



# Tropicana Gold Project Integrated Management System Manual

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	<b>INTEGRATED MANAGEMENT SYSTEM</b>
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**1. Introduction**

AngloGold Ashanti Australia (AngloGold) on behalf of the Tropicana Joint Venture (the Joint Venture) has developed an Integrated Management System (IMS) to effectively manage its activities associated with the Tropicana Gold Project (the Project) located approximately 330 km east-north-east of Kalgoorlie. The Joint Venture is a partnership between AngloGold (AngloGold; 70 % stakeholder and manager) and Independence Group NL (30 % stakeholder).

The IMS combines safety, health, environmental and community management requirements and outlines the policies, standards and procedures which have been developed and will be adopted to meet the requirements of the ISO14001 and OHSAS18001.

The Joint Venture will seek ISO14001 and OHSAS18001 certification for the Project. This manual describes the key components of the Project's IMS along with the standards and procedures that have been developed to ensure compliance and meet certification.

**2. Scope**

Personnel and organisations working for and on behalf of the Joint Venture are required to comply with all applicable policies, legal and other requirements and fulfil safety, and environmental duties of care.

Specific performance and procedural requirements of this IMS shall apply to all construction and operational activities associated with the Project.

**3. Purpose**

A management system is the framework of processes and procedures used to ensure that an organisation can fulfill all tasks required to achieve its objectives.

The ISO14001 and OHSAS18001 systems are recognised international specifications for Environmental Management Systems and Safety and Health Management Systems against which an organisation can be assessed and certified. Both systems specify the minimum requirements for an organisation with respect to policies, the identification and management of environmental and safety aspects/risks, compliance with legal and other requirements, and continual improvement of environmental, safety and health performance.

These international systems are based on the continuous improvement model (Plan, Do, Check, Act) or adaptive management model and has been designed to allow integration with existing and other management systems (such as ISO 9001). When implemented, these standards are a visible commitment by an organisation to responsible safety and environmental management.

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Management systems such as ISO14001/OHSAS18001 prescribe the minimum requirements for a management system which are:

- policy;
- legal requirements;
- aspects (risk) register;
- communication;
- document control;
- management review;
- emergency preparedness and response.
- management strategies;
- objectives and targets;
- roles and responsibilities;
- auditing;
- training and competency;
- reporting (con-conformance); and,

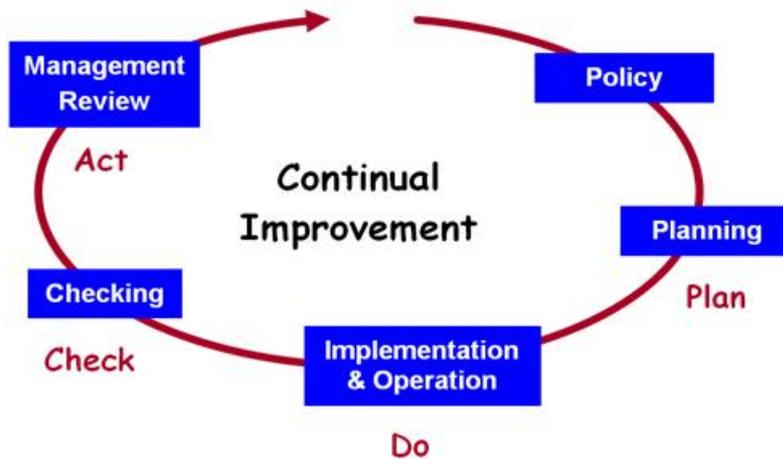


Figure 1 Integrated Management System Cycle

## 4. Integrated Management System Component

The IMS is based on a concept of an on-going cycle of reviews and improvements (Figure 1) which can be described as adaptive management. The components of the IMS and how they relate to each other, standards, strategies and procedures are described below.

## 5. Policy

Policy development is the driver for implementing and improving the management system. It reflects the commitment of top management and sets the level of responsibility and performance required of the operation. Policy is usually complemented by value statements or business principles as described in section 11 below.

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### **6. Planning**

Legal and other requirements relevant to the Project and associated activities have been identified and documented. These requirements form an important component of the risk management process, which involves the systematic identification of environmental, health and safety and community aspects of activities over which the Project has an influence.

Risk assessments take into consideration the potential for pollution and injury to occur, the inability to achieve targets, non-compliance with legal or other requirements and the potential for emergency situations to arise. The risks associated with changes to process, equipment, organisation, personnel or procedure are identified and managed in the same way.

Significant potential risks are addressed through the setting of objectives and targets, and the development and implementation of management programs.

### **7. Implementation**

To ensure that risk management requirements are effectively implemented, Project personnel and contractors are required to be experienced, qualified or trained to competency in managing their risks to the environment. Internal and external communication is maintained throughout the planning, implementation and completion phases of an activity to facilitate discussions on potential risks and performance.

Contractor and supplier selection processes and management processes will be implemented to address and manage significant aspects associated with the Project.

Aspects associated with significant environmental, health and safety and community risks will be documented and operational controls will be developed to minimise impacts arising from inconsistent work practices. These procedures, together with all other documents and records essential to the IMS, will be controlled, maintained and updated where required.

Potential emergency situations are recognised as a risk and as such, emergency scenarios are identified as part of the risk management process. Emergency response and preparedness requirements are identified, documented and practiced to ensure an experienced emergency response team and efficient response time in an actual emergency situation.

### **8. Checking and Corrective Actions**

Environmental, health and safety and community performance will be monitored at various levels through inspections, auditing, collection of data, and investigations into incidents and non-conformances. Corrective actions will be identified and implemented to address any non-conformance and preventative actions are documented to minimise the chance of the same non-conformance occurring again.

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### 9. Management Review

Performance results are discussed at senior management level to ascertain the continued appropriateness of the policies, strategies, objectives and targets, and the adequacy and effectiveness of each element of the IMS.

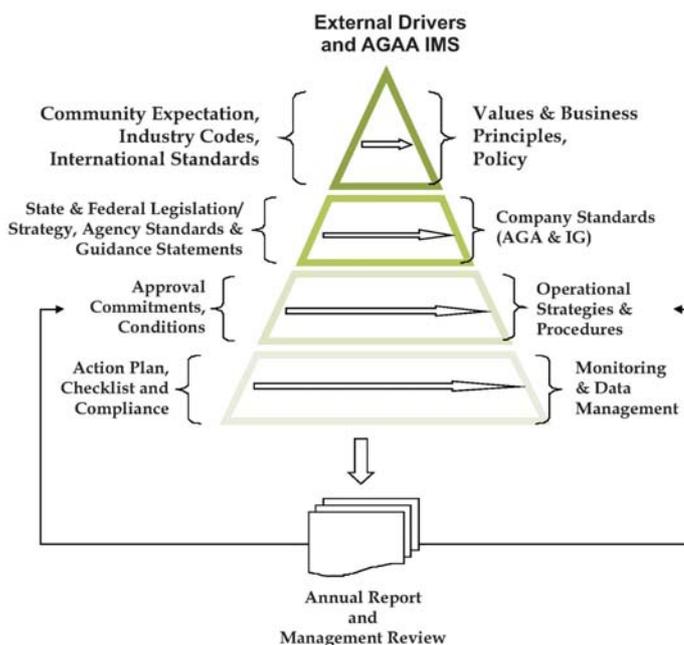
### 10. Continual Improvement

The cyclic nature of the IMS structure described above facilitates continual improvement in environmental, health and safety and community performance, and provides the mechanism for managing significant risks, achieving targets and complying with legal and other requirements.

### 11. Tropicana Gold Project Integrated Management System Structure

All AngloGold managed activities (including the Project and all Joint Venture activities) are required to comply with AngloGold policies, standards and procedures. Where necessary, Project-specific procedures, policies and tools will be developed and implemented. Similarly the IMS will comply with Independence Group NL policies and standards, in the case of a conflict of policies or standards, the more stringent policy (or standard) will be adopted for the Project.

These documents are placed in a hierarchical format (Figure 2) with each document tier supporting the implementation of the preceding tier. Figure 3 provides an indication of how the various documents and standards link together.

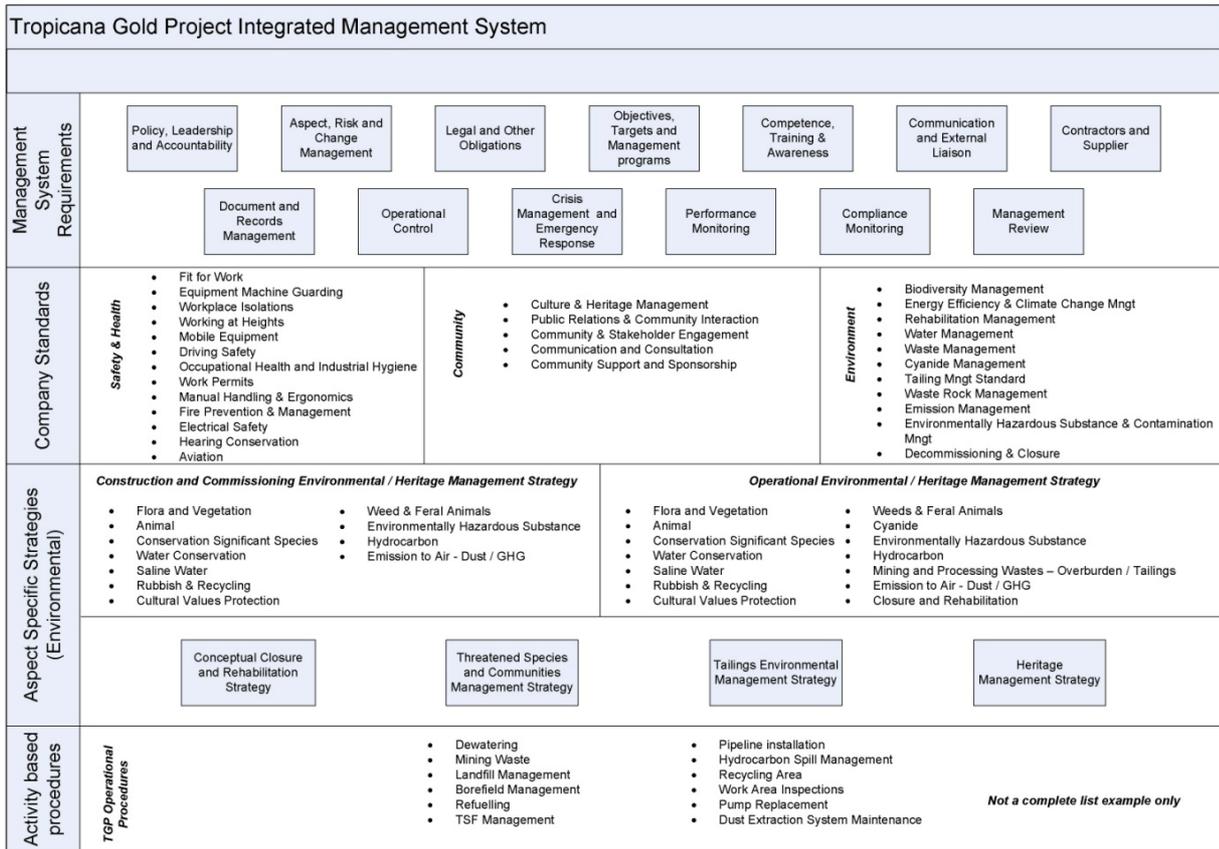


**Figure 2 Hierarchy of Documentation**  
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The underlying driver of the IMS is the value it provides as a compliance and risk management tool. The IMS provides a mechanism for identifying legal requirements and risks to the business in a systematic manner so that effective controls can be developed and implemented as required.



**Figure 3 Tropicana Gold Project Integrated Management System Structure**

**12. Business Values**

AngloGold recognises that the long-term sustainability of its business is dependent upon good stewardship in both the protection of the environment and the efficient management of exploration and mineral extraction activities.

AngloGold Ashanti (of which AngloGold Ashanti Australia is a subsidiary) has developed a vision and mission statement for all its national and international activities which respectively are:

*“To be the leading mining company”*

*“We create value for our shareholders, our employees and our business and social partners through safely and responsibly exploring, mining and marketing our*

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*products. Our primary focus is gold and we will pursue value creating opportunities in other minerals where we can leverage our existing assets, skills and experience to enhance the delivery of value”.*

The AngloGold Ashanti business values include:

- Safety – placing people first and place the highest priority on safe and healthy work practices and systems;
- Treating each other with dignity and respect;
- Embrace diversity and ensuring that we have the right person for the right job;
- Be accountable for your actions and deliver on commitments;
- The communities and societies in which we operate will be better off for AngloGold Ashanti having been there; and
- Respect the environment and continually improve processes in order to prevent pollution, minimise waste, increase carbon efficiency and make efficient use of natural resources.

To deliver on the business mission and values, five core strategies have been adopted. These are:

1. People are the business – provide leadership and supporting management processes to establish a climate in which every individual is able and willing to give their best.
2. Grow the business – successful exploration and organic growth projects are the most important building blocks for future value creation. AngloGold Ashanti will be opportunistic in looking for new business ventures that build on our core strength and provide pathways for growth.
3. Manage the Business as an asset portfolio – capital is a scare resource and has to be used wisely. Work our asset base to its fullest potential, selling non-core assets to ensure near-end projects are revitalised with new growth opportunities.
4. Maximise margins – manage revenue and costs to ensure delivery and protection of returns through the price cycle.
5. Deliver sustainable outcomes – responsibility to manage the environment and build our community, institution and political relationships so as to deliver mutually beneficial outcomes

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**13. Policies**

The Project IMS will be directed by Project-specific Environment, Community and Safety and Health policies or AngloGold/ Independence Group NL policies. Copies of the current AngloGold policies have been included as examples.

All Project employees and contractors are required to conduct their activities in accordance with the intent of all applicable policies.

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## SAFETY & HEALTH POLICY

AngloGold Ashanti Australia is committed to the value that:



**Safety is our First Value.**

*We place people first and correspondingly put the highest priority on safe and healthy practices and systems of work. We are responsible for seeking out new and innovative ways to ensure that our workplaces are free of occupational injury and illness. We live each day for each other and we use our collective commitment, talents, resources and systems to deliver on our most important commitment... to care.*

AngloGold Ashanti Australia through its personnel, will:

- comply, as a minimum requirement, with all relevant legislation, standards and codes;
- develop and apply comprehensive and robust safety and health management systems;
- integrate safety and health requirements with standard business practices;
- employ risk management processes to continuously improve workplace safety and health;
- promote safety and health awareness to create an injury and disease free workplace;
- identify relevant safety and health training opportunities for all employees;
- conduct annual audits, set performance objectives and measure progress to ensure continuous improvement and leading industry practice;
- use only those contractors and suppliers who demonstrate commitment to high standards of safety and health management and performance;

All personnel will be made aware of their duty of care to:

- work in a safe manner,
- follow established procedures,
- report all hazards, incidents and accidents

All employees and contractors are accountable for health and safety in their areas of responsibility, and will be regularly appraised on their performance.

**Mike Erickson**  
Vice President - Australia

**Date: 1 August 2009**  
Review : 1 July 2011

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## ENVIRONMENTAL POLICY

AngloGold Ashanti Australia is committed to the value that:



**We respect the environment**

*We are committed to continually improving our processes in order to prevent pollution, minimize waste, increase our carbon efficiency and make use of natural resources. We will develop innovative solutions to mitigate environmental and climate risks.*

To fulfil these commitments, AngloGold Ashanti Australia will:

- comply with all applicable environmental legislation and other requirements to which we subscribe;
- implement and maintain efficient and effective environmental management systems;
- work to maintain the integrity of the natural environment and biodiversity value in the area where we work by protecting natural processes, identifying critical habitats and /or threatened species and limiting our environmental footprint;
- integrate environmental, social and cultural aspects along with economic considerations into all planning activities and decision-making processes;
- manage the environmental and carbon footprint associated with our business from exploration through to mine decommissioning in order to reduce or eliminate their environmental impact and prevention of pollution;
- promote environmental awareness and understanding among our work colleagues to develop an informed and responsible environmental culture;
- provide relevant training and support for all personnel to enable them to fulfil their environmental responsibilities;
- conduct annual environmental audits, set and review performance objectives and targets and measure progress to ensure continuous improvement and responsible industry practice;
- develop and implement innovative approaches to environmental, energy efficiency and carbon management through scientific research and technology transfer;

All employees and contractors are accountable for upholding the company policy and standards on environmental management and will be regularly appraised on their performance.

**Mike Erickson**  
Vice President - Australia

**Date: 1 August 2009**  
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## COMMUNITY POLICY

AngloGold Ashanti Australia is committed to the value that:



**We want the communities and Societies in which we operate to be better off for AngloGold Ashanti having been there.**

*We uphold and promote fundamental human rights where we do business. We contribute to building productive, respectful and mutually beneficial partnerships in the communities in which we operate. We aim to leave host communities with a sustainable future.*

To achieve this, we will:

- recognise and respect the value of cultural heritage, diversity and comply with community agreements;
- develop and establish positive community relationships based on honesty, integrity and mutual trust;
- obtain guidance and input from our communities in business development strategies;
- encourage local participation in employment and contracting opportunities;
- consult and seek consensus between stakeholders in matters that effect them within particular reference to land management;
- conduct stakeholder surveys of AngloGold Ashanti's performance on community support and engagement;
- support the development and implementation of sustainable social and economic initiatives within our communities that we operate;
- provide management systems to identify, assess, monitor and control existing and potential impacts on communities;
- provide programs to ensure that employees are aware of and sensitive to the requirements of this policy.

**Mike Erickson**  
Vice President - Australia

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### **14. Standards**

The development of standards provides a higher level of corporate documentation which are applicable to the whole organisation. The standards translate policies into performance requirements and describe the what, when, where and who.

AngloGold has a number of existing standards which include (but are not limited to):

- Biodiversity Management
- Fit for Work
- Tailings Standard
- Hazardous Substance and Contamination Management
- Emissions Management
- Fire Prevention and Management
- Work Permits
- Working at Heights
- Workplace Isolation
- Management Review
- Mobile Equipment
- Emergency Preparedness and Response
- Monitoring and Data Management
- Operational Control
- Contracts and Suppliers
- Documentation and records Management
- Objectives, Targets and Management Programs
- Competence training Awareness
- Non-conformance management
- Communication
- Auditing and Assessment

Appendices 1 to 4 contain copies of all AngloGold the standards applicable to the Project.

### **15. Strategies**

The primary purpose of strategies is to provide an overall framework for environment, Health, Safety and Community management during specific aspects or activities of the Project. In addition, strategies are also developed to:

- identify key aspects to be addressed in supporting procedures;
- clearly articulate the management objectives;

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- document performance indicators and targets; and,
- identify monitoring and reporting requirements.

**16. Procedures**

The objectives of procedures are to:

- support the implementation of standards, policies and strategies;
- provide practical guidance on managing risks/aspects and compliance with legal requirements;
- ensure compliance with the management system;
- provide details on how to complete a task;
- provide sequential step by step instructions; and,
- provide a formal process for review and update.

The Project has procedures that relate to all applicable standards and strategies such as:

- dewatering;
- mining waste;
- landfill management;
- borefield management;
- refuelling stations;
- tailings management;
- pipeline installation;
- hydrocarbon spill management;
- recycling area management;
- work place inspections;
- pump replacement; and,
- dust extraction system maintenance

It is important to note that AngloGold has many procedures which are currently being implemented for its exploration activities within Australia and these are addressed in the *Australia Exploration IMS Manual* document. Procedures developed for the Project will expand on those which already exist.

Procedures will be made available in an electronic format on the company's intranet.

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### 17. *Records/database*

Records and databases provide documentary evidence of implementation and compliance with the management system. This evidence needs to be accessible and stored electronically using internal software package.

A number of internal AngloGold software packages for data management include:

- InControl;
- Compass;
- Intuition;
- InFlight; and,
- Lease Control.

These packages are likely to be upgraded or replaced over the life of the Project but the function / data management standard will be maintained, if not improved.

A description of each is provided below.

**InControl** is utilised for events management, safety meetings and minutes, audit schedule and outcomes, incident reports and risk register. Automatically generated e-mail notification is provided to all relevant employees when documents in this system have been updated.

**Compass** is used to manage our Geographical Information System (MapInfo) which provides hyperlinks to documentation such as environmental approvals and manages our data obtained on planning constraints such as locations of protected flora and fauna, environmentally sensitive areas and Aboriginal heritage sites.

**Intuition** is used to document training records and training schedules.

**InFlight** is used to monitor field activity, to manage flights to and from site and other travel arrangements. This system also contains emergency contact details and man hour information required to calculate lost time injury free days data.

**Lease Control** is a software package used to manage tenements and their associated requirements and approvals to ensure we are complying with specific tenement requirements.

### 18. *Inductions*

To ensure new personnel and contractors are aware and are familiar with the requirements of this IMS and its associated policies, standards, strategies and procedures prior to commencing work, a series of inductions have been developed in the form of presentations. Every employee and contractor is required to undergo the relevant induction process prior to commencing work. The inductions required include:

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- general site induction;
- work area specific inductions;
- IMS induction;
- Project environmental induction; and,
- cross-cultural awareness.

### **19. Management Review**

The policies, standards and procedures included (or to be developed and included) in this IMS will be complied with by all Project personnel and contractors. Any deviation from the intent of this IMS will be considered a non-conformance and will be documented and managed through the relevant procedure.

This IMS is dynamic and standards, strategies and procedures may be modified from time to time and new standards and procedures are developed as required. This IMS will be reviewed on a regular basis to ensure it remains current and accurate.

### **20. References**

AS/NZS ISO14001– 2004 “International Standard for Environmental Management Systems – Requirements with guidelines for use”.

AngloGold Ashanti Australia Integrated Management System Standard Manual (Issue V1)

OHSAS18001 – International Standard for Occupational Health and Safety Management System

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INTEGRATED MANAGEMENT SYSTEM

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***Appendix 1 – Integrated Management System Standards***

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# *Policy, Leadership and Accountability*

## 1 INTENT

Processes shall be developed, implemented and maintained so that all personnel at an AngloGold Ashanti Australia (AGAA) business unit are:

- Aware of their health, safety, environment and community (HSE&C) accountabilities and responsibilities
- Competent and appropriately resourced to fulfil these responsibilities.

## 2 SCOPE

This AGAA IMS Standard shall apply to all personnel, including contractors, working on the AGAA managed business unit.

## 3 PERFORMANCE REQUIREMENTS

### 3.1 POLICY AND LEADERSHIP

The operating General Manager shall:

- Demonstrate visible leadership in implementing the Health and Safety, Environment and Community (HSE&C) policies
- Provide an appropriate organisational structure for the implementation of the HSE&C policies
- Provide adequate human, financial and technological resources for the management of significant environmental, community, health and safety risks
- Where appropriate implement environment, community, health and safety performance reviews and incentive / disincentive schemes as part of employee management programs

### 3.2 ACCOUNTABILITY

The Corporate Manager HSE & C shall be accountable for:

- Ensuring periodic review, implementation and maintenance of the IMS, ensuring it is in compliance with HSE&C policies, AGA Values and Business Principles, ISO 14001 and OHSAS 18001
- Reporting on performance of the IMS to Top Management and include recommendations for review
- Facilitating internal / external communication of the IMS to employees / stakeholders

The operating site Safety Management Representative shall be accountable for:

- Ensuring periodic review, implementation and maintenance of the IMS, is in compliance with HSE&C policies, AGA Values and Business Principles, and OHSAS 18001
- Reporting on performance of the IMS to operating site management and include recommendations for review
- Facilitating internal / external communication of the IMS to employees / stakeholders

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## *Policy, Leadership and Accountability*

The operating site Environmental Management Representative shall be accountable for:

- Ensuring periodic review, implementation and maintenance of the IMS, is in compliance with HSE&C policies, AGA Values and Business Principles, and ISO 14001
- Reporting on performance of the IMS to operating site Management and include recommendations for review
- Facilitating internal / external communication of the IMS to employees / stakeholders

AGAA Management and operating site Management shall be accountable for:

- Compliance with the legal and other requirements;
- Demonstrating and maintaining leadership and personal commitment to the Health and Safety, Environment and Community policies
- Performance against objectives and targets; and
- Effective implementation and maintenance of the IMS.

Within each individual's area of accountability, responsibilities for management may be delegated to employees within each work group.

### **3.3 ROLES AND RESPONSIBILITIES**

Responsibilities for HSE&C management shall be documented and communicated:

- To employees as a position description, job description, or duty statement
- To others as an organisational chart or responsibility matrix

## **4 REFERENCES**

- ISO14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS18001:1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

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# ***Risk and Change Management***

## **1 INTENT**

Processes shall be developed, implemented and maintained to identify and manage the significant Health, Safety, Environmental and Community (HSE&C) risks and impacts at the AngloGold Ashanti Australia (AGAA) business unit.

## **2 SCOPE**

This AGAA IMS Standard shall apply to all personnel, including contractors, working on the AGAA managed business unit.

## **3 PERFORMANCE REQUIREMENTS**

### **3.1 IDENTIFYING HAZARDS AND RESULTING CONSEQUENCES / IMPACTS**

The business unit shall identify the HSE&C hazards associated with its business. The process of identifying these hazards should begin during the planning phase for activities, goods and services and take into account planned, current and relevant past activities.

For each activity, each area / department shall identify actual or potential events that may result in HSE&C consequences / impacts or a change in existing consequences / impacts. This identification process shall consider information on historical events within the company, in the country and in the industry globally, where available and relevant. The process shall also consider both normal and abnormal operating conditions (e.g. weather) as well as reasonably foreseeable emergency situations. In addition, the operation shall identify events that impact on the ability to meet the requirements of the policies. Impacts to the physical and social environment shall be identified. This shall include an indication of the extent of the impacts to the environment over time.

### **3.2 RISK ASSESSMENT**

The business unit shall assess the level of risks. The level of risk shall be estimated based on the consequences / impacts and the likelihood of these consequences occurring. Without controls in place, this risk is considered the inherent risk.

$$\text{Level of Risk} = \text{Consequence} \times \text{Likelihood}$$

### **3.3 RISK CONTROL**

Each activity shall have controls in place that act to prevent or reduce the likelihood of event occurrence, or reduce the severity of the consequences / impacts. Only controls that are implemented and effective shall be considered. When determining controls, the hierarchy of controls should be considered. Elimination, Substitution and Engineering should be considered before Administrative and Personal Protective Equipment controls.

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# Risk and Change Management

### 3.4 RESIDUAL RISK ASSESSMENT

With the controls in place, the risk should be reassessed. This is considered the 'residual risk'. In the process of a risk review, the risk may be assessed with current controls as the inherent risk, and improved controls can be considered when assessing the new 'residual risk'.

