Curriculum Vitae

Dr Robert N Hansen

Personal Details

Nationality:	South African Citizen
Family Name:	Hansen
First Names:	Robert Neill
Birth Date:	29 January 1979
Marital Status:	Married
Language:	Afrikaans (speak, read and write)
	English (speak, read and write)
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Professional Qualifications

B.Sc (Geology and Geochemistry) (1998 – 2000)	University of Stellenbosch
B.Sc Honours (Geology) (2000 – 2001)	University of Stellenbosch
M.Sc (Geology) (2002 – 2007)	University of Stellenbosch
	Title: *The use of geochemical exploration techniques in the exploration for additional Tanzanite deposits – Merelani, Northeastern Tanzania*
PhD (Geology) (2010 – 2014)	University of Stellenbosch
	Title: *Numeric geochemical modelling, incorporating systems theory and implications for sustainable development – Study on East Rand Basin acid mine drainage, Witwatersrand, South Africa*

Experience

I have 13 years' vocational experience in the field of geology, of which 10 are in environmental geochemistry.

June 2003 – December 2005	Geological research and ore resource determinations on granitic pegmatites in Namaqualand, South Africa
January 2006 – October 2010	Environmental geochemical research and impact studies of derelict mines associated with acid mine drainage. The research and impact studies entailed numeric geochemical modelling.
November 2010 – January 2016	Geochemical risk assessment studies and geochemical modelling for environmental risk assessments of mine waste for various mine sites representing various ore body types. These include gold, coal, platinum, chrome, iron, fluorite, rare earth elements (carbonatite), antimony, graphite and diamonds. Evaluation and geochemical modelling of post-closure remediation options, e.g. the impacts of backfilling material (mine waste rock and tailings) on groundwater and surface water quality in opencast and underground mines. Specialist geochemical studies such as source term characterisation of various constituents posing environmental risks, including uranium and thorium for radiological impact assessments for operational and pre-operational mine residue material. Environmental mine water and salt balances including probabilistic and dynamic modelling for mine water reticulation systems. Waste classification of mine residue material, i.e. tailings, waste-rock and ore stockpile material.
January 2016 – Present	Senior lecturer in environmental geochemistry for undergraduate and postgraduate students Research supervisor for a number of post-graduate (honours, masters and doctoral) students Research projects into a number of mine mineral waste related, mostly impact prediction and mine mineral waste systems geochemical process characterisation and associated publications in national and international journals. Interdisciplinary (groundwater, biochemistry, microbiology) mining related commercial projects, mostly focussed on geochemical process identification and modelling Geochemical risk assessment studies and geochemical modelling for environmental risk assessments of mine waste for various mine sites representing various ore body types. These include gold, coal, platinum, chrome, iron, fluorite, rare earth elements (carbonatite), antimony, graphite and diamonds.

Evaluation and geochemical modelling of post-closure remediation options, e.g. the impacts of backfilling material (mine waste rock and tailings) on groundwater and surface water quality in opencast and underground mines.

Specialist geochemical studies such as source term characterisation of various constituents posing environmental risks, including uranium and thorium for radiological impact assessments for operational and pre-operational mine residue material.

January 2020 to present:	Acting Director of the BIOGRIP (Biogeochemistry Research Infrastructure Platform) UFS node hosted under the CMBG (centre for Mineral Biogeochemistry)

Skills

- Environmental geochemical research
- Post-graduate study leadership (Honours, MSc and PhD students)
- Lecturing (university students)
- Academic writing (national and international publications)
- Numeric geochemical reaction modelling (Geochemist's Workbench and PHREEQC literate)
- Static and numeric mine water and salt balances
- Waste classifications of mineral waste
- Geochemical risk assessments related to geological waste and material, i.e. tailings, waste rock and ores stockpiles
- GIS (ArcMAP and QGIS literate)
- Managing a specialised research group in the field of environmental and biogeochemistry

Employment History

January 2021 – Present	Centre for Mineral Biogeochemistry (CMBG) – University of the Free State (Acting Director)
January 2016 – Present	University of the Free State: Senior Lecturer / Researcher (Environmental geochemistry)
June 2016 – Present	Sole proprietor – GeoDyn (Geochemical Dynamic Systems Modelling)
November 2010 – January 2016	Exigo Sustainability: Geochemist (Associate)
June 2003 to October 2010:	Council for Geoscience: Scientific officer

List of academic publications

Journal articles

1. **Hansen, R.N.**, 2020, Process network modelling of the geochemical reactions responsible for acid mine drainage emanating from the Witwatersrand tailings facilities. South African Journal of Geology, 123, 357-368

2. **Hansen, R.N.,** 2018, An assessment of the geochemical impacts of greenfields mining projects in South Africa on both sides of the mine drainage pH divide – A geochemical modelling approach. South African Journal of Geology 121, 487-494

3. **Hansen, R.N.,** 2018, Inter-comparison geochemical modelling approaches and implications for environmental risk assessments: A Witwatersrand gold tailings source term characterisation study. Applied Geochemistry 95, 71-84

