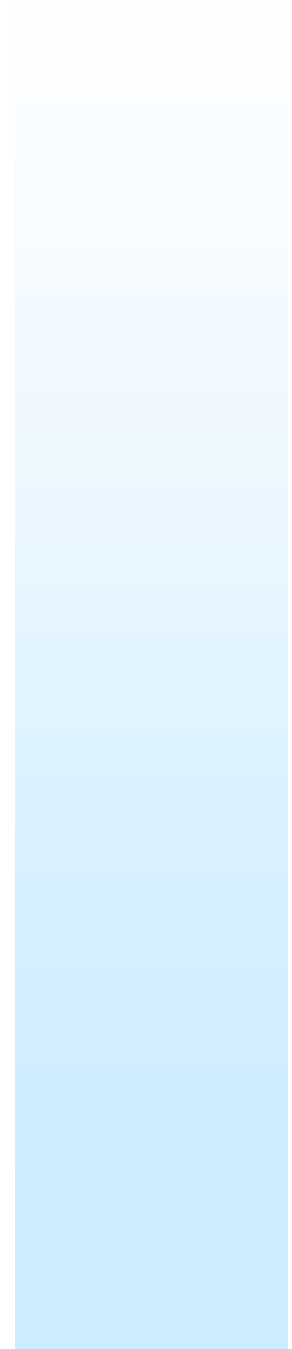
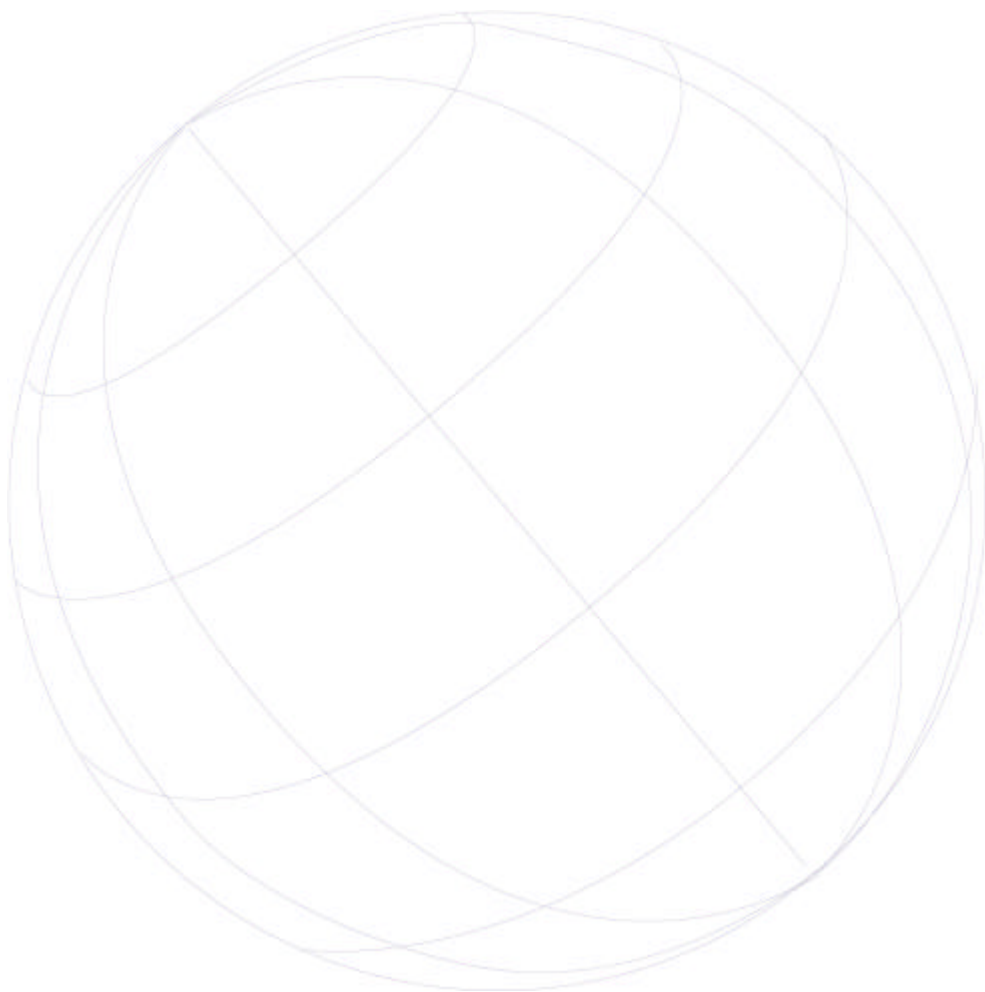