### 3.4 EMERGENCY RESPONSE AND ADDITIONAL CONTROLS

Where an extreme level of risk has been assessed, additional controls shall be implemented to further reduce the risk. This shall include emergency response measures to reduce the impacts of events.

### 3.5 RISKS REGISTER

The business unit shall develop and maintain a Risk register for its activities relating to HSE&C.

As a minimum, a risks register shall include:

- Activity / Task / Risk
- Actual / potential events / incidents
- Actual / potential consequences / impacts
- Mitigation and control measures
- Assessment of risk
- Emergency response / additional controls required

The Risk register shall be reviewed annually and at any other such time that the risks of an operation's activities change significantly. This may include reviews as a result of operational changes, hazards raised, incidents or implementation of further control measures.

### 3.6 CHANGE CONTROL

The business unit shall develop and maintain procedures to identify and manage the risks associated with changes to:

- Legal or other requirements;
- Equipment, infrastructure, process or work procedures; and
- Organisational structure and personnel.

The management of risks associated with changes shall be consistent with the requirements of this standard, and shall include revisions to the IMS and its documentation as appropriate.

### 3.7 RISK MANAGEMENT

The business unit shall develop and maintain appropriate objectives, targets, management programs, and documented operating criteria to reduce its highest risks.

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## *Risk and Change Management*

### 3.8 COMPETENCE AND COMMUNICATION

The business unit shall develop and maintain procedures to ensure all employees (including contractors) are competent to manage significant HSE&C risks associated with their tasks.

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy
- IMS-SYS-013 Management of Change

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# *Legal and Other Requirements*

## 1 INTENT

Processes shall be developed, implemented and maintained such that the AngloGold Ashanti Australia (AGAA) business unit is able to identify, and demonstrate compliance, with the legal and other requirements applicable to its Health, Safety, Environment and Community (HSE&C) risks.

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA managed business unit.

## 3 PERFORMANCE REQUIREMENTS

### 3.1 LEGAL REQUIREMENTS

The business unit shall identify and have access to the applicable legal and other requirements to which it subscribes, relevant to its risks.

Legal requirements to which the operating site may subscribe include:

- National and international legal requirements;
- State legal requirements;
- Local government legal requirements; and
- Permits, certificates and licences.
- Stock exchange listing requirements;

Other requirements to which the operating site may subscribe include:

- Agreements with public authorities;
- Agreements with community groups or non-governmental organisations;
- International and Australian Standards
- Guidelines and codes of practice;
- Obligations arising from membership of industry representative bodies, associations and affiliations; and
- Corporate requirements.

### 3.2 LEGAL REGISTERS

In respect of its legal and other requirements the operating site shall maintain these in the form of legal registers that:

- Defines the source of the legal or other requirement
- Defines the compliance requirements
- Provides a relationship with the relevant HSE&C aspects
- Is accessible to all relevant personnel
- Is regularly updated

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## *Legal and Other Requirements*

### 3.3 COMPLIANCE

The business unit shall implement and maintain procedures to ensure that compliance requirements are incorporated into the implementation and maintenance of the IMS.

### 3.4 COMPETENCE AND COMMUNICATION

The business unit shall implement and maintain procedures to communicate its legal and other requirements to relevant employees (including contractors).

Procedures shall be implemented and maintained to ensure that employees (including contractors) who have the potential to cause non-compliance are familiar with the requirements for achieving compliance.

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy

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# Objectives, Targets and Management Programs

## 1 INTENT

Processes shall be developed, implemented and maintained for establishing and achieving Health, Safety, Environment and Community (HSE&C) objectives and targets on the AngloGold Ashanti Australia (AGAA) business unit .

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA managed business unit. .

## 3 PERFORMANCE REQUIREMENTS

### 3.1 OBJECTIVES AND TARGETS

The business unit shall establish, implement and maintain documented objectives and targets aligned with requirements of the Safety and Health, Environmental and Community Policies.

Objectives and targets shall be relevant to:

- Reduction of significant HSE&C risks
- Compliance with legal and other requirements
- Concerns of stakeholders
- Opportunities and constraints within the business
- Continual improvement initiatives

The objectives and targets should be measurable, practicable and relevant to the operating site's technological options; financial, operational and business requirements.

As a minimum, the objectives and targets shall be:

- Documented
- Applicable to appropriate levels and functions within the organisation
- Communicated
- Monitored
- Annually reviewed

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# *Objectives, Targets and Management Programs*

## 3.2 MANAGEMENT PROGRAMS

The business unit shall establish, implement and maintain documented management programs for achieving its HSE&C objectives and targets. As a minimum, management programs shall include:

- Involvement of key stakeholders in the Management of the site
- Demonstrate sustainable and socially responsible Management
- Actions required to achieve the targets
- Resources allocated to the completion of actions
- Time-frames
- Assignment of responsibility for achieving objectives and targets at appropriate levels and functions within the organisation

Compliance with management programs shall be monitored and its progress reported to the management team.

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
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# Competence, Training & Awareness

## 1 INTENT

Processes shall be developed, implemented and maintained such that all employees and contractors on the AngloGold Ashanti Australia (AGAA) business unit are:

- Aware of their Health, Safety, Environment and Community (HSE&C) responsibilities
- Competent in managing significant impacts associated with their roles.

## 2 SCOPE

This AGAA IMS Standard shall apply to all personnel, including contractors, working on the AGAA managed business unit. .

## 3 PERFORMANCE REQUIREMENTS

The business unit shall establish, implement and maintain a training plan and program to achieve HSE&C awareness and role-based competency of all employees and contractors. The training program shall include the assessment of employee training needs, and the maintenance of records.

### 3.1 TRAINING NEEDS ANALYSIS

The business unit shall develop, implement and maintain procedures for analysing the training needs of employees and contractors.

Documentation shall be maintained such that the following information is available and up to date:

- Significant risks and potential impacts associated with employee roles
- Awareness training needs (IMS, conformance with policies, benefits of improved personal performance)
- Competency-based training needs (relevant operating procedures and role-based responsibilities)

### 3.2 TRAINING

The business unit shall establish and implement training sessions to meet the awareness and competency needs of specific employees and contractors. Employees and contractors should complete the necessary training packages.

Training sessions shall:

- Be undertaken by suitably competent personnel\*
- Be adequately provided for in terms of resources and time
- Cover the potential consequences of deviation from specified procedures

\*Competency shall be obtained through relevant qualifications, training and / or experience

### 3.3 RECORDS

The business unit shall establish, implement and maintain procedures for keeping and protecting the following records:

- Trainers' details
- Training session learning outcomes
- Employee attendance

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# Competence, Training & Awareness

- Records of attendance and / or competency

### 3.4 REVIEW

The business unit shall implement and maintain a process of review to ensure that training programs are adequate and satisfactorily implemented.

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

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# Communication

## 1 INTENT

Processes shall be developed, implemented and maintained for the communication of information on the significant Health, Safety, Environmental and Community (HSE&C) risks and impacts on the AngloGold Ashanti Australia (AGAA) business unit .

## 2 SCOPE

This AGAA IMS Standard shall apply to all personnel, including contractors, working on the AGAA managed business unit.

## 3 PERFORMANCE REQUIREMENTS

The business unit shall develop, implement and maintain a procedure/s to manage the internal and external communication of information related to its significant HSE&C risks and impacts. As a minimum, the operating site shall:

- Define the scope of internal and external communication
- Establish and document the communication roles, responsibilities and authorities within the relevant levels and functions of the organisation
- Establish, maintain and document the communication channels appropriate to the type and significance of the information
- Record significant communications
- Develop and document communication strategies and requirements in an emergency situation

### 3.1 INTERNAL COMMUNICATIONS

With regards to its internal communications, the operating site shall:

- Keep personnel informed of organisational targets, performance and initiatives
- Communicate relevant industry information that will assist in improved performance
- Ensure information required for the implementation and maintenance of the IMS is current and accessible
- Report significant actual or potential non-conformances to senior management

### 3.2 EXTERNAL COMMUNICATIONS

With regards to its external communications, the operating site shall:

- Record decisions to release, or otherwise, information on its significant HSE&C risks to the public and stakeholders
- Ensure that documented approvals from AngloGold Ashanti Australia Ltd have been obtained prior to the public release of information
- Receive, document and respond to external communications (including complaints) in a timely and appropriate manner
- Meet statutory reporting requirements
- Ensure that the HSE&C policies are available to the public on request

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# Communication

### 3.3 COMPETENCE AND COMMUNICATION

The business unit shall develop and maintain a procedure/s to ensure relevant employees (including contractors) are aware of the requirements of internal and external communications.

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- AGA Community & Social Development – Proposed Management System
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

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# Documentation & Records Management

## 1 INTENT

Processes shall be developed, implemented and maintained for the management of documentation and records required to demonstrate the functioning and continual improvement of the Integrated Management System (IMS) at the AngloGold Ashanti Australia (AGAA) business unit.

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA managed business unit.

## 3 PERFORMANCE REQUIREMENTS

The business unit shall establish, implement and maintain a procedure/s for the documentation and management of information essential to the implementation of the IMS.

The documentation shall include:

- Description of the context, scope and elements of its IMS
- Description of interaction between components of its IMS
- Direction to relevant information
- Procedures, records and external sources of information relevant to the management of significant Health, Safety, Environmental and Community (HSE&C) risks and implementation of the HSE&C Policies
- Records to verify compliance with the policies and IMS Standards

The documentation shall be uniquely identified and contain sufficient level of detail to enable the systematic implementation of the IMS with consistent results.

Documents and records shall be maintained and where required translated into the appropriate language for the individuals accountable for maintaining and implementing the IMS.

### 3.1 DOCUMENT MANAGEMENT

The business unit shall establish, implement and maintain a procedure/s to manage their IMS documentation, such that it is:

- Legible and retrievable
- Approved for issue
- Current and regularly reviewed
- Accessible to personnel
- Retained for specific purposes where required

Procedures shall ensure that obsolete information is prevented from unintended use.

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# Documentation & Records Management

## 3.2 RECORDS MANAGEMENT

The business unit shall establish, implement and maintain a procedure/s to manage records, such that they are:

- Legible and identifiable
- Traceable to the related activity
- Protected against loss or damage
- Retrievable
- Disposed of appropriately

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with Guidance for Use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems Specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

## 5 RELATED DOCUMENTS

- Document Retention and Destruction Policy 21
- Records Management Policy 21
- Retention and Disposal Schedule

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# Operational Control

## 1 INTENT

Processes shall be developed, implemented and maintained such that operations on the AngloGold Ashanti Australia (AGAA) business unit are carried out in compliance with the Safety and Health, Environment and Community (HSE&C) Policies, and are consistent with its HSE&C objectives and targets.

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA managed business unit.

## 3 PERFORMANCE REQUIREMENTS

### 3.1 OPERATING STANDARDS

The business unit shall consider the overall intent of the AGAA Operating Standards (AGAA-OS-1 - 13) when developing work processes for relevant tasks. These documents outline the performance requirements associated with certain activities.

### 3.2 OPERATING PROCEDURES

The business unit shall establish, implement and maintain documented operating procedures/management plans for the prevention and minimisation of their significant impacts.

As a minimum, operating procedures shall include:

- HSE&C considerations associated with the task where relevant
- Legal compliance requirements and limits where relevant
- Operating instructions for the activity to prevent and minimise significant impacts
- Potential consequences of failure to follow procedures

Operating procedures shall be consistent with HSE&C Policies and objectives and targets, and comply with the requirements of Standard 7 - Documentation and Records Management.

Procedures shall be translated into the appropriate language and dialect, and shall be kept up to date.

The existence of standard operating procedures and relevant procedures shall be communicated at site inductions for all new employees and major contractors.

### 3.3 COMPETENCE AND COMMUNICATION

The business unit shall implement and maintain procedures to ensure that personnel are competent to perform their tasks.

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# *Operational Control*

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy
- IMS-STD-005 Competence, Training and Awareness
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# *Emergency Preparedness and Response*

## **1 INTENT**

Processes shall be developed, implemented and maintained to prevent the occurrence, ensure preparedness for, and mitigate the impacts of potential emergencies on the AngloGold Ashanti Australia (AGAA) business unit.

## **2 SCOPE**

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA business unit.

## **3 PERFORMANCE REQUIREMENTS**

### **3.1 EMERGENCY PLANNING AND PREPAREDNESS**

The business unit shall establish, implement and maintain procedures to identify and document:

- Situations of potential emergencies
- Control measures to reduce the risk of emergency occurrence
- Response actions required to reduce the impacts of an emergency
- Internal and external communication and reporting requirements in the event of an emergency

The business unit shall ensure that:

- Emergency procedures are communicated to relevant personnel
- Adequate and appropriate human and technical resources are available and maintained to implement the Emergency Procedures
- Personnel are competent in the implementation of the Emergency Procedures
- The Emergency Procedures are periodically tested for effective and adequacy

### **3.2 EMERGENCY RESPONSE**

In the event of an emergency, or emergency preparedness and response drills, the business unit shall:

- Implement the Emergency Procedures
- Comply with statutory reporting requirements when applicable

### **3.3 POST EMERGENCY**

After the occurrence of an emergency or drill, the business unit shall:

- Investigate emergency and report findings to senior management
- Review and revise the Emergency Procedures as part of continual improvement
- Share the lessons learnt with the rest of AngloGold Ashanti

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# *Emergency Preparedness and Response*

## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

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# Monitoring and Data Management

## 1 INTENT

Processes shall be developed, implemented and maintained for Health, Safety, Environmental and Community (HSE&C) monitoring performance related to the significant risks and impacts on the AngloGold Ashanti Australia (AGAA) business unit .

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA managed business unit.

## 3 PERFORMANCE REQUIREMENTS

The business unit shall develop, implement and maintain a procedure(s) for the periodic monitoring of key characteristics of its significant HSE&C risks and impacts.

### 3.1 MONITORING AND MEASUREMENT

As a minimum, performance monitoring shall include the documentation and review of information necessary to assess:

- Progress against objectives and targets
- HSE&C impacts of changes to plant, process, procedures, organisational structure and personnel
- Extent of significant impacts
- Effectiveness of controls

### 3.2 MONITORING EQUIPMENT

Equipment required for monitoring performance shall be

- Fit for purpose
- Operated and maintained according to manufacture’s instructions
- Calibrated and tested for accuracy

### 3.3 MONITORING RECORDS

Monitoring data, results, and evidence of equipment testing and calibration shall be documented and managed as records.

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## 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy
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	<b>INTEGRATED MANAGEMENT SYSTEM STANDARD</b>			
	<b><i>Non-Conformance Management</i></b>			

## 1 INTENT

Processes shall be developed, implemented and maintained on the AngloGold Ashanti Australia (AGAA) business unit to:

- Identify and address actual and potential non-conformances with the Safety and Health, Environment and Community (HSE&C) Policies
- Prevent and mitigate significant HSE&C impacts.

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA managed business unit .

## 3 PERFORMANCE REQUIREMENTS

The business unit shall develop, implement and maintain a documented procedure(s) for management of actual or potential non-conformances and the implementation of corrective and preventative actions. The procedure(s) shall include:

- Responsibilities and authorities
- Methodology for investigations and impact assessment
- Implementing and documenting the results of corrective and preventive actions
- Reporting and communication requirements
- Requirements for preventing non-conformance
- Documentation of information

### 3.1 CORRECTIVE ACTIONS

In the event of a non-conformance, appropriate immediate actions shall be taken to prevent and / or mitigate the impacts of the event.

### 3.2 NON CONFORMANCE INVESTIGATION

As a minimum, investigation of non-conformances shall be documented and include the identification of:

- The actual and potential consequence severity of the impacts
- Actual or potential for breach of legal requirements
- Contributing factors
- Root causes
- Effectiveness of immediate corrective actions
- Actions required to prevent a recurrence including the need for changes to procedures and documentation
- Management approval of investigation for adequacy
- Relevant internal and external groups who should receive communication on the event

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	<b>INTEGRATED MANAGEMENT SYSTEM STANDARD</b>			
	<b><i>Non-Conformance Management</i></b>			

### **3.3 ACTIONS**

Actions identified during investigations shall be documented, implemented and tracked to completion. Monitoring processes shall be in place to determine the effectiveness of these actions.

Preventive actions shall be appropriate to the extent and nature of the actual or potential non-conformance, and designed to prevent a non-conformance or its recurrence.

### **3.4 DOCUMENTATION REVIEW**

IMS documentation including the HSE&C risk registers, objectives and targets and operational control procedures, shall be reviewed in light of significant incidents or non-conformances and revised if necessary.

### **3.5 COMPETENCE AND COMMUNICATION**

The business unit site shall develop and maintain procedures to ensure employees (including contractors) are competent in identifying and reporting non-conformances, and that Supervisors and Managers are aware of their roles and responsibilities in investigating non-conformances.

## **4 REFERENCES**

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

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# Auditing and Assessment

## 1 INTENT

Processes shall be developed, implemented and maintained to audit and assess compliance with the Safety and Health, Environment and Community (HSE&C) Policies, and the legal and other requirements of the AngloGold Ashanti Australia (AGAA) operating site.

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, on the AGAA operating site within the defined scope of the IMS.

## 3 PERFORMANCE REQUIREMENTS

The operating site shall develop, implement and maintain procedure(s) for the periodic evaluation of compliance with the HSE&C Policies, and to assess the adequacy of the IMS in fulfilling the policies.

### 3.1 COMPLIANCE MONITORING

As a minimum the operating site shall implement and maintain documented audits to assess and demonstrate compliance with:

- Legal and other requirements
- HSE&C Policies and IMS Standards
- Sunrise Dam Gold Mine specific IMS procedures
- OSHAS 18001:1999 Occupational Health and Safety Management System: Specification
- ISO14001:2004 International Standard Environmental Management Systems: Requirements for use

### 3.2 TECHNICAL AUDIT

The operating site management team shall develop, implement and maintain procedures to assess the adequacy of the HSE&C Policies and IMS Standards in achieving and maintaining:

- An injury free workplace
- Sustainable development
- Certification to ISO 14001:2004 and OHSAS 18001:1999 specifications

The operating site shall develop, implement and maintain documented audits to assess the adequacy of controls and procedures in:

- Implementing the HSE&C Policies and the IMS
- Preventing and mitigating injuries and significant impacts
- Preventing the recurrence of significant events and non-conformances
- Meeting objectives and targets

### 3.2 AUDIT PROCEDURES

Compliance and technical audit procedures shall include:

- Scope and criteria of the audits

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## *Auditing and Assessment*

- Frequency of audits based on significance of impacts
- Audit methodology
- Criteria for auditor selection where relevant
- Reporting of results to Senior Management
- Records management

### **4 REFERENCES**

- ISO 14000:2003 Guidelines for quality and/ or environmental management systems auditing.
- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

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# Management Review

## 1 INTENT

Processes shall be developed, implemented and maintained for Senior Management to review the suitability and adequacy of the AngloGold Ashanti Australia (AGAA) Integrated Management System (IMS) in meeting the requirements of the Health & Safety, Environmental and Community Policies.

## 2 SCOPE

This AGAA IMS standard shall apply to AGAA Management personnel within the defined scope of the IMS.

## 3 PERFORMANCE REQUIREMENTS

Procedures shall be developed, implemented and maintained to periodically review components of the IMS appropriate to the level of authority of the Management Team. This is done to ensure the ongoing suitability, adequacy, effectiveness and improvement of the IMS.

Information provided for the review shall be sufficient to allow the Management Team to make informed and appropriate decisions, and shall include:

- Results of compliance and technical audits
- External communications
- Health, Safety, Environment and Community (HSE&C) performance
- Progress against objectives and targets
- Status of corrective and preventive actions
- Status of actions from previous sessions
- Changes to legal and other requirements, equipment, procedures, organisation, and personnel
- Recommendations for improvement

The outcomes of the review shall include:

- Decisions on external communication of significant risks
- Required changes to components of the IMS appropriate to the level of authority
- Resource commitments where appropriate
- Initiatives for continual improvement

Management review sessions shall be documented and maintained as records.

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## *Management Review*

### 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
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# Contractors and Suppliers

## 1 INTENT

Processes shall be developed, implemented and maintained to manage the significant Health, Safety, Environmental and Community (HSE&C) risks associated with the contractors and suppliers on the AngloGold Ashanti Australia (AGAA) business unit.

## 2 SCOPE

This AGAA IMS Standard shall apply to all employees, including contractors, working on the AGAA managed business unit.

## 3 PERFORMANCE REQUIREMENTS

The business unit shall develop effective working relationships with its main contractors and suppliers, and engage them in performance improvement initiatives.

As a minimum, the business unit shall develop, implement and maintain procedures to:

- Identify the contractors and suppliers who interact with significant HSE&C risks of the operation
- Ensure that contractors and suppliers are competent in or are provided direction in managing significant impacts
- Identify local vendors with the capacity to supply goods and services
- Monitor and improve the performance of contractors and suppliers
- Provide leadership in good performance and continual improvement

### 3.1 CONTRACTOR SELECTION

For contractors and suppliers who will interact with significant HSE&C risks selection criteria shall include:

- Current demonstrable competence in impact prevention and management and work tasks, or the ability to achieve this competence prior to start of work
- Adequate financial and personnel resources for the above
- Ability to comply with the IMS requirements of the operating site

Documentation and records shall be maintained for verification of compliance with selection requirements.

### 3.2 CONTRACTOR ENGAGEMENT AND MANAGEMENT

The business unit shall establish, implement and maintain procedures to:

- Communicate to contractors and suppliers
- Periodically review and document contractor and supplier performance
- If appropriate provide incentive or disincentives regarding performance

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## *Contractors and Suppliers*

### 4 REFERENCES

- ISO 14001:2004 Environmental Management Systems- Requirements with guidance for use
- OSHAS 18001: 1999 Occupational Health and Safety Management - Systems specification
- IMS-POL-002 Safety and Health Policy
- IMS-POL-001 Environmental Policy
- IMS-POL-003 Community Policy

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INTEGRATED MANAGEMENT SYSTEM

***Tropicana Gold Project  
Integrated Management System Manual***

***Appendix 2 – Environmental Standards***

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# *Biodiversity Management*

## 1 INTENT

To ensure that all activities undertaken by AngloGold Ashanti Australia (AngloGold) minimise or avoid impacts on biodiversity. The implementation of this standard demonstrates that the protection of biodiversity is an integral component of the AngloGold business, and where possible, leads to positive biodiversity outcomes.

## 2 SCOPE

The intent of this standard shall apply to all personnel and contractors involved with any AngloGold Ashanti Australia managed activity.

## 3 PERFORMANCE REQUIREMENTS

### 3.1. INTRODUCTION

Biodiversity is the variety of life forms: the different animals, plants and microorganisms, their genes and the ecosystems of which they are a part (Government of Western Australia, 2002). Biodiversity is critical to maintaining the natural environment in a functioning state and is also recognised as being of value for aesthetic, spiritual, cultural, recreational and scientific purposes. The importance of biodiversity is recognised by its protection in state, territory and commonwealth acts and agreements (see References).

Mining has the potential to affect biodiversity directly, indirectly and cumulatively. The International Council of Mining and Metals (ICMM) identifies direct or primary impacts from mining as those that result from any activity that involves land clearance (such as access road construction, exploration drilling, overburden stripping or tailings impoundment construction) or direct discharges to water bodies (riverine tailings disposal, for instance, or tailings impoundment releases) or the air (such as dust or smelter emissions). Indirect or secondary impacts can result from social or environmental changes induced by mining operations and are often harder to identify immediately. Cumulative impacts occur where mining projects are developed in environments that are influenced by other activities that impact on the natural environment.

AngloGold acknowledges the high level of biodiversity present in Australia, particularly in remote regions, and recognises the potential impacts that its activities may have on biodiversity. The company is committed to the preservation of biodiversity in all aspects of its activities and is committed 'to contribute to the conservation of biodiversity and integrated approaches to land use planning'. This is achieved by:

- respecting legally designated protected areas;
- disseminating scientific data on and promoting practices and experiences in biodiversity assessment and management; and
- supporting the development and implementation of scientifically sound, inclusive and transparent procedures for integrated approaches to land use planning, biodiversity, conservation and mining.

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## *Biodiversity Management*

### 3.2. BIODIVERSITY MANAGEMENT STRATEGY

All business units that may have a potential impact on biodiversity (as determined via risk assessment) are required to develop and implement a Biodiversity Management Strategy (BMS). The BMS will incorporate elements based on leading practice management frameworks for biodiversity management as developed by the Department of Tourism Industry Resources (DTIR). These will include:

- Identifying primary, secondary or cumulative impacts on biodiversity values.
- Minimising and managing these impacts.
- Restoring conservation values.
- Managing conservation values on a sustainable basis.

#### 3.2.1 Identifying Impacts on Biodiversity values

Prior to commencing any activity that may impact biodiversity the Business Unit will:

- Identify regulatory requirements and confirm implications for the proposed activities.
- Identify areas important for biodiversity either by their status as protected areas or through baseline surveys. Any areas to be disturbed will be subject to baseline studies as required by applicable regulations and to demonstrate due diligence.
- Understand the interfaces between the proposed activities and biodiversity. This should include the active engagement of stakeholders to identify all impacts on native biota, including aquatic biota. Stakeholders may include government departments, local government councils and communities, non government organisations, Traditional Owners and private landholders.
- Carry out an impact assessment and risk assessment to identify activities that may have a negative impact on biodiversity, identify 'no go' areas and ensure the activity is viable. Impact and risk assessments should be carried out with reference to guidance provided in the DTIR's *Leading Practice Sustainable Development Program for the Mining Industry Series – Mine Rehabilitation* (2006) publication.

#### 3.2.2 Minimise and Manage Potential Impacts on Biodiversity

Identify and implement a hierarchy of measures to protect biodiversity and affected stakeholders<sup>1</sup>.

The hierarchy of mitigation measures should be prioritised from most to least desirable as follows: avoid – reduce – remedy (or mitigate, restore, revegetate) – compensate (offsets).

Measures should be incorporated in the Business Units Environmental Management Plan where appropriate.

<sup>1</sup> [For some examples of possible biodiversity mitigation measure refer to *Good Practice for Mining and Biodiversity* (ICMM, 2006)]

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# Biodiversity Management

### 3.2.3 Restore and Sustainably Manage Conservation Values

Where negative impacts on biodiversity cannot be avoided, rehabilitation and post rehabilitation management will be undertaken in accordance with the AngloGold Ashanti Australia Rehabilitation Standard.

Biodiversity offsets should be considered with reference to ICMM (2005) and EPA (2006).

Beyond the hierarchy of mitigation measures outlined above, all AngloGold activities should seek opportunities to enhance biodiversity wherever possible. Enhancement of biodiversity is best achieved in collaboration with stakeholders including local communities and NGO's.

