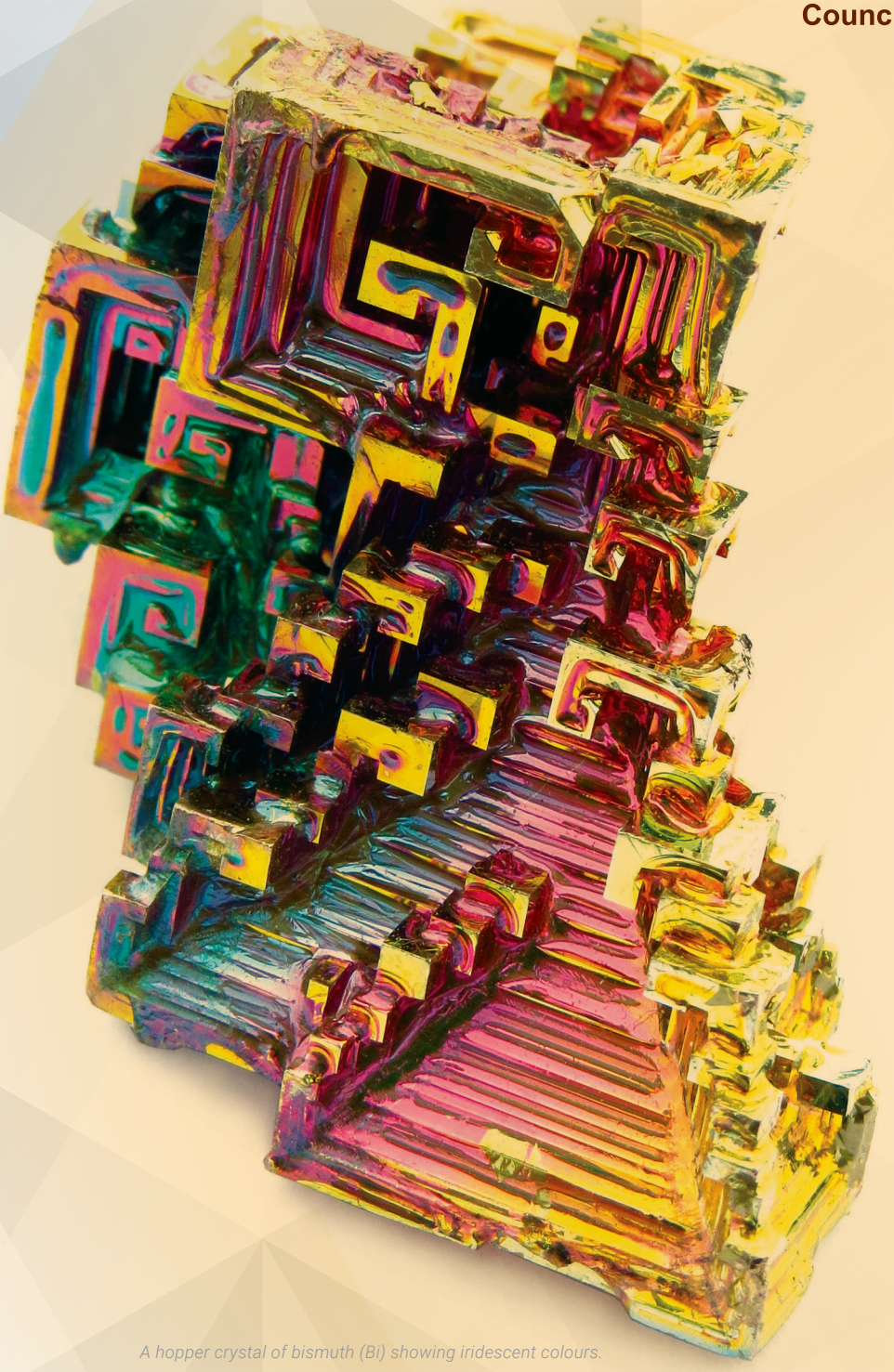
Council for Geoscience

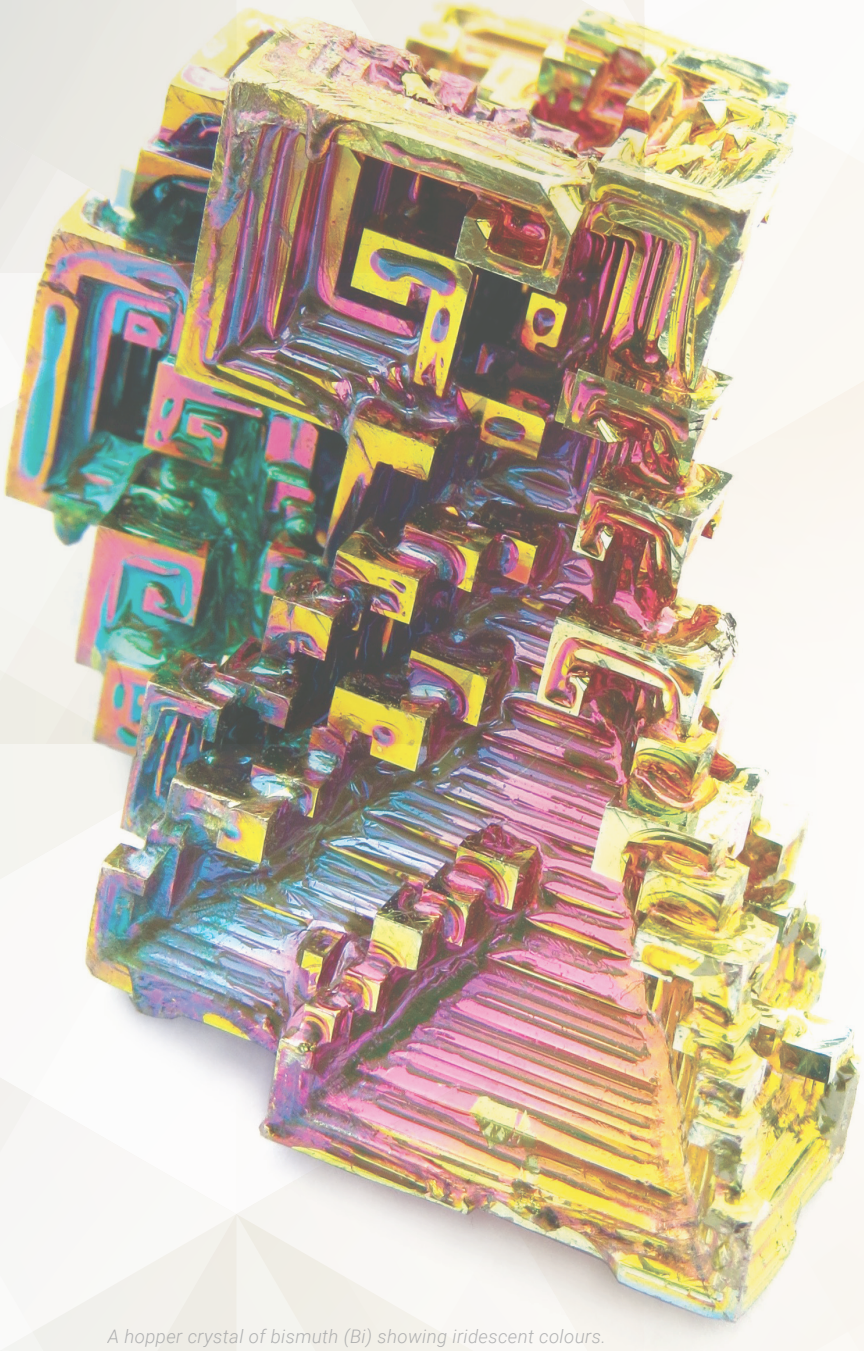


*A hopper crystal of bismuth (Bi) showing iridescent colours.*

# ANNUAL REPORT
of the COUNCIL FOR GEOSCIENCE

# 2017

Council for Geoscience



*A hopper crystal of bismuth (Bi) showing iridescent colours.*

# ANNUAL REPORT
## of the COUNCIL FOR GEOSCIENCE

# 2017

# CONTENTS

## TABLES

# PART A: GENERAL INFORMATION

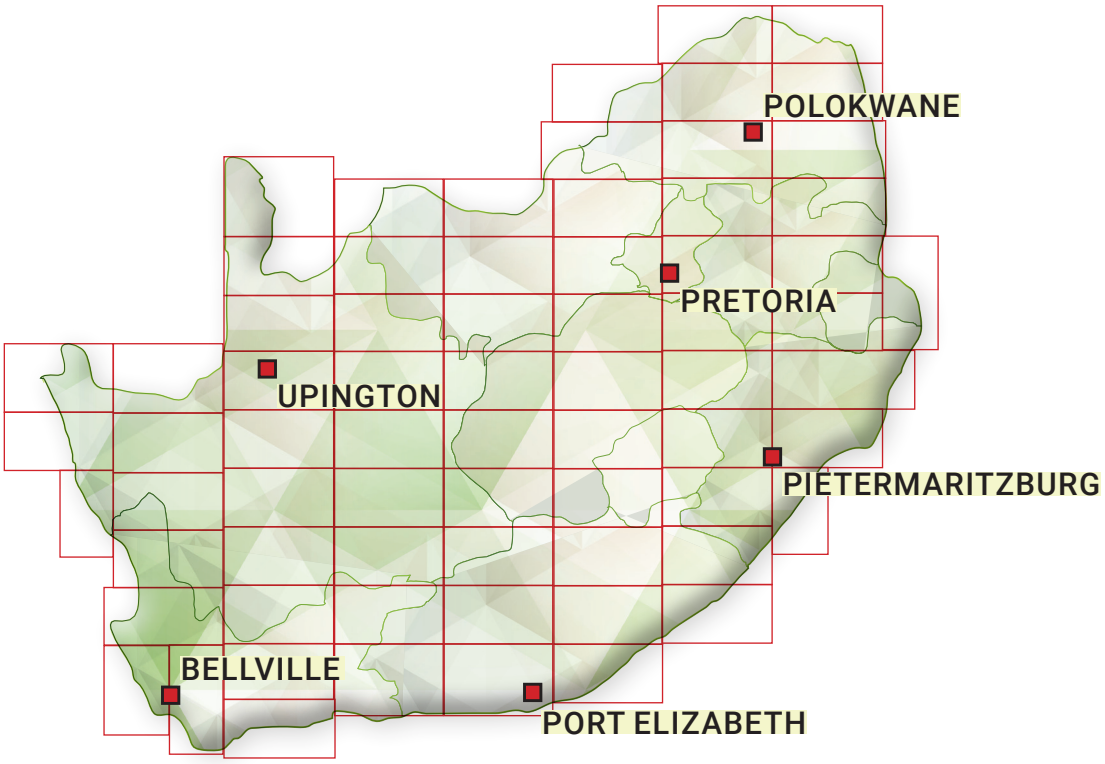
## 1. GENERAL INFORMATION ON THE COUNCIL FOR GEOSCIENCE

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

## Council for Geoscience

The Geoscience Amendment Act (Act No. 16 of 2010) established the Council for Geoscience as one of South Africa's national science councils. The Geological Survey of South Africa, which is the legal predecessor of the Council for Geoscience, was formed in 1912 by the amalgamation of the former surveys, the Geological Survey of the *Zuid-Afrikaansche Republiek* (1897), which became the Transvaal Geological Survey in 1903, and the Geological Commission of the Cape of Good Hope (1895–1911). The Council for Geoscience celebrated 100 years of existence in 2012.

The Council for Geoscience is a Schedule 3A Public Entity, boasting specialised facilities, assets and expertise, ranking among the best in Africa. The scientific focus areas of the organisation include Geoscience Mapping, Economic Geology, Geophysics, Marine Geoscience and Environmental, Groundwater and Engineering Geosciences. The Council for Geoscience has six regional offices in South Africa and its head office is situated in Pretoria.




***The six regional offices of the Council for Geoscience are situated in various provinces in South Africa. The grid in red shows the distribution of the 1:250 000-scale maps covering South Africa.***

## 2. ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| **AFTAC** | American Air Force Technical Application Centre |
| **AIDS** | Acquired Immunodeficiency Syndrome |
| **AIMS** | Aachen International Mining Symposia |
| **AMD** | Acid Mine Drainage |
| **BBBEE** | Broad-Based Black Economic Empowerment |
| **BRGM** | Bureau de Recherches Géologiques et Minières |
| **BSC** | Balanced Scorecard |
| **CAA** | Clean Air Asia |
| **CAR** | Central African Republic |
| **CCS** | Carbon Capture and Storage |
| **CEO** | Chief Executive Officer |
| **CGS** | Council for Geoscience |
| **CSR** | Corporate Social Responsibility |
| **CTBT(O)** | Comprehensive Nuclear-Test-Ban Treaty (Organisation) |
| **D&O** | Derelict and Ownerless |
| **DMR** | Department of Mineral Resources |
| **DST** | Department of Science and Technology |
| **ECSP** | Economic Competitiveness Support Package |
| **EDS** | Energy Dispersive Spectrometry |
| **GEMMAP** | Geological Mapping and Mineral Assessment of Malawi |
| **GIFT** | Geosciences Information for Teachers |
| **GIS** | Geographic Information System |
| **GRAP** | Generally Recognised Accounting Practice |
| **GSD** | Geological Survey Department |
| **GSN** | Geological Survey of Namibia |
| **GTK** | Geological Survey of Finland |
| **HIV** | Human Immunodeficiency Virus |
| **HVAC** | Heating, Ventilation and Air Conditioning |
| **IASTED** | International Association of Science and Technology for Development |
| **IESBA** | International Ethics Standards Board for Accountants |
| **IGC** | International Geological Congress |
| **IMS** | International Monitoring System |
| **IMSG** | Igneous and Metamorphic Studies Group |
| **IMWA** | International Mine Water Association |
| **IS** | Infrasound |
| **ISA** | International Standard on Auditing |
| **ISC** | International Seismological Centre |
| **ISO** | International Organisation for Standardisation |
| **IUAPPA** | International Union of Air Pollution Prevention and Environmental Protection Associations |
| **JSE** | Johannesburg Stock Exchange |
| **KOSAE** | Korean Society for Atmospheric Environment |

| | |
|---|---|
| **KOSH** | Klerksdorp–Orkney–Stilfontein–Hartebeestfontein |
| **LA-ICP-MS** | Laser Ablation Inductively Coupled Plasma Mass Spectrometry |
| **LiDAR** | Light Detection and Ranging |
| **LIMS** | Laboratory Information Management System |
| **MAIWD** | Ministry of Agriculture, Irrigation and Water Development |
| **MNREM** | Ministry of Natural Resources, Energy and Mining |
| **MPRDA** | Mineral and Petroleum Resources Development Act |
| **MQA** | Mining Qualifications Authority |
| **MTEF** | Medium Term Expenditure Framework |
| **MTSF** | Medium Term Strategic Framework |
| **NDP** | National Development Plan |
| **NEHAWU** | National Education, Health and Allied Workers' Union |
| **NEMA** | National Environmental Management Act |
| **OAGS** | Organisation of African Geological Surveys |
| **PAA** | Public Audit Act |
| **PASA** | Petroleum Agency of South Africa |
| **PDAC** | Prospectors and Developers Association of Canada |
| **PFMA** | Public Finance Management Act |
| **PGM** | Platinum Group Metal |
| **PHE** | Potential Harmful Elements |
| **PHTE** | Potential Harmful Trace Elements |
| **PIXE** | Proton Induced X-Ray Emission |
| **PRM** | Post-Retirement Medical Aid Fund |
| **PS** | Primary Seismic |
| **PSA** | Public Servants Association |
| **PSSA** | Palaeontological Society of Southern Africa |
| **REE** | Rare Earth Element |
| **SACCCS** | South African Centre for Carbon Capture and Storage |
| **SANAS** | South African National Accreditation System |
| **SANEDI** | South African National Energy Development Institute |
| **SANMAP** | South African Nearshore Mapping Programme |
| **SANSN** | South African National Seismograph Network |
| **SCR** | Stable Continental Region |
| **SEG-MJD** | Society of Economic Geologists and the Turkish Association of Economic Geologists |
| **SEM** | Scanning Electron Microscopy |
| **SHEQ** | Safety, Health, Environment and Quality |
| **SMME** | Small, Medium and Micro Enterprises |
| **SPLUMA** | Spatial Planning and Land Use Management Act |
| **UFH** | University of Fort Hare |
| **XRD** | X-Ray Diffraction |
| **XRF** | X-Ray Fluorescence |

## 3. FOREWORD BY THE CHAIRPERSON OF THE BOARD

**"We will continue to build a strong foundation that will ensure the prosperity of the organisation in the years to come."**

*Dr H. Mathe, Chairperson of the Board*

I am pleased to report that the Council for Geoscience (CGS) has benefited from a steady improvement in respect of operational performance, increased financial management and dedicated focus of all employees in ensuring that the Council for Geoscience mandate is adhered to and robustly implemented. The year 2016/2017 was particularly challenging in many respects and the Board, together with Management, worked tirelessly in overcoming these challenges. During the financial year under review, the Board and Management had to restrategise and refocus on the organisational structural redesign in order to deliver on major projects that were of benefit in the overall performance of the organisation and the strengthening of the internal governance structures.

In driving and delivering on its mandate, the organisation has performed very well in implementing a number of projects that are deemed to be of strategic significance to the South African society. These include, but are not limited to, geo-environmental studies for the development of shale gas in the Karoo Basin, rehabilitation of derelict and ownerless mines, assessment of uranium and thorium resources, strategic mine water management, high-resolution mapping and offshore mapping that is supportive of the Ocean's Phakisa and the Blue Economy development programme. Furthermore, the well-established Council for Geoscience laboratory facilities have begun a critical journey towards ISO accreditation, with the coal laboratory set to attain its accreditation during the next financial year. The laboratory is vital in ensuring that the integrity of data being analysed for the Council for Geoscience programmes or external clients meets and exceeds the established global standards.

In the coming years, the Council for Geoscience will undertake a high-resolution and multidisciplinary integrated mapping programme, which has a number of derivative deliverables that can optimise the contribution of the geosciences to human development. This programme will require additional substantial funding from government.

The Council for Geoscience has embarked upon an important risk management drive and has established a risk committee managed by the newly appointed Risk Manager and overseen by the Audit and Risk Committee of the Board.

It is the responsibility of this committee to assist the Board in the governance of risk and to design, implement and monitor a risk management process. The committee will focus on highlighting the strategic/operational risks facing the Council for Geoscience and will implement systems to ensure continuous risk monitoring.

Sustainability is an integral part of the Council for Geoscience mandate and business at the financial/economic, social, stakeholder and environmental level. The scientific focus and innovation within the organisation has the sustainability thrust embedded in it. The Board ensures that all Council for Geoscience divisions implement sustainable environmental, health and safety management systems. In terms of human resources, the Council for Geoscience maintains a harmonious and diversified workforce that has embraced the organisation as an employer of choice. This is confirmed by the positive employee survey results received recently.

In 2015, the Minister extended the term of office of the Board in order to host the 35th International Geological Congress (IGC) which took place from 28 August to 2 September 2016 at the Cape Town International Convention Centre. The congress was attended by the Minister of Mineral Resources, Mr Mosebenzi Zwane, and the Deputy Minister, Mr Godfrey Oliphant, and attracted a high calibre of scientists and delegates from all over the world. The Council for Geoscience, in addition to hosting a successful IGC, also contributed significantly to the number of scientific abstracts presented. The 35th IGC scientific programme was based on three core topics: Geoscience for Society, Fundamental Geoscience and Geoscience in the Economy. The hosting of the IGC promoted geological research, mining investment and tourism in South Africa and the rest of the continent.

We will continue to build a strong foundation that will ensure the prosperity of the organisation in the years to come. I am pleased to report that, for the past 15 consecutive years, the Council for Geoscience has obtained unqualified audits. In this premise, we will continue to strengthen organisational structures that will ensure robust governance and promote transformation on the path towards attaining clean audits.

In conclusion, I would like to express my gratitude to the former Acting CEO, Mr Simon Sikhosana, the former Board and the Chairperson of the Board, Prof. Phuti Ngoepe, for the outstanding work they have done during their tenure at the Council for Geoscience. I would also like to thank the Department of Mineral Resources, the Board, the Management team and the staff for their continued commitment to the organisation. In as much as there may still be challenges in the Council for Geoscience, I am confident that the organisation is steadily heading towards a stable environment and will continue to deliver on its mandate.

**Dr H. Mathe**
*Chairperson: Board of the Council for Geoscience*

## 4. OVERVIEW BY THE CHIEF EXECUTIVE OFFICER

**"As a science council, we pride ourselves in a low staff turnover of less than 1% and our investment in human capital development amounting to more than 3% of the payroll."**

*Mr M. Mabuza, Chief Executive Officer*

It is my privilege to share this report on the 2016/2017 performance of the Council for Geoscience supported by its competent and committed staff. As an organisation, we are encouraged by the growing number of scientific publications which contribute to our relevance and sustainability.

The Council for Geoscience is proud of having achieved 15 years of consecutive unqualified audit reports. Accordingly, we are steadfastly working towards attaining a clean audit report for the past financial year. This aspiration is enabled by our existing governance structures under the auspices of the Departments of Mineral Resources and Science and Technology, the Board of the Council for Geoscience and our internal processes and procedures. During the year under review, the Council for Geoscience appointed both a Company Secretary and Risk Manager in view of strengthening its internal governance structures and complementing the efficacy of its governance practices. It is against this background that we acknowledge the invaluable contribution of the former Board, while at the same time welcoming the new Board.

The honourable Minister of Mineral Resources, Mr Mosebenzi Zwane, reaffirmed the importance of the contribution of the Council for Geoscience to the national developmental priorities. In this regard, the Minister urged the organisation to refocus on its legislative mandate to optimise its aforestated contribution. Thus, we are delighted to announce a strategic reorientation of the Council for Geoscience which will place a greater emphasis on an integrated multidisciplinary mapping programme. This programme seeks to deliver geological infrastructure projects that will optimise the contributions of the organisation in attaining the National Development Plan objectives. These objectives include, without being limited to, infrastructure development, food security (agriculture development), the minerals and energy cluster (onshore and offshore), health (medical), environmental stewardship and geohazards.

As a science council, we pride ourselves in a low staff turnover of less than 1% and our investment in human capital development amounting to more than 3% of the payroll. The latter includes supporting 42 employees (12%) enrolled for MSc and PhD programmes. During the year under review, we hosted our second scientific conference which created a platform for the development of our young scientists and an arena for established scientists to share their achievements.

The support to Small, Medium and Micro Enterprises (SMMEs) is illustrated by our average creditor payment days of less than ten for work done. Moreover, we will continue to improve our Supply Chain Management Policy to support the national transformation objectives.

The year under review also saw the transition of the Presidency of the Organisation of African Geological Surveys (OAGS) from Namibia to Nigeria, with South Africa continuing its role as the permanent Secretariat. Further necessary reforms were introduced to expand the coverage of the OAGS across the entire continent with vice presidents being appointed across economic blocs. The support of the Council for Geoscience of the goals of the OAGS is consistent with the country's regional integration policy. To this end, we continue to develop, maintain and expand our strategic partnerships locally, regionally and internationally.

We acknowledge the challenge of remaining constrained by the provisions of the Geoscience Amendment Act that are still excluded from the operations of the Council for Geoscience. Necessary steps are being taken in this regard to ensure that these provisions will soon be implemented, in view of fully empowering the Council for Geoscience to deliver on its entire mandate.

Early in 2017, Executive Management met with the ground staff of the Council for Geoscience and the positive energy generated from this engagement is characteristic of the eagerness and enthusiasm across the organisation. With the new strategic plan of the organisation, the commitment of staff and guidance from the Board, I believe that the Council for Geoscience will go from strength to strength in the coming years.

**Mr M. Mabuza**
*Chief Executive Officer*
*Council for Geoscience*

## 5. STATEMENT OF RESPONSIBILITY FOR PERFORMANCE INFORMATION

**Statement of responsibility for performance information for the year ended 31 March 2017**

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

Moreover, it is the responsibility of the Chief Executive Officer to establish and implement a system of internal controls designed to provide reasonable assurance in regard 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 plans of the Council for Geoscience for the financial year ended 31 March 2017.

The performance information of the Council for Geoscience for the year ended 31 March 2017 has been examined by the external auditors and their report is presented on pages 82 to 86. The performance information was also approved by the Board of the Council for Geoscience.

**Mr M. Mabuza**
Chief Executive Officer
Council for Geoscience
31 July 2017

**Dr H. Mathe**
Chairperson
Board of the Council for Geoscience
31 July 2017

## 6. STRATEGIC OVERVIEW

The Council for Geoscience has embarked on a journey of assuming its rightful place on the national and global scientific platform as mandated by the Geoscience Act (as amended). The Council for Geoscience intends to realign itself by realising its Vision, Mission and Values through the following five strategic objectives:

- Delivery of the mandate;
- Advisory function, stakeholder engagement and knowledge management;
- Financial sustainability;
- Organisational effectiveness and efficiency;
- An empowered, transformed, motivated and capacitated workforce.

### 6.1 Vision

A prosperous society enabled by geoscience solutions

### 6.2 Mission

Provide geoscience solutions in South Africa and beyond

### 6.3 Brand promise

Applied geoscience solutions

### 6.4 Values

| | |
|---|---|
| **Innovation** | Working together as teams across functions to solve problems, develop novel ideas that create new value for our stakeholders, and improve the organisational performance of the CGS |
| **Diversity** | Striving 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 |
| **Excellence** | Excellence and continuous improvement in everything we do |
| **Accountability** | Consistently setting challenging yet realistic targets, taking ownership of personal actions and work commitments, and holding ourselves personally accountable for achieving results |
| **Learning** | Ensuring professional and personal development of our staff in a learning organisation |
| **Service** | Consistently providing prompt and courteous service to our external and internal stakeholders |

### 6.5 Strategic outcome-oriented goals

The Council for Geoscience will adopt a new five year strategy in order to encourage sustainability of the organisation in a changing state of polity, the economy, society as well as the scientific and technological landscape. The strategic objectives and their related initiatives, which are tabled below, are intended to shift the strategic orientation of the Council for Geoscience to deliver an impactful primary mandate, as inscribed in its founding legislation.

established under the Geoscience Act (Act No. 100 of 1993) and the subsequent Geoscience Amendment Act (Act No. 16 of 2010). The organisation is constitutionally mandated in terms of sections 24 and 32 of the National Constitution to explore and promote geoscience knowledge and services within and outside of South Africa.

The Geoscience Amendment Act was signed into law by the President of South Africa in December 2010 and came into operation on 1 July 2012. Sections 4(c), 4(eA), 4(f), 5(b) and 8, that deal with

*Table A1: Strategic objectives and related initiatives of the five year strategy*

| Strategic objectives | Strategic initiatives | Main outcome |
|---|---|---|
| Delivery of the mandate | Successfully execute the multidisciplinary mapping programme and all other Council for Geoscience projects through integrated, thematic and systematic mapping and research | GEOSCIENCE INFORMATION AND SOLUTIONS ENABLING PROSPERITY FOR ALL |
| Advisory function, stakeholder engagement and knowledge management | Manage, disseminate, make accessible and advise strategic local and international stakeholders in regard to geoscientific matters including geohazard data and information | |
| An empowered, transformed, motivated and capacitated workforce | Create an attractive organisational culture through the development of and investment in an empowered, diverse, competent and transformed staff | |
| Organisational effectiveness and efficiency | Implement sound policies, processes and best practices in view of adopting and promoting international standards, sustainable governance and economic growth | |
| Financial sustainability | Drive sustainable governance and the management of funding to enable the economic growth of the organisation | |

## 7. LEGISLATIVE AND OTHER GUIDING POLICIES

In terms of the Public Finance Management Act (PFMA) (Act No. 1 of 1999), the Council for Geoscience is a listed Schedule 3A Public Entity,

the custodianship 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, are still exempted. Along with the constitutional and legislative mandates,

the Council for Geoscience is aligned with other relevant documents, as detailed below.

The mandate of the Council for Geoscience, as defined in the Acts, can be summarised under four main headings:

- **Specialised geoscientific services:** The Council for Geoscience is mandated to promote the mining and exploration of mineral resources for the benefit of South Africa. The organisation also performs investigations and various prescribed services for private and public sector stakeholders.

- **Research, development and knowledge management:** Research and technological development are part of the core mandate of the Council for Geoscience. The organisation investigates a wide range of surface and subsurface, onshore and offshore georelated issues (including, but not limited to, geology, geochemistry, geophysics, engineering geology, economic geology, geohazards and geohydrology). The Council for Geoscience performs these duties either through government funds or through collaboration with other private and public institutions, including institutions of higher education. In addition, the Council for Geoscience is the national custodian of all such information, disseminating the relevant intelligence to the necessary stakeholders. The organisation also reviews and evaluates all geotechnical information that influence infrastructure development within the country. The information obtained from research studies plays a crucial role in regard to the other functions of the organisation. Moreover, the Council for Geoscience is responsible for the management of several national geoscience facilities. These include the National Seismograph Network, the National Borehole Core Repository, the National Geoscience Heritage Collections (Geoscience Museum) and the National Geoscience Library. As part of its seismological monitoring function, the Council for Geoscience contributes to the verification of global compliance to the ban on underground, underwater and upper atmospheric nuclear explosions in terms of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), by making available the data from stations located on South African territory.

- **Advisory function:** Based on its findings from the various other functions, the Council for Geoscience is mandated to advise its primary stakeholder, the Minister of Mineral Resources, on the prospects for mining of mineral resources that would benefit South Africa. The organisation also serves as the national advisory authority, advising various local, provincial, national and international authorities on geohazard and geo-environmental-related issues.

