planning of the optimal use of the country's coal resources and land management.

Our progress

During the year, 436 logs were prepared, 418 header details were coded and captured, 2 235 lithologies for 82 boreholes were captured, 1 316 logs were electronically converted and loaded into the database, and 2 324 logs are still in the conversion process and will be loaded soon. Two hundred and seven (207) logs were prepared and 179 headers captured into the COREDATA Database.

The future

The Coal Database now contains information on 115 630 boreholes, with 2 897 911 lithologies and 1 610 860 analyses. The COREDATA Database contains a total of 87 000 entries.



Coal and COREDATA borehole distribution in the Republic of South Africa.


International Metallogenic Map of Africa database maintenance

(Report 2014-0115)

Our motivation

The Africa Mineral Deposits Database was designed as part of the 1:5 000 000-scale International Metallogenic Map of Africa. It is important to continually update and improve the data necessary for the innovative manipulation and interrogation of the data in the production of a variety of products, including regional exploration target maps and deposit modelling.

Our progress

The International Metallogenic Map of Africa was published in June 2002 by the Council for Geoscience under the auspices of the Commission for the Geological Map of the World, with support from UNESCO. The B-version of the digital International Metallogenic Map of Africa was released in 2003. This Africa Metallogenic DVD was upgraded in 2009 to include projects in ArcMap 9.2 and 9.3 formats, with all shape file projects in WGS84.



Deposits and occurrences added to the Africa Mineral Deposits Database during 2013/14.



Sales of the digital data continued throughout the year.

The digital data have been used for the production of both country-specific and more regionally derived maps and reports. Currently, the Africa Mineral Deposits Database has 12 913 mineral deposit records in Paradox.db format.

The future

The release of the digital data has generated interest within the larger mining community. The maintenance of the Africa Mineral Deposits Database is an ongoing task and the database will be further improved, updated and expanded during the next financial year.

Technology in research

Our New Coal Laboratory

A Coal Laboratory was established to conduct scientific research, as well as commercial work for various mining and exploration companies and research institutions.

The Coal Laboratory will be utilised as a South African and African coal service for

coal petrographic characterisation, coal gas adsorption studies and basic coal characterisation analyses.

The laboratory uses the following instrumentation:

- The Leco CHNS analyser has the ability to characterise coal elemental analyses such as the total carbon, the hydrogen, nitrogen and the total sulphur in coal samples.
- The Leica CTR 6000 microscope with Carl Hilgers software has the ability to characterise the random and maximum



Leco CHNS analyser for ultimate analyses.





Leica CTR 6000 microscope with Carl Hilgers software.



100 Bar high-pressure volumetric analyser.

vitrinite reflectance and to do maceral and microlithotype analyses.

- The Micromeritics 100 bar high-pressure volumetric analyser has the ability to measure the adsorption gas contents, such as methane (CH₄) and carbon dioxide (CO₂) contained in coal samples.
- Furnaces and an oven for the determination of the ash, volatile matter, fixed carbon and moisture contents of coal samples.

In 2013/14, the Coal Laboratory was able to assist mostly university-based clients with coal analyses. During the same period, ICCP (Integral Coaching® Certification Programme) accreditation for the coal petrography microscope was achieved, and various collaborations and partnerships were signed with, among others, the University of the Witwatersrand and the South African Bureau of Standards.

67



GEOSCIENCE MAPPING

Geoscience mapping forms the basis from which products and services that are of value to our stakeholders and clients are derived. It embodies the primary expertise of the Council for Geoscience, and consists of several types of mapping, such as geological, geotechnical, geochemical, geophysical, metallogenic, seismological and marine-geoscience mapping. The main aim of the Geoscience Mapping thrust is to provide world-class (leading) geoscience solutions to stakeholders and customers to enhance the prosperity and sustainability of the resources of the country and the safety of its citizens.

mapping of the country on appropriate scales for national development will be conducted on land and in offshore areas within the territorial and Energy thrust in the identification of potential and/or economic mineral deposits and energy resources, including geothermal energy and other natural energy resources shale gas. The Environment and Water or avoidance of environmental geohazards, protection. This includes the provision of adequate quantities of water to communities, industry and agriculture, and monitoring the use of water. Assistance to the Engineering and Geohazards thrust pertains to safe and sustainable human settlement and infrastructure, Environmental sustainability and resilience, and Inclusive rural economy focus areas of the NDP 2030.

MEETING OUR TARGETS ABROAD

Mapping in Tanzania

(Project sponsored by the World Bank)

The Council for Geoscience is participating in an international geological and regional geochemical mapping project in Tanzania, managed by the British Geological Survey International (BGSi) and funded by the World Bank. Funds are allocated to five project activities, including geological mapping and geochemical mapping, a geotechnical laboratory upgrade, remote sensing and training. The major contributions of the Council for Geoscience involve geological mapping, geochemical and ground geophysical surveys, the provision of training and capacity development support to staff of the Geological Survey of Tanzania (GST), and improvements to the national geoscience database of the GST by acquiring new data, updating existing data and by making data available for rapid dissemination.

Four geologists of the Council for Geoscience assisted the BGSi in the supervision and geological mapping of selected quarterdegree sheets (1:100 000 scale) in Tanzania. Mapping was done in three sessions of six



Locality map for the geochemical survey in Tanzania.



weeks each, until the end of 2013. Areas for eighteen quarter-degree sheets (QDS), nos 82, 83, 101, 102, 146, 147, 148, 162, 166, 167, 178, 179, 185, 228, 229, 272, 273 and 286, were mapped. The teams also supervised the mapping of six of the QDS sheets (nos 148, 166, 167, 228, 229 and 286). In February and March 2014, the team assisted in supervising the map compilations by the teams of the Geological Survey of Tanzania.

Three geoscientists of the Council for Geoscience were involved in supervising the geochemical surveys and in geochemical sampling. Ten QDS in central Tanzania, nos 121, 122, 124, 147, 148, 162, 182, 184, 228 and 229, were identified for the geochemical survey programme. The geochemical sampling was completed in 2013. Three new 30 cm sieve shakers were installed in the sample preparation room of the GST laboratory. After completion of the sample preparation training, the daily routine of sieving the geochemical stream-sediment samples commenced. The first QDS, 162 Dodoma, was completed and the samples were shipped to three laboratories, in Canada, the People's Republic of China, and to the Analytical Laboratory of the Council for Geoscience in Silverton.

Training in ArcGIS and geochemical map compilation and statistics will be carried out in the new financial year, after all the analytical results have been received. Geochemical reports will be compiled by the Tanzanian geoscientists and will be supervised and edited by staff of the Council for Geoscience.



Soil sampling in the Dodoma area in Tanzania.





Samples for orientation studies taken at the Nzuguni Gold Mine in the Dodoma area.

International geological mapping and capacity building in Namibia

(Project sponsored by the Namibian Government)

The Council for Geoscience has recently completed a geological mapping, research and capacity building initiative together with the Regional Geology Division of the Geological Survey of Namibia (GSN). The thirteen-month project produced five new 1:50 000-scale geological maps covering ~3 000 km² along the Orange River, accompanied by an extensive geological explanation. The mapping was supported by modern remote sensing of high spatial resolution multispectral satellite, airborne hyperspectral, and geophysical datasets, as well as petrographic studies, geochronology, metamorphic P-T determinations and whole-rock and isotope geochemistry.

In addition to the geological survey, the project transferred mapping skills to GSN geologists through a three-module training programme. Module 1 involved a lecture series on the techniques of "Modern Mapping", including remote sensing, Geographic Information Systems (GIS), field logistics, staff management, map and database completion, cartography and field research methods. Module 2 consisted of hands-on training for three months in the field, and module 3 entailed a twoweek advanced research-methods course, presented by senior staff of the Council for Geoscience and university lecturers.

The project has been extended for an additional 12 months, with a further four sheets to be mapped, allied research to take place and advanced training of three GSN geologists.





Visual representation of one of the five new maps produced during the recent geological mapping project in southern Namibia.



A GSN geologist taking structural measurements in the field.



Training our young geoscientists

In November, a Field School was held for two young geologists of the Council for Geoscience and seven MQA graduate interns, drawn from five different business units in the organisation. The field trainers were from the Limpopo and Northern Cape regional offices. An initial course on GIS techniques was held in Pretoria in the preceding month to bring participants on par with entering data into a database and plotting various datasets from the database. Thereafter, a short workshop was conducted at the Bellville office before commencing the fieldwork. The purpose was for each trainee to develop both hard and digital copies of a base map and overlays to be utilised in the field. The trainees subsequently relocated to Kuboes, in a Northern Cape community conservation area in the Richtersveld, where they were introduced to the practical aspects of field mapping. Topics included logistics/planning, collecting relevant data, sampling, plotting and interpreting data, and report writing. The participants produced their own map and reports that were evaluated and the results were discussed at a group feedback session.



Participants discussing the finer points of using a structural compass in the field.



Field School participants being given a background briefing on the geology of their field area.

73



Participants of the Field School were responsible for compiling their own outcrop descriptions with the guidance of a trainer.

Supervision of a country-wide airborne geophysical survey of Malawi

(Project sponsored by the Government of Malawi)

The government of Malawi, through the Ministry of Mining, is implementing the Mining Governance and Growth Support Project (MGGSP), with support from the World Bank and European Union. Among others, the project includes a component to promote the minerals sector. One of the outcomes of this component is to provide support for a comprehensive high-resolution airborne geophysical survey, which involves magnetic, radiometric and gravity surveys. The aim of the survey is to generate up-to-date geological information, which will be used in the promotion of mineral exploration. To ensure that the project is efficiently and effectively executed, the Ministry has engaged the services of the British Geological Survey International (BGSi) and Council for Geoscience. The Council for Geoscience is acting as the project quality supervisor and training consultant for the Malawi Geological Survey Department.

LOCAL MAPPING AND RESEARCH

A three-dimensional surface and subsurface GIS-based model of the greater Thyspunt area in the Eastern Cape Province

(Report 2013-0119)

The area between Oyster Bay and St Francis is earmarked for substantial future development as it includes the strategic location of Thyspunt,



well known for its potential of becoming the possible site for the second nuclear power station of South Africa.

Because of the dense collection of scientific data in the Thyspunt area, the region is an excellent candidate site for the creation of a three-dimensional subsurface geomodel. The task of creating a robust and interactive 3D surface and subsurface GIS-based model of the greater Thyspunt area was undertaken with the aid of Google SketchUp software. The study aims to describe a methodology for the use of this dynamic 3D geomodelling software when integrating a variety of data sources, such as geological maps, borehole data, geophysical data, cross-sectional data and any other geographical information systems data. Additionally, associated scientific implications are strongly considered.

The model succeeds in integrating a large amount of data into a single location, with a 3D perspective upon which future investigations can be based. Special emphasis was placed on locating subsurface geological contacts and structural characteristics and on determining the occurrence of bedrock beneath dune cover. The thickness distribution of these Cenozoic dune cover deposits were further investigated and led to an article due for submission to the *Journal of Geology* of South Africa.



Various data sources such as geological maps (a), boreholes (b) and geophysical profiles (c) were used in the construction of the 3D model of the greater Thyspunt area in the Eastern Cape.



The geohydrology of the Augrabies National Park

The 2820CA Bysteek map sheet area covers part of the Augrabies National Park. The area is notorious for its weak groundwater potential. Even though the Orange River runs through the northern part of the area, farms further away from the river are dependent on groundwater for their daily needs.

During the course of a mapping project in the area, a geological map of the Augrabies National Park was produced. The aim was to provide geological information to tourists visiting the park and to park officials. The largest part of the park is characterised by rock outcrops belonging to the Namaqua Metamorphic Province, a Mesoproterozoic mobile belt of 1.2 to 1.0 Ga in age, which formed during the amalgamation of the Rodinia Supercontinent. The area is highly deformed and metamorphosed, with a variety of open to isoclinal folds, thrusts, and shear zones representing prominent Proterozoic structures. Isolated occurrences of Jurassic dolerite dykes occur in the northern part of the area, while Cenozoic deposits include red aeolian sand, soils and alluvium.

Prominent linear structures, in association with lithological contacts between permeable and impermeable rock units, are good targets for groundwater exploration. These structures are often concealed by Cenozoic deposits and can only be detected by remote sensing and geophysical methods, both of which were employed during this mapping project.



Locality map of the study area at the Augrabies National Park in the Northern Cape.







The Augrabies Waterfall cutting through granite.



The gabbroic Orange Basin Complex.

ONSHORE AND OFFSHORE

MAPPING OF OUR COASTLINE

Sea-level fluctuations, human evolution, and submerged landscapes of the continental shelf off Mossel Bay

The southern shores of South Africa offer significant palaeoanthropological sites for studying the origin of modern humans. Currently, these sites are located directly on the coastline but, for most of their history, they were set back from the coast, with a large plain existing between the sites and the sea. A significant portion of the modern human archaeological record was thought to have been lost under the Indian Ocean because of postglacial rising sea levels. However, new state-of-the-art techniques have allowed the study of the submerged landscapes and the building of accurate models of their past nature.

Three marine geophysical surveys, which included scuba diving, were done to examine evidence of past sea-level fluctuations and to interpret geological deposits on the seafloor. Additional geological mapping of coastal outcrops was carried out to link land and sea features, and rock samples were dated using optically stimulated luminescence (OSL). Geophysical investigations included a



regional seismic survey, extending out from Still Bay in the west to Buffels Bay in the east to a maximum water depth of 110 m. Other geophysical research included a highresolution investigation of the Mossel Bay shelf using multibeam bathymetry, side-scan sonar and subbottom profiling. A shallow seismic pinger survey of Swartvlei, the most prominent coastal lake in the Wilderness Embayment, was also done.

The project team identified and documented numerous features on the seafloor that are also seen on land along the adjacent coastal plain. 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 geological deposits on the emergent shelf indicate a greatly expanded glacial coastal plain that potentially received enough rain to feed lowgradient meandering rivers and wetland lakes. These extensive wetland environments provided a rich source of diverse food types, which, along with abundant marine resources on the shoreline, made the southern coastal plain an ideal habitat for our ancestors.



Multibeam bathymetry showing the mapped area of the seafloor offshore of Mossel Bay.





Back-barrier sediments associated with the Groot Brak River palaeochannel compared with the dimensions of Langvlei in the Wilderness Embayment. A. Multibeam bathymetric data superimposed 35 m below mean sea level, which inundated the back-barrier system. B. The same area, with interpreted acoustic facies draped over the multibeam bathymetric dataset.



PlioMAX project: Using Middle Pliocene sea level history, the last globally warm period with high CO₂ levels, to predict future trends

(Scientific paper)

PlioMAX is a five-year research project funded by the National Science Foundation (NSF) of the United States of America that aims to increase the accuracy of global sea level estimates for the Middle Pliocene warm period, between 3.3 and 2.9 million years ago. Numerous proxy methods suggest that atmospheric CO_2 levels at that time ranged between 350 and 450 ppm (the current atmosphere level is ~396 ppm). Proxies also suggest that the mean global surface temperature was 2–3 °C warmer than the pre-industrial level, but estimates of ice volume and/or sea level at that time are far more uncertain. The mid-Pliocene warm period thus provides a natural analogue for a warmer, higher CO_2 world that can be used as a testing ground for the climate and ice sheet models that are being used to predict the future response of the climate of the earth to increasing levels of greenhouse gases.

The Council for Geoscience is engaged in an international collaboration to use the Middle Pliocene sea-level history on a global scale to predict future trends in sea-level rise. The study is well funded for three years by a NSF grant. Marine isotope records indicate that the warmest climate phase was about 3.0 to 2.7 million years ago. At that time, global CO₂ levels were at the levels currently predicted for the future because of the current and expected human activities. The first phase of this study was along the South African west and south coasts under the leadership of a geoscientist of the Council for Geoscience. The data predict much higher sea levels in the future, even without the predicted human influence on climate.



The staircase of marine terraces of the West Coast in relation to the marine isotope record, as well as an excellent example of a fossiliferous Pliocene marine terrace from the West Coast.



THE IMPORTANCE OF GEOPHYSICAL

SURVEYS IN MAPPING

Developing a 3D potential field model of the Bushveld Complex

(Report 2014-0073)

The Bushveld Complex has been studied and mined extensively over the past 100 years, yet depth information that can help to constrain a potential field model is extremely limited in the public domain. A few boreholes and three deep seismic reflection lines provide localised constraints. The Southern African Seismic Experiment has contributed much to rectify this situation. However, different processing and modelling methods present substantially different results at some of the stations in the Bushveld Complex. The varying Moho models lead to two questions: first, how to select a Moho to use in gravity modelling and, second, what gives rise to the weak phase conversions observed for the Bushveld Complex area?

Three of the crustal thickness models were used to test the continuity of the mafic rocks of the Bushveld Complex by using gravity data. Three-dimensional gravity modelling, including crustal thickness and incorporating new densities, supports the concept of a connected Bushveld Complex. Gravity models using the different crustal thickness models and including various deep-seated bodies and density variations indicated that uncertainty in the crustal thickness models has a large impact on the calculated gravity field for the Bushveld Complex. It also affects the inferred thickness and depth of the Rustenburg Layered Suite substantially. Most of these uncertainties affect the calculated gravity field over the eastern and western lobes and are attributed to different results at one seismic station.

The results for the central part of the Bushveld Complex are similar for the three Moho models, and 3D modelling confirms that dense material is necessary between the eastern and western lobes to obtain a good fit.



Geophysical surveying in South Africa.





Geological map of the Bushveld Complex based on the 1:250 000 map series of the Council for Geoscience.



PyGMI — a Python-based geophysical modelling and interpretation package

(Report 2014-0074)

The natural expansion of the PyGMI software to include techniques complementary to 3D modelling has been achieved. The interface was completely reworked, accommodating a multitude of techniques, one of which is the 3D modelling module. The new system allows the interpretation of potential field and radiometric data, both in 2D and 3D, with the aid of multivariate statistical analysis, where necessary. The software can be used with other opensource packages, such as QGIS, to allow for a full interpretation suite, available free of charge. A radical change in interface was needed to expand the PyGMI packages to be able to account for other techniques. It was decided that the primary PyGMI package would be an intuitive interface, from which all other modules could be accessed. The previous version of PyGMI, which only entailed 3D modelling, would be only one module of the new software.

To ensure that the software is intuitive, while giving maximum information to the operator, the interface follows a flow diagram approach, of which one of the options is the modelling of potential field data in 3D. The menus in the PyGMI package are grouped as tasks into categories. The pathways between elements or tasks must be established by the user.



Geophysical model and datasets exported to Google Earth™.



Geothermal variation across the Karoo Basin as inferred from rock magnetic and palaeomagnetic studies

(Report 2014-0033)

Several rock magnetic and palaeomagnetic experiments were conducted on samples from eight boreholes spread across the Karoo Basin, as well as on surface samples collected adjacent to dolerite dykes in the vicinity of the town of Cradock in the southeastern part of the basin. Four boreholes intercepted one or more dolerite sills and the thermal impact of these on the sedimentary host rock was studied. Low field anisotropy of magnetic susceptibility (AMS), magnetostratigraphy using the classic baked contact test, as well as the alteration index (A₄₀) method indicated that the heating effect occurred over an area no wider than half of the sill thicknesses. A general elevation of the palaeotemperatures of the organic-rich Ecca Group sediments to temperatures where hydrocarbons are normally converted into gas was observed, suggesting a potential for,

as yet unquantified, hydrocarbon resources remaining between these intrusions.

Temperatures calculated by the A₄₀ method for selected boreholes across the Karoo Basin indicate a general increase from southwest to northeast in the thermal effect of the intrusions on the Karoo sediments. This correlates with the reported increased maturity of Karoo Basin coal deposits from west to east. However, there was a general increase in diagenesis from north to south across the Karoo Basin as a whole, mainly attributed to depth of burial, as well as the effect of dolerite intrusions in the central part of the basin. Temperatures calculated for boreholes that did not intercept any dolerite sills were much higher than expected, considering normal burial depth. This could possibly be ascribed to thermal heating during the formation of the Cape Fold Belt along the southern border of the Karoo Basin. It is of interest to note that the highest calculated temperatures were observed in boreholes located within the Kaapvaal Craton. Currently, a study is underway of the role played by variable heat flow of marine shale versus continental sandstone in the observed geothermal variations.



Laterally observed geothermal gradient across the Karoo Basin in relation to the borders of the Kaapvaal Craton.





ENVIRONMENT AND WATER

Business growth in the environmental field will focus on soil, water and surface pollution, and the preservation of sensitive environments. The basic geoscience knowledge infrastructure and an understanding of geological processes underlie the management of all the abovementioned environmental hazards. The development of expertise to contribute meaningfully to the management of these processes should unlock significant business opportunities.

The Council for Geoscience will continue to develop skills in mining environmental issues over the next few years.

In water resource assessment and protection, field investigations will focus on the physical and chemical processes associated with subsurface water-bearing environments, as well as the socioeconomic and institutional aspects that affect the management of these resources.

The Environment and Water thrust will contribute towards the NDP 2030 focus areas of *Environmental sustainability and resilience and Inclusive rural economy.*

SUSTAINING OUR ENVIRONMENT

Basin-scale assessment of the potential CO₂ storage capacity of the offshore Durban Basin in KwaZulu-Natal

(Report 2014-0096)

Carbon capture and storage (CCS) has been identified as one of the fundamental approaches to mitigating global climate change. CCS technologies can be implemented in many countries by the capture and injection of CO_2 into suitable geological reservoirs. The *Atlas on Geological*

Storage of CO2 in South Africa indicates possible onshore and offshore repositories within South Africa which conform to the prerequisites for CCS. The country-scale assessment of the atlas shows a total storage capacity potential of about 150 Gt, of which 98% occurs in Jurassic and Cretaceous offshore sedimentary basins. The offshore Durban Basin is preserved on the eastern continental margin of southern Africa north of Durban. The Durban Basin is relatively unexplored, compared with the other offshore basins. However, its close proximity to major CO, producing sources in KwaZulu-Natal earmarks this site as favourable for offshore CCS. The basin has previously been explored through seismic surveys and drilling and a



The atlas comprises a country-scale assessment of the potential for carbon capture and storage in South Africa.



number of possible structural traps have been identified. Although well data are limited, seismic analysis has identified major synrift sedimentary units in the Durban Basin that will likely form excellent reservoirs for CCS. The porosity and permeability of these units, as well as the effectiveness of the cap rock still need to be investigated. Deep saline reservoirs offer the best potential for CO₂ storage in South Africa; however, to date, only the low storage capacity onshore basins have been explored for CCS. The focus was initially on the safe storage capacity of the most accessible onshore sedimentary deposits, which have possible storage capacities in the order of 400-20 000 Mt. However, the storage

capacity of offshore saline formations is projected to be large and therefore these strata need to be characterised for possible CCS test injections. If the Durban Basin does have the necessary potential for CCS, it could have important strategic and economic implications for achieving either demonstration- or commercial-scale storage.

This project is undertaken in collaboration with the South African Centre for Carbon Capture and Storage, the University of KwaZulu-Natal and international partners such as TNO (Dutch Geological Survey), the British Geological Survey and CO2CRC (Cooperative Research Centre for Greenhouse Gas Technologies).



The relevant contributions of the different energy types towards South Africa's primary energy consumption.





Possible deep saline formation storage opportunities onshore and offshore in Mesozoic basins along the coast of South Africa. The storage capacities of the basins and coalfields are indicated by the round black symbols.

The health impact of the Pilanesberg Alkaline Complex and the Rustenburg Layered Suite on communities in the North West Province

The Council for Geoscience is investigating the impact of the alkaline Pilanesberg Complex and the mafic Rustenburg Layered Suite in the North West Province on the health of the human population of South Africa. Data on geological aspects that can have a direct or indirect effect on human health are limited. Therefore, rigorous studies are needed to generate such data to provide cost-effective solutions towards healthier living conditions for communities.