## 4 REFERENCES

- Department of Industry, Tourism and Resources. 2006. *Leading Practice Sustainable Development Program for the Mining Industry Series – Mine Rehabilitation.*
- *Conservation and Land Management Act 1984* (Western Australia)
- *Environmental Protection Act 1986* (Western Australia)
- *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
- Environmental Protection Authority. 2006. *Offsets. Position Statement No. 9.*
- Environmental Protection Authority. 2002. *Terrestrial Biodiversity Survey as an Element of Biodiversity Protection. Position Statement No.3.*
- Government of Western Australia. 2002. *A Biodiversity Conservation Act for Western Australia. Consultation Paper.*
- Government of Western Australia. 2004. *Towards A Biodiversity Conservation Strategy for Western Australia. Discussion Paper.*
- International Council on Mining and Metals. 2006. *Good Practice Guidance for Mining and Biodiversity*
- International Council on Mining and Metals. 2005. *Biodiversity Offsets – A briefing Paper for the Mining Industry*
- Minerals Council of Australia. 2004. *Enduring Value – The Australian Minerals Industry Framework for Sustainable Development, Guidance for Implementation.*
- Ministerial Council on Mineral and Petroleum Resources. 2005. *Principles for Engagement with Communities and Stakeholders*
- *Soil and Land Conservation Act 1945* (Western Australia)
- *Soil and Land Conservation Amendment Act 1994* (Western Australia)
- *Wildlife Conservation Act 1950* (Western Australia)

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# Energy Efficiency and Climate Change

## 1 INTENT

To ensure that energy consumption associated with AngloGold Ashanti Australia (AngloGold) activities is managed in accordance with the requirements of this standard. This standard aims to promote the efficient use of energy, minimising the greenhouse footprint (establishing stretch targets) and allows for future energy and emissions trading schemes.

## 2 SCOPE

The intent of this standard shall apply to all personnel and contractors involved with any AngloGold managed activity.

## 3 PERFORMANCE REQUIREMENTS

### 3.1. INTRODUCTION

AngloGold recognises the significance of climate change and thus the need to address both the short and long term energy consumption during its activities through improved energy efficiency and reduced Greenhouse Gas (GHG) emissions. As a member of the International Council on Metals and Minerals (ICMM) AngloGold is committed to:

- Continuing to meet or exceed government requirements.
- Monitoring and reporting GHG emissions consistent with both Australian and international standards, in line with their commitment to report in accordance with the Global Reporting Initiative framework.
- Reduce GHG emissions as measured in absolute terms or per unit of production or through improved energy efficiency.

Increased regulator requirements and stakeholder expectations are commensurate with recent focus of political action. The introduction of national greenhouse reporting and energy requirements (refer Section 3.2) is planned and it is likely an emissions trading scheme(s) will be introduced by state/territory and/or federal government in the near future. It is imperative that AngloGold activities continue to implement leading practice energy efficiency and greenhouse gas reduction measures in order to meet changing future requirements. It is recognised that in the absence of additional abatement action future emissions will increase as a result of production increases, energy intensity due to the remoteness of operations and the limitations on available renewable energy sources. This will require innovation and effort to improve energy efficiencies and reduce greenhouse emissions.

### 3.2. REPORTING

AngloGold is a member of Greenhouse Challenge Plus and is required to submit annual reports on details of emissions.

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## Energy Efficiency and Climate Change

Refer <http://www.greenhouse.gov.au/challenge/index.html> for more information on Greenhouse Challenge Plus commitments and reporting requirements.

The Commonwealth *Energy Efficiency Opportunities Act 2006* mandates planning, monitoring and reporting energy efficiency. Reporting requirements should be referenced at <http://www.energyefficiencyopportunities.gov.au/index.cfm>

From the 1<sup>st</sup> of July 2008 the *National Greenhouse Reporting and Energy Bill 2007* is planned to be introduced. This will require greenhouse gas emissions and energy consumption to be reported in accordance with a national framework. Regulation and reporting requirements under this legislation will be phased in over three years with first reports due in 2009. Refer to <http://www.greenhouse.gov.au/reporting/index.html> for updated information on requirements.

The *National Greenhouse Reporting and Energy Bill 2007* will from the basis of a future planned emissions trading scheme. The structure of the trading scheme is yet to be finalised and various schemes have been proposed at both state and federal level. The introduction of a trading scheme will place a financial value on emissions. It is essential that all emissions are accurately recorded and reported. AngloGold business units will need to consider financial implications when determining energy management strategies.

### 3.3. ENERGY EFFICIENCY AND GREENHOUSE REDUCTION STRATEGY

Energy Audits shall be carried out at by all business units to measure and monitor energy consumption trends to identify opportunities for improvements in energy efficiency.

Business units shall establish targets to focus improvements in energy efficiency and greenhouse gas emissions. Major initiatives such as reducing water demand, increasing production efficiencies and technologies, purchasing renewable energy, fuel switching (purchasing electricity from lower emissions sources), carbon sequestration and offsets (e.g. purchasing Australian Greenhouse Office approved offsets) should be evaluated by each business unit. Targets shall be reported annually.

Energy efficiency and greenhouse gas reduction measures shall be considered on a 'whole of activity or mine life' basis for new or expansion projects. Potential energy efficiency savings associated with exploration and mining activities are discussed further in Environment Australia's *Best Practice Environmental Management in Mining Series – Energy Efficiency, 2002*.

In planning for energy efficiency and GHG reduction the business unit shall also address the following general principles as set out by the ICMM

- Carrying out or promoting research, development, demonstration and technology transfer to reduce GHG emissions at operations.
- Continuing to promote and improve the recycling of products within the context of lifecycle GHG emissions reduction.
- Working with industry bodies in energy generation and transmission, as well as customers to develop integrated ways of improving energy efficiency.

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## Energy Efficiency and Climate Change

- Working with governments and civil society organizations to address the challenge of climate change.

Proposed future activities or expansions of existing activities will consider relevant state and territory greenhouse or energy strategies, commitments and targets when seeking development approval. For example

[http://portal.environment.wa.gov.au/pls/portal/docs/PAGE/DOE\\_ADMIN/GREENHOUSE\\_REPOSITORY/TAB6327544/2007006CLIMATECHANGE.PDF](http://portal.environment.wa.gov.au/pls/portal/docs/PAGE/DOE_ADMIN/GREENHOUSE_REPOSITORY/TAB6327544/2007006CLIMATECHANGE.PDF)

### 4 REFERENCES

- Australian Business Roundtable. 2006. *The business case for early action*. Available at: [www.businessroundtable.com.au](http://www.businessroundtable.com.au).
- Australian Greenhouse Office <http://www.greenhouse.gov.au/ago/index.html>
- Department of Industry Tourism and Resources. 2006. *Energy Efficiency Opportunity Guidelines*. National Framework for Energy Efficiency.
- Environment Australia *Best Practise Environmental Management in Mining Series – Energy Efficiency* <http://www.deh.gov.au/settlements/industry/minerals/booklets/index.html> UPDATE
- International Council on Mining and Metals. 2006. *Position Statement – Climate Change*.
- Government of Western Australia. 2007. *Making Decisions for the Future – Climate Change*.
- Government of Western Australia. 2006. *Western Australian Greenhouse Strategy*.
- Greenhouse Challenge Plus. 2007. <http://www.greenhouse.gov.au/challenge/index.html>
- Minerals Council of Australia. 2004. *Enduring Value – The Australian Minerals Industry Framework for Sustainable Development, Guidance for Implementation*.
- NSW Government. 2006. *Submissions to – A National Emissions Trading Scheme: Background Paper*. Submissions available at <http://www.cabinet.nsw.gov.au/emissions/emissions.html>.

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# Rehabilitation Management

## 1 INTENT

To ensure all AngloGold Ashanti Australia (AngloGold) business units undertaking ground disturbing activities must develop and implement an effective rehabilitation strategy in accordance with the requirements of this standard. This will ensure rehabilitation works result in a sustainable, long-term land use that complies with all stakeholder expectations and requirements, providing a positive environmental outcome or a net environmental benefit.

## 2 SCOPE

The intent of this standard shall apply to all personnel and contractors working on the AngloGold Ashanti Australia managed activities.

## 3 PERFORMANCE REQUIREMENTS

### 3.1. INTRODUCTION

Successful rehabilitation is a key component used to reduce the long-term impact of exploration and mining on the environment. Rehabilitation objectives depend on the ultimate land use and therefore, objectives may vary from creating a safe and stable landform to establishing a sustainable native ecosystem that closely resembles the pre-existing plant communities. The agreed final land use of the site should be determined in consultation with key stakeholders and should take into consideration both regulatory and physical constraints.

Planning, monitoring and maintenance are essential to achieve successful rehabilitation outcomes. Rehabilitation should be considered in all stages from exploration through to mine closure, and in all areas. By considering rehabilitation at all stages of our business; consideration can be given to preservation of critical vegetation (e.g. corridors and linkages, protected flora and vegetation, hygiene procedures), maximising the use of the resource (e.g. seed collection, mulching and topsoil protection), the shaping of landforms consistent with the agreed land use and the progressive staging of the rehabilitation works to meet the established criteria.

### 3.2. REHABILITATION MANAGEMENT STRATEGY

AngloGold requires that all business units develop and implement rehabilitation strategies that address the following items were appropriate:

- Tailored, site-specific management plan commensurate with the scale of the activity.
- Meet regulatory obligations and company commitments as documented in tenement condition, approval documents (such as Mining Proposals, Environmental Impact Assessment Documents and Ministerial conditions) and/or approved environmental plans.

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- The ultimate land use of the area is to be determined in consultation with relevant stakeholders, and considering regulatory and physical constraints.
- Documentation of stakeholder input including State government agencies, local government councils, non-government organisations, Traditional Owners and private landholders.
- The structure, function and values of the site collected during baseline studies. Baseline data may be obtained by supporting or initiating research and/or utilising existing environmental and relevant information (e.g. drainage characteristics, geology, landscape and topography information).
- The review and revision requirements (e.g. annual review) until the completion criteria are met. Rehabilitation plans should be progressively implemented through all stages of our activities from exploration, operations through to closure.
- Monitoring programs, which are to detail completion criteria established on baseline data, research programs (where applicable) and the ultimate land use. Criteria are to be developed and accepted by the appropriate regulatory authority and key stakeholders.
- Appropriate technologies to improve rehabilitation techniques and maximise the use of natural resources. This should include benchmarking with similar leading practice projects and investigating rehabilitation techniques for recalcitrant species.
- A whole of lease approach to rehabilitation e.g. conserve vegetation by carrying out weed eradication programs in adjacent undisturbed areas and considering rehabilitation corridors and linkages.
- Seek opportunities to undertake or support rehabilitation research to improve the ecological function of rehabilitated landform or area.

Several leading practice guidelines have recently been produced, notably the Department of Industry, Resource and Tourism, *Leading Practice Sustainable Development Program for the Mining Industry Series – Mine Rehabilitation, 2006*. Relevant requirements of these documents should be addressed in the Rehabilitation Management Strategy.

## 4 REFERENCES

- Department of Industry, Tourism and Resources. 2006. *Leading Practice Sustainable Development Program for the Mining Industry Series – Mine Rehabilitation*.  
<http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=91159894-AA63-72C7-B69D0E808FE48D8A>
- Environmental Protection Agency. 1995. *Best Practice Environmental Management in Mining Series - Rehabilitation and Revegetation*.  
<http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=BF645BCB-964A-B247-A9E94E25110BDA2E>

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## *Rehabilitation Management*

- Environmental Protection Authority. 2006. *Guidance for the Assessment of Environmental Factors (in Accordance with the Environmental Protection Act 1986) - Rehabilitation of Terrestrial Ecosystems. Guidance No. 6.*
- International Council on Mining and Metals. 2006. *Good Practice Guidance for Mining and Biodiversity.*  
[http://www.icmm.com/library\\_pub\\_detail.php?rcd=195](http://www.icmm.com/library_pub_detail.php?rcd=195)
- Ministerial Council on Mineral and Petroleum Resources. 2005. *Principles for Engagement with Communities and Stakeholders.*

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# Water Management

## 1 INTENT

To ensure AngloGold Ashanti Australia business unit effectively manage water in accordance with the requirements of this procedure. This will ensure that water is used efficiently and AngloGold Ashanti maintain a reputation as a responsible water user with stakeholders.

## 2 SCOPE

The intent of this standard shall apply to all personnel and contractors involved in any AngloGold Ashanti Australia managed activity.

## 3 PERFORMANCE REQUIREMENTS

### 3.1. INTRODUCTION

Water is fundamental to the minerals industry and almost all activities from exploration to mining requires reliable access to water resources. Currently in Australia there is increased competition for limited water resources. Uncertainty about climate change, particularly declining rainfall, threatens the security of traditional water sources. This in turn has led to heightened industry and community awareness of water sources, usage and quality. In order to gain approvals to access water resources, mine operators must adopt sustainable water use practices and continue to develop new technologies for efficient water and waste water use and reuse.

This standard applies to water abstraction, dewatering, transport, storage, usage (potable and process), direct/indirect discharge, surface, impounded and groundwaters.

### 3.2. WATER MANAGEMENT STRATEGY

Water management must be considered at every stage of our activities. During exploration it is important to establish a reliable water source that is not likely to have an impact on the local environment or an adjacent land user. Systems must be established to record abstraction rates and to monitor the potential effects of draw down on the aquifer and other adjacent water users. Wherever practical waste water should be recycled or re-used.

Unlike exploration activities, mining operations require large volumes of water so it is critical that a detailed water review be completed during the pre-feasibility stage of a new operation or expansion of existing operation. This provides the opportunity for water and waste water efficiency measures to be implemented through all stages of mine operation. Existing business units should seek opportunities for improvement in efficiencies to their current operations wherever possible. Water management planning should include the following:

- Baseline seasonal studies to understand the characteristics of surface and groundwater resources. This should include studies of climate, hydrology, hydrogeology, water quality, ecology, limnology and the associated inter

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# Water Management

relationships to enable ecological water requirements (to sustain the ecological values of water dependant ecosystems) to be established and understood.

- Identify available water resources and future operational water requirements for the ultimate design capacity.
- Identify opportunities for adopting water efficient technologies for the use and/or reuse of water and disposal of waste water e.g. reverse osmosis treatment.
- Identify potential impacts and opportunities of current and future water use on surrounding ecosystems, communities and stakeholders.
- Engage relevant stakeholders to determine competing demands for water, future water use (post closure) and community concerns.
- Set achievable targets for water management to drive improved water efficiency.

### 3.3. WATER MANAGEMENT PLAN

A Water Management Plan (WMP) is required for all AGAA business units. The WMP will address:

- Compliance with regulatory and licence conditions regarding water quality.
- Water quality monitoring regime to ensure water quality meets regulatory and licence requirements (e.g. groundwater extraction, discharge water, water storage integrity, water balance for all inputs, outputs, uses and losses).
- Monitoring to ensure operations are not impacting on surrounding water dependent ecosystems, including surface and ground waters on and off site.
- Requirements of Statutory and/or regional water management plans.
- Site water resources including ground and surface water, and recycled or treated water.
- Operational water supply, recycling and disposal needs.
- Treatment of waste water.
- Responsibilities and accountabilities for the WMP.
- Surface water quality e.g. turbidity (runoff and erosion control), flow regimes and receptors.
- Contingency planning e.g. water quality changes, flooding, drought, unplanned discharges, water storage failure.
- Setting water reduction and water quality targets.
- Identify long term water risk and opportunities.
- Community and local industry requirements and concerns.
- National Pollution Inventory (NPI) reporting requirements for discharges.

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The water management strategy should be updated annually and benchmarked against similar leading practice projects.

Several publications are available that provide further guidance on water and waste water management in the mining industry (see References). Relevant requirements of these documents should also be addressed in the Water Management Strategy.

## 4 REFERENCES

- ANZECC. 2000a. *Guidelines for Marine and Freshwater Quality*. ANZECC / Agriculture and Resource Management Council of Australia and New Zealand, Canberra
- ANZECC. 2000b. *Australian Guidelines for Water Quality Monitoring and Reporting*. ANZECC / Agriculture and Resource Management Council of Australia and New Zealand, Canberra
- Department of Environment. 2000. *Guidelines for Water Quality Management in Mining and Mineral Series*.  
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- Minerals Council of Australia and Ministerial Council on Mineral and Petroleum Resources. 2006. *Strategic Water Management in the Minerals Industry- a Framework*.
- Minerals Council of Australia. 2004. *Enduring Value – The Australian Minerals Industry Framework for Sustainable Development, Guidance for Implementation*.
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## ***Culture and Heritage Management***

### **1. INTENT**

To ensure all AngloGold Ashanti Australia (AngloGold) business units recognise Aboriginal and European heritage values in AngloGold's leases. The purpose of this guideline is to provide direction for establishing or maintaining positive and respectful relationships with local and indigenous communities, through observing laws, customs, and the careful management of heritage and culturally significant sites.

### **2. SCOPE**

The intent of this standard shall apply to all personnel and contractors working on the AngloGold Ashanti Australia managed activities.

### **3. PERFORMANCE REQUIREMENTS**

Heritage includes both physical and cultural aspects and may relate to the significance of places and objects to local and indigenous people in terms of traditions, observations, customs and beliefs. AngloGold acknowledges the importance of heritage to many local and indigenous communities and recognises the potential impacts its activities may have on heritage. All AngloGold business units are expected to ensure changes to the biological and physical environment resulting from their activities do not adversely affect matters of heritage significance to local or indigenous people. AngloGold is committed to contributing to the social, economic and institutional development of the communities in which we operate.

To understand cultural and heritage values AngloGold recognises the importance of having a respectful working relationship with local and indigenous communities. Successful community relations will be achieved by:

- Recognition that it is with the acceptance of local and indigenous communities that we are able to develop and maintain our operations;
- All personnel having genuine respect for local and indigenous communities' interests, rights, needs and cultures;
- Observance of appropriate behaviour and protocols regarding the land and in all other interactions; and,
- Ensuring that heritage sites or culturally significant sites are identified and protected from operational impacts.

AngloGold business units are required to develop sufficient knowledge, processes awareness and credibility to foster a respectful working relationship with local and indigenous communities that will enable community support for their activities. The Community Development Toolkit developed by the ICMM and other industry leading practice publications (refer references) provide further guidance on establishing successful relationships with local and indigenous communities.

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## Culture and Heritage Management

### 3.1 Cultures and Heritage Management Strategy

All business units that may have a potential impact on local and indigenous communities (as determined via risk assessment) are required to develop and implement a Culture and Heritage Management Strategy (CHMS). The Culture and Heritage Management Strategy (CHMS) must be developed in close consultation with local communities, local and regional authorities, the Department of Indigenous Affairs (DIA), and indigenous organizations, groups and individuals. The strategy must also take into consideration both State (e.g. *Aboriginal Heritage Act 1972 (WA)*, *Heritage of Western Australia Act 1990*) and Federal (e.g. *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*) legislation to protect sites with social and heritage significance and to identify, conserve and promote places of cultural heritage. The CHMS will address the following:

- Undertake baseline studies to determine the likelihood of the presence of matters of heritage significance to local and indigenous people and to develop knowledge of local and indigenous communities in order to understand their interests, concerns and needs. Baseline studies include desktop review of local government, State/Territory and Commonwealth heritage registers, ethnographic surveys of the area, inventory of known Aboriginal sites including maps and descriptions of known Aboriginal assets and archaeological surveys.
- Consult with relevant local and indigenous communities to enable them to make known to AngloGold their concerns in regards to impacts as they affect heritage matters. Where appropriate the preparation of a Community Development Plan should be considered in accordance with leading practice guidance (refer to references).
- Seek community engagement and consent for activities to ensure local communities participate in all stages of project conception, design and implementation.
- Commitment to creating long-term effective sustainable development opportunities by improving employment, retention and training for local and indigenous people and to assist in community initiatives.
- Heritage, and cross cultural education and training requirements for employees. All personnel are expected to be adequately trained to have an awareness of heritage management, and sufficient understanding of traditional beliefs, customs and values associated with the land and particular sites, to be able to conduct their work duties without contravening any customs or traditions. The effectiveness of education, training and compliance with cultural and heritage requirements should be periodically audited.
- Support of appropriate frameworks for facilitation, mediation and dispute resolution.
- Incorporate traditional knowledge and experience in managing the environment in a sustainable manner.

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## Culture and Heritage Management

- Compliance with legal requirements including processes for ensuring relevant heritage approvals have been obtained. A site specific heritage management plan may be considered to identify the relevant State/Territory and Commonwealth authorities involved and the approval process required.

### 4. REFERENCES

- *Aboriginal Heritage Act 1972-1980* (Western Australia)
- [Aboriginal and Torres Strait Islander Heritage Protection Act 1984](#)
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Env-STD-005 – Culture and Heritage Management	1.0	B.Bastow	30/04/2008	3 of 3



# Cyanide Management

## 1. 1 INTENT

To ensure that all AngloGold Ashanti Australia operations effectively manage all aspects of cyanide in accordance with the requirements of this procedure. This will ensure that cyanide is transported, stored, used and disposed of in a manner that minimises safety and environmental risks.

## 2. 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, on the AGAA operating site within the defined scope of the IMS.

## 3. 3 PERFORMANCE REQUIREMENTS

### 3.1. INTRODUCTION

Cyanide is an essential process chemical in the treatment and extraction of gold. Cyanide is highly toxic to both humans and most fauna, primarily birds and fish. In Australia and overseas, the environmental impacts of cyanide spills and fauna fatalities have been well publicised in the media. The gold industry and individual gold mining operations are reviewing strategies for improved use and management of cyanide use in an attempt to change public perception in the use of this chemical.

Further to cyanide incidents over the past ten years, the International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold has been developed. All AngloGold Ashanti Australia operations are expected to be fully aware of the content of the Code and, demonstrate that compliance with all relevant requirements of the Code.

### 3.2 Cyanide Management Strategy

All AngloGold Ashanti Australia operations are required to implement a cyanide management strategy that effectively considers the following requirements in order to reduce the safety and environmental risks associated with the use of this chemical;

- a. be aware of the regulatory requirements relating to cyanide producers;
- b. establish, monitor and audit cyanide transportation and cyanide transfer procedures;
- c. ensure that appropriate and well maintained storage facilities exist at all operations;
- d. minimise the use and maximise the reuse of cyanide;
- e. train personnel in the actual and potential risks and environmental impacts on fauna; and
- f. dispose of cyanide in a manner that is not detrimental on human health, safety and environment.

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# Cyanide Management

AngloGold Ashanti Australia operations are expected to ensure their cyanide management strategy complies with the International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold ('the Code'), as AngloGold Ashanti Australia is a signatory to this Code.

The Code focuses exclusively on the safe management of cyanide and cyanidation mill tailings and leach solutions.

It addresses production, transport, storage, use of cyanide and decommissioning of facilities. It includes requirements related to financial assurance, accident prevention, emergency response, training, public reporting, stakeholder involvement and verification procedures.

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# ANGLOGOLD ASHANTI LTD

## TAILINGS MANAGEMENT FRAMEWORK

<b>GUIDELINE TITLE</b>	<b>Tailings Management Framework</b>
<b>NUMBER</b>	<b>Revision 3</b>
<b>DATE OF FIRST ISSUE</b>	<b>April 2002</b>
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## I. INTRODUCTION

AngloGold Ashanti Limited (AGAL) recognises that the sustainability of its business is, amongst other factors, dependent upon environmental stewardship and efficient management in the exploration, extraction and processing of mineral resources, including sound tailings disposal practices.

The information provided herein is presented in good faith, believed to be reliable and based upon information and commonly adopted good practice at the time of preparation.

This document is for AGAL personnel use only and may not be distributed to others.

## II. SCOPE

AGAL views the implementation of the Tailings Management Framework (TMF) defined herein as being advisable at each of its Operations.

The TMF represents the minimum set of standards that the AGAL Operations should comply with. Where local laws or other factors, such as international financier or risk levels dictate, higher standards these should be adopted.

It is recognised that each tailings storage facility (TSF) is unique and that there is no single design or operating technique that can be adopted universally. The TMF therefore sets generic principles rather than stipulating the detail of each TSF lifecycle phase. Specific information has however been provided where such detail is considered to be important or informative. Detailed requirements for all elements of the TSF lifecycle should be covered in regional codes of practice and site/ facility-specific operating manuals.

Purely technical aspects are extensively covered in scientific, engineering, geotechnical and environmental literature and are not the subject of the TMF, which instead focuses on the sound management of all phases of the TSF lifecycle.

## III. AIMS & OBJECTIVES

The TMF endeavours to protect and maintain human health and safety, the environment, and efficient and responsible production.

The aims are to:

- Present a fundamental set of principles, standards, objectives and performance criteria with which each TSF should comply.
- Provide a yardstick against which TSFs should be assessed and measured.
- Encourage continuous improvement, as progressive advancements are envisaged to enhance long-term safety and environmental performance. The TMF therefore promotes the adoption of new and improved ways to achieve the stated objectives.

Fundamental objectives are that:

- TSFs must be safe.
- Public and worker health and safety must not be threatened by, or placed at unacceptable risk from any TSF.
- TSFs must result in an acceptable environmental impact without unnecessarily jeopardising environmental resources.

TMF adoption should:

- Achieve a common, high standard for tailings disposal throughout AGAL's interests and minimise the failure risk.
- Result in TSFs being planned, operated and closed at known and appropriately mitigated levels of risk thereby facilitating the identification of any flaws or adverse trends and their correction in advance of the occurrence of any undesirable event.
- Assist with the addressing of potential hazards to avoid the manifestation of unacceptable safety, health, environmental or business risks associated with tailings disposal.

## IV. COMPOSITION

The TMF comprises three main elements, namely 'Principles', 'Standards of Practice' and 'Guidelines'.

### Principles

'Principles' state broad commitments that the each AGAL mining operation (Operation) makes to manage tailings disposal in a responsible manner.

### Standards of Practice

'Standards of Practice' follow each Principle identifying performance goals and objectives that must be met to comply with the Principle.

### Guidelines

'Guidelines' provide descriptions of some of the measures that may be used to implement the Standards of Practice and describe some specific measures that meet these Standards. The Guidelines describe an acceptable level of protection for health, safety and the environment that is consistent with the Standards of Practice.

