

### Products

AngloGold Ashanti's main product is gold. An insignificant portion of its revenue is derived from the sales of silver, uranium oxide and sulphuric acid. AngloGold Ashanti sells its products on world markets.

### Gold market

The gold market is relatively liquid compared to many other commodity markets. Physical demand for gold is primarily for fabrication purposes, including jewellery (which accounts for almost 80% of fabricated demand), electronics, dentistry, decorations, medals and official coins. In addition, central banks, financial institutions and private individuals buy, sell and hold gold bullion as an investment and as a store of value.

The use of gold as a store of value (a consequence of the tendency of gold to retain its value in relative terms against basic goods and in times of inflation and monetary crisis) and the large quantities of gold held for this purpose in relation to annual mine production have meant that, historically, the potential total supply of gold is far greater than demand. Thus, while current supply and demand play some part in determining the price of gold, this does not occur to the same extent with other commodities. Instead, the gold price has from time to time been significantly affected by macro-economic factors such as expectations of inflation, interest rates, exchange rates, changes in reserve policy by central banks and global or regional political and economic events. In times of inflation and currency devaluation, gold is often seen as a refuge, leading to increased purchases and support for the price of gold.

Interest rates affect the price of gold on several levels. High real rates of interest increase the cost of holding gold and discourage physical buying in developed economies. High US interest rates would also make hedging or forward selling of gold attractive because of the higher contango premiums available in the forward prices. Increased forward selling in turn has an impact on the spot price at the time of such sales. At a secondary level, changes to interest rates are viewed by market participants as indicators of other economic changes (including expectations of inflation), and have been used historically by market participants to motivate decisions to buy or sell gold.

Changes in exchange rates against the dollar affect levels of demand for gold in non-US economies. In South East Asia, for example, during the mid-1990s strong local currencies encouraged robust gold demand due to low real gold prices in local currencies. In contrast, when South East Asian currencies fell sharply against the dollar in 1997, the local currency values of gold increased proportionally, and wholesale selling of the metal ensued in the region. Recoveries in Asian currencies since 1999, have resulted in a decline in gold prices in terms of these currencies which in turn has led to a rise in gold demand to previous levels. In the investment market, a strong dollar during the 1990s had a negative effect on investment demand for gold in developed economies. Since 2001, the weakness in the dollar has been seen as a signal to buy gold.

While political and economic crises can have either a positive or negative impact on gold, this is not inevitable. As a recent example of this, in 1998, despite negative sentiment caused by the Russian financial crisis and ensuing corrections in the capital markets worldwide, the price of gold

remained stable. By contrast, more recent political events have helped to drive the gold price higher, particularly the war in Iraq.

### The market in 2004

The return of investor interest in gold resulted in a sustained rise in the gold price during the latter half of 2004. The gold price rose almost uninterrupted for three months to early December to \$456.75 per ounce, the highest price in almost 17 years. There was a measure of correction after the price failed to rise above \$460 per ounce, and the price ended the year at \$435 per ounce, up by 6% from the beginning of 2004. The market has since corrected further to a low of \$410 per ounce, but buying interest has returned and the price rally of the past three years appears intact.

The driving influence on investor sentiment was the weakening dollar, particularly against the euro, but also against the Japanese yen. This has been the case also for the past three and a half years and the correlation between the rising dollar spot price of gold and the weakening dollar against the euro reached a remarkable 97% over the three months to December. While this does not mean that other factors do not influence the gold market and the price of gold from time to time, it does underline the primary influence of the health of the US currency on the gold price in the current market cycle.

In this respect, the gold market differs from the parallel cycle of rising base metal and commodity prices, which has also been influenced to some extent by investor buying on the back of a weakening US currency. However, prices of industrial metals are being driven mainly by Chinese demand at present. The correlation between the gold price and the weak dollar is an important one for the year ahead. With market commentators and analysts uniformly forecasting a weaker dollar at the end of 2005, these forecasts have translated to a forecast for higher spot prices of gold as well. Any stabilisation or recovery in the US currency would have the opposite effect on the gold price in the current market.