The study area immediately to the west of the Pilanesberg Complex is semi-arid, situated near the eastern edge of the Kalahari Desert, and about 60 km northwest of Rustenburg. Almost all the communities in this area depend on groundwater for domestic use. Particular focus is being placed on the possible association between the geology of the area and the health of the communities living there. Data from previous reports and preliminary results from groundwater sampling indicate high concentrations in F, Ca, U and total dissolved solids (TDS). Concentrations of these elements can be up to ten times more than the safe standards published by the Department of Water Affairs (South Africa) and the World Health Organisation. According to the mortality profile report of the North West Province, skeletal fluorosis, cardiovascular-related and renal diseases, as well as diarrhoea are prevalent. In addition, the local health data from the study area show a prevalence of hypertension (which may accompany musculoskeletal and mental disorders), gastric ulcers, diarrhoea and irregular menstrual cycles. These health problems could possibly be linked to the geology of the area that can directly influence soil, water and air by contributing elements and nanoparticles to the environment. The purpose of this investigation is to establish a correlation between the diseases



reported and the geochemical composition of the groundwater that is affected by the surroundings, with the ultimate aim of seeking simple and costeffective preventive measures for safer water. The findings of the project were presented at the 1st International Symposium on Medical Geology, hosted by the University of Johannesburg in March 2014.

STUDYING THE IMPACT OF MINING ACTIVITIES ON HUMAN HEALTH

A MTEF-funded project to study the impact of mining activities on human health commenced in 2013. A questionnaire for consultation purposes was prepared and the project team approached the University of Pretoria for ethical clearance of the application material. A biostatistician from the Medical Research Council was asked to participate in the study and to help define a sampling strategy for the Olifants catchment area. A reconnaissance survey of the district hospitals within the identified hotspots of the Olifants catchment (including the Mpumalanga and Limpopo Provinces) was carried out and the identified hospitals were contacted. Subsequently, the Mpumalanga and Limpopo provincial health offices were approached for clearance to carry out research studies in the hospitals. Clearance was obtained and consultations in three of the four Mpumalanga district hospitals have now been finalised. The response of the eMalahleni hospital in the Mpumalanga Province is currently awaited. Planning for consultations at the Limpopo district hospitals has been finalised and will go ahead soon.

Holistic approach towards the best management of mining pollution impacts on the water resources of South Africa

(Reports 2014-0246; 2014-0248)

The project is aimed at assessing and ranking, with the view to rehabilitate/remediate, the mining pollution hotspots of the country in a systematic and holistic manner. The project is undertaken in collaboration with the Department of Mineral Resources, as part of the MTEF-funded Strategic Mine Water Management Programme (SMWMP).

The project has two primary objectives, summarised as the assessment and quantification of mining pollution on the environment, with emphasis on water resources, and the preparation of the national mining pollution atlas, as well as the systematic and orderly management, prevention, remediation and rehabilitation of the identified mining pollution hotspots.

A catchment-scale approach, prioritised on the basis of geoenvironmental provinces,

was adopted for the mining pollution assessment phase of the project. This was based on the knowledge that the primary environment severely being impacted by mining contains major water resources. The quality and quantity of water resources ultimately affect the wellbeing of the other environmental subsystems such as the fauna and flora ecosystems. Mining pollution impact assessment is conducted in a multidisciplinary approach. The disciplines include water and sediment geochemistry, hydrology, hydrogeology, the current and potential status of acid mine drainage of mining infrastructure, ecotoxicology, remote sensing, geophysics and air quality studies.

The assessment of the mining pollution status to identify, characterise and quantify mining pollution hotspot areas is being completed for the Lower, Middle and Upper Vaal, Limpopo, Mfolozi/Pongola, Mkomazi and Tugela River catchment areas (RCAs). The objective is the ranking of the hotspots for the rehabilitation/ remediation phase of the project. The preparation of mining pollution hotspot maps of these RCAs is nearing completion.



The catchment-scale assessment of these primary catchment areas, together with the mining pollution hotspot maps of the Olifants and Inkomati-Crocodile RCAs, were finalised in the previous financial year. A preliminary national mining pollution atlas of the country can now be prepared. These RCAs cover a large portion of the country, affected by intense past and present mining activities.





Selected acid mine drainage hotspots in the Carolina and eMalahleni areas.





Mining pollution assessment mapping progress (light-green shaded area) which covers the most intensely mined part of the country.

Research in the Environmental Geoscience Unit (EGU) Laboratory

- Experiment 1. Realistic simulation of acid mine drainage generation in the gold mines of the Witwatersrand, South Africa
- Experiment 2. Laboratory simulation of the effects of influent acid mine drainage on dolomitic aquifers
- Experiment 3. A holistic approach to the closure of abandoned underground coal mines, using coal fly ash.

Our motivation

The underground mine voids in the Witwatersrand gold mining basins are rapidly flooding with water and there is general concern about the fate of this mine water. Two opinions in respect of the management of this problem exist:

- 1. The mine water should be pumped out and treated for discharge purposes; however, the walls of the mine voids with pyritic rock will be more exposed to oxygen.
- 2. The mine voids should be allowed to flood with water which will limit the oxidation of the pyritic rock.

This experiment, therefore, aims to simulate these two scenarios and to understand which of the options generate better quality mine water. It was decided to carry out column leach experiments, simulating the two conditions.



Our progress

A two-column experiment was set up in a way which resembles saturated and unsaturated underground mine void conditions. One column (C_A) was run in an upward flow configuration, allowing the packed pyritic ore sample to be completely covered in leachate, simulating the saturated zones in the underground mine environment. The second column (C_B) was run from top to bottom, with an air inlet allowing oxygen to ingress the column. The column was not allowed to flood, resembling the unsaturated zones in the upper part of the underground mine environment.

The two columns were continuously leached for 68 weeks, at a rate of around 0.45 L/week, with leachate collection and analysis performed weekly.

The leachates were syringe filtered, using 0.45 μ m hydrophilic filter discs. The leachates were then analysed for pH, electrical conductivity (EC), dissolved metals and anions. The leachate solutions were acidified with three to five drops of 3M nitric acid (HNO₃), prior to the dissolved metals analysis.

The future

The purpose of this study was to assess the quality of the mine water produced in the saturated and unsaturated areas in the underground mine voids in the Witwatersrand gold mining area. Additionally, the study aimed to reach a decision on whether the water should be pumped out or be left to continue flooding to displace oxygen and thereby limit acid generation through oxidation of the pyritic rock. The study revealed that the oxidation of pyrite in the flooded (saturated) zones is severely retarded, with pH values above 4.5 and reduced salt loads. However, in aerated (unsaturated) zones, pyrite is oxidised and produces a leachate with pH values of below 2.5 and high electrical conductivity, salt and metal loads. This information can be used to assist decision making regarding the flooding of the Witwatersrand mines; but a decision cannot be made based solely on the results of these findings.



The use of phytoremediation techniques for the treatment of contaminated lead and acid mine drainage contaminated soils

(Report 2013-0255)

The EGU Laboratory is engaged in the implementation of phytoremediation pot trials. Fieldwork was conducted on two sites, one

site was contaminated with lead and the other polluted with acid mine drainage. The soil samples from these sites were analysed by the EGU Laboratory with X-ray diffraction, X-ray fluorescence and batch leaching. A pot trial of the soil samples was set up in the laboratory. The leachate samples from the dripping system were analytically analysed with ICP-MS and ion chromatography.



Experimental setup for phytoremediation in the EGU Laboratory.



Management of state contingent liabilities with respect to derelict and ownerless mines in South Africa

(Reports 2014-0186; 2014-0188; 2014-0005)

The Council for Geoscience is closely involved in the implementation of this government strategy through the development of a comprehensive spatial database, investigations to identify high-priority sites, and by developing rehabilitation plans for the identified sites.

To date, 2 128 different commodity sites situated in the Gauteng, Mpumalanga, Limpopo, KwaZulu-Natal, Northern Cape and North West Provinces have been visited and ranked. This number includes 245 asbestos sites. The field visits and a ranking workshop indicated that 152 sites are high priority, 130 moderate priority, and 217 low priority. In addition, it was found that 887 sites did not require rehabilitation, 335 sites were not operational, while 407 sites were not accessible for assessment. Detailed information on operational and inaccessible mines was forwarded to the Department of Mineral Resources for possible verification of ownership from the records.

The high-priority sites were classified per commodity and still need to be evaluated for the estimation of the rehabilitation cost.

The data on the 2 128 visited and ranked sites were entered into the database, which is web based and functional and is continually being improved to make its search functionality easy to use. The database





allows searches according to commodities, locations (coordinates per province), and ranking information.

More than 27 holes were sealed in Gauteng and Limpopo during the year. A number of officials from the Department of Mineral Resources were given the opportunity to accompany staff on a field visit to some of the sealed and still unsealed shafts in Gauteng. The visit clearly showed the risk of these unsealed shafts to the community, as well as the security challenges posed by the presence of illegal miners on the sites.

An actuarial service provider was appointed for the annual review of the provisional and contingent liabilities of the Department of Mineral Resources with regard to the derelict and ownerless sites.



RANKING STATUS OF ALL VISITED DERELICT AND OWNERLESS MINES - 2013/14



PROJECTS IN THE WATER

GEOSCIENCES

Impact of fault structures on the occurrence of groundwater in fractured rock aquifers

(WRC-funded project in progress)

This comprehensive research project, funded by the Water Research Commission, encompasses a desktop study, field measurements and testing, with six deliverables. A report has been completed and a Reference Group Meeting is being planned.

The next step in studying fault-controlled groundwater, after a comprehensive literature review, was site selection. Taking into account the pilot studies done in the Alldays area (Taaibos fault) in Limpopo, Ottosdal (Kareekuil fault) in North West, Oudtshoorn (Cango fault) and Rawsonville (Waterkloof fault), a five-borehole network near Rawsonville in the Western Cape was selected for further study.

Data from pumping tests for unconfined aquifers and constant head tests for confined aquifers were interpreted for the determination of aquifer hydraulic properties and aquifer characterisation, from which the conceptual model was constructed. Based on aquifer conceptualisation, numerical modelling based on finite element codes for the quantification of groundwater flow and the determination of aquifer sustainable yield was done.

The hydrogeology of groundwater in the Central Highveld

(WRC-funded project in progress)

The project was commissioned by the Water Research Commission (WRC) in

2011. The project area 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 operations in three basins have been terminated, resulting in the increasing threat of mine water level rebounds.

The terms of reference for the project propose the collation of existing information on the aquifer and groundwater characteristics and the extent to which mining-related surface facilities such as slimes and tailings dams may have affected the natural groundwater quality. The study also attempts to compile information and data on pre-dewatering groundwater conditions pertaining to quantity and quality. The major objective is to produce a report that summarises and synthesises the fragmental present-day knowledge about the occurrence of groundwater in the Central Highveld region. The proposed report could serve as a guideline in the exploration and further development of groundwater supplies.

This research was completed and the final Reference Group Meeting was held in March 2014. The desktopbased study used the data derived from previous research and the information includes region physiography, geology, hydrogeological settings and borehole groundwater data sourced from the National Geographic Database (NGD), and other databases. The comprehensive literature review and acquisition of relevant data/information resulted in a broad understanding of the groundwater systems in the region.

The study will produce a number of products such as a series of statistical results and maps for the delineation of groundwater occurrences. The report will include geophysical techniques for borehole siting and information on the impact of mining activities, as well as a summary on the groundwater quality and indicators of harmful elements.





Hydrogeological subdivision of groundwater in Region 17 of the Central Highveld.

Assessment of the groundwater potential around Vryburg in the North West Province

(WRC-funded project in progress)

The project was commissioned by the Water Research Commission (WRC) in 2011. For this study, investigations on the groundwater potential in crystalline basement rocks of the North West Province were carried out. The study area is located in the Naledi Local Municipality, situated in the central part of the North West Province.

Two multivariate statistical modellings were carried out to map the prospective areas for groundwater occurrence. These models include an empirical (data-driven) and a conceptual (knowledge-based) approach. The data-driven approach includes artificial neural networks (ANNs), weights of evidence (WofE), logistic regression (LG), and principal component analysis (PCA). The knowledge-based modelling involves fuzzy logic (FL) and fuzzy clustering (FC). Both statistical modelling approaches were applied to five evidential themes that include geology, lineaments, geomorphology/ slope, land use and soil texture.

The multivariate statistical approaches used for the characterisation of groundwater potential in the crystalline basement and carbonate rocks of the study area proved very effective at delineating potential areas. Differences in fracture set populations coupled with the contrast in primary permeability of various rock types significantly contributed to variability in groundwater potential throughout the study area. Although high groundwater potential zones are primarily associated with carbonate rocks, the results derived from the calculation of statistical correlation between lineament density and borehole yield suggest that highyielding well fields are largely controlled by the fracture concentration within crystalline basement rocks. Furthermore, the significant contrast in groundwater potential between the southern and northern parts of the area can be attributed to the presence of two end members



controlling the development of groundwater. These are dissolution channels in the south and fracture connectivity and density in the central and northern parts of the area.

The multivariate groundwater potential modelling and statistical correlation used in

this study provided valuable information on hydrogeological parameters that control the development of groundwater in the area. These are effective approaches that can be used as a sound scientific basis for understanding the control of groundwater occurrences in similar hydrogeological settings.



Groundwater potential zones in the Vryburg area.



Statistical correlation with borehole yield.


Strategic mine water management

(Report 2013-0143)

The Council for Geoscience is continuing its research to address the long-term problems related to the prevention of water ingress into underground workings of the Witwatersrand mining basins and other geographical areas. The Strategic Mine Water Management Plan (SMWMP) for the Prevention of Water Ingress into Underground Workings of the Witwatersrand Mining Basins seeks to arrive at solutions to decrease the risk to society and the state for bearing the costs of continuous pumping when mines close down, and to manage and control decant of highly polluted water to the surface, with the attendant risks, particularly to human health and the environment.

Predict and prevent harm to the environment

The Council for Geoscience is closely monitoring the mine water levels, water qualities and water flows within the different basins in cooperation with the Hydrological Monitoring Committee (HMC), which reports to the Inter-Governmental Task Team on Acid Mine Drainage Management that was established in 2010. On a more proactive level, the SMWMP includes a component that considers the potential application of passive treatment technologies in the different areas of the Witwatersrand. Another subcomponent includes seismic monitoring in the Central, West and Far West Rand Basins and the investigation of the seismic response of the rock mass to the flooding of abandoned mining excavations.

The identification of structural areas that pose a significant seismic risk in the Central Rand Basin was done to provide a 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. This relied on a simple conceptual model of water ingress and significantly identified owners or rights holders for all the mining properties in the area. 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, the section between Main Reef Road and Fleurhof Dam, commenced in 2009 and was completed in 2010.

The construction of the northern section of the canal between Florida Lake and Main Reef Road was completed in 2013 and included the construction of a pedestrian bridge over the southern section of the canal and the refencing of the whole canal area. Currently, the canal is in the process of being handed over to the Johannesburg Roads Agency.

Feasibility studies for the implementation of ingress control measures in the Central Basin were conducted in three areas of intervention. The proposed canals are the Durban Roodepoort Deep (DRD) canal, New Canada Dam canal, and the Elsburgspruit canal. Canal designs and related activities, including geotechnical investigations and topographical surveys, have been completed. Environmental Impact Assessment (EIA) processes are at an advanced stage and should be completed soon.

Other work completed include specialised studies such as flora and fauna investigations, wetland delineation and assessments, the submission of Draft Basic Assessment Reports (DBARs) to commenting authorities, and parts of the public participation process such as advertising and running the commenting periods.

Fourteen major ingress areas have been identified in the East Rand Basin. Recommendations for intervention have been completed. Five areas were selected for further investigation in order to prepare the implementation plan. These ingress areas include the Central Blesbokspruit, the Geduld, Alexander and Cowles dams and the Van Ryn Pond ingress area.



SERVING THE COMMUNITY

Investigation of surface and groundwater pollution in the Sokhulu Community and Richards Bay Minerals mining areas

The main objective of the study is to establish scientific proof for the alleged complaint of groundwater pollution by the Sokhulu community against the Richards Bay Minerals (RBM) Mine.

Community surface water and groundwater was sampled for physicochemical studies. Water samples were also collected from monitoring boreholes, mining ponds, seepages, trenches and other areas within the mining region. The following water quality parameters were measured *in situ* using portable multisensor meters: temperature, pH, electrical conductivity (EC), total dissolved solids (TDS) and dissolved oxygen (DO). Cations were analysed, using inductively coupled plasma mass spectrometry (ICP-MS), and anions by ion chromatography (IC). The samples were collected using previously acid-washed high-density polyethylene (HDPE) bottles, chilled to between 3 and 5 °C and dispatched in a cooler box to the laboratory for analysis. Historical information and water chemistry data from Richards Bay Minerals and the Department of Water Affairs (DWA) were also analysed.

The project was completed with the indication that the pollutants originate naturally from geological settings rather than mining activities.



Water supply to rural communities.





ENGINEERING AND GEOHAZARDS

An adequate assessment of the geological environment is a prerequisite to formulating effective recommendations regarding the suitability of a site for sustainable human settlement and infrastructure development. Any structure or infrastructure interfacing with the geological environment can be constructed economically, perform safely, and can have a non-detrimental impact on other works and human lives only if all geological elements are accurately identified and their properties adequately measured and evaluated.

This requires, *inter alia*, the capability to identify and describe rock and soil types, rock mass and soil formation characteristics and groundwater conditions, and the recognition and description of the potential for phenomena such as sinkholes, flooding, erosion, slope failures, ground heave and subsidence, and collapse. In addition, insufficient geotechnical investigations, faulty interpretation of results, or failure to portray results in a clearly understandable manner may contribute to inappropriate designs, delays in construction schedules, costly construction modifications, use of substandard borrow material, environmental damage to the site, postconstruction remedial work and even failure of a structure and subsequent litigation.

The role of the Engineering and Geohazards thrust is to monitor, assess and conduct targeted research on a wide range of natural hazards in order that policy makers and the public understand the need to enhance preparedness, response and resilience. The thrust plays an important role in developing models, methods, information and tools to analyse hazard risks and impacts related to infrastructure development, thus contributing towards the *Economic infrastructure, Environmental sustainability and resilience and Inclusive rural community* focus areas of the NDP 2030.

The Geoscience Amendment Act (Act No. 16 of 2010) mandates the Council for Geoscience to, among others, be the custodian and curator of all geotechnical information in the country, as well as being a national mandatory authority in respect of geohazards related to infrastructure development. In other words, the Act empowers the Council for Geoscience to be the custodian of all geotechnical data with the purpose of advising and assisting government, state institutions, parastatals, private organisations and the general public by providing a complete geotechnical risk profile of the country. The mandate aims to ensure safe development on hazardous ground by taking all necessary and appropriate steps to ensure that adequate and sufficient geotechnical investigations are performed prior to any housing and/or infrastructure development.

Council for Geosciene

ENGINEERING GEOLOGY PROJECTS

Engineering geological mapping for sustainable infrastructure and human settlement development

(Reports 2013-0276; 2013-0278; 2014-0001; 2014-0002)

Following a request by the eMalahleni Local Municipality, engineering geological investigations of four informal settlements, Lekazi, Santa, Sizanani and Phola Siyabonga, were undertaken. The scope of the work included the classification of land parcels in accordance with the GFSH-2 guideline, NHBRC manuals and other relevant SAICE manuals relating to founding conditions and construction methods for township development.

Site investigations and report compilations for the four villages were completed and reports were handed over to the relevant municipality. In addition, four BTech degree candidates were successfully trained during these projects.

Some areas were indicated as being undermined on the map sourced from the archives of the Department of Mineral Resources. Therefore, a geophysical survey was recommended to detect and determine the presence of shallow undermined areas, the mine layout and the depth of the mine openings from the ground surface.



Soil samples collected for laboratory testing.



In situ DCP (Dynamic Cone Penetrometer) testing to determine soil consistency.



Aggregate quality investigation in Newcastle

(Report 2014-0040)

The South African Government plans to invest funds over the next three years to meet the demands of the growing economy and population by building adequate and appropriate infrastructure. In the National Development Plan, the Durban– Gauteng Corridor has been identified in the freight logistics strategy by government as one of its five infrastructure projects planned to boost the economy. The effective implementation of such an ambitious programme will require a vast amount of aggregate, of which the quality is a critical component in determining the use and life of the infrastructure.

First aggregate map

The overall aim of the study is to compile the first aggregate quality map of South Africa for the area around Newcastle in KwaZulu-Natal, with assistance from the Swedish Geological Survey. The map will comprise geological descriptions, chemical and physical qualities of aggregates and the suitability of each of the rocks found in Newcastle for aggregates. Magnetic susceptibility measurements and spectral radiometric measurements were taken at dolerite, sandstone and shale outcrop sites. Ground geophysical profiles, namely magnetics, electromagnetics and resistivity tomography were carried out to define the aerial and depth extent of potential aggregate rock formations.



(a) Teams of the Council for Geoscience and Swedish Geological Survey; (b) Aggregate quarry in Newcastle.





The Gauteng to Durban freight corridors are part of the National Development Plan.



It is therefore essential that a detailed investigation of the aggregate quality be conducted in order for decision makers to be aware of the position and spatial extent of potential construction and building materials during land-use planning.

A comprehensive desktop study was undertaken to summarise the main geological, geophysical and geotechnical information available. To date, three site visits have been conducted. Onsite observations and discussions were used to guide methodologies and conceptual approaches. Out of numerous targeted points, nineteen sites were evaluated against the proposed scope of work. The evaluation involved site visits to verify published topographical, geotechnical and geological maps. Eleven samples of approximately 80 kg each were collected for various laboratory tests, including geophysical measurements, geochemical analysis and various geotechnical tests.

Preliminary analyses of the available data indicate that constructive results can be obtained, especially with dolerite. Validation of these results along with the analysis and interpretation of data and/or information is currently being completed.

Why adequate site investigations for housing development are important

Our motivation

The risk of construction failure is heavily dependent on the quantity and quality of the information obtained from the geotechnical site investigation, which is aimed at characterising the underlying soil conditions.

Inadequate information on the expected ground conditions can lead to incorrect design assumptions and mistakes. Problems associated with the ground conditions can lead to cost overruns and longer construction periods. It is essential, therefore, to find as much information as possible about the site and its ground conditions by carrying out a thorough site investigation before construction. The information obtained through such investigations is used to assess the suitability of the site for designing and constructing the proposed works with regard to stability, serviceability, ease of construction and acceptable performance, balanced by the concern for safety, economics and the environment.

Our progress

The Council for Geoscience started a new series of reviews of geotechnical reports in September 2011. The reports to be reviewed have been collected mostly from RDP housing enrolment projects throughout the country. Since 2011, a total of 131 reports have been reviewed by the senior engineering geoscientists of the Council for Geoscience of which 93 reports or 71% were not supported or did not qualify for the GFSH-2 requirements.

In most of the geotechnical investigation reports reviewed, the shortcomings of the reports included the use of improper methodology for the investigation, an inadequate number of test pits and laboratory tests, lack of a geotechnical zonation map, and lack of proper site class designation and proper foundation recommendations. From this geotechnical review, it can be concluded that proper attention has not been given to geotechnical investigations for housing developments. The standard requires proper geotechnical investigations prior to any new development, but, owing to budget constraints, this exercise is sometimes overlooked.

Thus, without thorough site investigations and sample testing of local founding materials, engineering and scientific decisions will be inappropriate and very likely lead to structural damage. Lack of faulty or insufficient interpretation of the results may have adverse effects on the building project.

The future

After the geotechnical report review is done, a compliance certificate should be provided to the developer before the start of construction work. Geotechnical investigation results must be incorporated for the design of the foundation. The process can be better managed should a systematic approach be introduced to certify compliance with the requirements, as well as the certification of site class designations.



Refining the area defined as dolomitic land for the Gauteng Province, using available borehole information

(Report 2014-0114)

Proposed developments on dolomite require intensive and expensive investigation before development can proceed. Since the dolomitic land layer was defined in 2003, new information has become available and a great deal of borehole core has been submitted to the dolomite databank of the Council for Geoscience. Approximately 5 700 boreholes lie in the area between the surface expression of the dolomite and the extended area underlain by dolomite at depth. If a development falls within this extended zone, it still requires investigation, which may prove excessive if no dolomite is intersected. Therefore, review and data capturing of the available borehole information, as well as geological modelling will increase our understanding of the hazard within this dolomitic land area.

Data capturing is 65% complete and preliminary hazard maps of certain sample areas have been produced. Completion of the data capturing and classification, as well as geological modelling is planned for the next financial year. Further work, including extending the investigation to other provinces, is scheduled for 2015 to 2017.

It is apparent that areas of low to high hazard, mainly for subsidence formation, do occur on the Black Reef Formation owing to the presence of dolomite residuum (wad). However, some areas present no hazard. In some cases, significant 60–100 m nondolomitic cover is present within Karoo outliers. In general, the sample areas showed a low to medium hazard with subareas of high hazard.



Dolomitic land - preliminary findings in the Gauteng Province.