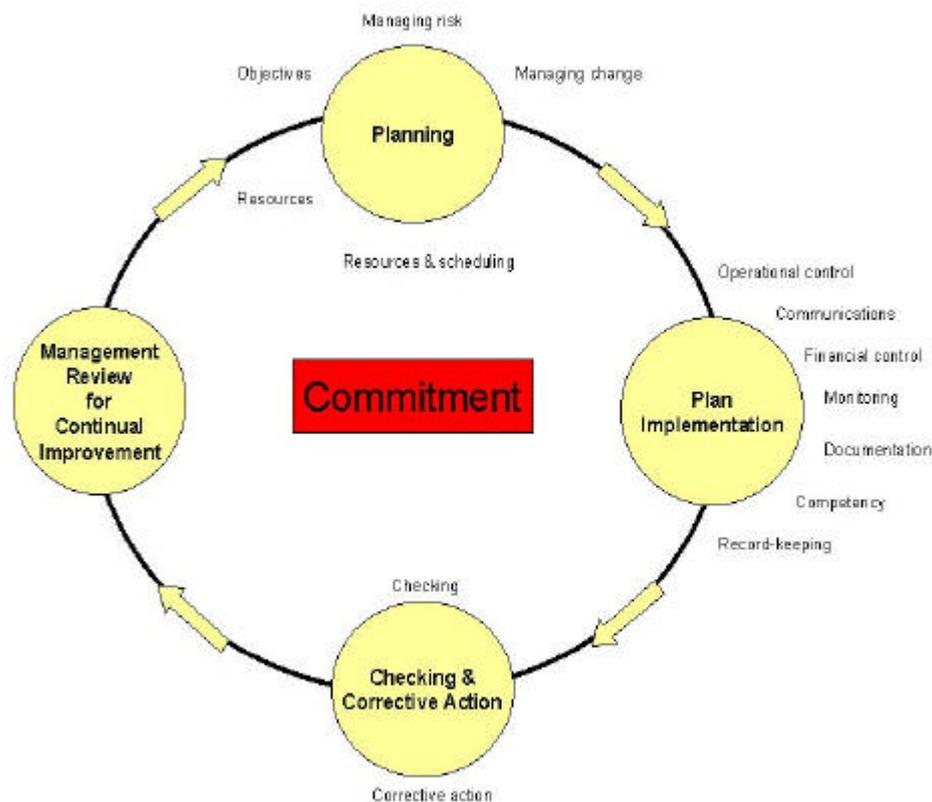
The Guidelines are not the only means to achieve the Standards, as alternative means to achieve these goals and objectives may be used. The Guidelines should however be used to evaluate the adequacy of any alternative measures being considered.

## V. APPLICATION & IMPLEMENTATION

The TMF should be implemented through all phases of the TSF lifecycle, from conception through to closure and aftercare, to provide assurance that the TSFs are being responsibly and safely managed.

The recommended process that embodies the TMF is depicted schematically in Figure V.1.

**Figure V.1 – Tailings Management Framework (TMF)**



This process comprises four key stages commencing with 'Planning', progressing to 'Plan Implementation', 'Checking and Corrective Action' and concluding with 'Management Review for Continuous Improvement'. The cycle is recommenced after 'Management Review for Continuous Improvement' for the next TSF lifecycle phase or project. This approach is consistent with that of the *ISO14 001 Environmental Management System*.

Each stage should be properly managed and successful implementation confirmed throughout the TSF lifecycle. The procedures identified by the Principles and Standards of Practice should be integrated into the Operation's overall safety, health and environmental management programmes.

Where external expertise is used to assist with any aspect of tailings disposal, that agency should commit and adhere to the TMF Principles and Standards of Practice.

An Operation that does not implement the recommended measures should be able to demonstrate that the outcome is equivalent to, or more protective than those described in the TMF (as appropriate to the site-specific conditions and risks).

Comprehensive details of the process are contained within the Mining Association of Canada's *A Guide to the Management of Tailings Facilities*. Summaries of the stages are given below:

'Planning'

The planning stage is important as many of the risks associated with the TSF are determined at this point in the project.

Key considerations during this stage are risk and change management, resource definition and scheduling, provision of adequate resources and setting of objectives.

'Plan Implementation'

During the 'Plan Implementation' stage operational and financial control, communication procedures, monitoring and competency requirements should be prepared, implemented and maintained. Supporting documentation should be prepared, maintained and kept on record.

'Checking and Corrective Action'

The 'Checking and Corrective Action' stage comprises, in addition to routine monitoring and inspections, periodic confirmation that the TMF has been properly implemented, revisiting the design, construction, operation and closure plans and programmes, re-evaluation of downstream risks, updating of failure modes, risk assessment and risk management and identification of items requiring corrective action.

'Management Review of Continuous Improvement'

The 'Management Review of Continuous Improvement' stage involves annual senior management review of the adequacy of policies, objectives and performance of the TMF.

## PRINCIPLES, STANDARDS OF PRACTICE & GUIDANCE

### 1. COMMITMENT:

**Commit to and comply with the TMF, applicable legislation and permits, relevant company guidelines and policies, take cognisance of relevant technical guidance, and meet stakeholder obligations.**

#### Standard of Practice:

##### 1.1 Comply with:

- *Applicable AGAL policies and guidelines:*
  - *\*Policy for the Management of Tailings Storage Facility Risk at AGAL Operations.*
  - *TMF.*
  - *AGAL's and Operation's environmental policies.*
  - *\*AGAL Corporate Environmental Management Guidelines including:*
    - *Water Management*
    - *Land Management*
    - *Air Quality Management*
    - *Chemicals Management*
    - *Waste Management*
  - *Policy for AGAL Project Management.*
- *Applicable legislative requirements.*
- *Applicable permit requirements.*
- *Applicable financier requirements.*
- *Applicable partner/ stakeholder requirements.*
- *International Cyanide Management Code for the Manufacture, Transport and Use of Cyanide in the Production of Gold.*
- *Applicable Regional/ Operation requirements:*
  - *Region- or Operation-specific TSF code of practice.*
  - *Site-specific TSF operations manual.*

\*Currently being drafted.

#### Guidance:

The **TMF** is a key component of the ***Policy for the Management of Tailings Storage Facility Risk at AngloGold Ashanti Operations*** and should be adopted through all TSF lifecycle phases.

Operations should **familiarise** themselves with the **requirements** of the documents listed above to ensure that the Operations are, and remain, in compliance and, if not, take the necessary steps to ensure that compliance is achieved. Where compliance is not possible or practical, the areas of non-compliance should be documented along with the reason for non-compliance.

Since few nations have legislation that deals exclusively with tailings disposal, legal requirements are typically specified in many separate pieces of legislation. For this reason, a **summary** of the local and national **legislation** pertaining to tailings disposal should be explicitly listed *verbatim* for ease of reference and to ensure that the requirements for full compliance are understood and can be confirmed. The *verbatim* requirements could be categorised using key words with those requirements accompanied by an interpretation as to the significance and applicability to the Operation.

All required **permits** and **approvals** should be **obtained** as necessary. Copies of the permits necessary to construct, operate or close the TSF, and changes to title deeds, surface rights and zoning should be identified and obtained in good time and kept on file.

Region- or Operation-specific TSF **codes of practice** should be prepared and maintained that set and specify details of the Regional/ Operational management framework and required measures. These codes should be consulted and complied with at all times.

Operation-, site-, or TSF-specific **operations manuals** should be prepared and maintained that set the detailed requirements for each TSF. These operations manuals should be consulted and complied with at all times.

This TMF has been prepared to be compatible with the **International Cyanide Management Code** (Appendix B). It is important that, for Operations making use of cyanide in their metallurgical processes, that these two documents be used concurrently, and that the requirements of both are adhered to at all times.

Standard of Practice:

*1.2 Take cognisance of appropriate technical texts and guidelines.*

Guidance:

There exist numerous industry and technical **guidelines** that have relevance to TSFs. Appendix B of this document provides a list of relevant texts as a starting point for the identification of additional guidance that could be appropriate and useful.

Standard of Practice:

*1.3 Honour relevant obligations and commitments made to stakeholders.*

Guidance:

**External stakeholders** should be consulted to identify expectations relating to the TSF(s). Progress achieved towards honoring commitments made should be communicated regularly to the relevant stakeholders.

## **2. PLANNING:**

***Develop, implement and maintain integrated procedures, practices, and assign responsibilities covering the planning, management and measurement of the design, construction, commissioning or re-commissioning, operation, recovery/ reprocessing, maintenance and aftercare of TSFs to ensure that they are operated and closed at known, mitigated levels of risk.***

Standard of Practice:

*2.1 Develop, implement and maintain a comprehensive, documented tailings management system to cover the entire TSF lifecycle that is accessible to users and auditors.*

Guidance:

**TSF lifecycle management** should cover all the phases of a TSF's life including the design phase (environmental baseline, tailings characterisation, TSF studies and plans), and the construction, operational, closure and after-care phases.

**Region-/ Operation-specific TSF management plans** should be produced and documented and should include descriptions of:

- Short, medium and long-term operational objectives, targets and performance measurements.
- Permits and approvals.
- Type and quantity of required resources anticipated over the life-of-mine.
- Roles and responsibilities.
- Site selection and characterisation criteria.
- Safety, environmental and engineering design criteria.
- Communication procedures.

- Construction, operating, decommissioning, conceptual closure and aftercare procedures and documentation requirements.
- Monitoring, inspection, reporting and review requirements.
- Knowledge and skills (awareness, training and competence) requirements and training records.
- Record-keeping requirements including as-built data, historical development as well as issues and incidents.
- Change management procedures.

The tailings management system would typically be documented within the Region- / Operation-specific TSF **code of practice**.

**Changes** made to designs and plans during the implementation phase should be **approved** by the **Regional Tailings/ Geotechnical Engineer** after consultation with the TSF designer, and Operational Line Management and **documented** in the site records and in updates of the operations manual. The reasons for, and impact of, changes made to the approved designs and plans should be identified and evaluated.

TSF management plans should be kept up-to-date and in a location that is accessible to Operational staff as well as external auditing or review personnel.

Standard of Practice:

*2.2 Fully integrate the management of tailings with other mining and processing operations and not add significantly to the total risk to which employees and the public are exposed.*

Guidance:

Tailings disposal activities should be **carefully planned** to ensure that changes in ore and production rates are anticipated in good time and so that **mining** and **processing operations** are neither **interrupted** nor unduly **constrained**.

Required **resources**, including staffing, specialised skill development, technology and financial resources should be scheduled and provide for effective and efficient tailings management. Adequate financial provision should be made for all phases the TSF lifecycle and sufficient construction materials identified and secured in good time.

Tailings disposal activities should **not add** significantly to the **total risk** to which employees and the public are exposed. A comprehensive understanding of the risks before, during and after tailings disposal operations is therefore required. Planning activities should endeavour to **'design-out'** or **minimise** as many **risks** as possible; this is often most effectively undertaken during the conceptual phases.

Standard of Practice:

*2.3 Define and document the responsibilities of all persons and organisations involved with tailings management.*

Guidance:

Operations should establish a **management** and **supervisory team** of appropriate size and capabilities for tailings disposal. **Roles, responsibilities** and **authorities** to implement effective tailings management through all stages in the TSF lifecycle should be **defined**. A competent and experienced **Tailings Manager** should be **specifically assigned responsibility** for the management and operation of the TSF as well as compliance with the TMF.

Roles and responsibilities should be **defined in writing** and this record kept current.

Verification via documented performance measurement should be performed regularly.

All **personnel** and **parties** involved in the management of TSFs, from the corporate level to the consultants as well as operators and contractors on site, should clearly **understand** their **roles** and **responsibilities**.

Standard of Practice:

*2.4 Establish environmental baselines prior to development, or analogue or reference sites in cases where baseline data is not available.*

Guidance:

Appropriate **environmental baseline data** pertaining to the proposed tailings deposition project should be gathered and **placed on record before** any **development** takes place. This serves the dual purpose of facilitating the evaluation and mitigation of potential environmental impacts and also as a record of conditions that existed at the site prior to tailings deposition activities.

In cases where environmental baselines were not established prior to construction or operation, a number of **analogue**, or **reference sites** as appropriate, should be identified and monitored. Information from such sites should prove useful in assessments of the impact of the TSF and in establishing closure success criteria.

Standard of Practice:

*2.5 Consider potential failure modes and effects and adopt mitigation measures where necessary to reduce potential risks.*

Guidance:

A **preliminary failure mode analysis** should be conducted during the planning phase. In essence, this is to consider what could go wrong, how it could occur, the consequences and what could and should be done to reduce the likelihood, and consequences of the potential occurrences.

Failure mode and effect analyses should be undertaken in a **workshop setting** to involve the expertise and experience of **suitable disciplines** and **experiences**.

The analysis process should be **formally documented** providing:

- A structured, repeatable and documented process.
- Identification of aspects requiring improvement.
- An action plan evolved from the process.

Standard of Practice:

*2.6 Assess, determine and report risk levels associated with all aspects of tailings disposal and instigate action plans to reduce risk to acceptable levels.*

Guidance:

**Risk assessments appropriate to site-specific conditions** should be conducted. Significant **environmental, social, health** and **safety aspects** should be identified, assessed and associated risks established.

**Risks** should be **managed** and **mitigated** to **reduce** the risks to **acceptable levels** and to:

- **Minimise** the **likelihood** of significant adverse health, safety or environmental impacts.
- **Detect** and **respond** to **potential failures**.
- **Establish contingency** and **emergency preparedness plans** to deal with potential significant adverse events, including the risk of climate change.

The **results** of the risk assessment and mitigation processes should be **documented**, kept on file and **reported** to AGAL senior management **annually**. These results should be used as input to the 'AGAL Group Risk Report' prepared by the AGAL Executive Officer: Head of Risk.

**Risk assessments** should be **reviewed** and **updated regularly** and whenever **significant changes** take place.

**Significant adverse changes** in risk levels should be **reported** to AGAL senior management as **soon as possible**.

A generic risk matrix is provided hereunder that should be used for an initial **qualitative** risk assessment.



Tailings/heap leach facility risk assessment matrix

Consequence/Impact Classification:	Aspects:						Risk Index:							
	Safety	Health	Environmental	Financial	Reputation	Social	0	1	2	3	4	5	6	
	<b>Catastrophic</b>	Multiple fatalities	Fatalities from occupational disease	Disaster with serious irreversible event/impact &/or regionally widespread	>US\$100M	International news	Disaster with displacement Class action Permanent loss of livelihood	A	3	4	5	6	7	8
<b>Very Severe</b>	Single fatality	Fatality/multiple occupational disease cases	Serious irreversible event/impact beyond mine site	>US\$10M	National news	Long-term displacement Individual legal action Medium-term loss of livelihood	B	2	3	4	5	6	7	8
<b>Severe</b>	Multiple LTIs/Disablement	Compensatable occupational disease	Major repairable event/impact beyond mine site	>US\$1M	Regional news	Short-term displacement Repeated complaints Short-term loss of livelihood	C	1	2	3	4	5	6	7
<b>Moderate</b>	Single Lost Time Injury (LTI)	Occupational disease	Moderate repairable event limited to mine site	>US\$100,000	Local news	Opportunity loss Complaints Decreased livelihood	D	0	1	2	3	4	5	6
<b>Low</b>	Minor accident (non-LTI)	Minor ill health	Self-reversing impact on mine site within project life	>US\$10,000	Word-of-mouth	Discomfort Complaint	E	0	0	1	2	3	4	5
<b>Insignificant</b>	First aid injury	Negligible	Negligible impact confined to small area	<US\$10,000	Negligible	Negligible	F	0	0	0	1	2	3	4
							<b>Frequency (period):</b>	>10,000yrs	>1,000yrs	>100yrs	>10yrs	Annually	Monthly	Weekly
							<b>Frequency (class):</b>	Almost impossible	Unlikely/rare	Seldom	Possible	Likely	Very likely	Almost certain
							<b>Likelihood (of event over TSF/HL life)</b>							

7-9	Very high risk
6	High risk
4-5	Moderate risk
1-3	Low risk
0	Very low risk

Adapted from: Golder Associates (Africa) & AGAL methodologies  
Rev. date: 3rd February 2006

In situations where the assessed risk levels are 'Very High' the **probability of third-party loss-of-life** associated with TSF failure should be **quantified** using a fault-event tree type or similar technique.

**3. PLAN IMPLEMENTATION:**

**Locate, design, construct, commission, re-commission, operate and close TSFs so that all structures will be stable in all likely circumstances and minimise the environmental impacts.**

Standard of Practice:

**3.1 Select the optimal tailings storage solution after a thorough and documented consideration of all possible sites, safety, health and environmental factors, waste minimisation methods, deposition and impoundment options and methods.**

Guidance:

Conceptualisation

**Appropriately qualified and experienced persons** should be appointed to assist with the **conceptualisation** of any new TSF to ensure an appropriate, safe, environmentally-responsible solution.

All potentially feasible **alternative methods** and **sites** should be **identified, assessed and traded-off** in accordance with professional practice making use of **formalised methods** for the assessment and comparison of the different alternatives considering, in the case of a new project or TSF, the following:

- Adoption of the '**design for the environment**' approach.
- **Minimising the quantity of tailings** produced by, for example, selection of the mining method (open pit/ underground and different mining methods).
- Consideration of **tailings disposal in conjunction** with the **development of the mining processes** to determine the availability of potentially suitable materials and sites for mining and stockpiling, and waste rock and overburden disposal.
- Consideration of **tailings disposal in conjunction** with the **development of the metallurgical processes and flow sheets**. Those responsible for the TSF conceptualisation should work closely with the metallurgical personnel in establishing the best techniques for tailings disposal. Possible modifications to the metallurgical process to provide a better tailings product for disposal should be considered and implemented where possible.
- Taking cognisance of **full lifecycle implications**, including environmental, social, technical and economic aspects.
- Prevention, reduction or control of **seepage** and its potential impact on ground and surface water resources.
- Consideration of the **water balance** and the need, or otherwise to discharge to stream.
- Availability of **suitable construction and cover/ closure materials**.
- Consideration of TSF impacts, requirements and implications in respect of **aftercare**.
- Determination of, and taking account of, the **full cost of tailings disposal** from conceptualisation to final decommissioning, reintegration into a sustainable land-use and aftercare. This should include the cost of water and energy as well as the closure costs and aftercare costs in perpetuity if applicable.
- Anticipation of the possible effects of **future stricter legislation and/ or climate change**.

#### *Tailings Disposal Method*

The choice of tailings disposal method, i.e. slurried, thickened, paste or dry tailings, should be determined after **evaluation of cost, environmental performance and failure risk/ consequences**. Wherever feasible and economically viable, the tailings material should be **dewatered** as far as is reasonable prior to disposal on the TSF. This is especially important in locations where water is scarce and/ or expensive.

All considered methods should satisfy the **key objectives** of:

- **Safety.**
- **Environmentally-responsible** deposition.
- **Waste minimisation.**
- **Risk minimisation.**
- **Water conservation.**
- **Energy conservation.**
- **Prevention of erosion.**
- **Prevention of dust generation.**
- **Cost effectiveness.**
- **Achieving sustainable closure.**

Potentially feasible methods that should be considered should include:

- Disposal in **disused underground workings** as backfill material. The safety of mining operations and disposal of excess material that cannot be accommodated underground are key considerations with this technique. The use of tailings material for hydraulic mine backfill should be considered in the following circumstances:
  - **Backfill is required as part of the mining method.**

- The additional cost for backfilling is at least compensated for by the higher ore recovery.
- There are sufficient quantities of the coarse fraction required to form suitable hydraulic backfill material.
- In open-pit mining, if the tailings material is easily dewatered through evaporation, drainage or filtration, and thereby avoiding the need for an additional or enlarged TSF.
- Nearby mined-out open pits are available and suitable for backfilling.
- The presence of large, nearby stopes in underground mines suitable for backfilling. Stopes backfilled with slurried tailings should be drained and binders may be required to increase stability.
- Potentially polluting tailings material could be treated via cementation and deposited safely as backfill.
- Backfill in the form of paste fill could be considered should the above apply and there is a need for competent backfill.
- Establishing and maximising the **potential uses** for the tailings material, e.g. as a construction material, as a soil-ameliorant, or in the restoration of another part of the mine site.
- The use of **suitable waste rock** and **soil emanating** from the **mining operations** to form part of the tailings disposal solution, to provide an integrated and cost-effective solution.
- The use of **disused** and **exhausted open pits** should be considered as part or all of the tailings disposal solution, provided that the hydro-geological conditions are understood and are suitable and that deposition does not impede or interfere with current or likely future mining operations.
- Conditioning the tailings within the **metallurgical processes** to minimise any environmental or safety hazards such as removal of hazardous compounds, addition of buffering material, additional treatment to form safe compounds thereby avoiding potentially deleterious states and additional dewatering.
- Reduction of **reagent usage** to minimise the potential pollutants discharged to the environment, such as cyanide recovery or destruction.

#### *Tailings Disposal Location*

**In-river tailings discharges** are considered **unacceptable** and should not be undertaken under any circumstances.

**Marine tailings discharges** should only be undertaken in **exceptional circumstances** when:

- There exists no environmentally and socially sound land-based alternative.
- A thorough environmental and social analysis of alternatives has been conducted.
- The potential effects on marine resources are fully understood.
- It has been demonstrated that a significant adverse effect on coastal resources should not result.

In the unlikely event that marine tailings disposal is carried out, the tailings should be released below the surface thermocline and euphotic zone.

The end result of the conceptualisation phase should be a report that **conclusively demonstrates** that the **proposed method** is the **best** for the **most suitable site**. The report should be transparent and defensible in any EIA process.

**Conceptual designs** should be **independently reviewed** prior to the commencement of the detail design phase, as the conceptualisation phase is extremely important in that it typically determines the intrinsic risk levels.

Any necessary **revisions to existing permits or environmental management documents** should be made at this stage.

Standard of Practice:

*3.2 Obtain and maintain a complete understanding of the TSF site, construction and tailings materials via appropriate investigations and analyses.*

Guidance:

**Appropriately qualified and experienced professional** persons should be commissioned to **conduct** geological, hydrological, hydro-geological, geotechnical and geochemical **investigations and analyses**, as well analyses of biological systems, social and community issues, archeology and indigenous peoples concerns, where appropriate, and proximity to potentially conflicting land uses. The investigations and analyses should be conducted in an integrated and coordinated manner and be based on the outcome of the conceptual design process. The resulting reports should be subject to **independent review**.

All relevant information regarding the TSF site and the tailings material should be established to ensure that **sufficient information** is available for **detailed design**. These should include the following and be presented and documented in report format:

- **Geotechnical site investigation** including assessment of potential geophysical hazards.
- **Hydrological investigations and analyses.**
- **Hydrogeological site investigation** including characterisation of pre-construction, operational and post-closure flow patterns.
- **Geochemical characterisation** of representative samples of the different types of tailings materials including dynamic evaluation of the acid rock drainage (ARD) potential, radiation, metals, pH, salts, potential for precipitation in drains, and potentially polluting compounds in solution for the full TSF lifecycle including post closure conditions and operational and closure management requirements.
- **Geotechnical characterisation** of representative samples of the tailings materials for stability and deposition method determination as well as for de-watering conditions for closure.
- **Mineralogical analyses.**
- The **effects of material changes** with time (e.g. weathering of the pyrite content, change from alkaline conditions upon deposition and subsequent change to acid condition, and disintegration of components).
- **Environmental baseline data** collection for the TSF site including climatology.
- **Environmental and social impact assessment** of the proposed TSF and any modifications.

Wherever possible representative tailings material should be obtained from a **pilot plant** for testing purposes and the test work repeated as soon as the actual plant is operational and is producing a representative tailings stream.

Standard of Practice:

*3.3 Design TSFs to incorporate the key objectives of containment of the tailings materials and solutions as well as waste minimisation and water conservation.*

Guidance:

*Design Process*

**Suitably qualified and experienced professionals** should be appointed to **design** TSFs or components thereof. Design consultants should have appropriate educational and practical experience directly applicable to TSF design along with proven construction and operational history for the design of similar projects. Where appropriate, the professionals should be registered by government or state as being recognised as being professionally competent for such work.

The following **fields of specialisation** would typically provide valuable input into the TSF design process: civil, geotechnical, structural and hydraulic engineers, hydrogeologists, environmental engineers, hydrologists, and seismologists.

The following should be taken into account during the **design process**:

- The **'Precautionary Principle'** should be applied when considering potential environmental impacts.
- The design should take cognisance of the **potential hazard** posed by the TSF during each of the stages in the TSF lifecycle and appropriate measures engineered into the design to **mitigate the risk to acceptable levels**.
- The design should take cognisance of **applicable legislation and regulations** and potentially more stringent future legislation.
- Potential **climatic changes** and **uncertainty** in climatic data.
- All reasonable steps should be taken to **minimise tailings production** and the **impacts** associated with the TSF.

The design should, where appropriate, incorporate the following:

- Reuse of **process water**.
- Provision of **sedimentation ponds/ paddocks** to retain eroded materials and prevent transport to the environment.
- Removal of **suspended solids** and **dissolved metals** prior to discharge of effluent to receiving watercourses.
- Neutralisation of **alkaline effluents**.
- Removal of **arsenic** from effluents.
- Neutralisation of **acid effluents** via active and passive treatments.

#### *Design Storage Capacity*

The design should address the options available to **extend the TSF life** beyond the **current ore resources**.

#### *Design Storms*

As a minimum, the once in **100-year 24-hour flood event** should be used as the **design storm** for the sizing of the emergency storage/ discharge capacity of a **low hazard TSF**. The once in **10.000-year flood event** should be used as the **design storm** for the sizing of the emergency storage/ discharge capacity of a **high hazard TSF**. Combinations of more frequent events and operating conditions, as well as ice/ snow melt if appropriate, should be evaluated to ensure that they are not more onerous and, if so, then used to design the emergency storage/ discharge capacity. **Adequate freeboard** of at least **1,0m** and **appropriate** to the **conditions** and **hazard** should be provided **in addition** to the **design storm** and **operating water level containment**. The design storm should be considered in addition to the capacity required to retain the maximum process flow conditions.

#### *Best Practice Considerations*

'**Best practice**' should be adopted in the design of any new TSF. The modern design philosophy that constitutes 'best practice' is one of **appropriate containment** that **maintains hydraulic separation** between the **tailings mass** and the **underlying/ nearby surface** and **ground water resources**. This could potentially be achieved via the use of **seepage-excluding mechanisms** such as full or partial, composite synthetic/ clay liners.

**Circumstances** that may justify the **omission** of **seepage-excluding mechanisms** could include:

- The **absence** of **ground water** that could be contaminated by seepage and the lack of potential for the development of a polluted plume from the TSF.
- **Dry** or **semi-dry disposal** with **insignificant leachate** production potential.
- **Fixation** or **elimination** of cyanide and other **potential pollutants** at source.

**Explicit motivations** to the contrary should be comprehensive, documented, and be based on the nature of the receiving environment and/ or the specific characteristics of the tailings. Ideally however, the location selected for the TSF would have been chosen to preclude the need for special, costly seepage-excluding mechanisms.

