

# mintek annual report



# 2009

1934 - 2009



A global leader in mineral and metallurgical innovation

**Our Mandate.** Mintek's mandate is to serve the national interest through high-calibre research, development, and technology transfer that promotes mineral technology, and fosters the establishment and expansion of small, medium, and large industries in the field of minerals and products derived from them.

**Our Vision.** To be a global leader in mineral and metallurgical R&D and technology transfer.

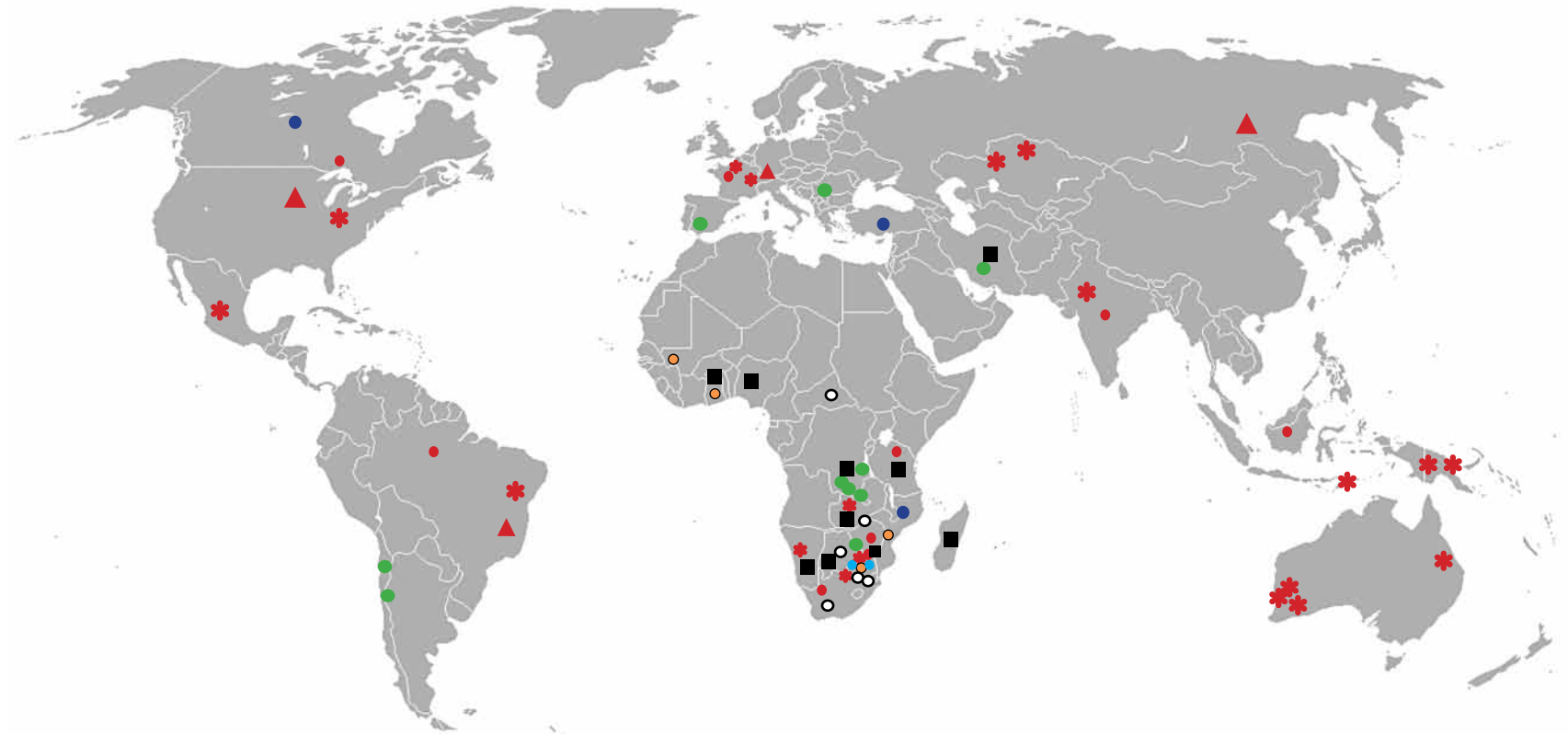
**Our Mission.** To serve our stakeholders by promoting technology, industrial growth and human development.

