

Research and development

AngloGold Ashanti's approach to research and development is a combination of external private and collaborative research and in-house research based at the operations.

The primary external collaborative research programmes include:

- electric drilling: significant progress is being made at TauTona in several key performance areas. Productivity improvements of approximately 15% have been achieved in terms of drilling rates and the number of machine operators required for production. Improvements in the cost per metre drilled now allow the unit to compete well with pneumatic machines at the mine. As drilling and blasting is the fundamental rock-breaking process in deep-level, narrow-vein hard-rock mining, the overall objective of a more energy-efficient stope is to move away from compressed air as the primary source of energy.
- the AMIRA projects:
 - P9N: research into increasing efficiency in comminution and flotation;
 - P420c: research into the gravity and leaching characteristics of gold extraction from both free milling ores and refractory ores; and
 - P266d: research into improving the performance of thickeners.
- a University of British Columbia Canada project researching the use of thiosulphate as an alternative lixiviant to cyanide;
- a research project to develop the scale-up data for the thiosulphate gold leaching process; and
- the Mintek (a South African metallurgical research centre based in Johannesburg)

research project, AuTEK, commissioned to develop new industrial uses for gold. The principal fields being investigated are those of catalysis, medical, biological and the nanoparticle.

Primary in-house research programmes being carried out in conjunction with private external technology suppliers are to:

- investigate aspects of open-pit wall stability design (including risk analysis design) and continuous slope stability measurement;
- investigate the use of GPS systems for drill blast hole location, truck monitoring and the management of ore placement on heaps;
- enhance the engineering design of the New Era Loco as an operational energy modelling system;
- investigate the arsenic compounds precipitated in the process plant and their long-term stability when discharged to tailings storage facilities;
- investigate variations to the mine-to-mill process so as to improve blasting efficiencies and effectiveness, monitor fragmentation and improve energy efficiencies in the comminution process. The aim is to reduce energy and costs and improve material-handling efficiencies;
- develop expert control systems in both comminution and leaching/gold recovery circuits; and
- develop and test a chiller performance software programme – the final outstanding research project within the Future Mine programme.

In addition, AngloGold Ashanti's wholly owned subsidiary, ISS International Ltd, (ISSI), is a global

company specialising in seismic monitoring of mines, engineering structures and earthquakes. The company initiates and undertakes both broad-based and focused research and development in a continuing quest to enhance the safety of those working in mining by developing effective monitoring and warning technology systems. ISSI functions on the international stage and its involvement in seismic matters extends well beyond the mining environment;

As a signatory of the International Cyanide Management Institute (ICMI) a decision was taken by AngloGold Ashanti to comply with the International Cyanide Management Code. Consequently, all process operations group-wide for AngloGold Ashanti have been audited by the in-house corporate Cyanide Management Code audit team. Areas of improvement have been identified at the operations and a schedule is in place for the operations to undergo their ICMI external audit to verify compliance with the International Cyanide Management Code. In addition, extensive cyanide speciation studies have been conducted in conjunction with Mintek at the various plants in the South Africa region to determine, on both a macro- and a micro-scale, the environmental impacts of cyanide in residue material. This has enabled a clearer understanding of the environmental impacts of cyanide and has led to the implementation of a strategy to ensure compliance with the requirements of the International Cyanide Management Code.

Cyanide management covers:

- cyanide recovery using the Hannah process system;
 - cyanide destruction using a number of proprietary processes; and
 - cyanide destruction based on bacteria destruction of cyanide compound.
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- compliance with the International Cyanide Management Code;
 - consumption by installation of continuous cyanide and weak-acid dissociable cyanide measuring devices with process control base on a forward control loop;