#### *Failure Mode and Effects Analysis*

A **detailed failure mode** and **effects analysis** appropriate to the hazard that would be posed by the TSF should be conducted during the detail design phase. Such analyses should be undertaken in a **workshop setting** to involve the expertise and experience of suitable disciplines and expertise. The process should capture the key elements of comprehensive TSF impoundment surveillance, including:

- Identification of **potential failure modes**.
- Identification of **warning signs** for the failure modes.
- Consideration of **failure speed** and **early detection** prior to incidents.
- Development of **'safe', 'caution' and 'stop' criteria**.

**Dam-break assessments/ analyses** should be undertaken for TSFs with significantly high downstream risks. Detailed guidance on this topic is provided by *ICOLD Bulletin 111* and *SANS10286:1998*).

The analysis process should be **formally documented** providing:

- A **structured, repeatable and documented process**.
- Assessment of **surveillance practices**, in terms of scope, frequency, reporting and interpretation, response to unusual conditions and resources available versus resources required.
- Identification of **aspects** requiring **improvement**.
- An **action plan** evolved from the process.

#### *Design Documentation*

A **design report** that covers all investigations, risk analyses and design aspects should be produced and should include:

- **Environmental aims**.
- **Social/ community aims**.
- **Design aims and assumptions** otherwise referred to as the design intent statement.
- **Design details, description** of the **design** and **design parameters** for each of the TSF elements.
- **Calculations** for structural and hydraulic adequacy, including safety factors.
- Average and extreme **water balance simulations**.
- **Engineering plans** with **general arrangements** of the TSF works before deposition commences.
- **Engineering plans** showing the **construction details** for the entire infrastructure associated with the TSF.
- **Operational aims and constraints**.
- **Operational and surveillance requirements**.
- **Failure mode and consequence analysis**.
- **Process details, tailings production rates, residue densities and properties and geo-chemical characteristics** of the tailings.
- **Specifications** for the construction quality assurance and the required qualifications and experience of personnel to undertake the construction, commissioning and operation of the TSF.
- **Conceptual closure details and costs**.

### *Design Approval*

All new designs and changes to designs should be subjected to appropriate **independent expert review** and should be formally approved by the Regional Tailings/ Geotechnical Engineer where applicable.

### Standard of Practice:

**3.4 Construct, commission, raise, re-commission, and operate TSFs in a sound, responsible manner that is transparent and demonstrates due diligence at all times.**

### Guidance:

#### *Management and Supervision*

**Suitably experienced and qualified professionals** should be appointed to **manage and supervise** the construction, commissioning, re-commissioning and operation of TSFs or components thereof.

#### *Operational Control*

The Operation should establish **operating procedures and specifications** that are designed to ensure an **acceptable level of risk as stipulated** by the **design, code of practice and TMF**.

The **operating procedures** should:

- Be **documented** in an appropriate **operations manual**.
- Be **communicated** to all relevant personnel.
- Include systems and methods for the **routine measurement** of TSF **performance and compliance**.
- Include systems and methods for **interpreting the performance data against pre-determined, prescribed criteria for acceptable risk levels**.
- Include **reporting and responding to deviations**.
- Include **procedures for obtaining the required resources**.
- Be **reviewed and updated** at least **annually**.

#### *Operations Manual*

A comprehensive **operations manual** should be prepared for each TSF or complex of similar facilities. The manual should be prepared with the benefit of **input from the Regional Tailings/ Geotechnical Engineer, appropriate specialists** including the designers, **Operational Line Management** and **operators**, as well as the **risk assessment process**.

The **Operations Manual** should:

- Provide a concise, practical **reference** document that could be used by operating personnel for details of the TSF and its operation, as well as surveillance of the TSF, thereby ensuring that design assumptions and requirements are known and considered during the operational phase.
- Be maintained as a **'living'** document that is updated at least annually and whenever circumstances change to significantly affect the manner in which the TSF is to be operated.
- Assist with the **training** of staff.
- Demonstrate to AGAL senior management and regulators that **formalised procedures** for the safe operation of the TSF are in place.
- Demonstrate **due diligence**.

The **Operations Manual** should contain:

- Administration **responsibilities** for TSF operation, safety and review (including corporate-level roles and responsibilities).
- **Design overview and key design criteria**.
- **Stage-capacity** curves.

- Tailings **deposition plans**.
- **Water management plans** and the **water balance**.
- **Planning** requirements (reviews, construction, operation and training).
- **Training** and **competency** requirements.
- **Operating systems** and **procedures**.
- TSF **surveillance**, including checklists, signs of unfavourable performance, and responses to unusual readings, events or observations.
- **Reporting** and **documentation** requirements.
- **Emergency action** and **response plans**.
- **Construction** and **quality assurance** and **quality control** requirements.
- **Indicative closure details**.
- **Standard formats** for monthly status reports and performance reviews.
- **Reference reports**.

#### *Communication Procedures*

**Communication procedures** for all personnel who have roles and responsibilities in implementing the tailings management plan should be prepared. This should include reporting of **significant information** (as specified in the Operations Manual and to include inspection reports and the results of interpretation of monitoring data) and **decisions** to senior management and external stakeholders.

#### *Financial Control*

A **financial control system** to track capital and operating costs towards meeting the objectives of tailings management should be maintained.

#### *Approvals*

Official, written **approval** should be obtained from the designers prior to commissioning or modification of a new TSF, or re-commissioning of a disused TSF.

A **TSF Review** should be undertaken in the case of **re-commissioning** a TSF prior to re-use. The code of practice, design report and operating manual should be **updated** to reflect the resumed usage.

#### *Document Management*

A **comprehensive, electronic tailings management document and information database** is considered essential to maintaining continuity and ensuring that important decisions are followed through. Operations should therefore establish such a database along with an associated document management system and should prepare, maintain, periodically review and revise the appropriate documents.

**Current versions** of all **documents** should be kept at the **Regional** and **Operational offices**. All documentation pertaining to the design, construction, commissioning, operation and monitoring of the TSF should be indexed within an information matrix and be available for inspection by the TSF Auditor, TSF Review Panel, and Regional and Operational staff.

**Superseded versions** of documents should be removed from current files to **Regional** and **Operational archives** where they should be securely stored for legal and information-preservation purposes.

#### *Required Documentation*

The following **documentation**, as appropriate to the complexity of the TSF, should typically be prepared, kept up-to-date and maintained at **Regional** and **Operational offices**:

- AGAL TMF.
- Copies of all pertinent legislation.
- Permit and approvals.
- Role, responsibility and authority definitions.

- Performance measurement documentation.
- Training records.
- Change management procedures.
- Communication procedures.
- Resources and schedules.
- Financial control system.
- Records of dealings with external stakeholders.
- Site selection report.
- Geotechnical site investigation report.
- Hydrogeological site investigation and model.
- Water management plan and model.
- Geochemical characterisation.
- Geotechnical characterisation.
- Environmental baseline data.
- Environmental impact assessments.
- Design report.
- Construction drawings.
- Construction quality assurance/ quality control report.
- As-built drawings and reports.
- Operations Manual.
- Operational diaries.
- Incident reports.
- Formal risk assessments.
- Dam-break assessment.
- Contingency and emergency preparedness plans.
- Topographical plan of the TSF at an appropriate scale.
- TSF surveillance meeting minutes.
- Key TSF characteristic and environmental data monitoring.
- Monitoring equipment calibration and independent checking.
- Formal inspection and corrective action reports.
- Senior management review reports.
- External audit and corrective action reports.
- Decommissioning report.
- Closure plans and drawings.
- Aftercare reports.

#### *Audit Trail*

The establishment and maintenance of a **comprehensive audit trail** during all stages of the TSF lifecycle is essential to demonstrate due diligence.

#### *Sound Construction Practices*

It is good practice during **construction** to:

- **Strip** the natural ground below the impoundment wall of all vegetation and topsoil/ humic soils prior to wall construction.
- Use an impoundment wall **construction material** that is **fit for purpose** and which will not weaken or deteriorate under operational or climatic conditions.

#### *Good Operational Practices*

**Good operational practices** that should be specified in the Operations Manual and adopted would typically include the following:

Preparation:

- **Removal** and **stockpiling** of available and **suitable topsoil** for future rehabilitation purposes.

Site Security:

- **Control** of **access** to prevent unauthorised personnel from entering the TSF.

- Clear **signage** that warns of the potential hazards on site and locality plans at the site entrance points to guide emergency services.

#### Process Water:

- **Minimisation** of the quantity and quality of **potentially polluting reagents** (cyanide in particular) discharged to the TSF.
- The **separation of clean and process waters** to minimise the contamination of clean water by contact or combination with process water.

#### Slurry Delivery:

- **Secondary containment of slurry delivery pipelines.**
- Slurry pipeline **burst or leak detection with automatic pump shutdown.**
- Provision and maintenance of a **standby slurry delivery pipeline** that could be used without delay in case of difficulties.

#### Water Management:

- **Minimisation of water retention or storage** on the TSF surface.
- **Minimisation of the discharge of process waters to stream with the goal of zero release.**
- **Amelioration of any excess process waters** prior to discharge.
- **Diligent water management** in accordance with **predetermined objectives.**
- **Exclusion of surface water** external to the site from the TSF to preclude surface water run-off from entering the TSF.
- **Control** of the concentration, flow and discharge of **storm water** that could accumulate on the TSF surface so that damage is always prevented.
- **Perimeter berms or paddocks to contain potential slurry spills and eroded material** to within the TSF site.

#### Stability:

- **Stability and pore water pressure** monitoring.
- Adequate **drainage and seepage control** and management.
- **Sub-aerial deposition, deposition in thin layers, or mechanical dewatering to encourage consolidation** of the tailings.
- Measurement, recording and analysis of **impoundment wall movements** with survey beacons, deep inclinometers, and/ or space borne Interferometric Synthetic Aperture Radar (InSAR) as appropriate.
- Clear **referencing** in the field of each monitoring point, such as piezometers, monitoring beacons, drain outlets, etc.

#### Freeboard:

- Maintenance of **freeboard in excess** of that **required** for the **design storm** appropriate to the level of hazard posed by the TSF.
- Maintenance of **physical markers** on the TSF clearly indicating the '**safe**', '**alert**' and '**critical**' **pool levels and extent.**

#### Deposition:

- **Systematic deposition** of tailings in accordance with the objectives specified by the design and operating procedures.
- **Deposition rates appropriate** to the **consolidation characteristics** of the tailings material and TSF design.
- Diligent tailings **density control** in accordance with predetermined objectives.
- Provision and maintenance of a suitable **alternative** tailings disposal **facility**, such as another TSF, that could be used without delay in case of difficulties.

#### Pool Management:

- Maintenance of the decant **pool away** from all **impoundment walls** to avoid contact of the pool with the walls and to establish a **long beach** between the wall and the pool unless the TSF has specifically been designed for to cater for this situation.

#### Decant:

- Provision and maintenance of **standby decant facilities**, such as emergency overflow and/ or standby pump barges for emergencies that could be used

without delay in case of difficulties and when the supernatant pool reaches the pre-determined freeboard.

Impoundment Wall Construction/ Raising:

- **Geometric control** of wall building and raising.

Environmental Protection:

- **Prohibition of disposal of other mine waste products** within the TSF unless an environmental risk assessment has been completed, appropriate design provisions have been made (probably separate containment within impermeable cells with leak detection facilities), roles and responsibilities have been defined and assigned, safe operating practices are adopted and maintained, and records on the waste properties, quantities and location are kept.
- **Hazardous waste** should be deposited at an off-site approved facility and not within the TSF. When such a facility is not available within a feasible distance the Operation should obtain the permits required to establish and operate its own. Hazardous waste sites should be provided with bottom-liner and leachate collection facilities similar to leach pads and final cover should be as for acid rock drainage/ metal leaching dumps.
- **Avian and wildlife protection measures.**

Rehabilitation:

- Concurrent **rehabilitation trials** to confirm the optimum closure technique as early as possible.
- **Concurrent rehabilitation** wherever and as early as possible.

#### *Raising Impoundment Walls*

The following should receive attention in good time whenever impoundment wall raises are required:

- Independent **professional evaluation** of the risk of the **development of excess pore water pressures** within, beneath or adjacent to the impoundment walls.
- **Monitoring of the pore pressure regime** before, during and after each raise.

#### *Type of Impoundment Wall Construction/ Raising*

- **Conventional-type impoundment construction/ raising** is considered appropriate under any of the following conditions:
  - Tailings material is suitable for construction.
  - TSF site is in a remote and inaccessible location.
  - TSF is required to routinely store water. The wall would however need to be specifically designed for this purpose and would probably include special drainage measures.
  - Retention of the process water is required over an extended period for the degradation of a toxic element, such as cyanide.
  - Natural inflow into the TSF is large or subject to high variations and water storage is required for its control.
- **Upstream-type impoundment construction/ raising** is considered appropriate under the following conditions when:
  - There is very low risk of dynamic loading, either from seismicity or from blasting activities.
  - The tailings material is suitable for use for construction of the impoundment walls. This would generally be the case when at least 40-60% by mass of the tailings material has a particle size of between 0,075mm and 4mm.
- **Downstream-type impoundment construction/ raising** is considered appropriate under the following conditions when:
  - Sufficient quantities of suitable impoundment wall construction/ raising material are available economically.
  - There is elevated risk of dynamic loading, either from seismicity or from blasting activities.

- **Centreline-type impoundment construction/ raising** is considered appropriate under the following conditions when there is:
  - Low risk of dynamic loading, either from seismicity or from blasting activities.

Standard of Practice:

*3.5 Define and maintain sound change management procedures.*

Guidance:

**Changes** in design, construction, operation or closure procedures should only be permitted once the entire **design** has been **reviewed** by the Regional Tailings/ Geotechnical Engineer after consultation with the TSF Designer and all applicable safety factor criteria are satisfied. No construction or operation that is, or may be, in conflict with the design-based construction and operating principles should be authorised.

**Construction** of any TSF, or component thereof, should **not be performed** without **third party construction oversight, quality assurance and quality control**, and **as-built certification**.

These processes should **include input** from the **original designer** to ensure that the design intent is correctly manifested during the construction phase.

Standard of Practice:

*3.6 Prevent the accumulation and long-term storage of water on the surface of the TSF unless it has specifically been designed for this purpose and then only if the water balance is strictly managed within pre-determined limits.*

Guidance:

The design and operational TSF **water balance** should be based on a thorough, **probabilistic analysis**, considering all lifecycle phases through to closure with an **appropriate allowance** for a **potential extension** of the **operating life**.

All **input parameters** for the water balance should be **recorded** and **analysed** at an **appropriate frequency**. The balance should be **recomputed** based on the best available information on an **annual basis** or more frequently if necessary.

If computations indicate that a safety factor could be adversely affected and potentially exceed safe limits, appropriate steps should be taken to avoid noncompliance with the design, construction, and operating principles.

Standard of Practice:

*3.7 During the TSF design and slurry deposition procedures, encourage all excess water to drain to enhance consolidation and improve tailings strength.*

Guidance:

The **drainage** of **excess water** is usually **critical** to the **stability** of a tailings deposit. For this reason, the TSF design and operation should endeavour to achieve **effective drainage** of water from the **tailings** material as soon after deposition as possible.

**Special drainage measures** within the **impoundment wall** zones are almost always essential. Such measures can often also be beneficial and desirable beneath the **pool area**.

Where necessary, beneficial and economical this process could be enhanced via thickening or filtering at the plant, cycloning and the provision of filter drains at the TSF.

Standard of Practice:

*3.8 Divert all storm water, external to the TSF, from the TSF and separate potentially polluted water from uncontaminated water.*

Guidance:

**External surface water** should be **kept away** from the TSF to limit the potential for overtopping and erosion.

TSFs should be **constructed upstream** of the **probable maximum flood lines**.

**Process and clean waters** should be **kept separate** as far as possible.

Standard of Practice:

*3.9 Maintain adequate static and dynamic factors of safety against impoundment wall failure, appropriate to the risk, at all times. Re-determine these factors regularly and whenever there are any significant changes.*

Guidance:

TSFs should be **designed** and **operated** for the **entire lifecycle** with an **appropriate set of static** (typically from gravitational forces) and **dynamic** (typically from earthquake or blasting loading) **safety factors**.

Safety Factors

- Typically a minimum **static factor of safety** against slope failure **greater than 1,5** is considered **desirable** during all phases of the TSF lifecycle.
- Static factors of safety **between 1,3 and 1,5** would indicate that **close supervision** and **monitoring** are required and that remedial measures are to be considered and adopted to increase the factor of safety to greater than 1,5 within a reasonable period.
- Static factors of safety **lower than 1,3** would normally indicate the need for **appropriate remedial action** to increase the factor of safety to greater than 1,5 as soon as feasible. In such situations, **comprehensive, probabilistic stability analyses**, based upon **detailed and reliable field and laboratory investigations**, are **strongly recommended**. A TSF with low factors of safety should only be **operated** once a **high confidence** in the **risk levels** have been **obtained** and **appropriate safeguards** to protect life and the environment have been put in place.
- Static factors of safety **less than 1,1** would normally indicate the need for **urgent** and **effective action**. It is considered highly imprudent to continue to operate a TSF with a factor of safety of less than 1,1 until such a time as **appropriate safeguards** to protect life and the environment have been put in place and **remedial measures** have increased the factor of safety to in excess of 1,3 initially and 1,5 ultimately.

It should be noted however that the factor of safety approach can be misleading as the result provides no indication of the degree of certainty of geotechnical and other parameters assumed whilst conducting the stability analyses. For this reason safety factors provide an **indication of stability** and are not definitive unless there is absolute confidence in the input parameters. In cases where factors of safety are low, or there is low confidence in the reliability of input data, more **detailed, probabilistic** and/ or **finite element analyses** should be undertaken.

Instrumentation and Monitoring

Appropriate **instrumentation** should be incorporated within the TSF **walls** to enable **meaningful determination of phreatic levels** on a regular basis and enable recalculation of the actual factors of safety.

Standard of Practice:

*3.10 Maintain adequate freeboard to cater for all likely storm events at all times and an emergency decant method to safely deal with extreme events exceeding the design storm.*

Guidance:

The maintenance of **adequate freeboard** at all times is paramount to TSF safety. The required freeboard should be determined from **probabilistic water balance simulations** for **average** and **extreme conditions**. The magnitude of extreme events should be determined in accordance with the hazard posed by the TSF and the degree of uncertainty in the climatic data.

**Actual** available **freeboard** should be carefully and regularly **monitored** and **compared** with the **required freeboard**.

A safe means of **evacuating excess water** from the TSF surface in **emergency situations** should be provided.

The following types of decant structure are generally appropriate in the following circumstances:

- **Spillway** formed in natural ground should be provided for valley and sidehill TSFs.
- **Decant tower** should be provided in cold climates in situations where there is a positive water balance and for paddock-type TSFs.
- **Decant well** should be provided in warm climates with a negative water balance, for paddock-type TSFs and if a high operating freeboard is maintained.

Standard of Practice:

*3.11 Design and operate TSFs for eventual closure to protect public health and safety, mitigate negative environmental impacts and to meet acceptable post-closure use.*

Guidance:

TSFs should be **designed** and **operated** for **final closure** with the main objectives of **protecting public health** and **safety**, **mitigating negative environmental impacts** and meeting **acceptable post-closure use** within an acceptable technical and economic system such as BATNEEC (otherwise referred to as BACET).

A **preliminary closure plan** with cost estimates should be prepared at the **design stage** and reviewed annually after TSF commissioning with updates as necessary.

#### 4. MONITORING, CHECKING & CORRECTIVE ACTION:

***Develop and adhere to management action plans to identify, deal with identified deficiencies, and demonstrate compliance with the Principles and practices of the TMF through regular and independent verification.***

Standard of Practice:

*4.1 Maintain a comprehensive TSF integrity and environmental monitoring system that permits timely comparison with pre-determined norms and facilitates the detection of adverse trends and potential problems.*

Guidance:

Special emphasis should be placed on TSF **monitoring**. This is a **critical** activity as, with the exception of failures triggered by earthquakes or major storm events, all types of failure provide some **warning signs**.

Data Collection and Analysis

Relevant **data** pertaining to all aspects of the TSF should be **gathered, checked, presented** and **interpreted** regularly.

The following data should be gathered routinely:

- **Visual assessment** of the TSF and components.

- **Climatic** data (precipitation, pan evaporation, solar radiation, wind speed, wind direction, humidity and temperature).
- **Environmental** data (ground and surface water qualities, ground water depths, traceable characteristics, flow and aquatic biology, noise levels and dust generation).
- Components of the TSF **water balance**, including water sent to and recovered from the TSF, under-drain flow rates, abstraction well pumping rates, seepage return rates.
- Ore/ tailings **geochemical analyses** including ARD generation potential.
- **Geotechnical testing and analyses** of the tailings materials as appropriate.
- **Pipeline condition** and rate of wear/ erosion/ accretion/ sulphate reducing bacteria attack.
- Quality and quantity of **seepage flow** through the TSF.
- Supernatant **pond level**.
- Position of the **phreatic surface**.
- **Pore pressure regime** within and adjacent to the impoundment walls.
- **Dynamic pore pressure** and **liquefaction potential** where appropriate.
- Vertical and horizontal **movements** of the crest and outer profile of the impoundment walls.
- Site **seismicity** where appropriate.
- Tailings **deposition rates** and **locations**.
- **Erosion rates**.
- **Rehabilitation** trial and concurrent rehabilitation success rates.

Procedures to regularly **inspect, monitor, test, record, evaluate** and **report key characteristics** of the TSFs should be implemented. These should include tracking of performance, operational controls and conformance with targets and objectives.

All **monitoring equipment** should be **calibrated** regularly as appropriate to the type of instrumentation, but not less than annually, to ensure the reliability of data. An independent checking system should be used as needed to confirm the validity of monitoring data.

#### *Tailings/ Geotechnical Consultant Monitoring Input*

Each Operation should appoint an appropriately qualified, professional, experienced and recognised Tailings/ Geotechnical Consultant to provide routine TSF integrity monitoring, analyses and interpretation. The Tailings/ Geotechnical Consultant should regularly:

- Re-visit the TSF **design, construction operation and closure plans and programmes** (by comparison of the design, water balance, operations and closure plan against the measured indicators to confirm plan validity).
- Conduct a **detailed formal inspection** to review the **physical condition** of the TSF in the presence of operational management.
- Review and analyse **monitoring and water balance data** and compare with pre-determined performance criteria.
- Review the adequacy of **relevant documentation, information and data**.
- Recalculate the **factors of safety** against failure.
- Reassess the **freeboard** recalculation.
- Re-establish and set 'safe', 'alert' and 'critical' **operating limits for key stability and freeboard/ over-topping indicators**.
- Determine the TSF **environmental status and performance**.
- Determine compliance with the **Policy for the Management of Tailings Storage Facility Risk at AGAL Operations**, the **TMF, legislation and permits**, the **International Cyanide Management Code, Regional Code of Practice and Operations Manual**.
- Confirm the **historical and predicted development** of the TSF via determination of settled densities and review of the latest life-of-mine plans and production scenarios.
- Review the **adequacy of pumping systems** providing estimates of when future upgrades would be required.

- Formulate specific **deposition strategies** and **development plans** for the short- and long-term to ensure that the strategies comply with legal requirements and render the TSF stable and safe.
- Conduct **risk assessments** to re-evaluate downstream risks to examine surrounding land usage and ground and surface water monitoring results to determine changed conditions.
- Review **emergency preparedness, response procedures** and **contingency plans**.
- Establish and update possible **failure modes** and **effects**.
- Conduct an appropriate on-site TSF **training workshop** for operational staff.
- Make recommendations for additional work to **improve** the **understanding** of **foundation, wall** and **deposited materials** and **additional instrumentation** if considered necessary.
- Conduct **confirmatory checking** of performance monitoring **instrumentation** and **data gathering**, e.g. piezometers, flow rates, monitoring wells, pipeline inspections and status, operational checking and inspection systems.

Standard of Practice:

*4.2 Commission and conduct a TSF Audit annually or biennially depending on the assessed risk levels.*

Guidance:

Each TSF should be **formally audited** at least annually, or biennially provided the assessed risks are low and there are no anticipated significant changes in between the audits, by a **TSF Auditor**.

The **purpose** of the **TSF Audit** is to:

- Review the **management system, operations** and **maintenance**, and **surveillance programme** based on the TMF.
- Examine TSF **implementation** and **conformance** to **plans** and **regulatory requirements**.
- Establish compliance with **statutory regulations** and **permits**.
- Review the **stability** and **environmental performance** of the TSF.
- Follow a **checklist format** that facilitates the identification of improvements or otherwise made with time.
- Re-evaluate **risks** (to examine surrounding land usage and ground and surface water monitoring results to determine what has changed).
- Make formal **recommendations** necessary to maintain compliance with the TMF.
- Provide **continuity**, as the nature of the mining industry is such that there is typically a high turnover of staff at the Operations and among external consultants.

During the TSF Audit the TSF Auditor should:

- Conduct a **detailed formal inspection** to review the **physical condition** of the TSF in the presence of operational management.
- Undertake a thorough **review** of the **TSF management system**
- Review **monitoring** and **water balance data** and compare with pre-determined performance criteria.
- Review the adequacy of **relevant documentation, information** and **data**.
- Review the **factors** of **safety** against failure.
- Review the **freeboard** recalculation.
- Review the **operating limits** for **key stability** and **freeboard/ over-topping indicators**.
- Determine the TSF **environmental status** and **performance**.
- Determine compliance with the **Policy for the Management of Tailings Storage Facility Risk at AGAL Operations**, the **TMF**, **legislation** and **permits**, the

***International Cyanide Management Code, Regional Code of Practice and Operations Manual.***

- Review **emergency preparedness, response procedures and contingency plans.**
- Establish and update possible **failure modes and effects.**
- Make recommendations for additional work to **improve the understanding of foundation, wall and deposited materials and additional instrumentation** if considered necessary.
- Detail findings on a comprehensive **checklist.**
- Recommend any necessary **enhancements.**
- Identify **work activities** required in the short-, medium- and long-term.
- Compile a list of **deficient items.**
- Make **recommendations** for a full TSF review (see Standard of Practice 4.3) if considered necessary.
- Provide **feedback** to senior management identifying key issues and corrective actions at the end of the audit.

Operations should make all **relevant data available** to the **TSF Auditor** and provide all necessary **assistance.**

Soon after the TSF Audit:

- The auditor should provide **written conclusions** concerning the acceptability or otherwise of current operating conditions, drawing comparison of actual operating conditions with design assumptions.
- Recommend the **timing of the next audit** based upon the assessed risk.
- Operational personnel should prepare a **corrective action programme** that commits to remedial actions stipulating commitment dates and persons responsible. The outcomes should be included in the final version of the TSF Audit report for presentation to AGAL senior management. Where the Operational personnel do not agree with the audit findings and/ or recommended remedial actions, the reasons should be documented as well as the alternative remedial actions.

