



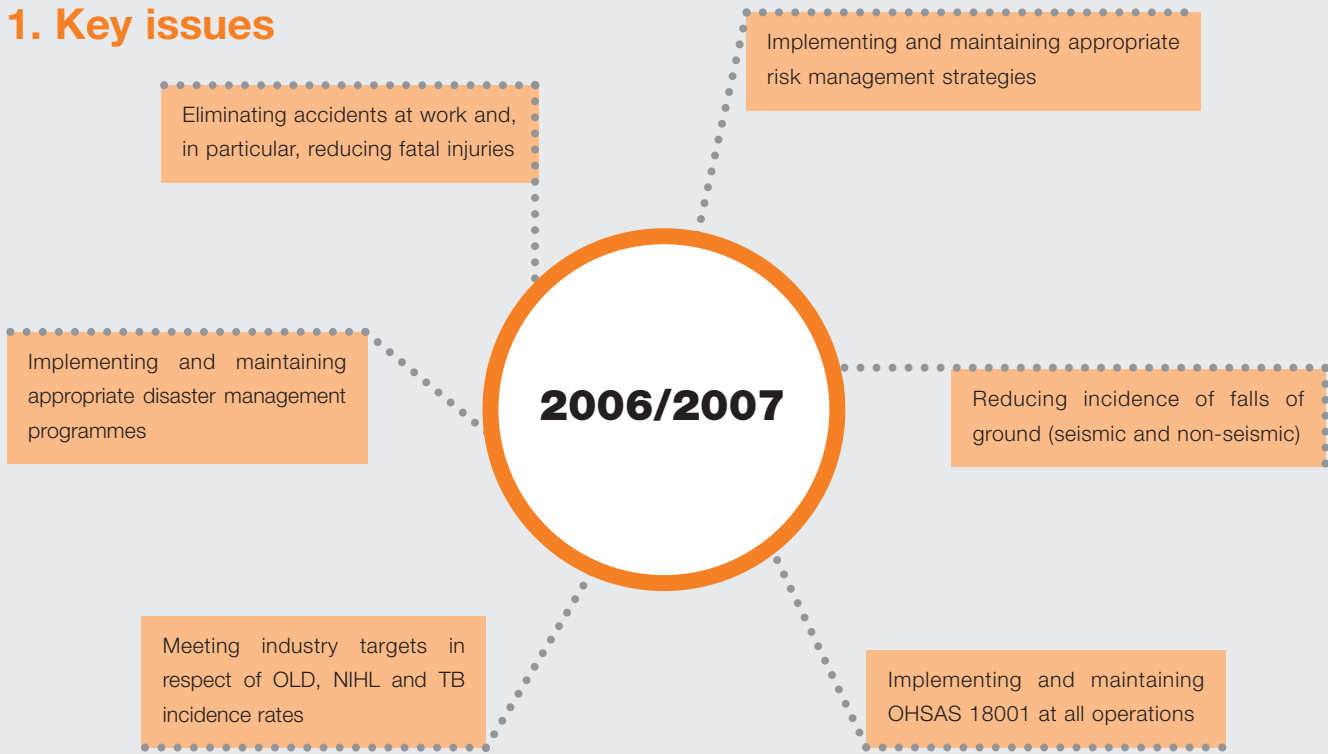


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Workplaces free of  
occupational illness and injury  
– occupational safety and health

## 1. Key issues



## 2. Living our values

One of our four core values at AngloGold Ashanti relates to the safety and health of employees, namely:

'Every manager and employee takes responsibility for health and safety; and together strive to create workplaces that are free from occupational injury and illness'.

### Wellness in the workplace



## OCCUPATIONAL SAFETY AND HEALTH

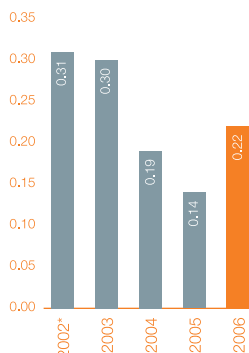
AngloGold Ashanti's safety and health management and practices are guided by the group's business principle, 'AngloGold Ashanti as an employer – safety and health'.

### **AngloGold Ashanti as an employer – safety and health**

1. The company is committed to complying with all relevant occupational health and safety laws, regulations and standards. In the absence of such standards, leading practice will be adopted.
2. We are committed to providing a working environment that is conducive to safety and health.
3. The management of occupational safety and health is a prime responsibility of line management, from the executive level to the first-line supervisory level.
4. We strive for employee involvement and consultation with employees or their representatives to gain commitment in the implementation of these principles.
5. The company is committed to providing all necessary resources to enable compliance with these principles.
6. The company will not tolerate or condone deliberate breaches in standards and procedures.
7. We will implement safety and health management systems based on internationally recognised standards and we will assess the effectiveness of these systems through periodic audits.
8. We will conduct the necessary risk assessments to anticipate, minimise and control occupational hazards.
9. We will promote initiatives to continuously reduce the safety and health risks associated with our business activities.
10. We will set safety and health objectives based on comprehensive strategic plans and will measure performance against these plans.
11. We will monitor the effects of the company's operational activities on the safety and health of our employees and others, and we will conduct regular performance reviews.
12. We will provide all necessary personal protective equipment.
13. We will establish and maintain a system of medical surveillance for our employees.
14. We will communicate openly on safety and health issues with employees and other stakeholders.
15. We will ensure that employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities. We will require our contractors to comply with these principles and we will seek to influence joint venture partners to apply them as well.

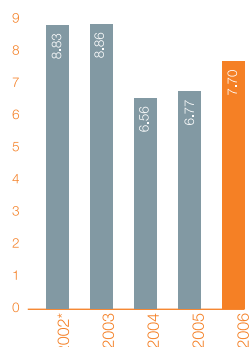
A comprehensive programme – Wellness in the Workplace – which adopts an integrated approach to managing the health and well-being of employees has been put in place at the company's underground mining operations in South Africa and Obuasi in Ghana. (See diagram on page 44.) The fundamental concept underlying this approach is the company's aim to engage healthy and productive people at the beginning of their careers and to ensure that these employees remain so until they leave the employ of the company, sometimes many decades later. This concept recognises the intrinsic interdependence of safety, occupational health, the environment and productivity, and requires an integrated and co-ordinated approach by the safety, occupational health, environment, medical and human resources disciplines. The programme has three phases: the pre-employment/engagement phase; the employment phase during which employees are exposed to the social and occupational environment; and the termination/post-employment phase.

**FIFR – Group**  
(per million man-hours worked)



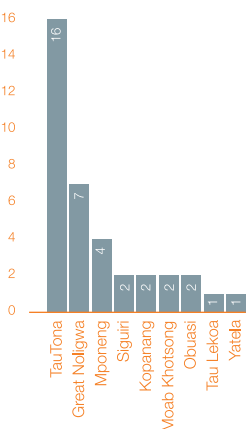
\* Not assured

**LTIFR – Group**  
(per million man-hours worked)



\* Not assured

**Number of fatalities**  
2006 – Group



## 3. Our scorecard

In our Report to Society 2005, we set a number of objectives that we wanted to achieve in 2006 and we report on these in our scorecard below.

Objectives for 2006	Performance in 2006
<b>Safety</b>	
Long-term objective to eliminate all accidents.	Regrettably there were 37 occupational fatalities at our operations and 1,288 lost-time injuries.
Reduce LTIFR by 20% year-on-year.	The LTIFR rose by 14%.
Incorporate risk management as a critical aspect of management of our operations.	Ongoing initiatives in place.
All operations working towards OHSAS 18001 implementation.	Gap audit programme completed in 2006 and CVSA recommended for certification in December 2006.

### Occupational health

Plan to meet South African Mine Health and Safety Council's targets on NIHL and silicosis. These targets are:

**OLD:** by 2008, 95% of all silica exposure measurements will be below the occupational exposure limit (OEL) of 0,1mg/m<sup>3</sup>

The AngloGold Ashanti internal target of 10% of exposure measurements readings above the OEL was achieved with 9.95% of readings above the OEL. The target set for 2007 is 7.5%, with 5% for 2008 as per the industry milestone. The average silica dust concentration for 2006 was 0,04mg/m<sup>3</sup>. Dust control standards have been set and are being inspected on a regular basis for determination of risk profiles for all working places. More than 4,020 personal dust samples were taken in 2006.

By 2013, no new cases of silicosis will occur in previously unexposed employees.

Although the milestone is aimed at the year 2013, AngloGold Ashanti is already tracking all new cases of silicosis in all employees.

**NIHL:** by 2013, noise emissions of all equipment will be below 110dBA; and by 2008, no deterioration in hearing greater than 10% will occur in noise-exposed employees.

Compliance with respect to meeting the DME target for noise emissions was 34% for 2006.

To further drive down the TB incidence in the South Africa Region.

The TB rate recorded for 2006 was 31 per 1,000 employees per annum up on that of 2005.

## 4. Review 2006

We report our performance in 2006 against our business principles.

**Business principle 1:** We are committed to providing a working environment that is conducive to safety and health.

Although, the group's safety and health performance has improved significantly since the formation of AngloGold in 1998, we have not achieved our long-term target of eliminating fatal accidents and occupational illness, particularly at the African operations. (See case study on Safety review at the South African operations on page 116.)

## OCCUPATIONAL SAFETY AND HEALTH

In 2006, the group's Fatal Injury Frequency Rate (FIFR) of 0.22 per million man-hours rose by 57% year-on-year, although it remains a 44% improvement on the rate in 1998. The Lost Time Injury Frequency Rate (LTIFR) – at 7.70 per million man hours in 2006 – rose by 14% year-on-year, and has declined by 47% since 1998.

In spite of the improvements noted above, we regret to report a deterioration in our group safety performance, primarily as a result of the reversal of a positive safety trend in the South African operations.

At the South African operations Noise-induced Hearing Loss (NIHL) rates have decreased in 2006 to 2 per 1,000 employees from 4 per 1,000 employees in 2005. Similarly, in respect of the South African operations, with respect to Occupational Lung Disease (OLD), including silicosis – new cases reported have increased from 7 per 1,000 in 2005 to 10 per 1,000 employees during 2006. The incidence of pulmonary tuberculosis (TB) has also increased in 2006 to 31 per 1,000 from that of 25 per 1,000 recorded in 2005. This is lower than the figure of 35 per 1,000 recorded in 2004.

**Business principle 2:** We will monitor the effects of the company's operational activities on the safety and health of our employees and others, and we will conduct regular performance reviews.

### Safety

A range of leading and lagging indicators are monitored throughout the group. Some of these are site-specific (particularly the leading indicators). The primary lagging indicators reported for the group as a whole are the FIFR, the LTIFR and the days lost per lost-time injury. The latter indicates the severity of lost-time injuries.

### Fatal accidents

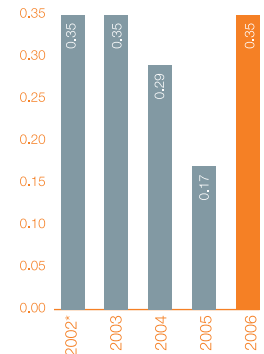
Regrettably, there were 29 accidents within the group in 2006 in which 37 employees (including contractors) lost their lives. Thirty-two of these occupational fatalities occurred at South African mines, 16 of them at one mine – TauTona – in nine separate accidents. (See case study on: *Mining plan changed in the interests of safety at [www.aga-reports.com/06/TauTona-safety.htm](http://www.aga-reports.com/06/TauTona-safety.htm)*). The board and management of the company extend their deepest sympathy to the families and colleagues of those who died. That employees die or become ill during the course of work is an area of great concern to the management and board of AngloGold Ashanti, and a great deal of attention and focus has been placed on ensuring that employees leave the company in good health at the end of their careers. Further details on each of these accidents and on the employees who died may be found on our website at [www.aga-reports.com/06/fatalities.htm](http://www.aga-reports.com/06/fatalities.htm)

### Safety rates

The FIFR increased from a rate of 0.14 per million man-hours in 2005 to 0.22 per million man-hours in 2006, a regression of some 57%. Nonetheless 13 operations ended the year having not experienced any occupational fatalities, while a further three operations improved their rates.

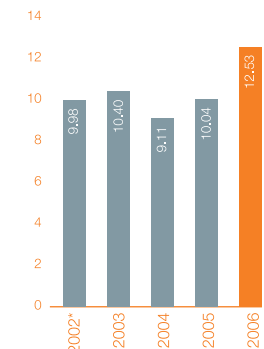
The LTIFR rose by 14% to 7.70 per million man-hours, from 6.77 in 2005. The LTIFR actually improved at a number of operations, with Cripple Creek & Victor (CC&V) in the United States having achieved a LTIFR of zero. In fact, CC&V has achieved a most notable milestone in having not had a single injury on mine during the past three years. (See case study on *Risk management in North America on our website at [www.aga-reports.com/06/risk-CC&V.htm](http://www.aga-reports.com/06/risk-CC&V.htm)*).

**FIFR: South Africa**  
(per million man-hours worked)



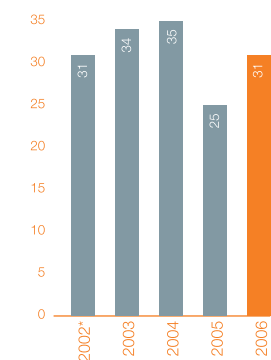
\* Not assured

**LTIFR: South Africa**  
(per million man-hours worked)



\* Not assured

**TB (new cases): South Africa**  
Rate per 1,000 employees



\* Not assured

## OCCUPATIONAL SAFETY AND HEALTH

FIFR year-on-year for each operation per million man-hours worked		
	2006	2005
<b>Argentina</b>		
Cerro Vanguardia	0.00	0.00
<b>Australia</b>		
Sunrise Dam	0.00	0.00
<b>Brazil</b>		
AngloGold Ashanti Mineração	0.00	0.18
Serra Grande	0.00	0.00
<b>Ghana</b>		
Iduapriem	0.00	0.00
Obuasi	0.08	0.29
<b>Guinea</b>		
Siguiri	0.31	0.00
<b>Mali</b>		
Morila	0.00	0.00
Sadiola	0.00	0.00
Yatela	0.43	0.00
<b>Namibia</b>		
Navachab	0.00	0.00
<b>South Africa</b>		
Great Noligwa	0.36	0.22
Kopanang	0.14	0.07
Moab Khotsong	0.27	0.16
Mponeng	0.30	0.21
Savuka	0.00	0.00
Tau Lekoa	0.15	0.41
TauTona	1.23	0.29
<b>Tanzania</b>		
Geita	0.00	0.00
<b>USA</b>		
CC&V	0.00	0.00
<b>Group</b>	<b>0.22</b>	<b>0.14</b>

### Causes of fatal accidents

The primary cause of fatal accidents in South Africa remains falls of ground (78%), with seismically induced falls of ground accounting for 44% of all South African fatalities. (See case study on A new strategy for managing falls of ground in South Africa at [www.aga-reports.com/06/FOGM.htm](http://www.aga-reports.com/06/FOGM.htm)). One fatal accident at Obuasi mine in Ghana was caused by an employee being scalded by chemicals in the metallurgical plant, and the other by an employee being pulled into the rotating drill system of an underground drill rig.