The relationship between lineaments, sinkholes and subsidence occurrences in Centurion, the East Rand, and Far West Rand

(Report 2014-0038)

In South Africa, sinkholes and subsidences are among the most serious prevalent geological hazards in the densely populated dolomitic areas of Centurion, the East Rand and the Far West Rand.

Previous studies have defined the extent and distribution of at least 3 000 events within the last 60 years, according to available records. These events have been linked to areas of known and suspected incipient instabilities and have been responsible for extensive and costly structural damage and, in some instances, fatalities.

A review of the literature indicates that there is very little published information on tectonic causes of sinkhole and subsidence formation. Moreover, very few, if any, systematic studies have considered the combined analysis of airborne magnetic data, satellite imagery and borehole analysis in the South African context.

A comprehensive desktop study has been undertaken to summarise the main geological, geophysical and geotechnical information available. A detailed geological map with enhanced features has been generated. Aeromagnetic data have been analysed to capture relevant structural features and the data on approximately 1 500 boreholes have been logged and captured in a database. Structures retrieved from aeromagnetic data and the existing database have been discretised in order to apply statistical analysis.

Preliminary analysis of the available data indicates that constructive results can be obtained with regard to potential correlative factors leading to sinkhole and subsidence occurrences. Validation of these results along with the analysis and interpretation of data and/or information is currently being completed. A summary of the findings will be incorporated in the second phase of the project, which is scheduled for the next financial year.



Enhanced Bouguer gravity map superimposed on known sinkholes in the Gauteng Province.





(a) Sinkhole in the densely populated Khutsong South. (b) Damage caused by subsidence in Khutsong.
 (c) Sinkhole at a local primary school.

The hazard of sinkhole formation in the Tshwane Metropolitan municipal area

(Report 2014-0065)

In South Africa, dolomite rock has the notorious reputation of forming sinkholes and subsidences. In the densely populated southern part of Pretoria, a total of 1 236 sinkholes have been recorded until recently, causing damage to and, in some instances, loss of property. As part of the Council for Geoscience's mandatory role to assist government authorities, the organisation has been conducting sinkhole risk evaluations since the early 1970s to assist local authorities such as the City of Tshwane, to ensure safe development on dolomite. The large amount of information available for this municipal area, particularly in a digital format, has meant that it has been possible to establish a preliminary sinkhole hazard analysis.

The project is being conducted in phases, of which the risk analysis of the Centurion CBD area was the first phase. During the current financial year, the project area was expanded to cover a total surface area of 11 563 hectares. The total area investigated thus far is bounded by the edge of the dolomitic land in the east, north and southwestern corners, Nellmapius Drive in the south, the Old Johannesburg Road, in the central west, and just west of Thaba Tshwane and Valhalla in the northwestern corner. A total of 10 854 percussion borehole profiles from 1 855 dolomite stability reports are available in the National Dolomite Databank of the Council for Geoscience.

Each of these boreholes was assigned an Inherent Hazard Class, using the proposed





The sinkhole that occurred in the island of the N14 highway disrupted traffic for many months.

"Modified Method of Scenario Supposition". Eight Inherent Hazard Classes are present which classify an area into low, medium or high hazard; an indication of the probability of sinkhole formation.

Millions of rands have been spent to repair structures, infrastructure and services as a result of sinkholes. A sinkhole which occurred on the island between the two lanes of the N14 highway during 2012 caused major disruption in the traffic flow and lasted for months while the sinkhole was investigated and remediated. An amount in excess of R13 million was spent to repair the sinkhole. Using the Spatial Analyst extension of ArcGIS 9.3, a preliminary map showing the hazard of sinkhole formation was compiled for the area, based on the Inherent Hazard Class assigned from each borehole in the area.

The hazard map of this area generally indicates a medium to high susceptibility to sinkhole formation with limited areas of low hazard. When comparing the map to the past occurrences of sinkholes, there is generally a good correlation. The majority of the sinkholes occurred in the medium hazard class areas, bearing in mind that just more than half of the area is considered to have a medium susceptibility for the formation of sinkholes. Just less than 40% of the sinkholes occurred in the areas classified as having a high hazard.

Recommendations regarding the various types of land uses are being made. Almost the entire area would be considered suitable for most types of commercial development. Restricted areas are considered suitable for residential development, although almost half of the area would be considered suitable for most types of residential development.





Draft map indicating the hazard of sinkhole formation in the City of Tshwane Metropolitan municipal area.



Why and how do we investigate sinkhole formation?

The formation of sinkholes and subsidences in South Africa is largely related to the presence of carbonate rocks. In particular, the dolomite-bearing formations of the Chuniespoort Group in the northern part of the country (North West, Gauteng, Limpopo and Mpumalanga Provinces) and the Campbell Group in the Northern Cape Province collectively occupy an area of approximately 15 500 km². Current standard practice is to carry out a geotechnical investigation on all dolomitic land earmarked for development, whether residential or commercial.

Dolomite stability reports produced by private engineering geological consultants for residential or commercial development are submitted to the Council for Geoscience, where they are stored in the National Dolomite Databank. Currently, not all the dolomite stability reports are submitted for review, depending on whether the specific local authority requires comments from the Council for Geoscience.

The dolomite stability reports are submitted on a weekly basis to the Council for Geoscience for review and comment. The SANS 1936 documents stipulate the requirements for development on dolomitic land, and, therefore, the organisation uses these documents as a basis for the report reviews. 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 (IHC).

Since 2005, more reports and requests have been received by the Council for Geoscience as a result of an increase in development on dolomite land. The graph below shows the number of submissions to the organisation per year since 2008. Most of the requests that have been submitted for review are reports (dolomite stability reports), although many letter requests,



NUMBER OF SUBMISSIONS PER YEAR

Submission of reports and requests for dolomite stability investigations from 2008 to 2014.



B4 applications (for NHBRC enrolment purposes) and cosigning of site development plans are also received every year. The average turnaround time, from when a report is submitted to when the comment is completed and made available to the client, is six consecutive days.

Letters of comment were provided to the following municipalities during 2013/14: City of Tshwane Metropolitan Municipality; Ekurhuleni Metropolitan Municipality; Tlokwe Local Municipality; Merafong City Local Municipality; West Rand District Municipality; City of Johannesburg Metropolitan Municipality; Delmas Local Municipality; Thaba Chweu Local Municipality; Mogale City Local Municipality; Midvaal Local Municipality; Randfontein Local Municipality; Ga-Segonyana Local Municipality and Tsantsabane Local Municipality. Other government departments or bodies that requested the advice of the Council for Geoscience during the year are the NHBRC, Dr Kenneth Kaunda District Municipality, Department of Human Settlements – Gauteng, Department of Human Settlements – North West Province, Far West Rand Dolomitic Water Association and Bombela Operating Company.

MITIGATING THE RISK

OF GEOHAZARDS

Remote sensing analysis of regolith susceptibility to erosion on the Eastern Cape Wild Coast

(Report 2013-0147)

Erosion is a major geohazard, posing onsite and offsite threats over large areas in South Africa. The Eastern Cape is one of the more severely affected provinces. Soil erosion and land degradation are environmental challenges that affect parts of the pristine Eastern Cape Wild Coast. It is critical to the conservation planning of the Wild Coast that high-risk areas be identified and protected.

This research is based on the hypothesis that future erosion is likely to occur under those conditions which led to existing local-scale erosion. Available historical remote sensing data, including aerial photography, as well as LANDSAT and SPOT satellite imagery, will be used for the collation of biophysical and socioeconomic spatial layers, mapping and the classification of eroded areas, the assessment of conditions before and after erosion development, analyses of the growth or shrinkage of erosion patterns and spreading rates, and the identification of critical erosion causal factors. This project will also evaluate erosion susceptibility and predict future scenarios along the Eastern Cape Wild Coast. In the Xolobeni pilot study region, there was a rapid increase in wind and water erosion features since the earliest aerial photographs were taken in 1937. Anthropogenic activity caused bare batches in communal croplands and along access tracks. Historical aerial photography revealed that some erosion features at Xolobeni and Mbolompo Point are associated with rapid changes in the morphology and type of erosion over time.

The project aims to develop an erosion monitoring protocol which will aid in the prediction and control of erosion in the environmentally important Wild Coast area.



Seismic activity in southern Africa

(Reports 2014-0108, 2014-0109, 2014-0110, 2014-0111)

The two largest earthquakes in the southern African subcontinent occurred in southern Namibia and Mozambique respectively. Both earthquakes were measured at M_{L} ~4.3. These earthquakes did not result in reported damage or injuries.

A total of 37 earthquakes were recorded and located in Lesotho during 2013, ranging in size from $M_{r} = 1.4$ to 3.3.

Seismic activity in the Northern Cape Province was high during the year, with 71 earthquakes recorded, a large number (24) of which occurred in the Augrabies area. The earthquakes appeared as a seismic swarm, ranging in size from M₁ 1.0 to 2.0.

Seven earthquakes were located in the Western Cape Province during the period under review.

The Eastern Cape Province also experienced seven earthquakes.

Seismicity in the Free State was dominated by earthquakes related to gold mining activity in the region, while 23 earthquakes could be identified as being tectonic in nature.

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

Twenty earthquakes were recorded in the North West Province.

The Limpopo Province experienced diffuse tectonic seismicity and 11 earthquakes were recorded.

Earthquake activity in the Mpumalanga Province was limited to 17 earthquakes.

The KwaZulu-Natal Province experienced twelve earthquakes, with two earthquakes occurring off the coast, measuring M_L ~2.6 and M_I ~3.8 respectively.



Tectonic activity recorded by the South African National Seismograph Network in the period January to December 2013.



7. DISSEMINATION OF INFORMATION

Our publication series

Bulletins

Bulletin 147: Investigation of hydrochemistry and uranium radioactivity in the groundwater of Namaqualand, Northern Cape, South Africa by J.T. Leshomo

Bulletin 148: The geological evolution and sedimentary dynamics of Hout Bay, South Africa by M.R. MacHutchon



Metallogenic Explanations

Sheet 2526 (Scale 1:250 000). The metallogeny of the Rustenburg area by R.H. Baillie, M.C. du Toit, D.L. Ehlers, J. Astrup and D. Hage

Sheet 3324 (Scale 1:250 000). The metallogeny of the Port Elizabeth area by S. Frost-Killian and D.L. Ehlers

Explanations

Sheets 2526BB and 2526BD (Scale: 1:50 000). Geology of the

Mabeskraal and Mabaalstad areas by R.P. Shelembe

Sheets 3317BB & 3318AA, 3217DB & DD and 3218CA & CC (Scale 1:50 000). The geology of the Saldanha, Vredenburg and Velddrif environs by D.L. Roberts and H.P. Siegfried

Sheets 3418BB & BD (Scale 1:50 000). The geology of the Somerset West– Hangklip area by H.P. Siegfried, L. Nhleko and F.D.J. Stapelberg

Sheets 3318AC & AD (Scale 1:50 000). The geology of the Yzerfontein–Darling area by H.P. Siegfried and L. Nhleko

Engineering Geology Explanations

Sheet 2931CA (Scale 1:50 000). The engineering and geotechnical conditions for the Verulam area by C.A. Willard

Popular Geoscience Series

The Bushveld Complex: An introduction and review of its crustal setting, emplacement and mineralization by H.V. Eales

Annual Reports

Annual Report of the Council for Geoscience, 2013



Annual Technical Report of the Council for Geoscience, 2013

Popular Publications

GEOclips Volume 33. June 2013, 12 pp.

GEOclips Volume 34. September 2013, 12 pp.

GEOclips Volume 35. December 2013, 12 pp.

GEOclips Volume 36. March 2014, 12 pp.



Maps released during the year

1:50 000 Geological Maps

- 2428BB Tinmyne (Mahwelereng)
- 3317BB & 3318AA Saldanha
- 3418BB Somerset West
- 3418BD Hangklip
- 3318AC Yzerfontein
- 3318AD Darling

1:250 000 Metallogenic Maps

2526 Rustenburg



Articles published in academic journals and books

Α

Albini, P., Strasser, F.O. and Flint, N.S., 2014. Earthquakes from 1820 to 1936 in Grahamstown and surroundings (Eastern Cape Province, South Africa). Bulletin, European Earthquake Engineering, 12, pp. 45–78, DOI: 10.1007/s10518-013-9562-0.

Atanasova, M.T., Strydom, A.M., Schutte, C.J.H., Prinsloo, L.C. and Focke, W.W., 2014. Crystal structure and magnetic properties of CuSb₂O₄. Journal of Material Science, 49(9), pp. 3497–3510.

В

Bommer, J.J., Strasser, F.O., Pagani, M. and Monelli, D., 2013. Quality assurance for logic-tree implementation in probabilistic seismic hazard analysis for nuclear applications: a practical example. Seismological Research Letters, 84(6), pp. 938–945, doi: 10.1785/0220130088.

Bommer, J.J., Coppersmith, K.J., Coppersmith, R.T., Hanson, K.L., Mangongolo, A., Neveling, J., Rathje, E.M., Rodriguez-Marek, A., Scherbaum, F., Shelembe, R., Stafford, P.J. and Strasser, F.O., 2013. A SSHAC level-3 probabilistic seismic hazard analysis for a new-build nuclear site in South Africa: Earthquake Spectra, DOI: 10.1193/060913EQS145M.

Botha, G.A., Haldorsen, S. and Porat, N., 2013. Geological history. *In:* R. Perissonoto, D. Stretch and R.H. Taylor (Eds), Ecology and Conservation of Estuarine Ecosystems; Lake St Lucia as a Global Model. Cambridge University Press, pp. 47–61.

Braun, D.R., Levin, N.E., Roberts, D., Stynder, D., Forrest, F., Herries, A.I., Matthews, T., Bishop, L., Archer, W. and Pickering, R., 2013. Initial investigations of Acheulean hominin behaviour at Elandsfontein. *In*: A. Jerardino, A. Malan and D. Braun (Eds), The Archaeology of the West Coast of South Africa. Cambridge Monographs in African Archaeology, 84, pp. 10–23.

Büttner, S.H., Sherlock, S., Fryer, L., Lodge, J., Diale, T., Kazondunge, R. and Macey, P., 2013. Controls of host rock mineralogy and H₂O content on the nature of pseudotachylyte melts: Evidence from Pan-African faulting in the foreland of the Gariep Belt, South Africa. Tectonophysics, 608, pp. 552–575.

С

Chuma, C., Hlatywayo, D.J., Zulu, J., Muchingami, I., Mashingaidze, R.T. and Midzi, V., 2013. Modelling the subsurface geology and groundwater occurrence of the Matsheumhlope low yielding aquifer in Bulawayo Urban, Zimbabwe. Journal of Geography and Geology, 5(3), ISSN 1916-9779, E-ISSN 1916-9787.

Cole, D.I. and Ngcofe, L., 2014. The distribution of the economic resource potential in the Western Cape Province. South African Journal of Science, 110(1/2), pp. 1–4.

Cole, J., Finn, C.A. and Webb, S.J., 2013. Overview of the magnetic signatures of the Palaeoproterozoic Rustenburg Layered Suite, Bushveld Complex, South Africa. Precambrian Research, 236, pp. 193–213.

Cole, J., Webb, S.J. and Finn, C.A., 2014. Gravity models of the Bushveld Complex – Have we come full circle? Journal of African Earth Sciences, 92, pp. 97–118.

F

Fisher, E.C., Albert, R., Botha, G.A., Cawthra, H.C., Esteban, I., Harris, J., Jacobs, Z., Jerardino, A., Marean, C.W., Neumann, F.H., Pargeter, J., Poupart, M. and Venter, J., 2013. Archaeological reconnaissance for Middle Stone Age sites along the Pondoland coast, South Africa. PaleoAnthropology, pp. 104–137, DOI: 10.4207/PA.2013.ART82.

Fritz, H., Abdelsalam, M., Ali, K.A., Bingen, B., Collins, A.S., Fowler, A.R., Ghebreab, W., Hauzenberger, C.A., Johnson, P., Kusky, T., Macey, P., Muhongo, S., Stern, R.J. and Viola, G., 2013. Orogen styles in the East African Orogen: A review of the Neoproterozoic to Cambrian tectonic evolution. Journal of African Earth Sciences, 86, pp. 65–106.

G

Gastaldo, R.A., Pludow, B.A. and Neveling, J., 2013. Mud aggregates from the Katberg Formation, South Africa: Additional Evidence for Early Triassic Degradational Landscapes. Journal of Sedimentary Research, 83(7), pp. 531–540.

Gastaldo, R.A., Knight, C.L., Neveling, J. and Tabor, N.J., 2014. Latest Permian paleosols from Wapadsberg Pass, South Africa: Implications for Changhsingian climate. Bulletin, Geological Society of America, ISSN 1943–2674.

Grantham, G.H., Macey, P.H., Horie, K., Kawakami, T., Ishikawa, M., Satish-Kumar, M., Tsuchiya, N., Graser, P. and Azevedo, S., 2013. Comparison of the metamorphic history of the Monapo Complex, northern Mozambique and Balchenfjella and Austhameren areas, Sør Rondane, Antarctica: Implications for the Kuunga Orogeny and the amalgamation of N and S Gondwana. Precambrian Research, 234, pp. 85–135.

Н

Hammond, N., 2013. Gold mineralization in banded iron formation in the Amalia greenstone belt, South Africa: A Mineralogical and Sulfur Isotope Study. Resource Geology, 63(2), pp. 119–140.



l

Ishikawa, M., Kawakami, T., Satish-Kumar, M., Grantham, G.H., Hokazono, Y., Saso, M. and Tsuchiya, N., 2013. Late extensional detachment in eastern Sør Rondane Mountains, East Antarctica: Implications for the Collapse of the East African Orogen. Precambrian Research, 234, pp. 247–256.

Κ

Kramers, J.D., Andreoli, M.A.G., Atanasova, M., Belyanin, G.A., Block, D.L., Franklyn, C., Harris, C., Lekgoathi, M., Montross, C.S., Ntsoane, T., Pischedda, V., Segonyane, P., Viljoen, K.S. and Westraadt, J.E., 2013. Unique chemistry of a diamond-bearing pebble from the Libyan Desert glass strewnfield, SW Egypt: Evidence for a Shocked Comet Fragment. Earth and Planetary Science Letters, 382, pp. 21–31.

L

Lambert, I., Durrheim, R., Godoy, M., Kota, M., Leahy, P., Ludden, J., Nickless, E., Oberhaensli, R., Anjian, W. and Williams, N., 2013. Resourcing future generations: A proposed new IUGS initiative. Episodes, 36(2), pp. 82–86.

Μ

Macey, P.H., 2013. Orogen styles in the East African Orogen: A review of the Neoproterozoic to Cambrian tectonic evolution. Journal of African Earth Sciences, 86, pp. 65–106.

Macey, P.H., Miller, J.A., Rowe, C.D., Grantham, G.H., Siegfried, P., Armstrong, R.A., Kemp, J. and Bacalau, J., 2013. Geology of the Monapo Klippe, NE Mozambique and its significance for assembly of central Gondwana. Precambrian Research, 233, pp. 259–281. Madi, K., Tsanwani, M., Zhao, B. and Tongu, E., 2013. Insights on structural, petrographical, mineralogical and geochemical approach on the Grahamstown kaolin deposit genesis in the Eastern Cape, South Africa. International Journal of Sciences: Basic and Applied Research (IJSBAR), 10(1), pp. 146–163.

Madzivire, G., Gitari, W.M., Vadapalli, V.R.K. and Petrik, L.F., 2013. Jet loop reactor application to facilitate sulphate removal from mine water using fly ash, lime and Al(OH)₃. International Journal of Environmental Science and Technology, DOI: 10.1007/s13762-013-0417-7.

Madzivire, G., Lindsay, R., Gitari, W.M., Vadapalli, V.R.K., Maleka, P.P. and Petrik, L.F., 2014. Fate of the naturally occurring radioactive materials during treatment of acid mine drainage with coal fly ash and aluminium hydroxide. Journal of Environmental Management, 133, pp. 12–17.

Midzi, V., Bommer, J.J., Strasser, F.O., Albini, P., Zulu, B.S., Prasad, K. and Flint, N.S., 2013. An intensity database for earthquakes in South Africa from 1912 to 2011. Journal of Seismology, 17, pp. 1183–1205.

Miller, J.A., Faber, C., Rowe, C.D., Macey, P.H. and Du Plessis, A., 2013. Eastward transport of the Monapo Klippe, Mozambique determined from field kinematics and XCT analysis, and implications for Late Orogenic tectonics in Central Gondwana. Precambrian Research, 237, pp. 101–115.

Muriithi, G.N., Petrik, L.F., Fatoba, O., Gitari, W.M., Doucet, F.J., Nel, J., Nyale, S.M. and Chuks, P.E., 2013. Comparison of CO₂ capture by *ex situ* accelerated carbonation and in *in situ* naturally weathered coal fly ash. Journal of Environmental Management, 127, pp. 212–220.

Ν

Neumann, F.H., Botha, G.A. and Scott, L., 2014. 18,000 years of grassland evolution in the summer rainfall region of South Africa – evidence from Mahwaqa Mountain, KwaZulu-Natal. Vegetation History and Archaeobotany, DOI: 10.1007/s00334-014-0445-3.

Ngcofe, L. and Cole, D.I., 2014. The distribution of economic mineral resource potential in the Western Cape Province. South African Journal of Science, DOI: 10.1590/sajs.2014/a0045.

Ngcofe, L., Minnaar, H., Halenyane, K. and Chevallier, L., 2013. Multispectral and Hyperspectral Remote Sensing: Target Area Generation for Porphyry Copper Exploration in the Namaqua Metamorphic Province. South African Journal of Geology, 116(2), pp. 259–272, DOI: 10.2113/ gssajg.116.2259.

R

Rao, K.S. and Rathod, G.W., 2013. Seismic microzonation of Indian megacities: A Case Study of NCR Delhi. Indian Geotechnical Journal, Springer, DOI: 10.1007/s40098-013-0084-0.

Roberts, D.L., Cawthra, H.C. and Musekiwa, C., 2013. Dynamics of late Cenozoic Aeolian deposition along the South African coast: A record of evolving climate and ecosystems. *In*: I.P. Martini and H.R. Wanless (Eds), Sedimentary Coastal Zones from High to Low Latitudes: Similarities and Differences. Special Publication, Geological Society of London, 388, DOI: 10.1144/SP388.11.

Roberts, D.L., Sciscio, L., Herries, A.I.R., Scott, L., Bamford, M.K., Musekiwa, C. and Tsikos, H., 2013. Miocene fluvial systems and palynofloras at the southwestern tip of Africa: Implications for Regional and Global Fluctuations in Climate and Ecosystems. Earth



Science Reviews, 124, pp. 184–201, DOI: 10.1016/j.earscirev.2013.05.001.

Roelofse, F. and Saunders, I., 2013. A first report on meteor-generated seismic signals as detected by the SANSN. Research Letters, DOI: 10.1590/ sajs.2013/20120022.

S

Sakala, E., Tessema, A. and Nyabeze, P.K., 2013. Regional interpretation of aeromagnetic data for groundwater exploration in the Capricorn District, Limpopo, South Africa. International Journal of Modelling and Simulation, 34(1), pp. 36–42.

Shabalala, A.N., 2013. Assessment of locally available reactive materials for use in permeable reactive barriers (PRBs) in remediating acid mine drainage. Water SA, 39(2), pp. 251–256.

V

Vincent, C.J., Hicks, N., Arenstein, G., Tippmann, R., Van der Spuy, D., Viljoen, J., Davids, S., Roos, M., Cloete, M., Beck, B., Nell, L., Arts, R., Holloway, S., Surridge, T. and Pearce, J., 2013. The proposed CO₂ Test Injection Project in South Africa. GHGT-11, Energy Procedia, 37, pp. 6489–6501.

Viswanath, R.K., Vadapalli, V., Fester, V., Petrik, L. and Slatter, P., 2013. Effect of fly ash size fraction on the potential to neutralize acid mine drainage and rheological properties of sludge. Desalination and Water Treatment, DOI: 10.1080/19443994.2013.823355.

Ζ

Zvimba, J.N., Mathye, M., Vadapalli, V.R.K., Swanepoel, H. and Bologo, L., 2013. Fe(II) oxidation during acid mine drainage neutralization in a pilot scale sequencing batch reactor. Water Science and Technology, 68, pp. 1406–1411.