- **Training and education:** Training and education are non-core elements of the mandate of the Council for Geoscience. As part of its duties, the Council for Geoscience cooperates with education institutions in the promotion of research, training and education of experts in the field. The organisation does this through the provision of bursaries, grants, loans and the exchange of geoscience knowledge/information.

It must be noted that, as per the Geoscience Acts, the Council for Geoscience may not:

- Engage in "mining development for itself" and

- "Undertake any research on behalf of any private institution which may favour the ability of such an institution… to acquire a mineral asset".

Details of the mandate of the Council for Geoscience are presented in the Constitution of South Africa, the Geoscience Act and the Geoscience Amendment Act.

### 7.1 Other relevant guiding policies

In realising the urgent need to address the national imperatives, the Council for Geoscience must ensure that its business model and all its activities address the following strategic national outcomes as per the National Development Plan (NDP) 2030.

- **Decent employment through inclusive economic growth:** Increase the benefits of the mineral resources to the country by delivering geoscience information and services to increase the rail, water and energy infrastructure.

- **A skilled and capable workforce to support an inclusive growth path:** Build capacity in respect of scientific, administrative and managerial/

leadership skills as well as the development of products, systems and services.

- **An efficient, competitive and responsive economic infrastructure network:** Geoscience information and services input into infrastructure development contribute to South Africa's economic development of coal, gas, electricity and water resources.

- **Vibrant, equitable and sustainable rural communities with food security for all:** Assistance by the Council for Geoscience in the development of South Africa and its people through improved infrastructure development, mining and geotourism.

- **Environmental assets and natural resources that are well protected and continually enhanced:** Conducting research regarding acid mine drainage (AMD), climate change and carbon capture and storage technologies (CCS).

- **An efficient, effective and development-oriented public service and an empowered fair and inclusive citizenship:** Development of the regulatory systems of the Council for Geoscience in line with legislative requirements and the national mandates that address gender and employment equity.

Along with the NDP, the strategy of the Council for Geoscience must be aligned with the outcome-oriented goals of the Department of Mineral Resources (DMR) as listed below:

- Increased investment in the minerals and mining sector;

- Efficient, effective and development-oriented department;

- Transformed minerals sector; increased investment in the minerals and mining sector;

- Equitable and sustainable benefits from mineral resources;

- Improved health and safety conditions.

The Council for Geoscience also recognises and is aligned with the government's Medium Term Strategic Framework (MTSF) for 2014–2019, the Stakeholders' Declaration on Strategy for the Sustainable Growth and Meaningful Transformation of South Africa's Mining Industry of the Department of Mineral Resources, and the Grand Challenges of the Department of Science and Technology (DST).

## 8. ORGANISATIONAL STRUCTURE

The organogram describes the reporting structure of the Council for Geoscience and the composition of its Board of Directors and Executive Management.

## 8.1 REPORTING STRUCTURE

**MINISTER**
**DEPARTMENT OF MINERAL RESOURCES**

**BOARD**


Dr H. Mathe
(Chairperson)
Tranter Resources
(Pty) Limited


Mr M. Mabuza
(CEO)
Council for Geoscience


Mr B. Gerryts
Department of Science
and Technology


Mr K. Koloi
Infracon


Dr J. Mahachi
University of Johannesburg


Dr M. Mayekiso
Department of
Environmental Affairs


Ms R. Mdubeki
Department of Rural
Development and
Land Reform


Mr K. Menoe
Department of Mineral
Resources


Ms D. Mochotlhi
Department of Water
and Sanitation


Mr T. Motaung
Bethlehem Magistrate
Court


Mr X. Mvinjelwa
Imerys South Africa


Mr K. Ramokgopa
KS Innovations


Mr O. Willcox
National Treasury


Mr I. Abader
(Alternate Member)
Department of
Environmental Affairs


Mr P. Nel
(Alternate Member)
Department of Water
and Sanitation


Ms P. Tsotetsi
(Alternate Member)
Department of Rural
Development and
Land Reform

**CHIEF EXECUTIVE OFFICER AND EXECUTIVE MANAGEMENT**


Mr M. Mabuza
(CEO)
Council for Geoscience


Ms T. Nxumalo
Company Secretary


Mr F. Ramagwede
Acting Chief Operations
Officer


Ms M. Kola
Acting Corporate Shared
Services Executive


Mr L. Matsepe
Chief Financial Officer

## 8.2 BOARD OF THE COUNCIL FOR GEOSCIENCE — 1 APRIL 2016 TO 28 FEBRUARY 2017

### BOARD MEMBERS

Prof. P.E. Ngoepe
(Chairperson)
University of Limpopo

Mr S.M. Sikhosana
(Acting CEO)
Council for Geoscience

Mr B.A. Gerryts
Department of Science and Technology

Prof. M.A. Hermanus
Council for Scientific and Industrial Research

Mr M. Mabuza
Department of Mineral Resources

Dr H. Mathe
Tranter Resources (Pty) Limited

Dr M. Mayekiso
Department of Environmental Affairs

Dr J.E. McGill
Anglo Platinum Limited

Ms D. Mochotlhi
Department of Water and Sanitation

Ms K.R. Mthimunye
Bluewaves Consulting Services

Mr M. Riba
Department of Rural Development and Land Reform

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 S. Mohale
(Alternate to Mr M. Mabuza)
Department of Mineral Resources

Mr P. Nel
(Alternate to Ms D. Mochotlhi)
Department of Water and Sanitation

Mr D. Sibiya
(Alternate to Dr J.E. McGill)
Tronox

# PART B: PERFORMANCE INFORMATION

The performance information provides an account of the overall performance of the Council for Geoscience. The performance management criteria and performance targets of the Council for Geoscience are discussed both from a strategic context and in terms of actual achievements as reported in the Corporate Balanced Scorecard, which has perspectives and objectives, as described below:

1. Market (stakeholder/customer) perspective:
   To drive stakeholder and customer satisfaction by the development of world-class products and services
   - To serve our stakeholders and customers
   - To effectively promote the Council for Geoscience and disseminate strategic information to the public
2. Economic/Financial growth perspective:
   To achieve sustainable revenue and profit growth
   - To generate revenue
   - To manage overhead efficiency
3. Effective systems (organisational) perspective:
   To develop and maintain effective and streamlined processes, using appropriate tools and methodologies
   - To develop and implement effective procedures
   - To drive preferential procurement
4. World-class people perspective:
   To develop a world-class geoscience organisation where our people can grow and perform optimally
   - To attract and retain workforce
   - To build a positive organisational culture
   - To reflect and embrace diversity in South Africa

Each objective is supported by activities with measures, targets and actual performance.

This performance account further details the service delivery environment of the organisation, the broad disciplines in which service delivery is provided as well as the range of clients and stakeholders the organisation serves. The programmes and projects of the organisation are outlined in the report in respect of their objectives, activities and progress.

## 1. 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 in the Report on the audit of the annual performance report and in the Report on the audit of compliance with legislation.

The Report of the Auditor-General, published as Part E: Financial Information, is contained from pages 82 to 86.

## 2. OVERVIEW OF THE PERFORMANCE OF THE COUNCIL FOR GEOSCIENCE

### 2.1 Service delivery environment

The Council for Geoscience is mandated to collect, 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 Council for Geoscience has always been reliant on commercial income to supplement the funding of its statutory activities. However, funding of statutory projects from commercial income has become unsustainable. It is thus envisaged that, in order for the Council for Geoscience to fund national projects in the future, a dedicated investment from government is required.

The statutory technical programme addresses many of the developmental needs of South Africa, as captured in the government's NDP, 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 provides for these developmental needs by releasing scientific publications, maps and articles aimed at the formal scientific and popular press in the following fields:

- **Geoscience mapping:**

The Council for Geoscience systematically gathers and documents geoscience information into in-house-maintained databases which are, in turn, used by other arenas of endeavour for their deliverables.

- **Minerals and energy development:**

The Council for Geoscience systematically collects geophysical and geochemical information on minerals and energy resources in the country. These data are researched in order to stimulate investment in the exploration and mining sector and to contribute towards the energy security of South Africa. The main source of funding for important greenfields exploration is the ECSP, a highlight of which is the regional geochemical mapping of the Pofadder 2918 sheet involving the collection and analysis of some 22 000 samples for 66 elements.

- **Environment and water:**

The Council for Geoscience advises government on the contingent environmental liabilities of the State with respect to derelict and ownerless mines in the country. It also advises the Department of Mineral Resources on the management of mine water emanating from defunct Witwatersrand goldfields and coal mines of the eastern Highveld with regard to, inter alia, water ingress and mine residue control and provides proactive solutions for mining of the Karoo Uranium Province, should this occur.

- **Engineering geoscience and physical geohazards:**

The Council for Geoscience provides advice to various entities in order to reduce the risk to lives and property from the potential effects of geohazards (e.g. sinkholes in dolomitic areas, seismicity and landslides).

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

- **Agency projects:** These projects are solicited from other government departments and public entities.

- **International projects:** These projects are mainly solicited through international tenders and have essentially advanced the country's regional integration policy to give effect to the developmental vision of the African Union.

- **Private sector:** These projects are solicited mainly from local South African companies.

- **Multinational research funding:** These projects are solicited through joint tenders with other international research institutes.

The Council for Geoscience successfully manages 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 crossing over the country;

- The national borehole core repository, which provides a comprehensive national collection of valuable geological materials;

- National geoscientific databases, of which the Council for Geoscience is the custodian;

- The national geoscience museum, which provides information to the public and preserves rare, scientifically valuable and beautiful geological heritage samples;

- The national geoscience library and bookshop, which provide both international and local geological publications and maps to the public;

- The national geoscience analytical facility, which is available for the analysis of geological samples and industrial raw materials.

## 2.2 Organisational environment

During the past year, the Council for Geoscience appointed a new Acting Chief Executive Officer and the outgoing Board handed the baton to a new Board in March 2017. In order to strengthen the governance structures of the organisation, two critical positions were filled, namely those of Company Secretary and Risk Management Officer.

In January 2017, the Board approved a new organisational structure for the Council for Geoscience in view of a new strategy formulated for adoption by the Board later in the 2017/2018 financial year.

The new business strategy is focussed on an expanded mapping programme, with all other Council for Geoscience activities integrated and coordinated around this programme. The aim of this strategy will be to map the land surface of South Africa at a greater level of detail, not only geologically, but also geophysically, geochemically and geotechnically to produce a new generation of more detailed maps to serve as a base to advise the State and various stakeholders, including the public. Marine geoscience mapping will also feature prominently, in line with the objectives of marine Operation Phakisa.

The new business strategy will phase out the Business Unusual strategy which was always intended as an interim measure. Although the Business Unusual strategy indeed yielded some positive results, for example revenue generation and the reduction of the financial rollover of funds allocated to MTEF projects, its project-style management is not able to cater for the broader administrative and personnel needs of the organisation.

The annual technical programme audit achieved a performance of 76.9%, a figure derived largely from the criteria of scientific quality and report completion. External evaluators from various universities and industry participated in the audit of the technical programme.

The Council for Geoscience is serving stakeholder interests and customer satisfaction, as can be seen in the overachievement of nearly all the targets of this category in the Corporate Balanced Scorecard, for example the number of geoscience

maps and publications produced, client satisfaction survey, the number of rural development projects completed, the number of regional and African development projects completed and the number of innovation projects completed.

The Council for Geoscience also excelled at disseminating strategic and scientific information to its stakeholders and the public by exceeding its targets for peer-reviewed articles and the number of conference proceedings. The main reasons for these achievements are the 35th IGC held in Cape Town in 2016 and the second scientific conference held by the Council for Geoscience in March 2017, which inspired staff to showcase their work to their peers and the public alike.

### 2.3 Key policy developments and legislative changes

No key policy developments have occurred in relation to the Geoscience Amendment Act (Act No. 16 of 2010) since it took effect on 1 July 2012. The Amendment Act includes a more comprehensive description of the services rendered by the Council for Geoscience, expands the mandate of the organisation and reflects its interaction with the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002), the amendment of which is still pending. With the new strategic approach, the Council for Geoscience is gearing itself towards aligning its activities with the latest developments in the MPRDA amendments, NEMA and SPLUMA.

## 3. PERFORMANCE INFORMATION

### 3.1 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 BSC 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 BSC incorporates the current performance measures under the following evaluation perspectives:

- Stakeholder and customer satisfaction; to drive stakeholder and customer satisfaction by the development of world-class products and services;
- Economic and financial 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 optimally.

Nine strategic objectives were identified in agreement with the BSC 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 serve our stakeholders and customers.
- To effectively promote the Council for Geoscience and disseminate strategic information to the public.

**B. Economic/financial growth perspective objectives**

- To generate revenue.
- To manage overhead efficiency.

**C. Effective systems (organisational) perspective objectives**

- To develop and implement effective procedures.
- To drive preferential procurement.

**D. World-class people perspective objectives**

• To attract and retain workforce.

• To build a positive organisational culture.

• To reflect and embrace diversity in South Africa.

### 3.2 Corporate performance targets of the Council for Geoscience

In order to evaluate the corporate performance of the Council for Geoscience, the organisation has developed a range of performance indicators which cover the entire spectrum of activities within the organisation. The performance indicators, together with the performance targets for the period 2016/2017, are summarised in the accompanying table on pages 21 to 24.

### 3.3 Corporate scorecard for 2016/2017

| Market (stakeholder/customer) perspective | TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD-CLASS PRODUCTS AND SERVICES | | | | |
|---|---|---|---|---|---|
| Strategic objective | 1. To serve our stakeholders and customers | | | | |
| Programme performance indicator | Actual achievement 2015/2016 | Planned target 2016/2017 | Actual achievement 2016/2017 | Deviation from planned target to actual achievement for 2016/2017 | Comment on deviations |
| Number of geoscience maps and publications published | 7 | 5 | 17 | +12 | The overachievement is due to an increased focus on the statutory programme that enhances information distribution. |
| Client satisfaction survey score | 57.8% | 60% | 84.3% | +24.3% | Target exceeded because of improved service delivery. |
| Number of rural development project reports completed | 8 | 5 | 22 | +17 | Target exceeded due to a refocus on the statutory programme and less on commercial projects. |
| Number of regional and African development project reports completed | 3 | 5 | 7 | +2 | Target exceeded due to a refocus on the statutory programme and less on commercial projects. |
| Number of innovation project reports completed | 1 | 2 | 3 | +1 | Target achieved due to a refocus on research. |
| Annual technical programme performance index | 81% | 80% | 76.9% | -3.1% | Target not met. Performance impeded by some projects not being completed. |
| Number of peer-reviewed articles published | n/a | 5 | 34 | +29 | Target overachievement is attributed to the impact of the IGC on scientists wanting to report on scientific findings. |
| Number of conference proceedings | n/a | 20 | 168 | +148 | The overachievement is ascribed to two conferences being held in the current financial year, i.e. the 35th IGC in Cape Town and the 2nd Council for Geoscience Conference in March 2017. |
| Number of projects with external collaborators | 6 | 5 | 20 | +15 | Target was exceeded due to increased collaboration with universities and international institutions. |
| Number of strategic science partnerships | 7 | 5 | 10 | +5 | Target was exceeded due to increased engagement with external partners to enhance CGS participation in multidisciplinary projects. |

| Market (stakeholder/ customer) perspective | TO DRIVE STAKEHOLDER AND CUSTOMER SATISFACTION BY THE DEVELOPMENT OF WORLD-CLASS PRODUCTS AND SERVICES *(continued)* | | | | |
|---|---|---|---|---|---|
| Strategic objective | 2. To effectively promote the Council for Geoscience and disseminate strategic information to the public | | | | |
| Programme performance indicator | Actual achievement 2015/2016 | Planned target 2016/2017 | Actual achievement 2016/2017 | Deviation from planned target to actual achievement for 2016/2017 | Comment on deviations |
| Number of media articles published | 2 | 4 | 54 | +50 | The overachievement is attributed to the use of social media and the appointment of a social media monitoring company. |
| Articles published in industry publications | 6 | 6 | 30 | +24 | The overachievement is attributed to increased aspects of public interest to report on. |

| Economic/financial growth perspective | TO ACHIEVE SUSTAINABLE REVENUE AND PROFIT GROWTH | | | | |
|---|---|---|---|---|---|
| Strategic objective | 3. To generate revenue | | | | |
| Number of audit qualifications | 0 | 0 | 0 | 0 | Unqualified audit report obtained. |
| Commercial revenue and sales (Rand) | R52m | R20m | R38.2m | +R18.2m | Target achieved. Despite a larger focus on statutory work, more commercial work was done than anticipated. |
| Grant revenue (Rand) | R340.7m | R378.6m | R390.2m | +R11.6m | The grant allocated for the year was utilised, including some deferred income from previous years. |

| Strategic objective | 4. To manage overhead efficiency | | | | |
|---|---|---|---|---|---|
| Ratio of overhead costs to total cost | 51.4% | 55% | 56.72% | +1.72% | Planned projects were not completed resulting in reduced total costs. |
| Ratio of personnel cost to total cost | 52.4% | 60% | 55.58% | -4.42% | Target achieved. This is due to an increased effort to contain personnel costs. |

| Effective systems (organisational) perspective | TO DEVELOP AND MAINTAIN EFFECTIVE AND STREAMLINED PROCESSES, USING APPROPRIATE TOOLS AND METHODOLOGIES | | | | |
|---|---|---|---|---|---|
| Strategic objective | 5. To develop and implement effective procedures | | | | |
| Programme performance indicator | Actual achievement 2015/2016 | Planned target 2016/2017 | Actual achievement 2016/2017 | Deviation from planned target to actual achievement for 2016/2017 | Comment on deviations |
| Number of policies written and/ or reviewed | 9 | 8 | 15 | +7 | Target exceeded because more policies required realignment to current practices and regulatory frameworks. |

| Strategic objective | 6. To drive preferential procurement | | | | |
|---|---|---|---|---|---|
| Preferential procurement as a percentage of total procurement | 69.7% | 60% | 73.9% | +13.9% | Target exceeded due to increased procurement from BBBEE-compliant service providers. |

| World-class people perspective | TO DEVELOP A WORLD-CLASS GEOSCIENCE ORGANISATION WHERE OUR PEOPLE CAN GROW AND PERFORM OPTIMALLY | | | | |
|---|---|---|---|---|---|
| Strategic objective | 7. To attract and retain workforce | | | | |
| Programme performance indicator | Actual achievement 2015/2016 | Planned target 2016/2017 | Actual achievement 2016/2017 | Deviation from planned target to actual achievement for 2016/2017 | Comment on deviations |
| Staff turnover | 9.7% | <10% | 0.86% | 9.14% | Overachievement is due to a conducive work environment and the unfavourable external economic environment. |
| Number of staff enrolled for MSc and PhD degrees | 36 | 40 | 42 | +2 | Target achieved due to increased expenditure on training and development. |
| Ratio of scientific staff to total staff | 36.9% | 60% | 69.41% | +9.41% | Target exceeded due to an increased focus to grow the scientific base. |
| Percentage of scientific staff with MSc and PhD degrees | 43% | 50% | 28.57% | -21.43% | Target not achieved. The Council for Geoscience is encouraging the educational development of all staff. |

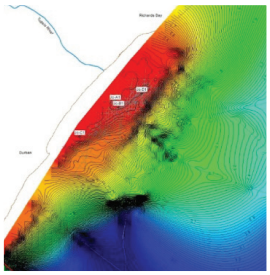
| World-class people perspective | TO DEVELOP A WORLD-CLASS GEOSCIENCE ORGANISATION WHERE OUR PEOPLE CAN GROW AND PERFORM OPTIMALLY *(continued)* | | | | |
|---|---|---|---|---|---|
| Strategic objective | 8. To build a positive organisational culture | | | | |
| Programme performance indicator | Actual achievement 2015/2016 | Planned target 2016/2017 | Actual achievement 2016/2017 | Deviation from planned target to actual achievement for 2016/2017 | Comment on deviations |
| Staff satisfaction level | 55.7% | 60% | 60% | 0 | Target achieved. |

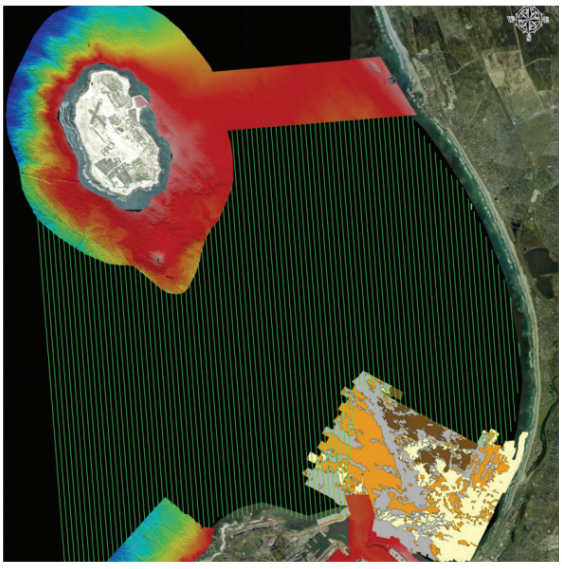
| Strategic objective | 9. To reflect and embrace diversity in South Africa | | | | |
|---|---|---|---|---|---|
| EE statistics (consolidated): W:B ratio | 26:74 | 32:68 | 24:76 | +8% | Target exceeded due to increased focus on transformation. |
| EE statistics (gender): M:F ratio | 55:45 | 56:44 | 54:46 | +2% | Target exceeded due to increased focus on transformation. |

## 4. OPERATIONAL HIGHLIGHTS

The MTEF programme of the Council for Geoscience, represented by five flagship projects, is sponsored by government through the Department of Mineral Resources. These projects focus on Karoo deep drilling, the management of derelict and ownerless (D&O) mines, mine water management, the stimulation of the minerals industry and the seismic microzonation of Johannesburg.

The Karoo deep drilling project seeks to establish a geo-environmental baseline for groundwater in view of establishing a better understanding of the prevailing environmental settings and contributing towards science-based policy and legislation governing the intended development of shale gas. The project also endeavours to provide an enhanced perspective of the geophysics and geochemistry of the Karoo. The management of D&O mines in South Africa has progressed over several subtasks. For example, database development is progressing towards a better delineation of the extent of the problems resulting from D&O mines in view of the ultimate quantification of the mine environmental liability. In addition, detailed work is carried out in respect of air quality studies aimed at mitigating the exposure of proximal communities to associated health hazards. The mine water management project continues to address the problems of acid mine drainage, with a particular focus on water ingress control into the gold and coal mines of South Africa, while making new proposals regarding mine water management to mitigate current impacts and limit future impacts. The seismic microzonation of Johannesburg and the KOSH area is nearing completion as data are being verified, analysed and incorporated into a GIS model. The promotion of exploration and investment in the minerals industry is a large multidisciplinary programme covering a countrywide range of prospective areas, such as Namaqualand, the Kheis terrane, the Karoo, the Tugela terrane, Sabie–Barberton and the alluvial diamond fields of the North West Province.





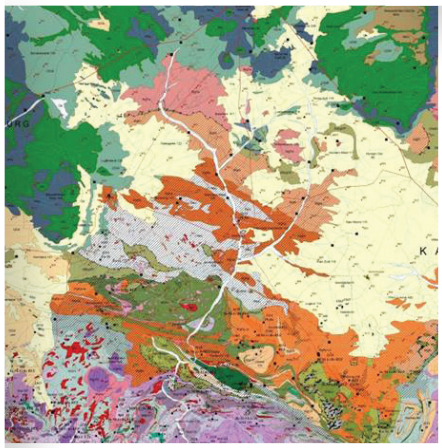


*Table B1: Status of national projects for 2016/2017*

| Item no. | Project no. | Project name | Project duration | | Status completion for work in the financial year 2016/2017 |
|---|---|---|---|---|---|
| | | | Start date | Anticipated end date | |
| 1 | ST-2016-1250 | Karoo deep drilling and geo-environmental baseline programme | August 2015 | March 2018 | 76% |
| 2 | ST-2013-1165 | Management of State contingent liabilities with respect to derelict and ownerless mines in South Africa | April 2015 | March 2018 | 84% |
| 3 | ST-2016-1251 | Mine water management programme | April 2015 | March 2020 | 94% |
| 4 | ST-2013-1163 | Stimulation of investment in the mining and mineral exploration sectors | April 2015 | March 2018 | 83% |
| 5 | ST-2015-1226 | Microzonation of Johannesburg | April 2014 | May 2017 | 97% |

## 4.1 NATIONAL PROJECTS

### *4.1.1 Karoo deep drilling and geo-environmental baseline programme (ST-2016-1250)*

The objective of this project is to determine the geo-environmental baselines that may be impacted by future exploration and exploitation. The areas of investigation include water resources, seismicity, soil, the atmosphere and other aspects of the Karoo geo-environment.

The project consists of the following tasks:

- Conducting a baseline study at regional and local scales and planning borehole activities;
- Drilling a deep vertical research borehole (down to 3 500 m);
- Undertaking down-hole logging and a borehole core study including, for example, gas content and groundwater assessments and deep water dynamics;
- Ongoing monitoring of any geo-environmental changes and the impacts of changes induced by drilling, the water dynamics and gas emanation.

Geological and structural mapping has been completed and baseline monitoring has commenced.

### *4.1.2 Management of State contingent liabilities with respect to derelict and ownerless mines in South Africa (ST-2013-1165)*

The derelict and ownerless (D&O) mines project identifies and rehabilitates derelict and ownerless mines resulting from the legacy of mining in South Africa. The tasks undertaken during the financial year under review are as follows:

- Maintaining the D&O mines database;
- Developing remedial techniques for coal mine sites affected by spontaneous combustion and subsidence;
- Monitoring dust-fall around asbestos mine dumps in the Limpopo, Mpumalanga and Northern Cape Provinces;
- Conducting hydrogeological and geotechnical studies of collieries in eMalahleni;
- Conducting hydrological investigations of asbestos mines in the Limpopo and Mpumalanga Provinces;
- Monitoring and rehabilitating asbestos mines in South Africa;

- Assessing potential opportunities for future mining at D&O sites;

- Closing and clearing D&O mine openings.

### *4.1.3 Mine water management programme (ST-2016-1251)*

The mine water management project identifies contamination of water through processes such as acid mine drainage in the gold mines of the Witwatersrand and the coal mines of the Mpumalanga and KwaZulu-Natal Provinces. The tasks undertaken during the financial year under review are as follows:

- Assessing availability of water for future mining;

- Assessing potential mining-related pollution to improve the response to water-related problems;

- Studying the impacts of current and historical mining activities;

- Identifying and implementing measures to minimise the inflow of water from the surface into the underground mines;

- Undertaking an environmental impact assessment of future offshore mining areas.

During the year under review, the following important milestones were achieved:

- Follow-up studies were undertaken on ingress areas in an important ingress zone, the outcrop zone in the East Rand goldfield.

- Identification and control of ingress points and areas.

- Engineering assessment for the reconstruction of an ingress control canal in the Van Rhyn area in Benoni.

- Identification of mining pollution hotspots in the coalfields of Mpumalanga and KwaZulu-Natal.

- Identification of vulnerable groundwater due to pollution for areas requiring specific protection from potentially polluting activities.

- Identification of optimal treatment technologies for mine water in the coalfields.

- Establishment of appropriate liners and covers for mine residue deposits.

- Investigation into the feasibility of transforming mining and mineral waste into useful products.

### *4.1.4 Stimulation of investment in the mining and mineral exploration sectors (ST-2013-1163)*

The objective of this MTEF project is to stimulate investment in exploration and mining in South Africa by gathering new high-quality geoscience data and integrating multidisciplinary geological datasets to produce mineral prospectivity maps. This is the fourth year of this MTEF project, which started in 2012/2013.

The project involves:
- Desktop studies for area selection as well as more focussed literature reviews on selected project areas in order to understand all aspects of mineralisation in support of data synthesis and interpretation;

- Acquisition of high-resolution airborne geophysical surveys (200 m line spacing) and regional and semiregional soil sampling (from 1 sample/km$^2$ to 8 samples/km$^2$);

- Data processing, interpretation, integration and the production of mineral prospectivity maps accompanied by reports.

The project areas covered in the 2016/2017 financial year include:

- Regional geochemical survey in Namaqualand, Northern Cape;

- Mapping of the alluvial diamond fields (Vaal River and Gariep River terraces);

- Regional geochemical stream sediment survey of the western part of the 2922 Prieska sheet area;

- High-resolution airborne geophysics over the

Kheis terrane and the Karoo Uranium Province;

- Regional geochemical survey of the Sabie–Barberton area, Mpumalanga;
- Sabie–Barberton goldfields structural mapping, Mpumalanga;
- Remote sensing data interpretation to identify various mineral exploration targets for areas around Sabie and the Bushveld Complex, both in the Eastern Limb and southwest of Rustenburg;
- Bushveld Complex follow-up soil sampling;
- Follow-up and verification of potential mineral targets along the Tugela terrane, KwaZulu-Natal;
- Crushed aggregate resource assessment.

This MTEF project is expected to continue into the 2017/2018 financial year with the finalisation of the various projects, data interpretation and report writing. New projects will also be identified for high-resolution airborne geophysical and soil geochemical surveys.

#### *4.1.5 Seismic microzonation of Johannesburg (ST-2015-1226)*

The termination of water pumping associated with mining in the Witwatersrand area has resulted in increased seismicity. The aim of this project is to identify seismic hazards at different locations and potential seismic hotspots to assist in the mitigation of earthquake damage within the Johannesburg and KOSH areas.

The following tasks were undertaken during the financial year under review:

- Liaison with disaster management teams and the City of Johannesburg with the aim of including the results of the project into their disaster management plans for provincial and municipal departments;
- Integration of the different disciplines into a GIS model. The risks and challenges will be documented and utilised in similar projects in the future;
- Recommendation to document and utilise the risks and challenges identified in this project.

The project has now reached the final stages of completion.

