ENVIRONMENT

OUR VALUES:

We strive to form partnerships with host communities, sharing their environments, traditions and values. We want communities to be better off for AngloGold Ashanti having been there. We are committed to working in an environmentally friendly way.

contents

1. Introduction

AngloGold Ashanti's environmental management and practices are guided by the group's business principle dealing with, AngloGold Ashanti and the environment (below).

In this year's report on environmental issues, the key indicators presented below have been subject to assurance by external auditors PricewaterhouseCoopers. While AngloGold Ashanti has provided more quantitative detail in this section than in the past, not all of the data generation systems are at a stage where these may be subject to a rigorous assurance process and these have thus been excluded from the assurance process. It is the company's intention to improve this, incrementally, over the next few years.

The report has been presented in accordance with the Global Reporting Initiative (GRI) guidelines *(see page 14 for details)*. In addition, a detailed response to the GRI environmental performance indicators by operation is provided on the website.

2. Business principle

AngloGold Ashanti and the environment

- We recognise that the **long-term sustainability** of our business is dependent upon good stewardship in both the protection of the environment and the efficient management of the exploration and extraction of mineral resources.
- We will comply with all applicable environmental **laws**, regulations and requirements.
- We are committed to establishing and maintaining **management systems** to identify, monitor and control the environmental aspects of our activities.
- The company will ensure that **financial resources** are available to meet its reclamation and environmental obligations.
- The company will ensure that its employees and contractors are **aware of** this **policy** as well as their relevant responsibilities.
- We will conduct **audits** to evaluate the effectiveness of our environmental management systems.
- We are committed to **communicating and consulting** with interested and affected parties on environmental aspects of our activities.
- We will work to **continually improve** our environmental performance.
- The company will participate in **debate** on environmental matters at international, national and local levels.

3. Key indicators

- AngloGold Ashanti formally adopted ISO 14001 as the standard for the group's environmental management system during 2005. The group has set itself the target of achieving certification of its operating mines by the end of 2006. The following operations currently have ISO 14001 certification: Cerro Vanguardia in Argentina; AngloGold Ashanti Mineração and Serra Grande in Brazil; Bibiani and Iduapriem in Ghana; and Geita in Tanzania. Further details may be found on page EN6.
- All the South African operations have approved Environmental Management Programmes (EMPs) in place. These EMPs are required in terms of South African environmental and mining legislation and were reviewed during the year as part of the company's application for the conversion of its mining rights in terms of the Minerals and Petroleum Resources Development Act (MPRDA). AngloGold Ashanti was the first gold mining company to receive all of its 'new order' mining rights in South Africa.
- All operations have set aside financial resources for the rehabilitation and eventual closure of operations. As at the end of 2005, the estimated liability amounted to $337.7 million (2004: $350.1 million). A detailed breakdown by country/operation may be found on page EN14.
- Environmental incidents of actual or potential significance are reported to the Board Committee on Safety, Health and Sustainable Development. 24 incidents of varying degrees of severity were reported in 2005. Further details may be found on pages EN8 to EN10.
- AngloGold Ashanti is committed to complying with all applicable legislation and regulations pertaining to the environment. At Obuasi in Ghana, the Environmental Protection Agency raised a number of concerns about the failure of the operation to achieve water quality discharge standards. An internal review of the operation has identified a series of remedial actions to address this situation.
- The following key performance indicators are reported for AngloGold Ashanti in 2005.*
  - Total cyanide usage was 31,939,528 kg. A table listing cyanide usage per country/operation may be found on page EN17.*
  - Total water use was 78,458,736 m^3. A breakdown of water usage by country/operation may be found on page EN22.*
  - Total direct energy use was 29,213,073 GJ. (See page EN23 for a breakdown of consumption by country/operation.)*

** Note that only information from the South African operations was assured by PwC.*

PRICEWATERHOUSECOOPERS

Our assurance is based on a test of the reliability of the selected data marked with the symbol , by way of:

- conducting interviews and holding discussions with management, key personnel and/or stakeholders of AngloGold Ashanti Limited and assessing data trends;
- obtaining an understanding of the systems used to generate, aggregate and report the selected data;
- conducting site visits to test systems and data and inspecting premises where necessary;
- assessing the completeness and accuracy of the selected data; and
- reviewing and analysing collected information and effecting re-calculations where considered appropriate.

4. Review 2005

In the Report to Society 2004, the company set a number of objectives for 2005. All of these targets have either been met in full or in part.

Environment	
Objectives for 2005	**Performance in 2005**
Continued implementation of a “high level” environmental reporting system.	A ‘major incident‘ environmental reporting system was put in place, with details of incidents recorded on page EN8.
Improve environmental data gathering systems in accordance with stakeholder and GRI reporting requirements.	Significant improvements have been made to environmental data collection and reporting systems. A series of environmental guidelines are being prepared to provide appropriate guidance. See GRI document on the website for further details.
Consider the adoption of ISO 14001 as the group-wide environmental management system.	ISO 14001 has been adopted as the group standard. A target has been set to achieve certification of all operating mines by the end of 2006.
Review mine closure plans and associated costs across the group.	Total environmental liability estimates are revised on an annual basis – see page EN14. Through the ICMM, AngloGold Ashanti is participating in a project aimed at understanding and improving current environmental and social practices related to mine closure.
Improve environmental awareness across the group.	This continues to be driven at the regional and mine level. The need for a series of group-wide environmental guidelines has been identified.
Develop criteria for company environmental award.	A number of criteria have been identified but concern about the objectivity of such an award has resulted in this being postponed until such time as the set of guidelines have been developed against which to evaluate performance objectively.
Continue with the integration of the former Ashanti operations.	The integration of the former Ashanti operations has continued. Apart from the routine visits to operations, involvement in management and board subcommittee meetings, and reporting of performance, other efforts have included: • Participation in the selection and deployment of environmental staff within the region; • Secondment of Dr William Ahortor from Iduapriem Mine to the Corporate Environmental Office; and • A strategic environmental review of the Obuasi mine was carried out by a team of internal environmental specialists drawn from the United States, Australia and Ghana.

Gold – a rare, safe and recyclable product

Gold has always been recycled because of its inherent high value, ever since it was first discovered before the Bronze age. It can be melted down, re-refined and re-used. It is therefore quite possible that modern jewellery and dental crowns may contain gold that was mined in prehistoric times. In modern times roughly 15% of annual gold consumption is recycled each year. **Gold can be melted down, re-refined and re-used. But it is never lost.**

Gold is the most malleable and ductile of all metals and is usually alloyed to increase its strength. Gold is a good conductor of electricity and heat. It is not affected by exposure to air or to most reagents. It is inert and a good reflector of infrared radiation. Pure gold is measured in troy weight, but when gold is alloyed with other metals the term carat is used to express the amount of gold present.

The discussion that follows reports on the group's environmental performance in line with the company's business principles, which appear in orange below.

We recognise that the long-term sustainability of our business is dependent upon good stewardship in both the protection of the environment and the efficient management of the exploration and extraction of mineral resources.

Environmental policy and strategy within AngloGold Ashanti is overseen by the Committee on Safety, Health and Sustainable Development. Although the committee is apprised of developments in all spheres of activity, the focus of each meeting rotates through safety, health, environment and community issues to ensure that adequate focus is given to each area.

The group has an environmental policy in place at a corporate level, although operations may have their own site-specific policies, which are consistent with group policy.

Environmental policy and strategy is driven at a corporate level. Within each region, the regional environmental manager provides advice to the relevant management teams. At most operations, on-site environmental professionals are responsible for implementing the mine's environmental programme and advising the general manager. Regional environmental offices and the operations themselves may, when appropriate, engage specialists who consult to the operations.

An Environmental Steering Committee has been established at a corporate level and is made up of the regional environmental managers. The insights of this group are used to identify and debate critical environmental issues facing the company, develop strategic response recommendations, and formulate plans for practical implementation.

As an example of the integrated approach that has been adopted, a strategic review of environmental management at the Obuasi operations was undertaken in November. The purpose of the exercise was to review environmental conditions at the operations, identify current environmental risks, prioritise these risks, develop short-term action plans and make recommendations for an improved environmental management programme.

We will comply with applicable environmental laws, regulations and requirements

The group's business principles and environmental policy guide AngloGold Ashanti's management of the impact that the company has on the environment. Operations are subject to the environmental laws, rules and regulations of the various countries in which they operate but, where no such laws exist or where these laws are perceived to be inadequate, operations are guided by the company's business principles, environmental policy and good practice.

Managing environmental issues is a key component of the overall risk management process. Thus, through effective environmental management, the company is able to manage its exposure to business risks and liabilities, providing assurance to shareholders and attracting potential investors.

In South Africa, for example, Environmental Management Programmes (EMP) are in place for the West Wits, Vaal River and Ergo operations as is required by the Minerals and Petroleum Resources Development Act (MPRDA). All policy issues that can be addressed at a business unit level are included in the EMP management actions, covering radiation management, waste management, air quality management, land management, surface water management and groundwater management. The EMPs are updated every two years. The conversion process started in 2005 with an Environmental Impact Assessment (EIA) being developed for each operating area where present direct and indirect impacts on the environment are identified and evaluated in terms of significance. Future direct and indirect impacts are identified and evaluated in the decommissioning and closure section of the EMP. Management actions and opportunities required to reduce the negative impacts are identified. The South Africa region's environmental policy was also modified during the quarter to comply with the requirements of ISO 14001, regarding such issues as pollution prevention, legal compliance, continual improvement and policy availability to the public.

No fines have been recorded during the year. A strategic environmental review of the Obuasi mine has been carried out by a team of internal environmental specialists drawn from the United States, Australia and Ghana. The purpose of the exercise was to review environmental conditions at the operations, identify current environmental risks, prioritise these risks, develop short-term action plans and make recommendations for an improved environmental management programme. The review has identified a series of remedial actions to address problem areas. A number of environmental licences and permits were granted during the year and none was retracted on the basis of environmental performance.

At the Big Springs operation in Nevada, the Great Basin Mine Watch appealed against the renewal of the Water Pollution Control Permit issued by the Nevada Environmental Protection Division. AngloGold Ashanti (Nevada) Corp. filed a petition in response to intervene. Briefs have been filed by the parties and a hearing to resolve the appeal has been scheduled to go before the Nevada State Environmental Commission on 29 and 30 March 2006.

ISO 14001

In March 2005, AngloGold Ashanti's Executive Committee (Exco) decided to pursue ISO 14001 certification for all its operating mines by December 2006. This follows a gap analysis undertaken during 2004 which indicated the degree to which current EMSs were aligned with ISO 14001.

The regions which had not previously implemented ISO 14001 are at different stages of implementation. The implementation in South Africa, for example, has been integrated with the region's Enterprise Wide Risk Management system, since environmental management is viewed as yet another risk that a business unit faces. The present auditing system, the legal register system, the performance assessment report process, and the EMP update process

About ISO 14001

ISO 14001: The International Organization for Standardization (ISO) is a voluntary not-for-profit network of national standards institutes from 146 countries with a Central Secretariat in Geneva, Switzerland, that co-ordinates the system. ISO 14001 focuses specifically on environmental management systems, and was first published in 1996. It applies to those environmental aspects over which the organisation has control and over which it can reasonably be expected to have an influence.

ISO 14001 certification: ISO 14001 is the only ISO 14000-series standard against which it is currently possible to be certified by an external certification authority. Based on regular auditing by an appropriately accredited external body, an organisation may state that it is ISO 14001 certified.

are all being incorporated into the new system. Overall, the initiative is on schedule, with good progress being achieved in the areas of systems procedures, the planning section, and the implementation and operation phase. The Geographic Information System (GIS) continued to be developed as a database for all environmental management data from monitoring and management actions, represented spatially for the three geographic areas. The GIS is being incorporated into the main EMS.

