Regional Geochemical Mapping

INDEX MAP: PROGRESS OF THE REGIONAL GEOCHEMICAL SURVEY OF SOUTH AFRICA

Sampled
Geochemical data available
1:250 000-scale Metallogenic Mapping

INDEX MAP:- 1:250 000-SCALE METALLOGENIC MAPPING PROGRAMME FOR SOUTH AFRICA

- Map compilation planned for 2012/2013
- Map compilation completed
- Map published

Cape Town
Pretoria
Polokwane
Durban
Port Elizabeth
KEY GEOSCIENCE PROJECTS
The objectives of the project are to:

- Update, maintain and rank the database as well as integrating it better into the DMR’s licensing system.
- The database should facilitate the estimation of the DMR’s contingent liability with respect to D&O Mines.
- The development of rehabilitation plans and the determination of bills of quantities on identified mine sites.
- Field investigation and Database ranking to identify priorities on an ongoing basis.
- The closure of dangerous holings where these pose immediate threat to human safety.
• The State’s liability w.r.t. D&O Mines was assessed in 2007 at around R30 billion.
• This has been reassessed using actuarial calculations:
  – Increased to R41 billion due to inflation and additional sites identified in the database
What are the conditions on these sites?

Abandoned gypsum mine in the Eastern Cape – minimal impact and no off-site impact. Difficult to justify rehabilitation.

Open gold mine shaft in Johannesburg – Immediate threat to local community – rehabilitation urgently required.
Derelict and Ownerless Mines
Field investigations – Focus on Asbestos Sites

Legend
- D & O Asbestos Mines
- Towns
- Eastern Cape
- Free State
- Gauteng
- KwaZulu-Natal
- Mpumalanga
- North West
- Northern Cape
- Limpopo
- Western Cape

Distribution of Asbestos Mines in South Africa
Rehabilitation Planning: Asbestos

- Over 200 asbestos sites are listed in the D&O Database, located in the Northern Cape, Limpopo, Mpumalanga, KZN and Gauteng.
- Comprehensive rehabilitation plans and bills of quantities are to be prepared for the rehabilitation of identified high-risk sites.
- Existing databases on asbestos sites will be updated with new information (remote sensing studies, site-specific investigations).
A number of D&O coal mines in Mpumalanga have been identified for rehabilitation. The program will start to quantify the requirements and costs for rehabilitation of these sites, focusing on:

- Subsidence - Safety
- Spontaneous combustion
- AMD (aim to prevent the generation of AMD)

Deliverable: Bills of quantities for rehabilitation projects.
• Scoping Test Work for Rare Earth Elements Resources

• Objective to contribute toward the advanced metals initiative (AMI) to facilitate research, development and innovation across the advanced metals value chain

• Goal is to develop technological competencies and achieve optimal sustainable local manufacturing of value-added products, generating significant export income and new industries for South Africa by the 2020s, while reducing environmental impact
South African Mineral Databases

The South African Databases are geared towards generating and improving the geoscientific minerals database by acquiring and updating existing data and information, as well as publishing and disseminating such information. The acquired and upgraded geoscientific data and information is pivotal in promoting mineral development and stimulation of mining investment by offering technical geological data and information and advice to small scale miners and junior and mid-tier mining and exploration companies.

Mineral information to date

- > 19 000 mineral records
  - Industrial Minerals
  - Metallogenic Minerals
- Geological reports
- > 11 000 borehole information
Mineral Development: Western Cape

- Map and data base of all minerals commodities completed

- Several end users: developers, land use, mining, environment

- Major stake holders: municipalities and private investors
Stimulation of Mining Investment-Target Generation

The aim of to find new mines in South Africa by identifying mineral potential targets of some high priority exploration areas using geophysics (Magneto-tellurics, seismic reflection surveys, high resolution aeromagnetic and gravity surveys, radiometric surveys, hyper spectral surveys), geochemistry, mineral occurrence/deposit data, structures and other relevant geological information. This will help reduce exploration expenditure and attract investment in exploration and mining and is a fundamental step towards opening up new mines for the country.