Company Profile



“AquiSim Consulting is a specialist company that provides a service for the integrated and effective management of groundwater, radioactive- and non-radioactive waste in environmental systems”

Japie van Blerk
Ph.D. Geohydrology (UFS)

Contact Details
Cell: 082 806 6159
Tel&Fax: 012 654-0212
e-mail: aquisim@netactive.co.za

Hugo Janse van Rensburg
Ph.D. Geohydrology (UFS), MBL (UNISA)

Contact Details
Cell: 082 784 2023
Tel: 012 991-2404
Fax: 012 665-3100 or 012 654-0212
e-mail: aquisim-hvr@mweb.co.za

“Integrated Environmental Systems Solutions at your Disposal”

About the Company



Aquisim Consulting (Pty) Ltd. is a specialist company that combines twelve years of experience in the safety assessment of radioactive waste disposal systems with eighteen years of experience in all aspects associated with the management of groundwater systems. These fundamental expertise enable *Aquisim Consulting* to provide *integrated environmental systems management solutions* to a number of scientific disciplines, notably geohydrology and geology, but also to all aspects associated with radioactive and non-radioactive waste disposal practices and their impact on human beings and the wider environment as a function of time.

Capabilities and Services

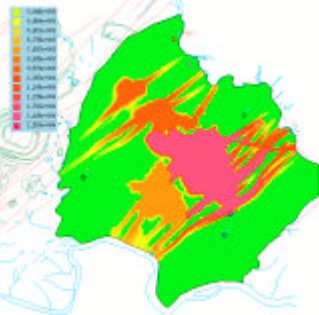
Aquisim Consulting provides a range of services associated with groundwater management, and radioactive and non-radioactive waste management, all of which are necessary for reliable and transparent decision-making.

Model Development

Development of site-specific geological-, conceptual-, mathematical and computer models.

Groundwater Simulation

Analysis of the fate and transport of radioactive and non-radioactive contaminants in one-, two-, or three-dimensional porous or fractured media under saturated or variable saturated (vadose zone) conditions, using analytical, semi-analytical or numerical techniques.

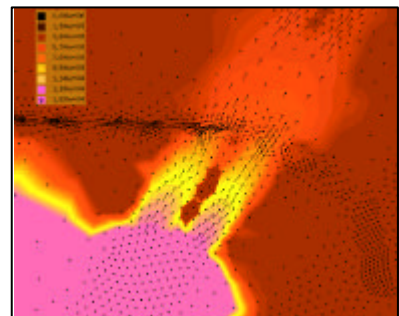


- Simulating the effects of mining operations on groundwater resources.
- Simulating the long-term effects of abstraction on groundwater levels.
- Simulating the interaction of surface water with groundwater.
- Simulating the influence of recharge on groundwater sustainability.
- Determination of water balances on a local and catchment scale.
- Sensitivity and uncertainty analysis.

Groundwater Pollution and Site Remediation

Evaluation of the extent and impact of groundwater pollution and provision of scientifically justified remedial alternatives.

- Determination of groundwater protection and capture zones.
- Recommendations on groundwater pollution monitoring and control.
- Risk/safety assessment on remediation strategies.
- Economic feasibility studies of remediation alternatives.