The following operations are currently ISO 14001 certified:

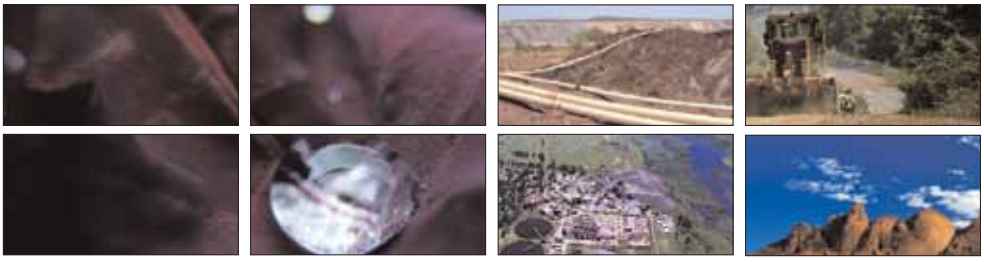
Country	Operation	Date achieved	Certified by	Valid until
Argentina	Cerro Vanguardia	July 2002	National Quality Assurance (NQA) – USA	May 2006
Brazil	AngloGold Ashanti Mineração	March 2004	National Quality Assurance (NQA) – USA	May 2007
	Serra Grande	March 2004	National Quality Assurance (NQA) – USA	March 2007
Ghana	Bibiani	February 2003	DLIQ Certification Services	Feb 2006
	Iduapriem	January 2004	DLIQ Certification Services	Jan 2007
Tanzania	Geita	July 2001	DLIQ Certification Services	July 2007

Environmental incident reporting

AngloGold Ashanti's reporting protocol enables the company to identify and manage the risks and impacts of environmental incidents, as well as their associated costs, by providing the appropriate level of information necessary to advise the executive and the board of the nature and occurrence of important incidents and developments and management's response.

In line with this protocol, a major environmental incident report must be made within 24 hours to the corporate office. A summarised report of incidents and major developments within each region is presented at the Safety, Health and Sustainable Development Board Committee meeting.

For purposes of reporting, a major environmental incident is defined as 'an event, action or non-conformance with a procedure that results, or has the potential to result, in an adverse



impact on the surrounding environment; or any event, action or occurrence which is contrary to the AngloGold Ashanti business principles'. The definition was reviewed by the board committee and is presented below.

A major incident is one which:

(1) could affect the company's reputation, or

(2) results in a cost to the company exceeding $100,000 including fines, compensation, clean-up, loss of production, anticipated litigation costs, etc.

Subject to meeting the above criteria, examples of issues of direct interest include, but are not limited to:

- matters which, by law, must be reported to government agencies;
- matters which, by law, are subject to fines and/or penalties;
- environmental impacts which are by their very nature either extensive or likely to have long-term effects;
- cyanide-related incidents;
- tailings dam failures;
- spillage or leakages with impact beyond the company's designated containment areas – of tailings materials, hydrocarbons, acids and other chemicals;
- emissions beyond permitted levels e.g. atmospheric and effluent releases;
- dust emissions which may impact on the company's reputation; and
- wildlife mortalities and land clearing activities which may impact on the company's reputation.

24 incidents were reported to the board during the year, which is a substantial increase on the number (16) reported the previous year. This increased level of reporting is as a result of: the increase in the size of the group and the fact that environmental performance is now reported for the Ghana and Guinea operations; and improved environmental performance, monitoring and reporting. Industry experience has demonstrated that as reporting systems continue to improve, particularly with the implementation of ISO14001 certified environmental management systems, further increases in the number of reported incidents are not unexpected. The significance of incidents is that they are recognized and that management actions are taken to reduce, or eliminate, further occurrences.

Operation	Nature of incident	Action taken
Argentina		
Cerro Vanguardia	An anomalously high value for HCN gas was detected in the Cyanosorb plant.	This was promptly corrected with no impact on people or the environment.
Australia		
Sunrise Dam	No major incidents	
Brazil		
AngloGold Ashanti Mineração	At Queiroz Plant, a high incidence of copper was detected in effluents from the treatment of old tailings deposited in the Nova Lima area.	Monitoring determined that there was no adverse effect on flora and fauna. At year end, with the conclusion of tailings retreatment, water quality has returned to permitted levels.
Ghana		
Obuasi	A tailings spillage from Sansu tailings dam resulted in approximately 4,000,000 m^3 of water entering the Nyam River.	On detection, the damaged portion of the dam, which was due to artisanal miners activities, was repaired. Security around the dam was also stepped up to prevent future damage to the dam walls.
	The Kokoteasua tailings retreatment retention sumps overflowed resulting in the flooding of a school and a number of residences downstream of this facility.	The sumps have been cleaned and stormwater drainage control has been improved. The school and houses downstream were cleaned and appropriate compensation was administered.
	On 19 February 2005 two birds died after drinking from a pool of arsenic contaminated water at the new arsenic storage yard.	The arsenic store has been covered with a high density polyethylene liner.
Mali		
Morila	12 bird (egrets) fatalities were recorded on the TSF on 29 March 2005.	The most probable cause of death is cyanide poisoning after consumption of contaminated water. Controls were tightened up.
Sadiola	A significant incident was recorded when a spring, consisting of tailings water, was detected outside the mine lease area. Cyanide levels, at 0ppm CN_{Free} and 0.4ppm CN_{WAD}, were considered to pose no danger to humans or animals.	The water was contained in a trench on the lease and then pumped back to the Tailings Storage Facility (TSF). The local government authorities were fully informed, visited site and were involved in the development of the remedial action plan.
	The TSF pipeline developed a leak outside the plant fence. .	Although the leak was small, the plant was immediately shut down to allow for repairs. A small quantity of tailings slurry ran under the road and mixed with a pond of rainwater next to the road, but it was all contained. Traditional leaders as well as the local government representatives were informed about the incident. Although the spill was relatively small, the incident was classified as Category 1 because it occurred outside of the mine fence, in an area that is accessible to the public and livestock. The two samples analysed had weak acid dissociable (WAD) cyanide levels of 5 and 9mg/l, below regulatory limits.
	Four bird fatalities (grey herons) were recorded on the TSF on 23 March 2005.	Autopsies concluded that the cause of death was sodium toxicosis. Sodium concentrations were above 1600mg/l. Sodium metabisulphate is used to detoxify cyanide. Controls have been put in place to manage the detoxification process.

Operation	Nature of incident	Action taken
Yatela	About 76,000 m^3 of water that had been pumped from the excess pond disappeared through sink holes at the base of the newly built Zero Discharge Dam. Water from the excess pond was known to contain high levels of chromium but analytical results indicated no groundwater contamination with chromium.	The dam basin was subsequently lined with clay and is now holding water.
	Two birds (a dove and a sparrow hawk) died after drinking cyanide containing water in a solution trench between the heap leach pad and process ponds on 4 April 2005.	Contaminated water originated from a leaking irrigation pipe. Repairs were carried out, the trench flushed and more patrols instituted to deter birds from approaching the area.
South Africa		
Ergo	Some 1,000 tonnes of slurry flowed down a dirt road, after a hole developed in a slurry pipeline from the Reclamation West pump station. About 500 tonnes of material flowed into the storm water system and was discharged into the Natal Spruit (stream).	About 500 tonnes of material were contained. Mitigatory action included repairs to the pipeline and the clean-up of the spilled material.
	The incoming C stream slurry pipeline created a slime spillage in an urban area.	Pumping operations ceased at Ergo at the end of October 2005.
	On 13 February 2005 a pipeline failure in the Reclamation West to the Ergo Metallurgical plant line resulted in ±3500 m^3 of slurry flowing down road into municipal storm water system.	Remedial clean-up measures were implemented.
	Ergo E-stream slurry line failure resulted in approximately 25 m^3 overflow from a containment paddock into the Elsburgspruit tributary on 16 February 2005.	Remedial clean-up measures were implemented.
	On 13 April 2005 some slurry flowed into the back gardens of four houses in Spyker Rd (Rynsoord) following the overtopping of a containment structure and subsequent flooding of the stormwater trench with process water.	Compensatory and clean-up procedures were implemented.
Vaal River	Unusually high rainfall of 239 mm fell in the catchment area between 26 December 2004 and 5 February 2005. The dam capacity subsequently proved to be insufficient to accommodate the resultant run-off and operational return water. The estimated discharge was 90,000 m^3 of water and 270 tonnes of salts which affected land below the dam. A similar overflow was experienced between 16 March and 15 April.	Management measures have included an upgrade of pumping capacity and investigations into the possibility of alternating water flow to the nearby West TSF complex.
	The final water pollution control dam overflowed.	A capital application to modify process water management in this area is in place to address this issue.

Operation	Nature of incident	Action taken
Vaal River	High concentrations of sulphur dioxide were recorded at the monitoring station adjacent to the Vaal River acid plant.	Improved monitoring systems have been installed to allow immediate process corrective action.
	Significant amounts of dust were generated on several occasions from the sulphur pay dam at Vaal River, resulting in several complaints.	Dust suppression using water cannons continues to be used. The removal and reprocessing of this dam will ultimately solve this problem.
	Contaminated storm water from the West Complex TSF entered the Schoonspruit between 20 and 21 January 2005.	Improved stormwater management measures have been implemented.
West Wits	An unauthorised discharge of process water 10,149 m^3 occurred from the North boundary dam into the Wonderboom Spruit between 21 and 23 January 2005.	The finalisation of the clean/dirty water separation project in February will ensure that there is no repeat occurrence.
	Overflow of the North Boundary of dirty water from the dam owing to insufficient capacity.	Management measures included the separation of clean and dirty water flows within the catchment area and the initiation of a R5.7 million legacy project to remedy the situation. *(See Report to Society 2004 for case study on legacy projects).*
Exploration	About 15 tonnes of sodium cyanide, 6 tonnes of copper sulphate and 10 tonnes of other chemicals were discovered in containers at the old plant site in the Kimin lease area at Mongbwalu.	An urgent three-phase plan is being implemented: first, guards were placed around the facility to prevent public access to the containers. A clean-up programme was completed by the end of December 2005, and in the ensuing phases appropriate containers were used for storage and transport away from site.
USA		
CC&V	No major incidents	

In addition, the Safety, Health and Sustainable Development board committee is informed of major developments and their anticipated impact on the company. The subjects that are to be reported on include matters such as:

- legislative and/or regulatory developments dealing with environmental matters that will have or, if passed or likely to be passed into law or adopted, would have a major impact upon AngloGold Ashanti business;
- identification of and/or updates on threatened or pending legal action against the company involving an environmental matter;
- environmental initiatives, or programmes, developed or proposed by non-governmental organisations (NGOs) and targeted at the company or the broader mining industry;
- complaints or demands dealing with environmental matters that are brought by a local community or government entity against the company; and
- any other environmental issue that operations feel is of significance to its region.

Risk management

Risk management forms an integral part of AngloGold Ashanti's environmental management systems. Each operation undertakes its own risk assessment in respect of environmental issues and these risks are then managed at an operational level. A number of high level risks were identified during 2005 and considered at a corporate level. These include increasing activity by NGOs such as Oxfam and Earthworks, in various anti-gold mining campaigns, for example, the 'No Dirty Gold Campaign'. Following media reports on AngloGold Ashanti in the DRC, the company featured on that campaign's website.

The use of cyanide in the mining industry is an ongoing debate, particularly in North America *(see case study on page EN38: Using cyanide responsibly at CC&V*), where environmental activist groups are continuing their efforts to ban the use of cyanide or other toxic/acidic ore processing reagents, heap leaching or surface mining. AngloGold Ashanti was party to the development of the International Cyanide Management Code and was one of the first signatories announced in November 2005. *(See box on page EN12)*.

Water management and the prevention of pollution, in particular groundwater seepage, are important global environmental concerns. The need for an integrated regional approach to water management was highlighted in South Africa recently when the Department of Minerals and Energy (DME) issued a directive to mining companies in relation to water pumping costs. *(See case study on page EN33: Mine closure stretches environmental legislation.)*

Mine closure issues, ranging from planning to financial provisions and potential liabilities are significant in all regions of operation. All AngloGold Ashanti operations have mine closure plans in place that are regularly updated. The total expected liability is detailed on page EN14.