**Key Objectives.** In order to attain its goals, Mintek shall strive to:

- Develop efficient mineral processing technologies and sustainable value-added products and services in order to, amongst others, strengthen Mintek's position as a global supplier of mineral-processing technology, equipment, process design and control-optimisation systems;
- Play a significant role in second economy interventions by developing technologies appropriate to the local jewellery, artisanal and small-scale mining (ASSM) industries with the aim of expanding the industry and of lowering entry barriers. Initiate poverty alleviation programmes and support the growth of Small, Medium and Micro Enterprises (SMMEs) in the mineral sector;
- Support regional interventions concentrating on value addition and capacity building through mineral-based anchor projects;
- Develop human and organisational skills whilst transforming its internal and external business processes and the workforce profile to ensure that it is in line with the socio-economic realities of South Africa today, whilst ensuring broad representation of diverse cultures and people; and,
- Uphold good governance practices.

## acronyms and abbreviations

<b>AAS</b>	Atomic Absorption Spectrometry
<b>AMI</b>	Advanced Metals Initiative
<b>AMP</b>	African Mining Partnership
<b>ARC</b>	Agricultural Research Council
<b>ASSM</b>	Artisanal and Small Scale Mining
<b>BEE</b>	Black Economic Empowerment
<b>CBT</b>	Cape Biotech Trust
<b>CDFR</b>	Client Dissatisfaction Frequency Rate
<b>CGS</b>	Council for Geoscience
<b>COST</b>	European Co-operation in the field of Science and Technological Research
<b>CRMs</b>	Certified Reference Materials
<b>DC</b>	Direct Current
<b>DME</b>	Department of Minerals and Energy (South Africa)
<b>DRC</b>	Democratic Republic of Congo
<b>DST</b>	Department of Science and Technology (South Africa)
<b>DTI</b>	Department of Trade and Industry (South Africa)
<b>EIFR</b>	Environmental Incident Frequency Rate
<b>EU</b>	European Union
<b>GAAP</b>	Generally Accepted Accounting Practice
<b>GDP</b>	Graduate Development Programme (of the MQA)
<b>GSM</b>	Global System for Mobile communications
<b>HPGR</b>	High pressure grinding roll
<b>HIV</b>	Human Immunodeficiency Virus
<b>ICMI</b>	International Cyanide Management Institute
<b>ICP</b>	Inductively Coupled Plasma
<b>JOGMEC</b>	Japan Oil, Gas and Metals National Corporation
<b>JSE</b>	Johannesburg Securities Exchange
<b>KIC</b>	Knowledge Interchange and Collaboration (programme of the NFF)
<b>KPI</b>	Key Performance Indicator
<b>LA-ICP-MS</b>	Laser Ablation Inductively Coupled Plasma Mass Spectrometer
<b>LTIFR</b>	Lost Time Injury Frequency Rate
<b>MESU</b>	Mineral Economics and Strategy Unit (Mintek)
<b>MLA</b>	Mineral Liberation Analyser
<b>MQA</b>	Mining Qualifications Authority
<b>MTC</b>	Metals Technology Centre (at Mintek)
<b>MTEF</b>	Medium-Term Expenditure Framework
<b>NCI</b>	National Council for Innovation (South Africa)
<b>NIC</b>	Nanotechnology Innovation Centre
<b>NIH</b>	National Institute of Health (USA)
<b>NNR</b>	National Nuclear Regulator (South Africa)
<b>PFMA</b>	Public Finance Management Act
<b>NRF</b>	National Research Foundation (South Africa)
<b>PDFR</b>	Public Dissatisfaction Frequency Rate
<b>PGMs</b>	Platinum-Group Metals
<b>PMDN</b>	Powder Metallurgy Development Network
<b>PLC</b>	Programmable Logic Controller
<b>R&amp;D</b>	Research and Development
<b>RBTS</b>	Resource-Based Technology Strategy
<b>RIL</b>	Resin In Leach
<b>RIP</b>	Resin In Pulp
<b>RME</b>	Regional Mineral Economics
<b>ROM</b>	Run-Of-Mine
<b>RPDP</b>	Research and Professional Development Programme (of the DST)
<b>RPP</b>	Radiation Protection Programme
<b>SADC</b>	Southern African Development Community
<b>SADPMR</b>	South African Diamond and Precious Metals Regulator
<b>SARIMA</b>	South African Research and Innovation Management Association
<b>SARM</b>	South African Reference Material(s)
<b>SEDA</b>	Small Enterprise Development Agency
<b>SEM</b>	Scanning Electron Microscope
<b>SMEs</b>	Small and Medium Enterprises
<b>SMS</b>	Short Message Service
<b>SOE</b>	State-owned enterprise
<b>STEM</b>	Science, Technology, Engineering and Mathematics
<b>THRIP</b>	Technology and Human Resources for Industry Programme
<b>UK</b>	United Kingdom
<b>UNECA</b>	United Nations Economic Commission for Africa
<b>USA</b>	United States of America
<b>WAD</b>	Weak Acid Dissociable (cyanide)