**Giyani Greenstone Belt**
- Soil geochemical data has been processed
- Remote sensing data has been processed
- Geophysical data has been processed
- Relevant thematic layers have been identified for both bedrock mapping and gold prospectivity
- Data integration: commences in November
- Project completion expected in 2013/2014

**Tugela-MTEF**

**AIRBORNE SURVEYS**
- Magnetic and radiometric surveys are expected to start in end of October 2012
- Electromagnetic surveys are expected to start end of October 2012

**GEOCHEMICAL SURVEYS**
- The survey is expected to commence in January 2012
Desktop studies

These are aimed at defining the geological, geochemical, geophysical etc., criteria for the mineral deposit sought, in a particular mineral province, belt and districts. The desktop study should allow to determine suitable:

• Geoscience spatial datasets to be used
• Evidential features (geological, structural, geophysical, geochemical etc.) to enhance and extract from individual dataset
• Methods of transforming mapped evidential features (structures, host rock, geophysical and geochemical signatures, alteration, remote sensing data etc.) into individual maps of prospectivity recognition criteria
• Methods of weighting classes to create individual predictor maps
• Methods of data integrating individual predictor maps

Desktop Studies are being conducted for the following areas
Namaqua Metamorphic Complex and Kheis Terrane (For many commodities including base metals, monazite (REE), tin, tungsten, alluvial-lacustrine uranium deposits etc.)
Barberton (for gold)
Sabi Pilgrim’s Rest Goldfield (for gold)
Geological Map of Namaqualand

Geological map of Namaqualand completed

Base for project on exploration stimulation in mining and energy sector
Investors Handbook

The aim of the project is to assess potential of various raw materials in South Africa with separate studies on the different natural resources compiled in a manual on new occurrences and deposits with investment and supply options for investors and purchasers in South Africa. Progress on the different commodities is as follows:

• Antimony-20%
• Chrome-0%
• Graphite-25%
• Flourspar-80%
• REE-20%
• Heavy mineral sands (focus on Zircon)-25%

Uranium Resources

• Technical presentation to IAEA : 20th-23rd August 2012- Uranium Group Meeting, Ukraine
• Uranium industry update of South Africa from 2011 to 2012.
• Highlights on uranium exploration, resources and reserves, production, company ownerships, future plans, and current mineral and nuclear policies.
Strategic Mine Water management Project

Objectives:

- Prevent ingress of surface and groundwater into the underground workings;
- Manage decanting of mine-polluted water;
- Predict and prevent harm to the environment;
- Apportion pollution sources and liabilities;
- Develop a mine water management strategy.
Strategic Mine Water Management Project

- Canalisation of the natural watercourse between Florida Lake and Fleurhof Dam
Strategic Mine Water Management Project

• **Prevention of Ingress**

  • Including: Pedestrian bridge and fencing.
  • The canal will be handed over to JRA after completion.
Projects: AMD Investigations, Limpopo

Contaminant plume mapping on old gold mines using electromagnetic methods in Giyani, Limpopo Province
Contaminant plume map and a depth section generated using electromagnetic data for an old gold mine in Giyani, Limpopo Province
Groundwater Targets in NW Province

Legend

Groundwater potential zones
- Very poor
- Poor
- Moderate
- Good
- Very good

Yield (l/s)
- 0.0 - 2.2
- 2.2 - 7.0
- 7.0 - 15.0
- 15.0 - 25.0
- 26.0 - 50.0

Drainage

Council for Geoscience
Sinkhole Investigation using the resistivity method, West Rand, Gauteng Province
The project entitled: “Integration of the South African National Seismograph Network and Database” was successfully completed.

This project compliments other similar projects in the Carletonville region, sponsored by JICA, and in the Johannesburg region.

These networks in the mining regions are a first for the CGS.
Record of Local Seismicity

Central Basin Area
- 12 stations installed in 2009/10

Far West Rand Area
- 11 stations installed in 2011/12

Bushveld - next

KOSH
- 25 stations installed in 2011/12
Remotely Monitoring of Seismicity at Data Centre
The South African Geological Hazard Observation System

• Funded by the Department of Science and Technology – 3 Year research programme
• Monitoring system to understand where geological hazards are occurring and to assess trends and possible impacts
• Aims to create a Geological Hazard decision support system
• Strong capacity building component with 4 Msc projects and 2 PhD projects
Geological Mapping School - Limpopo
International Geological Congress (IGC) 2016

• The bid to host the 35th IGC (IGC35) in 2016 was awarded to South Africa at IGC33 in Oslo, Norway in 2008
• At the closing function of IGC34 in Brisbane, Australia, the “President’s Cup” and therewith the responsibility for the next IGC was handed to South Africa
• The CGS Board approved R5 million as refundable seed money towards the organization and management of the IGC and a similar amount was awarded by the NRF
• A not-for-profit Company (the 35th IGC Foundation) was established to take the responsibility for the organization and management of IGC35 in South Africa
• A PCO was appointed to assist with the organization and management of the IGC35
THANK YOU