### Health

The primary occupational health threats to employees are NIHL and OLD, with the latter a particular threat in underground mining environments where silica dust exposure is present. In South Africa, TB in silica-exposed employees is a significant occupational disease risk, especially in view of the relationship between HIV/AIDS and TB. In many cases, the statistics reported below are presented for the South Africa operations only as this information is collected and reported to meet the requirements of the country's Mine Health and Safety Act (MHSA). Furthermore, it is the company's view that the risk posed by health threats is greater in South Africa owing to the large number of people involved in deep-level mining operations and the incidence of HIV/AIDS. HIV/AIDS and malaria, which are not strictly work-related but which present significant threats to the health and well-being of employees and communities, are dealt with under the Regional Health section of this report, on page 50.

### Medical surveillance

In South Africa, 50,343 occupational medical surveillance examinations (initial, periodic, transfer and exit) were performed during 2006 in accordance with the requirements of the MHSA. Medical surveillance statistics from AngloGold Ashanti operations outside of South Africa are reported in the country and operational reports which are available on our website at [www.aga-reports.com](http://www.aga-reports.com).

### Noise-induced hearing loss (NIHL)

Sixty-seven new cases of NIHL were identified in South Africa during 2006, which is a rate of 2 per 1,000 employees. This is a decrease from the 4 cases per 1,000 employees reported in 2005.

Comprehensive hearing conservation programmes are in place at all operations and include, among other aspects, noise control engineering (silencing), the provision of hearing protection devices, education and communication programmes, and annual audiometry examinations of employees. In South Africa, baseline audiograms conducted in 2005 in line with new compensation regulations form the basis of future assessments of employees' hearing loss. A major engineering initiative to reduce noise at source to below 110dBA has resulted in all underground drills and noisy fans having been silenced in the South Africa operations, with the ongoing identification and silencing of other noisy equipment in progress.

### Occupational Lung Disease (OLD)

Exposure to silica dust remains one of the major contributing factors to the development of OLD. (In this context OLD includes TB, TB silicosis and obstructive airways disease). Of these, TB is the most pervasive and is compounded by a high HIV prevalence in the mining population (of about 30%) which greatly increases the risk of TB. It is estimated that about 85% of employees diagnosed with TB are HIV-positive.

### OLD statistics

During 2006, 348 cases of OLD were identified in South Africa, which reflects a rate of 10 per 1,000 employees, an increase on that reported in 2005 (7) and 2004 (7). An additional factor contributing to the incidence of OLD (including high TB and HIV rates) is the increasing average age of the South African workforce which has had a longer, cumulative exposure to silica dust underground.

## Dust control

In South Africa, initiatives to eradicate dust and improve methods of dust control have continued, although the agreed\* industry target, for which 95% of all individual samples must be below the legal limit of 0.1mg/m<sup>3</sup> by 2008, has not yet been achieved. In 2006, the average silica dust concentration was 0.04mg/m<sup>3</sup> (2005: 0,04mg/m<sup>3</sup>), with the 95th percentile at 0.129mg/m<sup>3</sup> (2005: 0.13mg/m<sup>3</sup>). A total of 4,020 personal gravimetric samples were taken during 2006. (\*Targets agreed by industry body, the Mine Health and Safety Council.)

## TB control

TB control programmes in South Africa were boosted during the year with the roll-out of a second mobile digital diagnostic radiography unit. The two mobile units in service move from shaft to shaft to facilitate more frequent x-raying of employees. The objective is to detect and treat TB at an earlier stage, thereby preventing the spread of the disease and reducing its impact on the individual and the community.

World Health Organization-aligned TB treatment programmes are made available free of charge to employees and contractors alike by the group's medical services. The TB control programme results exceed the WHO target of an 85% cure rate of all TB cases. (See case study on Thibela project on our website at [www.aga-reports.com/06/thibela.htm](http://www.aga-reports.com/06/thibela.htm)).

## Silicosis

Silicosis is caused by the inhalation of free silica dust present particularly in deeper level mining areas with high quartz concentrations, such as in South Africa and Brazil. A case study on the Legacy of silicosis may be found on page 118 of this document.

Efforts to eradicate silicosis at the AngloGold Ashanti operations in Brazil have largely been successful with no new cases of silicosis having been identified in the past five years. In addition to successful dust mitigation programmes and intensive monitoring, Brazilian legislation limiting the number of years that employees may work underground has played a major role in this achievement.

The legacy of silicosis in South Africa remains a significant issue for the company. This is so for a number of reasons. The current state-led compensation systems are cumbersome and inefficient and, because of this, many silicosis-affected former employees of the mining industry may not have had access to regular medical examination, substantial medical care or compensation, if found to be due. AngloGold Ashanti, together with Gold Fields and Harmony, is working with the state and unions to identify affected ex-employees in need of care, and to improve access to and use of follow-up treatment and compensation systems. (See case study on the Nongoma project at [www.aga-reports.com/06/nongoma.htm](http://www.aga-reports.com/06/nongoma.htm) – and on Worker Compensation in South Africa under review – [www.aga-reports.com/06/worker-compensation.htm](http://www.aga-reports.com/06/worker-compensation.htm)). At the same time the company is participating constructively in the debate surrounding the possible combination of the current compensations mechanisms.

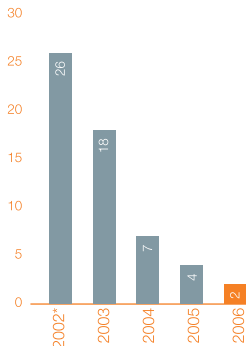
## Heat and physical fitness

A consequence of deep-level mining is exposure to heat. This is an issue of concern in South Africa and at Obuasi in Ghana. AngloGold Ashanti has comprehensive heat stress management programmes in place in South Africa and these have been extended to Ghana. Some of the largest refrigeration plants in the world are used to cool the underground working environment to below 27.5°. Temperatures above 27.5° require a heat stress management programme to be implemented on-mine. Stopping wet-bulb temperatures were, on a weighted average, 28.5°C during the year.

LTIFR year-on-year for each operation per million man-hours worked		
	2006	2005
<b>Argentina</b>		
Cerro Vanguardia	<b>3.13</b>	3.09
<b>Australia</b>		
Sunrise Dam	<b>1.81</b>	3.06
<b>Brazil</b>		
AngloGold Ashanti Mineração	<b>2.33</b>	2.95
Serra Grande	<b>1.76</b>	2.39
<b>Ghana</b>		
Iduapriem	<b>1.15</b>	0.58
Obuasi	<b>2.29</b>	2.89
<b>Guinea</b>		
Siguiri	<b>0.77</b>	0.64
<b>Mali</b>		
Morila	<b>1.42</b>	2.17
Sadiola	<b>1.02</b>	1.30
Yatela	<b>0.43</b>	1.25
<b>Namibia</b>		
Navachab	<b>4.09</b>	3.02
<b>South Africa</b>		
Great Noligwa	<b>12.21</b>	12.13
Kopanang	<b>15.22</b>	11.58
Moab Khotsong	<b>15.75</b>	12.98
Mponeng	<b>10.70</b>	12.20
Savuka	<b>19.30</b>	14.13
Tau Lekoa	<b>24.99</b>	14.58
TauTona	<b>17.09</b>	10.76
<b>Tanzania</b>		
Geita	<b>0.63</b>	0.79
<b>USA</b>		
CC&V	<b>0.00</b>	0.00
<b>Group</b>	<b>7.70</b>	<b>6.77</b>

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NIHL (new cases) South Africa  
Rate per 1,000 employees



\* Not assured

The Kwesi Mensah shaft refrigeration plant at Obuasi mine in Ghana was commissioned during 2006. The reduction in the average wet-bulb face temperatures in the working places since the commissioning of the refrigeration plants at end of April 2006 brought temperatures down from 32.6°C to 30.2°C wet bulb. Further improvements are expected early 2007 when the remaining 50% of plant installations are commissioned.

### Fatigue management

The management of fatigue is believed to be a major component of safety and health performance at those operations where rotational shifts are worked (such as at Sunrise Dam, Geita and Navachab). More recently, it is believed that fatigue is playing an increasingly important role in the South African operations (especially in light of an ageing workforce and rising HIV levels). Proprietary research is being conducted by the company to underpin a sound fatigue management protocol and to support the fatigue management strategy under development for South African operations. (See case study on *Successful implementation of fatigue management programme at Navachab* [www.aga-reports.com/06/fatigue-manage.htm](http://www.aga-reports.com/06/fatigue-manage.htm)).

### Performance reviews

Performance reviews in respect of health and safety and health performance are undertaken on a regular basis, internally and externally. Every fatal accident is reviewed not only through the required mine-based and statutory review bodies, but also by the corporate safety and health department and is subject to an executive review.

Given the disappointing safety performance in the South African operations during the year, high-level external parties (including participants from DuPont and major shareholder Anglo American plc) were asked to review the safety and health strategy. (See case study on *Safety review at South African operations on page 116.*)

**Business principle 3:** The management of occupational safety and health is a prime responsibility of line management, from the executive level to the first-line supervisory level.

Safety and health is overseen by the Board Committee on Safety, Health and Sustainable Development, which meets on a quarterly basis in alignment with the company's financial reporting periods. The committee's role is to evaluate the social, economic, environmental and health effects of the company's operations on both local and global communities, and to achieve a sustainable balance between economic and social development with due regard to the safety and health of employees and the impact of AngloGold Ashanti's operations on the environment. One of the stated primary objectives of this committee is to ensure the elimination of all work-related accidents and diseases. The committee conducts on-site inspections on matters of serious concern.

The management of safety and health is the responsibility of line management at an operational level, who in turn are supported by specialist safety and health personnel. In South Africa, health services are provided by AngloGold Ashanti Health, a separate but wholly-owned subsidiary of AngloGold Ashanti.

**Business principle 4:** We will set safety and health objectives based on comprehensive strategic plans and will measure performance against these plans.

The group's Safety and Health Policy, underpinned by our values and business principles on safety and health, are minimum guidelines for the group in respect of safety and health. Regions and

## OCCUPATIONAL SAFETY AND HEALTH

operations are encouraged to develop their own specific principles, guidelines and policies in line with local conditions and legislation, examples of which are available on our website.

**Business principle 5:** We are committed to complying with all relevant occupational health and safety laws, regulations and standards. In the absence of such standards, leading practice will be adopted. The company will not tolerate or condone deliberate breaches in standards and procedures.

During 2006 no significant breaches of the safety and health legislation and regulations came to the attention of the board.

In October 2006, AngloGold Ashanti received a claim for compensation of damages allegedly suffered by Mr Thembekile Mankayi, who was employed by the company at Vaal Reefs mine from 1979 to 1995, in respect of Mr Mankayi's having allegedly contracted silicosis. AngloGold Ashanti has indicated that it intends defending this action, although the company recognises the plight of former employees and proposes that a longer term and co-operative solution will be of significant benefit to former mineworkers and their communities. (See case study on page 118 on *The legacy of silicosis*).

**Business principle 6:** The company is committed to providing all necessary resources to enable compliance with these principles. We will provide all necessary personal protective equipment.

The provision of personal protective equipment to employees is provided for in terms of operation-specific policies, employment contracts and collective bargaining agreements, and varies from site to site and indeed from occupation to occupation.

Medical surveillance and medical care is provided for all employees, either at company-owned and -managed (or contracted) facilities or at the premises of external health care providers. These options are dependent on the location of the specific operation and the facilities that are available in that area.

Details on operation-specific medical facilities may be found on our website or in the respective country reports.

**Business principle 7:** We will implement safety and health management systems based on internationally recognised standards and we will assess the effectiveness of these systems through periodic audits.

While safety and health performance is overseen at a corporate level, with strategies for specific issues being driven at this level (such as protocols for, and the auditing of, the management of cyanide), individual regions and operations are encouraged to develop their own safety management systems, consistent with the company policy and OHSAS 18001 specification.

Following the liquidation of the National Occupational and Safety Association (NOSA), which was used by a number of operations in terms of specifications for safety management systems and external auditing and certification, the group is moving towards the implementation of an alternative specification, Occupational Health and Safety Assessment Series (OHSAS) 18001. (See case study on *From NOSA to OHSAS – a change for the group on our website [www.aga-reports.com/06/OHSAS.htm](http://www.aga-reports.com/06/OHSAS.htm)*).

**Business principle 8:** We will conduct the necessary risk assessments to anticipate, minimise and control occupational hazards. We will promote initiatives to continuously reduce the safety and health risks associated with our business activities.

	Number of shifts lost due to injuries	
	2006	2005
<b>Argentina</b>		
Cerro Vanguardia	131	283
<b>Australia</b>		
Sunrise Dam	5	12
<b>Brazil</b>		
AngloGold Ashanti Mineração Serra Grande	405 393	437 181
<b>Ghana</b>		
Iduapriem Obuasi	133 2,200	87 841
<b>Guinea</b>		
Siguiri	72	65
<b>Mali</b>		
Morila Sadiola Yatela	28 167 53	22 177 156
<b>Namibia</b>		
Navachab	45	116
<b>South Africa</b>		
Great Nologwa Kopanang Moab Khotsong Mponeng Savuka Tau Lekoa TauTona	10,990 8,883 5,878 5,995 1,754 7,381 6,679	10,867 5,428 4,074 7,325 2,346 8,601 4,523
<b>Tanzania</b>		
Geita	114	148
<b>USA</b>		
CC&V	0	0
<b>Other</b>	758	585
<b>Group</b>	<b>52,064</b>	<b>46,274</b>

# OCCUPATIONAL SAFETY AND HEALTH



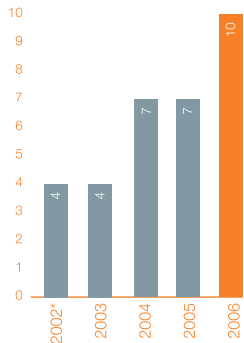
Risk assessments are conducted at both group and operational level, from the risks relating to the group as a whole to risks associated with specific working places, with the aim of understanding the potential safety and health risks that exist so that they may be eliminated or reduced to tolerable levels. A detailed discussion on risk analysis within the group can be found in the Annual Report 2006 in the Corporate Governance section, on pages 107 to 123.

Risk assessment may be conducted by or with the assistance of external consultants, by the group's corporate office, by underwriters (for insurance purposes) or by the operations themselves. In recent years, risk assessment has been extended to the rock face, with basic hazard identification skills being taught to front-line supervisors and employees. Specific risk management programmes and projects undertaken during the year are reported in the various country reports.