The Council for Responsible Jewellery Practices

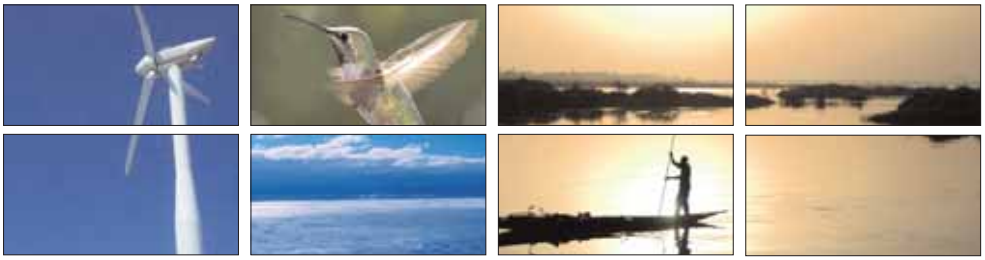
The Council for Responsible Jewellery Practices was founded in May 2005 with 14 members from a cross-section of the diamond and gold jewellery supply chain, from mine to retail.

Council members are committed to promoting responsible business practices in a transparent and accountable manner at all levels of the industry. They are committed to maintaining consumer confidence in diamond and gold jewellery products and the trust of all interested stakeholders in the industry.

Council members believe that a co-ordinated worldwide approach to addressing ethical, social and environmental challenges will drive continuous improvement throughout the jewellery industry to the benefit of stakeholders everywhere. This, in turn, will maintain and promote consumer confidence in the industry.

The council will enable the industry to work together to improve standards and practices, and avoid duplication of effort.

For further information see:
www.responsiblejewellery.com



Information released by the International Cyanide Management Institute

3 November 2005

Initial signatories announced to International Cyanide Management Code

The initial signatories to the International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold were announced today by the International Cyanide Management Institute (ICMI). The code is a voluntary industry programme for companies that use cyanide in the production of gold. The initial 14 signatories include nine gold mining companies and five cyanide manufacturing and transport companies, covering more than 80 facilities worldwide and representing approximately 36% of the gold presently being mined in the world.

The code's principles and standards of practice commit signatories to manage cyanide in a responsible manner. The code covers nine key areas: cyanide production, the transport of cyanide to mine sites, the handling and storage of reagent cyanide, on-site use and management of cyanide, the decommissioning of facilities, worker safety, emergency responses, training, and communication with the public.

The code's implementation guide describes the procedures necessary for the safe management of cyanide and identifies the practices to be followed in implementing each of the code's principles and standards.

In becoming a signatory, a company commits to following the code's principles and implementing its standards of practice, and to having verification audits of its individual operations conducted by independent third-party auditors within three years of its initial application, and every three years thereafter. The purpose of the verification audit is to evaluate an operation to determine whether its cyanide management is in line with the code's principles and standards of practice, or in the case of cyanide producers and transporters, the principles and practices identified in their respective verification protocols. Operations will be certified if in compliance with the code, and will be de-certified if the ICMI determines that they no longer comply with the code.

The initial signatory companies are:

AngloGold Ashanti Limited	Kingsgate Consolidated Limited
Australian Gold Reagents Pty Ltd	Kinross Gold Corporation
Barrick Gold Corporation	Newmont Mining Corporation
CYANCO	Orica Australia Pty Ltd
CyPlus Corporation	Pan Australian Resources Limited
E.I. DuPont de Nemours and Company	Placer Dome Inc.
Gold Fields Limited	Rio Tinto

A detailed list of the operations covered by these signatory companies' applications, along with the full text of the code and its implementation and administrative documents, are available at www.cyanidecode.org.

The company will ensure that financial resources are available to meet its reclamation and environmental obligations

In all the jurisdictions in which the group operates, the company is required to conduct closure and rehabilitation activities in order to return the land to a productive state post-mining. Additionally, these same jurisdictions require the company to provide financial assurance, in a form prescribed by law, to cover some or all of the costs of the anticipated closure and rehabilitation for the operation. Rehabilitation refers to the process of reclaiming mined land to that which existed prior to mining or to a pre-determined, use post-mining.

Closure plans are devised prior to the commencement of operation and are updated regularly to take into account life-of-mine projections. Although the final cost of closure cannot be fully determined ahead of closure, provision is made during the mine's economic operation. Total estimated environmental liability (rehabilitation and mine closure costs) amounted to $337.7 million as at 31 December 2005 (2004: $350.1 million).

In South Africa, the newly enacted MPRDA has emphasised the need for companies to cover all decommissioning, closure and rehabilitation financial liabilities at all times during the operational phases of the mines. The shortfall between the presently declared environmental liabilities and the present balance in the Trust Fund, designed to cover these liabilities, is R305 million. Negotiations have taken place over a period of time with the government over this issue, and it has recently been agreed with the DME that a joint task team will address the issue by revisiting an original agreement formulated three years ago.

This agreement described certain environmental and financial criteria that must be achieved by a mining company if the company wanted to use the Trust Fund mechanism solely for funding up to the closure date of the mine. The DME finalised a guideline document for the estimating of closure costs at the beginning of the year. The document was revised with input from the mining industry. Nevertheless, adoption of this guideline has not significantly increased the estimated cost of closure.

The new act and regulations place particular emphasis on the design, construction, operation and closure of tailings storage facilities and waste rock dumps. Approval from the government departments for the detailed closure plans for the Daggafontein and Brakpan tailings storage facilities was obtained during the year, a significant first for the gold mining industry in South Africa. The Brakpan complex facility is the largest gold tailings facility in the world.

Total environmental liability (restoration and decommissioning) are detailed below:

Total environmental liability 2005/2004

Country	Total estimated liability 2005 ($ million)	Total** estimated liability 2004 ($ million)	Comments
Argentina	8.8	38.9	The reduced costs are attributable to rehabilitation work carried out in 2005, exchange rate variations and adjustments made to the attributable portions of the company shareholdings.
Brazil	12.5		The reduced costs are attributable to rehabilitation works carried out in 2005, exchange rate variations and adjustments made to the attributable portions of the company shareholdings.
Australia	32.7	38.3	
Ghana	47.1	39.5	The upward revision of the Obuasi closure cost is a result of ongoing negotiations with the Ghanaian EPA regarding the rehabilitation programme and the mines' closure plans.
Guinea	8.5		Adjustments are a result of the plant expansion and a revision of the closure plan incorporating a more conservative approach to closure cost estimation.
Mali	13.4	45.3	At Yatela, the increase accommodates closure and rehabilitation of several new leach pads. At Sadiola, the decrease is a result of a revised estimate, excluding retrenchment costs and rehabilitation carried out as a result of ongoing efforts. At Morila, the increase is due to a revised closure plan which affects the slopes of the pit walls.
Namibia	3.0		
Tanzania	44.1		At Geita, the increase is due to a revision of the closure plan, including quantity survey, which resulted in more accurate estimation of costs.
South Africa	145.3	133.2	Changes in South African legislation have resulted in increased liability estimates and provisions being put in place.
USA	22.3	55	
Total	**337.7**	**350.2**	

*Note: The total environmental liability has decreased year-on-year. The current figures relate directly to the audited financial statements, which represent the current environmental liability, whereas the 2004 figures includes estimates related to projected future liability. Changes have also arisen as a result of the closure of operations.

The company will ensure that its employees and contractors are aware of this policy as well as their relevant responsibilities

The training of employees regarding environmental policies and procedures is an integral part of the ISO 14001 system in place at those operations that are ISO 14001 certified. Many of the operations that are not yet ISO 14001-compliant have in place sound training procedures for employees and contractors.

Environmental awareness training is generally most effectively included in site induction programmes. Other media used at an operational level include noticeboards, briefings, employee and contractor handbooks and the intranet.

We will conduct audits to evaluate the effectiveness of our environmental management systems

Both internal and external audits were conducted during the year. Most commonly, these were associated with the ISO 14001 certification and maintenance requirements. The table on page EN6 indicates the dates of the current ISO certification audits.

As a signatory to the Australian Minerals Industry Code for Environmental Management (Code 2000), the Australia region is committed to annual site audits in terms of the code. In February 2005, RISKMIN (certified auditing company) audited Sunrise Dam against its Corporate Environmental Standards. The result of this audit indicated a 71% level of compliance. These Environmental Standards are being used to develop the ISO 14001 system.

We are committed to communicating and consulting with interested and affected parties on environmental aspects of our activities

Communication and consultation with interested and affected parties on environmental aspects of AngloGold Ashanti activities is done through a range of mechanisms. Much of the interaction with community members is dealt with under the community section of this report. Of particular relevance to environmental reporting is the public consultation and disclosure programme currently being undertaken at Sadiola and Yatela in Mali. See case study in the Report to Society 2004.

A list of the stakeholders with whom the company engaged, both formally and informally, may be found on the website. This list is not exhaustive. It provides an indication of the range of bodies with which the company interacts on matters related to the environment.

In South America, for example, a toll-free number is available to community members to lodge complaints, which are then investigated.

We will work to continually improve our environmental performance.

The company's primary environmental concerns are:

- the use and management of cyanide,
- mine rehabilitation and closure,

Touching the community - environmental interaction by CC&V

Community and agency outreach and education regarding the operation are routinely undertaken by Cripple Creek Victor (CC&V) in the United States through site tours, formal and informal presentations, meetings, fact sheets, brochures, and other written materials which address a particular subject.

For example, prior to the release of the annual Toxic Release Inventory (TRI) information by the EPA for CC&V, briefings were given in co-operation with the Colorado Mining Association (CMA) to the Colorado Department of Natural Resources and the Colorado Department of Public Health and Environment. A presentation has been developed and is updated annually in the event that the need for these briefings arises on a more frequent basis.

Briefings of elected and appointed officials are conducted when needed to answer questions and provide information on the CC&V operations. Presentations are made to other interested parties (such as the Colorado Cattlemen's and Cattlewomen's Associations, Fremont County Cattlemen's Association) upon request or in response to particular issues.

- water use and management,
- the use of other resources (such as energy) and the minimisation of waste,
- biodiversity issues, and
- climate change.

Environmental and human rights NGOs have an important role to play in monitoring and reporting on the environmental (and human rights) conduct of companies, including AngloGold Ashanti. The company will continue to engage with these organisations in seeking solutions to identified problems, both directly with the NGOs and through our association with organisations such as the ICMM and the CRJP.

The use and management of cyanide

The use of cyanide in the recovery of gold is a core concern for the gold mining industry and is critical to its viability. This is particularly so for North American operations. The CMA has taken the lead in legally challenging the anti-mining ban in Summit County (not a county where AngloGold Ashanti conducts mining or exploration activities) and AngloGold Ashanti is represented on the steering committee. *(See case study on page EN38: Using cyanide responsibly at CC&V.)*

AngloGold Ashanti has been actively involved in the development of the International Cyanide Management Code and has adopted the published protocols and standards of practice for cyanide management. The code, which is available at www.cyanidecode.org, is a voluntary industry initiative developed under the auspices of the United Nations Environment Programme (UNEP) and the International Council on Mining and Metals (ICMM), was launched in May 2002.

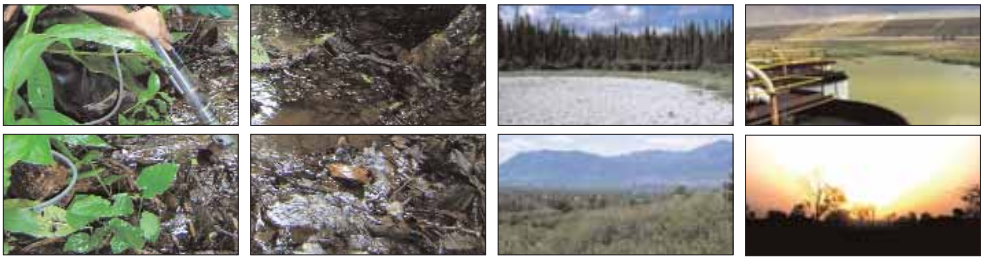
The code has two major parts:

- a commitment by signatories to manage cyanide in a responsible manner; and
- the practices that must be followed to ensure this.

AngloGold Ashanti became a signatory to the code in 2005.

AngloGold Ashanti is well on its way to compliance with the code and internal audits have been concluded at all operations in anticipation of external auditing.

- In January, Sunrise Dam in Australia was audited against 31 code categories and was found to be compliant with 29 categories and substantially compliant with two categories.



- In October 2004, CC&V was audited internally against 31 categories of the Code and was found to be fully compliant.

Cyanide usage by AngloGold Ashanti operations during 2005 amounted to 31,939,528 kg. Note that in 2004, cyanide usage by the former Ashanti operations (in Ghana and Guinea) was excluded.