Water Supply

Assessment of the current and future impact of any activity that might influence the groundwater characteristics or natural flow regime, in particular if groundwater serve or could serve as a source of water supply to communities.

- Catchment management.
- Well field development for water supply.

General Geohydrological Services

In association with *Southern Africa Geoconsultants (Pty) Ltd. (Geocon)*, *Aquisim Consulting* also offers general geohydrological services, which include, amongst others, the following:

- Exploration for groundwater sources and the evaluation of aquifer potential.
- Geohydrological census as well as data analysis and management.
- Siting of boreholes using structural geological studies and geophysical techniques.
- Drilling and/or testing supervision and management, with utilisation recommendations.
- Analysis of aquifer tests.
- Aquifer characterisation and the identification of aquifer parameters.
- Determination of groundwater recharge, storativity and sustainable groundwater supply yield.

Radioactive Waste Management

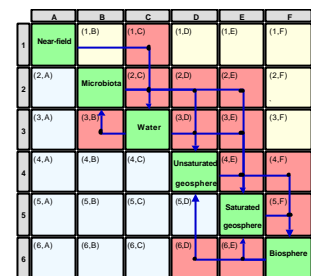
Determination of how radioactive materials may escape from the disposal facility, along which paths it may migrate, and what effect it will ultimately have on human beings and the environment in space over time.

- Regulatory guidance for the long-term management of radioactive waste.
- Development/refinement of long-term safety assessment methodologies.
- Safety/risk assessment of near-surface and geological disposal systems.
- Compilation of assessment context documents.
- Derivation of waste acceptance and clearance criteria.
- Performance assessment of the near-field, geosphere and biosphere.
- Total system safety assessment for site selection/characterisation, concept design, site remediation, decommissioning and public confidence.

Scenario Generation and Justification

Generation of a comprehensive and justifiable set of exposure scenarios.

- Auditing/screening of relevant features, events and processes (FEPs).
- Process System definition and evaluation.
- Visual representation of FEPs and FEP interactions.
- Scenario definition under natural processes and “*what if?*” events.



Radiological Public Impact Assessment of Mining and Mineral Processing Facilities

Assessing the radiological impact of mining and mineral processing facilities to the public, by determining whether doses incurred because of such releases are within the limits set by the national regulator.

- Analysis of the release of radioactive materials (source) from the facility (near-field analysis).
- Analysis of the transport of radioactive material from the source through the environment to humans (geosphere analysis).
- Estimation of doses to individuals from internal and external exposure due to radioactive materials in the environment (biosphere analysis).

Economic Risk-Cost-Benefit Decision Analysis

Providing the link between the economic framework in which decisions are made and the technical analysis on which decisions are based.

- Identification of the optimal alternative between a selected few.
- Waste site selection and disposal concept design.
- Well field and groundwater monitoring programme design.
- Selection of remedial action and water supply alternatives.

Consultancy, Technical Training and Reviewing of Documents

Providing consultancy and technical training services to organisations such as the International Atomic Energy Agency and Universities. These include the technical reviewing of groundwater and radioactive waste management documents.

Major AquiSim Consulting Projects

Post-closure safety assessment of the National Radioactive Waste Disposal Facility at Vaalputs.

[Client: South African Nuclear Energy Corporation Ltd.]

Long-term safety assessment of the Thabana radioactive waste storage facility at Pelindaba.

[Client: South African Nuclear Energy Corporation Ltd.]

Assessing the geohydrological impact of a gypsum waste tailings dam.

[Client: Southern African Geoconsultants (Pty) Ltd. and Kynoch Fertilisers]

Assessing the impact of mining operations on an aquifer system.

[Client: Southern African Geoconsultants (Pty) Ltd. and Southern Era (Pty) Ltd.]

Derivation of clearance criteria for volume contaminated radioactive material.

