Research
and development

AngloGold Ashanti has developed research and development (R&D) programmes which focus on technical initiatives to reduce risk and improve efficiency in the key areas of safety, environment, geology, mining, metallurgical processing and engineering.

Most of this work is conducted in collaboration with appropriate third parties such as research organisations, universities, other mining companies, mining service providers, equipment suppliers and contractors. The company also encourages and supports in-house research projects to address issues at specific operations.

AngloGold Ashanti's wholly owned subsidiary, ISS International (ISSI), is a global company specialising in seismic monitoring of mines and engineering structures. ISSI, in conjunction with AngloGold Ashanti, initiates and undertakes seismological research. This seismological research and development programme is focused on addressing the shortcomings that frustrate progress in the areas of science, technology and the transfer of knowledge and experience to the relevant people. Five main areas are addressed: emergency response to rock bursts, prevention of rock bursts, intermediate- and short-term hazard assessment, alerts and back analyses. Several of the research and development projects are done in combination with a newly established AngloGold Ashanti Rock Engineering applied research unit. The main objective of this research and development is to enhance the safety of those working in mining operations. R&D successes include improvements in quick location methodology and location accuracy, and progress has been made in both elastic and inelastic numerical modelling and seismic data integration, and in-stope wireless communication. Significant progress has also been made in capacity building among junior research personnel.

Cyanide management remains a key issue for AngloGold Ashanti which is a signatory of the International Cyanide Management Institute (ICMI) and the company is fully committed to achieving compliance with the International Cyanide Management Code. The company continues to participate in the Industry Advisory Group (a sub-committee of the ICMI) and communicates on cyanide-related issues with the ICMI on an ongoing basis. All processing operations are either fully accredited or in preparation for accreditation audits during 2009 or 2010.

AngloGold Ashanti continues to support the catalysis initiative within the AuTEK programme which is aimed at finding new industrial uses for gold. AuTEK is managed by Mintek, a South African research and development centre which also receives government funding. Fellow gold miners, Gold Fields and Harmony are co-sponsors of AuTEK with support specifically for nanotechnology and bio-medical applications respectively. The catalysis initiative has until now focused on developing catalysts for carbon monoxide oxidation for use in fuel cells and in photocatalysis. A pilot plant for the production of gold catalysts has been constructed and commissioned. The current focus is to develop business relationships with catalyst marketing companies and potential end users. Promising applications include gas masks, mine refuge bays, gas scrubbing for underwater welding, catalytic converters for diesel engines and the catalysis of a variety of industrial chemical reactions.

Safety, health and environmental initiatives include:

- Cyanide code implementation;
- Fall-of-ground management initiatives including
  - Risk-based mine planning using conditional simulation techniques;
  - Improving short-term seismic hazard assessment by means of an enhanced numerical modelling capability; and
  - Improving tunnel support systems in deep, seismically active mines using a destructive proof-testing approach;
- SPAR – Separate People And Risk (a South African division initiative to remove people from high-risk workplaces and to develop less people-intensive mining methods);
- Implementation of integrated malaria control programmes at high prevalence sites;

- Participation in research initiatives towards an effective tuberculosis control programme in collaboration with the University of Stellenbosch and involvement in the Thibela TB project being run by the CREATE – Consortium to Respond Effectively to the AIDS and TB Epidemic – consortium;
- Studies into the impact of employee health and wellness on health and safety performance in collaboration with the University of the North West.
- Initiation of a company-wide review of closure management funding and activities which will be completed during 2009; and
- Various initiatives to reduce silica dust exposure in stopes including automated in-stope water-blasting and deployment of fogging systems.

Geological initiatives include:

- Amira project P843 researching the geometallurgical characterisation of orebodies;
- Testing large-scale spectral core scanning as a geometallurgical tool;
- Production of metallurgical orebody domains based on geometallurgical characterisation and mine modelling;
- Investigations into alternative devices for underground sampling;
- Amira project to understand hydrothermal chemical characteristics of ores and the potential implications for processing and recovery;
- Integration of software used for geological mapping and modelling;
- Evaluation of the use of hand-held X-Ray Fluorescence instruments for in-situ analysis of metal content;
- Project to apply Sirovision 3D mapping technology to deep-level South African gold mines;
- Initial research into the use of real-time blast monitoring; and
- Advanced geostatistical research into multivariate estimation and advanced optimisation and scheduling.

Mining initiatives include:

- Investigation into uranium scanning technology to “infer” gold grade in samples; and
- Development, in conjunction with Sandvik, of a mini self-climbing box-hole borer, which will remove people from the development of 30 metres box holes, has been completed and is ready to begin its first hole.

Processing initiatives include:

- Research into the possible replacement of cyanide with thiosulphate for the leaching of gold in order to reduce environmental and health impacts associated with the use of cyanide;
- Converting to resin-based uranium extraction which has significantly reduced power requirements;
- The Amira P9 comminution and flotation project which is aimed at improving the efficiency of these processes with the development of sophisticated process control and simulation methods;
- Amira P420 gold processing project focused on improving gold recovery from refractory (difficult to process) ores; and
- Heap-leach solution flow modelling to improve the accuracy gold production forecasting at Cripple Creek & Victor.

Engineering initiatives include:

- A range of initiatives to reduce electricity requirements in South Africa including:
  - Replacement of compressed air drills with more efficient electric drills in conjunction with Hilti; and
  - Introduction of the three-pipe chamber system for pumping water out from underground;
- The phasing in of “New Era” locomotives which offer improved efficiency as well as better control systems, more effective brakes, better ergonomics and safer control systems;
- Implementation of collision avoidance systems to reduce underground tramming accidents; and
- Introduction of glass reinforced plastic instead of stainless steel to improve corrosion resistance in the highly acidic uranium plant.