



Ladies and gentlemen,

In the time that we have available to us during this lunch, my colleague Barrie Parker and I would like to discuss two things. The theme for our presentation to you is "Increasing value through R&D and growth".

First, I'm going to describe for you how we at AngloGold are targeting R&D; to both improve productivity and to grow demand for our product.

After which, Barrie Parker, the General Manager at AngloGold's Sunrise Dam operation in Western Australia, will describe how we're ensuring a long term future for that very profitable operation.

### Three parts:

- In South Africa, a step change in operating productivity will have to be supported by the implementation of production technology advances which deliver significant progress in face advance rates, safety and cash operating cost reductions
- World wide, to make continuous changes to the metallurgical process which improve recovery, lower costs and promote environmental protection
- World wide, to widen and speed up the search for alternative and sustainable industrial applications for gold

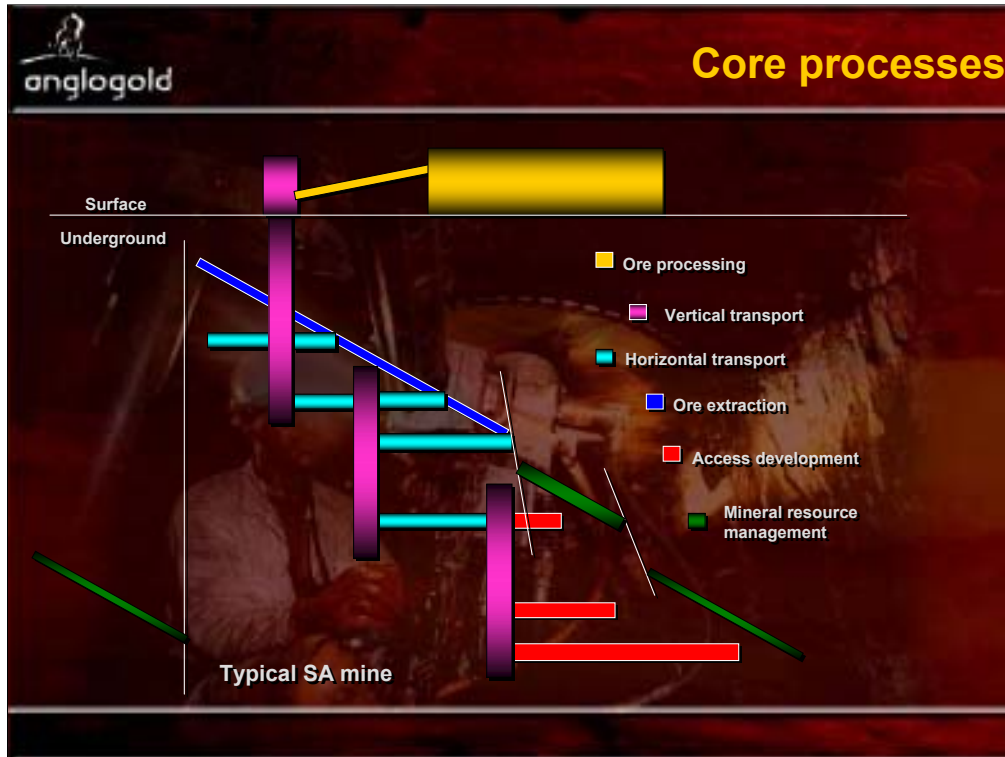
But first up: R&D: The AngloGold R&D strategy has three broad focuses.

The first two focus on underground production techniques and the metallurgical process. In South Africa, deep-level, hard rock gold mining is significantly constrained by the fact, that for the most part, it continues to employ 50 year old technology - epitomised in the hand-held rock drill and the underground locomotive (with its driver more often than not at the wrong end of the machine).

The lack of innovation in production and services technology leads to pedestrian face advance rates, and contributes to the industry's less than proud safety record and slow cost control progress.

What I'll be showing you in the next ten minutes are some of the programmes that we have in place to change the face of production technology on our South African mines. To those of you who are not familiar with deep-level, narrow vein mining, these advances may seem trivial. However, success in these ventures, I assure you, will yield results that are nothing short of dramatic.