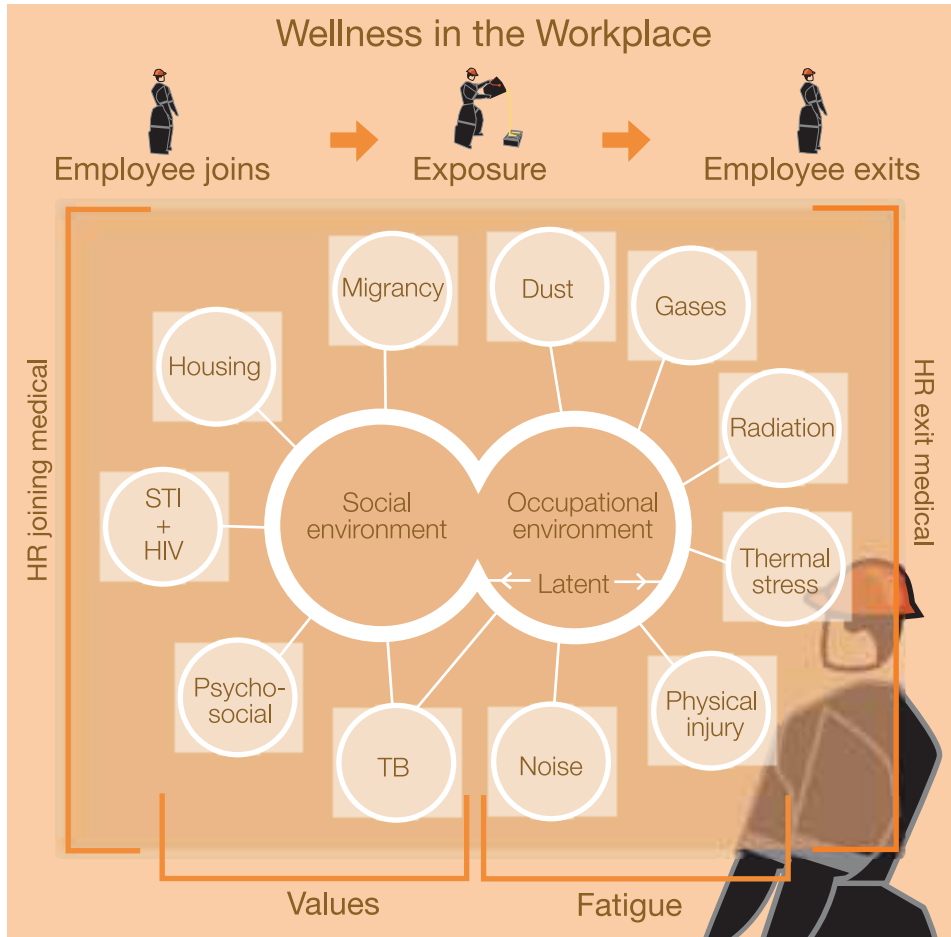
**Business principle 9:** We will establish and maintain a system of medical surveillance for our employees.

Medical surveillance forms an integral part of the management of occupational safety and health. Medical surveillance programmes are in place at all operations, and the results of this surveillance feed back into risk management processes and underpin the company's safety and health reporting protocols. Surveillance systems include the monitoring of TB, OLD, NIHL and other aspects of employee health that may have an impact both on the work performance of the

OLD (new cases) South Africa  
Rate per 1,000 employees



\* Not assured



## OCCUPATIONAL SAFETY AND HEALTH

employee and on his or her overall well-being. (See case study on progress made in using FWC in South Africa on our website [www.aga-reports.com/06/FWC.htm](http://www.aga-reports.com/06/FWC.htm)).

**Business principle 10:** We strive for employee involvement and consultation with employees or their representatives to gain commitment in the implementation of these principles.

Safety and health agreements which have been negotiated with representative unions are in place at those operations where this is required by law and where union membership or collective bargaining agreements are in place.

- In South Africa, which is governed by the Mine Health and Safety Act, each operation has its own agreement with the union representative of the majority of employees, the National Union of Mineworkers (NUM). These agreements, however, are extended to all the unions represented in the company. Joint health and safety committees are in place at every operation and all working places are covered by such agreements. As required by the Act, 23 full-time safety stewards and 1,900 safety and health representatives have been trained, designated and appointed.
- At Morila in Mali the union (representing the entire workforce) participates in the election of safety representatives, in conjunction with the labour inspector from regional government. Twenty employees are elected for a period of three years. The union is an active participant in monthly safety stewards and safety and health management meetings, as well as in investigations held into accidents and incidents.
- Agreements are in place between management and the unions in respect of safety and health at Sadiola and Yatela in Mali, with 15 union representatives employed in the different departments.
- At Navachab, safety and health agreements are in place with the Mineworkers' Union of Namibia (MUN), which represents 80% of the workforce.
- In Ghana employee safety and health is addressed in the collective bargaining agreements with the unions that cover all categories of employees.
- Agreements are in place with unions in Argentina and Brazil relating to employee participation in safety matters.
- Where no formal agreements are in place or where the operations are not unionised (such as at CC&V and Sunrise Dam), participation by employees is encouraged and forms part of their employment contracts.

**Business principle 11:** We will communicate openly on safety and health issues with employees and other stakeholders.

We believe that the involvement of employees and, where applicable, employee representatives, in the area of safety and health is crucial to success, not only in terms of creating awareness and commitment to standards and best practices, but also to keep employees fully informed of their rights and responsibilities in respect of safety and health. All operations have safety and health communications programmes in place and a number of the different campaigns undertaken during the year are documented in the country reports. Communication tools include meetings, notices and signage, the intranet, mine-based newsletters, safety newsletters, launches and other events, industrial theatre, posters, videos and induction procedures.



**Business principle 12:** We will ensure that employees at all levels receive appropriate training and are competent to carry out their duties and responsibilities.

We recognise that the provision of appropriate training is essential to ensure that employees are competent to carry out both their duties and their responsibilities safely. In many countries in which we operate, specific training requirements are provided for in terms of laws and regulations. A wide range of safety training initiatives was undertaken by the various operations in 2006 and details of these may be viewed on the website and in the country reports.

**Business principle 13:** We will require our contractors to comply with these principles and we will seek to influence joint partners to apply them as well.

Contractors form an integral part of our operations and are employed to undertake specific short- and long-term mining and processing operations and specialist services. It is our philosophy that contractors must act and be treated in the same way as employees and indeed this is required by law in many of the countries in which we operate. The management of contractors in terms of safety and health is recognised as an important part of overall contractor management and specific policies, procedures and requirements form part of the procurement and contractor engagement processes. Contractor safety and health performance is a key consideration when the company is considering the appointment or re-appointment of contractors.

### 5. Case studies

Two case studies relating specifically to occupational safety and health in South Africa are presented in this document (*Safety review at the South African operations on page 116 and The legacy of silicosis on page 118*). These case studies deal with two of the most challenging and material issues relating to safety and occupational health within the company.

A number of other case studies are presented on our website and illustrate how the challenges relating to safety and health are addressed around the world. A summary of these case studies appears below:

#### **From NOSA to OHSAS – a change for the group**

The OHSAS 18000 series of documents has been selected by AngloGold Ashanti as the standard safety specification across the group. The OHSAS 18000 series provide both a framework for identifying business risks associated with safety, health and environment, and guidelines for implementation and achieving certification. See [www.aga-reports.com/06/OHSAS.htm](http://www.aga-reports.com/06/OHSAS.htm)



#### **Mining plan at TauTona changed in the interests of safety**

TauTona mine experienced 16 fatalities in 2006, a sharp increase from the four fatal accidents of the previous year. The mine's multi-faceted response included a change in mining method, from longwall to sequential grid mining. Other measures include state-of-the-art seismic monitoring, a reduction of mining near the shaft pillar, and extensive behaviour-related communications interventions. (See [www.aga-reports.com/06/TauTona-safety.htm](http://www.aga-reports.com/06/TauTona-safety.htm)).



### Human dimension to managing fatalities

AngloGold Ashanti's commitment to the wellbeing and safety of employees extends to a comprehensive support programme for the bereaved families of employees who are victims of fatal accidents. Elements of the programme include expediting the payment of compensation or retirement fund benefits and financial provision for the education of the employee's children. (See [www.aga-reports.com/06/human-dimension.htm](http://www.aga-reports.com/06/human-dimension.htm)).



### Long-term strategic approach to safety in transport

AngloGold Ashanti has developed a comprehensive strategy to manage safety in horizontal and vertical transport. A number of new initiatives involve improved employee selection, operator training, and equipment monitoring and update. Through various computer-based simulation models, employees will experience a close approximation of the work environment during training, facilitating clear illustration of good and bad safety practices and their consequences. Much has also been done in the assessment, upgrading and maintenance of critical winding plant and shaft infrastructure. (See [www.aga-reports.com/06/transport-safety.htm](http://www.aga-reports.com/06/transport-safety.htm)).



### Managing a changing risk profile

Through a successful turnaround, involving reducing non-production complement and concentrating on mining payable areas, Savuka mine returned to profitability in 2006. This achievement initially had a negative impact on Savuka's safety profile, with virtually all staff exposed to production and thus to operational risk, and the inevitable low morale associated with threatened closure. To counter this problem, the behaviour-based model already successfully implemented at Mponeng was applied. (See [www.aga-reports.com/06/expansion-risk.htm](http://www.aga-reports.com/06/expansion-risk.htm)).



### A new strategy for managing falls of ground in South Africa

Falls of ground accounted for 78% of fatalities in AngloGold Ashanti's South African operations in 2006. In response to this, a sixth element – dealing with process – was added to the existing five-point strategy covering mine design, support standards, mindset, seismic monitoring and research. New initiatives include an emphasis on leading (rather than lagging) indicators, which focus on identifying and mitigating risk before the occurrence of an event, and on detailed workplace condition analysis to monitor adherence to standards. (See [www.aga-reports.com/06/FOGM.htm](http://www.aga-reports.com/06/FOGM.htm)).



### Disaster recovery plans in place at AngloGold Ashanti

The traditional approach to risk management, whereby risks are assigned a score in terms of their impact and the statistical probability of their occurrence, becomes problematic in the risk assessment of highly unlikely but potentially catastrophic events. To counter this, all health and safety related risks have been analysed within AngloGold Ashanti from an impact perspective only. Over 1,400 risks have been identified, most of which are operation- rather than company-specific, and detailed disaster recovery plans are being put in place to eliminate or mitigate these. (See case study at [www.aga-reports.com/06/disaster-recovery.htm](http://www.aga-reports.com/06/disaster-recovery.htm)).



### **Successful implementation of fatigue management programme at Navachab mine**

The causes and management of fatigue in open-pit mining have been the subject of extensive international research. A fatigue management programme has been implemented at Navachab mine (Namibia). The programme comprised a series of participatory workshops, followed by the development of a code of practice, a training programme and an extensive awareness campaign. (See [www.aga-reports.com/06/fatigue-manage.htm](http://www.aga-reports.com/06/fatigue-manage.htm)).



### **Managing risk during expansion at Cuiabá**

The Cuiabá expansion project, intended to increase the production of Cuiabá mine in Brazil from 830,000 to 1.3 million tonnes per annum, has involved extensive mining development and construction work, both on surface and underground. The mine's safety profile was maintained despite the increased risks posed by the need to manage the activities and labour associated with the expansion. (See [www.aga-reports.com/06/risk-CC&V.htm](http://www.aga-reports.com/06/risk-CC&V.htm)).



### **Managing risk in North America**

The comprehensive risk management programme in place in North America was developed with input from employees, supervisors and managers. Aspects of the programme include regular training, medical monitoring, industrial hygiene, occupational health and emergency procedures. CC&V in Colorado has not recorded an injury since November 7, 2003. (See the case study at [www.aga-reports.com/06/managing-risk.htm](http://www.aga-reports.com/06/managing-risk.htm).)



### **Worker compensation in South Africa under review**

AngloGold Ashanti is involved in the review of existing legislation which provides for compensation of illness and injury in the South African mining industry. This case study examines some of the provisions which provide for employee benefits, the anomalies in the existing legislation, and outlines the route going forward to seek greater uniformity between the Compensation for Occupational Injuries and Diseases Act (COIDA) and the Occupational Diseases in Mines and Works Act (ODMWA). (See [www.aga-reports.com/06/worker-compensation.htm](http://www.aga-reports.com/06/worker-compensation.htm)).



### **Making ODMWA work – Nongoma project to be launched**

The Nongoma district of South Africa's KwaZulu-Natal Province has been selected as the site of a rural pilot project to step up services available to former mineworkers who may have contracted OLD. The focus is on strengthening resources and infrastructure on a sustainable basis so that former mineworkers are better able to access treatment, benefit medical examinations, and improvement of the ODMWA certification and compensation claims processes. (See [www.aga-reports.com/06/nongoma.htm](http://www.aga-reports.com/06/nongoma.htm)).



### **AngloGold Ashanti's approach to fitness for work adopted as industry standard**

The Functional Work Capacity (FWC) programme, measuring occupation-specific physical and functional competence, was developed in 2001. FWC, together with a comprehensive vocational rehabilitation programme, constitutes the Rehabilitation and Functional Assessment programme, which has now become standard practice in a number of mining companies. (See [www.aga-reports.com/06/FWC.htm](http://www.aga-reports.com/06/FWC.htm)).



### **Thibela TB research programme under way at TauTona and Great Noligwa**

The aim of the Thibela TB programme is to establish whether administering community-wide TB preventive therapy, in addition to standard TB control, is more effective than the standard TB control alone. This programme, which if successful could ultimately lead to fewer TB cases and improved control of the disease, is currently under way at, among others, AngloGold Ashanti's TauTona and Great Noligwa in South Africa. (See [www.aga-reports.com/06/thibela.htm](http://www.aga-reports.com/06/thibela.htm)).



### **Multi-drug resistant TB treatment at AngloGold Ashanti Health**

AngloGold Ashanti Health has set up an isolation multi-drug resistant tuberculosis (MDRTB) ward at the Westvaal Hospital where patients with confirmed MDRTB can be treated. This is the only facility of its kind outside the state facilities in South Africa. (See [www.aga-reports.com/06/XDR-TB.htm](http://www.aga-reports.com/06/XDR-TB.htm)).



### **Pre-conditioning – a tool to combat face bursts**

Pre-conditioning, a method used to prevent face bursts is now standard practice at Mponeng and Savuka in the West Wits area, and is being introduced at Tau Lekoa in the Vaal River area. See case study at [www.aga-reports.com/06/preconditioning.htm](http://www.aga-reports.com/06/preconditioning.htm)



### **Reviving a safety culture at Obuasi**

Obuasi is one of the oldest operating underground mines in the world, with underground workings at an average depth of 1,500 metres. Major strides have been made in the past two years in improving the mine's safety infrastructure, which had suffered from a lack of available capital in earlier years, including the installation of a 15 MW refrigeration plant and 300m<sup>3</sup>/s surface fan, which were installed and commissioned during 2006. The other major innovation has been the insistence that safety is a line responsibility, rather than a specialised occupational health and safety function. See case study at [www.aga-reports.com/06/safety-obuasi.htm](http://www.aga-reports.com/06/safety-obuasi.htm)



## 6. Objectives 2007

The following safety and health targets have been set for 2007:

### **Safety**

Targets for safety for 2007 are:

- 20% reduction in LTIFR;
- 50% of mining operations to be substantially compliant with OHSAS 18001 specification; and
- no fatal accidents.

### **Health**

Key targets in this area remain to meet the South African Mine Health and Safety Council's targets for NIHL and silicosis, namely,

- OLD: by 2008, 95% of all silica exposure measurements will be below the occupational exposure limit of 0,1mg/m<sup>3</sup>; and by 2013, no new cases of silicosis will occur in previously unexposed employees; and
- NIHL: by 2013, noise emissions of all equipment will be below 110dBA; and by 2008, no deterioration in hearing greater than 10% will occur in noise-exposed employees.

In addition, efforts will continue to manage TB, a decrease on the 2006 figure of 31 per 1,000 is aimed for.



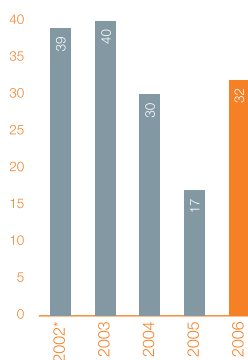
## safety review at South African operations

In November 2006 Bobby Godsell, AngloGold Ashanti CEO, was quoted\* as saying that there is no reason that the risk of harm should be greater in mining than it is in any other form of economic activity, and that while all human action involves a measure of risk, the challenge is to identify, understand and then manage this risk. Godsell said successful management of health and safety risks in mining requires good science to identify and understand the nature of risks in mining; engineering to remove or reduce the risks; and creating values, habits and behaviours which make every worker an effective manager of health and safety risk. But, he said, in 2006 AngloGold Ashanti had seen a disturbing regression in that progress in regard to accidents on its South African mines and that these reversals had deepened the company's determination to regain the trend evident over the past 10 years.