***Standard of Practice:***

***4.3 Commission a TSF Review at appropriate milestones during the TSF lifecycle, after serious incidents, and whenever recommended.***

**Guidance:**

A **TSF Review Panel** should review the TSF:

- At **appropriate milestones** during the TSF lifecycle. Such milestones would include at the end of the conceptualisation, design, construction, operational and closure phases.
- After **serious incidents** that raise questions about the efficacy of the TSF management system as applied at the Operation.
- Whenever **recommended** by senior Operational management or TSF auditor.

The **purpose** of the review is to:

- Ensure **human safety** and **protection** of the **environment** during the next phase of the TSF lifecycle.
- Identify the **causes** of a serious incident and to determine the best method of **ensuring** that such **problems do not occur** again.
- Examine the **efficacy** of the TMF and the management system as implemented.
- Review the TMF **design and operating procedures.**
- Improve the **confidence** of regulators and the public to facilitate regulatory processes and **demonstrate due diligence.**

Operations should make all **relevant data available** to the review panel and provide all necessary **assistance**.

Standard of Practice:

*4.4 Develop and implement action plans to correct all identified deficiencies.*

Guidance:

**Action plans** should be developed and implemented for items identified during inspections, audits or reviews that require corrective action as follows:

- Identify **items requiring corrective action**.
- Establish and commit to a **time-frame** for the corrective action based on meeting the TMF.
- The reporting of significant **remedial actions** and their **completion** to AGAL senior management.

## 5. DECOMMISSIONING & CLOSURE:

**Decommission and close TSFs to protect human health and the environment.**

Standard of Practice:

*5.1 Adopt the 'design for the environment' approach.*

Guidance:

- **Design for closure** right from the **start with the end in mind** and consider closure issues at project inception and re-evaluate throughout the life-cycle.
- Adopt the **ICMM Ten Principles for Sustainable Development** (ICMM, 2003).
- Adopt **holistic management principles** where goals are set, plans are made and progress towards attaining the goals are monitored whilst making decisions that simultaneously consider economic, social and environmental realities.
- Ensure a concerted, properly managed and integrated **team effort**.
- Follow the **recommended design process** which is to:
  - Ensure that storm water drainage measures are appropriate and durable.
  - Understand the final landform.
  - Manage closure from the outset by setting and maintaining the correct standards and not rely upon remedial measures to rectify an inappropriate design.
- Minimise **tailings generation**.
- Examine and implement **new methods** of **deposition** to provide a tailings disposal solution that is possible to close in a **sustainable manner**.
- Endeavour to **remove pollutants** from the tailings stream **at source** rather than sending them to the environment and having to deal with them there.
- Keep potential **pollutants separate**.
- Permanently **fix** potentially **toxic pollutants** in cemented backfill or by similar techniques where appropriate.
- Ensure that the TSF **does not degrade** the ambient environment and does **not inhibit** the ability of **future generations** to live at a **similar standard**.
- Adopt sound **technical details** that assist with closure.
- Develop a **framework** for **TSF closure** based upon detoxification at source.
- Consult with **interested** and **affected parties** in regard to post-closure expectations.
- Establish and as far as possible design for the optimum **after-use alternative**.
- Consider the potential to turn **liabilities into assets**, for example, the sale of valuable land after rehabilitation.
- Prepare an **initial closure plan** with costs and update these annually.
- Prepare a **closure and aftercare estimate**.

Standard of Practice:**5.2** *Establish environmental baseline data and analogue/reference sites.*Guidance:

- Compile and maintain a good **database** that includes all pertinent data during all TSF life-cycle phases.
- Obtain **baseline data** wherever possible and as soon as possible.
- Identify and monitor **analogue sites** that represent the area prior to tailings deposition.
- Identify **reference sites** that represent the area after tailings deposition and successfully rehabilitated.
- Ensure the certainty of **outcomes** supported by good quality factual information.

Standard of Practice:**5.3** *Follow a risk-based approach that includes re-evaluation of TSF-related risks that may be present upon cessation of operations.*Guidance:

- Adopt a **risk-based design approach** that includes:
    - Identification of hazards.
    - Preparation of preliminary design concepts.
    - Assessment of risks associated with the concepts.
    - Modification of design to address high risk areas.
    - Re-evaluation of risks, including development of a risk management plan.
    - Finalisation of design and implementation.
    - Ongoing design, monitoring etc.
    - Consideration of risk of premature and unplanned mine closure.
- A generic risk assessment matrix that could be used in this process is provided as guidance to Standard of Practice 2.6.
- Conduct **Strategic Environmental Assessment (SEA)** and **Environmental Impact Assessment (EIA)**.
  - Reconsider TSF **decommissioning** approximately **two years** prior to termination of the metallurgical plant operation.
  - Draft a **method statement** that defines the manner in which the TSF is to be closed.
  - Physically **cut all mechanisms** for delivery of tailings to the TSF to prevent further discharge of tailings or process water onto the TSF surface.
  - Ensure that **adequate storm water removal measures** are in place.
  - Re-assess the **long-term environmental, health and safety risks** posed by the TSF after closure to facilitate the final closure design process.
  - Consider the **potential impacts** of **system failures**, for example closure criteria not being met, changes in legislation or social pressures.
  - Reconfirm **aftercare requirements**.

Standard of Practice:**5.4** *Develop site-specific closure criteria.*Guidance:

- Define **strategic objectives** from the Strategic Environmental Assessment (SEA) process.
- Ensure that the **closure criteria** are site specific.
- Take cognisance of the **ambient climatic conditions** and consider **extreme climatic events**.
- Consider views and involve all **stakeholders**.
- Consider **potential changes** in future requirements.
- Consider the potential for the tailings to be a **future resource** that could be re-mined at in the future.

- Consider **social issues**.
- Meet end **land-use objectives**.
- Integrate closed TSF into **ambient landscape** where feasible.
- Limit TSF **erosion rate** to no faster than that of the surrounding natural topography.
- Set **measurable outcomes**.

Standard of Practice:

*5.5 Plan and implement procedures to manage storm water run-off and solutions from the TSF with the objective of protecting human health and the environment.*

Guidance:

- Employ **suitably qualified** and **experienced professionals** to design the closure profile and condition.
- Maintain **hydraulic separation** between the tailings mass and the underlying or adjacent surface and ground water resources.
- Prepare **construction drawings** and **as-built records** once the work is complete.
- Include any necessary **updates** of the **environmental modelling** to re-predict the long term after closure behaviour for monitoring purposes and anticipate the probable maximum flood and earthquakes, where applicable, ensuring that the TSF would be capable of sustaining these extreme events as considered during the design phase and reconfirmed during the closure design phase.
- Determine **capping** and **cover requirements** after consideration of the geochemical nature of the tailings and the environmental conditions that the TSF would be exposed to in the future.

Standard of Practice:

*5.6 Ensure a reduction in environmental liability throughout the life of the mining operation through operating for closure, progressive rehabilitation and footprint minimisation.*

Guidance:

- Pre-strip and stockpile suitable **topsoil** prior to tailings deposition for use during rehabilitation efforts.
- **Dewater tailings** as far as can reasonably be achieved prior to deposition to minimise the quantity of water used and the reagents sent to the environment.
- Adopt **sub-aerial deposition** techniques to accelerate consolidation of the tailings where appropriate.
- Commence **rehabilitation works** during the **operational phase** wherever possible.
- Recover and recycle **process waters** from the TSF.
- Incorporate suitable environmental **protection** measures.

Standard of Practice:

*5.7 Prepare final closure plan.*

Guidance:

- Prepare the **final closure plan** and update **cost estimates** two years prior to TSF closure.
- Return the TSF to a viable post-mining **land-use** in accordance with legal requirements and, as possible and appropriate, the reasonable requests of **interested** and **affected parties**.
- Create a **living system** using indigenous flora as far as possible, with maximum biodiversity. Invasive species should not be used unless it can be shown that they will die out within a short time frame.
- Make allowance for limited **historical data sets** and also for **uncertainty** around the climate change issues and the potential impact of climatic extremes.

- Apply **BATNEEC** to achieve a closure condition that is as close to a state that is as **maintenance-free** as possible.
- Construct the final TSF configuration to ensure that the **outer face profile** remains **stable** and is no more prone to wind and water erosion than the natural ambient topography.

Standard of Practice:

*5.8 Control the releases of potential pollutants from closed TSFs to protect human health and the environment.*

Guidance:

- Control **deleterious releases** from the TSF via suitable means for as long as necessary after closure to prevent degradation of human health and adverse environmental impacts.

Standard of Practice:

*5.9 Provide financial assurance for the closure of TSFs, within mine reclamation (rehabilitation) planning activities consistent with political jurisdictional requirements.*

Guidance:

- Make **adequate provision** during the operational life of the mine to cater for the **costs** associated with TSF closure.
- Consider **realistic closure, care and maintenance costs** at project inception and revisit annually throughout the lifecycle.
- Ensure **financial ability** to undertake **closure work**.
- Endeavour to obtain appropriate **reductions** in the magnitude of **financial guarantees** based upon company's track record of closure success.

Standard of Practice:

*5.10 Provide closure management system.*

Guidance:

- Prepare and implement a comprehensive **tailings management system** for the **full TSF life cycle**.
- Undertake all aspects of tailings management, from the pre-feasibility to decommissioning phases with **closure** in mind and as the **goal**.
- Define all **responsibilities**.
- Ensure project **continuity**.
- Manage and document **changes**.
- Prepare and update **operating procedures** and **manuals**.
- Ensure proper **supervision** of all phases.

Standard of Practice:

*5.11 Implement a monitoring and aftercare programme to confirm that procedures and controls are effective.*

Guidance

- Specify the **monitoring** and **aftercare requirements** during the closure design phase.
- Make the necessary provision for **ongoing repair and maintenance**.
- Prepare comprehensive **reports** that present the TSF condition and the results of the environmental monitoring.
- Compare the results of the **monitoring** with the **predicted results** to demonstrate the closure activities are achieving the desired effect.
- Ensure that **monitoring plans** conclusively **demonstrate** that the **objectives** have been **met**.

- Conduct **independent audits**.
- Formally **compare progress against predicted or modelled progress**.
- Continually **check** to ensure that the closure plan is being adhered to and that implementation is effective.
- Monitor **sustainability indicators** that include community sustainability.
- Conduct **Environmental and Social Impact Assessment (ESIA)** on the post-closure condition.

Standard of Practice:

*5.12 Conduct transparent reporting and take cognisance of stakeholder concerns and needs.*

Guidance:

- Keep **stakeholders** informed.
- Manage **expectations**.
- Undertake factual, concise and honest **reporting**.
- Conduct all closure processes in a **transparent** manner to foster trust thereby facilitating future permitting processes.
- Maintain and present comprehensive environmental and financial data with detailed and accurate information to demonstrate **success** and provide a database for future closure projects.
- Review successes and failures to achieve **continual improvement**.
- Listen to the **concerns** of non-governmental organisations, community groups, local government, and concerned individuals and endeavour to address their concerns to maintain the '**social licence to operate**'.
- Broadcast **successes** to renew the '**social licence to operate**'.

## 6. EMERGENCY RESPONSE:

**Protect communities and the environment through the development of emergency response strategies and capabilities that minimise possible impacts.**

Standard of Practice:

*6.1 Prepare detailed emergency response plans for potential TSF releases.*

Guidance:

**Emergency preparedness and response plans** should be **prepared, documented** and communicated to affected parties, including local communities. These plans should be based on the TSF failure mode and event, risk and dam-break assessments.

The emergency preparedness and response plan should contain:

- A **safety classification** in terms of risk to human life and property (low, medium and high hazard).
- An **environmental classification** in terms of risk to water, air and land.
- An **emergency preparedness plan** that considers at least three conditions;
  - Deterioration in stability or other potential failure mode that is identified (by observation or measurement) such that the supervisory and design personnel could be consulted and a remedial plan implemented.
  - An advanced state of deterioration of the TSF has been attained such that evacuation should take place, deposition halted, and immediate repairs or remedial measures implemented.
  - The TSF has started failing and an evacuation is carried out.
- A **disaster-recovery plan** in the event that the TSF has started to fail detailing activities that should be taken to enable recommencement of production,

environmental clean-up, community rebuilding and recovery of stakeholder reputation.

The plan would typically comprise the following:

*Notification flowchart*

- One per classification level in the emergency detection plan.
- Information-flow up and down the flowchart.
- Prioritised notification order.
- All contact details and alternatives (relief and substitute personnel).

*Background information*

- Locality maps.
- List of significant downstream features.

*Emergency detection plan*

*Responsibilities*

- Person responsible for declaring the emergency.
- Command structure.
- Responsibility matrix.
- TSF owner responsibilities.
- Local authority responsibility.
- Fire department responsibility.
- Traffic department responsibility.
- Paramedic responsibility.
- Medical facilities responsibility.
- Community leaders' responsibility.
- Media responsibilities/ guidelines.

*Zone of influence maps*

- Potential zones of influence (via dam-break analyses or by inspection depending upon level of risk as appropriate).

*Evacuation plans*

- One for every TSF/ complex.
- Definition of who initiates the evacuation.
- All contact information for the employees, residents and business premises etc. within the potential inundation area.
- Adequate transportation.
- Alternative accommodation, food, drinking water etc.
- Communication for evacuees.

*Emergency response plan*

- Shut-down of operations.
- Alarm systems.
- Disaster response.
- Access routes.
- Evacuation plan.
- Security for evacuees and property.
- Traffic control.
- Task completion review.
- Crisis centre.
- Media centre.
- Emergency resources such as power, water, food, transport, earth moving equipment, personal protective equipment, etc.
- Wildlife management/ rescue.
- Situation assessments.
- Communication procedure manual.
- Communication resources.
- Special or unique conditions (cyanide etc.)

- Follow-up with relatives etc.
- Trauma counseling for victims.

#### *Clean-up and rehabilitation plan*

- Termination conditions with definition of when the emergency is considered to be over.
- Authority to order re-start.
- Re-start procedures.
- Risk assessments on clean-up options.
- Collect environmental baseline data on water, soil, vegetation, etc.
- Soil, water contamination testing.
- Removal of spilt material.
- Rehabilitation of affected areas.
- Incident investigation.
- Evaluation of effectiveness of emergency response plan.
- Ongoing communication.
- Insurance considerations.

#### *Emergency response plan testing procedures*

- Frequency and nature of procedures to test the emergency response plan.

#### *Appendices*

- Dam-break analyses.
- Exercise/ scenario plan including review manual.
- Training programme.
- Annual review plan.
- Agreement and approval records.

#### *Standard of Practice:*

*6.2 Involve site personnel and stakeholders in the planning process.*

#### Guidance:

The **workforce** and **stakeholders**, including potentially affected communities, should be **included** in the **emergency response planning process**. Regular **consultation** and **communication** with the **local community** or its representatives should be conducted as necessary to ensure that the plan addresses current conditions and risks and that the community knows what to do in the event of an emergency.

#### *Standard of Practice:*

*6.3 Designate appropriate personnel and commit necessary equipment and resources for emergency response.*

#### Guidance:

Primary and alternative **emergency response coordinators** should be **designated**. The coordinator should have explicit authority to commit the resources to implement the emergency response plan.

**Emergency response teams** should be identified and appropriately trained and prepared.

The plan should identify all emergency response **equipment** that should be available at short notice. The plan should describe the functions and responsibilities of outside responders, medical facilities or communities in emergency response and include the necessary contact information. The Operation should ensure that any such entities remain aware of their involvement and are included as necessary in mock drills or implementation exercises.

#### *Standard of Practice:*

*6.4 Develop procedures for internal and external emergency notification and reporting.*

Guidance:

The plan should include **procedures** and up-to-date **contact information** for notifying management, regulatory agencies, outside response providers and medical facilities of the emergency, as appropriate.

Standard of Practice:

**6.5 Incorporate remediation and monitoring elements into response plans.**

Guidance:

The plan should describe **specific remediation measures** appropriate for identified failure modes and effects.

Standard of Practice:

**6.6 Periodically test response procedures and capabilities and revise as necessary.**

Guidance:

The plan should include provision for **reviewing** and **evaluating** its **adequacy annually** and after any event that required its implementation. Mock emergency drills that reflect the most likely incidents should also be periodically used to evaluate the adequacy of the plan.

## 7. COMPETENCY & TRAINING:

**Ensure that employees and contractors involved in tailings management are competent, aware of the TMF and their relevant responsibilities, and have the necessary skills.**

Standard of Practice:

**7.1 Determine and regularly review the competency and training needs of all personnel involved with the TSF and make the necessary budgetary provision to provide suitable training.**

Guidance:

Senior management should ensure the **competency** of the **various levels** of **responsibility** and should **ensure that adequate** and **appropriate training** is available regularly to ensure that personnel know what and why they are supervising, what constitutes unfavourable conditions and how to correct them, and the consequences of TSF failures.

Operations should **employ suitably qualified** and **experienced personnel** for TSF design, construction, operation and closure. Competency requirements for the various personnel in each of the TSF lifecycles will differ (Table 7.1).

**Table 7.1 – Recommended Competency Requirements**

LIFECYCLE PHASE	REQUIREMENT
Planning	Suitably qualified and experienced persons from engineering and environmental disciplines.
Design	Suitably qualified and experienced persons: design by engineer and independent review.
Construction & commissioning	Inspection of construction by suitably qualified and experienced engineer.
	Commissioning under the supervision of a suitable qualified and experienced person with review by the designer.
Operation	Operation by operational personnel in accordance with the operations manual.
	Surveillance by suitably qualified and experienced engineer.
	Inspection and audits by suitably qualified and experienced external party.
Decommissioning & aftercare	Decommissioning and aftercare plan and manual prepared by suitably qualified persons. Planning and design for closure as per planning and design phases.

The **training needs** of all personnel involved with any aspect of the TSF and its management should be **reviewed** at the start of a new TSF lifecycle phase and annually thereafter, and the necessary budgetary provision made to provide suitable training.

Standard of Practice:

*7.2 Provide annual refresher training, including in-field demonstration, for all employees and contractors regarding the requirements of the TMF.*

Guidance:

All personnel who have any contact with, or responsibilities relating to, tailings disposal activities should be **trained** on the requirements and importance of **compliance** with the **TMF, code of practice** and **operations manual**.

Standard of Practice:

*7.3 Ensure that adequate and appropriate training for personnel involved with the design, construction, commissioning, decommissioning, operation, and maintenance in a manner and to an extent that ensures and demonstrates adequate competency and readiness is provided.*

Guidance:

**Training** should be provided to **all personnel**, including contractors and suppliers, whose work may **significantly affect the TSF** on:

- Hazards associated with the tailings disposal process and TSFs.
- Relevance, impact and importance of their duties.
- TSF management plans, permits and approval requirements.
- The importance of conformance to design.
- Potential consequences of departure from specified operating procedures.
- Potential risks.
- Significant actual and potential environmental impacts.
- Emergency preparedness and response requirements.
- Individual roles and responsibilities in achieving conformance with the requirements.

Personnel should, as part of the training programme, **demonstrate** that they have attained the **required standard**. This should be achieved by means of competence testing, maintenance of training records and documented acknowledgement of training.

## **8. MANAGEMENT REVIEW FOR CONTINUAL IMPROVEMENT:**

***Achieve continuous improvement in tailings management.***

Standard of Practice:

*8.1 Conduct an independent annual senior management review of the adequacy of policies, objectives and performance of the tailings management system.*

Guidance:

AGAL and its Operations should implement an **annual senior management review** of the adequacy of policies, objectives and performance of the tailings management system. The scope of this review should be appropriate to the levels of the identified risk and re-assess the need for changes to system in light of inspection reports, changing circumstances, recommendations and the commitment to continuous improvement.

**Continuous improvement** should be achieved through:

- Adoption of applicable international best practice.
- Improved operational quality and risk minimisation.
- Anticipation of changes in legislation that could require higher standards.
- Focus on sustainable closure as the end goal.

The **results** of the review should be **presented** to AGAL senior management **annually**.

Standard of Practice:

8.2 *Annually review the TSFs, their associated environmental impacts, closure, safety and other issues to determine where technology should be transferred and where environmental and safety research should be advanced.*

Guidance:

AGAL should **annually review** all its TSFs, associated environmental impacts, closure, safety or other issues to **determine** where **technology** should be **transferred** and **environmental** and **safety research** should be **advanced**.

Key research and development areas are typically tailings:

- Training.
- Transportation.
- Deposition and storage techniques.
- Water conservation.
- Energy conservation.
- Sustainable closure.

## APPENDIX A DEFINITIONS & ABBREVIATIONS

### Definitions

The following definitions apply within the context of the TMF:

WORD/TERM	DEFINITION
<i>Acceptable environmental impact</i>	An <i>acceptable</i> environmental impact is one in which the potentially adverse influences have been minimised as far as possible using <i>BACET</i> and which are within limits stipulated by the regulatory authorities and other stakeholders.
<i>Analogue site</i>	A site that is similar to the TSF site prior to disturbance or tailings deposition. Such sites provide useful data in the absence of environmental baseline data and in determining suitable closure criteria.
<i>Appropriate containment</i>	<i>Appropriate containment</i> is the mitigation of seepage to result in <i>acceptable environmental ground or surface water impacts</i> .
<i>As-built drawings</i>	Engineering drawings that record the TSF as constructed immediately prior to commissioning.
<i>As-built records</i>	Engineering reports that detail the construction activities and document test results and problems or changes encountered.
<i>Best practice</i>	<i>Best practice</i> is referred herein to establish a benchmark against which the performance of a TSF can be measured. In the absence of internationally accepted standards in the tailings industry <i>best practice</i> is commonly accepted as being the standards typical of current good practice in North America for similar structures, although examples of <i>best practice</i> can also be found elsewhere. To an extent it is envisaged that the AGAL <i>TMF</i> will document <i>best practice</i> in TSF design and management where possible.
<i>Closure</i>	<i>Closure</i> will have been achieved when all appropriate steps have been taken to ensure that the TSF is in a state where all necessary legislative and regulatory approvals have been obtained to discontinue active management of the TSF.
<i>Commissioning</i>	The functions that precede the routine operation of the TSF, i.e. design, construction and certification.
<i>Commitments to stakeholders</i>	Obligations made to persons or organizations that have an interest in the TSF.
<i>Continual improvement</i>	The process of enhancing the TSF management system to achieve ongoing improvement in performance in stability, safety and/or environmental performance.
<i>Corporate Tailings Engineer</i>	The AGAL Professional Engineer appointed to audit the AGAL TSFs. The Tailings Engineer would typically be a government-registered Professional Engineer with tertiary qualifications in civil and geotechnical engineering, and who possesses at least ten years experience in the field of TSF design and management.
<i>Decommissioning</i>	The activities or processes that begin after cessation of prospecting activities or mineral production and ends with <i>closure</i> .
<i>Design</i>	<i>Design</i> is the: <ul style="list-style-type: none"> <li>• Application of rational engineering and scientific principles to the selection of exploration of sites for TSFs:</li> <li>• Establishment and measurement of characteristics and properties of the residue and the <i>in situ</i> properties of the site, including hydrological conditions.</li> <li>• Establishment by means of calculation, suitably qualified judgement and experience of a layout arrangement and dimension that will result in a safe and economical deposit.</li> </ul>
<i>Design for the Environment</i>	The recommended design philosophy for TSFs that has the key objective of designing with the ultimate end-use in mind right from the initial conceptual phase and through all subsequent lifecycle phases.
<i>Environmentally responsible</i>	<i>Environmental responsible</i> TSF management is achieved after identification and mitigation of all potential environmental impacts so that they <i>become acceptable environmental impacts</i> .
<i>Environmental protection</i>	Measures taken to safeguard the environment and to minimise the impact of TSF-related activities.
<i>Freeboard</i>	The vertical distance between the water/fluid pool surface and the lowest point on the dam wall.
<i>Liner</i>	A TSF <i>liner</i> is a low permeability barrier provided to all are part of a TSF to reduce seepage and provide <i>appropriate containment</i> . <i>Liners</i> may be partial or fill liners, consisting of compacted in situ material, imported clays, or synthetic membrane or combinations thereof. Drainage systems are usually provided to protect the liner.
<i>Mine residue</i>	Waste rock, slimes or tailings derived from the mining operation or processing of gold-bearing ores.

<i>Operation(s)</i>	AGAL <i>Operations</i> are gold mines and metallurgical processing plants that are wholly or partially owned, or operated by AGAL Limited.
<i>Precautionary Principle</i>	This principle states that: 'where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used a reason for postponing measures to prevent environmental degradation'. In other words, AGAL Operations should take active steps to deal with potentially serious pollution immediately and not defer protective measures until the problem has manifested itself fully.
<i>Probabilistic analysis</i>	A probabilistic analysis approach characterises input variabilities using probability density functions and then propagates these density functions through the performance model to yield uncertain model outputs, which can be related to failure metrics such as TSF overtopping, discharge to stream or likelihood of slope failure.
<i>Reclamation</i>	In some regions particularly the States 'reclamation' is equivalent to 'rehabilitation' (see below). In other regions 'reclamation' is the process of recovering and retreating tailings to realise additional value.
<i>Rehabilitation</i>	TSF rehabilitation is the process of returning the TSF surfaces to some land-use that is environmentally, socially and economically acceptable. While it is rarely possible to restore the TSF land area to its original condition, the rehabilitation process usually attempts to bring some degree of restoration or improvement.
<i>Reference site</i>	A site that is similar to the TSF site after disturbance/ tailings deposition and that has been successfully rehabilitated and closed to a good standard.
<i>Regional Tailings/ Geotechnical Engineer</i>	The AGAL Professional Engineer appointed to assist the Operations with TSF management in a particular Region or Regions. The Regional Tailings/ Geotechnical Engineer would typically be a government-registered Professional Engineer with tertiary qualifications in civil and geotechnical engineering, and who possesses at least five years experience in the field of TSF design and management.
<i>Safe</i>	A <i>safe</i> state is achieved when the TSF does not add significantly to the total risk to which employees, the public and the environment are exposed.
<i>Significant risk</i>	A <i>significant risk</i> is one that adds appreciably to the total risk to which employees, the public and the environment are exposed.
<i>Stable</i>	TSFs are considered to be <i>stable</i> when they pose low potential for rapid release of tailings or pollutants to the environment.
<i>Suitably qualified and experienced</i>	A person who has the training in the skills appropriate to the type of work to be undertaken and experience in the type of residue and size, complexity and hazard posed by the TSF or the environmental conditions pertaining to the project. <i>Suitably qualified engineers</i> would typically be state-registered Professional Engineers with tertiary qualifications in civil and geotechnical engineering, and who possess at least five years experience in the field of TSF design and management.
<i>Tailings</i>	Mine residues from the metallurgical processing of gold-bearing ores finer than 2mm are regarded as <i>tailings</i> .
<i>Tailings Manager</i>	The person appointed to ensure that the TSF is operated in accordance with the TMF, Regional Code of Practice and Operations Manual and based at the Operation. The Tailings Manager would typically be the Plant, Process or Metallurgical Manager with suitable experience to manage the tailings risks of the Operation.
<i>Tailings Storage Facility</i>	All components and activities associated with tailings delivery, deposition and storage, including all civil, mechanical and electrical infrastructures. It also includes all components and activities associated with the collection and return of tailings decant water, and the collection and disposal of seepage. <i>Tailings storage facilities</i> are also referred to as tailings containment facilities, tailings dams and slimes dams.
<i>TSF Audit</i>	The annual, or biennial, audit of the TSF and its management system conducted by a TSF Auditor.
<i>TSF Auditor</i>	The TSF auditor would typically be a government-registered Professional Engineer with tertiary qualifications in civil and geotechnical engineering, and who possesses at least ten years experience in the field of TSF design and management and is independent of the Operation. The auditor may, but not necessarily be, the Corporate Tailings Engineer.
<i>TSF Designer</i>	The TSF designer is the suitably qualified and experienced professional team appointed to design the TSF or components thereof.
<i>TSF Review</i>	The review of the TSF conducted at the end of each lifecycle phase, after any serious incident, or as recommended and conducted by the TSF review panel.
<i>TSF Review Panel</i>	A TSF review panel is an independent body set up to review AGAL TSFs, associated designs and projects, comprising two or more Professional Engineers of international repute, as appropriate, with relevant qualification and having suitable, extensive experience in TSF design and management.