Our second R&D thrust complements the work being done by my colleague Kelvin Williams in promoting gold jewellery and focuses on the search for alternative industrial applications for gold, an area as neglected by gold companies as the promotion of gold jewellery has been until recently.



For this presentation, I've categorized the production process on a typical, deep-level gold mine, into 6 core processes: they are-

- mineral resource management
- access development
- ore extraction (or mining, if you will)
- horizontal transport
- vertical transport, and
- ore processing (or metallurgy).

AngloGold's R&D program is addressing each of these processes in a wide range of projects.

For today's purposes, however, I'm going to showcase for you a few examples from some of the processes which we believe will, in the short term, deliver very real results in the areas of safety, face advance and cost control.



Stope drill rig

- Off-the-shelf technology
- Remote operation for improved safety
- Equally spaced and parallel blastholes
- 10% improvement in face advance

AngloGold has put considerable resources into developing and improving the design of stope drill rigs. These rigs are off-the-shelf technology and form an integral part of the 3-year technology implementation programme. To mention the most significant advantages of these new designs:-

- The new rigs allow for drilling of equally spaced and parallel blastholes;
- They are operated remotely, with the operator positioned in a safer area further away from the rock face; and
- Overall, the implementation of the new-design drill rigs results in a very significant, 10% improvement in face advance.

The AngloGold SA region has about 1100 working panels and about 65% of these are being targeted for implementation of drill rigs

Some factors which may restrain the smooth implementation of drill rigs, include:

- Resistance to change from machine operators and fear of job losses; and
- The constraint that the drill rigs are selected and implemented based on their suitability and applicability due to the varying geological nature of the orebody.

## Rocksplitting

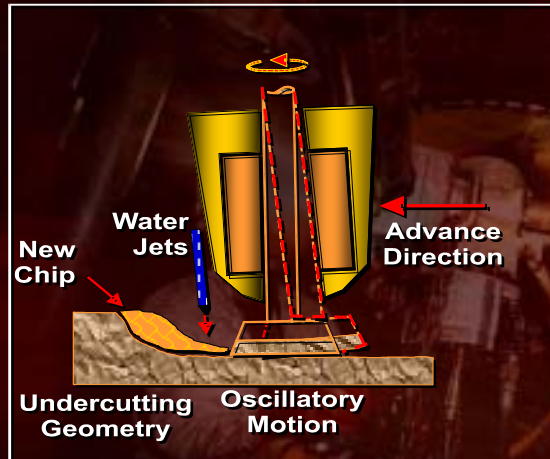


- Upside for safety and production from continuous operations
- Potential face advance in excess of 40m in 22 shifts
- 11% potential cost improvement with critical mass

Another technology that AngloGold is currently refining, is rock-splitting repetitive, which stands to benefit two focus areas, namely safety and productivity.

- This technology makes for potential face advance in excess of 40m in 22 shifts. One of our contractors has made a commitment to achieve 40m face advance by December 2000.
- Overall, rocksplitting yields an 11% potential improvement on costs in comparison with the conventional stoping method.
- As part of our greater R&D strategy, by mid next year, AngloGold will have established wider spread application of Rocksplitting in its deep-level, South African operations.

## Oscillating disc cutter



- Break-through technology
- Allows hard rock to be cut mechanically
- Currently undergoing field test trials in Australia
- Currently cutting soft rock at 100Mpa
- Further tests being done to demonstrate the ability to cut rock with hardness in excess of 200Mpa
- Benefits:
  - non-cyclic and non-explosive
  - breaks rock in tension

A longer-term break-through technology in ore extraction, is the Oscillating disc cutter.

This is a breakthrough technology that allows hard rock to be cut mechanically, and is an R&D project undergoing trials via CMTE in Brisbane, and is also a collaborative project administered by AMIRA.