The following table reports cyanide usage by operation in 2005.

Cyanide use (kg)		
Country	**2005**	**2004**
Argentina	560,000	1,478,000
Brazil**	1,037,000	
Australia	1,671,551	1,535,842
Ghana	5,954,000	*
Guinea	3,354,000	*
Mali**	6,873,000	10,157,000
Namibia	814,441	
Tanzania	2,497,400	
South Africa***	7,182,330	16,851,000
USA	1,995,806	2,189,254
Total	**31,939,528**	**32,211,096***

** The former Ashanti operations in Ghana and Guinea did not report for the year 2004.*

*** Total cyanide usage by operations and not attributable usage. Note that the company reports attributable production, that is, that portion of production, that is attributable to the company as a percentage of ownership.*

**** The significant decrease in cyanide usage at the South Africa operations is as a result of the closure of Ergo.*

Cyanide management in Australia

AngloGold Ashanti Australia has taken a leading role in the gold industry in Australia by engaging in discussions with the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) and its review of the Priority Existing Chemical (PEC) assessment process for sodium cyanide. Monitoring data provided by 10 leading gold mining companies, together with site visits and further discussions with industry representatives including the Australian Gold Council and the Minerals Council of Australia will assist NICNAS in fully understanding the management of sodium cyanide by the Australian gold mining industry.

This review has focussed on fauna mortalities associated with exposure to elevated CN_{WAD} (weak acid dissociable cyanide) levels in tailings discharges as a potential environmental risk. Fauna mortalities associated with exposure to elevated CN_{WAD} levels in tailings discharges have been recognised as a potential environmental risk of the Boddington Gold Mine expansion. Historic evidence of fauna mortalities at the mine, particularly in relation to avian fauna (Fairy Martins), suggests that the potential risks require careful management.

Similar risks of fauna mortalities associated with exposure to elevated CN_{WAD} levels in tailings discharges at Sunrise Dam have been addressed by managing CN_{WAD} discharges to the lowest levels practicable. The design of the tailings facility incorporates the release of thickened tailings from a central, raised discharge point so as to limit the extent of surface 'ponding', thus reducing the facility's attractiveness to wildlife.

The hyper-saline composition of the discharge solution may further discourage fauna from using ponded water and this, together with other strategies to reduce/eliminate the impact on the local fauna, is being investigated in collaboration with the Australian Centre for Minerals Extension & Research (ACMER) as part of an international study (including the Sadiola mine site in West Africa. *(See case study on page EN30: Protecting birdlife at Sadiola and Yatela).*

In addition to addressing the potential risks to wildlife associated with cyanide, Sunrise Dam has addressed the impact of fauna mortalities associated with tailings entrapment by building an electrified fence around the tailings facility to prevent access by the local fauna.

Mine rehabilitation and closure

The disturbance of land remains one of the most visible impacts of mining operations, particularly opencast mining with the creation of pits, surface infrastructure, and rock and tailings storage facilities. EIAs conducted prior to the commencement of mining have as their aim the identification and minimisation of these and other impacts. Mitigating measures identified are then incorporated within the operation's EMS and the operation is then bound to undertake these as mining progresses. Where possible, rehabilitation of disturbed areas is carried out concurrently with mining operations so as to minimise the amount of disturbance at any one time. Rehabilitation standards are usually regulated by the relevant national and regional authorities.

As new operations are developed and commissioned, older mines cease operation and are closed. In an environmental sense, true closure may often only be achieved long after mining has ceased and involves extensive planning and close collaboration with the regulatory authorities to obviate any unwanted environmental consequences and satisfy regulatory requirements.

A number of closures are currently in progress:

- Closure of the Alamatoula pit at Yatela in Mali is currently under way. *(See case study on page EN28: Planning and implementing closure at Alamatoula, Yatela.)*
- The closure programme for the Big Springs operation in the United States continued with costs of about $80,000 incurred in 2005. These costs covered implementation of the long-term passive water management programs at the mine and mill and water quality and biological monitoring. The Big Springs operation, which ceased milling in 1994, has completed all of its major reclamation activities, has maintained and monitored the performance of the closure measures and is additionally in the process of seeking bond release.
- With the official cessation of gold production on 30 March 2005, Ergo moved into full closure mode. As from that date, all activities conducted at Ergo were aligned with achieving closure certificates in terms of section 43 of the MPRDA. Approval from the relevant government departments for the detailed closure plans for the Daggafontein and Brakpan tailings storage facilities were obtained in 2005.
- The Mina Velha decommissioning process in Brazil continued in 2005. The clean-up project for the whole area, which includes dismantling/re-construction of a storm water drainage system, is under way. An expert archaeological team has been hired to follow up the project considering that some very old items of equipment were found during excavation activities. *(See Report to Society 2003 case study: Beyond the life of mine – model decommissioning plan at Mina Velha.)*

- Also in Brazil, as part of the Old Tailings Deposits (OTD) Agreement, two sites have been rehabilitated – Morro do Galo and Galo. The next site scheduled to be rehabilitated is Resende in May 2006. It is expected that this programme will have been completed by August 2006 at an estimated cost of $500,000.
- Decommissioning of the Engenho d'Água Mine is underway although the rehabilitation programme was concluded in December 2004. A final report is being prepared for submission to the Mining Resources Department (DNPM).

Environmental closure continues at Ergo

The world's largest tailings retreatment operation, Ergo, was closed in 2005 after nearly 30 years of operation. While many closure activities have been undertaken during recent years, the environmental closure activities have now begun in earnest.

The main activities undertaken during the year were:

- continued hydraulic and mechanical removal of material at some reclamation sites, either via the Brakpan plant to the Brakpan tailings storage facility (TSF), or consolidated on nearby grit dumps. This is required either in terms of contractual obligations with landowners or to reduce the number of long-term liabilities associated with residue deposits;
- flushing and cleaning of Brakpan plant;
- marketing of redundant assets;
- slope reshaping at Brakpan TSF;
- slope 'armouring' at Daggafontein TSF; and
- investigating alternative methods for radiation screening and decontamination of pipelines in order to maximise their resale value (i.e. so that they can be sold as pipes rather than as scrap).

Achieving closure of tailings dams remains a significant financial and technical challenge. Other challenges going forward are the:

- maximisation of asset values;
- radiation clearance of serviceable pipelines;
- recovery of usable materials;
- residual and latent impacts related to groundwater pollution and soil pollution at reclamation sites; and
- extent of rehabilitation of partially reclaimed old tailings dams, and in relation to unused mining rights on old tailings dams.

Resource use and waste generation

AngloGold Ashanti is committed to reducing the use of, and improving the efficient use of, scarce environmental resources such as energy, water, timber and other materials. Apart from the environmental advantages of reducing the use of such raw materials, the group can also potentially achieve significant cost savings.

Environmental targets are set by the individual operating mines or business units as they apply their own EMSs which reflect the priorities unique to them. Information on resource use and waste generation is collected and recorded at site level.

Water usage

Varying site conditions, mining and treatment processes, and the availability of water dictate to a large degree the use of water and the level of efficiency achieved.

Examples of programmes/initiatives in place at an operational level:

- A water Management Guide was developed in the Australia region to ensure that the interaction of mining and exploration activities with hydrological aspects of the environment does not result in over-use, unplanned wastage or adverse environmental or community impacts on water resources.
- CC&V uses a probabilistic water balance model (developed with the assistance of Golder Associates) to guide storage capacity sizing, account for meteorological events and evaporative losses, manage solution movements through the heap leach facility, and to assess current and future water needs (inputs) to the project. This model provides for predictions of volumes of solution in inventory over time as impacted by seasonal factors and changes in operating parameters.

In 2004, CC&V instituted a new water conservation measure that involves the burial of the drip irrigation lines on the surface of the heap leach facility. Recycling of water contained with the heap leach facility is a fundamental element of the facility design, construction and operation.

In South Africa, water management is of particular concern. Four mining companies operate in the Klerksdorp, Orkney, Stilfontein, Hartebeestfontein (KOSH) area, namely, Buffelsfontein gold mine, formerly owned by DRDGOLD, Harmony Gold Mining Company Limited, Stilfontein Gold Mining Company Limited and AngloGold Ashanti. All of these companies operate upstream from AngloGold Ashanti's mining operations and, in the past, these mines have been obliged to continue pumping underground water, even once their mining operations have ceased. When Buffelsfontein was placed into provisional liquidation on 22 March 2005, there was some uncertainty as to whether or not the pumping operations would continue at Stilfontein and Buffelsfontein. DRDGOLD has denied having any obligation regarding a contribution towards the pumping of underground water in the area.

As a result of this uncertainty, AngloGold Ashanti launched an urgent interdict on 12 April 2005 against DRDGOLD Limited, Buffelsfontein Gold Mines Limited, Stilfontein Gold Mining Company Limited, Harmony Gold Mining Company Limited, Hartebeestfontein Gold Mining Company Limited, the minister of minerals and energy, the minister of water affairs and forestry, and the minister of environmental affairs and tourism. AngloGold Ashanti applied to court for an order directing the mining companies to continue pumping and extracting underground water at their mine shafts and for the ministers to issue directives to the mining companies to continue with pumping at their mines, to take the necessary measures to prevent further pollution or degradation of the KOSH area, and to make the area safe.

As a result, the minister of water affairs and forestry issued directives that pumping should continue, and for AngloGold Ashanti, DRDGOLD, Harmony and Stilfontein to contribute equally to the costs. AngloGold Ashanti, DRDGOLD and Harmony have, under protest, complied with the directives but Stilfontein has refused to comply and is facing court action from the state in this regard. *(See case study on page EN33: Mine closure stretches environmental legislation.)*

The DME and the Department of Water Affairs and Forestry (DWAF) have recommended that companies involved in mining areas such as Klerksdorp and Carletonville, collectively design a regional closure plan for these geographic areas, in addition to the normal mine closure plans.

Total water usage by AngloGold Ashanti amounted to 78,458,736 m^3 in 2005.

Total water usage (m^3 per annum)

Country	2005	2004
Argentina	1,200,000	3,628,164
Brazil**	3,827,904	
Australia	2,989,962	3,025,041
Ghana	15,670,000	*
Guinea	3,717,191	*
Mali**	17,093,115	32,440,460
Namibia	1,031,554	
Tanzania	4,268,816	
South Africa***	27,086,783	49,629,937
USA	1,573,411	1,638,830
Total	**78,458,736**	**90,363,232**

** The former Ashanti operations in Ghana and Guinea did not report for the year 2004.*

*** Total water usage by operations and not attributable usage. Note that the company reports attributable production, that is, that portion of production, that is attributable to the company as a percentage of ownership.*

**** The significant decrease in water usage at the South Africa operations is as a result of the closure of Ergo.*

Energy usage

Energy usage is both a substantial factor in environmental management globally, and is a major cost driver, particularly in underground mining. In its efforts to conserve energy, AngloGold Ashanti is focused on ensuring the efficient use of energy and on developing and implementing renewable energy sources.

During 2004, AngloGold Ashanti together with Anglo American plc completed a technology strategy project in respect of an energy platform which has as its objective the reduction of

the group's energy intensity year-on-year. The target is to save 1 % per annum over the next 10 years, with the compounded total about 15%.

AngloGold Ashanti has registered a 6.7 % reduction in electrical energy consumption from 2004 to 2005. This included a 60% reduction at Ergo (closing), 14% reduction at Savuka (right sizing), and an increase of 32% at Moab Khotsong that is coming into production. The other business units had also generally lower energy use. During the year, the Sunrise Dam mine implemented a solar power pumping system to manage and control the water levels on the surface of the tailings dam, as well as a control system to use wind generated power for the purpose of ground water level control.

Total energy use by AngloGold Ashanti operations in 2005 was 29,213,073 GJ.