Investment demand remains the instrument through which this influence on the gold price is manifested. The role played by investors and speculators in gold on the New York Comex has been supplemented by the launch in the USA of the gold exchange-traded fund, the streetTRACKS Gold Shares. The fund was created by the World Gold Council in partnership with State Street Global Markets and by early 2005 this fund had purchased on behalf of its investors over 140 tons of physical gold in the market. This level of investment is equal to over 25% of the net long position in gold on the New York Comex. On the Comex itself, during the year the total open position in gold reached a record high of over 22 million ounces, or 685 tons. The net long position remained consistently strong throughout the final quarter of 2004, although it failed to reach the record high levels seen in early April.

The average spot price of \$409 per ounce for the year was \$46 per ounce or 13% stronger than the average for the previous year. However, the rand strengthened against the dollar by some 15% during this period, and the rand gold price enjoyed no benefit from the higher dollar prices. The gold price in rands at the end of 2004 of R79,442 per kilogram was over 10% (or R9,000 per kilogram) lower than the local

gold price at the beginning of 2004, and the average local price of R84,400 per kilogram for 2004 was 4% lower than the average price in 2003.

## Currencies

The recovery in the dollar which began early in the first quarter of 2004 lasted well into the third quarter of the year. For over six months, the US currency traded mostly between \$1.20 and \$1.25 to the euro, and reached ¥115 during May 2004. The dollar's strength during this time was a result largely of purchases of dollar instruments by monetary authorities in China and Japan. As this Asian intervention ended, so did the recovery in the US currency, and the dollar's devaluation resumed late in the third quarter, and continued unbroken for four months, to close 2004 at almost \$1.36 to the euro and at ¥102. By the end of the year, the euro had gained 8% and the yen 5% against the dollar compared to their exchange rates at the beginning of 2004.

The cycle of dollar weakness continued as the market took the view that the challenge of the US budget deficit was unlikely to be resolved and the US currency would have to weaken in order to set in train the economic corrections necessary to reduce the US deficits. This market view was reinforced by the public announcement in mid-November by Alan Greenspan, Chairman of the US Federal Reserve Bank, that the current account deficit of the US was unsustainable and that the willingness of foreign investors to finance that deficit through investments in the US currency was finite. After this announcement, the US currency went on to touch a record low of over \$1.37 to the euro, and also to lose ground against the yen. With the weaker dollar came a stronger gold price, and the behaviour of gold as a currency trade against the dollar was reinforced. Since the end of 2004, the dollar has recovered somewhat against both the euro and the yen.

The South African rand has strengthened against the dollar by significantly more than the dollar has weakened against other major currencies. At its strongest point against the dollar (at the end of 2004), the rand had gained 17% since the beginning of 2004. The local currency also showed significant volatility during the year. While the rand has been helped in 2004 by the weakening dollar, it has also benefited from strong commodity prices and from sustained investor interest in the South African economy. In addition, sound economic policies have translated to sustained growth in the country and to a further upgrading of the country's sovereign risk rating by international ratings agencies. While the value of the rand remains vulnerable to a recovery in the dollar, or to specific event-driven reactions, it is otherwise likely to sustain its strength against major currencies into 2005.

AngloGold Ashanti believes that the primary driver in gold continues to be strong speculator and investor interest in the metal, driven by a number of fundamental economic circumstances. Among these is the anticipated further decline of the dollar.

The physical market for gold in the first half of 2004 showed some positive adjustment, and some acceptance of higher gold prices. This resulted in a slight recovery in demand and some slippage in supply, and a physical market more in balance for that. In particular, in the important area of demand for gold in jewellery, latest reports show improved offtake in the Middle East (particularly in Turkey) and in South

East Asia (particularly Vietnam), and sustained demand in India. Set against this demand performance, official sales of gold were lower in 2004, due in part to the process of renegotiation and extension of the Washington Agreement for a further five years, and lower scrap sales.

A further contribution to an improved supply/demand balance is likely to come from rising gold offtake in jewellery in China this year, the first time in several years. This improvement has come with the completion in 2003 of the deregulation of the gold jewellery market in China, and the subsequent introduction by the World Gold Council of modern, 18-carat gold jewellery to metropolitan markets in China. This new product is able to compete with platinum jewellery on price, colour and design and it has been interesting to see growing sales of this new product and a simultaneous fall in platinum jewellery sales in the China mainland market during 2004.