### 4.2 STATUTORY PROJECTS

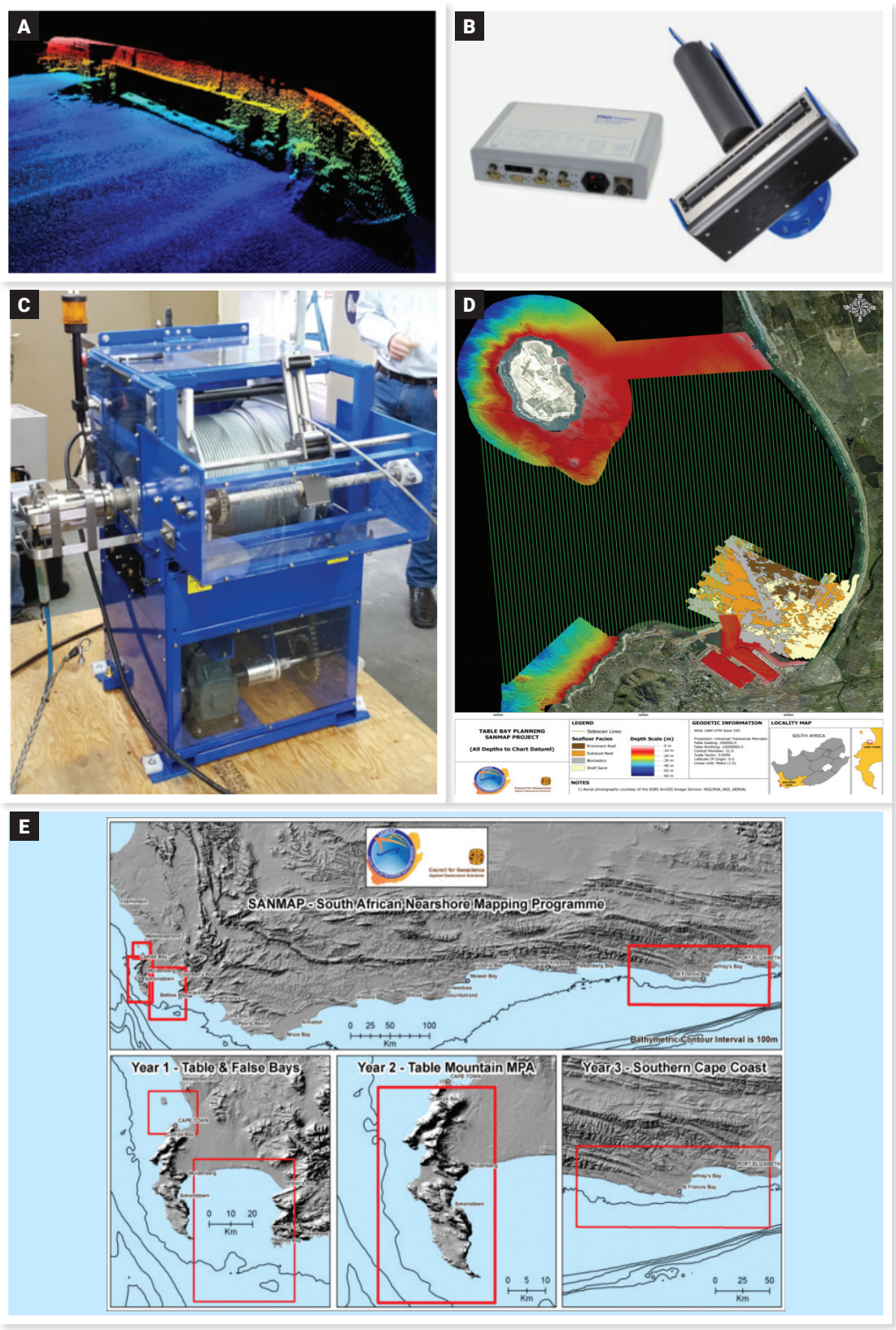
#### *4.2.1 Marine geological mapping (ST-2016-1264)*

The South African nearshore mapping programme (SANMAP) was initiated in April 2016 to determine the feasibility of an offshore mapping programme for the entire South African continental shelf. New geophysical data will be collected in Table Bay and False Bay in years 1 and 2, the Table Mountain marine protected area in year 2, while the focus will shift to the Southern Cape in year 3. SANMAP is being driven forward with a clear sense of purpose, to produce seamless onshore-offshore geological maps of the entire continental shelf of South Africa. The imperatives of the programme are linked to the mandate of the Council for Geoscience, Operation Phakisa and to global standards in marine geophysics and hydrography. SANMAP is based on six focus areas, each of which is being carefully addressed with equal priority. These include innovation in mapping, technological advancement, capacity building and training, knowledge through research, data management and ocean governance.

The rationale of the programme addresses environmental stewardship (e.g. renewable energy, hazard mitigation and climate change), sustainable resource management (both geological and biological), archaeological and historical heritage management, infrastructural development and, most importantly, cutting-edge scientific research in marine geology and coastal palaeoscience through the analysis of good-quality data.

Scientific aims for the three year period include:

- Designing a methodology for marine geoscientific data management (historical and current);
- Acquiring new marine geophysical datasets from regions of strategic interest using Council for Geoscience resources;
- Developing a high-resolution geophysical/geomorphic/palaeo-environmental database




*An example of the detail and quality of data (A) collected by the R2Sonic 2024 multibeam echosounder (B). A new survey winch was acquired for the SANMAP project (C). (D) Data used in planning the SANMAP Table Bay survey. The green lines represent planned side-scan sonar acquisition lines. (E) Selected geographic areas for the three year marine geoscience mapping programme.*

for key sections of South Africa's continental shelf, embracing technological development and innovation in the manipulation of high-resolution data;

- Generating computer models of offshore geological and palaeo-environmental settings under various climatic/sea level scenarios;

- Creating habitat maps for living marine resources to be applied in sustainable marine planning.

In the first year, 2016/2017, SANMAP has produced a total of 24 research publications, developed a new methodology in data management and commenced the first offshore marine survey in Table Bay. The marine capacity in the Council for Geoscience is being developed through the MQA internship programme and staff working on SANMAP are developing innovative ways to interpret existing marine geophysical data through experimentation and collaboration. The Council for Geoscience has become closely involved in matters pertaining to ocean stewardship and governance through Operation Phakisa, the International Seabed Authority and the second international Indian Ocean expedition and has upgraded its equipment to meet global standards in marine geophysics and hydrographic surveys.

### *4.2.2 Carbon capture and storage (CCS) technologies in South Africa (CO-2016-5798 and ST-2013-1183/CO-2014-5774)*

The Council for Geoscience and the South African Centre for Carbon Capture and Storage (SACCCS), represented by the South African National Energy Development Institute (SANEDI), have signed a service level agreement, which determines that work packages or tasks as defined by SACCCS can be added as required in future.

A typical proposal for further work was compiled between international and Council for Geoscience scientists and submitted to SANEDI for comment and finalisation. The Bongwana project is targeting a rare and natural occurrence of $CO_2$ emanating from the subsurface in southern KwaZulu-Natal. While such $CO_2$ seeps are common in volcanic regions, they are rare in sedimentary formations. The $CO_2$ release sites along the Bongwana fault and surrounds therefore represent the perfect natural analogue to a hypothetical leaky $CO_2$ injection site, in which soil gas and atmospheric as well as geological monitoring can be undertaken.

Another project involved the setting up of an inventory of all available data at the Council for Geoscience and PASA. The database and a final report were submitted to SANEDI. Other ongoing projects for SANEDI include a seismic and core reappraisal of the Zululand Basin and the assessment of the $CO_2$ storage capacity of the Mesozoic succession of the Durban Basin, off the KwaZulu-Natal coast.

### *4.2.3 Uranium research studies in the Springbok Flats Basin, South Africa (ST-2013-1182)*

This project aims to investigate the nature of uranium mineralisation, including distribution, concentration, form and origin, and to determine whether the Springbok Flats Coalfield hosts economically extractable quantities and qualities of uranium and coal. The information gathered from this project will contribute to the achievement of the objectives of the South African Government Beneficiation Strategy of 2011.

The project is progressing well and it is currently in the write-up phase. Data analyses using different techniques (e.g. XRD, XRF, SEM-EDS and PIXE) have been completed. Detrital zircon analyses using LA-ICP-MS have been done. Data reduction of detrital zircons has started and should be completed in the next financial year. Results on uranium occurrences and distribution in the upper coal zones of the Vryheid Formation and the mudstones of the Volksrust Formation were published in a peer-reviewed journal.

### *4.2.4 Reassessment of source parameters of major South African earthquakes ($M_L \geq 5.0$)(ST-2017-1266)*

The aim of this project is to identify and reassess the source parameters (i.e. location, depth and magnitude) of earthquakes of a magnitude greater than or equal to 5.0 that previously occurred in

South Africa. The purpose behind this initiative is to try to improve the source parameters for these large earthquakes as it has previously been observed that some of them have poor solutions. This is necessary given the high impact of such earthquakes on the seismic hazard of the country. A total of 147 earthquakes were identified by scrutinising the databases of the Council for Geoscience and the International Seismological Centre (ISC). Of these, 117 earthquakes had phase data which enabled their relocation. Thirty events did not have phase data and it is likely that their original source parameters had been determined using intensity data. The accuracy of the relocations was determined by producing and analysing error data and the number and distribution of stations that had contributed data to the assessment. This information showed improved locations for most of the new results.

To further improve the earthquake catalogue, it is necessary to extend the record of earthquakes further into history using all available historical information. Significant amounts of these historical data are currently being collected. It is anticipated that the data will be used in the reassessment of the observed large events as well as in the determination of source parameters of historical events that are currently not included in the Council for Geoscience database.

### *4.2.5 South African National Seismograph Network (ST-2002-0184)*

The South African National Seismograph Network (SANSN) provides seismological data that are processed and analysed to obtain epicentral information on tectonic earthquakes as well as other seismic sources such as explosions and induced seismicity. This information is disseminated to stakeholders, both nationally and internationally, through the Council for Geoscience website and published reports.

A total of approximately 5 100 seismic disturbances were investigated during 2016 of which 750 were attributed to a tectonic origin, with 260 located in South Africa, 690 resulting from explosions and 245 associated with earthquakes of a distant origin. The largest earthquake in South Africa during the year under review occurred on 18 August on the Lesotho–Eastern Cape border measuring 4.1 on the local magnitude scale. An earthquake of $M_L$~3.8 that occurred offshore of Durban was jointly investigated by the Council for Geoscience and the University of KwaZulu-Natal. An earthquake of $M_L$~5.7 in the Lake Victoria region, Uganda, on 10 September was the largest earthquake on the African continent during the year.

### *4.2.6 The establishment of geophysical test sites, provision of training and geophysical equipment and asset management (ST-2016-1263)*

In terms of the Geoscience Amendment Act, the Council for Geoscience should make provision for a geophysical test site. A test site is an integral part of and provides the foundation for in-house training and equipment maintenance. The aim of the geophysical test site is to have a national facility to calibrate field equipment for quality control purposes, a field area to train staff in various geophysical techniques so that they are able to evaluate their observations and measurements against previous results and a facility to appropriately store and maintain equipment.

Two sites have been identified; one at Rietvlei Dam (Tshwane Municipality) and another at Roodeplaat Dam (Gauteng Provincial Government), while a geohazard site at Donkerhoek has been partially developed. Staff and university students are receiving the required training in equipment handling, software use and general project management.

Negotiations are taking place between the Council for Geoscience, the University of the Witwatersrand, the Tshwane University of Technology and private companies regarding the establishment of an airborne geophysical test site at the Vredefort Dome.

### *4.2.7 New 1:1 000 000-scale geology map of South Africa (ST-2013-1179)*

The project comprises the revision and recompilation of a new version of the

1:1 000 000-scale geology map of South Africa, Lesotho and Swaziland. The project started as a consultation to incorporate the most recent thinking on lithostratigraphic subdivisions in southern Africa. This was followed by data acquisition and auditing involving the various 1:250 000-scale maps, an exercise which evolved into the compilation of the new map edition, and which has now largely become a GIS exercise, with related quality control by the project manager and other specialists.

The activities remaining for the finalisation of this project include some minor cartographic adjustments, adding some additional fault, dyke and point data according to the latest available geochronological, petrological and structural protocols, the finalisation of the legend and editorial checking.

#### *4.2.8 Council for Geoscience field school (ST-2006-0899)*

The 2016 field school was held in November 2016 for nine trainees (two young staff members and seven MQA interns). Prior to the field school, the participants had attended in-house ground geophysics and GIS courses to afford them a well-rounded introduction to field mapping and the production of a field geological map.

The participants were exposed to classical South African geology in the area of the Barberton Greenstone Belt and to spectacular outcrops along traverses such as the classic Komati River section. They examined critical contacts including the magmatic breccia contact between the Theespruit ultramafic rocks which are approximately 3 510 Ma old and the Theespruit pluton which is 3 450 Ma old. The group worked their way through aspects of the Pongola Supergroup rocks that include some of the earliest volcanosedimentary units atop a stable continental platform. Thereafter, the Karoo rocks were studied, starting with a study of the deltaic sequence of the coal-bearing Vryheid Formation and Dwyka tillite overlying the Mozaan Quartzite of the Pongola Supergroup. The participants were introduced to the main Karoo Basin by way of the Drakensberg lavas and mostly desert-dune deposits of the Clarens Formation at Golden Gate.

At this point, four students and their lecturer from Akita University in Japan joined the group. For these students, this encounter afforded them exposure to the world-class geology that South Africa offers and the Council for Geoscience was given an opportunity to benchmark its field training. Time was spent crossing the upper parts of the Beaufort Group and discussing the Permo–Triassic boundary, an international geological hot topic.

As has been the case for the last few years, the main mapping training took place in the remote Richtersveld, within the local community conservation area. Traverses across the mapped areas revealed the continuous repetition of the Gariep sequence, which necessitated the mappers to consider the tectonic history of this region in detail.

The trainees presented their reports, maps and geological cross-sections at the group feedback session in March 2017.

### 4.3 INTERNATIONAL PROJECTS

#### *4.3.1 Transfrontier geology mapping and research projects: South Africa and Namibia (FR-2016-5788, FR-2017-5805)*

For the past three years, the Council for Geoscience has been undertaking mapping and research projects on the complex Precambrian basement rocks of southern Namibia under contract for the Geological Survey of Namibia (GSN). The main aim of these projects has been to develop a unified lithostratigraphy and tectonostratigraphy across the South Africa–Namibia border in order to better understand the rock units and structures controlling mineralisation in the region, specifically deposits of Cu, Pb, Zn, U, Ta, Nb, REE, Li and W. Whilst the main application of the maps and reports is to provide base geological information to economic geologists,

the data may also be used to search for water and to provide information for infrastructure development (e.g. solar-powered farms, pipelines, roads and bridges).

The project includes extensive fieldwork in the rugged and remote mountain desert along the lower Orange River and has thus far delivered new 1:50 000-scale geological maps and geological explanations covering an area of over 25 000 km$^2$. The geological mapping is supported by U-Pb geochronology, Sm-Nd and Rb-Sr isotope geochemistry, whole-rock major, trace and REE geochemistry and structural investigations. Based on the mapping and research datasets, a modified geodynamic model for the central/ western Namaqua Metamorphic Province has been proposed.

In addition to the scientific work, the project has allocated significant resources to transfer mapping and research skills to GSN geologists. The training has progressed from office-based short course modules to basic field skills modules to joint CGS-GSN field mapping campaigns and geological mapping with supervision. The project has also involved several collaborators from the Universities of Stellenbosch, Cape Town, McGill (Canada) and Curtin (Australia).

The deliverables for the initial project include geological maps, databases and reports to the GSN. This project continues with two main objectives, the compilation of the 1:250 000-scale geological map 2818 Warmbad, a task that is nearing completion, and the geophysical interpretation of the 2818 Warmbad sheet. The aim of the follow-up project is to map and research the Huns Mountains between Ai-Ais and Rosh Pinah and the Port Nolloth zone of the Gariep Belt between April 2016 and March 2018. The projects are well on track in terms of the production of the geological maps and the research outputs.

### *4.3.2 Hydrogeological and water quality mapping consultancy in the Shire River Basin (FR-2015-5776)*

The Ministry of Agriculture, Irrigation and Water Development of Malawi (MAIWD), through Phase 1 of the Shire Basin management programme, is undertaking hydrogeological and water quality mapping of the Shire River Basin. The service is being carried out by a consortium consisting of the Council for Geoscience and PBM Consultants, in Malawi. The duration of the project is 16 months.

The objective of this study is to map groundwater aquifers in the Shire Basin and to determine the water quality parameters of the aquifers to improve the understanding of groundwater occurrence and quality for informed water resource planning, management and development. In addition to the production of hydrogeological and water quality maps, the consultancy service focusses on optimising the existing national groundwater monitoring network and building and simulating numerical groundwater models. Training and capacity building in the application of GIS coding for the production of hydrogeological and water quality maps and on groundwater modelling form part of the deliverables of the project.

### *4.3.3 Geological mapping and mineral assessment of Malawi (GEMMAP) (FR-2017-5811)*

The French government-funded project, Geological Mapping and Mineral Assessment of Malawi (GEMMAP), was won by tender in 2016 by a consortium led by the Bureau de Recherches Géologiques et Minières (BRGM) of France, the Council for Geoscience and the Geological Survey of Finland (GTK). The main objective of the project is to produce new geological maps of the Republic of Malawi for the Geological Survey Department (GSD) of Malawi, an organ of the Ministry of Natural Resources, Energy and Mining (MNREM).

The GEMMAP project will run for 4.5 years until the end of 2020. Involvement in the project by the Council for Geoscience started in October 2016 with the compilation of the inception report, submitted in March 2017, and the commencement of training.

In addition to the production of geological maps of the entire Malawi, the project also includes modules of mineral potential assessment, geohazard mapping, an assessment of the small-scale and artisanal mining sector and a GIS database.

An important component of GEMMAP is the training programme based on field studies, supervised by the geoscientists of the consortium, and short-term training on specific topics.

#### *4.3.4 Comprehensive Nuclear-Test-Ban Treaty (CO-2006-5606, CO-2006-5620)*

The Council for Geoscience operates and maintains the South African primary seismic (PS) and infrasound (IS) stations that form part of the international monitoring system (IMS). In addition, the Council for Geoscience is involved in the operation and maintenance of one of the auxiliary seismic stations at the South African Antarctic base and assists with another auxiliary station at Sutherland.

The infrasound IS47 and primary seismic PS39 stations, situated on the farm Magdalena's Rust 8 km south of the Free State town of Boshof, performed at an uptime of more than 98%. Both stations were certified as being 100% mission capable for the year under review. The American Air Force Technical Application Centre (AFTAC) and the Council for Geoscience simultaneously monitor the station. AFTAC confirmed that the station had continued to perform according to the requirements of the Preparatory Technical Secretariat of the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO).

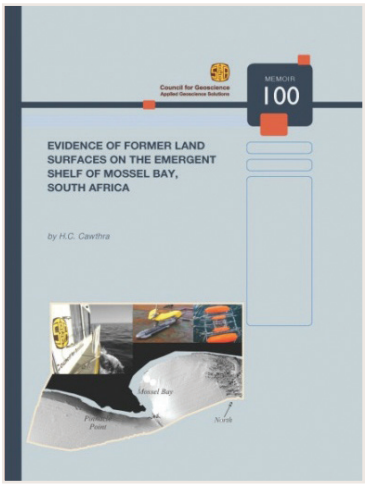
## 5. DISSEMINATION OF INFORMATION

The Council for Geoscience disseminates the results of its research to its stakeholders in a publication series including memoirs, bulletins, popular geoscience, explanations, annual reports, newsletters and maps. The organisation co-hosted the 35th International Geological Congress in Cape Town which was attended by some 4 000 delegates. The Council for Geoscience Annual Conference 2017 was held on 2 and 3 March 2017. Participation in both these events resulted in an increased number of papers being published.

### 5.1 Publications

#### *5.1.1 Memoirs*

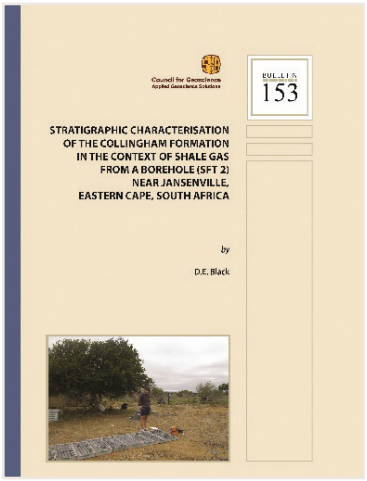
1. **Memoir 100**: Evidence of former land surfaces on the emergent shelf of Mossel Bay, South Africa by H.C. Cawthra




#### *5.1.2 Bulletins*

2. **Bulletin 152:** Exploring relationships between geological structures delineated from high-resolution geophysical data by M. Havenga

3. **Bulletin 153:** Stratigraphic characterisation of the Collingham Formation in the context of shale gas from a borehole (SFT 2) near Jansenville, Eastern Cape, South Africa by D.E. Black



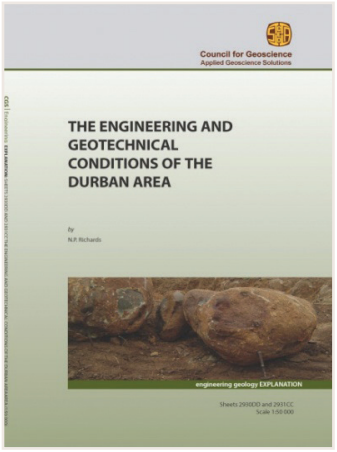
4. **Bulletin 154:** Phytoremediation application for the extraction of lead contaminants in acid mine drainage contaminated soil by S. Lekoadu

### *5.1.3 Popular Geoscience Series*

5. **Popular Geoscience Series 6:** Microminerals of the Bushveld Complex, South Africa by Maria T. Atanasova, Bruce Cairncross and Wolfgang R. Windisch

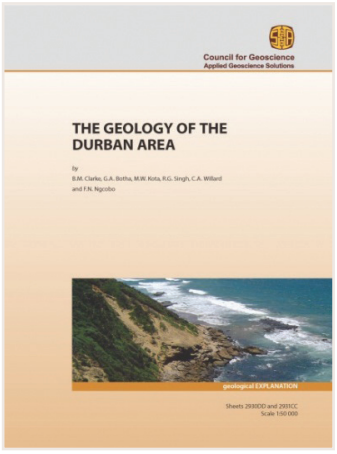

### *5.1.4 Explanations*

6. **Engineering Geology Explanation:** Sheets 2930DD and 2931CC, Scale 1:50 000. The engineering and geotechnical conditions of the Durban area by N.P. Richards (map on CD)




7. **Geology Explanation:** Sheet 3318DD, Scale 1:50 000. The geology of the Stellenbosch area by J.H.A. Viljoen (map on CD)

8. **Geology Explanation:** Sheets 2930DD and 2931CC, Scale: 1:50 000. The geology of the Durban area by B.M. Clarke, G.A. Botha, M.W. Kota, R.G. Singh, C.A. Willard and F.N. Ngcobo (map on CD)




### *5.1.5 Annual Reports*

9. Annual Report of the Council for Geoscience 2016

### *5.1.6 Newsletters*

10. GEOclips Newsletter, Volume 45, June 2016

11. GEOclips Newsletter, Volume 46, September 2016

12. GEOclips Newsletter, Volume 47, December 2016

13. GEOclips Newsletter, Volume 48, March 2017


### *5.1.7 Others*

14. Abstract Book, Council for Geoscience Annual Conference 2017, Geoscience for a changing world, compiled by M. Cloete and Z.E. Nel

### *5.1.8 Maps*

#### *1:50 000 Geotechnical series*

15. 2930DD & 2931CC Durban

#### *1:50 000 Geological series*

16. 3318DD Stellenbosch
17. 2930DD & 2931CC Durban

## 5.2 Articles published in academic journals and books

*(Council for Geoscience staff are indicated in bold)*

1. Archibald, D.B., Collins, A.S., Foden, J.D., Payne, J.L., Holden, P., Razakamanana, T., De Waele, B., **Thomas, R.J.** and Pitfield, P.E.J., 2016. Genesis of the Tonian Imorona–Itsindro magmatic Suite in central Madagascar: Insights from U–Pb, oxygen and hafnium isotopes in zircon. Precambrian Research, 281, pp. 312–337, http://dx.doi.org/10.1016/j.precamres.2016.05.014

2. Baughman, J.S., Flowers, R.M., Metcalf, J.R. and **Dhansay, T.**, 2017. Influence of radiation damage on titanite He diffusion kinetics. Geochimica et Cosmochimica Acta, 205, pp. 50–64, http://dx.doi.org/10.1016/j.gca.2017.01.049

3. **Botha, G.A.** and Grab, S., 2016. Evolution of the Ukhahlamba-Drakensberg; 200 million years of fire and ice. Africa's Top Geological Sites, Penguin Random House South Africa, pp. 74–78, ISBN: 9781775844488

4. **Botha, G.A.**, Armitage, S. and Duller, G., 2016. The Bazaruto Island archipelago, Moçambique. Africa's Top Geological Sites, Penguin Random House South Africa, pp. 275–278, ISBN: 9781775844488

5. **Botha, G.A.**, Temme, A.J.A.M. and **Singh, R.G.**, 2016. Colluvial deposits and slope instability. In: Knight, J.K. and Grab, S.W. (Eds), Quaternary Environmental Change in Southern Africa: Physical and Human Dimensions. Cambridge University Press, pp. 137–152, ISBN: 9781316572900

6. **Browning, C.** and Penn-Clarke, C.R., 2016. Lithostratigraphy of the Floriskraal Formation (Witteberg Group), South Africa. South African Journal of Geology, 119.2, pp. 425–434, doi: 10.2113/gssajg.119.2.425

7. **Cawthra, H.C.** and Bateman, M.D., 2016. Sandy coasts. In: Knight, J.K. and Grab, S.W. (Eds), Quaternary Environmental Change in Southern Africa: Physical and Human Dimensions. Cambridge University Press, pp. 203–218, ISBN: 9781316572900

8. **Chiliza, S.G.** and Hingston, E.D.C., 2017. Back analysis of an ancient rockslide at Lake Fundudzi, Limpopo Province, South Africa. Bulletin, Engineering Geology and the Environment, doi: 10.1007/s10064-016-1001-4

9. **Cole, D.I.**, Johnson, M.R. and Day, M.O., 2016. Lithostratigraphy of the Abrahamskraal Formation (Karoo Supergroup), South Africa. South African Journal of Geology, 119.2, pp. 415–424, doi: 10.2113/gssajg.119.2.415

10. **De Beer, C.H.** and **Macey, P.H.**, 2016. Lithostratigraphy of the Mesoproterozoic Kliphoek Granite. South African Journal of Geology, 119(4), pp. 705–712, doi: 10.2113/gssajg.119.4.705

11. **De Beer, C.H.** and **Macey, P.H.**, 2016. Lithostratigraphy of the Mesoproterozoic Garies Granite. South African Journal of Geology, 119(4), pp. 699–704, doi: 10.2113/gssajg.119.4.699

12. **Doucet, F.J.**, **Mohamed, S.**, Neyt, N., Castleman, B.A. and Van der Merwe, E.M., 2016. Thermochemical processing of a South African ultrafine coal fly ash using ammonium sulphate as extracting agent for aluminium extraction. Hydrometallurgy, 166, pp. 174–184, http://dx.doi.org/10.1016/j.hydromet.2016.07.017

13. Durrheim, R., Doucouré, M. and **Midzi, V.**, 2016. Earthquakes. In: Scholes, R., Lochner, P., Schreiner, G., Snyman-Van der Walt, L. and De Jager, M. (Eds). 2016. Shale gas development in the Central Karoo: A scientific assessment of the opportunities and risks. Council for Scientific and Industrial Research, Pretoria, CSIR/IU/021MH/EXP/2016/003/A, ISBN: 978-0-7988-5631-7

14. Evans, D.M., **Hunt, J.P.** and Simmonds, J.R., 2016. An overview of nickel in Africa with emphasis on the Mesoproterozoic East African Nickel Belt (EANB). Episodes, Journal of International Geoscience, 39(2), 35th IGC Special Publication, doi: 10.18814/epiiugs/2016/v39i2/95780

15. Gabbott, S.E., **Browning, C.**, Theron, J.N. and Whittle, R.J., 2016. The late Ordovician Soom Shale Lagerstätte: an extraordinary post-glacial fossil and sedimentary record. Journal of the Geological Society (London), 174, pp. 1–9, doi: 10.1144/jgs2016-076

16. **Hicks, N.** and Green, A., 2016. Sedimentology and depositional architecture of a submarine delta-fan complex in the Durban Basin, South Africa. Marine and Petroleum Geology, 78, pp. 390–404, http://dx.doi.org/10.1016/marpetgeo.2016.09.032

17. Hobbs, P., Day, E., Rosewarne, P., Esterhuyse, S., Schulze, R., Day, J., Ewart-Smith, J., Kemp, M., Rivers-Moore, N., **Coetzee, H.**, Hohne, D., Maherry, A. and **Mosetsho, M.**, 2016. Water Resources. In: Scholes, R., Lochner, P., Schreiner, G., Snyman-Van der Walt, L. and De Jager, M. (Eds). 2016. Shale gas development in the Central Karoo: A scientific assessment of the opportunities and risks. Council for Scientific and Industrial Research, Pretoria, CSIR/IU/021MH/EXP/2016/003/A, ISBN: 978-0-7988-5631-7

18. **Kenan, A.O.** and **Chirenje, E.**, 2016. Uranium in South Africa: Exploration and Supply Capacity. Natural Resources and Conservation, 4, pp. 25–33, doi: 10.13189/nrc.2016.040201