Our conference abstracts and posters

Α

Adomako-Ansah, K., Mizuta, T., Ishiyama, D., Hammond, N.Q. and Yamamoto, M., 2013. Archean banded iron formation gold-hosted deposit in the Amalia greenstone belt, South Africa: Ore textures and geochemical features of mineralization. International Association on the Genesis of Ore Deposits Conference, Miass, Russia, 7–9 August 2013.

Andreoli, M.A.G., Ben-Avraham, Z., Delvaux de Fenffe, D., Durrheim, R., Fagareng, A., Heibach, A.O., Hodge, M., Logue, A., Malephane, M., Van der Merwe, J.N., Muaka, J., Saalman, K. and Saunders, I., 2013. Stress patterns across South Africa: Something amiss? European Geosciences Union 2013 Conference, Vienna, Austria, 7–12 April 2013.

Atanasova, M.T., Schutte, C.J.H., Prinsloo, L.C. and Focke, W.W., 2013. Copper antimonite CuSb₂O₄ — Green synthesis and characterization. 12th International Chemistry Conference, Africa 2013, Pretoria, 8–12 July 2013.

В

Billay, A., 2013. Data fusion for interpretive bedrock mapping in the Giyani area (South Africa). 12th SGA (Society for Geology Applied to Mineral Deposits) Biennial Meeting, Mineral Deposit Research for a High-Tech World, Uppsala, Sweden, 12–15 August 2013.

Bommer, J.J., Coppersmith, K.J., Hattingh, E. and Nel, A.P., 2013. An application of the SSHAC Level-3 process to the probabilistic seismic hazard assessment for the Thyspunt nuclear site in South Africa. Transactions, SMIRT-22, San Francisco, California, USA, 18–23 August 2013.

Browning, C., 2013. The Cape Geosites Series. Geoheritage and Education in South Africa. Geoheritage Series Number 2, Geological Society of South Africa, Oudtshoorn, 8–11 September 2013.

С

Cawthra, H.C. and Compton, J.S., 2013. A marine geophysical study of the continental shelf off Mossel Bay, South Africa: Sea-level fluctuations, human evolution and submerged landscapes. 2013 SANCOR Workshop, South African Network for Coastal and Oceanic Research, Cape Town, 6 November 2013.

Cawthra, H.C., Fisher, E.C., Compton, J.S. and Marean, C.W., 2013. Drowned Quaternary environments and the significance for the South African southern Cape archaeological record. SplashCos 2013 Final Meeting, Under the sea: Archaeology and Palaeolandscapes, Szczecin, Poland, 23–27 September 2013.

Chevallier, L., 2013. The geology of the Karoo basin: Its role in hydraulic fracturing, groundwater supply and migration. Gas Week 2013, Johannesburg, 8–12 April 2013.

Chevallier, L., 2013. Groundwater challenge in the Karoo in relation to hydraulic fracturing. Shale Gas Southern Africa Conference — Understanding the risks and opportunities of shale gas exploration and production, Aminergy, Cape Town, 27–29 May 2013.

Chirenje, E., Sethobya, M. and Mbongonya, A., 2013. Geophysical delineation of a quartz hematite prospect in the Bushveld Granites: Implications for exploration. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Chirenje, E., Nyabeze, P., Coetzee, H. and Hobbs, P., 2013. Geophysics as a tool for mapping acid mine drainage flow



pathways at the Cradle of Humankind World Heritage Site (Sterkfontein Caves), West Rand, South Africa. Third IGCP/ SIDA/UNESCO Project No. 606 Workshop, Addressing Environmental Health Impacts of Major and Abandoned Mines in Sub-Saharan Africa, Yaoundé, Cameroon, 25–29 June 2013.

Chirenje, E., Sekiba, F.M.A., Nyabeze, P.K. and Coetzee, H., 2013. Electrical resistivity tomography surveys carried out to monitor a contaminant plume emanating from the Bank 5 discard dump. EO-MINERS (Earth Observation for Monitoring and Observing Environmental and Societal Impacts of Mineral Resources Exploration and Exploitation) Final Scientific and Technical Conference, Versailles, France, 10–11 October 2013.

Chizinski, T.L., Gastaldo, R.A. and Neveling, J., 2013. The fluvial sequence of a latest Changhsingian, pre-PT extinction river complex, Eastern Cape Province, South Africa. Geological Society of America 125th Anniversary Annual Meeting and Exposition, Denver, Colorado, USA, 27–30 October 2013.

Cichowicz, A., Birch, D., Midzi, V. and Mangongolo, A., 2013. Fluid-induced seismicity in the Johannesburg area, South Africa. IAHS/IAPSO/IASPEI Joint Assembly, Knowledge for the Future, Gothenburg, Sweden, 22–28 July 2013.

Cichowicz, A., Birch, D., Midzi, V., Singh, N. and Naidoo, K., 2013. Fluid-induced seismicity resulting from water ingress into mining voids in the Central Rand Basin area, South Africa. Workshop, Istituto Nazionale di Geofisica e Vulcanologia Sezione, Milan, Italy, 7–11 June 2013.

Coetzee, H., 2013. Flooding of the underground mine workings of the Witwatersrand goldfields. 2013 Annual Conference, International Mine Water Association, IMWA 2013 — Reliable Mine Water Technology, Denver, Colorado, USA, 5–9 August 2013.

Coetzee, H., 2013. Rapid field-based analytical techniques for the environmental screening of abandoned mine sites. 2013 Annual Conference, International Mine Water Association, IMWA 2013 — Reliable Mine Water Technology, Denver, Colorado, USA, 5–9 August 2013.

Coetzee, H., 2013. Interactions between dolomite and acid mine drainage in the Witwatersrand: results of field and laboratory studies and the implications for natural attenuation in the West Rand Goldfield. 2013 Annual Conference, International Mine Water Association, IMWA 2013 — Reliable Mine Water Technology, Denver, Colorado, USA, 5–9 August 2013.

Cole, D.I., 2013. Shale gas potential of the Ecca Group in the Main Karoo Basin of South Africa. Shale Gas Southern Africa Conference — Understanding the risks and opportunities of shale gas exploration and production, Aminergy, Cape Town, 27–29 May 2013.

Cole, D.I., 2013. Geoheritage opportunities for abandoned mines and quarries in the Cape Peninsula, South Africa. Geoheritage and Education in South Africa, Geoheritage Series Number 2, Geological Society of South Africa, Oudtshoorn, 8–11 September 2013.

Cole, J., Webb, S.J. and Finn, C.A., 2013. 3D potential field modelling of the Bushveld. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Cole, P. and Cole, J., 2013. PyGMI – The use of Python in geophysical modelling and interpretation. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

D

Diop, S., Ekolu, S. and Azene, F., 2013. Acid mine drainage research in Gauteng highlighting impacts on infrastructure and innovation of concrete-based remedial systems. American Geophysical Union Fall Meeting, San Francisco, California, USA, 9–13 December 2013.

Doucet, F.J., Mohamed, S., Van der Merwe, E.L., Altermann, W., Nkosi, Z.H. and Petrik, L., 2013. Mineral carbonation and valorization of platinum and diamond tailings for sustainable CO_2 management. 3rd South African Carbon Capture and Storage Conference, Johannesburg, 3–4 October 2013.

Durrheim, R.J., Ogasawara, H., Nakatani, M., Yabe, Y., Milev, A.M., Cichowicz, A., Kawakata, H. and Moriya, H., 2013. Observational studies in South African mines to mitigate seismic risks: a mid-project progress report. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Е

Eberle, D. and Paasche, H., 2013. How to join efforts to build a strong research community? Colloquium on Data Integration Technologies for Earth System Modelling and Resource Management under the SA-German Year of Science, Pretoria, 23 April 2013.

F

Foya, S., 2013. Derisking exploration: the Council for Geoscience's Contribution. IRR Junior Mining and Exploration Conference, Bryanston, 5–7 November 2013.



G

Gastaldo, R.A., Tabor, N.J., Neveling, J. and Knight, C., 2013. Latest Changhsingian paleosol trends and estimates of atmospheric pCO₂ from carbonate concretions at Wapadsberg Pass, Karoo Basin, South Africa. Geological Society of America 125th Anniversary Annual Meeting and Exposition, Denver, Colorado, USA, 27–30 October 2013.

Groenewald, C., Lambert, C.W. and Melosh, B.L., 2013. Snap, Crackle, Pop: Dilational fault breccias record seismic slip below the brittle-plastic transition. Geological Society of America 125th Anniversary Annual Meeting and Exposition, Denver, Colorado, USA, 27–30 October 2013.

Н

Hallbauer-Zadorozhnaya, V. and Nyabeze, P.K., 2013. Time-domain electromagnetic sounding in southern Africa: Recent case studies. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Hatton, C., 2013. Piscine evidence for the rise of Africa. Geoheritage and Education in South Africa, Geoheritage Series Number 2, Geological Society of South Africa, Oudtshoorn, 8–11 September 2013.

Havenga, M., Barton, J. (Jr) and Webb, S., 2013. A structural analysis of the geophysical signature relationship between linear features and plug-like bodies of sheets 2229AB and 2229AD in the Limpopo Province, South Africa. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013. Hearty, P.J., Raymo, M.E., O'Leary, M.J., Rovere, A., Inglis, J. and Roberts, D., 2013. Extracting Plio-Pleistocene sealevel history: a diversified field approach, Republic of South Africa (RSA). PALSEA2 2013 Workshop, Estimating Rates and Sources of Sea-Level Change during Past Warm Periods, Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy, 21–25 October 2013.

Hlatshwayo, S., Schalk, S. and Elsenbroek, J.H., 2013. Regolith geochemistry of the Rustenburg Layered Suite, southwestern Bushveld Complex, South Africa. 26th Applied International Geochemistry Symposium incorporating the 35th New Zealand Geothermal Workshop, Rotorua, New Zealand, 18–21 November 2013.

Hicks, N., 2013. Basin-scale assessment of the potential CO₂ storage of the offshore Durban Basin, KwaZulu-Natal, South Africa. 3rd South African Carbon Capture and Storage Conference, Johannesburg, 3–4 October 2013.

Higashino, F., Kawakami, T., Satish-Kumar, M., Ishikawa, M., Tsuchiya, N. and Grantham, G., 2013. Multi-stage CI-rich fluid activity and behaviour of REE-bearing minerals in a Neoproterozoic terrane. Goldschmidt 2013 Conference, Florence, Italy, 25–30 August 2013.

Higashino, F., Kawakami, T., Tsuchiya, N., Satish-Kumar, M., Ishikawa, M. and Grantham, G.H., 2014. Significance of multi-stage chloride brine activity in granulite terrane — an example from Brattnipene, Sør Rondane Mountains, East Antarctica. Water Dynamics Conference, Sendai, Japan, 12–14 March 2014.

K

Kawakami, T., Higashino, F., Sakai, H., Sato, K., Tsuchiya, N., Ishikawa, M., Satish-Kumar, M. and Grantham, G.H., 2014. Syn-metamorphic boron-bearing and chlorine-bearing fluid activities in continental collision settings. Geofluid 3 Conference, Nature and Dynamics of Fluids in Subduction Zones, Tokyo, Japan, 28 February to 3 March 2014.

Kenan, A.O., 2013. Uranium update: South Africa. 49th Joint OECD/NEA-IAEA Uranium Group Meeting, Vienna, Austria, 12–14 June 2013.

Kenan, A.O., 2013. Uranium resources, Production, Demand and Forecast: South Africa. 50th Joint OECD/NEA-IAEA Uranium Group Meeting, Paris, France, 6–8 November 2013.

Kgaswane, E., 2013. Shear wave velocity structure of the crust containing the Bushveld Complex. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Kota, M., Hein, K., Master, S., Abiye, T. and Durrheim, R., 2013. The challenges for resourcing future generations from an African perspective. Geological Society of America 125th Anniversary Annual Meeting and Exposition, Denver, Colorado, USA, 27–30 October 2013.

L

Lambert, C.W., Kisters, A.F.M., Macey, P.H., Frei, D., Buick, I.S. and Groenewald, C., 2013. Melt-shear zone relationships during the lifespan of a continental transcurrent shear zone. Geological Society of America 125th Anniversary Annual Meeting and Exposition, Denver, Colorado, USA, 27–30 October 2013.

Langwenya, M., Gastaldo, R.A., Neveling, J., Prevec, R., Kamo, S.L. and Geissman, J.W., 2013. The Late Permian stratigraphy of the upper Tweefontein



section, Eastern Cape Province, South Africa. Geological Society of America 125th Anniversary Annual Meeting and Exposition, Denver, Colorado, USA, 27–30 October 2013.

Lin, H. and Lin, L., 2013. GIS-PMWIN, a preprocessor in ARCGIS for groundwater modeling with PMWIN. 13th Biennial Groundwater Division Conference and Exhibition, Durban, 17–19 September 2013.

Lycka, B., Geissman, J.W., Gastaldo, R. and Neveling, J., 2013. Rock magnetic properties of the latest Permian to earliest Triassic Beaufort Group, Tweefontein area, Karoo Basin, South Africa. American Geophysical Union Fall Meeting, San Francisco, California, USA, 9–13 December 2013.

Μ

Maas, K., Ogola, J.S. and Matshusa, K., 2013. Modeling the distribution pathways of trace metals from accumulated tailing sites — First results from an international project. *In*: RWTH Aachen University (Eds), German Mine Surveyor Association, Institute for Mine Surveying, Mining Damage and Geophysics in Mining. XVth International ISM Congress, International Society for Mine Surveying, Aachen, Germany, 16–20 September 2013.

Madi, K., Nyabeze, P., Gwavava, O., Sekiba, M. and Zhao, B., 2013. Radiometric investigation in the vicinity of hot springs in the northern neotectonic belt in the Eastern Cape Province, South Africa. Third IGCP/SIDA/UNESCO Project 606 Workshop, Yaoundé, Cameroon, 25–29 June 2013.

Madi, K., Nyabeze, P., Gwavava, O., Sekiba, M. and Zhao, B., 2013. Magnetic and electromagnetic investigation of the Polile Tshisa hot spring in the northern neotectonic belt in the Eastern Cape Province, South Africa. Geoforum 2013, Mineralisation and Geosciences in Africa, Johannesburg, 3–5 July 2013.

Makgae, M., Maree, J. and Annandale, J., 2013. Neutralized mine water for irrigation — Cost and Feasibility Study. 2013 Annual Conference, International Mine Water Association, IMWA 2013 — Reliable Mine Water Technology, Denver, Colorado, USA, 5–9 August 2013.

Makhado, M. and Nngigideni, T., 2013. A revised thorium resources and provinces of South Africa. Technical Meeting on Thorium Resources and Provinces, International Atomic Energy Agency (IAEA), Vienna, Austria, 24–27 September 2013.

Makonto, O. and Dippenaar, M.A., 2013. Aquifer vulnerability assessment of the Molototsi and Middle Letaba Quaternary Catchments, Limpopo Province, South Africa. 13th Biennial Groundwater Division Conference and Exhibition, Durban, 17–19 September 2013.

Malumbazo, N., Wagner, N.J. and Bunt, J.R., 2013. The impact of particle size and maceral segregation on char formation in a packed bed combustion unit. International Conference on Coal and Science Technology, Pennsylvania, USA, 29 September to 3 October 2013.

Maré, L.P., De Kock, M.O., Cairncross, B. and Mouri, H., 2013. What rock magnetism reveals of the Karoo Basin. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Midzi, V., 2013. Seismotectonic map of Africa: Status of Southern African Activities. European Geosciences Union 2013 Conference, Vienna, Austria, 7–12 April 2013. Midzi, V., 2013. The seismotectonics of southern Africa. Workshop on the Seismotectonic Map of Africa, Agadir, Morocco, 30–31 May 2013.

Midzi, V., 2013. A database of intensity data for South Africa. IAHS/IAPSO/IASPEI Joint Assembly, Knowledge for the Future, Gothenburg, Sweden, 22–28 July 2013.

Midzi, V. and Zulu, B.S., 2013. Probabilistic seismic hazard analysis for dam sites: The Metolong Dam Site in Lesotho. South African National Committee on Large Dams Conference, Thaba 'Nchu, South Africa, 5–7 November 2013.

Mitha, V., 2013. The potential for proclaiming a Wild Coast Geopark. Geoheritage and Education in South Africa, Geoheritage Series Number 2, Geological Society of South Africa, Oudtshoorn, 8–11 September 2013.

Mohamed, S., Van der Merwe, E.L., Altermann, W., Nkosi, Z.H. and Doucet, F.J., 2013. Controlled mineral transformations in mining wastes for valorization and sustainability. MINSA Mini Symposium, Pretoria, 22 August 2013.

Mohamed, S., Nkosi, Z.H., Rapholo, K., Van der Merwe, E.L, Altermann, W. and Doucet, F.J., 2013. Investigating the CO₂ sequestration potential of mine waste tailings through mineral carbonation. Geoforum 2013, Mineralisation and Geosciences in Africa, Johannesburg, 3–5 July 2013.

Mulabisana, T., 2013. Compiling a homogeneous earthquake catalogue for southern Africa. AVCOR (Active Volcanism and Continental Rifting) Conference, Gisenyi, Rwanda, 12–14 November 2013.

Munyangane, P.M., Mouri, H. and Kramers, J., 2013. Potentially Harmful Trace Elements (PHTEs) in borehole water of the rural Greater



Giyani area, Limpopo, South Africa: Possible Health Implications. MEDGEO 2013, 5th International Conference on Medical Geology, Virginia, USA, 25–29 August 2013.

Muriithi, G., Petrik, L., Gitari, W.M. and Doucet, F.J., 2013. Carbon capture potential of fly ash dams and in accelerated *ex-situ* mineral carbonation. 4th International Conference on Accelerated Carbonation for Environmental and Materials Engineering — ACEME 2013, Leuven, Belgium, 9–12 April 2013.

Muriithi, G., Petrik, L., Gitari, W.M. and Doucet, F.J., 2013. Synthesis, characterization and potential CO₂ capture properties of a novel adsorbent (hydrotalcite) from South African coalcombustion fly ash. 12th International Chemistry Conference Africa, Pretoria, 8–12 July 2013.

Muriithi, G., Petrik, L., Fatoba, O.O., Gitari, W.M. and Doucet, F.J., 2013. A South African technology for the shortterm capture of CO_2 from flue gases: Synthesis, structure and CO_2 capture properties of zeolites. 3rd South African Carbon Capture and Storage Conference, Johannesburg, 3–4 October 2013.

Muriithi, G., Petrik, L., Fatoba, O.O., Gitari, W.M. and Doucet, F.J., 2013. A South African technology for the short-term capture of CO_2 from flue gases: Synthesis, structure and CO_2 capture properties of hydrotalcite. 3rd South African Carbon Capture and Storage Conference, Johannesburg, 3–4 October 2013.

Ν

Netshitungulwana, R., Yibas, B., Novhe, O. and Motlakeng, T., 2013. Stream sediments geochemistry of the areas impacted by mining around eMalahleni (formerly known as Witbank), South Africa: Fingerprinting AMD potential points. 2013 Annual Conference, International Mine Water Association, IMWA 2013 — Reliable Mine Water Technology, Denver, Colorado, USA, 5–9 August 2013.

Ngcofe, L. and Sebake, D., 2013. The application of hyperspectral remote sensing for mapping potential polluted areas in Johannesburg, South Africa. 35th International Symposium on Remote Sensing of Environment, Beijing, China, 22–26 April 2013.

Novhe, N.O., Netshitungulwana, R., Yibas, B., Motlakeng, T. and Sakala, E., 2013. Metal pollution sources and transport in mined watershed: an insight from Ermelo Coalfield, South Africa. 2013 Annual Conference, International Mine Water Association, IMWA 2013 – Reliable Mine Water Technology, Denver, Colorado, USA.

Nxumalo, V., 2013. Uranium mineralisation in the Springbok Flats Coalfield. 2nd Limpopo Coalfields Conference, Polokwane, 17–18 October 2013.

Nyabeze, P.K., 2013. Modelling of ground electromagnetic and electrical resistivity data for characterisation of swallow aquifers in the Limpopo Province, South Africa. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Nyabeze, P.K., Dube, M.P. and Gwavava, O., 2013. Investigating magnetic source depths in the Soutpansberg Basin, South Africa. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Nyabeze, P.K., Gwavava, O. and Shabalala, A., 2013. Mapping groundwater flow at Dopeni and Mphephu hot springs using electrical resistivity and electromagnetic surveys: Implications for Solute Migration. Third IGCP/SIDA/ UNESCO Project 606 Workshop in Yaoundé, Cameroon, 25–29 June 2013.

Nyabeze, P.K., Gwavava, O. and Shabalala, A., 2013. Characterization of groundwater potential in the northern parts of Limpopo Province, South Africa: Results from integrated geophysical studies across the Sagole hot spring. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Nyabeze, P.K., Musekiwa, C. and Shabalala, A., 2013. The use of remote sensing to identify hot springs in the Limpopo Province (South Africa) and Omaruru–Okahandja–Rehoboth Districts (Namibia). Internal Workshop, Council for Geoscience Geothermal Working Group, Cape Town, 15 October 2013.

Nyabeze, P.K., Shabalala, A. and Gwavava, O., 2013. Using geophysical techniques to delineate groundwaterbearing structures at the Sagole hot spring, Limpopo Province, South Africa. 13th Biennial Groundwater Division Conference and Exhibition, Durban, 17–19 September 2013.

Nyabeze, P.K., Mapani, B., Musekiwa, C., Nguno, A., Shabalala, A. and Gwavava, O., 2013. Using GIS datasets to delineate groundwater-bearing structures at hot springs in southern Africa: Case studies from South Africa and Namibia. Summer Symposium, Geology Society, Zimbabwe, Victoria Falls, Zimbabwe, 29 November 2013.

0

Ogasawara, H., Hofmann, G., Kato, H., Nakatani, M., Moriya, H., Naoi, M.,



Yabe, Y., Durrheim, R., Cichowicz, A., Kgarume, T., Milev, A., Murakami, O., Satoh, T. and Kawakata, H., 2013. *In-situ* monitoring and modelling of the rock mass response to mining. 8th International Symposium on Rockbursts and Seismicity, Japanese-South African Collaborative Research, RaSiM 8, Moscow, Russia, 1–7 September 2013.

R

Ramagwede, F., 2013. Integrated Infrastructure Programme. 2nd Limpopo Coalfields Conference, Polokwane, 17–18 October 2013.

Rathod, G.W. and Rao, K.S., 2013. A critical assessment of procedures used for the slope stability assessment of Lower Subansiri hydroelectric power house. South African National Committee on Large Dams Conference, Thaba 'Nchu, South Africa, 5–7 November 2013.

Rathod, G.W., Rao, K.S. and Gupta, K.K., 2013. Effect of uncertainties in ground motion and dynamic soil properties on seismic site response analysis. Indian Geotechnical Conference, IIT Roorkee, India, 22–24 December 2013.

Rathod, G.W., Rao, K.S. and Gupta, K.K., 2014. Processing earthquake catalogues: Critical issues and declustering algorithms. 9th Annual AfricaArray Workshop, University of the Witwatersrand, Johannesburg, 19–31 January 2014.

Roberts, D.L., 2013. UNESCO Geoparks in the Western Cape (South Africa): Potential and Progress. Geoheritage and Education in South Africa, Geoheritage Series Number 2, Geological Society of South Africa, Oudtshoorn, 8–11 September 2013.

Robey, K. and Tredoux, G., 2013. *In situ* iron removal: Innovative Option for Preventing Production Borehole Clogging. 13th Biennial Groundwater Division Conference and Exhibition, Durban, 17–19 September 2013.

S

Saeze, H.A., 2013. The radon in thermal springs of Limpopo Province. 13th Biennial Groundwater Division Conference and Exhibition, Durban, 17–19 September 2013.

Sainato, C.M., Hallbauer-Zadorozhnaya, V., Losinno, B.N., Nyabeze, P.K., Martinez, M.J.P. and Shabalala, A.N., 2013. Evaluation of contamination at a feedlot San Pedro, Argentina, by means of electromagnetic methods and laboratory modelling of soil samples. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Sakala, E., Chirenje, E. and Makonto, O.T., 2013. Multi-method geophysical approach for groundwater exploration in granitic basement terrain: Case study on Matok granite, Limpopo, South Africa. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Sakala, E., Chirenje, E. and Yibas, B., 2013. Investigation of contaminant plumes emanating from residual mine deposits in the Mpumalanga Province of South Africa, results from geophysical surveys. 13th Biennial Groundwater Division Conference and Exhibition, Durban, 17–19 September 2013.