## Hedging

As at 31 December 2004, the net delta hedge position of AngloGold Ashanti was 10.49 million ounces or 326.2 tons, valued at the spot price of gold on that date of \$434.70 per ounce. This net delta position reflects a decrease over the year of 4.2 million ounces or 130 tons in the net combined size of the AngloGold Ashanti hedge since the beginning of 2004 and the take-on of the Ashanti hedge in April 2004. This decrease has been achieved by the active management of hedge positions quarter by quarter, and a restructuring and reduction of hedge commitments during the final quarter of 2004. The marked-to-market value of the hedge position as at 31 December 2004 was negative \$1.16 billion. The group continues to manage its hedged positions actively and to reduce overall levels of pricing commitments in respect of future gold production by the group.

## Marketing channels

Gold produced by AngloGold Ashanti's mining operations is processed to saleable form at various precious metals refineries. Once refined to a saleable product – either a large bar weighing approximately 12.5 kilograms and containing 99.5% gold, or smaller bars weighing 1.0 kilograms or less with a gold content of 99.5% and above – the metal is sold directly by the refineries to bullion banks and the proceeds are paid to the company.

Bullion banks are registered commercial banks that deal in gold. They participate in the gold market by buying and selling gold and distribute physical gold bullion bought from mining companies and refineries to physical offtake markets worldwide. Bullion banks hold consignment stocks in all major physical markets such as India or South East Asia and finance such consignment stocks from the margins charged by them to physical buyers, over and above the amounts paid by such banks to mining companies for the gold.

Where forward sales contracts exist against which AngloGold Ashanti elects to deliver physical product, the same channel of the refinery is used, with the variation that the refinery does not sell the metal on its behalf, but instead delivers the finished gold bars to the bullion bank with which the group's forward contract is held. The physical delivery to the counterparty bank of the appropriate amount of gold fulfills

AngloGold Ashanti's obligations under the forward contract, and AngloGold Ashanti is paid by the relevant bullion bank with the price fixed under the forward contract, rather than at the spot price of the day.

### Gold market development

The challenge for marketing gold is significant. This is especially so given the fall in recent years in physical demand for gold, in part a result of the rise in price and market volatility. Demand for gold jewellery in many markets has declined materially in the past four years, with gold jewellery sales losing ground against other luxury consumer goods, particularly in developed markets.

AngloGold Ashanti is committed to developing the market for gold. The group's marketing programme aims to increase the desirability of its product, to sustain and grow demand, and to support the deregulation of the market in key economies.

During 2004, AngloGold Ashanti spent some \$15 million on gold marketing initiatives, of which 66% was spent through the World Gold Council (WGC). Gold marketing expenditure by AngloGold Ashanti in 2003 and 2002 amounted to \$19 million and \$17 million, respectively.

Independently of its support for the WGC, AngloGold Ashanti is active in a number of other marketing projects that support gold. It remains the only gold group in the world to have committed this level of resources to the marketing of the metal it produces.

Downstream initiatives have included GoldAvenue, an internet venture, established between AngloGold Ashanti, JP Morgan Chase and Pamp MKS of Geneva in 2000. This venture continued to sell gold jewellery by catalogue and website until early 2004, after which it was wound up.

AngloGold Ashanti holds a 26.6% stake in OroAfrica, the largest manufacturer of gold jewellery in South Africa, as an investment in the downstream beneficiation of gold in South Africa. AngloGold Ashanti and OroAfrica have co-operated in a number of projects, including OroAfrica's development and launch of an African gold jewellery brand. An important strategic step has been the establishment of a Jewellery Design Centre at OroAfrica at a cost of \$250,000. The purpose of the centre is to generate new gold jewellery designs, and to improve product standards through technology, design and innovation. The centre has been used during the past year to develop a new range of gold jewellery with an African theme. The Design Centre was commissioned by the South African Parliament in 2003 to manage the fabrication of the new Parliamentary mace to celebrate the tenth year of democracy in South Africa. The mace was successfully completed and presented to Parliament in 2003.