**Abbreviations**

The following abbreviations apply within the context of the *TMF*:

<b>ABBREVIATION</b>	<b>DEFINITION</b>
<i>AGAL</i>	AngloGold Ashanti Limited
<i>ARD</i>	Acid Rock Drainage otherwise referred to as Acid Mine Drainage
<i>BACET</i>	Best Available Cost Effective Technology, which implies that the technology being considered is proven by practical application appropriate to the particular problem and generally accepted by the industry at the time
<i>BATNEEC</i>	Best Available Technology Not Exceeding Excessive Cost
<i>EIA</i>	Environmental Impact Assessment
<i>EMP</i>	Environmental Management Programme
<i>ICOLD</i>	International Committee on Large Dams
<i>SI</i>	<i>System Internationale</i> units
<i>SEA</i>	Strategic Environmental Assessment
<i>TMF</i>	AGAL Tailings Management Framework
<i>TSF</i>	Tailings Storage Facility

## APPENDIX B RELEVANT TEXTS BY REGION/ COUNTRY

The following documents were used during the preparation of these TMF, are referred to in the text, or are considered to be useful references. The documents relate to the design, construction and management of TSFs.

The list, initially compiled from *A Case for an International Guide for Tailings Management* by Golder Associates dated October 2000, has been substantially updated and enhanced.

Particularly useful or important texts have been highlighted by means of shading.

### COMPANY

DATE	AUTHORITY	AUTHOR	TITLE
-		-	<b>AGAL Environmental Policy</b>
2001		South Africa Region Metallurgy	<b>Cyanide Safe Handling Guidelines</b>
2007	AGAL	Corporate	<b>*Environmental Management Guidelines: Water Management Guideline</b>
			<b>*Environmental Management Guidelines: Water Management Guideline</b>
			<b>*Environmental Management Guidelines: Air Quality Management Guideline</b>
			<b>*Environmental Management Guidelines: Chemicals Management Guideline</b>
			<b>*Environmental Management Guidelines: Waste Management Guideline</b>

\*Currently being drafted.

### EUROPEAN UNION

The European Community is bound by EC Directives covering, for example environmental assessment, water quality, and disposal of waste and landfills. The Directives are implemented by national legislation that varies from country to country.

France:

Mineral extraction and tailings disposal is covered by the Mining Code (*Code Minier*) and local plans (*Plan d'Occupation des Sols*).

Germany:

Each State is responsible for implementing the regulations.

Italy:

Regulations provide directions for the design, operation and closure of a TSF greater than 10m in height or for a TSF which in opinion of the responsible office, presents a safety risk.

Portugal:

*Decree-Law 99/90* controls mining and restoration and operators must enter a contract with the State and obtain a licence for ancillary operations.

Spain:

Spanish law requires mines above a given size to lodge financial guarantee to cover site restoration.

Sweden:

There are no specific guidelines or regulations for tailings management in Sweden. However all industrial activities have to be examined according to the Environmental Code that was in force January 1, 1999. This law substitutes regulations from fifteen earlier environmental law acts, i.e. the Water act. To achieve a mining licence the operator has to apply at one of the five regional environmental courts in Sweden. The application has to include an Environmental Impact Assessment of the mining operation, which includes the environmental aspects of operation, decommissioning and closure of the TSF. The environmental court establishes limits and guideline values for the mining operation that the Country Administrative Board or the Municipal Environmental Protection and Public Health Department later supervise.

The technical aspects of TSFs are described in the general Guidelines for Dam Safety given by the Association of Swedish Power Companies.

United Kingdom:

Whilst not specifically referencing TSFs, construction and operation are covered by a number of Acts administered by various government agencies and departments. Legislation under the *Environment Protection Act, 1990* requires an operator of a process plant to obtain prior authorisation before a plant can operate. The *Water Act, 1989* governs the discharge of water from a mine site into rivers and the *Environmental Protection Act, 1990* requires that a Disposal Licence be obtained for some wastes.

A TSF is classifiable in terms of the *Mines and Quarries (Tips) Act, 1971, Part 1* of which details a comprehensive system of reports and inspections. These regulations require that a TSF be designed and regularly inspected by a 'competent person' and describe the nature and frequency of reports required. Under Part 2 of the Act the local authority is responsible for ensuring that disused tips, not associated with active mines or quarries, do not constitute a danger to members for the public. In addition of these requirements the *Reservoirs Act, 1976* requires that an embankment which contains or is designed to retain, more than 25,000m<sup>3</sup> of water above the natural level of the adjoining land be registered and regularly inspected.

### EUROPE

DATE	AUTHORITY	AUTHOR	TITLE
2004	The Council of the European Union	European Commission Joint Research Centre	<i>Reference Document on Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities.</i> <a href="http://eippcb.jrc.es/">http://eippcb.jrc.es/</a>
2006		European Commission Joint Research Centre	<i>Directive 2006/21/EC on the Management of Waste from the Extractive Industries.</i> <a href="http://www.europa.eu/scadplus/leg/en/lvb/l28134.htm">http://www.europa.eu/scadplus/leg/en/lvb/l28134.htm</a>

### UNITED KINGDOM

DATE	AUTHORITY	AUTHOR	TITLE
1985	United Kingdom Chemical Industry Safety and Health Council	-	<i>The Control of Industrial Major Accidents Hazards Regulations</i>
1987			<i>Recommended Procedures for Handling Major Emergencies</i>
-	-	Morgan M.G. and Herion, M	<i>UNCERTAINTY: A Guide to Dealing With Uncertainty in Quantitative Risk and Policy Analysis</i>

### INTERNATIONAL

DATE	AUTHORITY	AUTHOR	TITLE
-	Commission Internationale des Grands Barrages	-	<i>A Guide to Tailings Dams and Impoundments – Design, Construction, Use and Rehabilitation</i>
1969	World Meteorological Organisation		<i>Estimation of Maximum Floods</i>
1982	International Committee on Large Dams <a href="http://www.icolc-cigb.net">http://www.icolc-cigb.net</a>		<i>Manual on Tailings Dams and Dumps.</i> Bulletin 45
1983	John Wiley & Sons	Vick, SG	<i>Planning, Design and Analysis of Tailings Dams</i>
1986	International Committee on Large Dams <a href="http://www.icolc-cigb.net">http://www.icolc-cigb.net</a>	-	<i>Operation of Hydraulic Structures of Dams.</i> Bulletin 49a
	Technical and Research Committee on Reclamation		<i>Proceedings International Symposium on Flow through Rock Drains</i>
	International Committee on Large Dams <a href="http://www.icolc-cigb.net">http://www.icolc-cigb.net</a>		<i>Geotextiles as Filters and Transitions in Fill Dams.</i> Bulletin 55
1987	World Meteorological Organisation	-	<i>Quality Control for Fill Dams.</i> Bulletin 56
	International Committee on Large Dams <a href="http://www.icolc-cigb.net">http://www.icolc-cigb.net</a>		<i>Manual for Estimation of Probable Maximum Precipitation</i>
	International Committee on Large Dams <a href="http://www.icolc-cigb.net">http://www.icolc-cigb.net</a>		<i>Spillways for Dams.</i> Bulletin 58
1988	World Meteorological Organisation	-	<i>Dam Safety Guidelines.</i> Bulletin 59
			<i>Dam Monitoring General Considerations.</i> Bulletin 60

			<i>Dam Design Criteria.</i> Bulletin 61		
			<i>Monitoring of Dams and Their Foundations State of the Art.</i> Bulletin 68		
	UNEP	Industry and Environment Office	<i>Awareness and Preparedness for Emergencies at Local Level The APELL Process</i>		
1989	International Committee on Large Dams <a href="http://www.icold-cigb.net">http://www.icold-cigb.net</a>		<i>Tailings Dam Safety – Guidelines.</i> Bulletin 74		
			<i>Sedimentation Control of Reservoirs</i> Bulletin 67		
			<i>Selecting Seismic Parameters for Large Dams.</i> Bulletin 72		
	World Meteorological Organisation		<i>Statistical Distributions for Flood Frequency Analysis</i>		
1991	International Bank for Reconstruction and Development – World Bank		<i>Environmental Assessment Sourcebook. Volume III Guidelines for Environmental Assessment of Energy and Industry Projects</i>		
			United Nations Environmental Programme	<i>Environmental Aspects of Selected Nonferrous Metals (Cu, Ni, Pb, An, Au) Ore Mining</i>	
1992	International Committee on Large Dams <a href="http://www.icold-cigb.net">http://www.icold-cigb.net</a>		<i>Selection of Design Flood – Current Methods.</i> Bulletin 82		
1993			<i>Improvement of Existing Dam Monitoring – Recommendations and Case Histories.</i> Bulletin 87		
			<i>Dams and Environment – Geophysical Impacts.</i> Bulletin 90		
1994			<i>Embankment Dams, Granular Filters and Drains – Review and Recommendations.</i> Bulletin 95		
			<i>Tailings Dams – Design of Drainage – Review and Recommendations.</i> Bulletin 97		
1995			<i>Tailings Dams and Seismicity – Review and Recommendations.</i> Bulletin 98		
			<i>Tailings Dams. Transport, Placement and Decantation – Review and Recommendations.</i> Bulletin 101		
			<i>Recommendations on the Transport of Dangerous Goods – Guidelines for the Risk Analysis of Technological Systems</i>		
1996			International Committee on Large Dams <a href="http://www.icold-cigb.net">http://www.icold-cigb.net</a>		<i>Tailings Dams and Environment – Review and Recommendations.</i> Bulletin 103
					<i>Monitoring of Tailings Dams – Review and Recommendations.</i> Bulletin 104
	<i>A Guide to Tailings Dams and Impoundments – Design, Construction and Rehabilitation.</i> Bulletin 106				
	<i>Case Studies Illustrating Environmental Practices in Mining and Metallurgical Processes</i>				
	<i>Safety of Dams</i>				
1997	International Committee on Large Dams <a href="http://www.icold-cigb.net">http://www.icold-cigb.net</a>		<i>Dams less than Thirty Metres High – Cost Savings and Safety Improvements.</i> Bulletin 109		
			UNEP/ ICME/ SIDA	<i>Proceedings of the International Workshop on Managing the Risks of Tailings Disposal</i>	
1998	International Council on Metals and the Environment		<i>Proceedings of the Workshop on Risk Management and Contingency Planning in the Management of Mine Tailings</i>		
			UNEP/ ICME	<i>Case Studies on Tailings Management</i>	
			International Finance Corporation <a href="http://ifc.org">http://ifc.org</a>	<i>Best Management Practices for Storage, Handling and Transportation of Cyanide in Mining Operations</i>	
1999	Bitech	Szmanski, MB	<i>Evaluation of Safety of Tailings Dams</i>		
	International Council on Metals and the Environment	Logsdon, MJ, Hagelstein, K &	<i>The Management of Cyanide in Gold Extraction</i>		

	Environment	Mudder, TI	
	World Bank		<b>Pollution Prevention and Abatement Handbook 1998 – Toward Cleaner Production</b>
	Canadian Dam Association		<b>Dam Safety Guidelines</b>
2001	International Committee on Large Dams <a href="http://www.icolc-cigb.net">http://www.icolc-cigb.net</a>	-	<b>Dam-break Analyses</b> . Bulletin 111
2001	International Committee on Large Dams <a href="http://www.icolc-cigb.net">http://www.icolc-cigb.net</a>	-	<b>Tailings Dams: Risk of Dangerous Occurrences (Lessons Learnt from Practical Experiences)</b> . Bulletin 121
	United Nations Environmental Programme		<b>APELL for Mining; Guidance for the Mining Industry in Raising Awareness and Preparedness for Emergencies at Local Level</b>
	University of Western Australia Press for the Australia Centre for Geotechnics	Jewell, R and Fourie, A.	<b>Paste and Thickened Tailings - A Guide</b>
2003	International Council on Mining and Metals	-	<b>10 Principles for Sustainable Development Performance</b> . <a href="http://www.icmm.com/icmm_principles.php">http://www.icmm.com/icmm_principles.php</a>
2004	International Standards Organisation	ISO	<b>ISO14001:2004 Specification for Environmental Management Systems</b>
	International Council on Mining and Metals/ World Conservation Union (UCN)	-	<b>Integrating Mining and Biodiversity Conservation: Case Studies from around the World</b> . <a href="http://www.icmm.com/library_pub_detail.php?rcd=173">http://www.icmm.com/library_pub_detail.php?rcd=173</a>
2005	United Nations Environmental Programme/ International Council for Mining and Metals	Alan C Emery	<b>Good Practice in Emergency Preparedness and Response</b>
2006	International Cyanide Management Institute <a href="http://www.cyanidecode.org">http://www.cyanidecode.org</a>	-	<b>The International Cyanide Management Code</b>
	International Council on Mining and Metals	-	<b>Good Practice Guidance for Mining and Biodiversity</b> . <a href="http://www.icmm.com/library_pub_detail.php?rcd=195">http://www.icmm.com/library_pub_detail.php?rcd=195</a>
2007	International Finance Corporation	-	<b>Environmental, Health and Safety Guidelines</b> . <a href="http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines">http://www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines</a>
Current	WISE Uranium Project	Antenna	<b>Chronology of Major Tailings Dam Failures</b> <a href="http://www.antenna.nl/wise/uranium/mdaf.html">http://www.antenna.nl/wise/uranium/mdaf.html</a>
Current	European funded project	-	<a href="http://www.tailingsinfo.com">http://www.tailingsinfo.com</a> Website that targets major problems associated with tailings failures
	WISE Uranium Project	Antenna	<b>Safety of Tailings Dams</b> <a href="http://www.antenna.nl/wise/uranium/mdas.html">http://www.antenna.nl/wise/uranium/mdas.html</a>
	EC funded project	European Research Project	<a href="http://www.tailsafe.com">http://www.tailsafe.com</a> Website that aims to promote sustainable improvements to tailings safety
	Commercial	Robertson GeoConsultants Inc.	<a href="http://technology.infomine.com/tailingsmine/">http://technology.infomine.com/tailingsmine/</a> Information and links relating to a variety of technical aspects of mining, mineral exploration and tailings.
	International Council on Mining & Metals	ICMM/ ICOLD	<a href="http://www.goodpracticemining.com/tailings/">http://www.goodpracticemining.com/tailings/</a> This website has been jointly developed by the International Council on Mining and Metals (ICMM) and the International Commission on Large Dams (ICOLD) to provide access to a library of good practice references on tailings. The site provides guidelines, standards, case studies, legislation and other relevant material, which are specifically relevant to tailings, and leading examples of their kind globally

## AUSTRALIA

Legislation of the various Australian states regulates the disposal of tailings. For example, in Western Australia a Notice of Intent (NOI) addressing the environmental issues associated with the mining project has to be submitted in accordance with the *Guidelines to Help You Get Environmental Approval for Mining Projects in Western*

*Australia* (Department of Minerals and Energy (DME), 1998). The NOI should contain a Design Report. The design should be carried out in accordance with the *Guidelines on the Safe Design and Operating Standards for Tailings Storage* (DME, 1999). The design is required to take cognisance of developments, operational and rehabilitation/closure conditions. The DME Guidelines set out minimum requirements in this regard.

TSFs in Western Australia are categorised based on a 'hazard rating', coupled with the maximum embankment height. All facilities over 15m in height are considered to be a high category that require the most stringent attention.

An operating licence may also be required. Operating licences usually stipulate specific conditions to be adhered to during the various stages. An annual environmental audit is normally required. Operation is to be carried out in accordance with the DME *Guidelines on the Safe Design and Operating Standards for Tailings Storage*, and a site-specific Operating Manual is required for every TSF. The manual should be prepared in accordance with the *Guidelines on the Development of an Operating Manual for Tailings Storage* (DME, 1999). It is a requirement to periodically review and update operating manuals.

The DME require periodic technical audits to be carried out during the operational phase on all TSFs. The *Guidelines on the Safe Design and Operating Standards for Tailings Storage* and the *Guidelines on the Development of an Operating Manual for Tailings Storage* contain requirements in this regard. An audit report is required annually for Category 1 facilities, every two years for Category 2 and every three years for Category 3. In addition, an Emergency Plan and a Decommissioning Plan are required for every TSF.

In Queensland, the *Queensland Environmental Resources Act 1989* requires environmental impact to be addressed and managed during all mining and rehabilitation activities. The Department of Minerals and Energy (DME) has developed an Environmental Management Policy for Mining in Queensland which seeks to develop eventual self-regulation with respect to environmental management. The regulations require that proponents and mine management prepare an environmental Management Overview Strategy (EMOS) which is a comprehensive and strategic environmental management plan for the life of a mining project. Regular Plans of Operations are prepared with the objective of achieving the environmental commitments, including protecting the environment and rehabilitating environmental disturbances to agreed standards.

The DME in association with other government departments, the Queensland Mining Council and tertiary education institutions prepared the *Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland* (DME, 1995).

The *Technical Guideline* document is divided into three sections dealing with Mine Planning, Water Management and Rehabilitation. It contains thirty one guidelines: fourteen in the Mine Planning section, five in the Water Management section and twelve in the Rehabilitation section. A further four guidelines are still to be issued. One guideline, *Tailings Management*, addresses tailings management and discusses the planning, design and operation of tailings management system and storage facility.

In New South Wales (NSW) the only guideline supporting the various regulations is the NSW Coal Association guideline, *Mine Rehabilitation – A Handbook for the Coal Mining Industry* (1995). This document provides information on the development of a successful rehabilitation programme. Advice is provided on rehabilitation planning, soils and top soiling, erosion control, drainage and sediment control and revegetation and maintenance of revegetation areas.

The Department of Mines and Energy of South Australia (MESA) is responsible for regulating tailings disposal in South Australia. The department proposes an objective-based, regulatory regime in which MESA monitors the performance of the mining industry against established objectives. Proponents and operators are responsible for determining and implementing procedures and auditable management to achieve the established objectives. Regulatory objectives currently are expressed in terms of outputs and efficiency but will gradually be amended to objectives expressed in terms of outcomes and effectiveness. Criteria for measuring the achievement of objectives are being developed and MESA is evaluating a method of measuring industry achievement of environmental objectives known as *Goal Attaining Scaling*. Environmental management systems must be auditable against some recognized standard or benchmark, although MESA does not request or require accreditation to a specific management system.

It is understood that MESA is currently considering the adoption of a regulatory system similar to that currently in use in Western Australia.

Tailings storage in Tasmania is regulated by various acts but not guidelines specific to Tasmania are available. The same is the case in the Northern Territory.

For nuclear waste in 1987, the Department of Arts, Sport, the Environment, Tourism and Territories (DASETT) issued a guideline for the decommissioning and rehabilitation of uranium mine, and waste disposal sites. The guideline includes the Code of Practice on the Management of Radioactive Waste from the Mining and Milling of Radioactive Ores (DASETT, 1982).

The Australian National Committee on Large Dams (ANCOLD) issued *Guidelines on Tailings Dam Design, Construction and Operation* in 1999. The document contains guidelines on the approach to the planning, design, management, construction, operation and closure of TSFs. The document presents objectives of a planned approach to tailings storage and notes that continuous management is a fundamental principle planning.

The Australian Government, Department of Industry, Tourism and Resources is preparing a series of *Leading Practice Sustainable Development* guides to replace the *Best Practice Environmental Management in Mining* guides. The new documents are designed to provide developers and contractors with guidelines on how to implement sound practices that minimise environmental impacts and reduce the impacts of mining by following the principles of ecologically sustainable development. Modules of particular relevance to tailings include: *Tailings Management (2007)* and *Managing Acid and Metalliferous Drainage (2007)*.

*Enduring Value – the Australian Minerals Industry Framework for Sustainable Development* of the Minerals Council of Australia (MCA) provides guidance on the International Council on Mining and Metals (ICMM) Sustainable Development Framework Principles and their application at the operational level. Implementation of *Enduring Value* is compulsory for MCA members, including AngloGold Ashanti Australia Ltd, wherever they operate, with the following obligations:

- Progressive implementation of the ICMM Principles and Elements;
- Public reporting of site level performance, on a minimum annual basis, with reporting metrics self-selected from the Global reporting Initiative (GRI), the GRI Mining and Metals Sector Supplement or self-developed; and
- Assessment of the systems used to manage key operational risks.

DATE	AUTHORITY	AUTHOR	TITLE
1983	Australian National Committee on Large Dams <a href="http://www.ancold.org.au">http://www.ancold.org.au</a>	-	<i>Guidelines for Dam Instrumentation and Monitoring Systems</i>
1986/ 90			<i>Guidelines on Design Floods for Dams</i>
1987	Australian Rainfall and Runoff	Institute of Engineers	<i>A Guide to Flood Estimation</i>
1993	Australian Standard	Standards Association of Australia	<i>Geotechnical Site Investigations</i>
1994	Australian National Committee on Large Dams <a href="http://www.ancold.org.au">http://www.ancold.org.au</a>	-	<i>Guidelines on Dam Safety Management</i>
			<i>Guidelines on Risk Assessment</i>
1995	Department of Minerals and Energy		<i>Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland</i>
	Australian and New Zealand Minerals and Energy Council		<i>Security Deposit Systems for Mine Site Rehabilitation</i>
	Australian/ New Zealand Standard		<i>Risk Management</i>
1996	Australian and New Zealand Environmental Foundation	-	<i>Environmental Auditing</i>
		Mulligan, D	<i>Environmental Management in the Australian Minerals and Energy Industries – Principles and Practices</i>
	Minerals Council of Australia		<i>Australian Minerals Industry Code for Environmental Management</i>
	Australian National Committee on Large Dams <a href="http://www.ancold.org.au">http://www.ancold.org.au</a>		<i>Interim Guidelines for Design of Dams for Earthquake</i>
	Western Australia Department of Minerals and Energy		<i>Guidelines for Mining in Arid Environments</i>
1997	Australian and New Zealand Environmental Foundation		<i>Hazardous Materials Management, Storage and Disposal</i>
1998	Western Australia Department of Minerals and Energy	-	<i>Guidelines to Help You Get Environmental Approval for Mining Projects in Western Australia</i>
			<i>Guidelines for Preparation of Annual Environmental Reports on Mining and General Purposes Leases</i>
	Department of Industry, Tourism and Resources	-	<i>Landform Design for Rehabilitation</i>
	Department of Industry, Tourism and Resources	Australian Minerals and Energy	<i>Cyanide Management</i>

		Environmental Foundation	
	Western Australia Department of Minerals and Energy		<a href="#">Guidelines on the Development of an Operating Manual for Tailings Storage</a>
	Australian and New Zealand Environmental Foundation	-	<i>Interim Ocean Disposal Guidelines</i>
	Department of Industry, Tourism and Resources	Australian Minerals and Energy Environmental Foundation	<i>Dust Control</i>
	Northern Territory of Australia	-	<i>Best Practice Guidelines. Reducing Impacts of Tailings Storage Facilities on Avian Wildlife in the Northern Territory of Australia</i>
1999	Department of Industry, Tourism and Resources	Australian Minerals and Energy Environmental Foundation	<i>Water Management</i>
		Australian Minerals and Energy Environmental Foundation	<i>Environmental Risk Management</i>
	Australian Minerals and Energy Environmental Foundation	Parker, G and Robertson, A	<i>Acid Drainage</i>
	Australian/ New Zealand Standard		<i>Risk Management</i>
	Western Australia Department of Minerals and Energy	-	<i>Guidelines on the Safe Design and Operating Standards for Tailings Storage</i>
	Australian National Committee on Large Dams <a href="http://www.ancold.org.au">http://www.ancold.org.au</a>		<i>Guidelines on Tailings Dam Design, Construction and Operation</i>
		Williams, DA	<i>Risk Analysis to Facilitate Decision-Making in Tailings Design</i>
2003	Ministerial Council on Mineral and Petroleum Resources and Minerals Council of Australia	-	<i>Strategic Framework for Tailings Management</i>
2007	Department of Industry, Tourism and Resources	Leading Practice Sustainable Development Program	<i>Biodiversity Management</i>
			<i>Community Engagement and Development</i>
			<i>Managing Acid and Metalliferous Drainage</i>
			<i>Mine Closure and Completion</i>
			<i>Mine Rehabilitation</i>
<i>Tailings Management</i>			

### BRAZIL

DATE	AUTHORITY	AUTHOR	TITLE
1993	Associações Brasileira de Normas Técnicas	-	<i>Elaboracao e apresentacao de projecto de disposicao de rejeitos de beneficiamento, em barramento, em mineracao – Procedimeto. NBR 13028/93</i>
			<i>Elaboracao e apresentacao de projecto de disposicao de rejeitos de esteril, em pilha, em mineracao – Procedimeto. NBR 13029/93</i>

### CANADA

Canadian Provinces regulate the mining industry through acts and regulations. The exception is uranium mining that is regulated by federal government. There are also federal environmental laws and regulations that relate directly to the mining industry, particularly respecting the receiving environment.

The Mining Association of Canada (MAC) determined, from workshops, that there was a consensus within the industry that the technology and expertise was available to design and build safe TSFs but that the industry believed it needed higher standards for its management and operation of its TSFs. This was the impetus for MAC to prepare *A Guide to the Management of Tailings Facilities*.

The MAC guide is a primarily management system as apposed to technical guide. It presents a full lifecycle tailings management framework, from planning and design, through construction and operation, to eventual decommissioning and closure. The framework is expanded into a series of checklists, each of which addresses the various stages of the lifecycle. Appended to the document are lists of technical considerations that cover the environmental setting, design, and operating aspects that are typically encountered throughout the life cycle of a TSF.