19. **Lambert, C.W.**, **Macey, P.H.**, **Doggart, S.**, Nethenzheni, S.S. and Bailie, R.H., 2016. Lithostratigraphy of the Friersdale Charnockite (Keimoes Suite), South Africa. South African Journal of Geology, 119(4), pp. 691–698, doi: 10.2113/gssajg.119.4.691

20. **Macey, P.H.**, **Thomas, R.J.**, **Minnaar, H.M.**, **Gresse, P.G.**, **Lambert, C.W.**, **Groenewald, C.A.**, Miller, J.A., Indongo, J.I., Angombe, M., Shifotoka, G., Frei, D., Diener, J.F.A., Kisters, A.F.M., **Dhansay, T.**, **Smith, H.**, **Doggart, S.**, Le Roux, P., Hartnady, M.I. and Tinguely, C., 2017. Origin and evolution of the ~1.9 Ga Richtersveld Magmatic Arc, SW Africa. Precambrian Research, 292, pp. 417–451, http://dx.doi.org/10.1016/j.precamres.2017.01.013

21. Meghraoui, M., Amponsah, P., Ayadi, A., Ayele, A., Ateba, B., Bensuleman, A., Delvaux, D., El Gabry, M., Fernandes, R., **Midzi, V.**, **Roos, M.** and Timoulali, Y., 2016. Seismotectonic Map of Africa, Scale 1:10 000 000. Commission for the Geological Map of the World, 1st Edition 2016, http://ccgm.org/en/29-afrique

22. **Moabi, N.G.**, Grantham, G.H., Roberts, J. and Le Roux, P., 2017. The geology and geochemistry of the Straumsnutane Formation, Straumsnutane, western Dronning Maud Land, Antarctica and its tectonic setting on the western margin of the Kalahari Craton: additional evidence linking it to the Umkondo Large Igneous Province. In: Pant, N.C. and Dasgupta, S. (Eds), Crustal Evolution of India and Antarctica: The Supercontinent Connection. Special Publications, Geological Society, London, 457, https://doi.org/10.1144/SP457.4

23. **Moja, S.J.**, **Kwata, M.G.**, **Sebesho, L.M.**, Masindi, K.G. and Mtunzi, F., 2016. Characterization of surface and trapped dust samples collected around human settlements that are in the vicinity of old mine tailings in Mpumalanga Province, South Africa. Journal of Earth Science & Climate Change, 7(7), doi: 10.4172/2157-7617.1000360

24. **Moja, S.J.**, Molepo, M.E. and Chadi, G.M., 2016. A review of the environmental authorization followed during the construction of Eskom's Kusile and Medupi Power Stations, South Africa. Journal of Remote Sensing & GIS, 5(4), doi: 10.4175/2469-4134.1000176

25. **Munyangane, P.**, Mouri, H. and Kramers, J. 2016. Assessment of some potential harmful trace elements (PHTEs) in the borehole water of Greater Giyani, Limpopo Province, South Africa: possible implications for human health. Environmental Geochemistry and Health, doi: 10.1007/s10653-016-9887-0

26. Muriithi, G.N., Petrik, L.F., Gitari, W.M. and **Doucet, F.J.**, 2017. Synthesis and characterization of hydrotalcite from South African coal fly ash. Powder Technology, 312, pp. 299–309, http://dx.doi.org/10.1016/j.powtec.2017.02.018

27. **Mutele, L.**, **Billay, A.** and **Hunt, J.P.**, 2017. Knowledge driven prospectivity mapping for granite-related polymetallic Sn–F–(REE) mineralization, Bushveld Igneous Complex, South Africa. Natural Resources Research, pp. 1–18, doi: 10.1007/s11053-017-9325-8

28. **Neveling, J.**, Gastaldo, R.A., Kamo, S.L., Geissman, J.W., Looy, C.V. and Bamford, M.K., 2016. A review of stratigraphic, geochemical, and paleontologic data of the terrestrial end-Permian record in the Karoo Basin, South Africa. In: Linol, B. and De Wit, M.J. (Eds), Origin and Evolution of the Cape Mountains and Karoo Basin. Springer International Publishing Switzerland, ISBN: 978-3-319-40858-3

29. **Nxumalo, V.**, Kramers, J., Mongwaketsi, N. and Przybyłowicz, W.J., 2016. Micro-PIXE characterisation of uranium occurrence in the coal zones and the mudstones of the Springbok Flats Basin, South Africa. Nuclear Instruments and Methods in Physical Research, http://dx.doi.org/10.1016/j.nimb.2016.10.034

30. **Oosterhuis, R.**, 2016. Mines and mineral resources of Sub-Saharan Africa. Mining Review Africa, Mines and Mineral Resources, Issue 4, April 2016.

31. **Oosterhuis, R.**, 2016. Mineral resources of Western Africa map. Mining Review Africa, Mines and Mineral Resources, Issue 7, July 2016.

32. **Oosterhuis, R.**, 2016. Mineral Resources of SADC map. Mining Review Africa, Mines and Mineral Resources, Issue 9, September 2016.

33. **Roberts, D.L.**, Neumann, F.H., **Cawthra, H.C.**, Carr, A.S., Scott, L., Durugbo, E.U., Humphries, M.S., Cowling, R.M., Bamford, M.K., **Musekiwa, C.** and **MacHutchon, M.R.**, 2016. Palaeo-environments during a terminal Oligocene to early Miocene transgression in a fluvial system at the southwestern tip of Africa. Global and Planetary Change, 150, pp. 1–23, http://dx.doi.org/10.1016/j.gloplacha.2017.01.007

34. **Thomas, R.J.**, **Macey, P.H.**, Spencer, C., **Dhansay, T.**, Diener, J.F.A., **Lambert, C.W.**, Frei, D. and Nguno, A., 2016. The Sperrgebiet Domain, Aurus Mountains, SW Namibia: a ~2020–850 Ma window within the Pan-African Gariep Orogen. Precambrian Research, 286, pp. 35–58, http://dx.doi.org/10.1016/j.precamres.2016.09.023

## 5.3 Conference abstracts and posters

1. Angombe, M., **Macey, P.H.**, Miller, J.A. and **Lambert, C.W.**, 2016. The lithostratigraphy and structural components of the Eureka Shear Zone, southern Namibia. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

2. **Baglow, N.** and **Dhansay, T.**, 2016. Training field mapping geologists; the Council for Geoscience field school experience. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

3. **Bensid, M.**, Strauss, S.W. and **Billay, A.Y.**, 2016. Geochemical mapping of the Tugela Terrane, KwaZulu-Natal, South Africa: semi-regional soil survey. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

4. Bierman, P.R., Coppersmith, R., Hanson, K. and **Neveling, J.**, 2016. Cosmogenically dated marine terraces in South Africa reveal low long-term rates of uplift and no evidence for localized faulting. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

5. Bierman, P.R., Coppersmith, R., Hanson, K., Rood, D.H., Portenga, E. and **Neveling, J.**, 2016. Cosmogenic $^{10}Be$ and $^{26}Al$ dating of ancient surfaces and recent fault scarps in south central South Africa — indications of both fault motion and stability in a stable continental region. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

6. **Black, D.E.**, 2017. The lithological, geochemical and petrological characterisation of the Collingham Formation, from a borehole (SFT 2) near Jansenville, Eastern Cape, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

7. **Black, D.E.**, Booth, P.W.K. and De Wit, M.J., 2016. Petrographic, geochemical and petro-physical analysis of the Collingham Formation near Jansenville, Eastern Cape, South Africa — potential cap rocks to shale gas in the Karoo. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

8. Bond, C.E., Johnson, G., **Hicks, N.**, Kremer, Y., Gilfillan, S., Jones, D., Lister, R., Maupa, T., **Munyangane, P.**, **Robey, K.**, **Saunders, I.**, Shipton, Z., Pearce, J. and Haszeldine, S., 2016. Fracture controlled $CO_2$ gas migration at the Bongwana Natural $CO_2$ Release Site, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

9. **Bosch, P.J.A.**, 2016. Ten geological superlatives of South Africa in a special issue of postage stamps to celebrate the 35th International Geological Congress at Cape Town, 2016. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

10. **Bosch, P.J.A.**, 2017. The importance of Dwyka Group glaciation with regard to alluvial diamond transportation, concentration and entrapment in South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

11. **Botha, G.A.** and Porat, N., 2016. Coastal geomorphological processes shaped the iSimangaliso World Heritage Site. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

12. **Browning, C.B.**, 2017. Soom Shale framboids — how oxygenated was the sea floor during late Ordovician postglacial sedimentation of the Cape Basin? Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

13. **Browning, C.B.**, Gabbott, S.E., Zalasiewicz, J. and Theron, J.N., 2016. A record of sedimentation of the Late Ordovician Soom Shale Member (Cedarberg Formation) from new borehole data in the Cedarberg region of South Africa. 19th Biennial Meeting of the Palaeontological Society of Southern Africa (PSSA), Stellenbosch, South Africa, 4–9 July 2016.

14. **Browning, C.B.**, Gabbott, S.E., Zalasiewicz, J. and Theron, J.N., 2016. A record of sedimentation of the Late Ordovician Soom Shale Member (Cedarberg Formation) from new borehole data in the Cedarberg region of South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

15. **Buthelezi, M.**, 2017. Geophysical applications in the Tugela Terrane and implications for chromite exploration. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

16. **Cawthra, H.C.**, 2017. Reconstructing submerged landscapes — clues from the continental shelf. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

17. **Cawthra, H.C.** and Makgae, M., 2017. Future direction of marine geoscience at the Council for Geoscience. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

18. **Cawthra, H.C.**, Compton, J.S., Fisher, E.C., Jacobs, Z., Karkanas, P. and Marean, C.W., 2016. An onshore–offshore record of sedimentation and shoreline shift through two glacial–interglacial cycles. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

19. **Cawthra, H.C.**, Cowling, R.M. and Marean, C.W., 2016. Evidence for former land surfaces on the emergent South Coast shelf, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

20. **Cawthra, H.C.**, Fisher, E.C. and Jacobs, Z., 2016. The influence of coastal and marine geology on archaeological occupation in Pondoland: the South African Wild Coast. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

21. **Cawthra, H.C.**, Hahn, A., Ando, S., Frenzel, P., Gander, L., Schefuss, E. and Zabel, M., 2016. Terrestrial Quaternary sediments preserved on the South African shelf shed light on the glacial palaeo-environment. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

22. **Chevallier, L.**, **Malumbazo, N.** and **Cole, D.**, 2016. Deep stratigraphic borehole for shale gas geo-environmental baseline research in the Karoo. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

23. **Chiliza, S.G.**, **Nxumalo, N.J.** and **Msane, B.**, 2016. Engineering geological and geotechnical mapping undertaken by the Council for Geoscience for regional land-use planning in South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

24. **Chiliza, S.G.**, **Tegegn, K.T.**, Zungu, N., **Nxumalo, N.J.** and **Rikhotso, J.**, 2016. A case study determining the stability of land affected by shallow undermining for urban development in Old Coronation, Witbank coalfield area. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

25. **Chirenje, E.**, **Sakala, E.**, **Sethobya, R.M.** and Tshikhovhokhovho, T., 2016. Optimizing the exploration of hydrothermally enriched calcium carbonate bearing faults using geophysical methods: Implications to resource estimation. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

26. Churchill, A.N., Gastaldo, R.A. and **Neveling, J.**, 2016. Geochemistry of Palingkloof siltstones near the vertebrate-defined PTB at Tweefontein, South Africa. Geological Society of America Annual Meeting, Denver, Colorado, 25–28 September 2016.

27. **Cichowicz, A.**, 2016. Seismicity induced by mine flooding. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

28. **Claassen, D.** and **Bosch, P.**, 2017. The preservation of alluvial diamond deposits along the lower Vaal

and middle Orange Rivers, Northern Cape. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

29. **Claassen, D.** and De Wit, M.J., 2016. A site specific geological risk assessment of the proposed location of South Africa's second nuclear power plant, Thyspunt, Eastern Cape. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

30. **Cloete, C.**, 2017. PANalytical Zetium — a new X-ray fluorescence spectrometer at the Council for Geoscience laboratory. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

31. **Coetzee, H.**, 2016. Management of water levels in the flooded mines of the Witwatersrand, South Africa. International Mine Water Association (IMWA) Symposium, Leipzig, Germany, 11–15 July 2016.

32. **Coetzee, H.**, 2016. Sustainable options to manage acid mine drainage in the Witwatersrand gold fields. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

33. **Coetzee, H.**, 2017. Identifying appropriate spatial and temporal resolution for environmental investigations — case study from the East Rand goldfield. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

34. Colarossi, D., Duller, G.A.T., Roberts, H.M., Tooth, S. and **Botha, G.A.**, 2016. Single grain quartz and feldspar ages for a key late Quaternary terrestrial archive: Voordrag, KwaZulu-Natal, South Africa. UK Luminescence and ESR Meeting, Liverpool, United Kingdom, 10–13 July 2016.

35. **Cole, D.I.**, 2016. The mining history of Cape Town. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

36. **Cole, J.**, Webb, S.J. and Finn, C.A., 2016. Recent advances in understanding the 3D geometry of the Bushveld Complex using geophysical data. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

37. **Cole, P.**, 2016. The continued evolution of the open source PYGMI project. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

38. **Cole, P.**, **Cole, J.**, **Jia, H.**, **Leshomo, J.** and **Grobbelaar, D.**, 2017. The use of remote sensing and GIS in proactive mine water monitoring. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

39. Coppersmith, R., Hanson, K., **Neveling, J.** and Bierman, P.R., 2016. Challenges in characterizing fault sources in a reactivated SCR environment, southern South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

40. **De Beer, C.H.**, **Musekiwa, C.** and **Noruka, S.**, 2016. The 2016 edition of the 1:1 million-scale geological map of the Republic of SA, and the Kingdoms of Lesotho and Swaziland. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

41. **De Kock, G.S.** and Armstrong, R.A., 2016. Dating rocks from the Central Zone, Damara belt, Namibia: Time constraints on orogenic events. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

42. **De Kock, G.S.**, Armstrong, R.A., **Dhansay, T.** and Zingelmann, M., 2016. Geochronology on rocks from Rwanda: deposition, magmatism and mineralization. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

43. **De Kock, G.S.**, Petro, F., Maganga, Z., Grantham, G. and Spencer, C., 2016. The Mgazini sheet in S Tanzania: the extent of the Ubendian, Irumide and Mozambique orogenic belts. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

44. **Dhansay, T.** and De Wit, M., 2016. The brittle evolution of the Critical Zone across South Africa: Implications for sustainable transformation. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

45. **Diop, S.**, 2016. Subsurface geotechnical evaluation for the seismic microzonation of the Greater Johannesburg area, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

46. **Diop, S.**, **Cole, P.**, **Chirenje, E.** and **Mkhize, N.**, 2016. Crushed aggregate potential in Newcastle, KZN Province, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

47. Doggart, S.W., Buick, I., Frei, D., Lana, C., **Macey, P.H.** and **Lambert, C.W.**, 2017. Monazite U/Pb geochronology and Sm/Nd isotope geochemistry of the Orange River pegmatite belt; a late stage felsic melt emplacement in the Namaqua Metamorphic Complex. IMSG Conference, Igneous and Metamorphic Studies Group, Johannesburg, South Africa, 15–18 January 2017.

48. **Doucet, F.J.**, **Mohamed, S.**, Neyt, N. and Van der Merwe, E.M., 2016. Aluminium recovery from coal fly ash for sustainable alumina resource. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

49. **Dube, G.**, **Novhe, O.**, **Ramasenya, K.** and Van Zweel, N., 2017. Laboratory-scale testing of the passive systems to treat acid mine drainage from abandoned coal mines, eMalahleni, Mpumalanga Province. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

50. **Dube, M.**, **Sakala, E.** and **Maligana, P.**, 2017. Mapping of dolomite-hosted alluvial diamonds trapping zones using high-resolution airborne magnetic data in the North West Province, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

51. Evans, D.M., **Hunt, J.P.** and Simmonds, J.R., 2016. The Mesoproterozoic East African Nickel Belt. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

52. **Flint, N.**, 2017. The historical seismicity of Johannesburg and the South African interior. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

53. Gastaldo, R.A., Li, J., **Neveling, J.** and Geissman, J.W., 2016. Red Green: Geochemistry of coloured siltstones from the *Daptocephalus (Dicynodon)* and *Lystrosaurus* Assemblage Zones at Old Lootsberg Pass and Bethulie, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

54. Gastaldo, R.A., **Neveling, J.**, Geissman, J.W., Kamo, S.L., Looy, C. and Bamford, M.K., 2016. Variability in the Late Permian landscape of the upper Balfour Formation (Beaufort Group strata, Karoo Basin, South Africa). Geological Society of America Annual Meeting, Denver, Colorado, 25–28 September 2016.

55. **Gcasamba, S.**, **Rathod, G.**, **Vadapalli, V.R.K.** and Ekolu, S., 2016. Fly ash as a backfill material — a geotechnical investigation. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

56. **Gcasamba, S.P.**, **Rathod, G.W.**, **Vadapalli, V.R.K.** and Ekolu, S., 2017. Fly ash as a backfill material — a geotechnical investigation. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

57. Geissman, J.W., Gastaldo, R.A. and **Neveling, J.**, 2016. Paleomagnetic data bearing on the thermal history of Upper Permian to Lower Triassic (?) Beaufort Group strata, Karoo Basin, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

58. Geissman, J.W., Gastaldo, R.A. and **Neveling, J.**, 2016. Paleomagnetic data bearing on the thermal history of Upper Permian to Lower Triassic Beaufort Group strata, Karoo Basin, South Africa. Geological Society of America Annual Meeting, Denver, Colorado, 25–28 September 2016.

59. **Grobbelaar, M.R.** and **Cichowicz, A.**, 2016. Complementary sources of earthquake data — a unique situation. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

60. Hanson, K.L., Slack, C., Coppersmith, R., **Neveling, J.**, Bierman, P.R., Forman, S., Goedhart, M. and **Black, D.E.**, 2016. Paleoseismic investigation of the Kango Fault, South Africa: Incorporating temporal and spatial clustering behaviour into a seismic source characterization model. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

61. **Hatton, C.**, 2017. Mantle viscosity and the supercontinent cycle. 9th Igneous and Metamorphic Studies Group Meeting, Muldersdrift, South Africa, 15–18 January 2017.

62. **Hatton, C.**, 2017. Global events recorded in the South African stratigraphic record. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

63. **Hatton, C.**, De Kock, M. and Altermann, W., 2016. On using the Kaapvaal Craton to naturalise the International Chronostratigraphic Chart for the Precambrian. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

64. **Hicks, N.** and Green, A.N., 2016. Sequence stratigraphy of the Durban Basin, South Africa. 35th

International Geological Congress, Cape Town, 28 August–2 September 2016.

65. **Hlatshwayo, S.M.** and **Strauss, S.W.**, 2016. Geochemical data interpretation techniques and mineral target generation of the Northern Limb, Bushveld Complex, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

66. **Hobo, M.**, **Chirenje, E.**, **Sekiba, M.**, **Ngobeni, D.**, **Sebothoma, S.**, **Sethobya, M.**, **Legotlo, R.**, **Ledwaba, L.**, **Maligana, P.** and **Mbongonya, A.**, 2017. Geophysical modelling of magnetics and gravity data from the Lichtenburg–Bakerville alluvial diamond field — implications for alluvial exploration in the area. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

67. **Hunt, J.P.**, 2016. Rank statistical analysis of selected South African gold endowment. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

68. **Hunt, J.P.** and Yigit, O., 2016. Rank statistical analysis of gold endowment in terranes of differing exploration maturity: Selected examples from Turkey and southern Africa. SEG-MJD 2016 Conference, Society of Economic Geologists and the Turkish Association of Economic Geologists, Cesme, Turkey, 25–28 September 2016.

69. Indongo, J., **Macey, P.H.**, Miller, J.A. and Shifotoka, G., 2016. The late-Namaqua Sperlingsputs Shear Zone System, Haib region, southern Namibia. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

70. Johnson, G., **Hicks, N.**, Bond, C., Gilfillan, S., Jones, D., Kremer, Y., Lister, R., Nkwane, M., Maupa, T., **Munyangane, P.**, **Robey, K.**, **Saunders, I.**, Pearce, J., Shipton, Z. and Haszeldine, S., 2016. The Bongwana natural $CO_2$ release. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

71. Johnson, G., **Hicks, N.**, Bond, C.E., Gilfillan, S.M.V., Jones, D., Kremer, Y., Lister, R., Nkwane, M., Maupa, T., **Munyangane, P.**, **Robey, K.**, **Saunders, I.**, Pearce, J., Shipton, Z.K. and Haszeldine, R.S., 2016. Detection and understanding of natural $CO_2$ releases in KwaZulu-Natal, South Africa. 13th International Conference on Greenhouse Gas Control Technologies, Lausanne, Switzerland, 14–18 November 2016.

72. Jones, D., Johnson, G., **Hicks, N.**, Bond, C., Gilfillan, S., Kremer, Y., Lister, R., Nkwane, M., Maupa, T., **Munyangane, P.**, **Robey, K.**, **Saunders, I.**, Shipton, Z., Pearce, J. and Haszeldine, S., 2016. Using the Bongwana natural $CO_2$ release to understand leakage processes and develop monitoring. European Geosciences Union General Assembly 2016, Vienna, Austria, 17–22 April 2016.

73. Kasper, T., Haberzettl, T., Lederer, M., Wündsch, M., Frenzel, P., Zabel, M., Kirsten, K.L., Daut, G., **Cawthra, H.C.**, Baade, J., Meadows, M.E., Quick, L.J. and Mäusbacher, R., 2016. The potential of coastal lakes in the Winter-Rainfall-Zone of South Africa for palaeontological reconstructions — an example from Verlorenvlei. European Geosciences Union General Assembly 2016, Vienna, Austria, 17–22 April 2016.

74. Kasper, T., Haberzettl, T., Wündsch, M., Frenzel, P., Zabel, M., Kirsten, K.L., Carr, A., Daut, G., **Cawthra, H.C.**, Meadows, M.E., Quick, L.J. and Mäusbacher, R., 2016. Paleoenvironmental reconstructions utilizing marine influenced sedimentary archives — The example of the coastal lake Verlorenvlei in the Winter Rainfall Zone of South Africa. American Geophysical Union Fall Meeting, San Francisco, CA, 12–16 December 2016.

75. **Kenan, A.O.**, 2016. GIS-based fuzzy logic mineral prospectivity modelling of surficial uranium systems in the Namaqualand region, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

76. **Kgari, T.**, **Van Wyk, Y.**, **Coetzee, H.** and Dippenaar, M., 2016. Mine water approach using tracers in South African abandoned coal mines. International Mine Water Association (IMWA) Symposium, Leipzig, Germany, 11–15 July 2016.

77. **Khumalo, V.M.**, **Cawthra, H.C.** and Compton, J.S., 2016. Seismic stratigraphy of the Saldanha Bay and Langebaan Lagoon areas. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

78. **Khumalo, V.M.**, **Cawthra, H.C.** and Compton, J.S., 2017. Seismic stratigraphy of the Saldanha Bay and Langebaan Lagoon areas. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

79. **Kwata, M.G.** and **Moja, S.J.**, 2016. A geochemical/mineralogical study of settleable dust samples collected near some old and abandoned asbestos mine dumps in Limpopo Province, South Africa.

5th International Conference on Earth Science & Climate Change, Bangkok, Thailand, 25–27 July 2016.

80. **Kwata, M.G.** and **Moja, S.J.**, 2016. Characterization of surface and trapped dust samples around some ownerless and abandoned asbestos mine dumps in Limpopo Province, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

81. **Kwata, M.G.** and **Moja, S.J.**, 2017. Is asbestos pollution in Mpumalanga Province real? Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

82. **Lambert, C.W.**, **Macey, P.H.**, Kisters, A.F.M., **Groenewald, C.A.**, Frei, D., Buick, I.S. and Angombe, M., 2016. The Marshall Rocks–Pofadder Shear Zone and other late-Namaqua dextral shear zones between Ai-Ais and Pofadder in the western Namaqualand Metamorphic Province: Fabrics, timing and late stage melt controls. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

83. **Ledwaba, L.**, **Chirenje, E.** and **Legotlo, R.**, 2016. Geophysical mapping of the Ramokokastad Carbonatite Complex, North West, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

84. **Ledwaba, L.**, **Chirenje, E.**, **Sakala, E.**, **Ngobeni, D.**, **Havenga, M., Sekiba, M., Sethobya, M., Buthelezi, M., Dube, M., Legotlo, R., Hobo, M., Sebothoma, S., Nxantsiya, Z., Mbongonya, A., Maligana, P., Netsianda, A.** and **Motjale, P.**, 2017. The overview role of geophysics as a task in exploration and mining investment promotion in the minerals and energy sectors. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

85. Li, J., Gastaldo, R.A. and **Neveling, J.**, 2016. Petrography, mineralogy, and geochemistry of greenish- and reddish-grey siltstones straddling the vertebrate-defined Permian–Triassic boundary in South Africa. Geological Society of America Annual Meeting, Denver, Colorado, 25–28 September 2016.

86. **Lin, H.**, 2017. Groundwater availability in the Tugela area. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

87. **Lin, L.** and **Lin, H.**, 2016. Determination of groundwater sustainable yield using the numerical modelling approach. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

88. **Macey, P.H.**, 2017. Modern methods in geological mapping. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

89. **Macey, P.H.**, **Lambert, C.W.**, Kisters, A.F.M., **Gresse, P.G.**, **Thomas, R.**, Miller, J.A., Groenewald, C., Angombe, M., Indongo, J., Shifotoka, G., **Minnaar, H.**, **Smith H.**, **Dhansay, T.**, Diener, J., Frei, D., Muvangua, E., Spencer, C., Le Roux, P. and **Doggart, S.**, 2016. Towards a new geodynamic model for the western Namaqua Province. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

90. **MacHutchon, M.R.**, 2016. The marine geology of the 1 nautical mile exclusive zone around Robben Island, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

91. **MacHutchon, M.R.**, 2017. The marine geology of the 1 nautical mile exclusive zone around Robben Island, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

92. **MacHutchon, M.R.** and Compton, J.C., 2017. The geological evolution and sedimentary dynamics of Hout Bay, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

93. **Magadaza, L.** and **Hatton, C.**, 2016. A field reconnaissance to locate the base of the Changhsingian Stage in the Karoo Basin, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

94. **Magadaza, L.** and **Kenan, A.O.**, 2017. Delineation of palaeochannels of the Northern Cape Province — implication for surficial uranium exploration. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

95. Mäkitie, H., Härmä, P., Kuosmanen, E., Lehto, T., Pokki, J., **De Kock, G.**, Schumann, A. and Kyagulanyi, D., 2016. Workflow and challenges in the geological mapping of Uganda 2008–2012. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

96. **Makonto, O.**, **Tegegn, K.**, **Marubini, S.** and **Coetzee, H.**, 2017. Water balance studies in Cowles Dam of the East Rand of the Wits Basin, Gauteng Province, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

97. **Malumbazo, N.**, 2016. Type, distribution and use of coal in South Africa. European Geosciences Union, GIFT – Geosciences Information for Teachers, Cape Town, South Africa, 27–28 August 2016.

98. **Manzunzu, B.**, **Midzi, V.**, **Mangongolo, A.** and Essrich, F., 2016. The aftershock sequence of the 5th August 2014 Orkney earthquake. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

99. **Manzunzu, B.**, **Midzi, V.**, **Zulu, B.**, **Pule, T.** and **Mulabisani, T.**, 2017. Probabilistic seismic hazard assessment for the microzonation study of the Johannesburg and KOSH regions. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

100. **Maré, L.**, 2017. The physical properties database on an ArcMap platform. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

101. **Maré, L.**, De Kock, M.O., Cairncross, B. and Mouri, H., 2016. The use of thermomagnetic curves for paleotemperature evaluation in sedimentary basins. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

102. **Mashalane, T.**, **Novhe, N.O.**, **Yibas, B.** and **Modiba, M.**, 2017. Iron removal from acid mine drainage using passive treatment technologies (anaerobic and aerobic) in the Ermelo Coalfield, Carolina, Mpumalanga. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

103. **Matshusa, K.**, 2016. Occurrence of Potential Harmful Elements (PHEs) around abandoned mines in South Africa: A case study at Albert Silver Mine, Mpumalanga Province. Aachen International Mining Symposia (AIMS 2016), 1st International Conference, Mining in Europe, Aachen, Germany, 18–19 May 2016.

104. **Mfikili, A.**, **Bornman, T.G.** and **Cawthra, H.C.**, 2017. An investigation of possible palaeotsunami deposits in the Swartkops estuary along the southeast coast of South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

105. **Midzi, V.**, **Mulabisana, T.**, **Manzunzu, B.**, **Zulu, B.**, **Pule, T.**, **Myendeki, S.** and **Rathod, G.**, 2016. Probabilistic seismic hazard assessment of South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

106. Miller, J.A., **Macey, P.H.**, **Lambert, C.W.**, Frei, D., Le Roux, P. and Muvangua, E., 2016. Distribution and characteristics of gabbros, gabbronorites and amphibolites across the western Namaqua Province and their role in constraining terrane boundaries. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

107. Miller, J.A., **Macey, P.H.**, **Lambert, C.W.**, Angombe, M., Shifotoka, G., **Thomas, R.J.**, Frei, D. and Le Roux, P., 2016. Reassessment of Mesoproterozoic granitic rocks in southern Namibia and their context within the broader western Namaqua Province. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

108. **Mkhize, N.P.**, Ekolu, S. and **Diop, S.**, 2016. Corrosion attack mechanisms of acid mine drainage on concrete. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

109. **Moabi, N.G.**, Grantham, G.H., Roberts, J. and Le Roux, P., 2016. A geochemistry of the Straumsnutane lavas (Jutulstraumen Group) in Western Dronning Maud Land, Antarctica and the Espungabera lavas (Mkondo Group) in Central Mozambique: Evidence for comagmatic and continental emplacement. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

110. **Mohamed, S.**, Van der Merwe, E.M. and **Doucet, F.J.**, 2016. Recovery of valuable elements from Platinum Group Metal (PGM) tailings and synthesis of iron-based materials. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

111. **Mohamed, S.**, Van der Merwe, E.M. and **Doucet, F.J.**, 2016. Suitability of different ammonium salts as extracting agents for elemental recovery from Platinum Group Metal (PGM) tailings. 54th Annual Microscopy Society of Southern Africa Conference, Port Elizabeth, South Africa, 5–8 December 2016.