- A prototype ODC machine is already undergoing field test trials in Australia with encouraging results:
- The ODC is currently cutting soft rock at 100Mpa, and further tests being done to demonstrate the ability of machine to cut rock with hardness in excess of 200Mpa
- The specific benefits of this application are that it is non-cyclic and non-explosive.

21st century loco



Outdated loco



- Front-driven
- More operator-friendly
- Lend themselves to communication and process control systems
- Three units of 21st century locomotives currently in use
- Population will increase, replacing most of the old units from 2001

AngloGold is also making progress in modernising horizontal transport technology. In terms of safety and ergonomics, the locomotives currently in use at AngloGold SA operations are outdated.

Our goal is to introduce 21<sup>st</sup> century locomotives which are front-driven, more operator-friendly and which lend themselves to communication and process control systems.

There are three units of 21st century locomotives currently in use on three different AngloGold operations in South Africa.

The population of these locomotives will gradually increase, replacing most of the old ones as from 2001.

### Old systems:

- Fragmented, copper/hardwire

### Current systems:

- Rationalized, analogue and low bandwidth radio

### Future systems:

- Digital, fibre, high bandwidth radio
- The final voice frontier:  
Effective mobile voice communications in stopes

In the area of communication systems, AngloGold has already made significant progress in modernising dated technology:

The older communication systems are typically unintegrated with a communication service for every application. Most of these systems are based on hard wire connections - typically copper.

Current installations include leaky-feeder radio for voice communications and low band-width data communication systems.

We have also moved to rationalized systems for handling voice and data, a good example of this is the installation of fibre optic shaft backbones in most of the long life operations.

Another communication technology currently in use is the spread-spectrum, radio LAN technology for multimedia (data, voice and video) mobile communications.

In-stope voice communications remains a challenge for AngloGold and is likely to secure substantial added-business-value. A new system will enable instant communication between an operator in the stope and the maintenance team located in the workshop. This is an R&D project undergoing trials with implementation planned for November 2000 on one of the SA mines.

## Appropriate Milling Technology



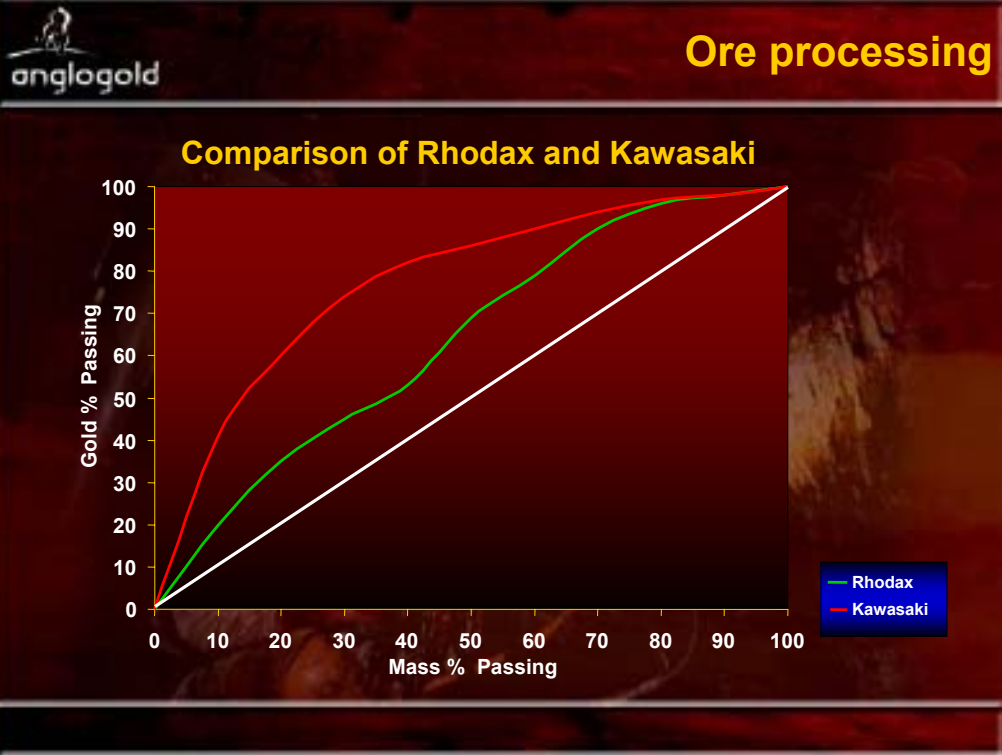
**Data for No.8 Gold Plant  
(300,000 tpm) - 20 yr LOM**