Total energy usage (GJ)

Country	2005	2004
Argentina	725,832	3,115,907
Brazil**		
Australia	2,149,981	2,294,075
Ghana	3,142,796	*
Guinea	4,057,888	*
Mali**	1,530,354	7,453,150
Namibia	227,524	
Tanzania	1,896,088	
South Africa	14,880,141	17,099,157
USA	1,328,301	1,241,179
Total	**29,213,073**	**31,203,528**

** The former Ashanti operations in Ghana and Guinea did not report for the year 2004.*

*** Total energy usage by operations and not attributable usage. Note that the company reports attributable production, that is, that portion of production, that is attributable to the company as a percentage of ownership.*

**** The significant decrease in energy usage at the South Africa operations is as a result of the closure of Ergo.*

Biodiversity

The need for preserving biodiversity and the ongoing threats to habitat continue to be the subject of global debate. AngloGold Ashanti, through its participation in the ICMM's Biodiversity Taskforce, is engaged with the IUCN (World Conservation Union) in a dialogue on mining and biodiversity.

In South Africa, a first-phase biodiversity assessment (desktop study) was completed for the Vaal River and West Wits operations.

No formally defined protected areas or sensitive areas exist in the Vaal River or West Wits operations. However, Ergo, which is in the process of closing is situated in close proximity to the Blesbokspruit, a Ramsar-listed wetland system. The Vaal River operations are situated adjacent to the Vaal River which is the country's most important river system, hosting a number of significant riverine wetlands as well as fauna and flora species.

The South African operations are all situated within the highveld grassland biome which is considered to be one of the most threatened regions in South Africa, with 60 to 80% irreversibly transformed, mainly by agriculture and residential development, and only 2% formally conserved. A number of preliminary Biodiversity Management Units (BMUs), which are areas with homogeneous biodiversity (for vegetation, terrestrial and aquatic fauna), have been identified.

The next phase, commencing 2006, will identify specific objectives, programmes and targets for the management of biodiversity (compilation of a Biodiversity Management Action Plan).

In Brazil, most of Anglogold Ashanti operations are situated in biodiversity rich areas such as the Atlantic Forest and Cerrado (Cuiabá Mine, Lamego and Córrego do Sítio). The decline of the Atlantic rainforests, mainly as a result of urbanisation and agricultural development, remain a high conservation concern within Brazil and internationally. For every hectare of Atlantic Forest land cleared for mining operations, the company rehabilitates twice the area using indigenous species. The company has been actively involved in the formal establishment and support of conservation reserves and now has approximately 1000 ha of land within the Natural Property Private Resource (NPPR) category. The Nova Lima environmental office is fully engaged with state environmental authorities and the legal environmental process. The department works closely with local universities who have been contracted to contribute to management plans and provide inventories of biodiversity in these areas. There is large number of species that inhabit these areas. Some species have been classified as endangered, while others are classified as vulnerable or at lower risk.

Climate change

The Kyoto Protocol, an international and legally binding agreement to reduce greenhouse gas emissions worldwide, came into force on 16 February 2005. The Kyoto Protocol requires the 126 countries that have signed the agreement to reduce their emissions of greenhouse gases to 5.2% below 1990 levels in an effort to combat climate change. It had to be ratified by 55 industrial nations, representing 55% of the world's emissions. Russia ratified the

convention at the end of 2004. The United States and Australia have refused to ratify the convention. South Africa has acceded to the convention.

In Western Australia, the government has announced the creation of a Greenhouse Task Force to advise the government on viable strategies to manage greenhouse emissions from the stationary energy sector. The EPA has released a Guidance Note on Minimising Greenhouse Gases which specifically addressed the minimisation of greenhouse emissions from significant new or expanding operations.

The State Government is also in the process of developing a State Greenhouse Strategy which will set the wider policy context for greenhouse gas management. Carbon dioxide is the major greenhouse gas in Australia and climate change will have significant impacts in Australia.

The company will participate in debate on environmental matters at international, national and local levels.

AngloGold Ashanti is committed to participating in debate on environmental matters at international, national and local levels. Some of the contributions the group has made internationally include membership of and active participation in the ICMM and the Global Reporting Initiative (GRI) as organisational stakeholders.

As part of its environmental strategy, AngloGold Ashanti actively participates in law-making processes in the countries in which it operates. This is often facilitated by participation in mining associations (for example, the Chamber of Mines of South Africa and the Minerals Council of Australia).

5. Case studies

Case studies that illustrate the performance of the company in the environmental sphere may be found on the pages that follow. Follow-ups on case studies presented in the Report to Society 2004 may be found on the website.

Awards/recognition:

Brazil

5 star NOSA rating confirmed for the Queiroz Plant, Cuiabá Mine and Rio de Peixe hydro-electric system

Geita

Certificate of Merit for Environmental Management in the Tanzanian government's President's Award for Environmental Excellence.

5.1 Water recycling at Bibiani

At Bibiani mine, as at all AngloGold Ashanti mines, water conservation and the prevention of polluted discharges into the environment are important aspects of water management. The mine is located close to the River Mensin and its tributaries, the Mpokwampa and Amponsah streams. At a slightly greater distance lies the river Tano, one of Ghana's major rivers into which the River Mensin flows. A number of communities are located within the mining lease area, and also beyond its boundary. They rely mainly on streams and shallow wells for their domestic water supply.

At the mine's tailings dam, the repository for slurry after the gold extraction process, all of the mine's water is recycled as part of the mine's zero effluent discharge philosophy, which means that process water is contained in a closed system and that there is no seepage or spillage of water into the environment. This water management programme has been in place since the mine was re-started as an open-pit mine in 1998, prior to which it was an underground operation for many decades.

At Bibiani, water is used in the milling and chemical extraction process in the treatment of approximately 2.5 million tons of ore annually. The ore is crushed and milled prior to leaching by cyanidation. The gold is then absorbed (collected) out of solution onto activated carbon and the residual solution is recycled to the process plant as process water.

Bibiani's water supply is obtained from a number of sources:

- the mine's tailings dam;
- levees (raised embankments for water storage) – the mine has five levees which store rainfall, underground water and, on a temporary basis, water from Lake Amponsah, until the water is pumped to the process plant;
- dewatering from the mine's underground project; and
- Lake Amponsah (water from the lake is used only when other sources are inadequate).

Bibiani's total water consumption for 2005 was estimated at 3.5 million m^3, almost 76% of which was recycled water. This meant a saving of 2.3 million m^3 in fresh water abstraction.

The water from the tailings dam, which forms the bulk of the water source, is recycled for re-use at the process plant. Waste from the treatment process forms slurry which is pumped to the tailings dam or tailings storage facility (TSF). The quality of the water is then improved through a decanting process which consists of both a particulate and a liquid phase: metal pollutants like iron and manganese settle on the bottom of the dam while cyanide residue in the water, is naturally degraded through exposure to the sun. This water is then pumped to the process water pond (a surge facility) before it is required for processing.

Water from the levees is pumped directly to the process water pond. Water levee levels are strictly monitored, particularly after a minor discharge from an overflow in 2003, when heavy rainfall caused one levee to collapse, forcing water into the next levee which consequently also collapsed, resulting in flooding of the environment. Immediate remediation measures were taken, including water sampling inside and outside the concession area to determine the level of local water body contamination as a result of silting; fish caught in the flood waters were removed to the dam; all regulatory bodies were informed; and the two affected levees were reconstructed: freeboard has been increased and spillways located in competent ground.

To ensure that no flooding occurs at the suspended underground project, a care and maintenance programme has been implemented to ensure that excess water is routed to the process plant where it supplements process water supplies. A comprehensive programme is in place to prevent spillages at the tailings dam itself. The programme includes grassing of the embankment, securing the tailings discharge joints to avoid breakage, inspections, audits and regular patrols; and the establishment of an Emergency Response Management Programme.

Excess water is used to fill up the water bowsers, or tankers, which sprinkle water regularly on haulage roads to minimise dust emissions.

Should an environmental issue present, communities have recourse to the mine through the human resource department which is charged with community relations. Complaints are investigated and the necessary remedial action taken. A possible indication of the success of Bibiani's environmental management programme is that no complaints were received in 2005. Bibiani's environmental department has recently requested to be represented on the district assembly, a community body which also deals with issues and grievances.

5.2 Tailings rehabilitation at Morila

In preparation for mine closure in 2010, Morila mine in Mali is conducting technical studies at its tailings storage facility (TSF) and waste rock dump to establish the most efficient and cost-effective rehabilitation measures at these two sites.

The pilot study, which is being carried out by Morila's on-site environmental team, is investigating whether mine-specific factors might have an impact on generally accepted best practice closure plans. Because operating and climatic conditions vary from operation to operation and from country to country, the trials may prove that there is no 'one-size-fits-all' model. For example, generally accepted best practice might specify that 300 millimetres of topsoil is needed for effective revegetation of a non-specific waste rock dump, whereas technical studies might indicate that at Morila the volume of topsoil needed could be reduced drastically, if mixed with non-acid forming waste rock. This would obviously have significant cost advantages.

A number of simulated tests are being undertaken at both the TSF and waste rock dump, both of which will eventually be rehabilitated with rock and/or soil and, in the case of the waste rock dump, revegetated with indigenous trees. Tests are being conducted at the TSF to determine the chemical characteristics of the various tailings types, and their potential to produce acidic leachate, also known as acid rock drainage. This leachate can potentially contaminate ground and surface water.

The results of the test will inform the type and amount of cover required to cap the TSF. Using two-metre high columns, the experiment simulates the effect of rainfall and in-situ water on layers of tailings materials, to analyse the best cover type, its thickness and composition, as well as what quantity will be required to prevent significant leaching.

The final cover for the waste rock dump, where non-gold-bearing ore is discarded, as well as slopes of the TSF, requires the addition of some organic matter to stimulate vegetation growth. Analysis is being conducted on what ratio of rock and soil combinations provide the best stability and minimal erosion.

Other expected outcomes from the technical studies are that restoration measures at both the TSF and waste rock dump should prove to be sustainable over a long period of time. It is expected that the amount of topsoil cover will be minimised, through the additional use of waste rock, which is in plentiful supply. This is also expected to minimise erosion which compromises slope stability. The studies will also identify the most suitable local plant species for the restoration of vegetation.

The technical studies commenced at the beginning of 2005 and are expected to continue for two years, after which they will be subject to an external independent review for the purposes of validation and verification.

5.3 Planning and implementing closure at Alamatoula, Yatela

Yatela mine in Mali has commenced with the implementation of its closure plan at Alamatoula pit, one of two pits at the operation. Production from the pit ceased in February 2005 and the pit and associated waste rock dump are now in the decommissioning and rehabilitation phase. At the main Yatela complex, mining will end sometime in mid-2007 and active heap leaching will be completed by mid-2008, and the rinsing of the leach pads scheduled for the fourth quarter of the same year. Rehabilitation is expected to be completed by 2009, with the lease anticipated to be relinquished in 2013.

Closure plans were first drawn up in 2002 and updated again in 2005, prior to production ceasing at Alamatoula. The estimate for the total cost of closing Yatela mine is currently $11.7 million.

Since large-scale mining is a fairly recent phenomenon in Mali, the existing legislation regarding mine closure is silent on a number of issues and the closure of Yatela has, therefore, presented an opportunity to bring together all stakeholders to discuss all aspects of closure, including environmental, social and economic impacts. A mine closure committee was formed comprising government representatives from the departments of mines and environment, Yatela mine, and the local community, which numbers 17 villages within the immediate environs of the Yatela and Sadiola mines. Among other things, the committee will facilitate a co-ordinated approach to mine closure through consultation and communication between various departments and levels of government, and with local communities and other affected parties.

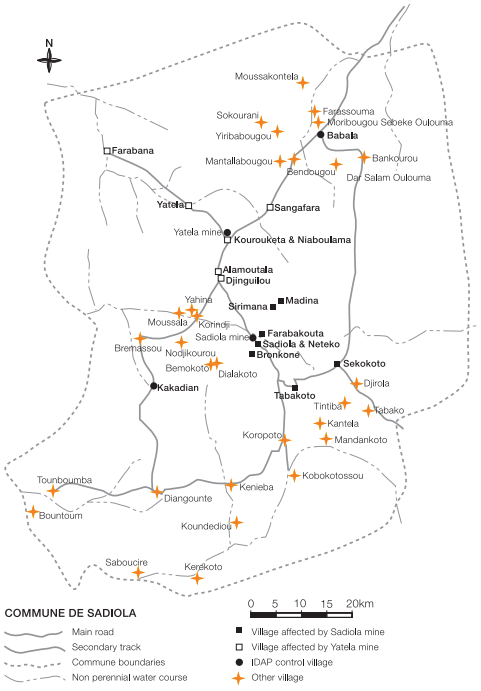
One of the major environmental challenges faced is the decommissioning of the pit. A possible solution arrived at following discussions at a recent stakeholder workshop (November 2005) envisages the likely conversion of the pit into a lake to be used for fish farming. An experimental fish farm is currently being run at an old quarry site at Yatela mine (See Report to Society 2004). The leach pads, used in the gold extraction process, are to be thoroughly cleaned and rinsed. Local vegetation will be encouraged to grow on the waste rock dumps and leach pads. Discussions will be held with the government, through the mine closure committee, on the possible alternative uses for the houses, offices, roads and other infrastructure.