112. **Mohamed, S.**, Van der Merwe, E.M., Petrik, L. and **Doucet, F.J.**, 2017. Recovery of valuable elements from platinum group metal tailings and synthesis of iron-based nanomaterials. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

113. **Moja, S.J.** and **Kwata, M.G.**, 2016. Characterisation of surface and trapped dust samples collected from human settlements that are in the vicinity of abandoned and ownerless mine tailings in Mpumalanga Province, South Africa. 5th International Conference on Earth Science & Climate Change, Bangkok, Thailand, 25–27 July 2016.

114. **Moja, S.J.** and **Kwata, M.G.**, 2016. A physico-chemical study of dust fall samples collected within human settlements that are close to derelict and ownerless asbestos mine dumps in Mpumalanga Province, South Africa. 17th IUAPPA World Clean Air Congress and the 9th CAA Better Air Quality Conference, IUAPPA, Clean Air Asia and KOSAE, Busan, South Korea, 29 August–2 September 2016.

115. **Mosavel, H.** and **Musekiwa, C.**, 2016. 3D geology modelling from boreholes, cross-sections and geological maps to support shale gas potential investigations in the Beaufort West area, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

116. **Mthembi, P.** and Harris, C., 2016. The chemical stratigraphy and palaeo-environmental significance of the Kalkkop Impact Crater Lake deposits, Eastern Cape, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

117. **Mukosi, N.C.**, Charrière, M., De Pascale, F., Gomez Cantero, J., Hassan, T. and O'Brien, C., 2016. The Young Scientist Club of the International Association for Promoting Geoethics — Promoting geoethics among the young geoscientists' community. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

118. **Mulabisana, T.F.**, **Zulu, B.S.**, **Midzi, V.**, **Manzunzu, B.** and **Rathod, G.**, 2016. Microzonation of Johannesburg: Impact of uncertainties associated with earthquake catalogue on seismic hazard assessment. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

119. **Mutele, L.**, **Hunt, J.P.** and **Billay, A.**, 2016. Prospectivity mapping of the Bushveld granite-related mineralisation in selected areas, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

120. Nethenzheni, S.S., Bailie, R.H., Frei, D., **Macey, P.** and Le Roux, P., 2016. The geochronology and geochemistry of the ferroan, A-type granites on the eastern margin of the Namaqua Sector, Namaqua-Natal Metamorphic Province, southern Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

121. **Netshitungulwana, R.**, Gauert, C., Vermeulen, D., **Yibas, B.** and **Novhe, N.O.**, 2016. Geochemical baselines and metal deportment in the Upper Olifants Primary Catchment by using stream sediment geochemistry, Witbank Coalfield, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

122. Neumann, F.H., **Cawthra, H.C.**, Carr, A.S., Scott, L., Durugbo, E.U., Humphries, M.S., Cowling, R.M., Bamford, M.K., **Musekiwa, C.** and **MacHutchon, M.**, 2016. Palaeo-environmental fluctuations during a terminal Oligocene–early Miocene transgression at the southwestern tip of Africa. 19th Biennial Meeting of the Palaeontological Society of Southern Africa (PSSA), Stellenbosch, South Africa, 4–9 July 2016.

123. Neumann, F.H., **Cawthra, H.C.**, Carr, A.S., Scott, L., Durugbo, E.U., Humphries, M.S., Cowling, R.M., Bamford, M.K., **Musekiwa, C.** and **MacHutchon, M.**, 2016. Palaeo-environmental fluctuations during a terminal Oligocene–early Miocene transgression at the southwestern tip of Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

124. **Neveling, J.**, Gastaldo, R.A., Geissman, J.W., Kamo, S.L., Looy, C.V. and Bamford, M.K., 2016. Variability in the Late Permian landscape of the upper Balfour Formation (Beaufort Group Strata, Karoo Basin, South Africa). 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

125. **Ngobeni, D.** and **Chirenje, E.**, 2017. Time domain electromagnetic case studies on alluvial gravel and kimberlites. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

126. **Novhe, N.O.**, **Yibas, B.**, **Coetzee, H.**, **Atanasova, M.** and **Netshitungulwana, R.**, 2016. Characterisation of precipitates formed in anaerobic and aerobic units designed to treat acid mine drainage from an abandoned coal mine in Carolina, Mpumalanga (South Africa). 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

127. **Novhe, O.**, **Yibas, B.**, **Coetzee, H.**, **Atanasova, M.**, **Netshitungulwana, R.**, **Modiba, M.** and **Mashalane, T.**, 2016. Long-term remediation of acid mine

drainage from abandoned coal mine using integrated (anaerobic and aerobic) passive treatment system, in South Africa: A pilot study. International Mine Water Association (IMWA) Symposium, Leipzig, Germany, 11–15 July 2016.

128. **Nxantsiya, Z.**, **Chirenje, E.**, **Sakala, E.**, **Ngobeni, D.**, **Ledwaba, L.**, **Buthelezi, M.**, **Sekiba, M.**, **Legotlo, R.**, **Hobo, M.**, **Sebothoma, S.** and **Mbongonya, A.**, 2017. 2D and 3D modelling of magnetic and gravity data over a known kimberlite pipe and probable fissure. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

129. **Nxumalo, V.**, Wagner, N., Cairncross, B., Kramers, J., Vorster, C., Przybylowicz, W. and Setladi, C., 2016. Coal geology and quality of the Springbok Flats Basin, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

130. **Nxumalo, V.**, Wagner, N., Kramers, J., Vorster, C., Cairncross, B., Hunt, J.P. and Przybylowicz, W., 2016. Trace elements associated with the upper coal zones of the Springbok Flats Basin, South Africa. PCC 2016, 33rd Annual International Pittsburgh Coal Conference, Cape Town, South Africa, 8–12 August 2016.

131. Ogasawara, H., Yabe, Y., Ito, T., **Van Aswegen, G.**, **Cichowicz, A.**, Durrheim, R., Onstott, T.C., Kieft, T., Ishida, A., Ogasawara, H.Y., Yasutomi, T., Funato, A., Imanishi, K., Okubo, M., Boettcher, M., Moyer, P., Ellsworth, W., Ziegler, M., Wiemer, S., Janssen, C., Shapiro, S., Gupta, H., Dight, P., Wechsler, N., Ward, A.K., Liebenberg, B., Mukuhira, Y., Somala, S.N., **Hunt, J.P.**, Bucibo, S., Berset, N., Harris, R. and Cason, E.D., 2017. Drilling to probe quasi-static and dynamic seismic ruptures in deep South African gold mines. Schatzalp Workshop on Induced Seismicity, Davos, Switzerland, 14–17 March 2017.

132. **Pieterse, L.**, Van der Merwe, E.M. and **Doucet, F.J.**, 2016. Preliminary screening of gold mine tailings in the context of acid mine drainage and geopolymerization. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

133. Przybylowicz, W.J., **Nxumalo, V.**, Sosnicka, M. and Woods, T.H.E., 2016. Recent geological applications of the nuclear microprobe at iThemba LABS. 15th International Conference on Nuclear Microprobe Technology and Applications, ICNMTA 2016, Lanzhou, China, 31 July–5 August 2016.

134. **Pule, T.G.**, Fourie, C.J.S., Kijko, A. and **Midzi, V.**, 2016. Comparison and quantitative study of vulnerability/damage curves in South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

135. **Rathod, G.W.**, **Cichowicz, A.**, **Kgaswane, E.**, **Mangongolo, A.** and **Birch, D.**, 2016. Shallow and upper crustal amplification of seismic waves. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

136. Roberts, D.L., Neumann, F.H., **Cawthra, H.C.**, Carr, A.S., Scott, L., Durugbo, E.U., Humphries, M.S., Cowling, R.M., Bamford, M.K., **Musekiwa, C.** and **MacHutchon, M.**, 2016. Fluvial palaeo-environments and vegetation during a terminal Oligocene–early Miocene transgression at the southwestern tip of Africa. 87th Annual Conference of the Palaeontological Society, Dresden, Germany, 11–15 September 2016.

137. **Roos, H.M.**, 2016. The production of the Africa seismotectonic map and database. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

138. **Roos, H.M.**, 2016. Towards geoscientific data integration: Challenges, Approaches and Implementation. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

139. **Roos, H.M.** and **Grobbelaar, D.A.**, 2016. Building a GIS-based 3D seismic microzonation model for the City of Johannesburg. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

140. **Sakala, E.**, **Saeze, H.** and Nkhata, M.G., 2017. Application of artificial intelligence for the assessment of groundwater potential in basement terrains of the central district of Malawi. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

141. **Sakala, E.**, Fourie, F., Gomo, M. and **Coetzee, H.**, 2016. Analogy of the mineral systems approach with the new proposed groundwater vulnerability approach: Case study of Highveld–Ermelo–Witbank coalfields, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

142. **Sakala, E.**, Fourie, F., Gomo, M. and **Coetzee, H.**, 2017. Groundwater vulnerability assessment as a tool for policy and decision makers — case study of acid mine drainage pollution in the Witbank–Ermelo–Highveld coalfields, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

143. **Sakala, E.**, Fourie, F., Gomo, M., **Coetzee, H.** and Magadaza, L., 2016. Specific groundwater vulnerability mapping: Case study of acid mine drainage in the Witbank Coalfield, South Africa. 6th IASTED International Conference, Gaborone, Botswana, 5–7 September 2016.

144. **Sakiah, L.** and **Matshusa, K.**, 2017. Characterisation of the soil at the abandoned Edendale lead and zinc mine. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

145. **Salzmann, L.** and **Van Zyl, W.**, 2017. Spatial database development within the Marine Geoscience Unit. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

146. **Sebothoma, S.**, **Chirenje, E.**, **Sekiba, M.**, **Nxantsiya, Z.**, **Sethobya, M.**, **Ledwaba, L.**, **Motjale, P.**, **Khoza, T.**, **Legotlo, R.**, **Lephogole, J.**, **Buthelezi, M., Hobo, M.** and **Hlungwane, W.**, 2017. Applications of the seismic refraction technique in alluvial diamond exploration. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

147. **Sekiba, M.**, **Chirenje, E.**, **Sethobya, M.** and **Mbongonya, A.**, 2017. Depth-to-bedrock investigations using the multi-electrode resistivity geophysical method in the area surrounding the City of Johannesburg, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

148. **Sekiba, M.**, **Chirenje, E.**, **Ngobeni, D.**, **Sethobya, M.**, **Legotlo, R.**, **Mbongonya, A.** and **Sebothoma, S.**, 2017. Assessment of geophysical techniques as an exploration tool for alluvial deposits in the southern fields, Schweizer-Reneke, North West Province. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

149. **Sethobya, M., Ledwaba, L., Sebothoma, S.** and **Sekiba, M.**, 2017. Electrical resistivity tomography applications for alluvial exploration — successes and shortcomings. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

150. **Shelembe, P.R.** and **Hatton, C.**, 2016. The elusive Rayton Formation in the Khayakhulu area; western Transvaal basin of the North West Province, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

151. **Shelembe, P.R.**, Mouri, H., Kramers, J. and Selinus, O., 2016. Health impacts of the Pilanesberg Complex and the Rustenburg Layered Suite on communities in the Mabeskraal–Mabaalstad areas in the North West Province, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

152. Shifotoka, G., Haimbodi, M., **Macey, P.H.**, Miller, J.A. and **Thomas, R.**, 2016. The regional geological setting of the Haib Porphyry-Copper Deposit, southern Namibia. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

153. **Sindane, V.**, Dippenaar, M. and **Malumbazo, N.**, 2017. Methane emissions in the Mpumalanga and KwaZulu-Natal coalfields attributable to coal mining and spontaneous combustion in derelict and ownerless mines. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

154. **Singh, R.G., Botha, G.A., Ncume, M.** and Kemp, J., 2016. Land degradation mapping along the Eastern Cape Wild Coast using Landsat 8 surface reflectance data. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

155. **Smith, H.P., Macey, P.H.**, Miller, J.A., Rowe, C., **Lambert, C.W.**, Diener, J. and Frei, D., 2016. The Lower Fish River/Onseepkans Thrust Zone: Time constraints and insights into Namaquan thrust tectonics. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

156. **Sogayise, S., Mahlase, B., Lekoadu, S., Mafunda, S., Mthembi, P.** and **Sindane, V.**, 2017. The use of a thermal and LiDAR survey to detect spontaneous combustion on coal dumps — preliminary results for the Endumeni coal dump in KwaZulu-Natal, South Africa. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

157. **Thomas, A.**, 2017. Application of radar interferometry for mapping surface deformation in KwaZulu-Natal Province associated with the Durban earthquake of 6 February 2016 using Sentinel-1 SAR data. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

158. **Thomas, A.**, 2017. Mapping of surface deformation associated with the 4.1 magnitude earthquake that occurred in the Maluti region of South Africa on 18 August 2016, using radar interferometry. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

159. **Thomas, A**. and Tellam, J.H., 2016. GIS-based modelling of groundwater vulnerability: a case study of Birmingham urban unconfined aquifer, United Kingdom. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

160. **Thomas, R.J.**, **Macey, P.H.**, Spencer, C., **Dhansay, T.** and **Lambert, C.**, 2016. Geological evolution of the Aurus Mountains, Sperrgebiet Domain, Namibia. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

161. Van der Merwe, E.M., Gray, C., Kruger, R. and **Doucet, F.J.**, 2017. Aluminium extraction from ultrafine coal fly ash by thermochemical processing with ammonium sulphate and/or ammonium bisulphate. EuroCoalAsh 2017 Conference, Brno, Czech Republic, 6–8 February 2017.

162. **Van Zyl, W.**, 2017. Sediment dynamics of the Atlantic Seaboard on the Cape Peninsula. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

163. **Voigt, M.**, Becker, M., Miller, J., Mainza, A. and Bradshaw, D., 2017. Using X-ray computed tomography for the 3D textural analysis of drill core in geometallurgy. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

164. Wündsch, M., Haberzettl, T., Meadows, M.E., Kirsten, K.L., Meschner, S., Frenzel, P., Baade, J., Daut, G., Mäusbacher, R., Kasper, T., Quick, L.J., **Cawthra, H.C.** and Zabel, M., 2016. Environmental change at the southern Cape coast of South Africa as inferred from a high-resolution Holocene sediment record from Eilandvlei. European Geosciences Union General Assembly 2016, Vienna, Austria, 17–22 April 2016.

165. **Yibas, B.**, **Netshitungulwana, R.** and **Novhe, O.**, 2016. Management of mine water and AMD challenges using the river water catchment area and geo-environmental provinces approach, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

166. **Yibas, B.**, Reimold, W.U., Anhaeusser, C. and **Hunt, J.P.**, 2016. Gold mineralisation in the Precambrian of southern Ethiopia. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

167. **Zilibokwe, N.**, **Foya, S.**, Hammond, N.Q. and Harmer, R.E., 2016. Characterization of Platinum Group Element distribution in sulphide ores within the Merensky Reef at Modikwa and Two Rivers Platinum Mines, Eastern Bushveld Complex, South Africa. 35th International Geological Congress, Cape Town, 28 August–2 September 2016.

168. **Zulu, B.**, **Manzunzu, B.** and **Midzi, V.**, 2017. Comparison of ground motion prediction equations with Orkney earthquake strong-motion data and application in the gold mining regions of the Gauteng Province. Council for Geoscience Annual Conference 2017, Pretoria, 2–3 March 2017.

## 5.4 Field guides published for the 35th IGC

1. **Cawthra, H.C.** and Haarhoff, P.J., 2016. Geology and palaeontology of the Cape West Coast: Langebaan Lagoon and the West Coast Fossil Park. ODPre1 Field Trip Guide, 35th International Geological Congress, 65 pp.

2. **Cole, D.I.**, 2016. The building stones of Cape Town. ODPre8 and ODPost1 Field Trip Guide, 35th International Geological Congress, 24 pp.

3. **Cole, D.I.**, 2016. Zevenwacht Wine Estate and Tin Mine. ODPost4 Field Trip Guide, 35th International Geological Congress, 12 pp.

4. **De Beer, C.H.** and **Flint, N.S.**, 2016. The geology and seismicity of the southwestern Cape. ODPost3 Field Trip Guide, 35th International Geological Congress, Cape Town, 32 pp.

5. **Dhansay, T.**, 2016. Table Mountain Hike: Maclears Beacon–Platteklip Gorge and Cable Car. ODPre9/ ODPre10/ODPost2 Field Trip Guide, 35th International Geological Congress, 65 pp.

6. Malan, J. and **Viljoen, J.**, 2016. Southern Cape Geology: Evolution of a rifted margin. Post11 Field Trip Guide, 35th International Geological Congress, Cape Town, 64 pp.

7. **Neveling, J.** Gastaldo, R.A. and Geissman, J.W., 2016. The Permo–Triassic Boundary in the Karoo Basin. Pre3 Field Trip Guide, 35th International Geological Congress, 79 pp.

## 35TH INTERNATIONAL GEOLOGICAL CONGRESS, CAPE TOWN

1


2


3


4

***1.** The Council for Geoscience co-hosted the 35th IGC. **2.** Dr Richard Viljoen handed over copies of the official conference publications to Prof. Ngoepe. **3.** Prof. Ngoepe, Dr Richard Viljoen, the Minister of Mineral Resources, Mr Mosebenzi Zwane, Dr Jeannette McGill and Mr Simon Sikhosana. **4.** Mr Willie Vukela, Deputy Director-General of the Department of Telecommunications and Postal Services, presented a set of geology stamps to Prof. Ngoepe.*

## COUNCIL FOR GEOSCIENCE ANNUAL CONFERENCE 2017

1

2


3

***1.** Some of the presenters who provided stakeholders with an insight into the scientific work of the Council for Geoscience.*
***2.** Delegates were afforded the opportunity to debate scientific hot topics at the conference.* ***3.** Keynote presentations featured local and international experts.*

# PART C: GOVERNANCE

The Corporate Governance of the Council for Geoscience embodies systems, structures and processes by which the entity is directed, controlled and held to account. In addition to legislative requirements based on the Council for Geoscience enabling Act, corporate governance with regard to the Council for Geoscience is applied through precepts of the PFMA together with the National Treasury regulations and policies of the organisation. This part of the report details governance systems, structures and processes within the organisation and comprises, but is not limited to:

- The Board and its committees — which covers the composition of the Board as well as committees of the Board; meetings of the Board and the committees; induction of the Board; remuneration of the Board, and conduct, role and responsibilities of the Board;
- Compliance with laws and regulations — which reports on the status of Council for Geoscience compliance with the relevant and applicable legislative prescripts;
- Internal control and risk management — which covers reporting on the risk management framework implemented as well as the effectiveness of the internal controls in the organisation;
- Fraud and corruption — covers measures put in place to detect and combat fraudulent activities;
- Internal audit — outlines the activities of the internal audit function;
- Quality assurance — status with regard to quality assurance within the Council for Geoscience;
- Health, safety and environment issues — Council for Geoscience level of compliance with SHEQ standards.

## 1. INTRODUCTION

The Council for Geoscience is committed to the fundamental principles of good governance, encapsulating transparency, integrity, accountability and responsibility as set out in the Public Finance Management Act (Act No. 1 of 1999, as amended), National Treasury Regulations, the Protocol on Corporate Governance in the Public Sector and best governance practices encapsulated in the King Code.

## 2. EXECUTIVE AUTHORITY

The Minister of Mineral Resources is mandated to oversee the management and performance of the Council for Geoscience. Accordingly, the organisation submits annual and quarterly reports in terms of National Treasury Regulations (26.1) to the Department of Mineral Resources on 31 January, 30 April, 31 July and 31 October.

## 3. BOARD OF THE COUNCIL FOR GEOSCIENCE

### 3.1 Board composition and duties

The term of office of the former Board terminated as of 28 February 2017. The Minister appointed the new Board, with effect from 1 March 2017, in terms of section 4 of the Geoscience Act (Act No. 100 of 1993, as amended). The Board currently consists of 12 non-executive members, three alternate members and one executive member, the Acting Chief Executive Officer. The Board is chaired by an independent non-executive member. The roles of the Chairperson and Chief Executive Officer and their duties are clearly separated.

The fiduciary duties of the Board are outlined in section 50 of the Public Finance Management Act (Act No. 1 of 1999, as amended) which, among others, requires Board members to declare their interests in the event of a potential conflict of interest. The Board has implemented a declaration of interest register to ensure that Board members disclose any direct/indirect interest and private interest a member/spouse/partner/close family member may have in any matter that requires withdrawal from the proceedings of the Board unless the Board rules the member's interest is trivial/irrelevant. The Board is accountable for the performance of the Council for Geoscience and for setting the strategic direction of the organisation, approves the vision, mission, strategic objectives and operating policies as well as monitors compliance with the policies and achievements with respect to scientific, administrative and financial objectives.

The Board has the authority to lead, control and manage the business of the Council for Geoscience. The Board has adopted a comprehensive Delegation of Authority framework in accordance with section 56 of the Public Finance Management Act (Act No. 1 of 1999, as amended). As a result, the Board has delegated the day to day management of the affairs of the Council for Geoscience to the Acting Chief Executive Officer. The delegation of authority policy does not in any way divest the Board of its responsibilities and accountability towards the organisation.

*Table C1: Composition of the Board — 1 April 2016 to 28 February 2017*

| Name | Designation | Employer | Date appointed | Qualifications | Area of expertise |
|---|---|---|---|---|---|
| Prof. P.E. Ngoepe | Chairperson | University of Limpopo | 1 October 2012 | PhD (Physics) | Physics |
| Mr S.M. Sikhosana (Term ended on 30 November 2016) | Acting CEO | Council for Geoscience | 1 May 2015 | MBA BSc Hons (Geology) | Geology |
| Mr B.A. Gerryts | Board member | Department of Science and Technology | 1 February 2013 | MSc (Engineering Management) | Technology and Innovation Systems |
| Prof. M.A. Hermanus | Board member | Council for Scientific and Industrial Research | 1 October 2012 | MSc (Engineering, Physical Metallurgy) | Mining Engineering |
| Mr M. Mabuza (Appointed as Acting CEO designate from 1 November 2016) | Board member | Department of Mineral Resources | 1 October 2012 | BSc Hons (Geology), Postgraduate Diploma in Business Administration | Mineral Policy and Promotion |
| Dr H. Mathe | Board member | Tranter Resources (Pty) Limited | 1 October 2012 | PhD (Geology) | Geology |
| Dr M. Mayekiso | Board member | Department of Environmental Affairs | 1 February 2014 | PhD (Marine and Environmental Science) | Conservation of Ocean and Coast |
| Dr J.E. McGill | Board member | Anglo Platinum Limited | 1 October 2012 | PhD (Economic Geology) | Economic Geology |
| Ms D. Mochotlhi | Board member | Department of Water and Sanitation | 1 October 2012 | MSc (Environment and Society) | Environmental Sciences |
| Ms K.R. Mthimunye | Board member | Bluewaves Consulting Services | 1 October 2012 | BCompt Hons (Accounting) CA (SA) | Accounting |
| Mr M. Riba | Board member | Department of Rural Development and Land Reform | 1 October 2012 | BSc (Mathematics and Chemistry, Surveying) | Land Surveying |
| Ms D. Fischer (Alternate to Dr M. Mayekiso) | Alternate member | Department of Environmental Affairs | 1 February 2014 | MSc (Environmental Management) | Environmental Management |
| Ms R. Mdubeki (Alternate to Mr M. Riba) | Alternate member | Department of Rural Development and Land Reform | 1 October 2012 | BSc (Land Surveying) | Land Administration (Cadastral Surveys) |
| Ms S. Mohale (Alternate to Mr M. Mabuza) | Alternate member | Department of Mineral Resources | 1 October 2012 | MSc (Globalisation and Development) | Economic Development |
| Mr P. Nel (Alternate to Ms D. Mochotlhi) | Alternate member | Department of Water and Sanitation | 1 October 2015 | BCompt Hons (Accounting) CA (SA) | Accounting |
| Mr D. Sibiya (Alternate to Dr J.E. McGill) | Alternate member | Tronox | 1 October 2012 | MSc (Mining Engineering) | Geology |

*Table C2: Board composition as from 1 March 2017*

| Name | Designation | Employer | Date appointed | Qualifications | Area of expertise |
|---|---|---|---|---|---|
| Dr H. Mathe | Chairperson | Tranter Resources (Pty) Limited | 1 March 2017 | PhD (Geology) | Geology |
| Mr. M. Mabuza | Acting CEO | Council for Geoscience | 1 March 2017 | BSc Hons (Geology), Postgraduate Diploma in Business Administration | Mineral Policy and Promotion |
| Mr B. Gerryts | Board member | Department of Science and Technology | 1 March 2017 | MSc (Engineering Management) | Technology and Innovation Systems |
| Mr K. Koloi | Board member | Infracon | 1 March 2017 | BTech (Electrical Engineering) | Electrical Engineering |
| Dr J. Mahachi | Board member | University of Johannesburg | 1 March 2017 | PhD (Structural Engineering) | Structural Engineering |
| Dr M. Mayekiso | Board member | Department of Environmental Affairs | 1 March 2017 | PhD (Marine and Environmental Science) | Conservation of Ocean and Coast |
| Ms R. Mdubeki | Board member | Department of Rural Development and Land Reform | 1 March 2017 | BSc (Land Surveying) | Land Surveying |
| Mr K. Menoe | Board member | Department of Mineral Resources | 1 March 2017 | BSc (Chemical Engineering) | Mineral Beneficiation |
| Ms D. Mochotlhi | Board member | Department of Water and Sanitation | 1 March 2017 | MSc (Environment and Society) | Environmental Sciences |
| Mr T. Motaung | Board member | Bethlehem Magistrate Court | 1 March 2017 | BA (Law) | Law |
| Mr X. Mvinjelwa | Board member | Imerys South Africa | 1 March 2017 | BSc (Chemistry, Production Management), MBA | Strategy and Corporate Services |
| Mr K. Ramokgopa | Board member | KS Innovations | 1 March 2017 | BSc (Civil Engineering), Masters in Business Leadership (MBL), Masters in Public Administration (MPA) | Civil Engineering, Business Management and Public Administration |
| Mr O. Willcox | Board member | National Treasury | 1 March 2017 | MA (Economics) | Economics |
| Mr I. Abader (Alternate to Dr M. Mayekiso) | Alternate member | Department of Environmental Affairs | 1 March 2017 | BA, BProc, MBA | Environmental Sciences |
| Mr P. Nel (Alternate to Ms D. Mochotlhi) | Alternate member | Department of Water and Sanitation | 1 March 2017 | BCompt Hons (Accounting) CA (SA) | Accounting and Financial Management |
| Ms P. Tsotetsi (Alternate to Ms R. Mdubeki) | Alternate member | Department of Rural Development and Land Reform | 1 March 2017 | BSc (Land Surveying) | Quantity Surveying |

### 3.2 Board Charter and responsibilities

The Board Charter, which is reviewed annually, provides for the following with respect to the Board:

i. Leadership role of the Board, judgement and strategic direction;

ii. Board composition;

iii. Accountability, fiduciary duties and responsibilities;

iv. Code of conduct for the Board;

v. Constitution and appointment of committees;

vi. Governance and meeting procedures;

vii. Management of conflict of interest;

viii. Responsibility for the adoption of strategic plans and the monitoring of operational performance and management;

ix. Determination and approval of policies;

x. Risk management;

xi. Board selection, orientation and evaluation.

### 3.3 Board induction and orientation

The Council for Geoscience has a programme which ensures that newly appointed Board members are inducted. Board members who were appointed with effect from 1 March 2017 were inducted on 24 March 2017.

### 3.4 Training of new Board members

The Council for Geoscience has implemented a comprehensive induction programme together with an extensive director development programme to ensure that the Board members are continually trained and have the necessary knowledge of the Council for Geoscience governance structures, operational activities and policies to enable them to fulfil their duties and responsibilities. Continual professional development programmes are also implemented to ensure that the Board and Board committee members receive regular briefings on changes in risks, laws and the environment.

### 3.5 Board meetings

The Board had eight meetings in the 2016/2017 financial year. Tables C3 and C4 depict the attendance of meetings by each Board member in the financial year under review.