[Client: South African Nuclear Energy Corporation Ltd. and Koeberg Nuclear Power Station].

Groundwater pollution evaluation and remediation of a hydrogen fluoride plant.

[Client: South African Nuclear Energy Corporation Ltd.]

Performance assessment of an engineered clay cap for near-surface radioactive waste disposal facilities.

[Client: South African Nuclear Energy Corporation Ltd.]

Radiological impact assessment of ESKOM fossil fuel power stations.

[Client: South African Nuclear Energy Corporation Ltd. and ESKOM]

Modelling of Contaminant Migration in the Mahem Spruit Area west of Welkom

[Client: AngloGold (Pty) Ltd]

Determination of the origin of the spring water at the slimes dam of AngloGold at Mponeng mine

[Client: AngloGold (Pty) Ltd]

Groundwater flow and contaminant transport modelling at SASOL's Sigma Colliery

[Client: SASOL COAL]

Dewatering of the PPV & PPV North Pit at Phalaborwa

[Client: Palabora Mining Company].

Development of the design requirements for the borehole disposal concept.

[Client: South African Nuclear Energy Corporation Ltd. and the International Atomic Energy Agency].

Radiological public impact assessment of proposed tailings dam.

[Client: South African Nuclear Energy Corporation Ltd. and Plaser Dome & Western Area Joint Venture]

AquiSim Consulting Staff

Japie van Blerk (M.Sc., Ph. D.)

Japie van Blerk obtained a B.Sc. in Applied Mathematics and Computer Science, and honours, M.Sc. and Ph.D. degrees in Geohydrology at the Institute for Groundwater Studies (University of the Free State). He has twelve years experience in the safety assessment of radioactive waste disposal systems. This include characterising the fate and transport of radioactive waste through the unsaturated zone, analysing post-closure safety assessment methodologies for radioactive waste disposal systems in South Africa, improving safety assessment methodologies for near-surface radioactive waste disposal systems,

performing total system safety assessment of radioactive waste disposal systems, scenario generation and justification, disposal concept development, performing public radiological impact and risk assessments from mining and mineral processing facilities and providing consultancy and technical training services to organisations such as the International Atomic Energy Agency (IAEA). Currently Japie serves as Director of Radioactive and Non-radioactive Waste Management in AquiSim Consulting (Pty) Ltd.

Hugo Janse van Rensburg (M.Sc.; MBL; Ph.D.)

Hugo Janse van Rensburg graduated from the University of the Free State with a B.Sc. in Geology and Geohydrology and Honours, M.Sc. and Ph.D. degrees in Geohydrology. He also completed an MBL degree at the University of South Africa. Hugo has ten years experience at the Department of Water Affairs in water resource development, recharge estimation and aquifer potential evaluation where he worked as a Specialist Scientist. He formed part of the team who produced the Manual on Quantitative Estimation on Groundwater Recharge and Aquifer Storativity. The past seven years he worked for the Anglo American Corporation of South Africa where he gained experience in mining related hydrogeological projects which took him across the globe to Russia, South America (Argentina and Chile) and parts of Africa (Zambia, Botswana, Zimbabwe and Namibia). He also conducted investigations for mines in Ireland and West Africa. He specialises in groundwater flow modelling, mass transport modelling and economical and technical decision analysis. Currently Hugo serves as Director of Groundwater Management in AquiSim Consulting (Pty) Ltd.

Selected Past Project

Development of the borehole disposal of spent sources (BOSS) concept.

[Client: International Atomic Energy Agency (Technical Corporation)].

Radiological public impact assessment from mining and mineral processing facilities.

[Client: Palabora Mining Company Limited. and Foskor Ltd.].

Groundwater flow modelling for the Letlhakane and Orapa diamond mines in Botswana.

[Client: Debswana Pty (Ltd.)].

Groundwater flow modelling for the Orapa and Jwaneng wellfields in Botswana.