Also in the area of design innovation, AngloGold Ashanti's Riches of Africa Gold Jewellery Design Competition was established in 1998 to showcase South African jewellery designers, to enhance jewellery manufacturing technical skills in South Africa and to support the local gold jewellery industry. Training workshops for competition entrants are held each year, while the award-winning works are exhibited and used in fashion shows and other events both locally and abroad. The 2004 competition attracted a record total of 459 entrants and a record number of student and

professional jewellers attended training workshops held by AngloGold Ashanti in Johannesburg, Cape Town and Durban.

A bi-annual gold jewellery design competition in Brazil, the Designers Forum, was launched by the group in South America in 2002. It was the first such competition in that country. The competition generated unprecedented interest in 2004, with a high quality of design and craftsmanship and some 650 projects involved. From these, 33 pieces were selected for the collection.

The Gold of Africa Museum was inaugurated in 2001 in Cape Town with the permanent endowment of the Barbier Mueller collection of West African gold objects purchased by the company in 1998. The Museum also serves as a training facility in the jewellery industry in Cape Town. The Museum continues to attract a growing number of visitors, and to provide special visits for school groups in the Cape Town area.

AngloGold Ashanti and Mintek, South Africa's national metallurgical research organisation, launched Project AuTEK in 2002 to research and develop industrial applications for gold. Project AuTEK has developed a gold-based catalyst for the oxidation of carbon monoxide at ambient temperature. Mintek has carried out pilot-scale catalyst production tests. Negotiations for the commercial production of the catalyst have commenced.

An important feature in many of AngloGold Ashanti's marketing projects has been the beneficiation of gold, particularly in South Africa. AngloGold Ashanti's commitment to adding value to gold extends beyond mining and aims to contribute towards the upliftment of people and the sustainability of communities. AngloGold Ashanti remains a sponsor of the Atteridgeville Jewellery Project, established in 2000 by the Vukani-Ubuntu Community Development Project to create opportunities in the jewellery industry in South Africa for the previously disadvantaged through training and development. In 2004, the company also sponsored the expansion of the Soweto Jewellery School to enable it to double its intake of students from 2005.

### The process of producing gold

The process of producing gold can be divided into six main phases:

- finding the orebody;
- creating access to the orebody;
- removing the ore by mining or breaking the orebody;
- transporting the broken material from the mining face to the plants for treatment;
- processing; and
- refining.

This basic process applies to both underground and surface operations.

### Finding the orebody

AngloGold Ashanti's global exploration programme generates targets and undertakes exploration, on its own or in conjunction with joint venture partners.

## Creating access to the orebody

There are two types of mining which take place to access the orebody:

- underground – a vertical or decline shaft (designed to transport people and/or materials) is first sunk deep into the ground, after which horizontal development takes place at various levels of the main shaft or decline. This allows for further on-reef development of specific mining areas where the orebody has been identified; and
- open-pit – where the top layers of topsoil or rock are removed in a process called ‘stripping’ to uncover the reef.

## Removing the ore by mining or breaking the orebody

- In underground mining, holes are drilled into the orebody, filled with explosives and then blasted. The blasted ‘stopes’ or ‘faces’ are then cleaned and the ore released is now ready to be transported out of the mine.
- In open-pit mining, drilling and blasting may also be necessary to release the gold-bearing rock; excavators then load the material onto the ore transport system.

## Transporting the broken material from the mining face to the plants for treatment

- Underground ore is transported by means of vertical and/or horizontal transport systems. Once on surface, conveyor belts usually transport the ore to the treatment plants.
- Open-pit mines transport ore to the treatment plants in vehicles capable of hauling huge, heavy loads.

## Services

Mining activities require extensive services, both on the surface and underground, including:

- mining engineering services;
- mine planning;
- ventilation;
- provision of consumable resources;
- engineering services;
- financial, administration and human resource services; and
- environmental/permitting services.

## Processing

- Comminution, which is the breaking up of ore to make gold available for treatment. Conventionally, this process occurs in multi-stage crushing and milling circuits. Modern technology is based on large mills fed directly with run-of-mine material.
- Gold ores can typically be classified into:
  - refractory ores, where the gold is locked within a sulphide mineral and not readily available for recovery by the cyanidation process; or
  - free milling, where the gold is readily available for recovery by the cyanidation process.
- Refractory ore treatment – after fine grinding the sulphide materials are floated away from the barren gangue material to produce a high-grade sulphide concentrate. The sulphide concentrate is oxidised by either roasting as at AngloGold Ashanti Mineração or bacterial oxidation (BIOX) as at Obuasi. The oxidation process oxidises the sulphide minerals liberating the gold particles making them amenable to recovery by the cyanidation process.