In total, 37 people died as a result of injuries sustained at work at AngloGold Ashanti during 2006, 32 of these deaths at the South African operations. In 2005, 25 employees lost their lives in work-related accidents, 17 of whom were in South Africa. Comparing the fatal injury frequency rate (FIFR) year-on-year shows a significant increase in the frequency of fatal accidents in the South Africa operations, from 0.17 in 2005 to 0.35 in 2006.

Half of the fatal accidents (16) in the region were at the TauTona mine near Carletonville (See case study: *Mining plan at TauTona changed in the interests of safety* at [www.aga-reports.com/06/TauTona-safety.htm](http://www.aga-reports.com/06/TauTona-safety.htm)), 12 of which were attributable to seismic falls of ground, two to gravity-related falls of ground and the remaining two to other causes. (Falls of

Fatalities:  
South Africa



\* Not assured

\*Bobby Godsell was speaking at the International Council on Mining & Metals (ICMM) conference in Johannesburg.

ground may be related to either seismicity or gravity: seismic-related falls of rock occur when energy is released into the environment, causing ground movement and possible rock falls; gravity-based falls of rock occur when loose ground is not sufficiently stabilised.)

TauTona's response to the fatalities has been multi-faceted, aligned to the various legs of the fall of ground management strategy (See case study: *Fall of Ground Management* at [www.aga-reports.com/06/FOGM.htm](http://www.aga-reports.com/06/FOGM.htm)). The mine is in the process of changing its mine plan and mining method from longwall to sequential grid mining in most mining areas, which will initially have a negative impact on production. In addition, this mine has reviewed its shaft-pillar mining plan that had been modelled by South Africa's Council for Scientific and Industrial Research (CSIR) in 2002 and was the subject of a workshop with the CSIR in 2006. The accident on 23 October 2006, which cost five lives, occurred in mining of the shaft pillar.

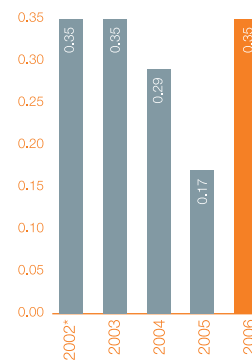
The TauTona mine plan has also been subject to scrutiny at industry level:

- It is a component of a two-year Safety in Mines Research Advisory Committee (SIMRAC) research project, involving the collection of seismic data from areas close to the shaft pillar. TauTona has an intensive and state-of-the-art seismic monitoring network in place.
- Tripartite workshops, involving high-level representation from the inspectorate and the National Union of Mineworkers and other unions were held to review the risks involved in mining each section and to draw up action plans.
- External parties, including representatives of AngloGold Ashanti's major shareholder Anglo American, participated in a review of the region's safety and health strategy. The review found a strong foundation to the region's strategy, with a high level of commitment, monitoring, modelling and programme development in place. The review also indicated that this should be used to leverage change and build upon it for further enhancements. A number of areas were also identified for possible improvement and this is being acted upon by the company. The review team endorsed the view proposed by Mr Godsell\* when he spoke on the importance and relative weighting of critical factors in the area of safety and health management and where he emphasised that positive results could only be achieved with an emphasis on people. He proposed an approach which comprises systems (10%), engineering (20%) and people (70%). The review team's recommendations were made in a similar vein.

One particular area of concern that has been raised, both in the external review, elsewhere and in the industry as a whole, is the matter of fatigue. While programmes have been put in place to manage workplace conditions (such as ventilation and cooling), there are clearly a range of issues relating to fatigue that need to be addressed. A comprehensive group level fatigue management guideline has been developed (See case study: *Managing fatigue at Sunrise Dam in the Report to Society 2005: page SH22 and Fatigue management programme progressing at Navachab mine* [www.aga-reports.com/06/fatigue-manage.htm](http://www.aga-reports.com/06/fatigue-manage.htm)). A fatigue management strategy is being developed for the South African operations and a roll out will commence in 2007.

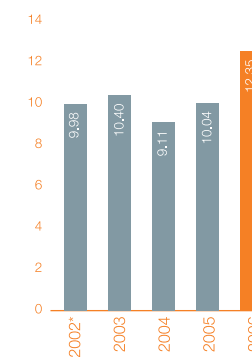
AngloGold Ashanti remains committed to eliminating accidents at work and is determined to achieve significant improvements in the year ahead. In the words of Bobby Godsell, "Every death is unacceptable. While we have achieved significant improvements in recent years and expended a great deal of effort, the recent trend means that we simply have to intensify our efforts."

**FIFR: South Africa**  
(per million man-hours worked)



\* Not assured

**LTIFR: South Africa**  
(per million man-hours worked)



\* Not assured



## Legacy of silicosis

The prevention of occupational lung disease and, in particular, silicosis (*see box: About silicosis on page 120*), is a key focus within AngloGold Ashanti's occupational health strategy. Silicosis has long been associated with underground mining and is an issue that industry, governments, unions and health care professionals have been grappling with for many decades. For AngloGold Ashanti, silicosis is largely of concern at operations in South Africa and Brazil where silica dust is present in the working environment and intensive efforts continue to be made to prevent the disease. Effort is also directed at identifying early silicosis and offering alternative, lower-risk placement to employees at risk. Employees with silicosis are treated and compensated in terms of prevailing statutory provisions. The significant efforts made in understanding, monitoring and managing dust control have yielded a great deal of success in recent years.

In Brazil, no new cases of silicosis have been reported in the past five years. In South Africa, silicosis rates declined in the early 2000s, but have been rising again in the past three years. In 2006, the Occupational Lung Disease rate in the South African mines of the company was 10 per 1,000 employees.

While the current focus on silicosis has highlighted the dangers associated with the disease and long-term exposure to the underground mining environment, it is the legacy of former employees who contracted silicosis during their employment that is also a major focus of attention for the company.

In Brazil, there are currently a number of former employees who were associated with AngloGold Ashanti's operations at some time and who contracted silicosis during their employment. Most of these former mineworkers reside in close proximity to Nova Lima, the centre of the Brazilian



mining operations for close on 170 years. In addition to compensation paid to affected employees and their families, AngloGold Ashanti has set up and sponsors the Pneumology Reference Centre for treatment and research into lung diseases. (See box on *Pneumology Reference Centre – focusing on the health of former employees in Nova Lima in Report to Society 2004*).

The centre is particularly aimed at ensuring a better quality of life for former employees afflicted by silicosis and was set up at the time of the closure of the Morro Velho Mina Grande mine in 1995. The centre currently has 1,801 registered users of the facility and, in addition to the rehabilitation and care of patients, provides assistance to employees and their families in dealing with the illness, and with the financial and social issues related to it.

In South Africa, the issue is not as clear cut and contained as it is in Brazil for a number of reasons. Among these are the fact that there are many thousands of former mineworkers associated with current, closed and sold mining operations – not only those owned and operated by AngloGold Ashanti but also other mining companies – and who very rarely reside in close proximity to these operations. It is estimated that some 1 million people have left the mining industry over the past 20 years, whether because of the downscaling and closure of operations or retirement and ill health. Many of these former employees may not have been diagnosed as suffering from the disease at the time that they left the industry or later, in retirement, and they may not have received due compensation from the Compensation Commissioner. It is widely recognised that the compensation system is unwieldy and inefficient and this is currently under review by government, industry and organised labour. (See case study: *Worker compensation in South Africa under review at [www.aga-reports.com/06/worker-compensation.htm](http://www.aga-reports.com/06/worker-compensation.htm)*).

Compensation for occupational diseases and injuries is currently provided for in South Africa by two different statutes – the Compensation for Occupational Injuries and Diseases Act (COIDA) and the Occupational Diseases in Mines and Works Act (ODMWA). ODMWA covers Occupational Lung Disease (OLD) in miners only. COIDA provides compensation for occupational injury in all industries (including mining) and for occupational disease in all industries (excluding OLD in

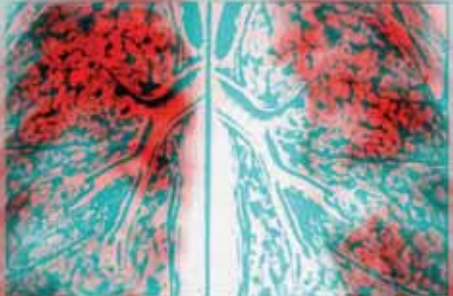
## Legacy of silicosis cont.

mining). There are differences in both the application of and benefits paid in terms of COIDA and ODMWA. The South African cabinet has recognised this anomaly and in 1999 made a decision to pursue uniformity between the two acts. This process, in which AngloGold Ashanti is an active participant, is under way. It seeks to develop legislation that provides for compensation that is fair and consistent with the company's view of the need for the sustainable viability of the South African mining industry.

The mining industry, unions and the departments of labour and health have further committed to improving the delivery of compensation where this is due and have formed a working party to direct a major initiative to detect, treat and assist former mineworkers with silicosis to lodge claims for compensation. (See case study on *Making ODMWA work – Nongoma project to be launched – [www.aga-reports.com/06/nongoma.htm](http://www.aga-reports.com/06/nongoma.htm)*). Specific issues being addressed are the identification of the primary areas where these mineworkers reside, the strengthening of the government's occupational health services so that former mineworkers are better able to access medical facilities for diagnostic examinations, and improvement of the ODMWA certification and compensation claims processes. A key part of the agreed strategy is the establishment of occupational health centres at identified government hospitals in largely rural areas where these former mineworkers reside, to provide for benefit medical examinations and to promote economically sustainable development projects in these areas.

While the Department of Health is, of necessity, the lead agent in the process, as it will identify and establish the occupational health centres and sustain them in the long term, the mining industry through the Chamber of Mines has agreed to fund capital equipment and pre-defined recurrent expenses for a period of two years for each site. This cost is currently estimated at about R50 million. The parties agreed to a 'pilot' project at the outset which would establish the basis for further centres. Of key concern to all parties is that the system that is set up is sustainable in the longer term and, to a large extent, this depends on the provision of appropriate infrastructure and equipment, the establishment of systems, adequate staffing and training of health care workers, and the adequate funding of the project.

## About silicosis



Silicosis is an occupational lung disease (OLD) which is caused by the inhalation of free silica dust. Silica dust is present in mines and quarries where quartz concentrations are high, as is the case in many deep-level gold mines (such as in South Africa and Brazil). If inhaled, silica dust may cause a fibrotic reaction (or scarring) in the lung, which results in a reduction of lung functioning. Often there are no symptoms of the disease, but in severe cases, breathlessness and coughing are the principal complaints. Of additional concern is that the presence of silicosis may predispose an individual to the development of TB, and this is especially so when an employee is immuno-suppressed – for example, if he or she is HIV-positive. Silicosis and TB in silica-exposed employees are considered to be Occupational Lung Diseases in South African legislation.

## Legacy of silicosis cont.

Extensive consultation on where the project should be initiated resulted in the selection of St Benedictine Hospital in the Nongoma district of KwaZulu-Natal being chosen as the 'pilot' site. The project is expected to begin early in 2007.

The issue of silicosis is complicated by the fact that both exposure to silica dust and the development of silicosis leads to an increased risk of contracting tuberculosis (TB), which is further compounded by the presence of HIV. The chances of getting TB each year are about 10% to 15% for an HIV positive person, compared with less than 10% in a lifetime, if HIV-negative. An associated research programme in which four of AngloGold Ashanti's South Africa operations are participating is the Thibela TB programme, two as experimental sites and two as control sites. (See the case study *Thibela TB research programme under way at TauTona and Great Noligwa* on our website at [www.aga-reports.com/06/thibela.htm](http://www.aga-reports.com/06/thibela.htm)).

The Thibela TB programme is part of a global research programme to find a solution, in the face of an escalating rate of infection, to reducing the incidence of TB, particularly as TB control in the South African gold mining industry appears to be faltering, despite the implementation of control programmes which exceed World Health Organization standards. This is largely attributable to silicosis and the escalating HIV/AIDS epidemic, which compounds the incidence of TB.

AngloGold Ashanti is acutely aware of its responsibility towards current and former employees in respect of preventing silicosis and assisting employees in accessing compensation for which specific statutory provision has been made. AngloGold Ashanti will defend any civil legal action for non-statutory compensation brought against the company (see box below). Although measures which were adopted in the past for the prevention and detection of silicosis complied with industry standards at that time and were based on the available knowledge of the disease, the company recognises that much needs to be done to identify and assist former mineworkers in accessing compensation. In addition, the company recognises that those communities within which these afflicted former mineworkers reside have also been affected, and that sustainable economic development projects should be put in place to recompense these communities in some way.

### Legal action

In October 2006, AngloGold Ashanti received a claim for compensation of damages allegedly suffered by Mr Thembekile Mankayi, who was employed by the company at Vaal Reefs mine from 1979 to 1995, in respect of Mr Mankayi's having allegedly contracted silicosis. AngloGold Ashanti is defending this action on the basis that avenues for compensation exist in terms of South African legislation, and that Mr Mankayi is precluded in terms of this legislation from recovering damages from the company. AngloGold Ashanti recognises the plight of former employees, however, and proposes that a longer term and co-operative solution (such as that proposed in the case study on the Nongoma project) will be of significant benefit to former mineworkers and their communities.





## Successful implementation of fatigue management programme at Navachab mine

Three current major focus areas in the safety arena at AngloGold Ashanti's open-pit operations are OHSAS 18001 implementation (*see case study [www.aga-reports.com/06/OHSAS.htm](http://www.aga-reports.com/06/OHSAS.htm)*), managing geotechnical risk and managing fatigue.

Sleep disturbance and sleep deprivation, and the resultant fatigue, are health risks associated with long working hours or shift work and clearly can have negative consequences for occupational safety and productivity. During 2006, a fatigue management programme was implemented at Navachab Mine in Namibia. The mine is situated 10 kilometres south-west of the town of Karibib, 170 kilometres north-west of Windhoek, the capital of Namibia. The introduction of the programme was prompted by an increasing industry-wide focus on the topic and as part of a proactive risk management intervention.

"The major risk we identified was a lack of knowledge of how fatigue can be identified and managed," says Navachab MD Gerry Arnat. "The remote location of the mine, shift schedules and hours of work are all relevant, but the main objective of a fatigue management programme is to create a climate in which employees feel able to advise their supervisors that they are fatigued, without fear of being disciplined. It's also important to equip employees with understanding the causes of fatigue and of how it can be managed."

In May 2006, Australian fatigue management consultant Peter Simpson was commissioned to carry out an assessment at Navachab mine. This took the form of a series of participatory workshops involving mining operators and organised labour. This was followed by the development of a code of practice, a fatigue management training programme and an intensive awareness campaign. Communication channels used in the campaign included face-to-face briefing sessions, posters and booklets.

The code of practice, developed with the involvement of unions, management and operators, specifies responsibilities and includes a comprehensive risk matrix and a procedure to be followed in fatigue identification and management.

Key concepts in the training campaign are the importance of self- and peer-management, and the creation of an environment where fatigue is closely monitored by supervisors. "We also stress the potential of after-hours social activities resulting in fatigue on the following day, and the importance of self-managing this aspect," says Arnat.