[Client: Debswana Pty (Ltd.)].

Technical review of dewatering model of the Konkola copper mine in Zambia.

[Client: ZCI].

Technical review of the water supply model of the Cerro Vanguardia gold mine in Argentina and the Collahuasi copper mine in Chile.

[Client: Anglo American, South America].

Groundwater pollution plume modelling of the tailings and return water dams at the Sadiola Hill gold mine in Mali.

[Client: Anglo Gold Pty (Ltd.)].

Water supply feasibility study to the dredging operations at NAMDEB's mines in Namibia.

[Client: NAMDEB Pty (Ltd.)].

Water supply feasibility project to the Gope mine operations in Botswana.

[Client: Debswana Pty (Ltd.)].

Risk-cost-benefit and financial decision analysis for water supply to the Venetia mine.

[Client: De Beers Pty (Ltd.)].

Groundwater flow and contaminant transport to determine the risk of pollution from the proposed underground Nooitgedacht colliery.

[Client: Amcoal Pty (Ltd.)].

Water balance modelling study for the Lisheen mine in Ireland.

[Client: Anglo American PLC].

Mine dewatering feasibility study for the Lomonosov diamond mine in Russia.

[Client: De Beers Centenary].

Groundwater flow and contaminant transport to determine the risk of pollution from the tailings site at the Gamsberg zinc mine.

[Client: Anglo Base Metals Pty (Ltd.)].

Dredge mining operation feasibility study for the Grib pipe in the Verkhotina area in Russia.

[Client: Arkhangelsk Diamond Corporation].

AquiSim Consulting Associates

Semane Consulting Engineers (Pty) Ltd.



Semane is a South African consulting company that provides clients with civil, structural and environmental engineering solutions. The company was established three years ago on strong commercial and skills-based black empowerment principles. Their expertise includes the conceptualisation, design and risk assessment of specialised infrastructure and structures, as well as environmental and rehabilitation solutions in the mining, heavy industry, non-mining natural resources, commercial built-environment and public sectors.

Southern Africa Geoconsultants (Pty) Ltd.



Southern Africa Geoconsultants (Pty) Ltd. (also known as GeoCon) is a South African consulting company that provides a wide spectrum of geological-, geophysical-, geohydrological-, environmental-, geotechnical- and engineering geological services. The company, which was founded in 1989, originated in the Northern Province. Today renders consulting services throughout Southern Africa from its three offices in Pietersburg, Centurion and East London.

Prof. J.F. (Jopie) Botha

Joseph Francois Botha started his career in 1961 as an agricultural meteorologist in the Department of Agriculture. He joined the University of Stellenbosch as lecturer in Physics in 1965 and the University of the Orange Free State as senior lecturer in Applied Mathematics in 1970. He was appointed as Research Professor at the Institute for Groundwater Studies in 1979.



He did research in numerical methods with Professor Leslie Fox, at the University of Oxford, for a year, and was Visiting Professor at the University of Princeton from July 1980 – June 1981.

He served three terms as member of the Executive Council of the Computer Society of South Africa, and as chairman of the society's Orange Free State and Northern Cape Branch. He is a member of the American Geophysical Union, the American Association for the Advancement of Science and the New York Academy of Sciences. He also serves as a member of the Editorial Board for the International Journal, 'Numerical Methods for Partial Differential Equations'. He represents the Committee of University Principles of South Africa, on the Management Board of the Computer Centre for Water Research.

His main research interests include numerical groundwater modelling and the physics of groundwater phenomena. He developed 10 models for aquifers in South Africa and Namibia, including the model that led to the licensing of the South African Radioactive Waste Disposal Site. He is presently involved with an investigation of Karoo aquifers in South Africa. He was the supervisor for 28 M.Sc. and 11 Ph.D. students.

He is the author of 20 articles in international journals, and 20 research reports. He is also the co-author of three books, and a chapter in one book.