Mine closure inevitably affects surrounding communities owing to a greater or lesser reliance on the mines for their livelihood. While jobs will be lost due to mine closure, it is anticipated that some employees may be redeployed to the nearby Sadiola mine while others may benefit from opportunities at other new mines which are being developed in Mali. In addition, as reported last year, an Integrated Development Action Plan (IDAP) has been instituted to work towards ensuring sustainable livelihoods for communities after closure. (See Report to Society 2004 and update in this report). The IDAP for the Sadiola commune, which comprises both the Sadiola and Yatela communities, was set up to promote socio-economic development within beneficiary communities. One of its objectives is to lessen the communities' reliance on mines after closure by offering a sustainable source of income. Comprising representatives from the communities, mine, government departments and non-governmental organisations (NGOs), the IDAP Association is discussing alternative livelihood projects which are now due to commence in 2006. Projects which have been recommended include bee-keeping, agriculture and cattle-fattening. While it was hoped to begin with implementation during the course of 2005, it took longer than anticipated to get buy-in from all stakeholders regarding the process of setting up and staffing the association and rolling out the proposed projects. This is an inherent dilemma in such a multi-stakeholder process.

5.3 Planning and implementing closure at Alamatoula, Yatela *cont.*

Post-closure monitoring is planned to continue for five years after the closure of mining operations. This will include the monitoring of ground water, surface water, dust and rehabilitated areas. A community liaison officer will be employed to maintain contact between the mine and the local community and annual environmental reports will be submitted to government to facilitate the final approval for termination of monitoring activities and relinquishment of the mining lease.

The Yatela mine closure is being viewed as a pilot project which may provide the Malian government with a blueprint for future mine closures to be followed by all large-scale mining companies operating in the country. As a result, it has attracted the attention of other mines operating in Mali. Representatives from Morila (owned by AngloGold Ashanti and Randgold Resources Ltd), Loulo (owned jointly by Randgold Resources Ltd and the Malian government) and Syama (owned jointly by Randgold Resources Ltd, the Malian government and International Finance Corporation), attended a one-day workshop on the 28 November 2005 to discuss mine closure policy.



5.4 Protecting birdlife at Sadiola and Yatela

In Mali, where the long dry season lasts for about nine months of the year, wildlife is attracted to what little water there is available. This often includes man-made water ponds associated with mining. At the Yatela and Sadiola mines, located in the Kayes region of the country, a number of operational facilities fall into this category, including the process ponds, tailings storage facility (TSF) and associated return water dam (RWD), all of which contain toxic residue both from the heap-leach gold extraction process at Yatela and the conventional process at Sadiola.

A study to investigate wildlife deaths associated with cyanide-bearing tailings dams and heap-leach operations was conducted by Graham Johnson, Environmental Manager at Sadiola and Yatela, and David Donato of Donato Environmental Services, in conjunction with the Australian Centre for Mining Extension and Research. At Yatela mine, it was established soon after production started that large numbers of birds were dying after ingesting cyanide residue from the process ponds, the top of the heap-leach pads, the solution trenches and other areas within the plant site. Site trials were then conducted to ascertain the most effective measure to deter birds from visiting these locations. They included permanent patrol personnel on heap-leach pads and around process ponds; shade cloth to cover ponding of cyanide solution on top of the heap-leach; spikes to pierce the heap material where ponding occurs; construction of fresh water bird ponds; suspended and floating netting over the process ponds and noise deterrents in the form of propane guns. The open-water process ponds proved the most challenging area to control and, eventually, the use of HPDE (high density polyethylene) bird balls to cover exposed water and to prevent birds from landing on the water, proved to be the most effective measure. The mitigation measures have resulted in a significant drop in bird deaths from 554 in 2001 to just two in both 2004 and in 2005. *(See Report to Society 2004 case study: The use of 'bird balls' at Yatela gold mine.)*

Sadiola mine, which began operating in 1997, experienced no bird fatalities in the first four years because only oxide ore was being processed. Consequently cyanide concentrations were relatively low and underwent natural degradation in the tailings decant pond. However, as supplies of oxide ore became depleted, the mine started processing deeper soft-sulphide ores which necessitated changes to the conventional metallurgical process, including the addition of higher cyanide concentrate levels. WAD (weak acid dissociable) cyanide levels increased to more than 200 milligrammes per litre (mg/l), well over the recently established International Cyanide Code limit, which recommends a maximum of 50 mg/l to protect birds, other wildlife and livestock. In a nine-week period between 1 March and 10 May 2002, 197 birds died at the silt trap, the return water dam and the tailings decant pond. Cyanide concentrations were immediately reduced by temporarily halting the sulphide ore treatment before installing a hydrogen peroxide plant at the tailings decant pond for initial cyanide destruction, and finally construction of a permanent cyanide destruction system.

However, despite these measures, in April of the following year 77 bird fatalities occurred at the TSF silt dam and RWD and 17 during December of that year. Toxicological tests conducted at Onderstepoort Veterinary Institute in South Africa were inconclusive. However, when a further 107 fatalities were recorded in May 2004, after ruling out natural causes such as extreme heat, starvation or disease, surprising evidence pointed to sodium ion toxicosis. Sodium levels in the brain tissue of two bird species were found to be 2,218 and 2,255 parts per million (ppm) respectively, above the 1,900 ppm threshold for sodium toxicosis.

5.4 Protecting bird life at Sadiola and Yatela *cont.*

Sources of sodium are sodium cyanide which is used in the leach circuit and sodium metabisulphite used in the cyanide destruction process. Dissolved sodium concentrations at the RWD were found to be elevated in relation to previous years; during the three-month period when it was estimated the birds died, levels ranged from approximately 800 mg/l to 1,400 mg/l.

Five birds that died of sodium toxicosis on two separate days in March and June 2005 were found to have sodium levels in a range of 1,958 ppm to 2,407 ppm. Average sodium concentrations in water were found to be 1,650 mg/l and 1,000 mg/l respectively.

It is suggested that, unlike birds that live in saline environments and have developed a nasal salt gland for excretion, terrestrial birds are poorly equipped to deal with excess sodium – especially where they do not have access to fresh water after ingesting saline water. At Yatela it was postulated that the grasshopper buzzard, heron species and egret species – the bird types which succumbed to sodium toxicity – have a toxic threshold of between 800 and 1,000 mg/l; whereas other species – for example, the spur-winged lapwing plover – might have higher tolerance levels. This apparent tolerance may be due to inherent physiological differences and/or species-specific behaviour that limits their exposure to sodium, for example, accessing freshwater ponds instead of the process ponds.

Sadiola staff have adopted 800 mg/l as a conservative target for regulating sodium levels in process waters. Mitigation measures include:

- reducing the attractiveness of habitat by:
  - removing dead trees standing in the ponds;
  - removing a 75-metre-wide strip of vegetation around ponds; and
  - placing tailings over exposed areas of natural ground inside the TSF;
- bypassing of the TSF silt trap pond;
- permanent bird hazing patrollers around ponds to deter birds from alighting on the water;
- propane cannons and electronic distress calls; and
- construction of 30 freshwater ponds

A wildlife monitoring programme has been instituted, and pond inspections are carried out regularly, to assess the performance of mitigation measures and to provide for the early detection of future incidents. It has already been noted that the number of bird species frequenting the process ponds has decreased from 50 to 15 and the frequency of visits has also reduced.

Further mitigation measures are currently being considered, primarily aimed at reducing the surface area of exposed process solutions.

5.5 Emphasis on dust monitoring and management at Sadiola

The Sadiola Hill Gold Mine is located in the Kayes region of Mali, West Africa, where there are two distinct seasons: a short wet one from June to early September and a longer hot and dry season from October to May. The region is subject to dust 'pollution' from the Harmattan, a dry dusty wind that blows along the north-west coast of Africa and which can reduce visibility to less then 50 metres. This can be exacerbated by construction and mining activities such as those at Sadiola and Yatela.

Dust was a significant issue during the construction of the mines. Emissions continue to emanate from the mine pits and the waste rock dumps, but it is dust caused by traffic between the mines – situated about 30 kilometres apart – that is of greatest concern to neighbouring communities.

The national road between Sadiola and Yatela mines is a dirt road which passes through several rural villages. Trucks use the road to deliver raw materials, buses transport employees to and from work, and supervisor vehicles shuttle between the mines. Secondary traffic comprises private cars, trucks and taxis, all of which use the same road on a regular basis. This assortment of traffic stirs up significant quantities of dust which form clouds of very fine dust particles which, particularly bad during the dry season, are both a health and a safety hazard. Respirable dust (particles of less than 10 microns – equivalent to about one seventh of a human hair) pose the greatest health risk because the particles can be easily inhaled.

The two villages most affected by dust emissions – Kourketo and Sadiola with a population of about 14,000 – are located on the route between the Sadiola and Yatela mines. Residents' complaints have been addressed both through the community Stakeholder Committee which liaises with the mine on behalf of the community, and directly to the community development manager at the mine.

Several measures are being implemented to minimise dust levels in and around the mines. They include:

- road watering – a contracted water bowser is used to spray sections of the road between Sadiola village and the tarred mine road, as well as roads inside Neteko village. During the dry season, approximately 96,000 litres of water are used per day for dust suppression;
- haul road watering – pit water from the dewatering programme is used to suppress dust on the access and haul roads inside the mining area;
- application of binding agents in the form of molasses and lignosulphonate – in 2004, both molasses and lignosulphonate were applied in trials at Sadiola and Kourketo villages respectively. Lignosulphonate has proven to be more efficient than molasses, which tends to get washed away quickly; and
- traffic relocation – a new road is being constructed to divert mine traffic off the national road and on to a new private road that is situated away from neighbouring villages.

At the last two stakeholder workshops, communities voiced their appreciation of the mine's efforts to manage dust emissions at the operations and in their communities. They also expressed a desire that the entire road between Kayes and Sadiola be tarred. This, however, would be the responsibility of national government.

Continuous dust monitoring

Both the fallout and respirable dust are monitored to evaluate the impact of mining on air quality in the Sadiola district. The dust fallout is monitored by means of dust buckets, which collect dust generated either by mining activities or any other movement, within the radius of the dust buckets. The dust buckets are collected monthly and the particle samples processed in the SEMOS (La Societe d'Exploitation des Mines d'Or de Sadiola) assay laboratory. The respirable dust is measured by a PM10 machine.

In an effort to achieve greater dust monitoring accuracy, new dust monitoring devices were installed on site by December 2005 – a set of each in the Sadiola area and another set (as a control) in Medine village which is unaffected by the dust to measure background dust levels.

5.6 Mine closure stretches environmental legislation

AngloGold Ashanti is an active participant in the development of a water management strategy in the Klerksdorp, Orkney, Stilfontein and Hartebeesfontein (KOSH) area, after it found itself, along with other mining companies, in the middle of uncharted legal territory.

This followed a dispute over responsibility for pumping of underground water after DRDGOLD placed its North West Operations (NWO), comprising Hartebeesfontein and Buffelsfontein mines, into provisional liquidation on 22 March 2005. Prior to this, dewatering of mines in the area was conducted by each mining company at their own mine shafts – DRDGOLD Limited, Harmony Gold Mining Company and AngloGold Ashanti – and Stilfontein Gold Mining Company, which, though closed, contracted the dewatering at its Margaret shaft to Hartebeesfontein.