A fatigue management tool has also been developed and has become an integral part of the mine's incident investigation procedure. This entails using a fatigue checklist to indicate, among other things, the time of the day which the incident took place, evaluating the person's pre-shift sleep patterns, the recent shift schedule history and the shift break procedure. The checklist gives a good indication as to whether the incident could have been fatigue-related or not.

Navachab mine changed from contract to owner mining in 2004. The change was beneficial to fatigue management, as it involved changing from a two-shift roster of 12 hours each to a three-shift arrangement. Reducing length of shifts reduced the risk of fatigue, but the change also necessitated recruiting a number of new employees, 80% of whom had no experience and required extensive training. This naturally raised the general safety risk.

Rest periods have been introduced for operators, and additional monitoring is applied during the high-risk period between 02:00 and 06:00 in the morning, when research has shown the body's resistance and concentration levels to be at their lowest.

No major changes to the current programme are planned for 2007. "We will review the code of practice to assess its effectiveness," says Arnat "and will continue benchmarking within the international mining industry to establish whether any new developments should be incorporated into our programme."



### A new strategy for managing falls of ground in South Africa

Falls of ground accounted for 78% of all fatal accidents at AngloGold Ashanti's South African operations during 2006 (88% in 2005). In South Africa 44% of fatalities were caused by seismic falls of ground (40% in 2005). Falls of ground may be related to either seismicity or gravity: seismic-related falls of rock occur when energy is released in the rock mass, causing ground movement and possible rock falls; gravity-based falls of rock occur when loose ground is not sufficiently stabilised or supported.

While the issue of falls of ground has been a major focus of attention for some years and a major fall of ground management campaign was initiated in 2003, the beginning of 2006 saw a significant increase in fall of ground fatalities. "This regression, after a period of sustained improvement, made us aware that the issue required urgent attention," says rock engineering manager Johan Laas. "We had a fall of ground management strategy in place: what was needed was a new initiative to give it a more consistent focus and close the gaps between its various components."

The existing fall of ground management strategy, initiated in 2002 and implemented since 2003, had five focus areas:

- preventing excess rock damage ahead of the work face (mine design);
- protecting people from rock falls in the workplace (mine support standards);
- promoting safe behaviour and work practices (mindset);
- providing warning of undesired trends (seismic and other monitoring); and
- problem-solving through research and development into new technologies.

In response to the identified need for a revised strategy, a high level review of fall of ground management at the South African operations was held on 28 March 2006, attended by senior production, safety and rock engineering staff from across the company.

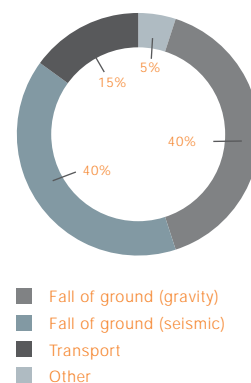
"The element we have added as a consequence of the review essentially deals with process," says Laas. "We have tried to integrate all risk management systems at mine and corporate level and have established a two-tier fall of ground management committee system, convened at corporate level by regional head of mining Mike O'Hare, and at mine level by the respective production managers.

Research, development and technology – the essential precursors to mine layout and design – remain integral to our strategy. Integrated Seismic Systems International Ltd (ISSI), a wholly-owned subsidiary of AngloGold Ashanti, was established in 1985 by Anglo American Corporation's Gold and Uranium Division to develop seismic interpretation and monitoring systems. (See case study in Report to Society 2005: Integrated Seismic Systems International.) Shaun Murphy, an experienced rock engineering manager at the corporate office, has been assigned to working closely with ISSI to combine mine-level practical experience with seismological methods. Together they are developing and integrating numerical simulated mine design with the seismic data that records the response of the rock mass to mining.

AngloGold Ashanti also continues to interact with a number of industry bodies, such as the Council for Scientific and Industrial Research (CSIR) and the Safety in Mines Research Advisory Council (SIMRAC). The unique nature of South African deep level mining has made the country's operations a focal point for



Causes of fatal accidents in South Africa



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international research into earthquakes and seismicity. The Natural Earthquake Laboratory in South African Mines (NELSAM), a collaborative research project between several universities in the United States, has staff members carrying out research at the TauTona and Mponeng mines in the West Wits region.

Further specific outcomes of the review include a revised strategy and an ongoing programme to enhance awareness at workplace level.

"A key aspect of the strategy is a move from lagging to leading indicators. We're still developing a system for consistent tracking of leading indicators, but the critical point is to identify and mitigate risks before an event happens, rather than analysing causes after the fact," says Laas. "For example, if one of the mining faces either lags or advances beyond the general line of the longwall, this imposes abnormal stresses on the rock with consequent rock engineering problems."

In the rock engineering field leading indicators can essentially be classified into two groups: pre-fall and pre-injury. The first comprises such aspects as mine layout and the seismic monitoring network managed by ISSI, and includes detailed analyses of the geology of each section of the mine.

The second focuses on, for example, detailed workplace-level analyses, again, for example, the analysis of fall of ground data. "When a fall of ground occurs that does not result in an injury, there is a tendency not to analyse it in detail," says Laas. "It's important that we capture and analyse that data as thoroughly as if an injury had in fact taken place."

Another planned initiative arising from the review is the development of a detailed workplace condition register, for every panel or development end in each of the six South African mines. This will involve monitoring adherence to mining standards through the continued deployment of the 'Rock Stars'. The Rock Stars, who, as members of the rock engineering department are independent of the mining hierarchy, carry out comprehensive workplace audits, the results of which are fed into the rock engineering database. Statistics relating to minor injuries arising from both seismic- and gravity related falls of ground are also analysed.

Events that have been predicted as likely by the various simulation systems can then be compared with subsequent actual experience in the workplace.

Another major focus area is the provision of what Laas calls an 'enabling environment'. "We cannot expect people to work safely in excessive heat, or if they have to walk excessive distances before reaching the workplace." Measures to mitigate the impact of the latter are essentially handled on a section-by-section basis, but increased awareness has been factored into all work schedules. At mine level, existing training, coaching and discipline procedures remain in place. To improve hazard identification, a checklist has been prepared for use at shiftboss and mine overseer level, enabling users to determine where special conditions exist that require additional attention or when expert rock engineering assistance is required in specific circumstances.

Finally, ongoing initiatives to enhance awareness and safe behaviour have been put in place. Fall of ground awareness audits are planned every six months. The first cycle has been completed, and results have been discussed with individual mine management teams. Competitions, based on continuous improvement, have been implemented at intra- and inter-mine level.

While it is too early to quantify the impact of the new strategy, the mining industry, through the Mine Health and Safety Council, has been set a target of a 20% annual reduction in the fall of ground-related fatality rate, and AngloGold Ashanti is fully committed to achieving this.

### Preconditioning – a tool to combat face bursts

Preconditioning, a method used to prevent face bursts (explosive releases of energy in the rock mass) has been used successfully at the West Wits operations, Mponeng (since 2000) and Savuka (since 2002). It is now standard practice at these two operations, and forms an important component of the falls of ground campaign.

Preconditioning involves drilling long holes of about 2.4 metres in length, and about 3 metres apart, in the stope face and detonating these ahead of the normal production holes. The explosive energy from the preconditioning holes mobilises existing stress fractures and creates additional fractures ahead of the stop face. This creates a zone of lower-stressed ground immediately ahead of the stope face and, while it does not necessarily reduce the likelihood of a seismic event, it mitigates its effects by acting as a cushion between the seismic event and the working place, preventing the face from bursting and the consequent risk of injury.

Preconditioning also provides a number of operational advantages, including improved face advance and drilling times, as well as the condition of the hangingwall – in effect, the roof of the working place. Drilling times improve because the immediate face is not as highly stressed as a face that is not preconditioned, allowing easier drill stem penetration. Hangingwall conditions improve because the stress fractures become more steeply dipping in relation to the face, and are therefore clamped more effectively by existing horizontal forces present in the hangingwall.

Preconditioning is used in operations which mine the Ventersdorp Contact Reef (VCR) as this is more prone to bursting than the Carbon Leader Reef, the other principal reef mined in the West Wits area, because of the inherent characteristics of the footwall and hangingwall. (VCR is unique because its immediate hangingwall is, unlike other reefs, not a quartzite but Ventersdorp lava.) In fact, no face burst has ever been experienced in the Carbon Reef.

Tau Lekoa is the only Vaal River operation to mine VCR, and, after recently experiencing face bursting in a specific area, management there has started using preconditioning on a limited basis. Results will be monitored and will determine the future of this programme.





### From NOSA to OHSAS – a change for the group

Most of AngloGold Ashanti's operations had, until 2006, used safety management systems based on those developed by the National Occupational Safety Association (NOSA) of South Africa. When NOSA was placed in liquidation in May 2005, this resulted in the requirement to implement another system, but at the same time provided the opportunity to standardise systems across the group. The objective has been set for half the AngloGold Ashanti operations to achieve certification in terms of OHSAS 18000, the international occupational health and safety management system specification, by the end of 2007, with the balance being completed by the end of 2008.

OHSAS 18000 comprises two parts, 18001 and 18002, and embraces input from a number of international standards bodies, international certification registrars and other interested parties around the world. OHSAS 18001 indicates the specifications to be complied with, while the complementary 18002 documents explain the requirements of the system and how to work towards implementation and certification.

Broadly, the system provides a framework for organisations to identify elements of their business that present risks from an occupational health, safety or environmental perspective, and to identify and document a programme to manage, mitigate or eliminate those risks (*See box below on OHSAS guidelines.*)

Cerro Vanguardia was the first AngloGold Ashanti operation to be recommended for certification, in December 2006.

"The operation carried out an exhaustive review of systems in place, covering all 17 areas across five broad sections, namely occupational safety and health policy, planning, implementation and operation, checking and corrective action and management review," says John McEndoo, Manager: Safety for the AngloGold Ashanti Group.

"The OHSAS 18001 specification has a number of advantages compared with the NOSA classification," says McEndoo. "The specification, together with the guidelines, is used and accepted internationally, facilitating internal and external benchmarking; it is accessible and supported in more than 70 countries worldwide, including many areas in which the company operates; and the system provides for – indeed is driven by – continuous improvement. Using NOSA, a mine could maintain a 5-star rating year after year without making any changes. Using OHSAS 18001, a steady improvement is necessary to retain OHSAS classification, with achievements that were once exceptional becoming the norm."



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Another advantage is that, while not officially aligned with International Standards Organization (ISO) standards, the OHSAS and ISO guidelines are very closely aligned, for example with the ISO14000 series used as the basis for environmental management systems. Mines which have already gained ISO14000 certification, or are close to achieving this, should have little problem achieving OHSAS 18001 certification.

Cerro Vanguardia has been working with integrated management systems since the start up in 1999. At the end of 2005 the operation started the transition to the OSHAS standard.

“Every change must be seen as an opportunity for improvement, and it is against this background that the Cerro Vanguardia team has embraced this challenge,” says Rodrigo Vilela, general manager of operations. “Safety awareness and management is something we live with every day, and if we let any aspect of this process slip, we increase the risk of an accident. Integrated systems like OSHAS help the organization and the internal order of doing things.”

### More on OHSAS guidelines



OHSAS guidelines do not state specific performance criteria, nor do they give detailed specifications for the design of a health and safety management system, but rather suggest standards covering the following aspects:

- general requirements
- policy
- planning for hazard identification, risk assessment and risk control
- legal and other requirements
- objectives
- management programme
- structures and responsibilities
- training, awareness and competence
- consultation and communication
- documentation
- document and data control
- operational control
- emergency preparedness and response
- checking and corrective action
- performance measurement and monitoring
- accidents, incidents, nonconformance and corrective and preventive actions
- records and record management
- audit
- management review.



## Managing a changing risk profile at Savuka

Savuka gold mine (the name means ‘wake up’ in isiZulu) was previously scheduled for closure in the first quarter of 2006. After operating for some time as part of neighbouring TauTona, with which it shares a metallurgical plant, it was brought under the control of Mponeng gold mine in June 2005.

“After a thorough re-assessment of costs, and supported by the rising gold price, we concluded Savuka could still be profitable,” says general manager Johan Viljoen. In 2006, the mine made a profit of R120.2 million, compared with a R46.4 million loss the previous year. Costs have been contained at below R70,000/kg. “One of the key lessons we have learnt,” says Viljoen “is that we can successfully move out of our usual approach of operating only high-quality, long-life, low-risk assets. People’s ability to deal with change should not be underestimated.”

The mine’s complement was reduced from some 3,500 to 1,000, principally by natural attrition and intra-group transfers, with fewer than 500 employees retrenched. “Only employees directly involved in production, from section manager and section engineer level downwards, remained at Savuka,” says Viljoen, “with management and services coming from Mponeng.”

Insofar as mining infrastructure is concerned, strategy has focused on isolating non-productive mine areas and concentrating on the payable sections. “At current cost scenarios, the mine’s closure is now planned for the end of 2009,” says Viljoen.

These changes had a significant impact upon the mine’s risk profile. “This is something we missed at the beginning,” explains Viljoen. “Removing service personnel meant that virtually everyone working at Savuka was directly exposed to production and its related occupational risks.”

Savuka is a challenging mine from a safety perspective: established in 1958, it is currently the deepest operating mine in the world (mining is carried out at depths up to 3.7km) with long travelling distances between the shaft and the workplace.

Apart from the impact of the changed operational approach, the Mponeng management team had to deal with the challenges posed by low employee morale. “Inevitably, imminent closure has a negative effect on a mine’s risk profile,” says Viljoen. “People’s jobs are not secure, and there is a temptation to cut corners from a safety perspective in order to achieve production targets.”

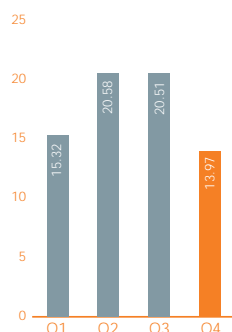
To counter this, Viljoen and his team applied the safety management model successfully implemented at Mponeng, currently the only one of AngloGold Ashanti’s South African mines to have achieved a lost time injury frequency rate (LTIFR) marginally above 10.

The core themes of the model are articulated in a set of Mponeng values, derived from, and integrated into, the AngloGold Ashanti business principles. “The model focuses on a caring culture, placing value on people and their right to a safe workplace, and taking pride in work,” says Viljoen. With the full involvement of unions and associations, the Mponeng model has been transferred to Savuka through an ongoing process of education and communication. “We have found this was the key issue, as safety standards and procedures were already in place and being adhered to.”

The effectiveness of the turnaround strategy is evident in the mine’s improved safety results. Lost time injury frequency rates improved significantly in the last quarter of the year. For the first time in the mine’s history, it achieved 19 days completely free of injury in December 2006. Savuka is the only mine among the South African operations to have achieved two fatality-free years in succession.

*Note: Unfortunately, on 14 February 2007, Savuka experienced three seismic events – of magnitudes 3.1, followed by a 1.1 and a 2.2 – resulting in an extensive fall of ground, and fatally injuring a scraper winch operator, Mr. Norini Sombo. Two of his co-workers sustained minor injuries in the accident.*

Savuka mine LTIFR 2006  
(rates per million man-hours)



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### Mining plan at TauTona changed in the interests of safety

TauTona mine (the name means 'great lion' in seSotho) is situated in AngloGold Ashanti's West Wits region and employs some 5,500 people (including contractors). The R1.2 billion Below 120 Carbon Leader project, approved by the AngloGold Ashanti board in 2003, will take the mine to 128 level and will result in mining being carried out at 3.9 kilometres below surface, giving TauTona the edge over Savuka as the deepest operating mine in the world.