Saunders, I., 2013. Calibration of a MI scale for South Africa using tectonic earthquake data recorded by the SANSN. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Sekiba, M., Nyabeze, P.K. and Madi, E., 2013. A report on ground geophysical surveys carried out at Aliwal North, Badfontein and Kenegha Drift hot springs in the Eastern Cape Province, South Africa. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Sethobya, M., Nyabeze, P.K. and Phalandwa, S., 2013. A report on borehole siting at Tshivhilwi Village in Limpopo Province, South Africa. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Shelembe, R., Mouri, H. and Kramers, J., 2013. Possible sources of contamination of groundwater from the Pilanesberg Alkaline Complex and the Rustenburg Layered Suite and health impact on North West Province communities, South Africa. MEDGEO 2013, 5th International Conference on Medical Geology, Virginia, USA, 25–29 August 2013.

Shelembe, R., Mouri, H. and Kramers, J., 2014. Possible health impacts of the alkaline Pilanesberg Complex on communities in the semi-arid region of the North West Province, South Africa. 1st International Symposium of Medical Geology, Johannesburg, 24–26 March 2014.

Spencer, K., Gastaldo, R.A., Neveling, J., Geissman, J.W. and Kamo, S.L., 2013. The Late Permian stratigraphy of the basal Tweefontein section, Eastern Cape Province, South Africa. Geological



Society of America 125th Anniversary Annual Meeting and Exposition, Denver, Colorado, USA, 27–30 October 2013.

Strasser, F.O., 2013. A stochastic GMPE for the UK. ISTerre/Université Joseph Fourier, Grenoble, France, 7 May 2013.

Т

Tessema, A. and Nzotta, U., 2013. Multidata integration approach in groundwater. Resource potential mapping: A Case Study from the North West Province, South Africa. 13th Biennial Groundwater Division Conference and Exhibition, Durban, 17–19 September 2013.

Tessema, A., Nyabeze, P.K. and Chirenje, E., 2013. Mapping potential mineral targets using integration of geophysical and geochemical data at Nietverdiend Mafic Layered Intrusion, the Bushveld Complex, South Africa. 12th SGA (Society for Geology Applied to Mineral Deposits) Biennial Meeting, Mineral Deposit Research for a High-Tech World, Uppsala, Sweden, 12–15 August 2013.

Tlowana, S., Coetzee, H. and Makgae, M., 2013. Realistic simulation of acid mine drainage generation in the gold mines of the Witwatersrand, South Africa. 2013 Annual Conference, International Mine Water Association, IMWA 2013 — Reliable Mine Water Technology, Denver, Colorado, USA, 5–9 August 2013.

V

Viljoen, J.H.A., 2014. The Council for Geoscience and its role in assessing the geological storage potential of CO₂ in South Africa. Carbon Capture Workshop 2014, Carbon Capture: Clean Environment, Cape Town, 24–26 March 2014.

Y

Yibas, B., Netshitungulwana, R., Novhe, O., Mengistu, H., Sakala, E., Thomas, A. and Nyabeze, P.K., 2013. A holistic approach towards best management practices of mine pollution impacts using a catchment area strategy, South Africa. 2013 Annual Conference, International Mine Water Association, IMWA 2013 — Reliable Mine Water Technology, Denver, Colorado, USA, 5–9 August 2013.

Ζ

Zadorozhnaya, V., 2013. Electromagnetic sounding in high resistive sections for ore exploration on the African continent. The VIth International Electromagnetic Workshop, Novosibirsk, Russia, 2–6 September 2013.

Zadorozhnaya, V., 2013. Different types of TEM signals along only one profile: Benefit Study for Beginners. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Zadorozhnaya, V., Santarato, G. and Abu-Zeid, N., 2013. A new induced polarization effect generated by current pulses on TEM soundings. 13th Biennial Conference, South African Geophysical Association (SAGA), 6–9 October 2013; 6th International Conference on Airborne Electromagnetics (AEM), Kruger National Park, South Africa, 10–11 October 2013.

Popular journals and books

Mining Review Africa. Mines and Mineral Resources. July 2013: Mines and Mineral Resources of Sub-Saharan Africa.

Mining Review Africa. Mines and Mineral Resources. October 2013: Mines and Mineral Resources of Western Africa.

Mining Review Africa. Mines and Mineral Resources. November 2013: Mines and Mineral Resources of Central Africa. Mining Review Africa. Mines and Mineral Resources. December 2013: Mines and Mineral Resources of Southern Africa.

German Mineral Resources Agency (DERA) and the Council for Geoscience, South Africa (CGS), 2013. Investor's and Procurement Guide South Africa. Part 1: Heavy Minerals, Rare-Earth Elements, Antimony. http://www. deutsche-rohstoffagentur.de/DE/ Gemeinsames/Produkte/Downloads/ DERA_Rohstoffinformationen/ rohstoffinformationen-21.pdf?__ blob=publicationFile&v=2.



125

PART C GOVERNANCE

m

iii

III

<u>ii ii</u>

h

H

th

İ

D

fil

1

1. INTRODUCTION

The Council for Geoscience is fully committed to applying the fundamental principles of good governance, transparency, integrity, accountability and responsibility. It 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.

2. EXECUTIVE AUTHORITY

The Council for Geoscience submits reports in terms of National Treasury regulations (26.1) to the Executive Authority on a quarterly basis on 31 January, 30 April, 31 July and 31 October. The Annual Performance Plan and the Council for Geoscience Strategic Plan are submitted to the Department of Mineral Resources on 30 September.

No issues were raised during the 2013/14 financial year.

3. THE 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 continually 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 outlined in section 50 of the Public Finance Management Act (Act No. 1 of 1999, as amended) which, among others, requires them to declare their interests in the event of a potential conflict of interest. The Board meets on a quarterly basis, or as required during the course of a financial year. Five meetings were held during the period under review on 23 May, 25 July, 29 August and 21 November 2013 and on 27 February 2014.

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:

- role in exercising leadership, judgement and providing strategic direction
- composition
- accountability
- 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.



Other committees		Technical PRT Finance	Technical	Technical	Audit and Risk	PRT Technical	,	Technical Finance	Audit and Risk Finance
Area of expertise	Physics	Geology	Technology and Innovation Systems	Mining Engineering	Mineral Policy and Promotion	Geology	Conservation of Ocean and Coast	Economic Geology	Accounting
Qualifications	PhD (Physics)	MSc (Exploration Geology), MBA, Postgraduate Diploma (Financial Strategy)	MSc (Engineering Management)	MSc (Engineering, Physical Metallurgy)	BSc (Geology)	PhD (Geology)	PhD (Marine and Environmental Science)	PhD (Economic Geology)	BCompt Hons (Accounting) CA (SA)
Date appointed	1 October 2012	1 December 2012	1 February 2013	1 October 2012	1 October 2012	1 October 2012	1 February 2014	1 October 2012	1 October 2012
Employer	University of Limpopo	Council for Geoscience	Department of Science and Technology	Council for Scientific and Industrial Research	Department of Mineral Resources	Tranter Resources (Pty) Limited	Department of Environmental Affairs	Council for Scientific and Industrial Research	Bluewaves Consulting Services
Designation	Chairperson	CEO	Board Member	Board Member	Board Member	Board Member	Board Member	Board Member	Board Member
Name	Prof. P E Ngoepe	Mr M W Kota	Mr B A Gerryts	Prof. M A Hermanus	Mr M Mabuza	Dr H Mathe	Dr M Mayekiso	Dr.J E McGill	Ms K R Mthimunye

Composition of the Board



Other committees	Audit and Risk	Technical	ı		РЯТ		Finance	РŖТ Technical	РЯТ
Area of expertise	Special Advisor to Minister of Water Affairs	Regulatory Compliance Services	Land Surveying	Environmental Management	Land Administration (Cadastral Surveys)		Environment	Economic Development	Geology
Qualifications	MSc (Soil Science)	BCom (Business Management) MBL (Financial Management, Project Management and Corporate Strategy)	BSc (Mathematics and Chemistry, Surveying)	MSc (Environmental Management)	BSc (Land Surveying)	BSc	MSc (Environment and Society)	MSc (Globalisation and Development)	MSc (Mining Engineering)
Date appointed	1 October 2012	1 October 2012	1 October 2012	1 February 2014	1 October 2012	1 October 2012 Resigned on 31 December 2013	1 October 2012	1 October 2012	1 October 2012
Employer	Department of Water Affairs	Department of Human Settlements	Department of Rural Development and Land Reform	Department of Environmental Affairs	Department of Rural Development and Land Reform	Department of Environmental Affairs	Department of Water Affairs	Department of Mineral Resources	Exxaro
Designation	Board Member	Board Member	Board Member	Alternate Member	Alternate Member	Alternate Member	Alternate Member	Alternate Member	Alternate Member
Name	Mr M P Nepfumbada	Ms S Ngxongo	Mr M Riba	Ms D Fischer (Alternate to Dr M Mayekiso)	Ms R Mdubeki (Alternate to Mr M Riba)	Mr T M Gordon (Alternate to Ms L D Nteo who resigned on 28 February 2013)	Ms D Mochotlhi (Alternate to Mr M P Nepfumbada)	Ms S Mohale (Alternate to Mr M Mabuza)	Mr D Sibiya (Alternate to Dr J E McGill)

PRT - Personnel, Remuneration and Transformation Committee

130

oard Directorships	
oard Directorsh	ips
oard Direc	torsh
oard	Direc
	oard

MEMBER	DIRECTORSHIP
 Prof. P E Ngoepe 	Madibeng — Life member
• Mr M W Kota	• IGC Co-President and Board Member of the 35th IGC Foundation NPC Board
Mr B A Gerryts	• None
 Prof. M A Hermanus 	 AVENG (Pty) Ltd — Non-Executive Board Member Bokamoso Trust — Chairperson of the Board of Trustees for AngloGold Ashanti Option
• Mr M Mabuza	• None
• Dr H Mathe	• Zaria Mining – Director • Howden Africa Holdings – Director
	African Emissions Trading - Director
	Tranter Kismet Investments — Director
	Tranter Pangea Diamond — Director
	Tranter Pangea Gold Investments - Director
	Tranter Holdings - Director
	Dorper Wind Farm (RF) — Alternate Director
	Wescoal Holdings - Director
	Vulanamasango Business Venture — Member
	Witwatersrand Consolidated Gold — Director
	Ferret Mining and Environmental Services — Director
	Upward Spiral 10 - Director
	Eyesizwe Mining - Director
	Amatikulu Gold — Director
	Tranter Resources - Director



MEMBER	DIRECTORSHIP
• Dr H Mathe	 Tranter Energy and Mining Services – Director Scinta Energy – Director Scinta South Africa – Director Scinta South Africa – Director Acetomanzi – Director Tranter Rock Drills – Director Dorper Wind Development – Director Tranter – Inkwali Engineering – Incorporator Dorper Wind Farm BBEEE Holdings (RF) – Director Dorper Wind Farm BEEE Holdings (RF) – Director Dorper Wind Farm BEEE Holdings (RF) – Director Talent 10 Holdings – Director Ramiscape – Director
 Dr M Mayekiso 	• Moisource (Pty) Ltd — 25% interest
• Dr J E McGill	· Note
• Ms K R Mithimunye	 Hatfield Group – Shareholder NERSA – Director Mintek – Director Konika Minolta SA – Director OCE SA – Director Cecil Nurse – Director
• Mr M P Nepfumbada	Member of the SAQA Audit Committee
Ms S Ngxongo	• None

Annual Report 2014

132

MEMBER	DIRECTORSHIP
Mr M Riba	• None
Ms D Fischer	• None
Ms R Mdubeki	• None
Ms D Mochothi	• None
Ms S Mohale	• Sasol – Shareholder • Applewood Trading – Shareholder • State Diamond Trader – Non-Executive Director
Mr D Sibiya	• None
Appointment of Bo	ard Committee Members
Audit and Risk Committe	
Chairperson	Mr S M Xulu
Members	Mr M Mabuza Ms K R Mthimunye Mr M P Nepfumbada Dr B Tema



	Ms K R Mthimunye	Mr T M Gordon (<i>Resigned on 31 December 2013</i>) Mr M W Kota – Chief Executive Officer Dr J E McGill (<i>Appointed on 1 July 2013</i>) Mr K Mkwanazi Ms D Mochothi	n and Transformation Committee	Dr H Mathe (Appointed on 1 August 2013)	Mr M W Kota — Chief Executive Officer Ms R Mdubeki Ms S Mohale Mr D Sibiya		Dr J E McGill	Mr B A Gerryts (Appointed on 1 June 2013) Prof. M A Hermanus Mr M W Kota – Chief Executive Officer Dr H Mathe Ms S Mohale Ms S Ngxongo
Finance Committee	Chairperson	Members	Personnel, Remuneration	Chairperson	Members	Technical Committee	Chairperson	Members



BOARD AND COMMITTEE MEETINGS

BOARD MEETINGS

1 APRIL 2013-31 MARCH 2014

	2013/14							
MEMBERS	23 May	23 May 25 July		29 August 21 November		Meetings attended		
Prof. P E Ngoepe	Present	Present	Present	Present	Present	5		
Mr M W Kota	Present	Present	Present	Present	Present	5		
Mr B A Gerryts	Present	Present	Present	Present	Present	5		
Mr T M Gordon (Resigned on 31 December 2013)	Apology	Apology	Apology	Apology	Not a member	0		
Prof. M A Hermanus	Apology	Present	Present	Present	Present	4		
Mr M Mabuza	Apology	Apology	Apology	Apology	Apology	0		
Dr H Mathe	Present	Present	Apology	Present	Apology	3		
Dr M Mayekiso (Appointed on 1 February 2014)	Not a member	Not a member	Not a member	Not a member	Present	1		
Dr J E McGill	Present	Present	Present	Present	Present	5		
Ms K R Mthimunye	Present	Present	Present	Apology	Present	4		
Mr M P Nepfumbada	Present	Apology	Apology	Present	Present	3		
Ms S Ngxongo	Apology	Present	Apology	Apology	Apology	1		
Mr M Riba	Apology	Apology	Apology	Apology	Apology	0		
Ms D Fischer (Alternate to Dr Mayekiso) (Appointed on 1 February 2014)	Not a member	Not a member	Not a member	Not a member	Main member present	0		
Ms R Mdubeki (Alternate to Mr Riba)	Present	Present	Apology	Present	Present	4		
Ms D Mochotlhi (Alternate to Mr Nepfumbada)	Main member present	Present	Present	Main member present	Main member present	2		
Ms S Mohale (Alternate to Mr M Mabuza)	Present	Present	Present	Present	Present	5		
Mr D Sibiya (Alternate to Dr J E McGill)	Main member present	0						

Council for Geoscience 135

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 address emerging risks. The composition of the Audit and Risk Committee as at 31 March 2014 was:

Chairperson:	Mr S M Xulu					
Members:	Mr M Mabuza					
	Ms K R Mthimunye					
	Mr M P Nepfumbada					
	Dr B Tema					

AUDIT AND RISK COMMITTEE MEETINGS

	2013/14							
MEMBERS	16 May	25 July	22 August	12 November	13 February	Meetings attended		
Mr S M Xulu	Present	Present	Apology	Present	Present	4		
Mr M Mabuza	Apology	Apology	Apology	Apology	Apology	0		
Ms K R Mthimunye	Present	Present	Present	Present	Present	5		
Mr M P Nepfumbada	Apology	Apology	Present	Apology	Apology	1		
Dr B Tema	Present	Present	Present	Present	Present	5		

1 APRIL 2013-31 MARCH 2014

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 2014 was:

Chairperson: Ms K R Mthimunye

Members: Mr T M Gordon (Resigned on 31 December 2013)

Mr M W Kota

Dr J E McGill (Appointed on 1 July 2013)

Mr K Mkwanazi Ms D Mochotlhi


FINANCE COMMITTEE MEETINGS

1 APRIL 2013-31 MARCH 2014

	2013/14				
MEMBERS	16 May	22 July	12 November	13 February	Meetings attended
Ms K R Mthimunye	Present	Present	Present	Present	4
Mr T M Gordon	Apology	Apology	Apology	Not a member	0
Mr M W Kota	Apology	Present	Present	Present	3
Dr J E McGill	Not a member	Present	Present	Present	3
Mr K Mkwanazi	Apology	Present	Present	Present	3
Ms D Mochotlhi	Present	Present	Apology	Apology	2

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 2014 was:

Chairperson:	Dr H Mathe
	(Appointed on 1 August 2013)
Members:	Mr M W Kota
	Ms R Mdubeki
	Ms S Mohale
	Mr D Sibiya

PERSONNEL, REMUNERATION AND TRANSFORMATION COMMITTEE MEETINGS

	2013/14				
MEMBERS	8 May	16 August	11 November	12 February	attended
Dr H Mathe	Not a member	Present	Present	Present	3
Mr M W Kota	Present	Present	Present	Present	4

1 APRIL 2013-31 MARCH 2014



	2013/14					
MEMBERS	8 May	16 August	11 November	12 February	attended	
Ms R Mdubeki	Present	Present	Apology	Present	3	
Ms S Mohale	Present	Present	Present	Apology	3	
Mr D Sibiya	Present	Apology	Present	Present	3	

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 2014 was:

Chairperson:	Dr J E McGill
Members:	Mr B A Gerryts (Appointed on 1 June 2013)
	Prof. M A Hermanus Mr M W Kota Dr H Mathe Ms S Mohale Ms S Ngxongo

	2013/14				
MEMBERS	8 May	20 August	11 November	12 February	Meetings attended
Dr J E McGill	Present	Present	Present	Present	4
Mr B A Gerryts	Not a member	Apology	Present	Present	2
Prof. M A Hermanus	Apology	Apology	Present	Present	2
Mr M W Kota	Present	Present	Present	Present	4
Dr H Mathe	Present	Present	Present	Present	4
Ms S Mohale	Present	Present	Present	Present	4
Ms S Ngxongo	Apology	Apology	Apology	Apology	0



Remuneration of the Board Members

Remuneration is paid to Board Members in accordance with departmental approved guidelines pertaining to Maximum Remuneration payable to Non-Official Members of Commissions and Committees of Inquiry. Other allowances in the column below refer to travel claims paid to members for attending board meetings. Other reimbursements reflect all other re-imbursable expenses (other than remuneration and travel) incurred by Board Members for attending meetings.

Name	Remuneration	Other allowances	Other re-imbursements	Total
Prof. P E Ngoepe	157 636.95	34 190.07	27 898.72	219 725.74
Dr H Mathe	81 256.00	5 352.37	0.00	86 608.37
Ms K R Mthimunye	120 986.00	9 046.11	0.00	130 032.11
Mr S M Xulu	90 944.00	5 549.98	0.00	96 493.98
Prof. M A Hermanus	51 008.00	3 881.18	0.00	54 889.18
Ms L Khangala	40 704.00	1 834.56	0.00	42 538.56
Dr J E McGill	86 696.00	7 720.22	0.00	94 416.22
Mr D Sibiya	16 776.00	1 190.80	0.00	17 966.80
Dr B Tema	30 784.00	2 515.59	0.00	33 299.59
Total	676 790.95	71 280.88	27 898.72	775 970.55

4. RISK MANAGEMENT

The Council for Geoscience has to consider a number of strategic risks to the organisation, which are clearly outlined in the Strategic Risk Register. The register describes the impact of the risks on the strategic objectives of the organisation, the root causes, the residual risk scorecard, actions to manage the risks and associated time frames. The Risk Committee of the Council for Geoscience ensures that a proper and effective management process is in place to deal with these risks.

Strategic risks

The following key strategic risks are labelled either critical or high in the residual risk scorecard in the Strategic Risk Register:

- Failure to develop and implement effective and efficient business systems
- Fragmented information and communications technology (ICT) infrastructure and compromised information security
- Misalignment of the skills base to current and emerging opportunities
- Insufficient financial resources to effectively execute the mandate of the organisation
- Ineffective marketing strategy (structured, coherent and policy driven)
- Lack of a coherent and effective stakeholder management and leveraging approach



- Inability to diversify the income streams to grow the business in order to reach its full potential (diversify projects portfolio)
- Lack of supportive research infrastructure
- Failure to develop and implement an efficient supply chain management (SCM) strategy.

Progress made on addressing the identified risks

A number of projects were undertaken by the Risk Committee with the aim of improving the management of the identified risks. These projects are subject to time frames, which are reviewed every quarter in order to monitor the project progress. These projects include:

• Develop and implement a change management strategy

- Develop and implement an ICT strategy, aligned to the corporate strategy
- Develop and implement a new HR strategy and resource plan
- Conduct stakeholder engagements to demonstrate the level of the projects and to lobby for sufficient funding to enable the organisation to achieve its mandate
- Develop and implement a new marketing strategy, including resources
- Plan and develop relevant products and services and implement appropriate project management oversight tools/systems
- Utilise reserves to fund equipment replacement
- Develop and implement an efficient SCM strategy.

Risk Failure to develop and implement effective and efficient business systems Mitigation 1. Develop and implement change management strategy. 2. Align systems, policy and procedures to strategy. 3. Resource recapitalisation plans optimally. 4. Reward good performance and discourage poor performance. Risk Fragmented ICT infrastructure and compromised information security Mitigation 1. Develop and implement an ICT strategy aligned to the corporate strategy (sufficient HR and financial resources). Risk Misalignment of the skills base to current and emerging opportunities Mitigation 1. Skills audit to be conducted and matched with project requirements. 2. Multiskilling training and development programmes. 3. Recruitment plan. 4. Develop and implement a new HR strategy and resource plan. Risk Insufficient financial resources to effectively execute the mandate of the organisation Mitigation 1. Conduct stakeholder engagements. 2. Submit MTEF funding proposals. 3. Proposals to address the needs of stakeholders.

The table below shows the detailed risk management process.



Risk	Ineffective marketing strategy (structured, coherent and policy driven)
Mitigation	1. Develop and implement a new marketing strategy and resource plan.
	2. Conduct stakeholder engagements.
	3. Promote the Council for Geoscience and communicate with industry.
	4. Review policy for the dissemination of information to the public domain.
Risk	Lack of a coherent and effective stakeholder management and leveraging approach. Inability to diversify the income streams to grow the business in order to reach its full potential (diversify projects portfolio).
Mitigation	1. Implement business development and stakeholder engagements plans.
	2. Submit politically supported proposals.
	3. Formulate strategic partnerships.
	4. Implement the appropriate strategy.
	5. Plan and develop relevant products and services.
	6. Implement appropriate project management oversight tools/systems.
Risk	Lack of a supportive research infrastructure
Mitigation	1. Utilise reserves to fund equipment replacement.
	2. Stakeholder engagement to establish partnerships/joint ventures.
	3. Develop innovation encouragement programmes.
	4. Solicit support for MTEF proposals.
Risk	Failure to develop and implement an efficient supply chain management (SCM) strategy
Mitigation	1. Develop and implement sensitisation programmes for staff.
	2. Workshop policies and procedures.
	3. Automate systems.
	4. Develop and implement an efficient SCM strategy.
Risk	Failure to map the country at the appropriate scale
Mitigation	1. Conduct stakeholder engagements – biannually.
-	2. Submit MTEF funding proposals.
	3. Develop and implement an appropriate annual technical programme.
Risk	Lack of compliance with relevant transformation legislation
Mitigation	1. Implement an employment equity (EE) plan.
	2. Develop and implement a targeted recruitment and staff development plan.
Rick	Inshility to respond to the macro-economic environment
Mitigation	Identity and secure long-term projects/contracts.
	2. Alian ampleument contracts to project duration
	5. Align employment contracts to project duration.
Risk	Substandard performance levels and high staff turnover
Mitigation	1. Implement the staff satisfaction survey recommendations.
	2. Develop an appropriate performance incentive scheme and reward strategy.
	3. Develop and implement clear career paths.
	4. Develop and implement awareness programmes on strategy and values.



Risk	Audit qualification
Mitigation	1. Comply with regulations, legislation and accounting frameworks and standards.

5. INTERNAL CONTROL UNIT

An Internal Audit Plan is approved annually by the Board of the Council for Geoscience and quarterly reports are provided to the Board by the Internal Auditors. Internal Auditors also perform ad-hoc assignments, as required by Management.

6. INTERNAL AUDIT AND RISK

COMMITTEES

The members of the Audit and Risk Committee of the Council for Geoscience 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, continually evaluates and monitors the effectiveness of all internal control systems in respect of all areas of risk that have been identified.