Pumping is necessary to prevent the flow of underground water from mines at a higher location within the mining area to lower-lying mines and to keep the mines at the higher location dry for their own operating purposes. The designs of higher lying and shallower mines, like Hartebeesfontein, Buffelsfontein and Margaret, took account of the challenges posed by large volumes of water, unlike the deeper shafts owned by AngloGold Ashanti and Harmony, which do not encounter such volumes. Indeed Margaret shaft pumps a total of 37 megalitres a day (Ml/d), the equivalent of 740 swimming pools, while five other shafts in the area pump much lesser amounts each – 20.50 Ml/d in total. Once DRDGOLD abrogated its responsibilities to continue pumping natural underground water, the ensuing debate highlighted a crucial area, namely, on whose shoulders the pumping responsibility should lie when one mine closes down before another. The South African statutory law, in the opinion of AngloGold Ashanti, is clear in this regard, the mine in whose area the underground water occurs has the obligation to manage such water.

When DRDGOLD left responsibility for pumping with its liquidators, mines operated by AngloGold Ashanti and Harmony, lying as they do on the down dip of DRDGOLD's North West Operations, were at risk of flooding with a number of possible impacts: cessation of operations, loss of a valuable resource, and resultant job losses affecting the social and economic fabric of the area.

AngloGold Ashanti's immediate response, on 13 April 2005, was to launch an urgent interim interdict to request the court to order DRDGOLD to continue to dewater at its operations, in terms of legislation contained in the National Water Act, the National Environmental Act, the Mine Health and Safety Act and the Mineral and Petroleum Resources Development Act, which says that each mining company is responsible for its own environmental impacts and safety and that it may not pass pollution and safety problems on to another mining company – in other words "the polluter pays" principle. Mining companies, in any event, are compelled to make financial provision and fulfil certain environmental obligations before obtaining a closure certificate from the Department of Minerals and Energy (DME). AngloGold Ashanti also asked the court to direct the state to fulfill its statutory duties.

As a result of the launching of the urgent interdict, the Department of Water and Forestry Affairs (DWAF), in the meantime, issued a directive to mining companies to formulate a proposal on how to handle the KOSH water issue. AngloGold Ashanti submitted a document suggesting a way forward. The proposal suggests that over the next 18 years (covering the life of mines in the area), water should continue to be pumped to surface at Stilfontein's Margaret shaft before being piped to the local water service provider,

5.6 Mine closure stretches environmental legislation *cont.*

Midvaal Water Company or other water services provider where it is to be blended with Vaal River water, treated and used for domestic, industrial and mining purposes.

AngloGold Ashanti has also suggested that a water company (with the mining companies and government as members), similar to Midvaal, be formed to manage the current crisis now and into the future. This should create a revenue stream to pay for pumping costs over the next 18 years and will make more widespread use of the water being pumped at Margaret shaft, now being discharged to the surface environmental and water resources. On the question of sustainability, as raised by government, the proposal further advises continued pumping for a 10-year period following mine closure, until voids fill up. It is also envisaged that, since the quality of water may not be accurately established at this time, a pre-treatment plant be erected at Margaret shaft before water is transferred to Midvaal Water Company. With regard to water pollution, a monitoring measure is currently under investigation by DWAF, which is considering installing a Water Discharge Charge system, whereby companies will be charged for volumes and contaminants discharged into the natural watercourse.

At a two-day workshop held in October 2005, all mining companies and stakeholders agreed on the establishment of a water company, which will ultimately benefit the community, mining companies and government. Foreseeable challenges, besides raising the R60 million needed to set up the company, are how DWAF and the DME will legally appropriate Margaret shaft from Stilfontein in view of the fact that the company has no directors – they resigned en masse earlier in the year when they faced contempt of court proceedings for failing to comply with the DWAF directives; and the speed with which DWAF will be able to furnish a water licence permit for the new company.

While AngloGold Ashanti is confident that the new water company will get off the ground in the foreseeable future, it would like to see government intervention in certain areas before a crisis on the scale of the KOSH area presents itself. Chief of these is ensuring that closure strategies are in place long before all mining operations cease, and that these strategies adopt a holistic view of the needs of affected areas.

5.7 Dust management at Vaal River

The dust management programme implemented at the Vaal River operations in South Africa in 2005 has been relatively effective. The problems experienced here and, in particular, the concerns of the local community, were reported in the Report to Society 2004.

Since that time the western extension tailings storage facility has continued to grow, increasing in height from 32 m to 41.5 m. Tailings deposition has also increased from 22 million t to 24,7 t. To accommodate the increased tailings material, the height of the dam has had to be increased. During the process of a routine pipe lift, which was necessary for cycloning operations to proceed smoothly, the stabilised surface on a portion of the eastern wall was disturbed. This has resulted in a temporary increase in dust levels, which are expected to continue until cycloning operations resume at the beginning of 2006.

Dust emissions from the dried-out sulphur dam, located on the northern side of the Potchefstroom/Orkney road, have also increased significantly. The dam is currently in the process of being reclaimed, which in the longer term, will lead to a reduction in dust emissions. In the meantime, a short-term strategy has been implemented for dust suppression, including:

- installation of sprayers – the initial system proved to be unsuccessful and consequently a micro-jet system is being investigated which should provide a much finer droplet, improving the agglomeration of airborne particles;
- installation of bulk chemical storage tanks for dust suppressant chemicals which will reduce the lag time when urgent applications are required; and
- spraying of ligno-sulphonate – a synthetic, non-toxic, eco-friendly binding agent has been applied over the dam surface to bind dust particles. Approximately 90% of the surface has been covered and the rest is scheduled for completion in early January 2006.

The dust monitoring programme, which comprises 17 dust fall-out buckets, has continued during 2005 with the latest results indicating compliance with legislation.

Although complaints regarding high dust emissions were lodged with the North West Department of Minerals and Energy (DME) during October 2005, AngloGold Ashanti was not singled out by the complainants. Nevertheless, following a meeting with all stakeholders, the DME constituted a formal dust committee comprising local authority and mine representatives, which will meet regularly to discuss dust issues and remediation measures.

5.8 Hydrogeology in the South Africa region

Management of water resources

Responsible management of water resources is crucial for economic development and social and environmental well-being. It is against this need that government formulated national policy through the Water Policy (1997) and Water Act (1998), "to manage the quantity, quality and reliability of the nation's water resources to achieve optimum, long-term, environmentally sustainable social and economic benefit for society from their use".

Hydrogeology – the study of the interaction of groundwater with surface water bodies, soil and rock formations and waste rock bodies – forms part of Anglogold Ashanti's integrated water management plan as prescribed by South African legislation.

Hydrogeology falls under the Water Management section of the South African Environmental Management Department. A number of hydrogeology projects have been undertaken over the past four years. They include isotope analyses to determine the origin and speciation of water bodies; studies to predict the influx of water into gold mines within the KOSH (Klerksdorp, Orkney, Stilfontein and Hartebeesfontein) area and to quantify the future influx of water into the Stilfontein area in the event of mine closure; and an assessment of the impact of dewatering of mines on neighbouring groundwater users, both in terms of quantity and water quality.

The main objectives of hydrogeology in the South Africa region are to establish the following:

- identification of pollution sources and potential pollution sources (e.g. tailings dams, dirty water separation dams, storm water dams);
- risk assessment and classification of pollution sources;
- mitigating the paths of pollution sources to prevent their ingress into unpolluted water;
- identification of receivers of pollution (e.g. rivers and other natural water sources) and mitigation options; and
- impacts of mine dewatering.

Data obtained from the integrated ground and surface water monitoring network has enabled the compilation of a number of formal monitoring reports in the South Africa region. This has allowed for the construction of a detailed groundwater model and predictive simulations to identify potential groundwater risk. Groundwater contaminant flow transport models were constructed to quantify possible pollution impacts over a period of, for example, 20 years. The transport models were ranked according to their salt load allocation (the higher the salt load, the more polluted the water) and the distance over which the pollution travels.

From an identification of groundwater risk, AngloGold Ashanti has been able to pinpoint potential problem areas, and to implement mitigation strategies. These include:

- responsible management of explosives which contain a high nitrate composition and therefore the potential to pollute groundwater;
- implementation of production boreholes to intercept groundwater pollution plumes and thus reduce the contaminant flow into unpolluted water sources;
- rehabilitation of soils and continuous monitoring of dam water level overflows to prevent seepage;
- maximisation of the re-use of water;
- installation of under-drains to intercept polluted water in shallow groundwater tables;
- regular assessment of evaporation dams, to check salt levels, and of clean water dams, to prevent the ingress of potential pollution sources;
- lining of dirty water dams to prevent seepage; and
- rehabilitation of pyrite stockpiling areas, which are a potential pollution source.

These measures are intended to substantially reduce the risk of groundwater pollution, ensuring company compliance with national water management policy, while at the same time minimising AngloGold Ashanti's potential liability.

5.9 Complying with stringent new air quality legislation in South Africa

South Africa's new National Environmental Management: Air Quality Act 39 of 2004, which repeals the Air Pollution Prevention Act of 1965, came into effect on 11 September 2005 with exclusions of certain sections such as the licensing of listed activities. (Until these sections are included, the relevant sections of the Air Pollution Prevention Act will remain in force.)

The new act introduces a system based on ambient air quality standards and corresponding emission limits to achieve them. The act prescribes air quality standards at national level for ozone, nitrogen dioxide, sulphur dioxide, lead, particulate matter and total suspended solids. Linked to the new Air Quality Bill are two standards set by the South African National Standards (SANS), namely SANS 69 which defines the basic principles of a strategy for ambient air quality management in South Africa, and SANS 1929 which gives limit values for common pollutants.

In order to ensure compliance with new legislation, AngloGold Ashanti established an Air Quality Impact Assessment and Development of Air Quality Management Plan Framework in August 2004. The starting point was the compilation by a task team of an emissions inventory at the company's Vaal River and West Wits operations to examine all air pollutants, including sulphur dioxide (SO_2), lead (Pb), PM10 (particulate matter smaller than 10 microns which is a health risk), and total suspended solids. The task team, comprising the company's South African environmental departments and business units, in conjunction with an external consultant, prioritised emissions, after which management and monitoring plans were put in place.

Running almost concurrently with the above Air Quality Impact Assessment was an identification and compliance assessment by an external consultant, Airshed, of 'scheduled processes' – those which require permission to operate. Following application, provisional registration certificates were granted in 2005 for two new scheduled processes under the new legislation – Vaal River's East Gold Acid Float (EGAF) plant, for SO_2 emitted in the gold extraction process, and for the assay laboratories at Vaal River and West Wits where lead is used in the analysis of gold samples. The provisional registration was granted for both scheduling processes, with the proviso that compliance is proven within a year. Unlike the previous legislation which imposed certain limits on emissions, the new act legislates in terms of ambient concentrations measured in 10-minute averages, hourly averages and yearly averages.

Management plans are in place to meet these stringent limits during the course of 2006. In the meantime, a management and monitoring programme of harmful emissions was embarked upon in June 2005 to analyse stack emissions from the acid plant and ambient air quality monitoring of PM10, and total suspended solids from dust fall-out. Monitoring equipment was installed at a cost of approximately R600,000. This includes meteorological stations at West Vaal and Vaal River; ambient monitoring stations for SO_2 and PM10 to measure airborne pollutants; and monitoring equipment at Vaal River's acid plant and both operations' assay laboratories.

Modifications had been planned to the calcine stripping tower at a cost of around R2 million, to increase the stripping efficiency of SO_2 in effluent, thereby significantly reducing fugitive emissions. Once completed at the end of 2006, the plant will be re-evaluated to assess the extent of reduction of emissions. Although SO_2 emissions also emanate from the smelt house, furnace and electro-winning process, they are negligible. An analysis of lead oxide emissions from the assay labs shows that emissions are within World Health Organization (WHO) standards. The emissions inventory will be updated annually or when processes change.

5.10 Using cyanide responsibly at CC&V

The use of cyanide for the recovery of gold has become an increasingly contentious issue following, on the one hand, a number of high-profile and negative cyanide-related environmental incidents in recent years, and, on the other, increasingly vocal and visible non-governmental organisations (NGOs), such as Greenpeace and Oxfam, calling for the banning of cyanide use.