Tragically, the mine experienced 16 fatalities in the period January to December 2006, compared with four in 2005. Of these, 12 were attributable to seismic falls of ground, two to gravity-related falls of ground and the remaining two to other causes.

"Of the 12 fatalities related to seismic falls of ground, 10 resulted from three discrete seismic events, on 10 January, 3 February and 23 October 2006," says General Manager Frank Russo-Bello. The three seismic events measured 3.0, 2.6 and 2.5 respectively on the Richter scale.

"A number of employees were injured in all of these events, and many more injuries could have resulted if effective rescue procedures had not been in place," says Russo-Bello.

The mine's response to the fatalities has been multi-faceted, aligned to the various legs of the fall of ground management strategy (*See case study Fall of Ground Management at [www.aga-reports.com/06/FOGM.htm](http://www.aga-reports.com/06/FOGM.htm)*).

"We are in the process of changing the mining method from longwall to sequential grid mining in some of our mining areas," says Russo-Bello. Sequential grid mining involves pre-development of the orebody, allowing for advance knowledge of dykes, faults or other geological features. The area currently being mined at TauTona involves intersecting a number of such features. The percentage of off-reef mining, (the measure of the amount of mining being carried out in areas containing geological features), has dropped from 18% in January this year to just over 4% in December (see graph overleaf).

The change in mine plan around the TauTona shaft pillar will initially have a negative impact on production. "But," says Russo-Bello, "that is a price we are prepared to pay in the interests of safety." AngloGold Ashanti anticipates that it will take two years to return to planned production levels at TauTona.

The mine plan around the TauTona shaft pillar has also been subject to scrutiny at industry level. A workshop with the Council for Scientific and Industrial Research (CSIR) was held on 1 November 2006.

The October 23 accident, in which five employees died, led specifically to a replanning of Tau Tona's shaft pillar mining plan. The shaft pillar is the area around the main shafts. A plan to mine them was approved by the regulatory authorities and the board in 2001.

Following the accident, mining in the area was stopped and in agreement with the mining regulators and unions a panel of experts from AngloGold Ashanti, industry and research organisations reviewed the mine designs and studied the mechanism of the event. The group concluded that both macro and micro mine designs and support methods were satisfactory. They recommended that it was necessary to improve the geotechnical mapping of workplaces in order to identify zones of geological weakness and review the construction and support of dip gullies.



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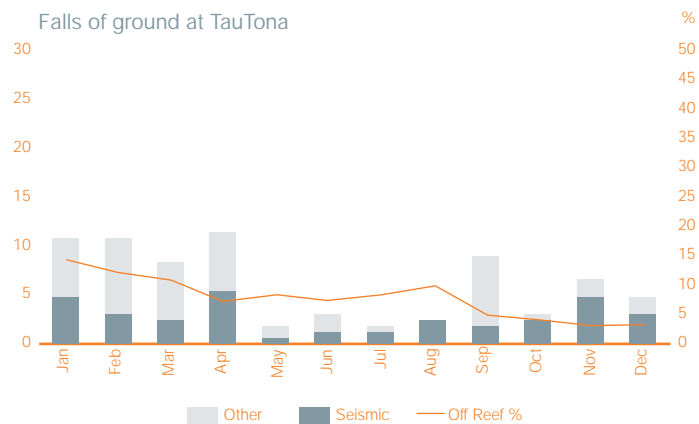
"Mining near the shaft pillar is being reduced," says Russo-Bello. "The seismic events we experienced this year were not directly attributable to mining near the shaft pillar, but reducing mining activity in itself reduces the likelihood of seismic events."

TauTona is also the subject of a two-year Safety in Mines Research Advisory Committee (SIMRAC) research project, involving the collection of seismic data from areas close to the shaft pillar. TauTona has a state-of-the-art seismic monitoring network, which is able to pick up even smaller-magnitude seismic events.

Support systems in use at TauTona are considered industry best practice, and have remained essentially unchanged, making extensive use of backfill (the use of waste material, or rock integrated with timber props, to support the hangingwall after the removal of ore from a stope).

An intensive communications and behaviour-focused campaign has also been implemented. Production was halted for two full days (20 April and 2 November), and tripartite workshops, involving high-level representation from the inspectorate and the National Union of Mineworkers, were held to review the risks involved in mining each section and to draw up action plans.

TauTona's target for next year is to achieve a 25% improvement in fall of ground accidents.



### Long-term strategic approach to safety in transport

Horizontal and vertical transport of people and materials is a key risk area in mining, and an integrated, long-term strategy is in place to manage this in AngloGold Ashanti's South African operations.

"In terms of our risk and consequence analysis matrix, vertical transport incidents have a relatively low probability, but potentially very serious consequences because of the likelihood of major loss of life," says Head of Engineering Africa Underground Region Iain Menzies. "Horizontal transport accidents, while involving fewer people, are statistically more probable. An integrated strategy is therefore required to deal with both."

Approaches to managing horizontal transport incidents in the past, continues Menzies, tended to be reactive rather than proactive. "A number of incidents would occur, to which we would respond with relatively short-term interventions that addressed the issue at hand. These would achieve an improvement, but not always address underlying causes. Our aim now is to achieve a balance between a long-term strategy and short-term interventions, in order to achieve sustained improvements going forward."

Because of their potentially catastrophic consequences, all shaft-related incidents are followed by a thorough investigation of risks and potential consequences. "We now treat horizontal transport incidents in exactly the same way. In the past, if a locomotive derailed in the haulage and no injury resulted, the loco team would re-rail and carry on working, without a management investigation. That no longer happens," says Menzies.

This change in approach was part of a broader horizontal transport strategy under development since 2003. The process began with a high-level strategic review in 2003: detailed strategic plans for horizontal and vertical transport were developed in 2004, and integrated into a single transport safety strategic plan in 2005.

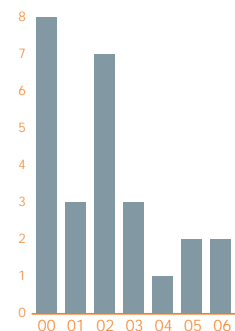
Key initiatives, implementation of which has continued into 2006, may be grouped under the headings of employee selection, operator training and equipment monitoring and upgrade. Other interventions include regular audits, the introduction of user group meetings, the development of codes of practice, the introduction of transport safety competitions and the appointment of dedicated transport safety personnel at mine level.

One of a number of training-related initiatives is the development of a new locomotive simulator, to be used as part of the induction process and for periodic re-training. The software, being developed in association with the Safety in Mines Research Advisory Committee (SIMRAC), will allow new drivers to experience an exact simulation of the working environment during the training process. Timing for the introduction of the simulator – to be mounted on mobile equipment and deployed from mine to mine as required – is expected to be finalised in January 2007. Other computer-based simulation packages include a virtual mine haulage, comprising a chute, rail line and work platforms. Blocked chutes can result in the accumulation of hundreds of tons of rock, slime and water, which can rush out as the blockage is removed, often with fatal results. The virtual mine haulage demonstrates good and bad practice, and the consequences of each.

Revised selection criteria, comprising a battery of internationally-recognised psychometric tests, have been introduced for the operators of mobile equipment such as locomotives, in addition to the existing



Horizontal transport-related fatalities 2000-2006



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tests to determine hearing, sight and fine motor controls. Existing employees undergoing the tests are graded as fully-suited to the occupation concerned or as requiring some re-training. New employees are selected according to the new criteria. Improved surveillance has also been achieved by the introduction of video cameras in congested areas in haulages in most operations. "We're also looking at easing congestion through increasing capacity of individual locos, thus reducing the size of the fleet (currently 426 locomotives in the South African operations)," says Menzies. "The new locomotive dubbed 'Big Mama' at Kopanang, for example, carries 200 tons compared with the average of 30 tons."

With specific regard to vertical transport, the Structural Inspection and Maintenance Management (SIMM) process, developed by Anglo American plc with input from AngloGold Ashanti, has been introduced at older, deeper shafts such as TauTona and Savuka. The system, through state-of-the-art computer-based simulation, allows the condition of the shaft steelwork to be assessed and remedial action taken. Over the last five years some R60 million has been spent on the upgrading of winding plant and shaft infrastructure with this programme continuing for the next few years. A further focus area is on the training of all critical shaft related personnel where much work has been done: a grading system for key artisans has also been introduced to improve the retention of these critical employees

The results of the strategy are evident in improving audit results of the horizontal transport ratings – in terms of system compliance and physical condition of equipment – which have improved over Phases 1 to 3, carried out between 2003 and 2006, at all operations. "Similar results", says Menzies, "are evident in the vertical transport audits."



# Thibela TB research programme under way at TauTona and Great Nologwa

About 3,300 AngloGold Ashanti employees at the TauTona and Great Nologwa mines have consented to participate in the largest TB research programme undertaken in the South African mining industry. (Two other AngloGold Ashanti mines are acting as controls in the programme.)

The Thibela TB programme, which was launched towards the end of 2005, is being funded by the South African Mine Health and Safety Council and the international Consortium to Respond Effectively to the AIDS/TB Epidemic (CREATE). The programme is being conducted and overseen by South African medical research organisation, Aurum Institute for Health Research, a member of CREATE and formerly AngloGold Ashanti Health's internal research initiative.

The overall aim of the programme is to establish whether administering community-wide TB preventive therapy in addition to standard TB control is more effective than the standard TB control alone. The programme includes targeted TB preventive therapy to individuals at high risk of developing TB, as is the case with underground gold miners working in dusty environments. If successful, such a programme would radically reduce TB transmission between people, which would lead to fewer TB cases occurring later, thus resulting in improved control of the disease. Specifically, the aim of the programme is to demonstrate that community-wide preventive therapy, used in addition to standard TB control measures, is effective in reducing both the incidence of TB and its consequences, and that it can improve the control of TB in high-risk environments, particularly where there is a high prevalence of HIV/AIDS and silicosis.

The Thibela TB research programme is being undertaken in collaboration with several South African gold mining companies, and labour unions and associations. The study has the support of various government departments, including labour, health and minerals and energy.

The process of enrolling consenting individuals onto TB preventive therapy began in July 2006 and may take as long as 24 months to complete. The enrolment process is currently under way at TauTona and Great Nologwa and at the end of 2006 3,300 individuals had consented to participate in the programme. In all, around 65,000 miners will be involved in the study. The enrolment process is expected to be completed by June 2008. The programme is progressing well but as the study could take five years to complete, it is too soon to report any preliminary results. Currently, funding is available for four and a half years.

The Thibela TB programme is part of a global research programme to find a solution, in the face of an escalating rate of infection, to reducing the incidence of TB, particularly as TB control in the South African gold mining industry is proving increasingly difficult, despite the implementation of control programmes exceeding World Health Organization standards. This is largely attributable to silicosis and the escalating HIV/AIDS epidemic, which compounds the incidence of TB. Similar studies are being conducted by CREATE in high-risk communities in Zambia and Brazil.

According to Professor Gavin Churchyard, CEO of the Aurum Institute for Health Research and principal investigator for the study, "If successful, this study will demonstrate that it is possible to control TB in settings where HIV is prevalent and will serve as a model to control TB in other settings with high rates of TB transmission and HIV."

TB has a high social and economic cost, both for the individual concerned and the industry as a whole. The onset of the AIDS epidemic in South Africa coincided with a four-fold increase in the rates of TB, which has serious implications both for the country and the gold mining industry. Historically, because of the increased risk of TB in silica-exposed gold miners, TB is considered an occupational disease in South Africa. Improved employee health would lead to an improved quality of life, improved productivity and much reduced healthcare costs.





## AngloGold Ashanti's approach to fitness for work adopted as industry standard

An individual's physical fitness to perform his or her occupation is fundamental to the maintenance of good health and safety, particularly in an industry – such as gold mining – that is heavily dependent upon manual labour performed in a physically demanding environment. Much of the work performed by production workers underground on South African deep-level mines is intensely physical and carried out in confined spaces with temperatures, though moderated by complex ventilation systems, of approximately 28°C.

In 2001, AngloGold Ashanti, in a joint venture with Anglo Platinum, developed a comprehensive battery of tests – known as the Functional Work Capacity (FWC) programme – to measure occupation-specific physical and functional competence.

The FWC, together with a comprehensive vocational rehabilitation programme, constitutes the Rehabilitation and Functional Assessment (RFA) programme used in AngloGold Ashanti's operations, both to assess an individual's capacity for a specific occupation and to provide rehabilitation, and, if necessary, training for an alternative occupation after injury. The RFA is not used in isolation, but forms part of a series of assessments (initial and periodic medical examinations, physical and heat tolerance screening) directly linked to the company's medical surveillance programme.

FWC is defined as an objective assessment to determine an employee's capacity to undertake specific physical tasks, safely and productively, without undue fatigue or adverse consequences, over a normal working shift. Input from the various disciplines involved in the mining process, as well as from the medical and occupational hygiene departments, provided input into FWC development.

FWC comprises 19 elements covering such aspects as mobility, dexterity and level of effort in both restricted and unrestricted environments. Only those elements relevant to a specific occupation profile are used: each element has a specific physiological workload and has to be completed in a reasonable time.

The intellectual property contained within the FWC concept is jointly owned by AngloGold Ashanti and Anglo Platinum. Its use has been extended to Gold Fields (Beatrix, Driefontein and Kloof mines), Assmang (Beeshoek and Black Rock Mines), De Beers (Jwaneng Mine) and Sasol Secunda. To date, 12 RFA centres (providing both assessment and rehabilitation) have been established.

A centralised database is being developed, under the guidance of RFA co-ordinator Tia-Mari Hofmann, and will be used to plot trends and correlate data between different companies. The database currently contains some 60,000 records. Aspects captured include company demographics as well as employee lifestyle and work experience factors. "The database will assist us in quality control and refining test standards, as well as measuring the impact of certain risk factors on physical work capacity," says Hofmann.

Within AngloGold Ashanti, the test forms part of rehabilitation and assessment for return to work after injury. About 20 employees per day go through the process on average. At a number of other companies, Anglo Platinum and Gold Fields for example, the test has been extended to form part of the initial medical examination.



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It is important to note, Hofmann explains, that test results are never used alone to indicate the suitability of an individual for a specific occupation. Rather, the results from FWC are used by the occupational medical practitioner, in conjunction with a suite of other tests, such as lung function, weight, vision, hearing and heat tolerance testing, to make a decision on fitness.

FWC testing can be applied on three levels, each of which has a specific purpose:

- **Level 1** is intended to provide a rating of full-shift capacity of healthy, fit individuals. All jobs of a physical nature have been analysed according to the functional requirements of the tasks involved;
- **Level 2** is used for assessment of new employees and for rehabilitation after illness and injury. Insofar as rehabilitation is concerned, only selected elements are used to monitor progress; and
- **Level 3** assessments are solely directed at rehabilitation. The emphasis falls on functionality and not endurance. The specific elements of the assessment will depend on the nature of the injury or illness.

RFA provides an objective, specific instrument to match the capacity of an employee to the physical demands of a particular occupation, thereby preventing premature injury or fatigue. The system also provides objective criteria for the assessment of fitness before employees return to work after injury or illness. Where fitness standards for the original occupation cannot be achieved, RFA provides a means of identifying alternative employment, thereby ensuring – from the company's perspective – retention of skills and – from the employee's perspective – the retention of a rewarding career. Through an assessment of the necessary workplace adaptation and design, RFA can also be extended to the employment of people with disabilities.