No.	Project				
OFFICE	OFFICE OF THE CEO				
1	Performance Information: Business process review				
2	Stakeholder Management				
3	Revenue Generation and Business Development Strategy				
4	Project Management				
5	Research				
FINANC	FINANCE				
6	Supply Chain Management (Procure-to-Pay)				
HUMAN CAPITAL					
7	HR – Administration, Succession Plan and Strategy				
8	Performance: Service Delivery				

The following internal audit work was completed during the year under review:



No.	Project			
HUMAN	HUMAN CAPITAL			
9	HR – Performance Management System			
RISK AN	ID COMPLIANCE			
10	Enterprise Risk Management			
СОММЕ	COMMERCIAL SERVICES			
11	Marketing and Communication Strategy			
OTHER				
12	Follow-ups (External and Internal Audit Reports)			
AD-HOC	ASSIGNMENTS			
13	Council for Geoscience Schedule Classification			
14	HR Investigation			
15	Board Remuneration Review			
16	Review of Nuclear Geo-Hazards Group (NGG) Procurement Interface Procedures			

The table below discloses relevant information on the Audit and Risk Committee members.

Name	Qualifications	Internal or external	Date appointed	Number of meetings attended
Mr S M Xulu	CA (SA)	External	22 November 2012	4
Mr M Mabuza	BSc (Geology)	External	1 October 2012	0
Ms K R Mthimunye	BCompt Hons (Accounting), CA (SA)	External	1 October 2012	5
Mr M P Nepfumbada	MSc (Soil Science)	External	1 October 2012	1
Dr B Tema	PhD (Science Education)	External	22 November 2012	5

Council for Geoscience 143

7. COMPLIANCE WITH LAWS

AND REGULATIONS

The Council for Geoscience complies with National Treasury regulations through the PFMA Compliance Calendar.

8. 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.

A Fraud Prevention Policy is in place, as well as a "whistle blowing facility" that is administered by Deloitte. Reports are issued on a monthly basis and fraudulent conduct is investigated by the Internal Auditors and reported to the Audit and Risk Committee of the Board of the Council for Geoscience.

9. MINIMISING CONFLICT OF INTEREST

In terms of National Treasury regulations, all suppliers of goods and services to a public entity are required to complete standardised Treasury documentation (SBD4 Declaration of Interest). In view of possible allegations of favouritism, should the resulting bid, or part thereof, be awarded to persons employed by the State, or to persons connected with or related to them, it is required that the bidder or his or her authorised representative declare his or her position to the evaluation/adjudication authority.

In terms of the Bid Evaluation Committee, all staff members of the Council for Geoscience involved with the Evaluation Committee are required to complete a declaration and nondisclosure form to indicate that the staff member declares that he/ she will not favour any other business institution, and undertakes to disclose all material interest which he/she may have in any bid or quotation or potential contracts.

The Bid Adjudicating Committee members are also required to complete a declaration of confidentiality and impartiality; this is to clarify that committee members have no interest in a person, form, cooperation or business entity that is competing for a contract with the Council for Geoscience.

Should there be any declaration of interest, the committee member will not be allowed to participate in the evaluation and rewarding of the contract or bid.

10. CODE OF CONDUCT

All staff members of the Council for Geoscience abide by the Code of Ethics and Conduct which has been duly adopted. As a result, the Council for Geoscience is committed to ethical and fair business dealings, and promotes a corporate culture which is nonsectarian and which is socially and environmentally responsible. It does so by subscribing to the following values and principles:

- Fairness and integrity in all business dealings, including the ethical handling of actual or apparent conflicts of interest between personal and professional relationships.
- Respect for the human rights and dignity of all employees.
- Acceptance of diverse cultural, religious, race, gender and sexual orientations.
- Honesty, transparency and accountability.
- Adherence to sound standards of corporate governance and applicable laws.

In terms of the Code of Ethics and Conduct, all persons serving on behalf of the Council for Geoscience are required to uphold the highest



standard of business ethics and integrity. In furthering this, all staff, contractors, consultants and others acting on behalf of the organisation are required to accurately and honestly represent the organisation, and will refrain from engaging in any activity or scheme intended to defraud anyone of money, property or services. The reputation and integrity of the Council for Geoscience are central to its ability to operate as an effective state-owned organisation.

The following standards are set to provide guidance to ensure that the business activities of the organisation reflect the highest standards of business ethics and integrity:

- Personal excellence and integrity: Staff members, contractors, consultants and others acting on behalf of the Council for Geoscience will pursue the highest possible standards of performance, quality, service and achievement while working to fulfil the mission, goals and objectives of the organisation.
- Honest communication: The Council for Geoscience requires candour, honesty and cooperation from individuals in the performance of their responsibilities and in communication with others.
- Accountability: Staff members, contractors, consultants and others acting on behalf of the Council for Geoscience will operate in a manner that ensures cost-effective use of available resources and maintain sound business practices.
- Proprietary information: All staff members shall exercise care to ensure that intellectual property rights, including patents, trademarks, copyrights and software are carefully maintained and managed to preserve and protect their value.
- Misappropriation of proprietary information: Staff members, contractors, consultants and others acting on behalf of the Council for Geoscience will not misappropriate confidential or proprietary information belonging to the organisation, or utilise any publication, document, computer

program, information or product in violation of the interest of the organisation.

- **Confidentiality:** Staff members, contractors, consultants and others acting on behalf of the Council for Geoscience will strive to maintain the confidentiality of information in accordance with legal and ethical standards. Each individual has an obligation to actively protect and safeguard confidential, sensitive and proprietary information in a manner designed to prevent the unauthorised disclosure of such information.
- **Conflict of interest:** Staff members, contractors, consultants and others acting on behalf of the Council for Geoscience owe a duty of loyalty to the organisation and may not use their positions to profit personally or to assist others to profit in any way at the expense of the organisation.

If this code of ethics is breached, a staff member will face disciplinary action, which may result in the termination of employment in accordance with the disciplinary code and procedures of the organisation.

In addition, certain transgressions may also be criminal in nature and may lead to prosecution.

11. QUALITY ASSURANCE

The Council for Geoscience is a schedule 3A public entity, established with an overarching mandate to provide geological information and to stimulate the mining industry in South Africa. The organisation has identified the need to develop and implement a Quality Management System to support its corporate functions and to assure the quality of the outputs of its processes aimed at delivering on the mandate.

All services offered by the Council for Geoscience are rendered within the context of the Quality Management System. The Quality Management System ensures that the creation, delivery and monitoring of services occur within stringent quality standards. The Council for Geoscience strives for ISO 9001 certification for the organisation and ISO 17025 accreditation for its





The Quality Management System of the Council for Geoscience will include a fully operational Laboratory Information Management System (LIMS).

laboratory operations. The aim of implementing these standards is to improve the effectiveness and efficiency of the processes of the Council for Geoscience and to align these processes with international best practices.

Laboratory testing facilities were identified as a high priority area within the Quality Management System. The Analytical Laboratory is in the process of concluding the implementation of a Laboratory Information Management System (LIMS). This is a database that is used mainly to store and access customer, as well as sample data. The LIMS will also be used to control various laboratory support processes, namely calibration records, standard operating procedures and equipment maintenance data, and to perform other related functions. The laboratory scientists attended the ISO 17025 Laboratory Quality Systems course at the South African National Accreditation System (SANAS). This training course equipped them with the ability to align the analytical processes of the Council for Geoscience with national and international standards of testing.

A Quality Assurance Manager was appointed in December 2013. He was tasked with the responsibility of ensuring that a Quality Assurance team is formed and capacitated to support and monitor all organisational processes, from inception to delivery. New and existing processes of the Council for Geoscience are being designed or redesigned to include quality control points, which are to be observed at all times. Technical, as well as service-related requirements from customers and various stakeholders are being analysed and scientific solutions are being rendered to meet these needs. Solutions are being benchmarked and audited against international norms and standards. All business units have identified their respective processes and are currently at an advanced stage of compilation of their revised standard operating procedures. A Quality Management Forum was initiated and is being used as a steering committee to drive the Quality Management System implementation project, as well as to serve as a platform for sharing best quality assurance practices among the business units of the Council for Geoscience.

12. HEALTH, SAFETY AND ENVIRONMENTAL ISSUES

The Management of the Council for Geoscience is obliged to provide a safe workplace without risk to human life, while staff members have an obligation





The Health and Safety Committee of the Council for Geoscience.

to work and behave in compliance with the safety directives of the organisation. The Council for Geoscience uses its Health and Safety Management System to routinely identify hazards, assess risks and prevent potential workplace injuries. A baseline Health and Safety Risk Assessment was conducted and subsequently followed by a Health and Safety Programme rollout. The Health and Safety Programme includes regular staff communication on health and safety matters, health and safety training, incident investigation and root cause analysis, health and safety audits, statistical data analysis and other improvement tools that are administered from time to time. The aim of the Health and Safety Programme is to safeguard employees, contractors, customers and visitors on the sites of the organisation.

The Executive Management of the Council for Geoscience monitors health and safety performance and ensures improvement in this regard through the use of subcommittees, namely the Operational Risk Management Committee (ORMC) and the Business Continuity Committee (BCC). These committees meet on a regular basis to review business risks, including risks emanating from health and safety hazards. The Council for Geoscience encourages and ensures staff involvement in health and safety matters, as provided for by the Occupational Health and Safety Act through the appointment of health and safety representatives and their participation in the Health and Safety Committee.

All activities within the Council for Geoscience are conducted in an environmentally sensitive manner. The approach of the organisation is to prevent pollution and resource wastage caused by its activities, while applying core competencies in environmental geosciences to assist customers and stakeholders in minimising and remediating environmental degradation. The Council for Geoscience has created and sustains the necessary organisational competency to enable the development of health, safety and environment (HSE) plans for major projects.

13. BOARD ADMINISTRATOR

Following the recommendations of the King Report on Corporate Governance, the current structure of the Council for Geoscience provides for the appointment of a Board



Administrator. The Board Administrator is responsible for preparing the schedule of all Board and Committee meetings for the year and for recording and filing the minutes of these meetings. It is the function of the Board Administrator to submit quarterly compliance reports to the National Treasury, the Department of Mineral Resources and the Auditor-General, and to update Board Member details. The Board Administrator plays a key role in the induction process of new members

and must ensure that the annual Strategy Reviews in terms of the National Objectives and the annual Board Assessment as per the PFMA (section 53) Treasury Regulation 30.1 take place.

14. PUBLIC AWARENESS

The Council for Geoscience participated in the following public awareness initiatives:

Event	Date	Activity	Purpose of participation	Outcome
Minister's Budget Vote Speech	21 May 2013	The Council for Geoscience sponsored the photography of this event and participated in a sector exhibition at Parliament.	To promote the Council for Geoscience at the Budget Vote Speech and exhibition.	A collection of photographs was produced in a photo album and on a DVD.
Nelson Mandela Day	18 July 2013	The National Geoscience Museum hosted 71 learners from various schools in Mpumalanga, with a view to exposing them to the geoscience collections in the museum and to careers in the geosciences.	To celebrate the Nelson Mandela 67 minutes of community service outreach.	Seventy-one learners from the Mpumalanga Province visited the museum and were introduced to exhibitions of fossils and various minerals and careers in the geosciences.

Visits of Foreign Delegations to the Council for Geoscience

Purpose of visit: Several international delegations visited the Council for Geoscience to investigate opportunities to enter into collaborations for business development purposes.

Outcome: Several proposals for business opportunities are awaiting approval or have been finalised.

Delegation from	Date	Outcome
Sudan	17 May 2013	The Council for Geoscience is exploring ways of raising funds for already granted projects. A Memorandum of Understanding is in place.
Cameroon	30 July 2013	A proposal for a Memorandum of Understanding is pending.
Nigeria	14 August 2013	Finalisation of a proposal for a Memorandum of Understanding between the Council for Geoscience and the Geological Survey of Nigeria is pending.
Chile	15 October 2013	The Council for Geoscience is exploring ways of pursuing geoscientific cooperation in Chile.
Japan	26 November 2013	The relationship between the Japan International Cooperation Agency and the Council for Geoscience in respect of collaboration in areas of interest is being reinforced.
Botswana Visit to the National Geoscience Museum	20 February 2014	Delegates from Botswana visited the National Geoscience Museum with a view to benchmarking their institution against the museum.



Exhibitions				
Event	Date	Outcome		
Mining Lekgotla	27–29 August 2013	The Council for Geoscience exhibited and gave presentations at this conference. Various countries visited the organisation with a view to collaborating in mapping projects.		
OAGS Meeting and Exhibition in Ghana	18–20 September 2013	The Council for Geoscience attended and exhibited at the annual meeting of the Organisation of African Geological Surveys.		
Mining in Mexico, Acapulco	15–18 October 2013	The Council for Geoscience accompanied the Minister of Mineral Resources to Acapulco, Mexico, where she delivered a speech to the 30th International Mining Congress. The Council for Geoscience participated at the mining congress with the objective of selling its expertise to and securing business with potential clients in Mexico. The organisation managed to reach a number of potential stakeholders, who were interested in the services of the Council for Geoscience, and also identified potential suppliers of specialised equipment and services in the fields of geochemistry, geophysics, geology, spatial data and seismology.		
2nd Limpopo Coal Conference	17–18 October 2013	Scientists of the Coal Laboratory of the Council for Geoscience participated at this conference in order to promote and market their services.		
Mining Indaba, Johannesburg	29–31 October 2013	The Council for Geoscience participated at this event to market and promote its services to industry members who attended this event. A presentation was given on the services offered by the Council for Geoscience to the industry.		
Mining Indaba, Cape Town	3–6 February 2014	The Council for Geoscience exhibited and gave presentations at the conference. Various countries visited the organisation with a view to collaborating in mapping projects. The CEO gave a number of presentations at various forums promoting the service offerings of the organisation.		

In-House Events				
Event	Date	Outcome		
CGS Wellness Day	19 April 2013	The Council for Geoscience recognises that a healthy workforce increases productivity, and facilitated testing of lifestyle-related illnesses such as high blood pressure. Staff members were given opportunities for counselling and testing for HIV and AIDS.		
Women's Day Celebrations	30 August 2013	Female staff members of the Council for Geoscience celebrated Women's Day in recognition of National Women's Month.		
Nelson Mandela Memorial	10 December 2013	Management and staff of the Council for Geoscience held a memorial service in honour of former President Nelson Mandela.		

Career Exposure Events					
Event	Date	Outcome			
International Museums Day	8 May 2013	The National Geoscience Museum participated at this event to highlight the critical place the museum holds in society and to promote its services to learners and the public. This initiative was supported by the Heritage Council of South Africa.			
DMR Career Day in Mamelodi	27 June 2013	Two young scientists attended the career day in Mamelodi, staffed a "Careers in Geoscience" exhibition and gave a presentation to aspiring learners who wish to follow a career in the geosciences.			



Career Exposure Events					
Event	Date	Outcome			
Engineering Geoscience Unit Job Shadowing	4 July 2013	A student from Polokwane was given exposure to careers in the engineering geosciences by working with scientists in the Engineering Geoscience Unit for a day.			
Vikelwa School visit to the Council for Geoscience	7 August 2013	Twenty-seven learners with special needs visited the Council for Geoscience and were exposed to careers in the geosciences. Presentations were given by all business units.			
North West College visit to the Council for Geoscience	11 September 2013	Fifty-five students visited the Council for Geoscience and were introduced to careers in the geosciences. They visited the Mineral Resources Development Unit, the National Geoscience Museum and the Geochemical Laboratory.			
Wits and UP students visit to the Council for Geoscience	12 February 2014	Twenty-two students attended a Geophysics Open Day. The purpose of this open day was to introduce these students, who are all studying geophysics, to opportunities in the Council for Geoscience.			
Limpopo University students visit to the Council for Geoscience	28 February 2014	Forty-nine students attended presentations on careers in the geosciences focusing on the Geochemical and Analytical Laboratories and the Geophysics and Central Mapping Units.			



The Chief Executive Officer at the mining exhibition in Mexico.





Visit of a delegation from Cameroon to the Council for Geoscience.





The stand of the Council for Geoscience in the SA Pavillion at the 2014 Mining Indaba.



Nelson Mandela International Day

Learners in front of the National Geoscience Museum.





Vikelwa School visiting the Council for Geoscience.



Learners writing messages for Madiba.





The Council for Geoscience pays tribute to Nelson Rolihlahla Mandela.





PART D HUMAN RESOURCE MANAGEMENT



1. INTRODUCTION

In support of the strategic objectives of the Council for Geoscience, the vision of the Human Resources Department is to provide a customer-focused service that is efficient, responsive and cost effective.

2. OVERVIEW OF HUMAN RESOURCE MATTERS

The King III Report encompasses several references to governance matters affecting human resources (HR), either directly or indirectly. Certain HR matters are addressed very explicitly, such as performance management, employment equity (EE) and succession planning, but there are many other areas outlined in King III that should also be considered by an HR Department.

The Council for Geoscience acknowledges that good governance practices are essential for sound people management and essential to the improvement of business performance in progressively competitive local and global economic markets.

Consequently, the HR Unit has a critical role to play as a champion of governance issues affecting the people and the business management of the Council for Geoscience.

3. PRIORITIES FOR THE YEAR

UNDER REVIEW

Employment Equity

In terms of the Employment Equity Act, the Council for Geoscience is a "designated employer" and, as such, is obliged to provide annual EE reports on or before 1 October each year. EE targets, as set out in the national guidelines, were successfully achieved during the reporting period.

As a designated employer, the Council for Geoscience prepared an EE plan in order

to progress towards employment equity in the workplace.

The organisation seems to be doing well at all levels, except at Executive level where there is a need to employ more female staff. A plan will be put in place to address female representation at Executive level. An alternative in addressing this challenge is an aggressive development programme for female employees already at Management level to prepare them for possible Executive appointments.

Skills Development

The current skills and professional development strategy is aimed at ensuring that the Council for Geoscience has adequate capacity in order to leverage its vision of becoming the leading provider of public geoscience expertise in South Africa and Africa. To this end, the following professional development interventions were implemented during the reporting period:

Internships

The Council for Geoscience is participating in the Internship Programme aimed at providing learning and valuable work experience for previously disadvantaged individuals. This initiative has been realised in partnership with the Mining and Qualification Authority (MQA). The ultimate goal is to leverage marketability and support the career aspirations and development of previously disadvantaged individuals.

Bursaries

The Council for Geoscience, in its quest to improve the quality of life of the citizens of the country, has offered bursaries to young deserving South African students to study at institutions of higher learning across the country and was able to successfully maintain a sustainable bursary programme aimed at developing young scientists from previously disadvantaged backgrounds.





The Council for Geoscience has a team of highly skilled female scientists.



Interns are employed as part of the Internship Programme of the Council for Geoscience with the MQA.



4. CAREER SUPPORT AND

DEVELOPMENT OF STAFF

Workforce Planning Framework and Key Strategies to Attract and Recruit a Skilled and Capable Workforce

The Council for Geoscience recognises that one of the key factors determining the success of

an organisation is its workforce. The resourcing strategy which encompasses workforce planning, retention and the attraction of requisite skills has enabled the Council for Geoscience to attract the right people while making sure that its demographics are in accordance with the requirements of the Employment Equity Act (EEA). The overall purpose of the resourcing strategy is to provide the approach, guidelines and techniques to be utilised when staffing the organisation.



Employee Performance Management Framework

The Council for Geoscience has implemented a performance management process according to the Balanced Scorecard principles. The process is aimed at continually managing organisational and individual performance, and the development of the organisation's resources.

The foremost purpose of the Performance Management strategy is to enable the management of teams and individual performance to ensure the achievement of the strategic objectives of the organisation. Moreover, the strategy provides guidelines and standards, in terms of which the performance of employees is monitored, measured and rewarded in order to enhance efficiency and effectiveness and to improve service delivery within the organisation. During the year under review, all employees signed performance contracts and the performance against set targets was reviewed quarterly.

Employee Wellness

The Human Resources Department, through its Employee Wellness Programme (EWP), provides a comprehensive, integrated and holistic approach to employee wellness in accordance with its policy. In order to proactively and effectively address the health and wellbeing of its employees, the Council for Geoscience has implemented the following:

Employee Assistance Programme (EAP)

In partnership with Proactive Health Solutions (PHS), a reputable health service provider, the EAP offers a confidential offsite 24-hour advisory



service designed to assist employees with problems, which range from marital and substance dependency to work-related issues. Work-related challenges have contributed 19% of all issues reported since the commencement of the contract between PHS and the Council for Geoscience. The organisation will therefore consider the implementation of stress management training to enhance the coping skills of employees. Some of the programmes that were implemented in the reporting period included blood donations, health screenings and lifestyle programmes.

Policy Development

In support of the repositioning strategy of the Council for Geoscience, new HR policies have to be developed and some of the existing policies have to be reviewed to facilitate the implementation of the new strategy. The policies developed to support the new strategy are currently in draft format, and their adoption and implementation are envisaged for the 2014/15 financial year. The policies that have been developed and reviewed so far are the following: Succession and Career Planning, Remuneration Strategy and Reward, Employment Equity, Acting Allowance, Secondment, Pay Progression, Bursary and Career Progression.

5. HIGHLIGHTS OF ACHIEVEMENTS

Challenges

The Council for Geoscience functions in a workplace which is a microcosm of our diverse society and sociopolitical and economic challenges, and, as such, it is not immune to the challenges faced by South African organisations, in particular those functioning in the mining sector.

Industrial Relations

Changes in the employee relations landscape, triggered by a high demand of minimum entrylevel wages set by organised labour in the mining sector, had a bearing on salary expectation set by affiliated organised labour within the organisation. The challenge of managing the salary increase expectations of staff within a compressed market is further fuelled by staff having to bear the brunt of additional economic costs in the wake of the weakening rand.

Talent Management

Amid difficult economic and market conditions, the Council for Geoscience is also facing the challenge of attracting, developing and retaining talent. This challenge is caused by the scramble for talent locally and internationally, and the impact of global mobility on the South African labour market. The shortage of key technical skills has been further exacerbated by the lessened attraction of the country internationally owing to instability in the mining industry.

Depressed economic and market conditions have also hampered the creation of jobs for new graduates and the management of the expectations of internships/learnerships expecting permanent employment after completion of their programmes.

Future Human Resource Plans

Reward and remuneration philosophy

Henceforth, the remuneration of employees within the organisation will mirror the dynamics of the market and the environment in which the Council for Geoscience functions. It will at all times align to the strategic direction and specific value drivers of the business. Remuneration will play a critical role in attracting, motivating and retaining high-performing individuals, which should reinforce, encourage and promote superior performance. Through variable remuneration linked to value drivers, superior performance will be recognised and rewarded, while poor performance and underachievement will be penalised.

"Recognition and Reward" is one of the key strategies of the organisation to foster a highperformance culture with engaged employees. Performance-related remuneration forms the cornerstone of the reward philosophy of the



organisation, supported by robust Performance Management, Pay Progression and Career Path models.

Variable remuneration

Variable remuneration programmes will be established within the Council for Geoscience, in an effort to support the achievement of its objectives. In addition, participants will obtain a clear view of their remuneration opportunities.

Short-term incentives

Staff members of the Council for Geoscience receive discretionary incentive bonuses related to the achievement of financial targets and other nonfinancial objectives. The discretionary bonuses are directly related to performance.

Annual remuneration reviews

For the Council for Geoscience to maintain appropriate remuneration competitiveness vis-à-vis the labour market, remuneration is reviewed on an annual basis. The organisation has an agreement with organised labour to negotiate annual salary increases on behalf of its members. Annual salary increases are paid in April of each year to coincide with the organisation's financial year end. The percentage annual salary increase is mandated by the Board of the Council for Geoscience. The organisation will introduce performance-based salary increases for the entire organisation in the near future.