*Table C3: Board meetings — 1 April 2016–28 February 2017*

| MEMBERS | 21 April (special and strategy workshop) | 26 May | 28 July | 25 August | 13 October (special) | 27 October | 26 January | 15 February (special) | Number of meetings attended |
|---|---|---|---|---|---|---|---|---|---|
| Prof. P.E. Ngoepe | Present | Present | Present | Present | Present | Present | Present | Present | 8 |
| Mr S.M. Sikhosana | Present | Present | Present | Present | Present | Present | Not a member | Not a member | 6/6 |
| Mr B.A. Gerryts | Apology | Present | Apology | Present | Present | Apology | Present | Present | 5 |
| Prof. M.A. Hermanus | Present | Present | Present | Present | Present | Present | Present | Present | 8 |
| Mr M. Mabuza | Apology | Apology | Apology | Apology | Apology | Present | Present | Present | 3 |
| Dr H. Mathe | Present | Present | Present | Present | Present | Present | Present | Present | 8 |
| Dr M. Mayekiso | Apology | Present | Apology | Apology | Apology | Apology | Apology | Apology | 1 |
| Dr J.E. McGill | Present | Present | Apology | Present | Apology | Present | Present | Present | 6 |
| Mr A. Moatshe | Not a member | Not a member | Not a member | Not a member | Not a member | Not a member | Present | Present | 2/2 |
| Ms D. Mochotlhi | Apology | Apology | Apology | Present | Present | Apology | Present | Present | 4 |
| Ms K.R. Mthimunye | Present | Present | Apology | Present | Present | Present | Present | Present | 7 |
| Mr M. Riba | Apology | Apology | Apology | Apology | Apology | Apology | Apology | Apology | 0 |
| Ms D. Fischer* | Present | Main member present | Apology | Apology | Apology | Apology | Apology | Apology | 1 |
| Ms R. Mdubeki* | Present | Present | Apology | Present | Present | Present | Present | Present | 7 |
| Ms S. Mohale* | Present | Apology | Apology | Apology | Present | Present | Not a member | Not a member | 3/6 |
| Mr P. Nel* | Present | Present | Apology | Main member present | Main member present | Apology | Main member present | Main member present | 2 |
| Mr D. Sibiya* | Main member present | Main member present | Present | Main member present | Apology | Main member present | Main member present | Main member present | 1 |

** Alternate members*

*Table C4: Board meetings of the Board appointed on 1 March 2017*

| MEMBERS | 13 March 2017 (Special) | Number of meetings attended |
|---|---|---|
| Dr H. Mathe | Present | 1 |
| Mr M. Mabuza | Present | 1 |
| Mr B. Gerryts | Present | 1 |
| Mr K. Koloi | Present | 1 |
| Dr J. Mahachi | Present | 1 |
| Dr M. Mayekiso | Apology | 0 |
| Ms R. Mdubeki | Present | 1 |
| Mr K. Menoe | Present | 1 |
| Ms D. Mochotlhi | Apology | 0 |
| Mr T. Motaung | Present | 1 |
| Mr X. Mvinjelwa | Present | 1 |
| Mr K. Ramokgopa | Present | 1 |
| Mr O. Willcox | Present | 1 |
| Mr I. Abader* | Present | 1 |
| Mr P. Nel* | Present | 1 |
| Ms P. Tsotetsi* | Present | 1 |

** Alternate members*

## 3.6 Board remuneration

The remuneration of Board members is determined by the Minister of Mineral Resources, as disclosed in note 12 of the financial statements.

## 3.7 Committees of the Board

In terms of section 15 of the Geoscience Amendment Act (Act No. 16 of 2010), the Board may establish a committee which shall, subject to the direction of the Board, perform such functions of the Board as the Board may determine from time to time. Furthermore, section 56 of the Public Finance Management Act (Act No. 1 of 1999, as amended) provides that the Board may delegate some of its responsibilities to its committees and the Management of the Council for Geoscience respectively. The Board committees are mandated to make recommendations to the Board before any strategic decisions may be implemented by Management.

Therefore, as duly mandated by section 15 of the Geoscience Amendment Act (Act No. 16 of 2010) and section 56 of the PFMA (Act No. 1 of 1999, as amended), the Board has constituted four Board committees and delegated some of its functions to these well-structured committees.

### *3.7.1 Audit and Risk Committee*

The Audit and Risk Committee is established in terms of section 77 of the Public Finance Management Act (Act No. 1 of 1999, as amended) and the National Treasury Regulation 27. The Audit and Risk Committee discharges its responsibilities in terms of its Charter, which sets out its committee composition, roles and responsibilities. The Audit and Risk Committee continually monitors the quality and reliability of financial information used by the Board, financial statements issued by the Council for Geoscience and various functions in the organisation. This committee ensures that emerging risks are timeously identified and that appropriate and effective measures are put in place to mitigate these risks.

The composition and meeting attendance of the Audit and Risk Committee as from 1 April 2016 to 31 March 2017 are reflected in the table below.

*Table C5: Audit and Risk Committee meetings*

| MEMBERS | 2016/2017 | | | | | Meetings attended |
|---|---|---|---|---|---|---|
| | 23 May | 22 July | 19 August | 18 October | 20 January | |
| Mr S.M. Xulu | Present | Present | Present | Present | Present | 5 |
| Mr M. Mabuza | Apology | Apology | Apology | Apology | Not a member | 0/4 |
| Dr M. Mayekiso | Apology | Present | Apology | Apology | Apology | 1 |
| Ms K.R. Mthimunye | Present | Present | Present | Present | Present | 5 |
| Mr P. Nel | Not a member | Present | Present | Apology | Present | 3/4 |
| Dr B. Tema | Present | Present | Present | Present | Present | 5 |

### *3.7.1.1 Audit and Risk Committee Report*

The Audit and Risk Committee (the Committee) reports that it has complied with its responsibilities arising from section 77 of the PFMA and National Treasury Regulation 27.1. The Committee also reports that it has adopted the Audit and Risk Committee Charter as its appropriate terms of reference, has regulated its affairs in compliance with this Charter and has discharged all its responsibilities as contained therein.

In executing its duties, the Committee has, inter alia, performed the following functions:

**1. Evaluation of Internal Controls**

The Committee has directed, monitored and evaluated the activities of the Internal Audit Function. Through the Internal Audit Function, the Committee constantly monitored the effectiveness of the internal control systems and assessed whether the Internal Audit Function effectively and efficiently fulfilled its roles. During the financial year 2016/2017, the internal controls were reported to have significantly improved and compliance with prescribed policies as well as procedures was reported to be satisfactory. However, there is room for improvement in relation to:

a) Procurement;

b) Financial management;

c) Human resources;

d) Perfomance management;

e) IT infrastructure related control measures;

f) Fraud prevention and corruption related control measures.

The Committee is confident to report that corrective measures were implemented towards resolving all findings relating to internal control weaknesses. The Committee further reports that during the year under review a number of weaknesses around performance information were identified and management has assured the Committee that appropriate corrective measures would be implemented in the 2017/2018 financial year.

**2. Evaluation of the Annual Report**

The Committee has:

a) Reviewed the Council for Geoscience's Report on Corporate Performance Information;

b) Reviewed the Council for Geoscience accounting policies and practices;

c) Reviewed the adequacy and reliability of financial information provided to the Auditor-General;

d) Evaluated, reviewed and discussed with the Auditor-General the audited Annual Financial Statements included in the Annual Report;

e) Reviewed the Auditor-General's Management report and Auditor's report, and

f) Based on the information provided to the Committee, considered and concluded that the Annual Financial Statements comply with the requirements of the PFMA, National Treasury Regulation requirements as well as South African Standards of Generally Recognised Accounting Practice (SA Standards of GRAP).

**3. Risk Management**

The Committee reports that during the year under review it approved the Risk Management strategy and the Fraud Prevention Plan which was subsequently communicated to employees and incorporated in the culture of the Council for Geoscience. The Committee reviewed:

a) The organisation's risk appetite and tolerance levels;

b) Significant financial risk exposures and directed management to monitor and develop mitigation strategies for such exposures including, but not limited to, reputational, operational, fraud, strategic and technological (data-security business continuity risk);

c) The Risk Management Framework, Anti-Fraud and Corruption Prevention Policies, IT Policies and practices with respect to risk assessment;

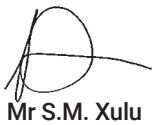
d) The scope of work of Risk Management and its planned activities with respect to risk management and compliance activities.

**4. Evaluation of financial statements**

The Committee reviewed and discussed the financial statements of the Council for Geoscience for the year ended 31 March 2017 with the Auditor-General. The Committee also reviewed the management letter of the Auditor-General and the responses of Management thereto. The Committee is of the opinion that the financial statements are compliant, in all material respects, with the requirements of the Public Finance Management Act (Act No. 1 of 1999, as amended) and the South African Standards of Generally Recognised Accounting Practice (GRAP).

**5. Auditor's report**

The Committee has reviewed the prior year audit findings implementation plan and hereby reports that a significant number of findings have been resolved. The Committee will ensure that management resolves the audit findings that are still work in progress. The 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 should be accepted and read together with the report of the Auditor-General.



**Mr S.M. Xulu**
*Chairperson: Audit and Risk Committee*
*Council for Geoscience*
*31 July 2017*

### 3.7.2 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 for approval by the Board.

The composition and meeting attendance of the Finance Committee as from 1 April 2016 to 31 March 2017 are reflected in the table below:

*Table C6: Finance Committee meetings*

| MEMBERS | 2016/2017 | | | | | Meetings attended |
|---|---|---|---|---|---|---|
| | 23 May | 22 July | 12 August | 18 October | 20 January | |
| Ms K.R. Mthimunye | Present | Present | Apology | Present | Present | 4 |
| Dr J.E. McGill | Present | Apology | Present | Present | Present | 4 |
| Mr K. Mkwanazi (resigned in September 2016) | Apology | Apology | Apology | Not a member | Not a member | 0/3 |
| Ms D. Mochotlhi *Mr P. Nel | Present | Present | Present | Apology | Present | 4 |
| Mr S.M. Sikhosana | Present | Present | Present | Present | Not a member | 4/4 |

** Alternate member*

### 3.7.3 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 scientific and technical matters for approval by the Board.

The composition and meeting attendance of the Technical Committee as from 1 April 2016 to 31 March 2017 are reflected in the table below.

*Table C7: Technical Committee meetings*

| MEMBERS | 2016/2017 | | | | Meetings attended |
|---|---|---|---|---|---|
| | 16 May | 11 August | 17 October | 17 January | |
| Dr J.E. McGill | Present | Present | Present | Present | 4 |
| Mr B.A. Gerryts | Present | Present | Present | Present | 4 |
| Prof. M.A. Hermanus | Present | Present | Present | Present | 4 |
| Dr H. Mathe | Present | Present | Present | Present | 4 |
| Ms S. Mohale | Apology | Present | Present | Present | 3 |
| Mr S.M. Sikhosana | Present | Present | Present | Not a member | 3/3 |

### *3.7.4 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 performance bonuses. The committee also decides upon the remuneration of Executive Management.

The composition and meeting attendance of the Personnel, Remuneration and Transformation Committee as from 1 April 2016 to 31 March 2017 are reflected in the table below:

***Table C8: Personnel, Remuneration and Transformation Committee meetings***

| MEMBERS | 2016/2017 | | | | Meetings attended |
|---|---|---|---|---|---|
| | 16 May | 11 August | 17 October | 17 January | |
| Dr H. Mathe | Present | Present | Present | Present | 4 |
| Ms R. Mdubeki | Present | Apology | Present | Present | 3 |
| Ms S. Mohale | Apology | Present | Present | Apology | 2 |
| Mr D. Sibiya | Present | Present | Present | Present | 4 |
| Mr S.M. Sikhosana | Present | Present | Present | Not a member | 3/3 |

## 4. RISK MANAGEMENT

The Risk Committee is a committee of the Board responsible for overseeing risk exposure related to governance and risk management in the organisation. The strategic risk register is developed annually based on the organisational strategy. The organisational risk management structure of the Council for Geoscience is presented below:

## 5. INTERNAL CONTROL

Management has the responsibility to design, implement and continually review internal controls to provide assurance on the effectiveness, efficiency of operations and reliability of financial reporting, safeguarding and maintaining accountability for the assets of the organisation. These controls are monitored throughout the Council for Geoscience by Management and employees, with the necessary segregation of duties. The internal audit performs independent reviews on the effectiveness of these controls as part of its annual internal audit plan and the audit reports are presented to the Audit and Risk Committee.

## 6. INTERNAL AUDIT

The internal audit function was established in terms of the Public Finance Management Act (Act No. 1 of 1999, as amended) and conducts risk-based audits aligned with the Standards for the Professional Practice of Internal Auditing. A formal internal Audit Charter was reviewed and approved by the Audit and Risk Committee.

An annual internal audit plan was approved by the Audit and Risk Committee and the internal audit reports were presented to the Audit and Risk Committee on a quarterly basis. Follow-up audits were conducted in areas where major internal control weaknesses had been identified. The internal audit also performed ad-hoc tasks that were requested by Management.

## 7. COMPLIANCE WITH LAWS AND REGULATIONS

The Council for Geoscience complies with National Treasury Regulations through the PFMA compliance calendar. The PFMA compliance calendar is continually monitored and updated. Compliance with laws and regulations is monitored through the activities of the Audit and Risk Committee.

## 8. FRAUD AND CORRUPTION

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 appropriate steps to prevent unauthorised, irregular, fruitless and wasteful expenditure and losses resulting from criminal conduct. An Anti-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.

## 9. MINIMISING CONFLICTS OF INTEREST

All suppliers of goods and services to the Council for Geoscience are required to complete standardised National 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 Council for Geoscience, 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 addition, staff members of the Council for Geoscience involved in the Bid Evaluation and Adjudication Committee are required to complete a declaration and nondisclosure form at each meeting.

## 10. CODE OF CONDUCT

All staff members of the Council for Geoscience abide by the Code of Ethics and Conduct which has been adopted. The Council for Geoscience is committed to ethical and fair business dealings, and promotes a corporate culture which is non-sectarian and 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 orientation;

- 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.

## 11. COMPANY SECRETARY

The Council for Geoscience appointed a Company Secretary with effect from 1 March 2017. The Company Secretary provides advisory services to the Board and notifies Board members of any relevant regulatory changes and new developments in corporate governance. In addition, the Company Secretary provides the Board and the Board committees with guidance in respect of how their responsibilities should be discharged in the best interests of the organisation. The Company Secretary facilitates and attends Board and Board committee meetings and takes custody of the related policy documents.

## 12. QUALITY ASSURANCE

Services delivered by the Council for Geoscience are rendered within the context of a quality management system which ensures that the creation, delivery and monitoring of services occur in line with national and international quality standards. The purpose of quality management in the Council for Geoscience is to ensure that stakeholders receive excellent services at all times. A quality gap assessment has been initiated which is being used as a tool to drive the implementation of the ISO 9001 quality management system within the Council for Geoscience. An organisation-wide quality awareness programme was initiated during the financial year with 248 staff members having been trained.

Laboratory testing facilities remain a high priority area within the quality management system of the Council for Geoscience. The Laboratory Services have commissioned and continue to expand the Laboratory Information Management System (LIMS), which is a database that is used primarily to process, store and access customer, quality control and sample information. LIMS is also used for various laboratory support processes, namely equipment calibration and maintenance records. Specialised ISO 17025 quality management training has been undertaken by selected laboratory staff which took place at the facilities of the South African National Accreditation System (SANAS). This training has contributed positively to the process of validating laboratory test methods fit for purpose in view of ensuring the quality of Council for Geoscience analytical test results.

## 13. HEALTH, SAFETY AND ENVIRONMENTAL ISSUES

The Council for Geoscience strives to conduct all its activities in a safe and environmentally sensitive manner at all times. The organisation has created and sustains the necessary organisational competency to enable the development and rollout of health, safety and environmental management plans for its major projects.

The Executive Management of the Council for Geoscience is obliged, in terms of the Occupational Health and Safety Act, to provide a safe workplace without risk to human life, while staff members have a duty to work and behave in compliance with the safety directives of the organisation. The Council for Geoscience Health, Safety and Environment Policies enable the organisation to drive compliance with occupational health, safety and environmental legislation.

The Council for Geoscience conducts health and safety risk assessments to routinely identify hazards and assess risks in order to prevent workplace injuries and diseases. Project hazard assessments are conducted

on all key projects. Significant hazards and risks in affected areas are communicated to all staff members. Identified countermeasures are implemented according to the health and safety programme rollout. Occupational health and safety performance is monitored through various indicators aimed at ensuring continual compliance to applicable legislation. Committees such as the Operational Risk Management Committee, Business Continuity Committee, Audit and Risk Committee and the Council for Geoscience Board monitor the occupational health and safety performance of the organisation on a quarterly basis.

Environmental management is pivotal to the operations of the Council for Geoscience. In addition to the scientific work that the organisation undertakes to address the environmental challenges of the country, it has also developed a corporate environmental management programme aimed at addressing its own environmental impacts. The approach that has been adopted by the organisation is to proactively prevent pollution and reduce resource wastage in its processes by conducting an environmental risk assessment as well as developing and implementing an environmental management plan to manage identified environmental risks.

## 14. PUBLIC AWARENESS

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

Visits of foreign delegations to the Council for Geoscience
**Purpose of visit:** Several international delegations visited the Council for Geoscience for benchmarking purposes and to explore opportunities for collaboration and partnerships.
**Outcome:** Several proposals for collaboration are awaiting approval or have been finalised.

| Delegation from/for: | Date | Outcome |
|---|---|---|
| Nigerian Ministry of Mines and Steel Development | 1 June 2016 | The Nigerian delegation was led by the Minister of Mines and Steel Development. Discussions were held around potential collaboration between the Council for Geoscience and the Nigerian Geological Survey Agency. |
| DST–Namibia | 24 June 2016 | Possible areas of collaboration between the Council for Geoscience and its Namibian counterpart were explored. |
| Zimbabwe Geological Survey | 24–25 October 2016 | The Zimbabwean delegation visited the Council for Geoscience to explore best practices in managing scientific operations in a Geological Survey and a laboratory. |
| Botswana Geoscience Institute | 28 October 2016 | The delegation from the Botswana Geoscience Institute visited the Council for Geoscience to benchmark corporate governance and organisational management. |
| Mozambique | 7–9 November 2016 | The Council for Geoscience shared the history of its establishment, scientific operations, the acquisition of its assets and footprint in Africa with the Mozambican delegation. |
| Central African Republic (CAR) | 31 January 2017 | Discussions were held on immediate collaboration with and support from the Department of Mineral Resources to assist in the postconflict reconstruction and development of the Central African Republic, particularly in the field of scientific research, i.e. geological mapping. |
| | 2 March 2017 | The Council for Geoscience donated geophysical equipment to foster scientific relations and strengthen economic ties with the Central African Republic. |

| Exhibitions | | |
|---|---|---|
| Event | Date | Outcome |
| Budget vote speech, Cape Town | 19 April 2016 | The Council for Geoscience exhibited at the budget vote speech of the Department of Mineral Resources. Several members of Parliament visited the exhibition stands of the organisation. |
| Sustainability Week, Pretoria | 30 May–2 June 2016 | The Council for Geoscience was invited to present and exhibit at the mining seminar of the Sustainability Week Conference. The presentation and exhibition were both well attended. There was great interest in the topics presented by the organisation. |
| 35th International Geological Congress (IGC), Cape Town | 28 August–2 September 2016 | The Council for Geoscience hosted the 35th IGC in Cape Town and geologists from all over the world attended the event. Furthermore, the Council for Geoscience had a large exhibition stand which disseminated information on its work. |
| Small-scale mining workshop, Polokwane | 7 September 2016 | Council for Geoscience representatives attended the workshop held in Polokwane and shared information on how the organisation assists small-scale miners with geological information. |
| China Mining Conference, Tianjin, China | 23–25 September 2016 | The Council for Geoscience was invited to support the Department of Mineral Resources at the China Mining Conference in Tianjin. The Council for Geoscience co-exhibited with the DMR and its other entities and supported the Ministry in all its scheduled meetings. |
| Mining Indaba Conference, Cape Town | 5–9 February 2017 | The Council for Geoscience was invited to support the Minister of the Department of Mineral Resources at the Mining Indaba in Cape Town. The Council for Geoscience also exhibited with the DMR and all its other entities. Representatives from various countries visited the Council for Geoscience stand to acquaint themselves with the service offerings of the organisation. |
| Prospectors and Developers Association of Canada (PDAC) Conference | 5–8 March 2017 | The Council for Geoscience exhibited with the Department of Mineral Resources at the biggest mining conference in the world in Toronto, Canada. The organisation supported the Ministry in all its planned engagements, i.e. panel discussions and bilateral meetings. |

| Career exposure events | | |
|---|---|---|
| Event | Date | Outcome |
| International Museums Day | 18 May 2016 | The National Geoscience Museum participated in this international event to highlight the importance of the museum in society as well as to promote its services to learners and the general public. |
| Take a girl child to work | 26 May 2016 | The Council for Geoscience hosted 23 girl learners from Letsibigo High School, Soweto. The learners were exposed to the various functions within the Council for Geoscience as well as the different career paths that are available at the organisation. |
| Learners Focus Week, Ventersburg, Free State | 4–7 July 2016 | The Council for Geoscience participated in the annual Learners Focus Week through exhibitions and presentations to learners on the various career paths at the organisation. The focus was on learners from all nine provinces studying Mathematics and Science. |
| Niani career exhibition | 18 July 2016 | Council for Geoscience representatives attended a career exhibition at Niani, Limpopo. The career exhibition included presentations to high school learners studying Mathematics and Science on the available career paths in the field of Geology as well as the role of the organisation. |
| Career guidance and exhibition, QwaQwa | 30–31 July 2016 | The Council for Geoscience was invited by the Department of Mineral Resources to participate in the career guidance and exhibition event. Participation was in the form of an exhibition and presentations to the learners on the various career paths at the Council for Geoscience. |
| National Science Week, Cape Town | 5–6 August 2016 | The Council for Geoscience participated in the National Science Week held by the Department of Science and Technology at the University of the Western Cape. Learners were exposed to the work of the organisation and were encouraged to pursue science-related career paths. |

1

2

3


4

5


6


7

8

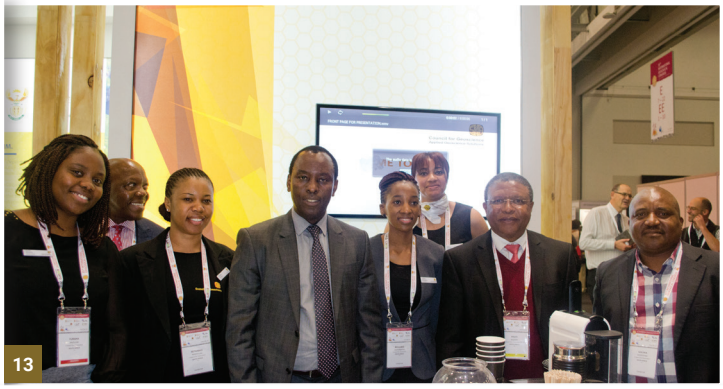

9


10

***1.** Nigerian delegation. **2.** Mozambique delegation. **3.** Sustainability Week, Pretoria. **4.** Mining Indaba, Cape Town. **5.** China Mining Conference. **6.** Take a girl child to work. **7.** International Museums Day. **8.** National Science Week, Cape Town. **9–10.** Learners Focus Week, Ventersburg.*


11


12

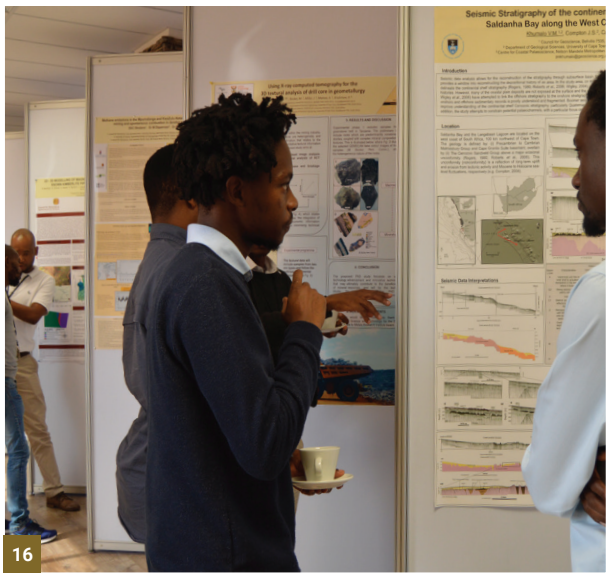


13


14

17


15



16

18

***11–13.*** *35th IGC Conference, Cape Town.* ***14–17.*** *CGS Annual Conference 2017 — Geoscience for a Changing World.* ***18.*** *Career Guidance and Exhibition, QwaQwa.*

| CORPORATE SOCIAL RESPONSIBILITY (CSR) INITIATIVES | | |
|---|---|---|
| Employee-focussed initiatives | | |
| Event | Date | Outcome |
| National Arbour Week | 1–7 September 2016 | The Council for Geoscience commemorated Arbour Week with Executive Management planting trees at the head office premises. In addition, more trees were planted at the various regional offices of the Council for Geoscience. |
| National Heritage Day | 24 September 2016 | Council for Geoscience employees celebrated Heritage Day by wearing their traditional outfits to work in celebration of their diverse cultures and traditions. |
| National Breast Cancer Awareness Month | 1–31 October 2016 | The Council for Geoscience observed Breast Cancer Month throughout October by creating awareness about breast cancer amongst employees in the organisation. |
| World AIDS Day | 1 December 2016 | The Council for Geoscience created awareness about HIV/AIDS amongst employees by encouraging them to ascertain their HIV/AIDS status. |

*National Heritage Day.*

| Community-focussed initiatives | | |
|---|---|---|
| **Event** | **Date** | **Outcome** |
| Nelson Mandela Day | 18 July 2016 | The Council for Geoscience was of service to the following homes during the commemoration of Mandela Day 2016:<br>• Amadea Safe House in Pretoria which looks after abused, disabled and HIV/AIDS-infected children<br>• The Haven night shelter for homeless children and adults in Bellville<br>• Samaritan Centre and Ngwana House for abandoned and homeless children in Polokwane |
| Donation of old and unused chairs | 16 September 2016 | The Council for Geoscience donated 100 unused chairs to Christ the Saviour Catholic Church in Nellmapius, Mamelodi and 96 unused chairs to the Uniting Reformed Church, Soshanguve. The congregations will use the chairs for church services. |
| | 28 September 2016 | The Council for Geoscience donated 60 unused chairs to the Church of Christ in Atteridgeville. The donated chairs will be used by the congregation during church services. |
| Geophysical training to four students of the University of Fort Hare (UFH) | 3 March 2017 | The Council for Geoscience provided experiential training in Geophysics to four UFH students participating in the Karoo deep drilling project at Beaufort West. |


*1. Nelson Mandela Day.*

*2. Donation of old and unused chairs.*

# PART D: HUMAN RESOURCES MANAGEMENT

The report under Human Resources Management introduces key focus areas of the Human Resources department for the year under review. An overview of key priority focus areas is discussed, including training and transformation initiatives of the Council for Geoscience.

The section further details the following:

- Performance measurement system that is used to assess performance;
- Management of employee wellness to ensure the health and wellbeing of staff;
- Key highlights in respect of human resources activities for the year under review;
- Challenges faced by the organisation pertaining to human capital issues;
- Future human resources goals for the management of human resources;
- Report on human resources statistics.

## 1. INTRODUCTION

The Council for Geoscience regards its staff members as a critical resource pivotal to the delivery of its strategic objectives. To this end, the Human Resources department is a strategic partner in the organisation with the role of ensuring that the Council for Geoscience attracts and retains the required resources and expertise to carry out its legislative mandate and strategic objectives.

## 2. OVERVIEW OF HUMAN RESOURCES MATTERS

The following is an overview of some of the key focus areas of the Human Resources department for the year under review:

- Capacitation of the Council for Geoscience with the required resources;
- Review of remuneration levels for staff;
- Review of some of the key policies;
- Training of staff in various disciplines aligned with Council for Geoscience strategic objectives;
- Facilitation of MSc and PhD studies for staff through the Council for Geoscience bursary programme;
- Facilitation of training for full-time students through the Council for Geoscience bursary programme in the various scientific disciplines in line with the Council for Geoscience mandate;
- Ensuring employee wellness.

## 3. HUMAN RESOURCES PRIORITIES FOR THE YEAR UNDER REVIEW

Resourcing the Council for Geoscience with the required skills and expertise continues to be a key component of the core deliverables in the Human Resources department. The appropriate skills are pivotal to the delivery of the Council for Geoscience on its strategy, projects and mandate.

***Organisational structure review***

The organisation recently unveiled its new organisational structure. The new organisational structure will usher in much needed certainty in the organisation in clarifying the roles and responsibilities of its staff. Implementation of the structure will be rolled out in the 2017/2018 financial year.

***Diversity and transformation***

The Council for Geoscience, as a designated employer, is required to develop and submit an employment equity plan in order to monitor progress in achieving its employment equity targets. The Council for Geoscience plans to review its employment equity plan in September 2017. As prescribed by the Employment Equity Act, the Council for Geoscience submitted its employment equity report in January 2017.

The Council for Geoscience overall staff profile in terms of gender includes 54% male and 46% female staff members and the profile in terms of race comprises 76% Blacks and 24% Whites. The percentage representation of people with disabilities is 0.89% against the national target of 2%. The Council for Geoscience has to focus its efforts to attract Coloureds, Indians, women and people with disabilities.

***Employee benefits and compensation***

The Council for Geoscience reviews staff salaries on an annual basis in line with inflation indices. This is a negotiated process with three recognised unions, i.e. Solidarity, PSA and NEHAWU. The organisation further conducts benchmarking of salaries against the national all incumbents market. As part of the strategy of the Council for Geoscience to offer competitive salaries and benefits, the organisation aligned the salaries of staff to the 50$^{th}$ percentile of the national all incumbents market in November 2016.

The following are benefits offered to staff:

- Life cover in the event of death during employment;
- Income care scheme in the event of temporary and permanent incapacitation.

***Training and professional development***

*Full-time study bursaries*

The Council for Geoscience uses its full-time study bursary programme as a feeder pipeline to build its scientific expertise. For the year under review, the Council for Geoscience awarded a total of 43 bursaries for full-time studies in respect of PhD, MSc, BSc Honours and BSc qualifications.