4. **Hansen, R.N.,** 2015, Contaminant leaching from gold mining tailings dams in the Witwatersrand Basin, South Africa: A new geochemical modelling approach. Applied Geochemistry 61, 217-223

Conference abstracts and proceedings

1. **Hansen, R.N.,** 2016, U and Th source term characterisation in selected Au tailings of the Witwatersrand, South Africa: A geochemical modelling and reaction network approach. 35th International Geological Congress, Paper 1064, URL: https;//www.americangeosciences.org/sites/default/files/igc/1064.pdf

2. **Hansen, R.N.**, Roychoudhury, A.N. and Clarke, C., 2011, Determination of anthropogenic influence from non-parametric statistics and spatial analysis of regional soil data and surface water contaminant transport hydrogeochemical modelling: Implications for groundwater contamination – Okiep Copper District, Namaqualand, South Africa. *In* Adams, S. (*Ed.) International Groundwater Conference Abstract Volume,* ISBN: 978-0-620-50725-7

3. **Hansen, R.N.**, 2020, Quantification of environmental risk of U and Th in Witwatersrand gold-mine tailings, South Africa. Mine Water Solutions, International Mine Water Association Congres 2020 New Zealand Proceedings, 25-33

4. Lourens, P., Erasmus, M., **Hansen, R.N.** and Allwright, A., 2020, Groundwater nitrate bioremediation of a fractured rock aquifer system in South Africa. Mine Water Solutions, International Mine Water Association Congres 2020 New Zealand Proceedings, 140-145

5. Molabe, M. and **Hansen, R.N.**, 2020, An assessment of the environmental geochemical processes in the Okiep Copper tailings: A kinetic geochemical modelling approach. Goldschmidt Virtual 2020

Technical reports (last 3 years)

1. **Hansen, R.N.**, 2020, Theta Gold Mining Estates: Geochemical risk assessment of historic mineral waste material for water use licensing. GeoDyn Technical Report 20201001
2. **Hansen, R.N.**, 2020, Theta Gold mining Estates: Geochemical assessment of the historic Blyde River tailings facility. GeoDyn Technical Report 20211001
3. **Hansen, R.N.**, 2020, Kalgold: Geochemical mineral waste classification & assessment. GeoDyn Technical Report 20200801
4. **Hansen, R.N.**, 2020, Kloof Mine: Geochemical shaft water mixing quality assessment. GeoDyn Technical Report 20200901
5. **Hansen, R.N.**, 2020, Gravenhage Manganese Mine: Long-term post-closure in-pit water quality assessment. GeoDyn Technical Report 2002-001
6. **Hansen, R.N.**, 2019, Eland Mine: Post-operational in-pit tailings disposal geochemical specialist study. GeoDyn Technical Report 20190902
7. **Hansen, R.N.**, 2019, Theta Gold Mining Estates: Geochemical assessment of long-term generation and mobility of potential contaminants. GeoDyn Technical Report 20190502

8. **Hansen, R.N.**, 2019, Geochemical assessment of SASOL CAE disposal option. Institute for Groundwater Studies UFS Technical Report 2019/05/RNH02
9. **Hansen, R.N.**, 2019, West Wits MLI (Pty) Ltd 11 Shaft gold mining right application: Geochemical specialist assessment. GeoDyn Technical Report 20190303
10. **Hansen, R.N.**, 2019, West Wits MLI (Pty) Ltd Creswell Park gold mining right application: Geochemical specialist assessment. GeoDyn Technical Report 20190306
11. **Hansen, R.N.**, 2019, West Wits MLI (Pty) Ltd Kimberley East gold mining right application: Geochemical specialist assessment. GeoDyn Technical Report 20190302
12. **Hansen, R.N.**, 2019, West Wits MLI (Pty) Ltd Kimberley West gold mining right application: Geochemical specialist assessment. GeoDyn Technical Report 20190301
13. **Hansen, R.N.**, 2019, West Wits MLI (Pty) Ltd Mona Liza gold mining right application: Geochemical specialist assessment. GeoDyn Technical Report 20190304
14. **Hansen, R.N.**, 2019, West Wits MLI (Pty) Ltd Roodepoort gold mining right application: Geochemical specialist assessment. GeoDyn Technical Report 20190305
15. **Hansen, R.N.**, 2019, West Wits MLI (Pty) Ltd Rugby Club gold mining right application: Geochemical specialist assessment. GeoDyn Technical Report 20190307
16. **Hansen, R.N.**, 2018, Sibanye West Rand Basin Closure Plan: Geochemical assessment of Cooke Mine and Rand Uranium Mine sites. GeoDyn Technical Report 1801-001

Professional Affiliations

2008 - Present	South African Council for Natural Science Professions (SACNASP) – Membership Nr. **400125/08**
2017 – Present	Association of Applied Geochemists – Membership Nr. AAG4350