- Free milling and oxidised refractory ores are processed for gold recovery by agitator leaching the ore in an alkaline cyanide leach solution followed generally by adsorption of the gold cyanide complex onto activated carbon-in-pulp (CIP).
- The alternative process is the heap-leach process. Generally considered applicable to only high-tonnage, low-grade ore deposits, AngloGold Ashanti has successfully applied this to medium-grade deposits where the ore deposit tonnage cannot economically justify constructing a process plant. Here, the run-of-mine ore is crushed and placed on the leach. Low strength alkaline cyanide solution is applied, generally as a drip, to the top of the heap for periods of up to three months. The dissolved gold bearing solution is collected from the base of the heap and transferred to the carbon-in-solution (CIS) columns where the gold cyanide complex is adsorbed onto activated carbon. The stripped solution is recycled back to the top of the heaps.
- Gold adsorbed onto activated carbon is recovered by a process of re-dissolving the gold from the activated carbon (elution), followed by precipitation in electro-winning cells and subsequent smelting of that precipitate into bars that are shipped to the gold refineries.
- The retreatment of tailing stockpile from previous decades’ operations is also practised by AngloGold Ashanti. The old tailings are mined by water sluicing followed by agitator leaching in alkaline cyanide solution and recovery of dissolved gold onto activated carbon.
- At AngloGold Ashanti operations, the major by-products produced are:
  - silver, which is associated with gold in ratios ranging from 0.1 to 1 to 200:1 silver to gold
  - sulphuric acid which is produced by scrubbing the off gases from the roasting plants; and
  - uranium which is recovered in a process which involves initial acid leaching followed by recovery of the leached uranium onto resin and subsequent stripping with ammonium hydroxide and precipitation of crude yellow cake.
- The tailings from the process operations are stored in designated Tailings Storage Facilities designed to enhance water recovery and prevent contaminant seepage into the environment.

## Refining

The gold dust is then smelted into gold bars, which are transported to a refinery for further refining, to as close to pure gold as possible – good delivery status. This gives the assurance that the bar contains the quantity and purity of gold as stamped on the bar.

## Research and development – 2004

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 prime external collaborative research programmes include:

- electric drilling: progress was made towards the end of the final quarter of 2004 in several key performance areas. 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 will need to rely on moving away from

compressed air as the primary energy source for this and several other in-stope activities;

- the AMIRA projects:
  - P9N which is essentially research into increasing efficiency comminution;
  - P420c which is essentially research into the gravity and leaching characteristics of gold extraction from both free milling ores and refractory ores; and
  - P266d which is essentially 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; and
- the Mintek, Johannesburg, research project AuTEK, commissioned to develop new industrial uses for gold. The principal fields being catalysts, medical, biological and nanoparticle.

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

- open-pit wall stability design aspects (including risk analysis design) and continuous slope stability measurement;
- use of GPS systems for drill blast hole location, truck monitoring and management of ore placement on heaps;
- the engineering design enhancement to the New Era Loco, an operational energy modelling system;
- a chiller performance software programme is being completed as the final outstanding research project within the FutureMine Programme;
- AngloGold Ashanti's wholly-owned subsidiary, ISS International Ltd, (ISSI), remains a world leader 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;

- the mine to mill and variations of that theme to improve blasting efficiencies and effectiveness, monitor fragmentation and improve energy efficiencies in process comminution practices. The objective is to reduce energy and costs and improve material-handling efficiencies; and
- expert control systems in both the comminution circuits and leaching/gold recovery circuits.

A company-wide decision has been taken to comply with the International Cyanide Code. To this end, extensive cyanide speciation studies have been conducted at the various plants in the South African region in conjunction with Mintek (a South African metallurgical research centre) to determine, on both a macro- and a micro-scale, the environmental impacts of cyanide in the residue material. This has facilitated 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 Code.

Cyanide management covers the areas of:

- consumption by installation of continuous cyanide and cyanide WAD measuring devices with process control based on a forward control loop;
- 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.