***Table D1: Racial and gender profile of students in the bursary programme***

| Category | MALE | | | | FEMALE | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | African | Coloured | Indian | White | African | Coloured | Indian | White | |
| PhD | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 3 |
| MSc | 6 | 0 | 0 | 2 | 6 | 3 | 0 | 4 | 21 |
| BSc Hons | 2 | 0 | 0 | 0 | 7 | 0 | 3 | 0 | 12 |
| BSc | 2 | 1 | 0 | 0 | 2 | 0 | 0 | 2 | 7 |
| Total | 11 | 1 | 0 | 2 | 16 | 3 | 4 | 6 | 43 |

*Internships*

The Council for Geoscience has partnered with the Mining Qualifications Authority (MQA) to support skills development, growth and career opportunities for aspiring young graduates. To this end, a total of 50 interns were trained at the organisation during the year under review.

***Table D2: Gender and racial profile of interns in the internship programme***

| Category | RACE | | | | Total |
|---|---|---|---|---|---|
| | African | Coloured | Indian | White | |
| PhD | 24 | 2 | 2 | 1 | 29 |
| MSc | 19 | 1 | 1 | 0 | 21 |
| BSc Hons | 43 | 3 | 3 | 1 | 50 |

## 4. PERFORMANCE MANAGEMENT

The Council for Geoscience continues to use the balanced scorecard as a performance measurement tool to measure performance at a corporate level and individual level.

## 5. EMPLOYEE WELLNESS PROGRAMMES

The Council for Geoscience strives to ensure the wellness of its staff through the contracted service provider Careways. Services under this programme include, among others, support with

emotional and personal difficulties, alcohol, drug and gambling abuse, management of stress, HIV/AIDS and financial wellness.

## 6. HIGHLIGHTS OF ACHIEVEMENTS

The Council for Geoscience has achieved a turnover rate of 0.86% for the year under review. Moreover, the organisation has improved its compensation strategy. The investment in training and development amounted to 3.8% of the personnel expenditure. This percentage is significantly higher than the 1% prescribed by the Skills Development Act.

## 7. CHALLENGES FACED BY THE ORGANISATION

The Council for Geoscience is faced with a loss of a critical mass of high expertise in scientific skills owing to staff members reaching retirement age. Measures are being put in place to transfer these skills to young scientists through mentoring and succession planning.

The absence of a sustainable structure has created uncertainty, but this is being addressed through the recently approved structure that will be populated in the 2017/2018 financial year.

## 8. FUTURE HUMAN RESOURCES GOALS

Resourcing the organisation with scientific skills in line with the proposed mapping programme will be vital in the 2017/2018 financial year as well as for the rollout of the organisational structure.

## 9. HUMAN RESOURCES OVERSIGHT STATISTICS

***Table D3: Age profile***

| | Age group | 25–34 | 35–44 | 45–54 | 55–64 | >65 | Total |
|---|---|---|---|---|---|---|---|
| 2016/2017 | Number of staff | 128 | 102 | 75 | 45 | 3 | 353 |
| | Percentage of staff | 36.26 | 28.90 | 21.25 | 12.75 | 0.85 | 100 |

***Table D4: Training costs***

| Personnel expenditure | Training expenditure* | Training expenditure as a percentage of personnel cost | Number of employees trained | Average training cost per employee |
|---|---|---|---|---|
| 159 018 422 | 5 987 528 | 3.8 | 349 | 17 156.24 |

** Training is centralised, hence this aspect has not been partitioned.*

***Table D5: Employment and vacancies***

| Levels | Number of employees | Approved posts | Vacancies | Percentage vacancies |
|---|---|---|---|---|
| Top Management | 3 | 4 | 1 | 25 |
| Senior Management | 17 | 18 | 1 | 5.56 |

| Levels | Number of employees | Approved posts | Vacancies | Percentage vacancies |
|---|---|---|---|---|
| Professional qualified | 160 | 170 | 10 | 5.88 |
| Skilled | 106 | 110 | 4 | 3.64 |
| Semiskilled | 58 | 65 | 7 | 10.77 |
| Unskilled | 9 | 9 | 0 | 0 |

***Table D6: Employment changes***

| Levels | Employment at beginning of the period | Appointments | Terminations | Employment at end of the period |
|---|---|---|---|---|
| Top Management | 3 | 0 | 0 | 3 |
| Senior Management | 16 | 2 | 1 | 17 |
| Professional qualified | 158 | 11 | 9 | 160 |
| Skilled | 102 | 7 | 3 | 106 |
| Semiskilled | 61 | 1 | 4 | 58 |
| Unskilled | 10 | 0 | 1 | 9 |
| Total | 350 | 21 | 18 | 353 |

***Table D7: Reasons for staff leaving***

| Reason | Number | Percentage of total number of staff leaving |
|---|---|---|
| Death | 0 | 0 |
| Resignation | 10 | 56 |
| Dismissal | 0 | 0 |
| Retirement | 2 | 11 |
| Ill health | 0 | 0 |
| Expiry of contract (No renewal) | 1 | 5 |
| Other | 5 | 28 |
| Total | 18 | 100 |

*Table D8: Labour relations: misconduct and disciplinary action*

| Nature of disciplinary action | Number |
|---|---|
| Verbal warning | 0 |
| Written warning | 1 |
| Final written warning | 2 |
| Dismissal | 0 |

*Table D9: Equity targets and employment equity status*

| Levels | MALE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | African | | Coloured | | Indian | | White | |
| | Current | Target | Current | Target | Current | Target | Current | Target |
| Top Management | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 1 |
| Senior Management | 8 | 7 | 0 | 1 | 1 | 1 | 4 | 6 |
| Professional qualified | 38 | 49 | 1 | 7 | 2 | 2 | 30 | 33 |
| Skilled | 66 | 48 | 3 | 5 | 0 | 0 | 7 | 7 |
| Semiskilled | 8 | 11 | 2 | 2 | 0 | 0 | 2 | 2 |
| Unskilled | 6 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 128 | 124 | 6 | 15 | 3 | 3 | 43 | 49 |

| Levels | FEMALE | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | African | | Coloured | | Indian | | White | |
| | Current | Target | Current | Target | Current | Target | Current | Target |
| Top Management | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Senior Management | 2 | 6 | 0 | 0 | 0 | 0 | 2 | 3 |
| Professional qualified | 49 | 51 | 1 | 7 | 5 | 3 | 17 | 21 |
| Skilled | 19 | 27 | 0 | 4 | 1 | 1 | 10 | 11 |
| Semiskilled | 33 | 31 | 3 | 3 | 0 | 0 | 10 | 12 |
| Unskilled | 3 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 107 | 120 | 4 | 14 | 6 | 4 | 39 | 47 |

| Levels | DISABLED STAFF | | | |
|---|---|---|---|---|
| | Male | | 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 | 0 | 0 |
| Semiskilled | 2 | 2 | 0 | 0 |
| Unskilled | 0 | 0 | 0 | 0 |
| Total | 2 | 2 | 1 | 1 |

# PART E: FINANCIAL INFORMATION

This part of the report provides insight into the financial wellness of the organisation. It covers the following aspects:

- The statement of responsibility for the Annual Financial Statements of the year ended 31 March 2017 as signed by the CEO, Mr M. Mabuza and the Chairperson of the Board, Dr H. Mathe;
- The report of the Chief Executive Officer, which includes the general financial review and matters related to the proposed activities, retention of surpluses, supply chain management, audit report matters and plans for the future;
- Report of the Auditor-General to Parliament on the Council for Geoscience. This report gives an opinion in regard to the fairness of the Annual Financial Statements in presenting the organisation's financial position, financial performance and cash flow in accordance with SA Standards of GRAP and requirements of the PFMA, in all material aspects. It reports on performance on legal and regulatory compliance, internal control and matters related thereto;
- The Annual Financial Statements comprise: the Statement of Financial Position; Statement of Financial Performance; Statement of Changes in Net Assets; Cash Flow Statement and Notes to the Financial Statements.

## STATEMENT OF RESPONSIBILITY

**Statement of responsibility for the annual financial statements for the year ended 31 March 2017**

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.

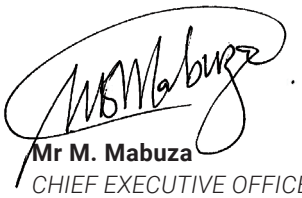
It is the responsibility of the Accounting Authority to establish and implement a system of internal controls designed to provide reasonable assurance in respect of the integrity and reliability of the annual financial statements.

In our opinion, the financial statements fairly reflect the operations of the Council for Geoscience for the financial year ended 31 March 2017.

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 2017 have been audited by the external auditors and their report is presented on pages 82 to 86.

The annual financial statements of the Council for Geoscience set out on pages 87 to 115 have been approved.



**Mr M. Mabuza**
*CHIEF EXECUTIVE OFFICER*
*Council for Geoscience*
*31 July 2017*

**Dr H. Mathe**
*CHAIRPERSON OF THE BOARD*
*Council for Geoscience*
*31 July 2017*

## REPORT OF THE CHIEF EXECUTIVE OFFICER

### General financial review of the Council for Geoscience

The statement of the financial position of the organisation shows growth in total assets from R571.1m to R613.7m. Current assets amount to R336.7m and current liabilities to R157.5m for the reporting period, meaning that the Council for Geoscience will be able to meet its current financial obligations. An amount of R74.7m was spent on Council for Geoscience infrastructure such as scientific and office equipment, machinery, buildings and computer equipment. Plans are in place to increase this investment to build a sustainable organisation. For the year under review, the financial performance of the Council for Geoscience shows an increase in total revenue and a surplus in the amount of R60.6m.

The increase in revenue and surplus is attributable to the changes that are being implemented in the organisation for better future performance and stability. There were also challenges in respect of implementing the projects that are of national importance, i.e. MTEF-funded projects.

### 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 the rollover of funds

In terms of section 53(3) of the Public Finance Management Act (Act No. 1 of 1999), the Council for Geoscience has to obtain approval from the National Treasury to retain surpluses. Approval was obtained for the use of accumulated surpluses for the maintenance of and investment in scientific equipment and infrastructure and the implementation of the repositioning strategy. A new request will be made for the year under review.

### Supply chain management

A Supply Chain Management section is 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).

### Audit report matters

The Council for Geoscience obtained an unqualified audit opinion from the Auditor-General for the year ended 31 March 2017.

### Plans for future additional financial challenges

The Council for Geoscience has reviewed its strategy and structure to optimise the delivery of its mandate. The new strategy includes an expanded mapping programme which aims to refocus the organisation in regard to its statutory mandate as well as to rejuvenate investment in the mining sector.

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

### Report on the audit of the financial statements

#### *Opinion*

1. I have audited the financial statements of the Council for Geoscience set out on pages 87 to 115, which comprise the statement of financial position as at 31 March 2017, and 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 to the financial statements, including a summary of significant accounting policies.

2. In my opinion, the financial statements present fairly, in all material respects, the financial position of the Council for Geoscience as at 31 March 2017, and its financial performance and cash flows for the year then ended in accordance with South African Standards of Generally Recognised Accounting Practice (SA Standards of GRAP) and the requirements of the Public Finance Management Act of South Africa, 1999 (Act No. 1 of 1999) (PFMA).

#### *Basis for opinion*

3. I conducted my audit in accordance with the International Standards on Auditing (ISAs). My responsibilities under those standards are further described in the auditor-general's responsibilities for the audit of the financial statements section of my report.

4. I am independent of the public entity in accordance with the International Ethics Standards Board for Accountants' *Code of ethics for professional accountants* (IESBA code) together with the ethical requirements that are relevant to my audit in South Africa. I have fulfilled my other ethical responsibilities in accordance with these requirements and the IESBA code.

5. I believe that the audit evidence I have obtained is sufficient and appropriate to provide a basis for my opinion.

#### *Emphasis of matters*

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

#### *Restatement of corresponding figures*

7. As disclosed in note 25 to the financial statements, the corresponding figures for 31 March 2016 have been restated as a result of an error in the financial statements of the public entity at, and for the year ended, 31 March 2017.

#### *Irregular expenditure*

8. As disclosed in note 23 to the financial statements, irregular expenditure to the amount of R393 000 was incurred, due to payments made by the entity in contravention of the treasury regulations.

#### *Responsibilities of the accounting authority for the financial statements*

9. The accounting authority is responsible for the preparation and fair presentation of the financial statements in accordance with SA Standards of GRAP and the requirements of the PFMA and for such internal control as the accounting authority determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

10. In preparing the financial statements, the accounting authority is responsible for assessing the Council for Geoscience's ability to continue as a going concern, disclosing, as applicable, matters relating to going concern and using the going concern basis of accounting unless there is an intention by the accounting authority either to liquidate the public entity or to cease operations, or there is no realistic alternative but to do so.

### *Auditor-general's responsibilities for the audit of the financial statements*

11. My objectives are to obtain reasonable assurance about whether financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes my opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

12. A further description of my responsibilities for the audit of the financial statements is included in the annexure to the auditor's report.

## Report on the audit of the annual performance report

### *Introduction and scope*

13. In accordance with the Public Audit Act of South Africa, 2004 (Act No. 25 of 2004) (PAA) and the general notice issued in terms thereof I have a responsibility to report material findings on the reported performance information against predetermined objectives for selected objectives presented in the annual performance report. I performed procedures to identify findings but not to gather evidence to express assurance.

14. My procedures address the reported performance information, which must be based on the approved performance planning documents of the public entity. I have not evaluated the completeness and appropriateness of the performance measures included in the planning documents. My procedures also did not extend to any disclosures or assertions relating to planned performance strategies and information in respect of future periods that may be included as part of the reported performance information. Accordingly, my findings do not extend to these matters.

15. I evaluated the usefulness and reliability of the reported performance information in accordance with the criteria developed from the performance management and reporting framework, as defined in the general notice, for the following selected objectives presented in the annual performance report of the public entity for the year ended 31 March 2017:

| Objectives | Pages in the annual performance report |
|---|---|
| Objective 1 – To serve our stakeholders and customers | 21 |
| Objective 2 – To effectively promote the CGS and disseminate strategic information to the public | 22 |
| Objective 3 – To generate revenue | 22 |
| Objective 4 – To manage overhead efficiency | 22 |
| Objective 5 – To develop and implement effective procedures | 23 |
| Objective 6 – To drive preferential procurement | 23 |
| Objective 7 – To attract and retain workforce | 23 |
| Objective 8 – To build a positive organisation | 24 |
| Objective 9 – To reflect and embrace RSA diversity | 24 |

16. I performed procedures to determine whether the reported performance information was properly presented and whether performance was consistent with the approved performance planning documents. I performed further procedures to determine whether the indicators and related targets were measurable and relevant, and assessed the reliability of the reported performance information to determine whether it was valid, accurate and complete.

17. I did not identify any material findings on the usefulness and reliability of the reported performance information for the following objectives:

- Objective 1 – To serve our stakeholders and customers
- Objective 2 – To effectively promote the CGS and disseminate strategic information to the public
- Objective 3 – To generate revenue
- Objective 4 – To manage overhead efficiency
- Objective 5 – To develop and implement effective procedures
- Objective 6 – To drive preferential procurement
- Objective 7 – To attract and retain workforce
- Objective 8 – To build a positive organisation
- Objective 9 – To reflect and embrace RSA diversity

***Other matters***

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

19. Achievement of planned targets

Refer to the annual performance report on pages 21 to 24 for information on the achievement of planned targets for the year and explanations provided for the under/overachievement of a number of targets.

20. Adjustment of material misstatements

I identified material misstatements in the annual performance report submitted for auditing. These material misstatements were on the reported performance information of Objective 1 – To serve our stakeholders and customers, Objective 7 – To attract and retain workforce, Objective 8 – To build a positive organisation and Objective 9 – To reflect and embrace RSA diversity. As management subsequently corrected the misstatements, I did not report any material findings on the usefulness and reliability of the reported performance information.

**Report on audit of compliance with legislation**

***Introduction and scope***

21. In accordance with the PAA and the general notice issued in terms thereof I have a responsibility to report material findings on the compliance of the public entity with specific matters in key legislation. I performed procedures to identify findings but not to gather evidence to express assurance.

22. The material findings in respect of the compliance criteria for the applicable subject matters are as follows:

23. Annual financial statements, performance and annual report

The annual performance report did not include some of the actual performance results against the objectives, indicators and targets as per the annual performance plan, as required by section 55(2)(a) of the PFMA.

## Other information

24. The Council for Geoscience accounting authority is responsible for the other information. The other information does not include the financial statements, the auditor's report thereon and those selected objectives presented in the annual performance report that have been specifically reported on in the auditor's report.

25. My opinion on the financial statements and findings on the reported performance information and compliance with legislation do not cover the other information and I do not express an audit opinion or any form of assurance conclusion thereon.

26. In connection with my audit, my responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements and the selected objectives presented in the annual performance report, or my knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work I have performed on the other information obtained prior to the date of this auditor's report, I conclude that there is a material misstatement of this other information, I am required to report that fact. I have nothing to report in this regard.

## Internal control deficiencies

27. I considered internal control relevant to my audit of the financial statements, reported performance information and compliance with applicable legislation; however, my objective was not to express any form of assurance thereon. The matters reported below are limited to the significant internal control deficiencies that resulted in the findings on the annual performance report and the findings on compliance with legislation included in this report.

## Financial and performance management

### *Regular, accurate and complete financial and performance reports*

28. The review process did not detect errors in the annual performance report information submitted for audit.

Auditor General

Pretoria

31 July 2017

AUDITOR-GENERAL
SOUTH AFRICA

*Auditing to build public confidence*

## Annexure – Auditor-general's responsibility for the audit

1. As part of an audit in accordance with the ISAs, I exercise professional judgement and maintain professional scepticism throughout my audit of the financial statements, and the procedures performed on reported performance information for selected objectives and on the public entity's compliance with respect to the selected subject matters.

### *Financial statements*

2. In addition to my responsibility for the audit of the financial statements as described in the auditor's report, I also:

- identify and assess the risks of material misstatement of the financial statements whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for my opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- obtain an understanding of internal control relevant to the audit 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 public entity's internal control.

- evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the accounting authority.

- conclude on the appropriateness of the accounting authority's use of the going concern basis of accounting in the preparation of the financial statements. I also conclude, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Council for Geoscience's ability to continue as a going concern. If I conclude that a material uncertainty exists, I am required to draw attention in my auditor's report to the related disclosures in the financial statements about the material uncertainty or, if such disclosures are inadequate, to modify the opinion on the financial statements. My conclusions are based on the information available to me at the date of the auditor's report. However, future events or conditions may cause a public entity to cease to continue as a going concern.

- evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

### *Communication with those charged with governance*

3. I communicate with the accounting authority regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that I identify during my audit.

4. I also confirm to the accounting authority that I have complied with relevant ethical requirements regarding independence, and communicate all relationships and other matters that may reasonably be thought to have a bearing on my independence and here applicable, related safeguards.

## ANNUAL FINANCIAL STATEMENTS FOR THE YEAR ENDED 31 MARCH 2017

### Statement of Financial Position at 31 March 2017

| | Notes | 2017 R'000 | 2016 (Restated) R'000 |
|---|---|---|---|
| **Assets** | | | |
| **Non-current assets** | | | |
| | | 276 943 | 228 358 |
| Property and equipment | 3 | 255 542 | 206 984 |
| Intangible assets | 4 | 3 839 | 3 812 |
| Heritage assets | 26 | 17 562 | 17 562 |
| **Current assets** | | 336 761 | 342 771 |
| Inventories | 5 | 5 | 5 |
| Trade and other receivables | 7 | 19 391 | 30 247 |
| Cash and cash equivalents | 8 | 317 364 | 312 519 |
| **Total assets** | | 613 704 | 571 129 |
| **Net assets and liabilities** | | | |
| **Net assets** | | | |
| Accumulated surplus | | 448 121 | 387 546 |
| **Non-current liabilities** | | | |
| Post-employment benefit liabilities | 6 | 8 050 | 7 872 |
| **Current liabilities** | | 157 533 | 175 711 |
| Trade and other payables | 9 | 26 295 | 35 449 |
| Deferred income | 10 | 113 072 | 125 188 |
| Accruals | 11 | 18 166 | 15 074 |
| **Total net assets and liabilities** | | 613 704 | 571 129 |

## Statement of Financial Performance for the period ended 31 March 2017

| | Notes | 2017 R'000 | 2016 (Restated) R'000 |
|---|---|---|---|
| **Revenue** | 12 | 428 438 | 384 085 |
| Cost of commercial projects | 12 | (14 615) | (28 454) |
| Cost of statutory projects | 12 | (159 243) | (145 831) |
| **Gross surplus** | | 254 580 | 209 800 |
| Other operating income | 12 | 6 513 | 8 884 |
| Administrative expenses | | (219 087) | (169 315) |
| Other operating expenses | 12 | (6 948) | (17 965) |
| Interest received | 13 | 25 572 | 19 919 |
| **Surplus from operations** | | 60 630 | 51 323 |
| Finance cost | 14 | (55) | (19) |
| **Net surplus for the year** | | 60 575 | 51 304 |

## Statement of Changes in Net Assets for the period ended 31 March 2017

| | Notes | Accumulated surplus R'000 | Total R'000 |
|---|---|---|---|
| **Balance at 31 March 2015** | | 336 242 | 336 242 |
| Net surplus for the period restated | | 51 304 | 51 304 |
| Net surplus for the period 2016 | | 54 180 | 54 180 |
| Correction of prior period error | 25.1 | (2 876) | (2 876) |
| **Balance at 31 March 2016 restated** | | 387 546 | 387 546 |
| Net surplus for the period | | 60 575 | 60 575 |
| **Balance at 31 March 2017** | | 448 121 | 448 121 |

## Cash Flow Statement for the period ended 31 March 2017

| | Notes | 2017 R'000 | 2016 (Restated) R'000 |
|---|---|---|---|
| **Cash inflow from operating activities** | | 78 293 | 100 995 |
| Cash receipts from customers | | 439 301 | 375 149 |
| Cash paid to suppliers and employees | | (386 525) | (294 054) |
| Cash generated from operations | 15 | 52 776 | 81 095 |
| Interest received | 13 | 25 572 | 19 919 |
| Finance cost | 14 | (55) | (19) |
| **Cash outflow from investing activities** | | (73 448) | (40 413) |
| Acquisition of: | | | |
| Property and equipment | 16.1 | (73 127) | (40 002) |
| Intangible assets | 16.2 | (1 633) | (1 719) |
| Recovery of losses from property and equipment | 3.1 | 1 312 | 1 308 |
| **Net increase in cash and cash equivalents** | | 4 845 | 60 582 |
| **Cash and cash equivalents at beginning of period** | 8 | 312 519 | 251 937 |
| **Cash and cash equivalents at end of period** | 8 | 317 364 | 312 519 |

## 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 was prepared in accordance with the direct method.

3. Specific information has been presented separately on the statement of financial position such as:

   (a) receivables from non-exchange transactions, including taxes and transfers;

   (b) taxes and transfers payable;

   (c) trade and other payables from non-exchange transactions.

   The budget reporting standard does not apply to the Council for Geoscience as our budget is not tabled independently as an entity in parliament or legislatures and is not publicly available.

### 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 a baseline allocation from the Department of Mineral Resources.

Revenue from non-exchange transactions is recorded as deferred income when it is received. It is then recognised as income on a systematic basis over the period in relation to the costs incurred.

#### *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

Property and equipment are tangible non-current assets that are held for use in the production or supply of goods or services, or for administrative purposes, and are expected to be used during more than one period.

The cost of an item of property and equipment 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.

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

Costs include costs incurred initially to acquire or construct an item of property and equipment 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 property and equipment, the carrying amount of the replaced part is derecognised.

Property and equipment 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 or 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 property and equipment 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 & Helicopter — Body | 15 years |
| Aircraft & 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 it is 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.

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 values, on a straight-line basis, being two to five years.

**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;

Where no internally generated intangible asset can be recognised, development expenditure is recognised as an expense in the period in which it is incurred. Internally generated assets are amortised on a straight-line basis over their useful lives.

### 1.6 Heritage assets

Heritage assets are assets held for their cultural, environmental or historical significance. Heritage assets are initially recognised at deemed cost (fair value) which has been determined, due to the nature of heritage assets, by specialised valuators. Heritage assets are reflected at fair value and are not depreciated.

### 1.7 Inventories

The Council for Geoscience is a custodian of scientific information that 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 initially measured at deemed cost (fair 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 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.

### 1.10 Retirement benefit costs

**Short-term employee benefits**
The cost of short-term employee benefits (those payable within twelve 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 are 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.

## 1.11 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.

## 1.12 Financial instruments

**Initial recognition**

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

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

Financial assets and liabilities are recognised initially at fair value.

**Derecognition of financial instruments**

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

The entity derecognises financial liabilities when the 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 uncollectable, 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 values 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 values 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 evaluated individually 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.

## 1.13 Operating leases

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

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

## 1.14 Impairment

The Council for Geoscience identifies cash generating assets as assets that are managed with the objective of generating a commercial return, and non-cash generating assets as assets that do not generate market related cash flows from that asset.

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 assumed costs to sell and its value in use.

If the recoverable amount of an asset is less than its carrying amount, the carrying amount of the asset is reduced to its recoverable amount. That reduction is an impairment loss recognised immediately in surplus or deficit.

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

## 1.15 Critical accounting estimates and judgements

**Provision for bad debts**
Past experience indicates a reduced prospect of collecting debtors 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.

### 1.16 Sources of estimation uncertainty

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

## 2. 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 2015 or later periods:

| GRAP statement | Description | Impact | Effective date |
|---|---|---|---|
| GRAP 20 | Related Party Disclosure | None | No effective date |
| GRAP 32 | Service Concession Arrangements: Grantor | None | No effective date |
| GRAP 108 | Statutory Receivables | None | No effective date |
| GRAP 109 | Accounting by Principals and Agents | None | No effective date |
| IGRAP 17 | Services Concession Arrangements | None | No effective date |

## 3. PROPERTY AND EQUIPMENT

| 2017 | Land R'000 | Buildings and fixtures R'000 | *Equipment R'000 | Office furniture R'000 | Aircraft and boat R'000 | Motor vehicles R'000 | Computer equipment R'000 | Total R'000 |
|---|---|---|---|---|---|---|---|---|
| Gross carrying amount | 18 231 | 161 454 | 120 375 | 14 002 | 23 382 | 16 496 | 21 407 | 375 347 |
| Accumulated depreciation at the beginning of the period | (1 600) | (49 785) | (76 522) | (8 214) | (8 732) | (9 854) | (13 656) | (168 363) |
| **Opening net carrying amount at 31 March 2016** | 16 631 | 111 669 | 43 853 | 5 788 | 14 650 | 6 642 | 7 751 | 206 984 |
| Movements during the period: | | | | | | | | |
| Work in progress (refer to note 3.3) | - | 19 360 | 2 230 | - | 983 | - | - | 22 573 |
| Acquisitions | - | 3 459 | 29 724 | 664 | - | 14 275 | 2 432 | 50 554 |
| Impairment | (360) | - | - | - | - | - | - | (360) |
| Disposals | - | - | (2 116) | (404) | - | (11) | (486) | (3 017) |
| Disposals — Cost | - | - | (13 341) | (1 147) | - | (117) | (3 449) | (18 054) |
| Disposals — Depreciation | - | - | 11 225 | 743 | - | 106 | 2 963 | 15 037 |
| Depreciation | - | (4 941) | (10 020) | (685) | (1 750) | (1 821) | (1 978) | (21 195) |
| **Closing net carrying amount at 31 March 2017** | 16 271 | 129 547 | 63 674 | 5 363 | 13 883 | 19 085 | 7 719 | 255 542 |
| Gross carrying amount | 18 231 | 184 273 | 138 988 | 13 519 | 24 365 | 30 654 | 20 390 | 430 420 |
| Accumulated depreciation/ impairment | (1 960) | (54 726) | (75 314) | (8 156) | (10 482) | (11 569) | (12 671) | (174 878) |

*Property and equipment (continued)*

| 2016 | Land R'000 | Buildings and fixtures R'000 | *Equipment R'000 | Office furniture R'000 | Aircraft and boat R'000 | Motor vehicles R'000 | Computer equipment R'000 | Total R'000 |
|---|---|---|---|---|---|---|---|---|
| Gross carrying amount | 18 231 | 141 457 | 112 959 | 14 600 | 31 324 | 18 922 | 23 505 | 360 998 |
| Accumulated depreciation at the beginning of the period | - | (40 570) | (76 304) | (8 034) | (9 781) | (9 790) | (15 095) | (159 574) |
| **Opening net carrying amount at 31 March 2015** | 18 231 | 100 887 | 36 655 | 6 566 | 21 543 | 9 132 | 8 410 | 201 424 |
| Movements during the period: | | | | | | | | |
| Work in progress | - | 16 133 | 2 400 | - | - | - | - | 18 533 |
| Impairment | (1 600) | (4 304) | - | - | - | - | - | (5 904) |
| Acquisitions | - | 3 864 | 12 534 | 170 | 3 224 | - | 1 677 | 21 469 |
| Disposals | - | - | (908) | (262) | (8 829) | (906) | (539) | (11 444) |
| Disposals — Cost | - | - | (7 518) | (768) | (11 166) | (2 426) | (3 775) | (25 653) |
| Disposals — Depreciation | - | - | 6 610 | 506 | 2 337 | 1 520 | 3 236 | 14 209 |
| Depreciation | - | (4 911) | (6 828) | (686) | (1 288) | (1 584) | (1 797) | (17 094) |
| **Closing net carrying amount at 31 March 2016** | 16 631 | 111 669 | 43 853 | 5 788 | 14 650 | 6 642 | 7 751 | 206 984 |
| Gross carrying amount | 18 231 | 161 454 | 120 375 | 14 002 | 23 382 | 16 496 | 21 407 | 375 347 |
| Accumulated depreciation/ impairment | (1 600) | (49 785) | (76 522) | (8 214) | (8 732) | (9 854) | (13 656) | (168 363) |

** Equipment in the tables above include the following categories of equipment: specialised equipment, audio and visual equipment and technical equipment*

## 3.1 Compensation from third parties for property and equipment lost

| | 2017 R'000 | 2016 R'000 |
|---|---|---|
| Proceeds from insurance | 1 312 | 1 308 |

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 at date of transfer R'000 |
|---|---|
| 474 Carl Street, Town Lands 351 JR, Pretoria West | R 2 800 |
| 280 Pretoria Street, Silverton, Pretoria | R 94 000 |

The value of these properties has been included in the carrying amount of land and buildings as at 31 March 2017 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.