Cyanide is used around the world to recover low concentrations of gold that could otherwise not be extracted, from its host rock through a leaching step. (See box on the Understanding the Valley Leach Facility at CC&V). Unlike the frequent public contention that the mining industry is a major user of cyanide, globally this industry accounts for only 20% of consumption a year. Approximately 1.4 million tonnes of hydrogen cyanide are produced annually worldwide. The remaining 80% is used in industrial applications including the production of plastics, adhesives, fire retardants, cosmetics, pharmaceuticals, food processing and as an anti-caking additive for table and road salts. (Source: www.cyanidecode.org)

AngloGold Ashanti is acutely aware of the potential impact of cyanide on both people and the environment and the importance of the correct management of cyanide. The company was actively involved in the development of the International Cyanide Management Code. AngloGold Ashanti was one of the first signatories to the code in 2005. By being involved in code activities, AngloGold Ashanti maintains its awareness of best industry practice. The Cresson Project will be reviewed by a third-party expert to determine certification under the code within the next three years (as allowed in terms of the code).

Yet the use of cyanide remains an issue of high-profile debate, particularly in North America. The responsible use of cyanide is critical to the viability of many North American operations, CC&V included.

The cyanide issue came to the fore in North America in 1992, when major problems were discovered at the Summitville Mine in Colorado, the same state in which CC&V is located. The Summitville Mine was a surface mining operation for gold and silver that used heap leaching with cyanide ore-processing reagents. The site had been permitted (or licensed) in the 1980s in an area of south-western Colorado at a high altitude known for deep snow accumulation. A liner for the leach pad ripped during construction and was never repaired, allowing water containing dilute cyanide and certain metals to leak from the heap-leach pad into an adjoining stream. In response, the company installed a water treatment plant to be used to neutralise the cyanide in the heap and related ponds. In 1992, the Colorado Department of Public Health and Environment (CDPHE) imposed new discharge limits on the operation. The inability to meet these lower standards, in conjunction with other factors led to the abandonment of the site in December 1992. Owing to the magnitude of the problems that remained, and the potential for additional issues related to uncontrolled flows from the site, the State of Colorado requested assistance from the US Environmental Protection Agency (EPA). The adjoining streams historically had naturally occurring low pH and high metal content as evidenced by such names as Alum Creek and Bitter Creek. While the initial cyanide contamination garnered the headlines, it was the release of certain metals through acid rock drainage that posed the biggest long-term issue. The EPA declared the mine a Superfund site, allowing use of the Superfund itself for site clean-up.

5.10 Using cyanide responsibly at CC&V *cont.*

In 1993, the state, environmental NGOs, and the mining industry co-operated through the development and later enactment of new legislation and regulations designed to significantly strengthen the mining and reclamation requirements with the goal of avoiding a reoccurrence of Summitville. The revised laws are amongst the strongest mining and reclamation laws in the United States. Shortly after enactment, CC&V voluntarily sought re-licensing of those portions of the operations associated with the Valley Leach Facility (VLF) under the new, more stringent requirements and its Cresson Mine became the first heap-leach gold mine licenced in Colorado under the new law.

CC&V remains committed to the responsible use of cyanide and uses the latest containment technologies to assure that cyanide solution does not escape and the zero discharge status of the gold recovery operations is maintained. The VLF and Adsorption, Desorption and Recovery (ADR) facility are the primary zero discharge facilities involving complete containment of dilute cyanide solutions. The VLF features a double- and, where solution is collected in the internal ponding structures, a triple-lined design. Solution collection and detection systems are also included in the design. The ADR was similarly designed with solution collection and detection systems.

In addition to these sophisticated design features, a quality control and quality assurance (QA/QC) programme was instituted to achieve compliance with the stringent 1993 legal requirements. A third party expert consultant was used to rigorously monitor and test materials during construction of the VLF and other solution containing facilities such as the ADR. Prior to activation, all of the monitoring and testing results were compiled and submitted with a certification statement by a registered professional engineer to the Colorado Division of Minerals and Geology (DMG) for review and approval. DMG also conducted frequent inspections throughout the construction process. Only upon acceptance by DMG of the certification reports, could dilute cyanide containing solution be used.

Intensive monitoring conducted since the facility's activation has verified the zero discharge status of the VLF and other facilities. Various prescribed monitoring of critical elements of the VLF and associated facilities as well as down-gradient water quality sampling are conducted at regular intervals. In addition, ground water monitoring wells have been installed around the Cresson Project and are routinely monitored. VLF and ground water monitoring results are submitted to the DMG. Surface water monitoring results are provided to CDPHE monthly. Based upon the results from this monitoring, there is no evidence of leakage or loss of containment from the VLF or associated facilities.

Another potential concern related to facilities such as the VLF is the atmospheric emission of hydrogen cyanide (HCN). CC&V minimises the HCN releases by maintaining the pH of the solution at high levels and the burial of the drip lines used to wet the ore. To address these concerns and others raised by local residents, the Agency for Toxic Substances and Disease Registry (ATSDR) completed a Public Health Assessment of the Cresson Project in 2000. This agency is affiliated with the Centers for Disease Control or CDC. The summary of the completed study states:

"The Agency for Toxic Substances and Disease Registry has concluded that the ambient air emissions associated with Cripple Creek and Victor Mining Company do not pose a threat to human health. The cancer incidence and birth defects in the Victor and Cripple Creek area are not elevated when compared

5.10 Using cyanide responsibly at CC&V *cont.*

to those in similar areas. The local drinking water has not been impacted by mining activities. The dust and metals levels in Victor and Cripple Creek do not [represent] a threat to public health. Current hydrogen cyanide levels on-site and in nearby residential areas are not at levels of health concern."

CC&V believes that its record shows that the Cresson mine represents the state-of-the-art in cyanide solution facility design, construction quality assurance and operation. We continue to strive to improve operations, where possible.

Understanding the Valley Leach Facility at CC&V

At CC&V's Cresson mine, gold is removed from the crushed ore through the same basic process used all over the world. Naturally occurring minerals, including gold and silver, that are exposed on the broken faces of the crushed ore, are dissolved using a dilute sodium cyanide solution. This is called the leaching process.

At the Cresson mine, leaching is undertaken out of doors in a valley leach facility (VLF), a valley area with clay and plastic liners upon which the crushed ore is placed for the removal process. The bottom and sides of the VLF are made up of impermeable double and triple liner systems. The crushed ore is placed in layers of about 11 metres and a dilute solution of sodium cyanide (about 100 parts per million) is applied to each successive layer using agricultural-type drip irrigation tubes. As the solution soaks through the ore, it dissolves the gold and silver on the surface of the ore. The so-called 'pregnant' solution is then captured in specifically designed internal ponding structures at the lowest point of the VLF, and pumped into the recovery facility.

There are no external ponds where the solution is held prior to processing; rather the solution is kept in the facility within the pore space of the ore, much as ground water is held in porous bedrock. The VLF therefore has a large excess capacity to cater for significant precipitation events such as rain or snow. A sophisticated and comprehensive water monitoring system is in place to maintain the water balance as the VLF is a zero discharge facility.

Once it leaves the VLF the pregnant solution enters the Adsorption, Desorption and Recovery (ADR) facility where the solution is pumped through steel tanks containing activated carbon (roasted coconut shell) granules which attract (or adsorb) the dissolved gold-cyanide complex. The barren process solution from which the gold has been removed is recirculated to the VLF to start the leaching cycle all over again. Meanwhile the gold is removed from the carbon, before refining.

Through this process about 70% of the gold is removed. This is because the cyanide process dissolves only that gold or silver which remains on the surface of the rock. To recover all the metals the rock would need to be crushed so finely that the process solution would not flow through it.

The ore on the VLF is not removed once the gold has been recovered from its surface. Rather, new ore is stacked on top of the leached rock.

5.11 Big Springs reclamation continues

Following the cessation of mining operations AngloGold Ashanti (Nevada) Corporation (AGANC) continues with environmental closure activities at Big Springs in north-eastern Nevada approximately 60 miles north of the town of Elko and 30 miles south of the Idaho border. The mine area is situated within the Independence Mountains on public lands inside the Humboldt-Toiyabee National Forest, which is administered by the US Forest Service (USFS). Elevations range from 7,200 to 9,200 feet above mean sea level (amsl) with average annual rainfall of 25 to 30 inches. Heavy snowfalls and severe winter conditions resulted in the mine operating on a seasonal basis, typically from March/April to October/November. Big Springs had a relatively short operating life from mid-1987 to mid-1993. The roaster system was shut down in 1994.

During the mine's life, gold ore was extracted from 12 relatively small surface mining areas scattered around the site using conventional loader-truck methods. Ground water encountered during mining required dewatering in the northern portion of the mine area. The headwaters of the North Fork of Humboldt River were crossed to access one of the rock storage areas. Ore was crushed at the mine and then transported on highway-legal trucks on a gravel road to the mill site located four miles east of the mine, out of the mountainous terrain, and at a considerably lower elevation, which allowed for year-round milling and leaching operations.

Environmental mitigation measures at Big Springs started early, during the construction phase, when the dirt road along the North Fork of Humboldt River was replaced with a gravel road higher up the hill side outside the riparian corridor to reduce the impact on the resident threatened fish species, the Lahontan cutthroat trout. Other mitigation measures to protect the trout were: the construction of a five-mile fence to protect the riparian corridor (the narrow strips of land along the banks of the river) along the North Fork of the Humboldt River from livestock; structural improvements to the channel; riparian plantings, and numerous sediment control measures. By 1992, these collective mitigation measures contributed to the 'good' classification of the north fork of the Humboldt River and were recognised in the US Fish and Wildlife Service (USFWS) 1995 Recovery Plan for the cutthroat trout. This classification remains today, as chronicled in a report published by the Nevada Department of Wildlife in December 2004.

In 1992, certain constituent concentrations appeared to be increasing in the North Fork of the Humboldt River and its tributaries within and near the mine areas. This change in water quality was attributed to above normal rainfall after a prolonged drought. As a precautionary measure, a third party expert consulting firm was retained to determine if the changes were exclusively attributable to the flushing of dissolved salts that had accumulated during the drought years. Rigorous water quality sampling and geochemical testing was conducted to better understand the natural processes that might be contributing to the change. Considerable time, effort, and expense were involved, but it was determined that cover systems for the rock storage areas and a series of diversion channels to capture surface run-off were warranted.

Cover system and diversion installation started in 1995 as part of mine closure and reclamation and continued on a seasonal basis to the end of 1997. Improvements and repairs to the diversions continued through 2000. Since that time, little work has been required to operate and maintain these systems.

5.11 Big Springs reclamation continues *cont.*

Simultaneous with this reclamation work, seven of the 12 surface mines were partially backfilled. Three of the surface mines had been backfilled during active mining operations. The partially backfilled surface mines were covered with soil and revegetated. The two remaining surface mines contain water, one of which supports a fish population.

In August and September 2005, the company conducted field reviews of the mine areas with government agency representatives. During these site visits, a good cover of vegetation was observed on all of the reclaimed areas. Similarly, the three large sedimentation ponds and fill across the north fork of the river were no longer apparent after being removed and creatively contoured to blend with the surrounding terrain. Likewise, the haul road on the steepest terrain was determined to have been successfully recontoured and stabilised with vegetation.

Water quality improvements have also been observed at selected locations since the covers and diversions were completed and the planted vegetation started to develop. Finally, ongoing aquatic studies involving fish and aquatic insects have demonstrated that no long-term adverse effects have resulted from the mining activities.

AngloGold Ashanti will continue to work with the agencies to monitor water quality and evaluate the effectiveness of the mine area reclamation and closure strategies. The company is implementing a new permit that calls for continued monitoring, reporting, and evaluation of water quality within and near the mine area for the next five years. The valuable experience in reclamation gained at Big Springs will stand the AngloGold Ashanti team in good stead for future planned closures.

6. Objectives for 2006

- Achieve ISO14001 certification at all operating mines by the end of December 2006.
- Develop a series of environmental guidelines to direct and continue to improve environmental performance across the company.
- Establish targets for a reduction in water use, energy consumption and carbon emissions.
- Continue to improve environmental data gathering systems in accordance with GRI reporting requirements.
- Formally integrate biodiversity considerations in the environmental management programmes of the company.
- Participate in the ICMM's mine closure project and review the company's processes on the basis of emerging good practice.
- Maintain the environmental incident reporting system.