- ◆ Capex: \$22m
- ◆ Opex: -\$1/t (-17%)
- ◆ Labour: -260 (-58%)
- ◆ IRR 30%
- ◆ payback 4 yrs

New ore-processing technology, to replace 3-stage crushing and 2-stage milling circuits with one, single-stage ROM mill, has the potential to reduce labour from 260, mainly unskilled employees, to approximately 20 skilled employees.

This technology represents significant cost savings - with an overall return on investment of 30%.

Previously, the largest ROM mills in the SA division, at 15' x 30', rated at 100 tph. The new mill will be a 26' diameter by 38', and rated at 450 tph. It has variable speed, a wrap around 11MW motor and an expert control system (OCS).



- The appropriate milling technology could also be linked to the more medium-term projects on mineral liberation with an objective of particle liberation as opposed to pure size reduction.
- Possible equipment under investigation are interparticle crushers (the Kawasaki crusher) and grinding devices (Loesch mill).
- The graph shows the effect of the Kawasaki modified jaw crusher when compared to the particle liberation using a Rhodax crusher.
- This phenomena is undergoing further investigation at the AARL.

**anglogold** **Ore processing**

**Expert systems in use:**

Sadiola	6% increase in throughput
Jerritt Canyon	12% increase in throughput
West Wits	Installed in 2000

In the field of modern, intelligent-ore-processing, an expert, rules-based system that works on mathematical models and that can perform dynamic simulation and learn from previous events - will be installed at AngloGold's West-Wits No. 1 plant.

The benefits of this system stem from consistency of performance which will result in cost savings, particularly in mill power and improved recovery.

The system that will be installed is known as the OCS (Optimisation Control System) and is based on the OCS installed and successfully used at Sadiola where throughputs in excess of 25% of design have been achieved - of which 6% is attributed to the OCS.

At Jerritt Canyon JV, an expert system controls both a dry milling circuit and a fluidised bed roaster circuit. The system resulted in a 12% throughput increase for the milling circuit and significant stabilisation of the roaster operating conditions. The net result has been a 21% plant throughput increase.

- AuTek is a JV between AngloGold and South Africa's national metallurgical research organization, Mintek, to exploit the unique properties of gold for industrial applications
- Project will focus on the catalytic properties of gold and on applications in, for example:
  - diesel engine emission control
  - air purification systems
  - fuel cells
- AngloGold is organizing a conference involving international researchers and potential commercial users of new products in Cape Town in April 2001

Moving now from the mining processes R&D, the second prong of AngloGold's R&D strategy, is to exploit the unique properties of gold, for industrial applications, with the goal of significantly increasing industrial demand for our product.

With this in mind, in June 2000, AngloGold and Mintek, South Africa's national metallurgical research organization, announced an equal joint venture to do just that.

Project Autek will focus on the catalytic properties of gold and on applications in, for example:

- diesel engine emission control
- air purification systems
- fuel cells

AngloGold is organizing a conference involving international researchers and potential commercial users of new products in Cape Town in April 2001

While we have major challenges ahead of us in modernising SA gold production and in ensuring a future for our product, AngloGold's R&D projects have the capacity to yield real results in the short to medium term

In conclusion, ladies and gentlemen:

While we have major challenges ahead of us in modernising the company's deep-level, South African gold production and in ensuring a future for our product, AngloGold's R&D projects have the capacity to yield real results in the short to medium term.

Thank you - you have been an attentive audience.

I hand you over now to my colleague, Barrie Parker, to describe what AngloGold is doing at Sunrise Dam.