### 3.2 Impairment of property

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| Description | | |
| Buildings and fixtures | - | 4 304 |
| Land | 360 | 1 600 |
| | 360 | 5 904 |

The events and circumstances that led to the recognition of impairment loss was as a result of a devaluation on land and buildings. The recoverable service amount used is the higher of the fair value less cost to sell and value in use. A certified property valuator was contracted and based on the findings of the valuator the appropriate recoverable service amount is its fair value less cost to sell.

### 3.3 Property and equipment in the process of being constructed

**Cumulative expenditure recognised in the carrying value of property and equipment being developed/ constructed**

| | Buildings and fixtures<br>R'000 | Equipment<br>R'000 | Aircraft and boat<br>R'000 | Total<br>R'000 |
|---|---|---|---|---|
| Gross carrying amount | 16 133 | 2 400 | - | 18 533 |
| Accumulated depreciation at the beginning of the period | - | - | - | - |
| **Opening net carrying amount at 31 March 2016** | 16 133 | 2 400 | - | 18 533 |
| Movement | 3 227 | (170) | 983 | 4 040 |
| **Closing net carrying amount at 31 March 2017** | 19 360 | 2 230 | 983 | 22 573 |

### 3.4 Property and equipment in the process of being constructed with delays

Included in the work in progress for buildings and fixtures is a carrying amount of R18 748m in respect of an HVAC system (airconditioning system) in the Silverton building that has been delayed due to technical difficulties.

| | Buildings and fixtures<br>R'000 |
|---|---|
| Gross carrying amount | 13 654 |
| Accumulated depreciation at the beginning of the period | - |
| **Opening net carrying amount at 31 March 2016** | 13 654 |
| Movement | 5 094 |
| **Closing net carrying amount at 31 March 2017** | 18 748 |

*Property and equipment (continued)*

Repairs and maintenance expenditure incurred for the year to repair and maintain property and equipment

**Repairs and maintenance**

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| **Description** | | |
| Land and buildings | 4 064 | 4 447 |
| Office equipment and furniture | 92 | 112 |
| Technical and scientific equipment | 3 271 | 1 871 |
| Computer equipment | 375 | 192 |
| Aircraft | 1 229 | 2 293 |
| | 9 030 | 8 915 |

## 4. INTANGIBLE ASSETS

| | | |
|---|---|---|
| **Computer software** | | |
| Gross carrying amount | 8 639 | 8 878 |
| Accumulated amortisation | (4 827) | (5 299) |
| **Opening net carrying amount at 31 March 2016** | 3 812 | 3 579 |
| Movements during the period: | | |
| Acquisitions | 1 633 | 1 719 |
| Disposals | (90) | (183) |
| Disposals — Cost | (301) | (1 958) |
| Disposals — Amortisation | 211 | 1 775 |
| Amortisation | (1 516) | (1 303) |
| **Closing net carrying amount at 31 March 2017** | 3 839 | 3 812 |
| Gross carrying amount | 9 971 | 8 639 |
| Accumulated amortisation | (6 132) | (4 827) |

## 5. INVENTORIES

| | | |
|---|---|---|
| Publication inventories | 5 | 5 |

## 6. RETIREMENT BENEFIT

### 6.1 Post-retirement medical-aid fund (PRM)

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:**

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| Current service costs | 118 | 144 |
| Interest charge | 1 995 | 1 651 |
| Expected return on planned assets | (1 355) | (1 158) |
| Actuarial (gain)/loss recognised | (580) | 1 873 |
| Recognition of loss on asset realisation | - | (1 650) |
| | 178 | 860 |

**The amount included in the statement of financial position arising from Council for Geoscience obligation in respect of PRM is as follows:**

| | 2017<br>R'000 | 2016<br>R'000 | 2015<br>R'000 | 2014<br>R'000 |
|---|---|---|---|---|
| Present value of fund obligations | 23 084 | 22 931 | 21 863 | 19 504 |
| Fair value of planned assets | (15 034) | (15 059) | (14 851) | (14 147) |
| Liability recognised in statement of financial position | 8 050 | 7 872 | 7 012 | 5 357 |

| Movement in net liability during the period is as follows: | 2017 | | | 2016 | | |
|---|---|---|---|---|---|---|
| | Liability | Planned asset | Net | Liability | Planned asset | Net |
| Liability at beginning of period | 22 931 | - | 22 931 | 21 863 | - | 21 863 |
| Value of planned assets at beginning of period | - | (15 059) | (15 059) | - | (14 851) | (14 851) |
| | 22 931 | (15 059) | 7 872 | 21 863 | (14 851) | 7 012 |
| Interest charge/expected return of planned asset | 1 995 | (1 355) | 640 | 1 651 | (1 158) | 493 |
| Contributions received | 118 | - | 118 | - | (1 650) | (1 650) |
| Current service costs | - | - | - | 144 | - | 144 |
| Benefits paid | (1 670) | 1 670 | - | (1 549) | 1 549 | - |
| Actuarial (gain)/loss | (290) | (290) | (580) | 822 | 1 051 | 1 873 |
| Actuarial loss/(gain) recognised on curtailment | - | - | - | - | - | - |
| Closing balance | 23 084 | (15 034) | 8 050 | 22 931 | (15 059) | 7 872 |

*Retirement benefit (continued)*

**Contributions expected to be paid**

No top-up payments are expected to be made during the 2017 year.

| | | |
|---|---|---|
| Expected rate of return on assets | | 8.55% |
| **Assumptions** | | |
| Discount rates | | 8.55% |
| Basis of discount rates | JSE zero coupon bond yield after the market closed on 31 March 2017 | |
| Return on assets | | 8.55% |
| Expected salary increases | | 7.50% |
| Health care cost inflation rate | | 7.04% |

**Sensitivity analysis on accrued liability (R millions) for the year ending 31 March 2017**

| Assumption | Change | In-service | Continuation | Total | Change |
|---|---|---|---|---|---|
| Central assumptions | - | 3.718 | 19.367 | 23.085 | - |
| Health care inflation | 1% | 4.287 | 20.943 | 25.230 | 9% |
| | -1% | 3.25 | 17.968 | 21.218 | -8% |
| Discount rate | 1% | 3.252 | 17.956 | 21.208 | -8% |
| | -1% | 4.294 | 20.984 | 25.278 | 10% |
| Post-retirement mortality | -1 year | 3.835 | 20.212 | 24.047 | 4% |
| Average retirement date | -1 year | 3.806 | 19.367 | 23.173 | 0% |
| Continuation of membership at retirement | -10% | 3.351 | 19.367 | 22.718 | -2% |

The table above indicates, for example, that if medical inflation is 1% greater then the long-term assumptions made, the liability will be 10% higher than that shown.

**Sensitivity analysis for current service and interest cost for the year ending 31 March 2017**

| Assumption | Change | Current service | Interest cost | Total | Change |
|---|---|---|---|---|---|
| Central assumptions | - | 118 400 | 1 995 100 | 2 113 500 | - |
| Health care inflation | 1% | 140 500 | 2 198 500 | 2 339 000 | 11% |
| | -1% | 100 700 | 1 819 100 | 1 919 800 | -9% |
| Discount rate | 1% | 101 600 | 2 019 600 | 2 121 200 | 0% |
| | -1% | 139 600 | 1 959 100 | 2 098 700 | -1% |
| Average retirement age (60) | -1 year | 100 200 | 2 012 800 | 2 113 000 | 0% |

The table above indicates, for example, that if medical inflation is 1% greater then the long-term assumptions made, the liability will be 12% higher than that shown.

### 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 R10 521m (2016: R9 176m) represents equal contributions of 7.5% by the employer and employee.

## 7. TRADE AND OTHER RECEIVABLES FOR EXCHANGE REVENUE

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| Trade receivables | 9 037 | 6 810 |
| Contract customers | 6 747 | 20 500 |
| Other receivables | 4 269 | 4 609 |
| | 20 053 | 31 919 |
| Less — Provision for bad debts | (662) | (1 672) |
| | 19 391 | 30 247 |
| Provision for bad debts | | |
| Opening balance | 1 672 | 218 |
| Movement | (1 010) | 1 454 |
| Closing balance | 662 | 1 672 |

### Analysis of impairment

| | | |
|---|---|---|
| Long overdue debtors considered impaired | 662 | 1 672 |
| | 662 | 1 672 |

There is no difference between the fair value of trade and other receivables and their book value.

## 8. CASH AND CASH EQUIVALENTS

Cash and cash equivalents at the end of the period are represented by the following balances:

| | | |
|---|---|---|
| Cash at bank | 16 497 | 20 389 |
| Call accounts | 300 867 | 292 130 |
| Cash and cash equivalents at the end of the period are represented by the following balances: | 317 364 | 312 519 |

There is no difference between the fair value of cash and cash equivalents and their book value.

## 9. TRADE AND OTHER PAYABLES

| | | |
|---|---|---|
| Trade payables | 10 409 | 19 487 |
| Other payables | 15 886 | 15 962 |
| | 26 295 | 35 449 |

There is no difference between the fair value of trade payables and their book value.

## 10. DEFERRED INCOME

### Exchange revenue

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| **10.1 Deferred income arising as a result of an agreement entered into with the Department of Science and Technology to investigate rock innovation.** | | |
| Carrying amount at the beginning of period | 192 | - |
| Amounts received | - | 304 |
| Amounts used during the period | (192) | (112) |
| Carrying amount at the end of period | - | 192 |
| **10.2 Deferred income arising as a result of an agreement entered into with the Department of Science and Technology to develop an intellectual property management office. (Geoscience Act par 5(1)(g))** | | |
| Amounts received | 1 421 | 1 421 |
| Carrying amount at the end of period | 1 421 | 1 421 |
| **10.3 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 period | - | 33 |
| Amounts used during the period | - | (33) |
| Carrying amount at the end of period | - | - |
| **10.4 Deferred income arising as a result of an agreement with the Department of Science and Technology for environmentally friendly and efficient methods for the extraction of Rare Earth Elements.** | | |
| Carrying amount at the beginning of period | 1 502 | 1 299 |
| Amounts received | - | 203 |
| Amounts used during the period | (498) | - |
| Carrying amount at the end of period | 1 004 | 1 502 |
| **10.5 Deferred income arising as a result of an agreement with the Department of Science and Technology in terms of the Earth Observation and Geohazards Assessment.** | | |
| Carrying amount at the beginning of period | 2 922 | 2 922 |
| Carrying amount at the end of period | 2 922 | 2 922 |
| **10.6 Deferred income arising as a result of an agreement with the Department of Science and Technology to study the Witwatersrand Central Basin mine water apportionment.** | | |
| Carrying amount at the beginning of period | 35 | 35 |
| Carrying amount at the end of period | 35 | 35 |

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| **10.7 Deferred income arising as a result of an agreement entered into with the National Research Foundation.** | | |
| Carrying amount at the beginning of period | 110 | 110 |
| Amounts received | 211 | - |
| Carrying amount at the end of period | 321 | 110 |
| **10.8 Deferred income arising as a result of pre-funding for the Microzonation Project.** | | |
| Amounts received | 11 493 | - |
| Amounts used during the period | (11 493) | - |
| Carrying amount at the end of period | - | - |
| **10.9 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 period | 119 006 | 108 468 |
| Amounts received | 194 006 | 177 613 |
| Amounts used during the period | (205 643) | (167 075) |
| Carrying amount at the end of period | 107 369 | 119 006 |
| **Total deferred income** | 113 072 | 125 188 |

## 11. ACCRUALS

| | | |
|---|---|---|
| **Accruals for leave pay** | | |
| Carrying amount at the beginning of period | 10 927 | 10 856 |
| Provision current period | 3 683 | 1 357 |
| Amounts used during the current period | (1 026) | (1 286) |
| Carrying amount at the end of period | 13 584 | 10 927 |
| The leave pay provision relates to the estimated liabilities as a result of leave days due to employees. | | |
| **Accruals for 13th cheque** | | |
| Carrying amount at the beginning of period | 4 147 | 3 944 |
| Provision current period | 435 | 203 |
| Carrying amount at the end of period | 4 582 | 4 147 |
| The 13th cheque accrual relates to the structuring of the employee costs to the company and is paid out on employees' birthdays. | | |
| **Total accrual** | 18 166 | 15 074 |

## 12. SURPLUS/DEFICIT FROM OPERATIONS

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| Operating surplus/deficit is arrived at after taking the following items into account: | | |
| **Revenue** | | |
| **Non-exchange revenue** | | |
| Total grant received | 378 598 | 342 914 |
| Project related revenue | (194 006) | (177 613) |
| | 184 592 | 165 301 |
| **Exchange revenue** | | |
| Department of Mineral Resources project related revenue | 205 643 | 167 075 |
| Contracting revenue | 32 833 | 45 893 |
| Publication revenue | 5 369 | 5 816 |
| | 243 846 | 218 784 |
| | 428 438 | 384 085 |
| **Cost of contracts** | | |
| Direct cost | 7 222 | 17 625 |
| Personnel expenditure | 7 393 | 10 829 |
| | 14 615 | 28 454 |
| **Cost of statutory projects** | | |
| Direct cost | 79 373 | 67 633 |
| Personnel expenditure | 79 870 | 78 198 |
| | 159 243 | 145 831 |
| **Other operating income** | | |
| Foreign currency gains | 183 | 4 503 |
| Recovery of asset losses | 1 312 | 1 308 |
| Sundry income | 5 018 | 3 073 |
| | 6 513 | 8 884 |
| **Administrative expenses include -** | | |
| Audit fees | 3 024 | 1 913 |
| - Current period | 2 318 | 1 538 |
| - Internal audit | 194 | 238 |
| - Fee for other services | 512 | 137 |
| Bad debts written off | 1 090 | - |
| Provision for bad debts | (1 010) | 1 454 |
| Depreciation — on owned assets | 21 195 | 17 094 |

*Surplus/deficit from operations (continued)*

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| - Buildings | 4 941 | 4 911 |
| - Equipment | 10 020 | 6 828 |
| - Office furniture | 685 | 686 |
| - Motor vehicles | 1 821 | 1 584 |
| - Aircraft | 1 750 | 1 288 |
| - Computer equipment | 1 978 | 1 797 |
| | | |
| Amortisation — intangible assets | | |
| - Computer software | 1 516 | 1 303 |
| | | |
| Rentals in respect of operating leases | | |
| - Land and buildings | 651 | 1 035 |
| - Multifunctional printers | 438 | 546 |
| | | |
| **Other operating expenses** | | |
| Net loss on disposal of equipment | 2 116 | 1 714 |
| Net loss on disposal of vehicles | 11 | 906 |
| Net loss on disposal of intangible assets | 90 | 184 |
| Net loss on disposal of computer equipment | 486 | - |
| Net loss on disposal of office furniture | 404 | - |
| Net loss on disposal of aircraft | - | 8 828 |
| Impairment of assets | 360 | 5 904 |
| Writing off of bad debts | 1 090 | - |
| Foreign currency losses | 2 391 | 429 |
| | 6 948 | 17 965 |
| Staff costs | 222 281 | 187 620 |
| Included in staff costs are: | | |
| Defined benefit plan expense for the post-retirement medical-aid fund | 178 | 860 |
| Current service cost | 118 | 144 |
| Interest cost | 1 995 | 1 651 |
| Expected return on plan assets | (1 355) | (1 158) |
| Recognised actuarial (gain)/**loss** | (580) | 223 |
| - Defined contribution plan expenses for the pension and provident fund | 10 521 | 9 176 |

*Surplus/deficit from operations (continued)*

## *Emoluments*

| Senior management | 2016/2017 | | | |
|---|---|---|---|---|
| | Pensionable salary R'000 | Provident/Pension fund contributions R'000 | *Other contributions R'000 | Total R'000 |
| Mr Sikhosana S.M. (Acting CEO) — End date November 2016 | 1 973 | - | 21 | 1 994 |
| Mr Matsepe L.D. | 2 041 | 107 | 90 | 2 238 |
| Mr Ramagwede L.F. | 1 909 | 108 | 88 | 2 105 |
| Dr Makgae M.E. | 1 645 | 100 | 84 | 1 829 |
| Mr Mabuza M. (Acting CEO) — Start date November 2016 | 438 | - | 6 | 444 |

| | 2015/2016 | | | |
|---|---|---|---|---|
| | Pensionable salary R'000 | Provident/Pension fund contributions R'000 | *Other contributions R'000 | Total R'000 |
| Mr Kota M. (CEO) — End date April 2015 | 441 | 12 | 28 | 480 |
| Mr Matsepe L.D. | 1 576 | 103 | 86 | 1 765 |
| Mr Ramagwede L.F. | 1 559 | 95 | 86 | 1 740 |
| Dr Makgae M.E. | 1 503 | 91 | 83 | 1 677 |
| Mr Sikhosana S.M. (Acting CEO) — Start date May 2015 | 2 347 | - | 29 | 2 375 |

| Board emoluments | | |
|---|---|---|
| Non-executive Board members | | |
| | 2017 R'000 | 2016 R'000 |
| Prof. Ngoepe P.E. | 394 | 400 |
| Ms Mthimunye K.R. | 171 | 123 |
| Dr Mathe H. | 203 | 101 |
| Mr Sibiya D. | 28 | 10 |
| Prof. Hermanus M.A. | 68 | 52 |
| Dr McGill J.E. | 101 | 108 |
| | 966 | 793 |

* Other contributions relate to employer contributions towards statutory deductions.

*Surplus/deficit from operations (continued)*

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 expired on 28 February 2017.

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| **13. INTEREST RECEIVED** | | |
| Interest received | | |
| - Interest income on call accounts | 22 081 | 17 517 |
| - Interest income on current accounts | 3 491 | 2 402 |
| | 25 572 | 19 919 |
| **14. FINANCE COST** | | |
| Interest | 55 | 19 |
| **15. RECONCILIATION OF NET SURPLUS FOR THE PERIOD TO CASH GENERATED FROM OPERATIONS** | | |
| Net surplus for the period | 60 575 | 51 304 |
| Interest | 55 | 19 |
| Depreciation on property and equipment | 21 195 | 17 094 |
| Amortisation — intangible assets | 1 516 | 1 303 |
| Impairment of assets | 360 | 5 904 |
| Compensation from third parties for property and equipment lost | (1 312) | (1 308) |
| Net loss on disposal of fixed assets | 3 107 | 11 632 |
| Interest earned | (25 572) | (19 919) |
| Provision for post-retirement medical-aid benefits | 178 | 860 |
| Operating cash flows before working capital changes | 60 102 | 66 889 |
| Working capital changes - | | |
| Increase in provision for accumulated leave pay and 13th cheque | 3 073 | 274 |
| Decrease (increase) in trade and other receivables | 10 860 | ( 7 363) |
| (Decrease) increase in trade and other payables | ( 9 140) | 8 970 |
| (Decrease) increase in deferred income | ( 12 119) | 12 325 |
| Cash generated from operations (including finance costs) | 52 776 | 81 095 |

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|

## 16. ACQUISITION OF ASSETS

### 16.1 Property and equipment

| | | |
|---|---|---|
| Land and buildings | 3 459 | 3 864 |
| Equipment | 29 724 | 12 534 |
| Office furniture | 664 | 170 |
| Aircraft and boat (including WIP aircraft) | - | 3 224 |
| Motor vehicles | 14 275 | - |
| Computer equipment | 2 432 | 1 677 |
| | 50 554 | 21 469 |

**Work in progress — Acquisitions**

| | | |
|---|---|---|
| Land and buildings | 19 360 | 16 133 |
| Equipment | 2 230 | 2 400 |
| Aircraft | 983 | - |
| | 22 573 | 18 533 |
| Total acquisitions | 73 127 | 40 002 |

### 16.2 Intangible assets

| | | |
|---|---|---|
| Computer software | 1 633 | 1 719 |
| | 1 633 | 1 719 |

## 17. CONTINGENT LIABILITY

### 17.1 Bank guarantees

| | | |
|---|---|---|
| Performance bonds and bid bonds issued for contract work to various financial institutions | 1 400 | - |
| | 1 400 | - |

### 17.2 Pending legal action

| | | |
|---|---|---|
| The Council for Geoscience has an estimated legal liability due to a pending labour case | 3 000 | 990 |
| | 3 000 | 990 |

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|

## 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 reporting date, the outstanding commitments under non-cancellable operating leases, which fall due are as follows:

| | | |
|---|---|---|
| Up to I year | - | 492 |
| Total lease commitments | - | 492 |

### 19.2 Lease of office printing equipment

The operating lease between a supplier and the Council for Geoscience entered into on 01 October 2015 to 30 September 2018.

At the reporting date, the outstanding commitments under non-cancellable operating leases, which fall due are as follows:

| | | |
|---|---|---|
| Up to I year | 1 689 | 1 689 |
| 2 to 5 years | 2 214 | 4 090 |
| Total lease commitments | 3 903 | 5 779 |

### 19.3 Commitments

| | | |
|---|---|---|
| Operating expenditure | | |
| Approved and contracted | 85 337 | 74 270 |
| Capital expenditure | | |
| Approved and contracted: Property and equipment | 27 889 | 23 689 |
| Total commitments | 113 226 | 97 959 |

| | | |
|---|---|---|
| Commitments | | |
| Up to I year | 89 570 | 88 538 |
| 2 to 5 years | 23 656 | 9 421 |
| Total commitments | 113 226 | 97 959 |

The Council for Geoscience has usage based contracts for the provision of the following services:

- Sampling services, Geophysics
- Accommodation and travel
- Courier services

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|

## 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 exposure of the Council for Geoscience 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 on-going basis. The Council for Geoscience does not have any significant exposure to any individual customer or counterparty.

Trade receivables and other payables are carried at amortised costs. Refer to notes 7 and 9.

### 20.2 Interest rate risk

The exposure of the organisation to interest rate risk and the effective interest rates on the financial instruments at reporting date are:
31 March 2017

| | Weighted average effective interest rate | Weighted average effective interest rate |
|---|---|---|
| **Assets** | | |
| Cash | 3.95% | 3.95% |
| Call accounts | 7.46% | 7.04% |

**Short-term deposits**

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.
- Short-term deposits are only reinvested or invested with Management 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. The Council for Geoscience exposure at 31 March 2017 is disclosed in note 21.

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|

## 20.4 Airborne operations risk

It is the policy of the Council for Geoscience to transfer risk in respect of airborne operations to third parties, namely insurance and an external operator.

## 21. FOREIGN CURRENCY EXPOSURE

| | 2017 R'000 | | | 2016 R'000 | | |
|---|---|---|---|---|---|---|
| | Exchange rate | Foreign amount | R-value | Exchange rate | Foreign amount | R-value |
| **21.1 Trade receivables** | | | | | | |
| Foreign currency | | | | | | |
| British Pound | R 16.39520 | £ 15 | 238 | R 20.80070 | £ 7 | 146 |
| US$ | R 13.19130 | $ 166 | 2 195 | R 14.51300 | $ 33 | 479 |
| **21.2 Banks** | | | | | | |
| Foreign funds | | | | | | |
| Moroccan Dirham (MAD) | R 1.32690 | 7 774 | 10 316 | R 1.51791 | 7 861 | 11 932 |
| Euro | R 14.05630 | € 240 | 3 374 | R 16.53060 | € 240 | 3 967 |

## 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 received | 378 598 | 342 914 |

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 Health and Safety Council |

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| **23. IRREGULAR EXPENDITURE** | | |
| Opening balance | 217 | 1 428 |
| Irregular expenses identified in the current year | 393 | 217 |
| Expenditure condoned | (610) | (1 428) |
| | - | 217 |
| **Analysis of expenditure awaiting condonation per age classification** | | |
| Prior year — payments not in line with supply chain management requirements | - | 217 |
| An investigation was performed and it was confirmed that the irregular expenditure was not the result of fraudulent, corrupt and criminal activities or actions that deprived the State of value for money that may result in the State instituting a civil claim against a third party. | - | - |
| | - | 217 |
| **Analysis of expenditure condoned per age classification** | | |
| Opening balance — condoned by the accounting authority of the Council for Geoscience | 217 | - |
| **Irregular expenses identified in the current year** | | |
| Current year — condoned by the accounting authority of the Council for Geoscience | 64 | 1 314 |
| Prior year — Condoned by the accounting authority of the Council for Geoscience | 329 | 114 |
| | 610 | 1 428 |
| Details of irregular expenditure identified in the current year.<br>Two board members were remunerated in direct contravention of the CGS policy and treasury regulation. An investigation confirmed that the irregular expenditure was not a result of fraudulent, corrupt and criminal activities or actions that deprived the state of value for money. | 393 | - |
| | 393 | - |
| **24. FRUITLESS AND WASTEFUL EXPENDITURE** | | |
| Interest for late payment to supplier | 33 | - |

## 25. CORRECTION OF PRIOR YEAR ERROR

### 25.1 Correction of prior year unrecorded revenue and accruals

***Nature***

**Statement of financial performance as at 31 March 2016**

| | | |
|---|---|---|
| Revenue recorded in the incorrect period — MTEF | - | 129 |
| Revenue recorded in the incorrect period — Commercial revenue | - | 48 |
| Depreciation recorded in the incorrect period | 600 | - |
| Refund of overpaid expenditure — Retirement benefit expenses | (297) | - |
| Expenditure captured in the incorrect period | 2 573 | 497 |

*Correction of prior year error (continued)*

| | 2017<br>R'000 | 2016<br>R'000 |
|---|---|---|
| ***Effect*** | | |
| **Statement of financial position as at 31 March 2016** | | |
| Government grant project related revenue recognise — Deferred income | - | 129 |
| Commercial revenue work in progress — Trade debtors | - | (48) |
| Depreciation recorded in the incorrect period | (600) | - |
| Refund of overpaid expenditure of retirement benefit expenses — Sundry debtor | 297 | - |
| Expenditure captured in the incorrect period | (2 573) | (497) |
| Statement of net assets for the period ended 31 March 2016 Accumulated surpluses | (2 876) | (416) |

## 26. 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:

| | | |
|---|---|---|
| - Gemstone collections | 1 445 | 1 445 |
| - Meteorite collections | 2 804 | 2 804 |
| - Mineral collections | 13 313 | 13 313 |
| Take on value | 13 313 | 13 318 |
| Scrapped during the year (minerals) | - | (5) |
| | 17 562 | 17 562 |

The heritage assets were at initial recognition valued at fair value using evaluators with the following credentials:
Fossils — Professor for Palaeontological Research, University of the Witwatersrand
Mineral collections — MSc Geology and Professor and Chairman of the Department of Geology, University of the Witwatersrand
Meteorite collections — Author of "Meteorites", Private collector of meteorites
Gemstones — MSc Geology

Various valuation methods were used taking into account the different types of heritage assets held by the Council for Geoscience.
The valuation reports are held at the Council for Geoscience offices and are available for inspection.
The Palaeontological (fossil) assets have no monetary value as legislation does not permit the purchase or sale of fossils.
(National Heritage Resources Act 1999 par 35(4)(c)).
The Council for Geoscience is in possession of old scientific equipment for display purposes only. This equipment does not carry any value.

## COUNCIL FOR GEOSCIENCE OFFICES IN SOUTH AFRICA


**1. Pretoria**
280 Pretoria Street,
Silverton, Pretoria

Private Bag X112,
Pretoria, 0001,
South Africa

**Tel:** +27 (0)12 841 1911
**Fax:** +27 (0)12 841 1221
**e-mail:** info@geoscience.org.za
**website:** www.geoscience.org.za

**2. Bellville**
3 Oos Street, Bellville,
South Africa

P.O. Box 572,
Bellville, 7535,
South Africa

**Tel:** +27 (0)21 943 6700
**Fax:** +27 (0)21 946 4190
**e-mail:** info@geoscience.org.za
**website:** www.geoscience.org.za

**3. Pietermaritzburg**
139 Jabu Ndlovu Street,
Pietermaritzburg, South Africa

P.O. Box 900,
Pietermaritzburg, 3200,
South Africa

**Tel:** +27 (0)33 345 6265/6
**Fax:** +27 (0)86 675 6880
**e-mail:** info@geoscience.org.za
**website:** www.geoscience.org.za

**4. Polokwane**
30A Schoeman Street,
Polokwane, South Africa

P.O. Box 620,
Polokwane, 0700,
South Africa

**Tel:** +27 (0)15 295 3471
**Fax:** +27 (0)15 295 2826
**E-mail:** info@geoscience.org.za
**website:** www.geoscience.org.za

**5. Port Elizabeth**
16 2nd Avenue,
Walmer, Port Elizabeth

P.O. Box 5347,
Walmer, 6065,
South Africa

**Tel:** +27 (0)41 581 1164/1128
**Fax:** +27 (0)41 581 1165
**e-mail:** info@geoscience.org.za
**website:** www.geoscience.org.za

**6. Upington**
24 Josling Street,
Upington, South Africa

P.O. Box 775,
Upington, 8800,
South Africa

**Tel:** +27 (0)54 332 1403
**Fax:** +27 (0)54 332 3961
**e-mail:** info@geoscience.org.za
**website:** www.geoscience.org.za

www.geoscience.org.za

RP148/2017

**ISBN: 978-1-920226-83-1**