6. HUMAN RESOURCE OVERSIGHT STATISTICS

Programme	Total expenditure for the entity (R)	Personnel expenditure (R)	Personnel expenditure as % of total expenditure	No. of employees	Average personnel cost per employee (R)
Applied Geoscience		30 621 219.18	22.7%	68	450 312.05
Office of the CEO		10 359 430.08	7.7%	14	739 959.29
Finance		18 487 343.66	13.7%	51	362 496.93
Corporate Services		2 970 768.95	2.2%	6	495 128.16
Regional Geoscience and Mapping		25 729 778.84	19.0%	55	467 814.16
Scientific Services		46 927 259.44	34.7%	130	360 978.92
Total	312 826 174.54	135 095 800.15	100%	324	

Personnel cost by programme



Personnel cost by salary band

Salary bands 2013/14					
Level	Personnel expenditure (R)	Percentage of personnel expenditure to total personnel cost	No. of employees	Avarage personnel cost per employee (R)	
Top Management	6 830 080.07	5.06%	4	1 707 520.62	
Senior Management	14 845 891.83	10.99%	17	873 287.75	
Professional qualified	73 306 669.90	54.26%	144	509 074.10	
Skilled	23 039 876.92	17.05%	88	261 816.78	
Semiskilled	15 497 582.85	11.47%	59	262 670.90	
Unskilled	1 575 698.58	1.17%	12	131 308.22	
Total	135 095 800.15	100%	324		

Performance reward

Programme	Performance rewards (R)	Personnel expenditure (R)	Percentage of performance rewards to total personnel cost
Top Management	415 218.78	6 324 148.22	0.32%
Senior Management	961 368.88	12 753 457.76	0.74%
Professional qualified	5 487 125.46	75 231 288.12	4.22%
Skilled	1 550 099.42	21 548 632.62	1.19%
Semiskilled	849 196.76	12 979 792.56	0.65%
Unskilled	89 227.49	1 323 478.08	0.07%
Total	9 352 236.79	130 160 797.36	7.19%

Note: The performance rewards for the year 2012/2013 were based on the cost to company, year ended 31 March 2013.



Training cost

Directorate/ Business Unit	Personnel expenditure (R)	Training expenditure (R)	Training expenditure as % of personnel cost	No. of employees trained	Average training cost per employee (R)
Council for Geoscience	135 095 800.15	1 595 246.00	1.18%	274	5 822.07
Note that the training budget is centralised.					

Employment and vacancies

PROGRAMME	2013/14 Approved positions	2013/14 No. of employees	2013/14 No. of vacancies	Percentage vacancies
Applied Geoscience	73	68	5	6.85%
Office of the CEO	17	15	2	11.76%
Finance	62	55	7	11.29%
Corporate Services	10	6	4	40.00%
Regional Geoscience and Mapping	54	50	4	7.41%
Scientific Services	141	130	11	7.80%
Top Management	6	4	2	33.33%
Senior Management	19	17	2	10.53%
Professional qualified	160	144	16	10.00%
Skilled	93	88	5	5.38%

61

10

7

1

10.29%

9.09%



Semiskilled

Unskilled

68

11

Reasons for staff leaving

Reason	Number	Percentage of total number of staff leaving
Death	1	4.17
Resignation	13	54.16
Dismissal	0	0.00
Retirement	6	25.00
III health	1	4.17
Expiry of contract	0	0.00
Other	3	12.50
Total	24	100.00

Labour Relations: Misconduct and disciplinary action

Nature of disciplinary action	Number
Verbal warning	7
Written warning	14
Final written	2
Dismissal	0
Total	23

Equity targets and Employment Equity status

	MALE								
Level	AFRICAN		COLOURED		INDIAN		WHITE		
	Current	Target	Current	Target	Current	Target	Current	Target	
Top Management	3	3	0	0	0	0	1	2	
Senior Management	7	3	1	0	1	1	6	7	
Professional qualified	47	29	2	3	2	3	33	40	
Skilled	50	50	5	6	0	3	7	8	

Level	MALE								
	AFRICAN		COLOURED		INDIAN		WHITE		
	Current	Target	Current	Target	Current	Target	Current	Target	
Semiskilled	11	9	2	1	0	0	2	3	
Unskilled	7	5	0	1	0	0	0	0	
Total	125	99	10	11	3	7	49	60	

	FEMALE								
Level	AFRICAN		COLOURED		INDIAN		WHITE		
	Current	Target	Current	Target	Current	Target	Current	Target	
Top Management	0	1	0	0	0	0	0	0	
Senior Management	1	1	0	1	0	1	2	2	
Professional qualified	33	22	2	3	3	5	22	30	
Skilled	13	5	1	2	1	2	11	13	
Semiskilled	5	22	0	4	0	14	0	0	
Unskilled	0	5	0	0	0	0	0	0	
Total	52	56	3	10	4	22	35	45	

Disability	MA	LE	FEMALE		
	Current	Target	Current	Target	
Top Management	0	0	0	0	
Senior Management	0	0	0	0	
Professional qualified	0	0	1	1	
Skilled	0	0	1	1	
Semiskilled	2	2	0	0	
Unskilled	0	0	0	0	



COUNCIL FOR GEOSCIENCE STATEMENT OF FINANCIAL POSITION

Assets

ent asset

Non-current assets

erty and equipment

oible assets

PART E FINANCIAL INFORMATION

Dillide

Council for Geoscience



5

07 378

1101530-30

1. STATEMENT OF RESPONSIBILITY

Statement of Responsibility for the Annual Financial Statements for the Year ended 31 March 2014

The Board is responsible for the preparation of the Annual Financial Statements of the Council for Geoscience and for the judgements made in this information.

It is the responsibility of the Accounting Authority to establish and implement a system of internal controls designed to provide reasonable assurance as to the integrity and reliability of the Annual Financial Statements.

In our opinion, the financial statements fairly reflect the operations of the Council for Geoscience for the financial year ended 31 March 2014. The external auditors are engaged to express an independent opinion on the Annual Financial Statements of the Council for Geoscience.

The Annual Financial Statements of the Council for Geoscience for the year ended 31 March 2014 have been audited by the external auditors and their report is presented on page 171 to page 174.

The Annual Financial Statements of the Council for Geoscience set out on page 175 to page 204 have been approved.

Mr Mxolisi W Kota CHIEF EXECUTIVE OFFICER Council for Geoscience 28 July 2014

Prof. P E Ngoepe CHAIRPERSON OF THE BOARD Council for Geoscience 28 July 2014



2. AUDIT AND RISK COMMITTEE REPORT

The Audit and Risk Committee of the Council for Geoscience is pleased to present its report for the financial year ended 31 March 2014.

Audit and Risk Committee Responsibility

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.

The Effectiveness of Internal Control

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.

From the various reports of the Internal Auditors, the Audit Report on the Annual Financial Statements, and the management letter of the Auditor-General, it was noted that there were some significant noncompliances with regulations that have been reported. These were subsequently addressed in accordance with the Public Finance Management Act. We can report that the system of internal controls was restored to be efficient and effective during the period under review.

In-Year Management and Monthly/ Quarterly Reports

The Audit and Risk Committee met five times during the year under review and submitted monthly and quarterly reports to the Executive Authority.

Evaluation of 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 2014 with the Auditor-General. 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 Practice (GRAP). The Audit and Risk Committee agrees that the adoption of the going-concern premise is appropriate in preparing the Annual Financial Statements.

Auditor's Report

The Audit and Risk Committee has reviewed the implementation plan of the Council for Geoscience for audit issues raised in the prior year and is satisfied that the matters have been addressed adequately.

The Audit and Risk Committee concurs and accepts the conclusions of the Auditor-General on the financial statements and is of the opinion that the audited Annual Financial Statements be accepted and read together with the report of the Auditor-General.

Mr S M Xulu Chairperson: Audit and Risk Committee Council for Geoscience 23 July 2014



3. REPORT OF THE CHIEF EXECUTIVE OFFICER

General Financial Review of the Council for Geoscience

The Council for Geoscience developed a repositioning strategy to optimise the delivery on its mandate. This process involved the determination of the root causes of challenges that hinder the optimal utilisation of human capital, movable and immovable assets, knowledge and information. The repositioning strategy was approved by the Board of the Council for Geoscience in November 2013 and is currently being implemented. The deliverables for the strategic objectives of 2013/14 had to be met concurrently in the process.

The Council for Geoscience received grant transfers in the amount of R271.2m, of which R20.9m was deferred as a conditional grant. Although the contract revenue was lower than expected, delivery on the targets of the annual technical programme and MTEF projects was good. Some key MTEF projects include: Management of Mine Pollution Impact on the Water Resources of South Africa; the Strategic Mine Water Management Plan - Witwatersrand Basin; Management of State Contingent Liabilities with Respect to Derelict and Ownerless Mines in South Africa, and Promotion of Exploration and Mining Investment in the Minerals and Energy Sectors. In total, a revenue of R290.8m was achieved, which is R18.2m more than the previous year, with a net surplus of R1.5m.

During the reporting period, attention was given to asset administration, especially in view of the preparations for full compliance with the Heritage Asset Accounting Standard (GRAP 103). The Council for Geoscience invests its commercial surpluses in replacing aged infrastructure and scientific equipment, and during the year under review an amount of R20.1m was spent in this regard. Other expenditure included R4.4m for vehicles, R7.3m for scientific equipment, R2.5m for computer equipment, R1.6m for aircraft components, R2.9m for computer software, R1.0m for land and buildings, and R0.4m for office furniture. An amount of R45m was sourced from National Treasury through the MTEF process for the installation of a ventilation system in the Silverton office building, particularly in air-controlled environments such as the laboratories. The project is expected to be completed in August 2015. Plans are in place to invest further in the replacement of the aged infrastructure.

New Proposed Activities

The Geoscience Amendment Act (Act No. 16 of 2010) mandates the Council for Geoscience to, among others, be the custodian and curator of all geotechnical information in South Africa. The Council for Geoscience is also the national mandatory authority in respect of geohazards related to infrastructure development. Thus, the Act empowers the Council for Geoscience to be the custodian of all geotechnical data, with the purpose of advising government, state institutions, private organisations and the public on the complete geotechnical risk profile of the country.

Request for Rollover of Funds

Approval was obtained from National Treasury, in terms of section 53(3) of the Public Finance Management Act (Act No. 1 of 1999), as amended by Act No. 29 of 1999, for the Council for Geoscience to retain a surplus to the amount of R1.5m and cash and cash equivalents to the amount of R225.8m.

The retained funds will be used for the maintenance and replacement of and investment in scientific equipment and infrastructure and the implementation of the repositioning strategy over the next five years.

Supply Chain Management

A Supply Chain Management Section is now operational under the division of the Chief Financial Officer. This business unit 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 the PFMA Act of 1999 (as amended by Act No. 29 of 1999).

The repositioning strategy of the Council for Geoscience has indicated certain challenges which are currently receiving attention. These challenges include human capacity shortages and disintegrated manual operating systems.

Audit Report Matters

The Council for Geoscience obtained an unqualified audit opinion from the Auditor-General for the year ended 31 March 2014. A number of issues were raised, but were resolved during the current financial year.

Plans for Future Additional Financial Challenges

The repositioning strategy revealed a need for the alignment of the operations of the Council for Geoscience and a review of the organisational structure. This shortcoming was evident in the increasing deferred income in current liability on the statement of financial position. The Council for Geoscience is focusing on delivering on all contracts in a prescribed period and, to this end, a Project Management Office is being established and equipped with the necessary project management system needed for both statutory and commercial projects. The Council for Geoscience is moving away from the current "silo" approach to a more integrated operational system delivery.

The endeavour to increase the grant allocated to the organisation through the MTEF process will continue, together with an integrated business development strategy to solicit projects from government departments and from other clients. The liquidity ratio (current assets to current liabilities) of the Council for Geoscience as at 31 March 2014 was 2.5:1. This implies that the organisation has enough resources to meet its obligations. I would like to take this opportunity to thank the loyal and dedicated staff of the Council for Geoscience, our supportive clients and our stakeholders for their support and hard work during the year. In particular, I want to thank the Board of the Council for Geoscience for their guidance and supervision of the organisation.

Mr Mxolisi W Kota CHIEF EXECUTIVE OFFICER Council for Geoscience 31 July 2014



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

Report on the financial statements

Introduction

1. I I have audited the financial statements of the Council for Geoscience (council) set out on pages 175 to 204, which comprise the statement of financial position as at 31 March 2014, the statement of financial performance, statement of changes in net assets and cash flow statement for the year then ended, as well as the notes, comprising a summary of significant accounting policies and other explanatory information.

Accounting authority's responsibility for the separate financial statements

2. The accounting authority is responsible for the preparation and fair presentation of these financial statements in accordance with the requirements of the South African standards of Generally Recognised Accounting Practice (SA standards of GRAP) and for such internal control as the accounting authority determines is necessary to enable the preparation of the 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 separate 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.

Opinion

5. In my opinion, the financial statements present fairly, in all material respects, the financial position of the Council for Geoscience as at 31 March 2014, its financial performance and cash flows for the year then ended, in accordance with SA standards on GRAP and the requirements of the PFMA.



Emphasis of matter

6. I draw attention to the matter below. My opinion is not modified in respect of this matter.

Restatement of corresponding figures

7. As disclosed in note 24 to the financial statements, the corresponding figures for 31 March 2013 have been restated as a result of an error discovered during 2014 in the financial statements of the Council for Geoscience at, and for the year ended, 31 March 2013.

Report on other legal and regulatory requirements

8. In accordance with the PAA and the general notice issued in terms thereof, I report the following findings on the reported performance information against predetermined objectives for selected objectives presented in the annual performance report, non-compliance with legislation as well as internal control. The objective of my tests was to identify reportable findings as described under each subheading but not to gather evidence to express assurance on these matters. Accordingly, I do not express an opinion or conclusion on these matters.

Predetermined objectives

I performed procedures to obtain evidence about the usefulness and reliability of the reported performance information for the following selected objectives presented in the annual performance report of the Council for Geoscience for the year ended 31 March 2014:

- To address stakeholder needs on pages 29–30
- To generate revenue on page 30
- To attract and retain a skilled workforce on page 32
- To enhance present levels of excellence on page 33
- To reflect and embrace the diversity of South Africa on page 33.
- 9. I evaluated the reported performance information against the overall criteria of usefulness and reliability.
- 10. I evaluated the usefulness of the reported performance information to determine whether it was presented in accordance with National Treasury's annual reporting principles and whether the reported performance was consistent with the planned objectives. I further performed tests to determine whether indicators and targets were well defined, verifiable, specific, measurable, time bound and relevant, as required by National Treasury's *Framework for managing programme performance information* (FMPPI).
- 11. I assessed the reliability of the reported performance information to determine whether it was valid, accurate and complete.
- 12. I did not raise any material findings on the usefulness and reliability of the reported performance information for the selected objectives.

Additional matter

13. Although I raised no material findings on the usefulness and reliability of the reported performance information for the selected objectives, I draw attention to the following matter:


Achievement of planned targets

14. Refer to the annual performance report on pages 27 to 33 for information on the achievement of the planned targets for the year.

Adjustment of material misstatements

15. I identified material misstatements in the annual performance report submitted for auditing on the reported performance information for the objective *To address stakeholder needs*. As management subsequently corrected the misstatements, I did not raise any material findings on the usefulness and reliability of the reported performance information.

Compliance with legislation

16. I performed procedures to obtain evidence that the Council for Geoscience had complied with applicable legislation regarding financial matters, financial management and other related matters. My findings on material non-compliance with specific matters in key legislation, as set out in the general notice issued in terms of the PAA, are as follows:

Annual financial statements, performance and annual reports

17. The financial statements submitted for auditing were not prepared in in accordance with the requirements of section 55(1)(a) of the PFMA. Material misstatements in the statements of financial performance, financial position and disclosure notes identified by the auditors were subsequently corrected resulting in the Council for Geoscience receiving an unqualified audit opinion.

Expenditure management

 The accounting authority did not take effective steps to prevent irregular expenditure, as required by section 51(1)(b)(ii) of the PFMA.

Procurement and contract management

- 19. Invitations for competitive bidding were not always advertised for a required minimum period of 21 days, as required by Treasury Regulations 16A6.3(c).
- 20. The procurement processes did not comply with the requirements of a fair SCM system as per section 16A6.3(b) of the Treasury Regulations, in that requests for quotations or any other documents made available to bidders did not specify the evaluation and adjudication criteria to be applied.

Other matters

21. The accounting authority did not promptly and in writing inform the relevant treasury of the establishment of a company in terms of section 54(2)(a) of the PFMA.

Internal control

22. I considered internal control relevant to my audit of the financial statements, annual performance report and compliance with legislation. The matters reported below are limited to the significant internal control deficiencies that resulted in findings on the annual performance report and the findings on non-compliance with legislation included in this report.



Leadership

23. Management has not exercised adequate oversight responsibility regarding financial reporting and compliance within the procurement processes to ensure that expenditure incurred does not result in irregular expenditure.

Financial and performance management

- 24. The council 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.
- 25. Management did not comply with the PPR and did not follow the guidelines for the procurement process which is that all tenders must be fair, equitable, transparent, competitive and cost-effective.

Other reports

Investigations

26. An independent consulting firm performed an investigation at the request of the council, which began in the previous financial year. The investigation was initiated based on an allegation of possible conflict of interest by an employee of the entity, in the awarding of a tender. The investigation was concluded and resulted in the dismissal of the employee.

Auditor General

Pretoria 31 July 2014



Auditing to build public confidence



5. ANNUAL FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 MARCH 2014

1 STATEMENT OF FINANCIAL POSITION AT 31 MARCH 2014

	Notes	2014 R'000	2013 R'000				
Assets							
Non-current assets							
Property and equipment	3	189 800	194 541				
Intangible assets	4	4 363	2 634				
Current assets		242 040	255 238				
Inventories	5	5	5				
Trade and other receivables	7	16 190	47 815				
Cash and cash equivalents	8	225 845	207 418				
Total assets		436 203	452 413				
Net assets and liabilities							
Net assets							
Accumulated surplus		334 726	333 276				
Non-current liabilities							
Post-employment benefit liabilities	6	5 357	14 382				
Current liabilities		96 120	104 755				
Trade and other payables	9	11 493	9 709				
Deferred income	10	74 589	86 076				
Accruals	11	10 038	8 970				
Total net assets and liabilities		436 203	452 413				



Council for Geoscience

2 STATEMENT OF FINANCIAL PERFORMANCE FOR THE PERIOD ENDED 31 MARCH 2014

	Notes	2014 R'000	2013 R'000
Revenue	12	290 798	272 581
Cost of commercial projects	12	(25 203)	(55 517)
Cost of statutory projects	12	(114 759)	(56 092)
Gross surplus		150 836	160 972
Other operating income	12	9 295	6 310
Administrative expenses		(167 019)	(159 961)
Other operating expenses	12	(5 348)	(748)
Interest received	13	14 182	9 255
Surplus from operations		1 946	15 828
Finance cost	14	(496)	(12)
Net surplus for the year		1 450	15 816



3 STATEMENT OF CHANGES IN NET ASSETS FOR THE PERIOD ENDED 31 MARCH 2014

	Notes	Accumulated surplus R'000	Total R'000
Balance at 31 March 2012		227 595	227 595
Effect of adjustment - building	24.3	83 009	83 009
		310 604	310 604
Net surplus for the period as restated		15 816	15 816
Balance at 31 March 2013		326 420	326 420
Effect of correction of error	24.1	6 856	6 856
Balance at 31 March 2013 as restated		333 276	333 276
Net surplus for the period		1 450	1 450
Balance at 31 March 2014		334 726	334 726



4 CASH FLOW STATEMENT FOR THE PERIOD ENDED 31 MARCH 2014

	Notes	2014 R'000	2013 R'000
Cash inflow from operating activities		38 158	52 809
Cash receipts from customers		322 425	259 866
Cash paid to suppliers and employees		(297 953)	(216 300)
Cash generated from operations	15	24 472	43 566
Interest received	13	14 182	9 255
Finance cost	14	(496)	(12)
Cash outflow from investing activities		(19 731)	(18 784)
Acquisition of:			
Property and equipment	16.1	(16 843)	(18 325)
Intangible assets	16.2	(2 898)	(473)
Proceeds on disposal of property and equipment		10	14
Net increase in cash and cash equivalents		18 427	34 025
Cash and cash equivalents at beginning of period	8	207 418	173 393
Cash and cash equivalents at end of period	8	225 845	207 418



5 NOTES TO THE FINANCIAL STATEMENTS FOR THE PERIOD ENDED 31 MARCH 2014

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 Practice (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.

These annual financial statements have been prepared on a going-concern basis, i.e. the assumption that the Council for Geoscience will continue to operate as a going concern for at least the next twelve months.

- 2. The cash flow statement has been prepared in accordance with the direct method.
- 3. Specific information has been presented separately on the statement of financial position as is required by the SA standards of GRAP.

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 a baseline allocation from the Department of Mineral Resources.

1.2.3 Revenue from exchange transactions

Revenue from exchange transactions comprises sales and contract revenue as follows:

Sales revenue

Sales revenue represents the invoiced value of goods and services 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 referring to the stage of completion of the contract outcome.



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:

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

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

Land and buildings were valued at initial recognition and subsequently only the buildings are depreciated on a straight-line method.

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 it. If the cost of a replacement part 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 the 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 instalments 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
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:

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



Intangible assets are 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 to five years.

1.6 Heritage assets

Heritage assets are assets held for their cultural, environmental or historical significance. Heritage assets are initially recognised at cost and where heritage assets were received as donation or acquired at nominal value, the cost is recorded as nil. The Council for Geoscience has taken advantage of the transitional provisions of GRAP 103 as it is in the process of measuring all its heritage assets classes and will comply fully with the requirements of the standards as at 31 March 2015. Heritage assets will be reflected at fair value and are not depreciated as they have an infinite useful life.

1.7 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 for free or at a nominal charge.

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

1.8 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:

• 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.

1.9 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:

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



- The ability to use or sell the intangible asset; and
- 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 straightline basis over their useful lives.

1.10 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.

1.11 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.

1.12 Provisions and contingent liabilities

Provisions are recognised when:

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

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

Commitments

The Council for Geoscience classifies commitments as contracted future transactions that are non-cancellable or only cancellable at significant cost, and that will normally result in the outflow of cash. This excludes steady routine transactions such as salary commitments relating to employment contracts or social security benefits.

A distinction is made between operational and capital commitments.

Disclosure is made of the aggregate amount of operational and capital expenditure contracted



for at the reporting date, to the extent that the amount has not been recorded in the financial statements.

If a commitment is for a period longer than a year, it is stated in the note to the commitments. No disclosure of expenditure that has been approved, but that has not yet been contracted for, is made.

1.13 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 statement of financial position when the entity 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 entity's obligations are discharged, cancelled or 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.

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.

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.

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.



1.14 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.

1.15 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.

1.16 Critical accounting estimates and judgements

Provision for bad debts

Past experience indicates a reduced prospect of collecting debts over the age of four months. Debtors balances are regularly assessed by management and provided for in line with the policy.

Provisions

Provisions were raised and management determined an estimate based on the information available and in line 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 that the entity is party to as operating leases, as they do not transfer substantially all risks and ownership 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 Polokwane office current lease, and the agreement will be classified in its entirety as an operating lease.

1.17 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 New standards and interpretations

2.1 Standards and interpretations issued, but not yet effective

The Council for Geoscience has not applied the following standards and interpretations, which have been approved, but are not yet effective for accounting periods beginning on or after 1 March 2014 or later periods:

GRAP statement	Description	Impact	Effective date
GRAP 18	Segment reporting	None	No effective date
GRAP 20	Related-party disclosure	None	No effective date
GRAP 105	Transfer of functions between entities under common control	None	No effective date
GRAP 106	Transfer of functions between entities not under common control	None	No effective date
GRAP 107	Mergers	None	No effective date

3 Property and equipment

	Land	Buildings and fixtures	Equipment	Office furniture	Aircraft and boat	Motor vehicles	Computer equipment	Total
2014	R'000	R'000	R'000	R'000	R'000	R'000	R'000	R'000
Gross carrying amount	18 231	138 069	116 929	15 174	21 687	16 150	25 581	351 821
Accumulated depreciation at the beginning of the period	-	(31 066)	(83 418)	(7 372)	(8 501)	(8 085)	(18 838)	(157 280)
Opening net carrying amount at 31 March 2013	18 231	107 003	33 511	7 802	13 186	8 065	6 743	194 541
Movements during the pe	eriod:							
Work in progress prior year	-	-	(367)	-	-	-	-	(367)
Acquisitions	-	1 011	7 318	389	1 562	4 369	2 561	17 210
Disposals	-	-	(3 7 37)	(667)	-	(109)	(450)	(4 963)
Disposals - Cost	-	-	(16 706)	(1 686)	-	(680)	(6 124)	(25 196)
Disposals - Depreciation	-	-	12 969	1 019	-	571	5 674	20 233
Depreciation	-	(4 646)	(7 102)	(725)	(751)	(1 614)	(1 783)	(16 621)
Closing net carrying amount at 31 March 2014	18 231	103 368	29 623	6 799	13 997	10 711	7 071	189 800
Gross carrying amount	18 231	139 080	107 174	13 877	23 249	19 839	22 018	343 468
Accumulated depreciation	-	(35 712)	(77 551)	(7 078)	(9 252)	(9 128)	(14 947)	(153 668)



Property and equipment (continued)

	Land	Buildings and fixtures	Equipment	Office furniture	Aircraft and boat	Motor vehicles	Computer equipment	Total
2013	R'000	R'000	R'000	R'000	R'000	R'000	R'000	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)
Opening net carrying amount at 31 March 2012	18 231	108 327	33 488	1 536	14 715	4 543	4 333	185 173
Movements during the pe	eriod:							
Adjustments - Low value	-	-	433.00	6 012.00	2.00	-	361.00	6 808
Cost	-	-	3 355	12 164	46	-	2 615	18 180
Accumulated depreciation	-	-	(2 922)	(6 152)	(44)	-	(2 254)	(11 372)
Acquisitions	-	-	9 617	976	100	4 057	3 575	18 325
Disposals	-	(629)	(456)	19	(182)	(5)	(82)	(1 335)
Disposals - Cost	-	(629)	(1 067)	(14)	(1 121)	(47)	(617)	(3 495)
Disposals - Depreciation	-	-	611	33	939	42	535	2 160
Adjustments	-	3 350	(3 350)	-	-	-	-	-
Depreciation	-	(4 674)	(6 381)	(741)	(627)	(1 352)	(1 444)	(15 219)
Closing net carrying amount at 31 March 2013	18 231	107 003	33 511	7 802	14 008	7 243	6 743	194 541
Gross carrying amount	18 231	138 069	116 929	15 174	21 687	16 150	25 581	351 821
Accumulated depreciation	-	(31 066)	(83 418)	(7 372)	(7 679)	(8 907)	(18 838)	(157 280)

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 351 JR, Pretoria West 280 Pretoria Street, Silverton, Pretoria

R2 800 000 R94 000 000

The value of these properties has been included in the carrying amount of land and buildings as at 31 March 2014 and was determined by an independent valuator.