## mintek global locations

### Gold



- Evaluation and design of recovery circuits, carbon / resin adsorption, elution, electrowinning. Leach optimisation and heap leach / bio-leaching amenability.
- Cyanide speciation monitoring, online cyanide measurement and control, cyanide destruction. Assistance with ICMI gap or full certification audits.
- Minfurn™ technology for granular activated carbon regeneration.
- Minataur™ all-hydrometallurgical gold refining process.
- New industrial uses for gold – catalysis, biomedicine, nanotechnology.

### PGMs



- Design and optimisation of integrated comminution and flotation circuits
- ConRoast smelting technology for high-chromium low-sulphur PGM materials.
- Catalyst development for automotive, fuel cell, and industrial applications.
- Novel PGM-containing alloys, powder metallurgical processes.

### Ferrous Metals



- DC arc smelting processes for chromite, ilmenite, nickel laterites, magnetite, magnesium metal production, metal recovery from slags and dusts.
- Iron ore beneficiation.
- Materials characterisation (physical, mechanical and corrosion properties), failure investigations.

### Non-ferrous Metals



- Bioleaching of copper, nickel, and polymetallic concentrates. Heap bioleaching of low-grade chalcopyrite-bearing materials.
- Integrated circuit design for metal recovery and purification by leaching/heap leaching, precipitation, ion exchange, and SX/EW.

### Industrial Minerals



- Physical beneficiation - comminution, flotation, gravity, dense media, electrostatic and magnetic separation, optical sorting.
- SAVMIN™ process for acid mine

- drainage purification. Acid-base accounting.
- Kimberlite indicator mineral investigations. Alluvial diamond provenance studies.

### Uranium



- Ambient, pressure, and heap leaching, solvent extraction, fixed bed and countercurrent (NIMCIX) ion exchange, resin-in-pulp, ADU precipitation.
- Mintek is registered as a uranium testwork facility with South Africa's National Nuclear Regulator (NNR) and the Department of Mineral Resources.

### Process Control Strategies



- Advanced process control and optimisation strategies for milling, flotation, and gold leaching circuits, submerged-arc furnaces.
- Online cyanide measurement and control.
- Heap leach operator guidance software and in-heap instrumentation.

### Capital Equipment



- Minfurn™ regeneration furnace for activated carbon in the gold processing, water treatment, and food industries.
- Gold electrowinning cell.
- DC arc furnace.
- Atomijet™ atomiser for base and precious metals.

### Economic and Regional Studies



- Regional commodity-based mineral economic studies.
- Resource-based technology strategies.
- Sustainable development studies.