## Making ODMWA work – Nongoma project to be launched

The legacy of silicosis in the South African mining industry presents a challenge to the industry not only in dealing with the number of undiagnosed cases that may be present, but that many former mineworkers are both undiagnosed and cannot easily access healthcare or compensation. Compounding the latter is the apparently inequitable legislation (*see case study – [www.aga-reports.com/06/worker-compensation.htm](http://www.aga-reports.com/06/worker-compensation.htm)*) that is in place and the poor delivery mechanisms within government hospitals.

For some years the mining industry employers (through the Chamber of Mines), the Departments of Health and Labour and National Union of Mineworkers (NUM) have been in discussions to address the issue of former mineworkers who, for many are reasons, are not accessing medical examinations. Specific issues that are being addressed are the identification of the primary areas where former mineworkers reside, the strengthening of occupational health services so that former mineworkers are better able to access benefit medical examinations, and improvement of the Occupational Diseases in Mines and Workds Act (ODMWA) certification and compensation claims processes. A key part of the agreed strategy is the establishment of occupational health centres at identified government hospitals in largely rural areas where these former mineworkers reside to assist them with medical examinations and compensation claims and to promote economically sustainable development projects in these areas.

While the Department of Health is of necessity the lead agent in the process, as it will identify and establish the occupational health centres and sustain them in the long term, the mining industry through the Chamber has agreed to fund capital equipment and pre-defined recurrent expenses for two years at a number of sites. The schemes at these sites are scheduled to be rolled out over a maximum of six years. This cost is currently estimated at about R50 million.

The parties have agreed to a 'pilot' project at the outset which would establish the basis for further centres. It is planned that this project will be operated for a period before proceeding with the establishment of new centres. Of key concern to all parties is that the system to be set up is sustainable in the longer term and, to a large extent, this depends on the provision of appropriate infrastructure and equipment, the establishment of systems, adequate staffing and training of health care workers and funding of the project.

Extensive consultation on where the project should be initiated resulted in the selection of St Benedict's Hospital in the Nongoma district of KwaZulu-Natal being chosen as the 'pilot' site. This is because:

- data from TEBA (the employment assistance agency primarily responsible for employment matters in the mining industry) database indicate that some 10,000 former mineworkers reside in this district;
- there is a comprehensive government health service both at primary and secondary health level in this area; and
- there is an existing occupational health centre run by a trained occupational health nurse at St Benedict's Hospital.

The start of the project was delayed in 2006 as the various parties conducted further discussions. Following high-level discussions at the end of 2006, it was agreed that the project should commence and it is expected that the roll out should commence in early 2007.



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Allied to the Nongoma project, the industry – through the Chamber of Mines – recognises that many former mineworkers are living in rural areas subject to economic hardship, high levels of poverty, limited livelihood options and challenging agricultural environments. The parties have therefore agreed to pair the medical initiative with a social and economic development programme to bring added relief to affected ex-mineworkers and their broader communities.

The broad objectives of the programme are to enhance or add sustainable value to various communities' current or potential asset base, mainly comprising:

- Natural assets: land, water, minerals and forests
- Infrastructural assets: roads, irrigation, electricity, buildings and vehicles
- Financial assets: wages, remittances, salaries, pensions, loans and welfare payments
- Social assets: family systems, NGOs, businesses, traditional social systems, community organisations and other valued networks
- Personal assets: skills, educations, experience, health, energy, innovativeness and entrepreneurship.

An additional objective, which will also fall into the methodology to achieve objectives, is to draw into the programme as much leverage or multiplier effect as possible by integrating programmes with the Integrated Development Plans of the regions and securing additional funding wherever possible from other sources.

As the parties have already initiated discussion with communities and village authorities of Nongoma during site visits in 2005, the social development pilot programme will be based upon an agricultural intervention overseen by Teba Development, as agreed in principle at the time.





## Worker compensation in South Africa under review

The South African mining industry and the people it employs have historically faced unequal and inappropriately diverse regulation of compensation for illness, injury and disablement. This legislation is currently under review. From the company's perspective, the objective of the review, in which it proposes to become extensively involved, is the development of legislation that provides for compensation that is fair and which seeks to promote the long-term viability of the mining industry.

Compensation for occupational diseases and injuries is currently provided for in South Africa by two different statutes – the Compensation for Occupational Injuries and Diseases Act (COIDA) and the Occupational Diseases in Mines and Works Act (ODMWA). ODMWA covers Occupational Lung Disease (OLD) in miners only. COIDA provides for compensation of occupational injury in all industries (including mining) and for occupational disease in all industries (except mining) as well as for certain occupational diseases not covered by ODMWA, such as noise induced hearing loss.

There are differences in both the application of and benefits paid in terms of COIDA and ODMWA. The South African Cabinet has recognised this anomaly and decided, in 1999, to seek greater uniformity between the two Acts. This is now in process and a framework for the new Act has been developed by the Department of Labour. The framework is expected to be presented to Parliament during 2007 and will then move on into a deliberation phase, where the stakeholders (state, labour and employer organisations) in the National Economic Development and Labour Council (NEDLAC) will make comments and contribute to the continuing debate. AngloGold Ashanti, through the Chamber of Mines and Business Unity South Africa (BUSA), will participate in this process.

The two Acts are quite different. ODMWA is almost 100 years old and was last amended in 1994. COIDA is more recent (an entirely new Act was promulgated in 1993) and is more consistent with the ILO Convention 121, on Worker Compensation. Nonetheless, both Acts require review and, where necessary, reformulation and drafting. The table below illustrates some of the main differences between COIDA and ODMWA. According to Dr Dave Barnes, Manager Occupational Health, ODMWA is more user friendly than COIDA. It provides for free, biennial medical examination (by State hospitals) of ex-miners, in order to determine whether they are suffering from an occupational disease. This is important as many occupational diseases (especially of the lungs) take years to develop and often only become apparent in retirement. COIDA has no such provision. In terms of COIDA, potential claimants must pay a private doctor for medical examination in order to make a submission for compensation, if due. ODMWA also provides for post mortem benefits and a deceased miner's estate is compensated if occupational lung disease is found to be present, even if the disease did not cause death. COIDA does not have such a provision.

However, ODMWA pays lump sum benefits only, while COIDA pays lump sums for permanent disability (PD) below 30% and pensions if the PD is ascertained to be greater than 30%. Benefits paid in terms of COIDA are generally more generous than those of ODMWA and an earlier degree of disease is compensable in COIDA. This may mean that a miner, with the same degree of occupational lung disease as a non-miner, may not be compensable, but his non-mining colleague would be.

Worker Compensation law in South Africa and many other jurisdictions is based on the presumption that, where an individual is a member of a statutory contributory compensation scheme, that person surrenders his or her common law right to compensation for injury or illness,



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that arises from work. In this situation, the law should provide for quick and fair compensation – financed through mandatory employer premiums. Compensation entitlement should be consistent with the intention of the ILO Convention on Worker Compensation.

Achieving a balanced solution which offers fair compensation but which also ensures the sustainability of the industry will require a balanced approach.

#### Differences between ODMWA and COIDA

	ODMWA (administered by Dept of Health)	COIDA (administered by Dept of Labour)
Cover	Mining related occupational lung	Accidents and occupational diseases only (mining and industry) except for that covered by ODMWA (miners only).
Follow-up of ex-employees	Biennial and free	Nil
Low-fence for compensable lung disease	65% lung function (i.e. 35% loss)	80% lung function (i.e. 20% loss)
Maximum earnings for calculation of benefit	R2,500	R15,820
Lump sum benefits paid		
Min	First degree: R39,300 (Max)	R14,531 (for 30% PD)
Max	Second degree: R86,500 (Max)	R132,924 (for 30% PD)
Pensions	Not paid	Min: R1,411 Max: R11,865
Medical costs	Life-long costs, paid by owner of mine, for occupational lung disease diagnosed in service	Maximum of two years costs, paid by the COIDA fund
Funeral costs	Nil	R9,200 (Max)
Post mortem benefits	Routinely provided for and free. Compensation paid, irrespective of cause of death	Not provided routinely. Compensated only if occupational disease caused death





## Multi-Drug resistant TB treatment at AngloGold Ashanti

In recent months, media articles have raised the issue of multi-drug resistant (MDRTB) and Extensively Drug Resistant Tuberculosis (XDRTB) in Southern Africa and internationally. This follows both a drive to highlight an international awareness campaign and the detection of an XDRTB strain in KwaZulu-Natal, which is a new mutant virulent strain that had not previously been identified.

MDRTB refers to Multi Drug Resistant TB where the TB organism demonstrates resistance to at least Isoniazid (H) and Rifampicin (R), two of the most effective first line anti-TB drugs available. XDRTB stands for Extensively (or Extremely) Drug Resistant TB, where the TB organism demonstrates resistance to one of the second line injectable drugs (Kanamycin (Km), Amikacin (Am), or Capreomycin (Cm)) and to the Fluoroquinolones.

### A global perspective

According to the World Health Organization (WHO), 8.9 million new cases of TB were reported in 2005, with 80% of these in 22 highest-burden countries. South Africa is placed at fifth highest in burden of disease and seventh highest in disease incidence. Further, of the 1.7 million TB related deaths in 2004, 98% were in the developing world. MDRTB is present in 102 of 109 countries which report TB statistics to the WHO.

The WHO estimates suggest that 424,203 MDRTB cases were detected in 2004, representing 4.3% of all new and previously treated TB cases. More than half of these were in China and India, while the highest estimated prevalence was in countries of the former Soviet Union and certain provinces of China. This represents a 55% increase over the estimates for 2000.

The first global survey of TB culture and drug sensitivity testing showed that 10% of global MDRTB bacterial isolates fulfilled the criteria for XDRTB. Of MDRTB isolates detected in Africa, less than 1% were XDRTB. This may not be a true reflection of the situation and might reflect the lack of cultures (TB bacterial samples) being tested in Africa (owing to lack of infrastructure and the high cost of testing).

### TB in South Africa

Not only is South Africa experiencing a high burden of TB cases, this is negatively influenced by the high rates of HIV infection in the country. The South African mining industry has seen a steady rise in the incidence of TB over the past 20 years, fuelled by the HIV epidemic and, to a lesser extent, by the prevalence of silicosis.

Identifying the outbreak of XDRTB in KwaZulu-Natal has been facilitated by the application of DNA technology. The organism – named the KZN strain – demonstrated particular virulence, causing 52 deaths in 53 patients in the initial case finding report whilst demonstrating resistance to all available treatment. Further investigation identified the strain in patients in 28 hospitals in KwaZulu-Natal, but not necessarily in the severely resistant form. The KZN strain has not been identified among AngloGold Ashanti employees.

### TB in AngloGold Ashanti

Currently the TB incidence within AngloGold Ashanti's South African operations is estimated at a rate of 3,000 per 100,000 individuals. AngloGold Ashanti Health's TB Control Programme is



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robust, incorporating and exceeding the criteria stipulated by the South African National TB Control Programme Guidelines, and the Department of Mineral and Energy Guidelines for the Control of TB in the Mines.

Recent TB case finding reports indicate that between 85% and 90% of the current TB cohort (employees with TB) are also infected with HIV. Despite the TB Control Programme (with outcomes which exceed the WHO objectives of 85% successful treatment outcomes for new TB cases), the incidence of TB remains high.

MDRTB-infected patients were first identified at AngloGold Ashanti in 1987. Following a noted increase in the number of patients presenting with MDRTB in 2003, a combined research project was initiated at AngloGold Ashanti's request with the Department of Biomedical Tuberculosis Research at the University of Stellenbosch using DNA fingerprinting technology to evaluate the epidemiology and identify the possible causes. Within the cohort of MDRTB, the health service currently has three patients who meet the criteria for XDRTB, where the disease is not responding to the available medication. These patients obviously pose a threat to other patients, health care workers and visitors.

Two of the six classes of second line alternative drugs used for the treatment of MDRTB were previously not available in South Africa. The health service has since remedied this situation via the intervention of the Medicines Control Council (MCC), in the event that any cases of the virulent strain of XDRTB (as identified in KwaZulu-Natal) manifest within AngloGold Ashanti.

A particular area of concern is that, with increased exposure, health care workers naturally have a higher incidence of TB than lay people and consequently a higher incidence of MDRTB. Since 1999, four health care workers in service are known to have contracted MDRTB; one has recovered and three have died.

The MDRTB risk to health care workers has prompted even greater infection control effort in our health facilities including: provision of special respiratory protective equipment for staff, ward ventilation control measures, installation of UV lights and a six monthly medical surveillance programme.

#### **AngloGold Ashanti's response to MDRTB and XDRTB**

The average incidence of MDRTB in the West Vaal hospital in the Vaal River operations over the last four years (2002 to 2006) is 5.3% of all TB cases. The WHO defines an MDRTB 'hot spot' as an area with rates of 7% and above. States in the former Soviet Union and Eastern Europe, for example, have MDRTB rates of 10 to 14% and higher.

Mortality as a result of MDRTB is much higher than that associated with normal TB. Strongly influencing that mortality rate is the presence of HIV infection in the patient.

Of the total cohort of 140 patients being followed:

- 20% were cured
- 1.4% were treatment failures (XDRTB)
- 32% died, although not necessarily from the MDRTB
- 7.1% were transferred out to other appropriate facilities
- 7.9% left employment voluntarily
- 23.6% were still on treatment
- 7.9% of patients who had laboratory evidence resistance but without clinical evidence of disease are being followed up (with negative subsequent laboratory tests)

The drug cost for treating normal TB is approximately R4 per day and R155 per day for MDRTB.



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In response to the presence of and increase in MDRTB patients, AngloGold Ashanti Health has set up an Isolation MDRTB ward at the West Vaal Hospital where patients with confirmed MDRTB are treated. This is the only facility of its kind outside of the state facilities in South Africa.

A comprehensive strategy has been developed in the face of rising MDRTB and the detection of a few XDRTB cases. Elements of the strategy include:

- Transmission and environmental controls to limit the spread of the disease, including early identification and limiting the spread in the clinical environment;
- Patient-centred controls, which include the promotion of cough education and etiquette, identifying and fast tracking coughing patients through clinic and hospital waiting areas and contact tracing;
- Staff-centred controls, including ensuring that staff wear personal protective equipment (PPE) in all designated high risk areas;
- More efficient treatment follow-up, particularly for treatment defaulters;
- Monitoring and surveillance of statistics; and
- Information, education and communication.

All of the above are normal elements of well run 'drug sensitive' TB control programmes and strict application will do much to reduce the incidence of MDRTB and XDRTB

Despite having a sophisticated TB laboratory on site (that makes use of up to date and current best practice microscopy and culture technology) it may still take from two to eight weeks to confirm the diagnosis of normal TB or MDRTB. This prolongs the potential infectious period before isolation of patients in the MDRTB ward can be justified. The possibility of transmission of normal sensitive TB or MDRTB strains in the setting of a high HIV prevalence in the population is therefore a significant reality.

Rapid identification of MDRTB strains using DNA technology such as that used at the University of Stellenbosch has the potential to confirm diagnosis within 48 hours on a single sputum sample. At present this is however still a research tool and as such is expensive and available in only a few specialised laboratories. It requires development into a form that can be performed at any laboratory.

The health service is currently investigating the introduction of rapid techniques to identify resistance to Rifampicin (Rifampicin resistance is a surrogate marker of MDRTB as nearly all cases of Rifampicin resistance are associated with Isoniazid resistance, which fulfills the diagnostic criteria for MDRTB), with plans to have this diagnostic regimen up and running for routine use at the West Vaal Hospital TB Laboratory in the first quarter of 2007. This could result in the current delay in identification of possible MDRTB patients being shortened to 48 hours, making it possible to institute appropriate isolation infection control measures for the suspects much earlier, thus preventing spread of the condition.