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



4 Intangible assets

	2014 R'000	2013 R'000
Computer software		
Gross carrying amount	14 083	16 014
Accumulated amortisation	(11 449)	(13 048)
Opening net carrying amount at 31 March	2 634	2 966
Movements during the period:		
Adjustments - Low value	-	47
Cost	-	852
Accumulated depreciation	-	(805)
Acquisitions	2 898	473
Disposals	(303)	(3 256)
Disposals - Cost	(6 031)	-
Disposals - Amortisation	5 728	278
Impairment	-	2 965
Amortisation	(866)	(839)
Closing net carrying amount at 31 March	4 363	2 634
Gross carrying amount	10 950	14 083
Accumulated amortisation	(6 587)	(11 449)

5 Inventories

Publication inventories	5	5

Council for Geoscience



6 Retirement benefit

20	14 2	.013
R'û	00 R'	000

6.1 Post-retirement medical aid fund

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.

The amount recognised in the statement of financial performance is determined as follows:					
Current service costs	360	256			
Interest charge	2 144	1 777			
Expected return on planned assets	(1 100)	(943)			
Actuarial (gain)/loss recognised	(8 628)	6 027			
Recognition of loss on asset realisation	(1 800)	(2 801)			
	(9 024)	4 316			

	2014	2013	2012	2011		
The amount included in the statement of financial position arising from Council for Geoscience obligation in respect of post-retirement medical aid contributions is as follows:						
Present value of fund obligations	19 504	26 226	21 155	19 775		
Fair value of planned assets	(14 147)	(11 844)	(11 090)	(10 449)		
Liability recognised in statement of financial position	5 357	14 382	10 065	9 326		

	2014			2013		
Movement in net liability during the period is as follows:	Liability	Planned asset	Net	Liability	Planned asset	Net
Liability at beginning of period	26 226	-	26 226	21 155	-	21 155
Value of planned assets at beginning of period	-	(11 845)	(11 845)	-	(11 089)	(11 089)
	26 226	(11 845)	14 381	21 155	(11 089)	10 066
Interest charge/expected return of planned asset	2 144	(1 100)	1 044	1 777	(943)	834
Contributions received	-	(1 800)	(1 800)	-	(2 801)	(2 801)
Current service costs	360	-	360	256	-	256
Benefits paid	(1 281)	1 281	-	(1 399)	1 399	-
Loss/(gain) recognised on realisation of planned asset	(4 800)	-	(4 800)	-	-	-
Actuarial loss/(gain)	-	(683)	(683)	-	-	-
Actuarial loss/(gain) recognised on curtailment	(3 145)	-	(3 145)	4 437	1 590	6 027
Closing balance	19 504	(14 147)	5 357	26 226	(11 844)	14 382



Retirement benefit (continued)

Contributions expected to be paid

No top-up payments are expected to be made during the 2015 year.

Expected rate of return on assets		8.62%
Assumptions		
Discount rates		8.62%
Basis of discount rates	JSE zero coupon bond yield after the market closed on 31 March 2014	
Return on assets		8.62%
Expected salary increases		7.50%
Health care cost inflation rate		7.58%

Sensitivity Analysis-on accrued liability (R Millions)

Sensitivity analysis

	Change	In service	Continuation	Total	Change
Central assumptions	-	4.192	15.311	19.504	-
Health care inflation	1%	4.912	16.706	21.619	11%
	-1%	3.603	14.085	17.687	-9%
Discount rate	1%	3.604	14.073	17.677	-9%
	-1%	4.924	16.745	21.669	11%
Post-retirement mortality	-1 year	4.334	15.962	20.297	4%
Average retirement date	-1 year	4.502	15.311	19.814	2%
Continuation of membership at retirement	-10%	3.787	15.311	19.098	-2%

Current service and interest cost - 2014

Sensitivity analysis

	Change	Current service	Interest cost	Total	Change
Central assumptions	-	359 876	2 144 087	2 503 963	-
Health care inflation	1%	413 682	2 388 334	2 802 016	12%
	-1%	315 462	1 935 999	2 250 749	-10%
Discount rate	1%	315 193	1 932 999	2 248 192	-10%
	-1%	415 063	2 395 785	2 810 848	12%
Average retirement age (60)	-1 year	424 150	2 232 129	2 656 279	6%



Retirement benefit (continued)

6.2 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 R8 047 015 (2013: R7 140 361) represents equal contributions of 7.5% by the employer and employee.

2014	2013
R'000	R'000

7 Trade and other receivables for exchange revenue

Trade receivables	5 055	20 254
Trade receivables - Retention	2 571	2 571
Contract customers	4 778	23 717
Other receivables	3 568	3 052
Prepaid expenses	386	228
Personnel debt	50	51
	16 408	49 873
Less - Provision for bad debts	(218)	(2 058)
	16 190	47 815
Provision for bad debts		
Opening balance	2 058	1 735
Movement	(1 840)	323
Closing balance	218	2 058

Analysis of ageing of receivables past due but not impaired

Retention on foreign project - Over 120 days	2 571	2 571

Analysis of impairment

Debtors liquidated	27	-
Long overdue debtors considered impaired	191	2 058
	218	2 058

There is no difference between the fair value of trade and other receivables and their book value.

8 Cash and cash equivalents	2014	2013
	R'000	R'000
Cash and cash equivalents at the end of the period are represented by the following balan	ces:	
Cash at bank	14 021	10 189
Call accounts	211 824	197 229
Cash and cash equivalents at the end of the period are represented by the following balances:	225 845	207 418
Certain foreign funds are considered not available for use	10 333	8 204

There is no difference between the fair value of cash and cash equivalents and their book value.

9 Trade and other payables

Trade payables	7 959	9 107
Other payables	3 534	602
	11 493	9 709

There is no difference between the fair value of trade payables and their book value.

10 Deferred income

Exchange revenue

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 the period	1 044	1 009		
	Interest earned	34	35		
	Amounts used during the period	(1 078)	-		
	Carrying amount at the end of the period	-	1 044		

10.1.2	Nedbank Investment Acc. 03/7881543469/006		
	Carrying amount at the beginning of the period	10 024	14 149
	Amounts used during the period	(10 111)	(4 490)
	Interest earned	87	365
	Carrying amount at the end of the period	-	10 024

Council for Geoscience



Deferred income (continued)

		2014	2013
		R'000	R'000
10.1.3	Nedbank Investment Acc. 03/7881543469/007		
	Carrying amount at the beginning of the period	20 254	29 242
	Amounts used during the period	(20 567)	(9 692)
	Interest earned	313	704
	Carrying amount at the end of the period	-	20 254

10.2 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.

Carrying amount at the beginning of the period	68	66
Amounts used during the period	(70)	-
Interest earned	2	2
Carrying amount at the end of the period	-	68

10.3 Deferred income arising as a result of an agreement with the Department of Mineral Resources in terms of the Sustainable Development Through Mining project.

Carrying amount at the beginning of the period	887	858
Amounts used during the period	(916)	-
Interest earned	29	29
Carrying amount at the end of the period	-	887

10.4 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.

Carrying amount at the beginning of the period	1 371	660
Amounts received	-	711
Carrying amount at the end of the period	1 371	1 371

10.5 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.

Carrying amount at the beginning of the period	-	171
Amounts used during the period	-	(171)
Carrying amount at the end of the period	-	-



Deferred income (continued)

		2014	2013
		R'000	R'000
10.6	Deferred income arising as a result of an agreemen and Technology in terms of the Earth Observation a	t with the Department of the	ent of Science sessment.
	Carrying amount at the beginning of the period	3 500	982
	Amounts received	3 500	3 500
	Amounts used during the period	(4 078)	(982)
	Carrying amount at the end of the period	2 922	3 500

10.7Deferred income arising as a result of an agreement with the Department of Science
and Technology to study the Witwatersrand Central Basin Mine Water Apportionment.Anount at the beginning of the period1 386Amounts received481Carrying amount at the end of the period1 867

10.8Deferred income arising as a result of an agreement entered into with the National
Research Foundation.Carrying amount at the beginning of the period11060Amounts received-50Carrying amount at the end of the period110110

10.9	Deferred income arising as a result of prefunding for the Uganda Project.		
	Carrying amount at the beginning of the period	-	24
	Amounts used during the period	-	(24)
	Carrying amount at the end of the period	-	-

10.10 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.

Carrying amount at the beginning of the period	47 432	9 667
Amounts received	116 521	78 381
Amounts used during the period	(95 634)	(40 616)
Carrying amount at the end of the period	68 319	47 432
	74 589	86 076

Deferred income (continued)

		2014	2013
		R'000	R'000
11	Accruals		
	Accruals for leave pay		
	Carrying amount at the beginning of the period	8 970	7 450
	Provision current period	1 703	1 958
	Amounts used during the current period	(635)	(438)
	Carrying amount at the end of the period	10 038	8 970

The leave pay provision relates to the estimated liabilities as a result of leave days due to employees.

2	Deficit/surplus from operations		
	Operating deficit/surplus is arrived at after taking the following items into account:		
	Revenue		
	Non-exchange revenue		
	Total grant received	271 232	223 006
	Project-related revenue	(116 521)	(78 381)
		154 711	144 625
	Exchange revenue		
	Department of Mineral Resources project-related revenue	95 634	40 616
	Contracting revenue	40 209	87 034
	Publication revenue	244	306
		136 087	127 956
		290 798	272 581

Contract revenue for work in progress is included in the contracting revenue at an amount of R5 758m (2013: R24 307m). Contract cost for work in progress is included in the cost of contracts and amounts to R5 529m (2013: R23 818m). The net surplus included in the net surplus for the year amounts to R0,229m (2013: R0,489m).

Cost of contracts		
Direct cost	13 469	34 744
Personnel expenditure	11 734	20 773
	25 203	55 517

Cost of statutory projects		
Direct cost	64 549	24 016
Personnel expenditure	50 210	32 076
	114 759	56 092



Deficit/surplus from operations (continued)

	2014	2013
	R'000	R'000
Other operating income		
Foreign currency gains	2 606	1 799
Profit on disposal of fixed assets	10	14
Recovery of asset losses	226	-
Recovery of bad debts	103	-
Provision for bad debts	1 839	-
Sundry income	4 511	4 497
	9 295	6 310
Administrative expenses include		
Audit fees	2 970	1 484
- Current period	734	284
- Prior period	1 226	784
- Internal audit	547	114
- Fee for other services	463	302
Bad debts written off	1 602	11
Provision for bad debts	-	323
Depreciation - on owned assets	16 621	15 219
- Buildings	4 646	4 674
- Equipment	7 102	6 381
- Office furniture	725	741
- Motor vehicles	1 614	1 352
- Aircraft	751	627
- Computer equipment	1 783	1 444
Amortisation - intangible assets		
- Computer software	866	839
Rentals in respect of operating leases		
- Land and buildings	447	435
- Photocopying machines	1 767	1 605
Other operating expenses		
Net loss on disposal of equipment	5 265	559
Foreign currency losses	83	189
	5 348	748
Staff costs	160 392	159 972
Included in staff costs are:		
Defined benefit plan expense for the post-retirement medical aid fund	(9 024)	4 316
- Current service cost	360	256
- Interest cost	2 144	1 777
- Expected return on plan assets	(1 100)	(943)

Council for Geoscience



Deficit/surplus from operations (continued)

	2014	2013
	R'000	R'000
Other operating income		
- Recognised actuarial loss	(10 428)	3 226
Defined contribution plan expenses for the pension and provident funds	8 047	7 140

Emoluments

Senior management	2013/2014				
	Pensionable salary	Provident/ Pension fund contributions	Performance bonus	Other contributions	Total
	R	R	R	R	R
Mr Kota M W (CEO)	2 092 076	136 325	54 878	297 623	2 580 902
Mr Matsepe L D	1 375 664	83 655	130 152	80 947	1 670 418
Mr Ramagwede L F	1 390 496	90 684	111 535	81 216	1 673 931
Dr Graham G	1 396 273	84 909	118 654	79 710	1 679 546

	2012/2013			
	Pensionable salary	Provident fund contributions	Other contributions	Total
Dr Ramontja T	-	-	334 317	334 317
Mr Kota M W (CEO)	701 258	42 075	36 852	780 185
(020)	101200	12 07 0	00 002	
Mr Matsepe L D	1 206 210	73 053	191 166	1 470 429
Mr Ramagwede L F	1 287 496	83 967	179 512	1 550 975
Dr Graham G	1 292 845	78 619	487 313	1 858 777
Ms Mabuza M	975 445	56 034	545 590	1 577 069

Board emoluments						
Non-executive Board Members	Non-executive Board Members					
	2014	2013				
	R	R				
Prof. Ngoepe P E	198 188	232 501				
Prof. Barton J M (Jr)		131 824				
Mr Smith M	-	29 862				
Ms Mthimunye K R	129 538	108 316				
Dr Mathe H	85 766	16 838				
Mr Sibiya D	24 049	9 678				
Prof. Hermanus M A	61 104	22 971				
Dr McGill J E	100 766	29 267				
	599 411	581 257				

Details regarding Board Members' service contracts: 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.

		2014 R'000	2013 R'000
13	Interest received		
	- Interest income on call accounts	13 419	8 254
	- Interest income on current accounts	763	1 001
		14 182	9 255

14	Finance cost		
	Interest	496	12

15

Reconciliation of net surplus for the period to cash generated from operations

Net surplus for the period	1 450	15 816
Adjustments for -		
Interest	496	12
Depreciation on property and equipment	16 621	15 219
Amortisation - intangible assets	866	839
(Net proceeds) on disposal of fixed assets	(10)	(14)
Net loss on disposal of fixed assets	5 265	559
Increase in provision for bad debts	-	323
Interest earned	(14 182)	(9 255)
Provision for post-retirement medical aid benefits	(9 024)	4 317
Operating cash flows before working capital changes	1 482	27 816
Working capital changes -		
Increase in provision for accumulated leave pay	1 068	1 520
Decrease/(increase) in trade and other receivables	31 625	(14 158)
Increase in trade and other payables	1 784	586
(Decrease)/increase in deferred income	(11 487)	27 801
Cash generated from operations	24 472	43 565

16	Acquisitions		
16.1	Property and equipment		
	Land and buildings	1 011	-
	Equipment	6 951	9 617
	Office furniture	389	976
	Aircraft and boat	1 562	100
	Motor vehicles	4 369	4 057
	Computer equipment	2 561	3 575
		16 843	18 325

Council for Geoscience



Acquisitions (continued)

		2014 R'000	2013 R'000
16.2	Intangible assets		
	Computer software	2 898	473

17	Contingent liability		
17.1	Bank guarantees		
	Performance bonds and bid bonds issued for contract work to various financial institutions. All bank guarantees expired this year.	-	578
		-	578

17.2	Pending legal action		
	A court case between the Council for Geoscience and the responsible officer is still underway. A contingent liability exists in relation to the court case on the maintenance of the helicopter.	100	-

18	Taxation
	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.

19	Operating lease commitments		
19.1	Lease of office space		
	At the reporting date, the outstanding commitments under non-cancellable operating leases which fall due are as follows:		
	Up to 1 year	447	425
	Total lease commitments	447	425

19.2	Lease of office printing equipment		
	The operating lease between a supplier and the Council for Geoscience entered on 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	374	1 495
	Total lease commitments	1 869	2 990



Operating lease commitments (continued)

		2014 R'000	2013 R'000
19.3	Commitments		
	Operating expenditure		
	Approved and contracted	45 983	84 530
	Capital expenditure		
	Approved and contracted: Property and equipment	4 094	-
	Total commitments	50 077	84 530

Commitments		
Up to I year	26 808	25 358
2 to 5 years	23 269	59 172
Total commitments	50 077	84 530

The Council for Geoscience has usage-based contracts for the provision of the following services:

- Sampling services Geophysics
- Accommodation and travel
- Courier services

20 Financial instruments

Financial instruments consist of cash and cash equivalents, investments with financial institutions, trade and other receivables and trade and other payables.

20.1 Credit risk

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 Council for Geoscience's cash equivalents and short-term deposits are placed with high credit quality financial institutions. Trade receivables are presented net of the allowance for doubtful debts. Credit risk with respect to trade receivables is limited due to 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 Council for Geoscience'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.

The maximum exposure to credit risk amounts to R16 365 (2013: R46 696).

20.2	Interest rate risk			
	The entity's exposure to interest rate risk and the effective interest rates on the financial instruments at reporting date are:			
	31 March 2014			



Financial instruments (continued)

		2014 R'000	2013 R'000		
20.2	Interest rate risk				
		Weighted average effective interest rate	Weighted average effective interest rate		
		%	%		
	Assets				
	Cash	3.28%	3.20%		
	Call accounts	5.21%	5.26%		
	Investments				
	The risk is perceived to be low due to the following factors:				
	- Funds are only invested with approved financial institutions according to the policy of the Council for Geoscience, as was approved by the Board.				
	- Investments are only reinvested or invested with Executive Manageme	ent approval.			
	- Investments are only reinvested or invested with Executive Manageme	ent approval.			

20.3 Foreign currency risk 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 due to the fact that these transactions take place on an ad-hoc basis. Exposure of the Council for Geoscience at 31 March 2014 is disclosed in note 21.

20.4 Airborne operations risk

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.

21	Foreign currency exposure						
		2014 R'000					2013 R'000
		Exchange rate	Foreign amount	R-value	Exchange rate	Foreign amount	R-value
21.1	Trade receivables						
	Foreign currency						
	Euro	R 14.31590	€ 257	R 3 684	R 11.58079	€215	R 2 487
	US\$	R 10.37850	\$ 26	R 271	-	-	-

21.2	Banks						
	Foreign funds						
	Moroccan Dirham	R 1.28766	DH 8 025	R 10 333	R 1.05737	DH 7 760	R 8 204
	Euro	R 14.31590	€ 30	R 425	R 11.58079	€29	R 344



		2014 R'000	2013 R'000		
22	Related-party transactions				
	During the period, the following related-party transactions took place between the Council for Geoscience and the Department of Mineral Resources:				
	Total grant received	271 232	223 006		
	Refer to note 10 for further details regarding transactions with the Department of Mineral Resources.				
	All other related-party transactions were concluded at arm's length.				
	Relationships:				
	Parent National Department:	Department of Mineral Resources			
	Other government departments and entities:	Mine H	lealth and Safety Council		

23 Irregular expenditure

	Irregular expenditure current ye	ear			
	Demolition of a damaged building		1 897	-	
	Consulting services earth observat	ion	670	-	
	Helicopter maintenance		2 325	-	
	Irregular expenses awaiting condo	nation	4 892	-	
	Analysis of expenditure awaiting co	ondonation per age classification			
	Current year		4 892	-	
	Incident Tender erroneously awarded	Disciplinary step taken An investigation was conducted and a disciplinary hearing held as a result of which the responsible officer was dismissed for irregular practice.			
	Deviation not approved by delegated official	Ratification to be applied for.			

24	Correction of prior year errors		
24.1	Correction of prior year cost and accumulated depreciation		
	Nature Capitalisation of small assets to comply with GRAP 17		
	Effect Statement of financial position as at 31 March 2014		
	Property and equipment		



201

Correction of prior year errors (continued)

		2014 R'000	2013 R'000
24.1	Correction of prior year cost and accumulated depreciation (continued)		
	Cost	19 379	19 032
	Accumulated depreciation	(13 614)	(12 934)
		5 765	6 098
	Statement of financial performance for the period ended 31 March 2014		
	Administration expenses		
	Depreciation	680	758
		680	758
	Statement of net assets for the period ended 31 March 2014		
	Accumulated surplus	-	-
	Effect of the error	-	6 856
		-	6 856

24.2	Correction of prior year unrecorded revenue		
	Nature Revenue recorded in the incorrect period		
	Effect		
	Statement of financial position as at 31 March 2014		
	Deferred income	-	24
	Trade and other receivables	-	849
		-	873
	Statement of financial performance for the period ended 31 March 2014		
	Revenue	(849)	-
	Statement of net assets for the period ended 31 March 2014		
	Accumulated surplus	-	873



Correction of prior year errors (continued)

		2014 R'000	2013 R'000
24.3	Correction of prior year building		
	Nature Correction of deferred grant to comply with GRAP 23		
	Effect		
	Statement of financial position as at 31 March 2014		
	Deferred grant - Long-term liability	-	80 343
	Short-term portion of deferred grant	-	2 666
		-	83 009
	Statement of financial performance for the period ended 31 March 2014		
	Effect of error on prior year revenue is as follows:		
	Net surplus	-	(2 666)
		-	(2 666)
	Statement of net assets for the period ended 31 March 2014		
	Effect of the prior year error on accumulated surplus is as follows:		
	Accumulated surplus	-	83 009
		-	83 009

24.4	Correction of prior year depreciation error		
	Nature Depreciation calculation error		
	Effect		
	Effect of error on current year depreciation and prior year accumulated surplus is as follows:		
	Correction of error	-	(266)

24.5	Correction of prior year staff debt error		
	Nature Staff debt raised in the incorrect period		
	Effect		
	Effect of the prior year error on accumulated surplus is as follows:		
	Correction of error	-	61

Council for Geoscience



Correction of prior year errors (continued)

		2014 R'000	2013 R'000
24.6	Correction of prior year closing balance of fixed	assets	
	Nature Incorrect allocation of fixtures to buildings, included in equipment		
	Effect		
	Increase in buildings	-	3 350
	Decrease in equipment	-	(3 350)
		-	-

24.7	Correction of prior year addition to fixed assets		
	Nature Gearbox for helicopter incorrectly stated as an addition instead of a debt		
	Effect		
	Decrease in aircraft components	-	(2 240)
	Increase in debt	-	1 120
	Decrease in accounts payable	-	1 120
		-	-

25 Heritage assets disclosure

GRAP 103 defines heritage assets as assets which have a cultural, environmental, historical, natural, scientific, technological or artistic significance and are held indefinitely for the benefit of present and future generations.

Certain heritage assets are described as inalienable items, thus assets which are retained indefinitely and cannot be disposed of without consent as required by law or otherwise.

Nature

The Council for Geoscience has the following different classes of heritage assets not yet disclosed in the financials:

- Fossil collections
- Library books, maps and publications
- Old scientific equipment
- Mineral collections
- Meteorite collections
- Gemstone collections

Effect

These collections have the 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 for these collections.



Our Offices in South Africa



Walmer, Port Elizabeth P.O. Box 5347,

Walmer, 6065, South Africa Tel: +27 (0)41 581 1164/1128 Fax: +27 (0)41 581 1165

Fax: +27 (0)41 581 1165 e-mail: info@geoscience.org.za website: www.geoscience.org.za

www.geoscience.org.za

RP137/2014

ISBN: 978-1-920226-66-4