According to Dr Alistair Calver, senior specialist physician at AHS, "The biggest challenge to achieving higher successful outcome percentages is the fact that our mortality rates from other AIDS-defining conditions within our TB cohort is high. This reflects a need to get more of our HIV infected employees onto our Wellness Program and Anti-Retroviral Therapy (ART) at an earlier stage before they become ill."



## Disaster recovery plans in place at AngloGold Ashanti

Managing risk is an integral part of business. The process essentially involves identifying risks, assigning each risk a priority value in terms of the probability of its occurrence and its impact, and developing strategies either to reduce the likelihood of its occurrence or mitigating its impact.

"The problem with this approach is that events which are highly unlikely, but potentially catastrophic, tend not to receive enough attention," says manager: safety John McEndoo.

To counter this, a new analysis of health and safety-related risks was carried out at all AngloGold Ashanti operations, between 2002 and 2007, ignoring probability and focusing only on impact and plausibility.

The analysis team, led by McEndoo, focused on three types of event: fire, flood and explosion. Each of these was analysed in terms of possible causes (failures in conditions, activities, systems or technology) and likely impact on people, equipment, materials and the environment. Over 1,400 risks were identified in this way, some common and some operation-specific.

"These risks were further categorised by whether their negative impact would affect the operation or reputation of the group as a whole, or of an individual mine," says McEndoo. "The great majority – over 90% – fell into the latter category, and the mine-level teams were tasked with developing disaster recovery plans (DRPs) to eliminate or mitigate these." Disaster recovery is defined as the process of recovering business functions in the shortest possible time to minimise impact on business objectives such as market share and reputation.

The six areas of the DRP comprise programme management, risk assessment, emergency response, crisis management, training and awareness and post-event audit and maintenance. The six areas are further broken down into a number of elements, each of which is given a rating from zero (non-existent) to five (world class). "We regard an overall score of three as being acceptable," says McEndoo. Plans are in place, although with work required in some areas before the required rating is attained, at Siguiri in Guinea, Navachab in Namibia and Serra Grande in Brazil. Operations for which plans will be completed in 2007 include Moab Khotsonq in South Africa, Obuasi and Idupriem in Ghana and Cerro Vanguardia in Argentina.

"CC&V provides a good example of a proactive approach to the issue," says McEndoo. "The mine has an excellent safety record (it has achieved three years without an injury) but has prepared a DRP in anticipation of being required to comply with the Mine Improvement and New Emergency Response (MINER) Act, recently promulgated in the United States in response to a number of coal mine fatalities."

Although developed at operational level, local DRPs are audited by McEndoo in his capacity as DRP co-ordinator, and the overall DRP status is reported to the board on an annual basis. The programme is supported at the highest levels in the organisation, and is aimed at equalling global best practice in the area.

Depending on the nature of the risk, DRPs may include measures to avoid the risk altogether, or, where these are not feasible, to mitigate its impact. As an example of the former, McEndoo cites the 30,000kg gas bullet used in the canteen at Sunrise Dam in Australia. "The mine is situated in a major lightning strike area," says McEndoo "and, should the gas bullet have been struck, the resulting fire would have been catastrophic. Installing lightning conductors would have reduced the risk, but the mine opted to remove the risk altogether by relocating the gas bullet away from the danger zone. No DRP was thus required for this issue."

Some risks – the use of cyanide in the metallurgical process for example – cannot be avoided, and a complete and comprehensive DRP is then required (*see case study: Using Cyanide responsibly at CC&V, AngloGold Ashanti Report to Society 2005 page EN38*).





## Managing risk in North America

Risk management in the North America region is approached systematically, addressing such issues as training, risk identification, injury management and employee communication. In this multi-disciplinary approach, specific protocols or procedures have been developed in all areas of the workplace. These involve comprehensive safety training (*see case study: STOP programme implemented in the North America: Report to Society 2004: 7.10*) (induction and periodic refresher training), risk assessment, DuPont safety observation training, hazard communication, crisis response, industrial hygiene and a complete medical surveillance programme.

Says General Manager, Ron Largent, "Programmes such as induction and annual safety training, safety observation training and hearing conservation training are designed to instruct employees in specific hazard areas and safety practices employed at CC&V and to recognise unsafe acts and conditions they may encounter in the workplace, or, indeed, in themselves. Employees are coached and empowered not only to recognise unsafe acts and conditions, but to act on those observations. In doing so, they may approach anyone in the organisation, from co-workers to senior management. Occasions have been recorded of the general manager of CC&V receiving counselling from an employee about an unsafe act."

To ensure a multi-faceted approach to the risk assessment programme, employees, as well as managers and supervisors, were invited to provide input. Issue-based programmes such as medical monitoring, industrial hygiene and hearing conservation are in place. They monitor employee health in relation to exposure to dust, noise, welding fumes, fire assay lead exposures and (in the case of refinery workers) silver exposures,

Formal emergency procedures which specify how notification of an accident should be made in order to summon emergency medical personnel are an important part of the risk management protocols at CC&V. Announcing a 'Code 90' over the company radio will immediately set off a chain of events designed to restrict movement in the accident area, summon on-site medical personnel as well as off-site paramedics and an ambulance, and when necessary, the air ambulance from Colorado Springs, an hour's drive by road. The hazard communication programme maintains a database of the Material Safety Data Sheets for all chemicals used at CC&V. This database is available to all personnel with computer access and provides ready access to information about chemical hazards and first aid treatment. Other protective policies and procedures such as electrical lockout, personal protective equipment and confined space entry procedures specify actions that must be taken to address specific workplace hazards and in some cases require a permit signed by a supervisor. All these measures, in addition to others, manage and minimise risks where workers are or may be exposed to in their daily work.

### Safety observation training

This programme teaches workplace safety and auditing skills for observing people while they work, with steps to reinforce safe work practices and to correct unsafe acts and conditions.

## Three years without injury at Cripple Creek & Victor



The Cripple Creek & Victor Gold Mine in Colorado has not recorded an injury since November 7, 2003. The incident involved a lower back injury to an employee working in a support group. Since that occurrence, employees have worked hard at observing unsafe acts and conditions and fixing them no matter who is carrying out the unsafe act. November 7, 2006 marked the third year and 2.1 million man-hours without a lost time injury. The record also includes contractors. CC&V celebrated the achievement during December 2006 for all CC&V and contractor employees.

### Managing risk during expansion at Cuiabá

The Cuiabá expansion project, approved by the AngloGold Ashanti board in January 2005, is intended to increase production from Cuiabá mine in Brazil from 830,000 tonnes per annum to 1.3 million tonnes per annum. The project, which was commissioned in February 2007, will reach full production by the end of the second quarter of 2007, involves the deepening of the mine from 11 level to 21 level and is expected to increase the life-of-mine average production from 190,000 ounces to 260,000 ounces per year.

The project has involved extensive mining development and construction work, both on surface and underground. Underground activities included the opening of two ventilation raises, opening new development faces and the construction of an underground chamber for the assembly of primary crushing at level 11. Surface activities have included the construction of a new hydrometallurgical plant, a tailings storage facility and a new backfill plant.

The project has involved the recruitment of 209 permanent staff and 1,819 temporary contractors.

Managing an operation outside the normal production cycle, whether through expansion or downsizing, also involves managing an altered risk profile (*see also case study: Managing a changing risk profile at Savuka, at [www.aga-reports.com/06/risk-savuka.htm](http://www.aga-reports.com/06/risk-savuka.htm)*).

"Principal risks associated with this project involved the recruitment of large numbers of new employees – both permanent and contract – and the increased necessity for training," says general manager Denis Dinardi.

"The most significant risk areas underground were rockfalls (associated with the construction of the underground chamber for primary crushing), the opening of the ventilation raises and equipping the deepened shaft with new pipelines and electrical cables. Surface risks included construction workers having to work at considerable heights (in building the new plant), the risk of accidents during road transport of ore and the danger of injury during grinding and welding."

Measures taken to mitigate these risks included in-depth safety training, with comprehensive daily briefing sessions, for all employees including contractors. A 'permission for special works' was obtained. This involved an in-depth expert evaluation by external risk management consultants to identify the risks involved and define the controls that needed to be put in place. Contract employees were recruited from a specialised company that operates in the mining field, ensuring that basic safety training was already in place. Detailed operating procedures were prepared and briefed covering all aspects of new activities. Vehicle drivers also received thorough training, and hazard identification and risk assessment (HIRA) and hazard and operability (HAZOP) procedures were developed.

The results of these interventions can be seen in the mine's improved safety profile.

The lost time injury frequency rate decreased from 2.95 in 2005 to 2.33 in 2006. Total man hours worked increased from 1,861,589 in 2005 to 3,409,657 in 2006.



### Fatal accidents – dealing with families after an accident

A commitment to a workplace free of occupational injury and illness is a key component of AngloGold Ashanti's values and business principles. But, the company recognises that, in instances of fatal workplace accidents, this commitment must then extend to a comprehensive support programme for the bereaved family.

Historically, the South African mining industry, heavily dependent on migrant labour from remote rural areas, did not provide a climate conducive to personal contact between mine management and the families of most employees. Since its inception in 1998, however, AngloGold – now AngloGold Ashanti – seeks to ensure that support for the spouse and children of employees who are victims of mine accidents is part of safety and health management at operational level.

“Since 1999, all fatalities at AngloGold Ashanti operations have been the subject of an intensive review at corporate executive level,” says Manager: Safety John McEndoo. “The focus of the inquiry is two-fold: a technical review of the causes of the accident, and a detailed investigation into the circumstances of the surviving spouse and children, and of the level of assistance that is required.”

As a matter of policy, members of the management team of the mine together with union officers concerned attend the funerals of all employees killed on duty, irrespective of the distance or remoteness of the employee's area of origin. A community chief at a mineworker's funeral in Lesotho made this observation, “Today is the first time that I have seen a management team comprising mainly white people accompanying the body of one of their deceased employees to his last place of rest. No longer are employees merely tools to bring gold from the ground; management now cares about their lives.”

Benefits paid to the families of employees who have died



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Compensation for the families of deceased mineworkers is payable in terms of the prevailing legislation in the country concerned, but, where necessary, interim financial support is provided to the family until such time as prescribed compensation or pension payment is available. "Each case is treated on its merits," says McEndoo, "but the guiding principle is that, in a time of severe emotional trauma, people should not have to undergo financial hardship as well."

In South Africa, Teba Limited, a service organisation dealing with the recruitment of mineworkers for the mining industry, which has an extensive network of offices in the labour-sending areas, carries out a critical role in the payment of compensation and provident fund benefits. Mine officials maintain close contact with Teba throughout the process to ensure payments are made timeously and that ongoing communication is maintained with the family.

The company has also made financial provision for the children of employees who die in mine accidents. The AngloGold Fatal Accident Education Fund, known as Masifunde (meaning 'Let us learn' in isiZulu) was established in 2000 and covers the cost of tuition, boarding and books at public schools. Fund benefits apply retrospectively to all children of employees killed in mine accidents since the company's formation in July 1999. Policy guidelines set out in the Fund apply to all AngloGold Ashanti's operations, although, because of the statistical distribution of fatal accidents, focus is placed on the South African operations. The Fund is financed internally as a running expense. Trade unions were extensively consulted before the Fund's establishment, and they maintain an ongoing involvement.

In the South African operations, through a long-standing union agreement, a nominated relative of the deceased will be employed by the company.

While no amount of compensation can make up for the loss of a loved one AngloGold Ashanti endeavours to ensure that compensation is paid swiftly to bereaved families and that they are supported by this compensation despite the loss of a breadwinner. AngloGold Ashanti is frequently asked what compensation is provided to the families of employees who die in a work-related accident. The following information is therefore provided in respect of South African employees:

- Pension/Provident Fund – all employees have the option of belonging to the industry pension fund (Sentinel) or the Mineworkers Provident Fund (MPF). Most mineworkers are members of the latter. Following the death of an employee in service, the MPF pays the following: a funeral benefit, a lump sum payment equal to the credit in the fund that has been built up by the employee (50% immediately and 50% one year later); a risk benefit of 36 times monthly salary (10% paid out immediately and the balance is invested to provide an income);
- Unemployment Insurance Fund (UIF), or state unemployment fund benefits for South Africa citizens;
- The mining industry insurance fund, Rand Mutual Assurance, which pays a funeral benefit, an immediate lump sum and a pension to the spouse and children under 18;
- Education fund (Masifunde) – to fund the schooling of the deceased's children for the duration of their schooling; and
- Family support and assistance toward funeral arrangements are provided by the company.



## Reviving a safety culture at Obuasi

"Safety is a journey and not a destination, and is the responsibility of all, workers and management," said managing director Danie Spies, speaking at a recent operational safety day celebration at Obuasi mine in Ghana. Instituted at the end of 2005, these safety days have become a regular feature of the mine's calendar, as part of a major intervention that led to a marked improvement in performance during 2006.

Obuasi is one of the oldest operating underground mines in the world, with underground workings at an average depth of 1,500 metres. The mine, which employs some 8,400 employees, operates three gold processing plants, and produced 390,000 ounces of gold in 2006.

"Major strides have been made in the past two years in improving the mine's safety infrastructure, which had suffered from a lack of available capital in earlier years," says Danie Spies, who was appointed managing director of the mine in March 2005. "A 15MW refrigeration plant and 300m<sup>3</sup>/s surface fan were installed and commissioned during 2006."

The other major innovation has been the insistence that safety is a line responsibility, rather than a specialised occupational health and safety function. "In the past, there was no senior management review of dressing cases, for example," says Spies. "The prevailing perception was that once employees had been trained in safety procedures, they were responsible for applying them."

Spies is a firm believer that behaviour is the critical component in safety. "Safety is a state of mind, and an integral part of production: there is no question of trading one off against the other," he says. "Senior management here strives to make AngloGold Ashanti's value system an integral part of daily life: every person has the right to a healthy retirement and quality work goes hand in hand with safety."

The fall of ground management strategy used in the company's South African operations has now been implemented at Obuasi (*see case study on: A new strategy for managing falls of ground in South Africa at [www.aga-reports.com/06/FOGM.htm](http://www.aga-reports.com/06/FOGM.htm)*). The risk management system is being implemented, with 200 employees – considered to be critical mass – trained and certificated in hazard identification and issue risk management during 2006. A programme to train the entire workforce in risk assessment will begin in 2007 and is scheduled for completion within five years.

The success of these sustained interventions is evident in improved safety results. The dressing cases rate improved from 13.35 in 2005 to 5.19 in 2006. Lost time injury frequency rates, after a period of regression, are showing an improvement. The mine recorded 2 million fatality-free shifts in 2006, as well as 101 days without a fall of ground injury and 34 days without a lost time injury. Fog injuries reduced from 16 in 2005 to four in 2006.

An accident review process was implemented during 2006. All accidents, with the injured employee and his line managers in attendance, are reviewed within 24 hours. Review sessions are chaired by the managing director. Spies comments that organised labour is fully involved in, and supportive of, the various safety initiatives implemented over the last two years.

During the year, Obuasi achieved ISO 14001 certification in respect of environmental management. Training to achieve OHSAS 18001 certification in respect of health and safety (*see case study: From NOSA to OHSAS at [www.aga-reports.com/06/OHSAS.htm](http://www.aga-reports.com/06/OHSAS.htm)*) started in January 2007, and is expected to be complete by the year end.