For each stage in the lifecycle, design, construction, operation and closure, the check list revolves around:

- Policy and commitment.
- Planning.
- Plan implementation.
- Checking and corrective action.
- Management review for continual improvement.

The approach recognises that the responsibility for tailings management may rest with different groups within a company and that the emphasis changes during the different stages of the lifecycle. The checklist approach assists in identifying the stages and roles and provides a management framework. The system requires that actions be planned within the context of agreed policies and commitments, implementation in accordance with the plans, checking corrective action and management review. Each checklist has six columns that address a key element in implementing the management framework: management action, responsibility, performance measures, schedules, technical considerations and references. These elements can be customised to address a mining company's tailings management and operating needs.

It is intended that the mine management use the checklists to:

- Develop operating procedures and manuals.
- Identify gaps within existing procedures.
- Communicate with stakeholders.
- Assist in obtaining permits.
- Assist in achieving compliance and due diligence.

The approach is designed for self-management and assists mine management in demonstrating due diligence, to complement government regulations and in protecting the environment and the public.

DATE	AUTHORITY	AUTHOR	TITLE
1981	Atmospheric Environment Service	Pugsley, W.I. (ed)	<b><i>Flood Hydrology Guide for Canada: Hydrometeorological Design Techniques.</i></b> CL13-81
1987	Northwest Territories Water Board	-	<b><i>Guidelines for Tailings Impoundment in the Northwest Territories</i></b>
1988	British Columbia Hydro	-	<b><i>Guidelines for Review of Reservoir Slope Stability.</i></b> Report H1890
	Atmospheric Environment Service	Routledge, B. Carr, D.A., and Hogg. W.D.	<b><i>An Index to Storm Rainfall in Canada. CLI-I-88</i></b>
	Prairie Farm Rehabilitation Administration	-	<b><i>Revised Project Data Book Guidelines and Phase 1 Dam Safety Evaluation Guidelines</i></b>
1989	National Research Council of Canada	Watt, W.E. (ed)	<b><i>Hydrology of Floods in Canada: A Guide to Planning and Design</i></b>
	British Columbia Acid Mine Drainage Task Force	-	<b><i>Draft Acid Drainage Technical Guide</i></b>
1990		Vicks, S	<b><i>Planning, Design and Analysis of Tailings Dam.</i></b> BiTech Publishers, Vancouver
	Northwest Territories Water Board	-	<b><i>Guidelines for Abandonment and Restoration Planning for Mines in the Northwest Territories</i></b>
	Canadian Electrical Association	-	<b><i>Safety Assessment of Existing Dams for Earthquake Conditions</i></b>
1992	Ontario Hydro	Lukajic, B. and Tsui. K.	<b><i>Dam Safety Assessment Program, Engineering Standards and Criteria, Section 2, Rock Foundations</i></b>
	British Columbia Technical and Research Committee on Reclamation, Cyanide Sub Committee	-	<b><i>Technical Guide for the Environmental Management of Cyanide in Mining</i></b>
1990		Enegren, E.G., and Moore, D.P.	<b><i>Guidelines for Landslide Hazard Evaluation on Reservoirs. Proceedings, Canadian Dam Safety Conference</i></b>
1991	Canadian Standards Association	-	<b><i>Risk Analysis Requirements and Guidelines.</i></b> CAN/CSA-Q634-91
	Ontario Ministry of Northern Development and Mines	SRK	<b><i>Rehabilitation of Mines: Guidelines for Proponents.</i></b> Version1.1
1992	Saskatchewan Environment and Public Safety Mines Pollution Control Branch	-	<b><i>Mine Rock Guidelines Design and Control of Drainage Water Quality.</i></b> Report No. 933301

1993	British Columbia Hydro		<b>Guidelines for Consequence-Based Dam Safety Evaluations and Improvements (Interim)</b> . Report No. H2528
	Royal Society of Canada and The Canadian Academy of Engineering		<b>Health and Safety Policies: Guiding Principles for Risk Management</b>
	Major Industrial Accidents Council of Canada		<b>Dangerous Substance Risk Assessment Guidelines for Municipalities and Industries</b>
	Royal Society of Canada and The Canadian Academy of Engineering		<b>Health and Safety Policies: Guiding Principles for Risk Management</b> . JCHS 93-1 "Final Draft". Rev. 7
1994	Environment Canada		<b>Manual for spills of Hazardous Materials</b>
1995	Canadian Standards Association		<b>Emergency Planning for Industry</b> . CAN/CSA-z731-95
	Environment Canada		<b>ENVIROTIPS (Technical Information for Problem Spills) Manuals</b>
1996	Canadian Standards Association		<b>A Guide to Public Involvement. General Instruction No.1</b> Z764 96. March 1996
1997	Canadian Standards Association		<b>Risk Management: Guideline for Decision-Makers</b> CAN/CSA-Q850-97. October 1997
	British Columbia MEI-Reclamation Section, Energy and Minerals Division		<b>Draft Guidelines and Recommended Methods for the Prediction and Metal Leaching and Acid Rock Drainage at Mine Sites in British Columbia</b>
1998	MAC		<b>A Guide to the Management of Tailings Facilities</b>
	British Columbia Ministry of Energy and Mines	Price, W.A. and Errington J.C.	<b>Guidelines for Metal Leaching and Acid Rock Drainage at Mine Site in British Columbia</b>
1999	Canadian Dam Association		<b>Dam Safety Guidelines</b>
2000	Mining Association of Canada	-	<b>Proceedings from: Workshop- Implementing Tailings Management Systems: Lessons Learned</b>
2002	Mining Association of Canada	-	<b>Developing an Operations, Maintenance and Surveillance Manual for Tailings and Water Management Facilities</b>

## CHINA

In the People's Republic of China (PRC), TSFs must be designed and constructed in accordance with *National Codes (Design Standards)*. Provincial authorities are responsible for issuing a licence to construct and operate a TSF.

*Code ZBJ 1-90 (1991) Design Standard – Tailings Facility for a Mine*, addresses the design of a TSF as one of five classes according to capacity and dam height. The Code specifies the minimum factors of safety for various operating conditions. Tables are presented stipulating the minimum freeboard and storage (beach) length for different classes and types of construction (upstream and centreline), minimum crest widths and downstream slope angles.

*Code GB 50201-94 (1994) Standard for Flood Control, and Code SDJ 218-84 (1984) Standard for Earth and Rockfill Dams* stipulates the design return period storm to be used for the TSF classes and presents design standards for earth and rock fill dams, including freeboard. Other codes also address aspects of the design of TSFs.

Quality criteria for water discharged from a TSF are presented in *Code GB 3838-88 (1988) Quality Standard – Surface Water*. The Environmental Protection Department will issue an operating permit. This permit stipulates the location, type and frequency of testing that is required to verify compliance with the permit.

A construction and operating permit has to be obtained before TSF construction can start. The operator or proponent must submit a Design Report to the Provincial authorities who convene a Provincial Planning Committee to review and approve the proposals. On acceptance of the design by the committee a construction permit is awarded and work may commence. Periodic inspections are made by authorities during construction and operation during which compliance to various regulations is assessed. Closure and rehabilitation plans are required for the TSF.

The approach adopted in China is one of strict adherence to the national codes and frequent inspection and reporting by National, Provincial and District regulatory agencies.

DATE	AUTHORITY	AUTHOR	TITLE
1984	-	-	<b>Standard for Earth and Rockfill Dams</b> . Code SDJ 218-84
1988			<b>Quality Standard – Surface Water</b> . Code GB 3838-88
1991			<b>Design Standard – Tailings Facility for a Mine</b> . Code ZBJ 1-90
1994			<b>Standard for Flood Control</b> . Code GB 50201.94

## CHILE

The legislation in Chile that applies to the management of TSFs is contained in the *Decreto Supremo* N° 86 (DS-86) (dated 1970). This document, that has the force of a law, was initiated after the strong earthquake in Central Chile in 1965 that caused the failure of several TSFs constructed using the upstream method. This degree specifically regulates TSFs constructed using the coarse fraction of cycloned tailings, although in some cases, it has been applied to TSFs contained behind dams constructed of borrow materials (earth and rock fill dams).

The most important aspects contained in the DS-86 related to the design, construction and operation of TSFs are:

- The TSF type is limited to the downstream and centreline construction methods.
- The quality for the dam material (cycloned tailings) is emphasized, in terms of permeability and density.
- The presence of a strong basal drainage system is positively assessed.
- Piezometers to monitor the water level in the TSF are required.

### *Environmental Permits*

Environmental impact verifications are performed by the *Comisión Nacional del Medioambiente (CONAMA)* – national level, or by *Comisiones Regionales del Medioambiente (COREMA)* – regional level. Both CONAMA or COREMA are responsible for applying the established environmental impact evaluation system. Water, air and soil quality are assessed providing that baseline studies have been previously in each case. Other impacts, such as social, archaeological, anthropological, are also included in the evaluation system.

### *Sectorial Permits*

The following government agencies are also involved in the permitting process for TSFs:

- *Servicio Nacional de Geología y Minería (SERNAGEOMIN)*, an agency of the Ministry of Mining, responsible for applying the DS-86. SERNAGEOMIN is mainly concerned with the physical safety or stability of the TSFs.
- *Dirección General de Aguas (DGA)*, an agency of the Ministry of Public Works, responsible for the water resources in the national territory. DGA focus is to verify that a minimum impact on the natural surface water and ground water is produced as consequence of the presence of a TSF. DGA is also concerned with the operational safety of the hydraulic works inside the impoundment and the surface water management in the TSF basin.
- *Servicio de Salud*, an agency of the Ministry of Health, that is concerned with miscellaneous aspects related to the public health.

### *General Comments*

- After the 1965 earthquake a 'new culture' has been developed in Chile for the design, construction and operation of TSFs. The main aspect that characterises this approach is that the practice of the upstream construction method has been avoided since that time. Also with this culture more restrictive environmental constraints apply to new TSFs.
- Medium and large mining companies develop TSF management procedures by applying design and construction procedures in accordance with state of the art techniques, with the support of experienced and internationally recognised engineering consultants. In practice, the following standards are considered for design: ICOLD guidelines for TSFs, World Bank guidelines and Canadian guidelines.
- In recent years, new large mining developments have been financed by international banks, agencies or related mining companies, thus requiring that the design must be performed in accordance with the best international engineering practice and using codes and standards in force in the respective origin countries. Also, the use of proven technology is highly valued by the regulatory agencies.
- Small size mining operations (i.e., under 1000 tonnes per day) usually develop their designs and operations under their own methods (self construction). In general, they do not use recognised engineering consultants and in some cases, they do not follow the established permitting process for their mining operations. Despite this SERNAGEOMIN has developed a complete register of all mining operations in the country.

DATE	AUTHORITY	AUTHOR	TITLE
1970	-	-	<i>Decreto Supremo N°86</i>

## GHANA

Ghana plans to promulgate 'Mining Regulations' legislation towards the end of September 2007. The 4<sup>th</sup> January 2007 draft extracted from 'Technical Assistance to the Inspectorate Division Ghana Draft Mining Regulations, 04/01/2007' states the following:

### **Subdivision 2.7 Tailings Storage Facilities**

#### **2701. Hazard Classes**

(1) TSFs have to be classified in hazard classes. This is to be done according to the number of dwellings affected by a dam failure as follows:

- Hazard class affected
- Dwellings
- Environmental/material damage
- C: 0 moderate

- B :1-5 serious
- A: > 5 very serious
- Not allowed > 50

(2) Specific minimum standards shall be established by the Chief Inspector of Mines according to the hazard class. A more dangerous facility requires a higher safety standard, e.g. a higher static safety factor for the embankment, a specific construction method, increased control and inspection etc.

(3) The location of a TSF must be in an area where the failure of the embankment does not result in a threat to human lives. A location where the failure of an embankment would affect more than 50 dwellings must not be allowed.

#### **2702. Embankments**

(1) Embankments of TSFs in hazard class A or B shall be constructed by downstream method.

(2) Upstream construction methods can be allowed for TSFs in hazard class C.

(3) The area of construction of embankments must be cleared of vegetation. Topsoil and weak ground has to be removed. A proper foundation of the embankment must be ensured. The material used for the construction of embankments must be resistant against liquefaction. Soils used for the construction of embankments must be suitable for this purpose. Soil used in the construction of embankments has to be placed in layers of not more than 0,3m and compacted.

(4) Embankments must have a drainage system to control the phreatic surface and seepage. Water which has seeped outside the embankment has to be collected in a sump and pumped back into the TSF.

(5) Embankments have to be calculated by a qualified engineer. Minimum safety factors for static and dynamic load according to a specific calculation method have to be established. For hazard class C a static load safety factor of 1,5 is required. Hazard class B requires a safety factor of 1,6 and hazard class A, a safety factor of 1,7.

(6) The construction of the embankment has to be supervised by a qualified engineer who has to submit reports to the Inspectorate Division.

(7) Embankments must provide for a freeboard of not less than 1m to ensure that the impoundment has enough capacity for water inflow during storm events.

(8) Embankments must be designed in such a way, that the TSFs can store water inflow of the respective catchment area of a 100-year 24-hour storm event still having a freeboard of not less than 1m. This is to prevent overtopping of and unacceptable phreatic surfaces in embankments.

#### **2703. TSF Impoundment**

(1) The impoundment must be cleared of vegetation and topsoil must be removed.

(2) The impoundment must have an under-drainage system.

(3) The impoundment must have a clay liner, 0,3m thick, placed in such a way that permeability is less than  $10^{-6}$  cm/s. Alternatively, competent bedrock or other geologic formations underlying the site which has been demonstrated to provide an equivalent degree of containment, is acceptable.

#### **2704. Tailings Pipeline and Discharge System**

(1) The tailings pipelines must be placed in a trench lined with HDPE liner. The system must be equipped with a device which is able to detect a leakage in the tailings pipeline.

(2) In areas where the tailings pipeline is running through a valley, an emergency pond has to be placed at the bottom of the valley.

(3) Tailings have to be discharged into TSF in well arranged beaches by spigoting. No single point discharge is allowed.

#### **2705. Safety Arrangements of TSFs**

(1) An emergency spillway has to be constructed which leads into an emergency pond for treatment of overflow from the TSFs before release into the environment. The spillway has to be lined with gunite or concrete in such a way that overflowing water can not erode the channel.

(2) An emergency pump and an emergency electric power generator must be available to be installed at any time in case of exceptional high water inflow or in case of failure of the installed equipment.

(3) The system to divert natural run-off water from entering the TSF must have a capacity for a 1000-year 24-hour storm event.

#### **2706. Monitoring of TSFs**

(1) Seepage through embankments has to be monitored by piezometer holes to be drilled within the embankments as follows:

- (i) An embankment of 30m length shall have a piezometer hole installed at the middle of the crest.
- (ii) Any embankment longer than 30m but less than 120m shall have two piezometer holes.
- (iii) Embankments longer than 120m but less than 240m shall have three piezometer holes installed.
- (iv) Embankments longer than 240m shall have piezometer holes at a distance of not more than 30m from the side of the embankment and not more than 60m between two neighbouring piezometer holes.

(2) Additional monitoring holes have to be drilled at appropriate distances around any TSF to monitor seepage from the tailings into the groundwater.

#### **2707. Establishment of the Figure of Qualified Engineer for TSFs**

The Chief Inspector of Mines shall certify Qualified Engineers for design, construction supervision and monitoring of TSFs. Only Qualified Engineers are allowed to prepare the design, supervise construction and operation and to carry out audits on TSFs.

#### **2708. Plans and audits for TSFs**

(1) Before start of any works the manager has to submit for approval to the Inspectorate Division the initial operating plan of the TSF, consisting of:

- (i) Engineering design report

- (ii) Operating plan
- (iii) Monitoring plan
- (iv) Water management and cyanide management plan
- (v) Emergency preparedness plan
- (vi) Preliminary closure plan

(2) The closure plan must provide for safety measures which enable the closed TSF to withstand a number of extreme events which will happen in the future.

#### **2709. Audits**

The manager has to provide for yearly dam safety audits, employing an independent qualified engineer.

### **MALAYSIA**

Malaysia's current mining legislation is limited because it deals almost exclusively with the small-scale alluvial tin mines that have dominated the country's mining sector. To attract foreign investment, Malaysia has proposed new legislation for large-scale hard rock mining. The proposed legislation includes specific requirements for tailings management such as: design that complies with good engineering practice, supervised construction, stability against static and dynamic loading, an operating plan and freeboard of not less than 1m.

### **MEXICO**

*The Mexican Official Standard (1997)* stipulates the compulsory requirements for site selection, construction, operation and monitoring of TSFs. These requirements include: an environmental impact study, compliance with laws governing historical or cultural heritage, and surface water protection, geological characterization, land surveys, compliance with dam design standards, and monitoring for TSFs over 50m in height.

DATE	AUTHORITY	AUTHOR	TITLE
1997	-	-	<i>The Mexican Official Standard</i>

### **PERU**

The Political Constitution of Peru establishes the need to protect the environment by promoting the sustainable use of natural resources. The General Bureau of Environmental Affairs of the Ministry of Energy and Mines has issued laws and guidelines for the implementation of environmental policy. These laws have been issued regarding the obligatory nature of Environmental Impact Assessments for new mining projects and Environmental Adequacy and Management Programs for ongoing operations.

An emergency law specific to TSFs was issued in 1996 following the failure of several TSF from an earthquake. This law forced the mining companies to perform stability analysis on both operating and non-operating TSFs and define the factors of safety for the TSF. As a complement to the environmental laws, seventeen environmental protocols and guidelines were also issued. The protocols define procedures for environmental monitoring, while the guidelines refer to design issues related to environmental protection. One of these guidelines refers specifically to tailings:

*The Guide for Mine and Mill Tailings Management* (Vick, 1994) aims to present 'the broad and complex issues associated with TSF management ... emphasising not only operation but post-closure conditions'. The document is primarily relevant to new mines and addresses:

- TSF management objectives at each lifecycle stage of TSF (Construction, Operation, Closure and Post-Closure).
- Tailings characteristics including a discussion on the origin of tailings and other solid wastes, the engineering properties of tailings, chemical characteristics and acid rock drainage (ARD) from tailings.
- The geography and climate of Peru, highlighting the extreme and seismic conditions that must be accommodated in the design.
- Alternative methods of tailings disposal including surface disposal underground backfilling and submarine tailings disposal.
- Stability is discussed in relation to the types of facility and the effects and causes of failures. It is concluded that upstream-type construction is not appropriate for the conditions in Peru.
- Mitigation of ARD and the control of seepage from surface TSFs.
- Rehabilitation and closure of surface TSFs: environmental practices in tailings management must be implemented progressively, with incremental improvements introduced systematically over time.

*The Heap Leach Project Guide* (Golder, 1994) has as its objective to provide guidance on the development, construction and operation of heap leach projects in Peru. The guide addresses: typical layouts, surface water hydrology, siting considerations, containment design and operation and monitoring.

*The Mine Closure Guide* (Golder, 1994) provides an outline of closure objectives, approaches and technical issues for the planning of closure of mines. The guide addresses: perpetual disruptive forces and control technologies, chemical stability, design methodologies, closure alternatives, and post-closure monitoring.

Other guidelines of relevance in Peru are *Procedures for Preparing the Environmental Impact Study and Environmental Guidelines for the Handling of Mine Acid Drainage*.

DATE	AUTHORITY	AUTHOR	TITLE
1994	Ministry of Energy and Mines	Golder Associates	<i>Mine Closure Guide</i>
	Govt. of Peru	Vicks, S.	<i>Heap Leach Projects Guide</i>
1995	Ministerio de Energia Y Minas		<i>Guia Ambiental para la Perforacion y Voladura en Operacion Mineras</i>
1997			<i>Guia Ambiental para la Estabilidad de Taludes de Depositos de Desechos Solidos de Mina.</i>
No Date	Republica de Peru Ministerio de Energia Y Minas	-	<i>Guia Ambiental Para Proyectos de Exploracion Y Produccion.</i>
No Date			<i>Protocolo de Monitoreo de Calidad de Agua</i>
			<i>Protocolo de Monitoreo de Calidad de Aire y Emisiones</i>
			<i>Guia Ambiental para el Manejo de Agua en Operaciones Minero – Metalurgicas</i>
			<i>Guia Ambiental para el Manejo de Drenaje Acido de Minas</i>
			<i>Guia para elaborar Estudios de Impacto Ambiental</i>
			<i>Guia para Elaborar Programa de Adecuacion y Manejo Ambiental</i>
			<i>Guia Ambiental para Vegetacion de Areas Disturbadas por la Industria Minero Metalurgica.</i>
			<i>Guia Ambiental para el Cierre y Abandano de Minas</i>
			<i>Guia Ambiental para Proyectos de Lixiviacion en Pilas</i>
			<i>Guia Ambiental para Actividades de Exploracion de Yacimientos Minerales en el Peru</i>
			<i>Guia Ambiental para el Manejo en Cianuro</i>
			<i>Guia para el Manejo de Reactivos y Productos Quimicos</i>
			<i>Guia Ambiental para la Estabilidad de Taludes de Depositos de Residuos Solidos provenientes de Actividades Mineras</i>
			<i>Guia Ambiental para el Manejo de Problemas de Ruido en la Industria Minera</i>
	<i>Guia de Manejo Ambiental para Minería No Metalica</i>		
1997			<i>Guia Para El Manejo de Relaves Mineros</i>

## RUSSIA

Engineering practice in Russia and other countries that used to form the Soviet Union is very highly regulated. Even though engineering regulations in all these countries originate from the former Soviet regulatory system, over the last ten years each country has adopted its own standards. For example, one cannot assume that Russian regulations would be still valid in Kyrgyzstan or Ukraine.

There are detailed guidelines for all aspects of engineering design and these guidelines must be strictly followed. They are regulations. The most common regulations include the State Standards (GOST) and the Construction Norms and Regulations (SNIiPs). The State Standards set general guidelines for all aspects of engineering investigations, design, and construction. For example, there are at least nine different State Standards dealing with geotechnical soil classification. They cover definitions, terminology, methods of laboratory analyses of physical properties, organic content, peat properties, granulometric composition, compressibility, and filtration. The Construction Norms and Regulations provide specific calculation procedures, equations, tables, maps and design charts for the evaluation of various engineering characteristics. These include, for example, calculations of the design flood flow, minimum water level, buffer zone along the river, geotechnical design in permafrost areas.

In case of the engineering structure failure, the main focus of the investigation is whether there were any deviations in the design from the procedures in GOST and SNIiP. If such a deviation is found, the blame for the failure is automatically placed on it regardless of the real cause of the problem.

DATE	AUTHORITY	AUTHOR	TITLE
1978	Gosstroj (State Committee for Construction) Building Codes SNIiP	-	<i>Engineering Investigations for Construction General Provisions.</i> II-9-78
1980			<i>Safety Regulations for Construction.</i> III-4-80
1983			<i>Estimated Hydrological Characteristics.</i> 2.01.14-83
1984			<i>Building Dams with the Use of Soil Materials</i> 2.06.05-84
			<i>Earth Dams.</i> 02.06.05-84
1985			<i>Hydro-Technical Facilities: General Project Development Provisions.</i> 2.02.02-85
			<i>Foundations for Hydro-technical Facilities.</i> 2.02.02-85
			<i>Hydraulic Structure Bases.</i> 02.02.05-85
1986			<i>Hydraulic Structures Main Design Provisions.</i> 02.06.01-86
2000			

1997	Gosgortekhnadzor (Mining Safety Inspectorate) of the Russian Federation	<b>Operating Standards for Tailing, Pulp and Sludge Handling Facilities.</b> PB-06-123-96, 1997
1998		<b>Instruction on Hydraulic Structure Safety Monitoring Procedure for Plants and Organisations Controlled by the Gosgortekhnadzor of Russia.</b> (RD 03-259-98), Regulation No. 2 of 12.01.98
1999		<b>Rules for Industrial Safety Declaration Expertise.</b> (PB 030314-99), Regulation No. 65 of 07.09.99
		<b>Regulation No 74 on Conducting Industrial Safety Expert Review in Mining Sector.</b> (RD 06-318-99), 18.10.99
		<b>Additional Requirements to Hydraulic Structure Safety Declaration Expert Review, Procedure for Formation and Operation of Boards of Experts, Board Member Qualification Standards.</b> RD 03-202-99, Regulation No. 60 of 29.07.99
2001		<b>Additional Requirements to the Scope of Industrial Safety Declaration and Drafting Procedure Taking into Account Specifics of the Hydraulic Structure Declaration Procedure for Organizations, Industrial Plants and Facilities Controlled by Gosgortekhnadzor of Russia.</b> RD 02-404-01, Regulation No. 11 of 09.04.2001
2002		<b>Safety Rules for Hydraulic Structures of Industrial Waste Liquid Storages.</b> PB-03-438-02, Regulation No. 6 of Gosgortekhnadzor of 28.01.02, Justice Ministry Regulation No. 3372 of 16.04.02
2003	<b>Guidelines for Calculation of Hydraulic Incident Development at Industrial Waste Liquid Storages.</b> RD 03-607-03, Regulation No. 51 of 05.06.03	
-		<b>Safety Regulations for Tailing, Slime and Sludge Pond Facilities Operation</b>
1997	Federal Law	Federal Law No. 116-FZ <b>On Industrial Safety of Hazardous Industrial Facilities as of 21.07.97</b>
		Federal Law No. 117-FZ <b>On Hydraulic Structure Safety of 21.07.97</b>
1983		SN 551-82 <b>Regulations on the Development and Construction of Polyethylene Film Anti-Filtration Facilities for Artificial Reservoirs</b> Moscow, Stroyizdat, 1983
1991		<b>Surface Water Protection Regulations (1991)</b>
1996		<b>Regulation On Classification of Natural and Industrial Emergencies.</b> Approved by Russian Government Regulation No. 1094 of 13.09.96
1997		Russian Government Regulation No.1320 <b>On Organisation of State Supervision over Hydraulic Structure Safety of 16.10.97</b>
1998		Russian Government Regulation No. 1303 <b>Provisions for Hydraulic Structure Safety Declaration of 06.11.98</b>
		Russian Government Regulation No. 1490 <b>On Formation and Keeping of the Russian Hydraulic Structure Register of 23.05.98</b>
		<b>Technological Development Standards for Tailings Storage Facilities of Hydrometallurgical and Concentration Plants.</b> RTM 8-54-87, Archive No. A -1995-87, Moscow, 1998

### SOUTH AFRICA

The following legislation is relevant to TSFs in South Africa:

- Environment Conservation Act, No. 73 of 1989
- Atmospheric Pollution Act 45 of 1965
- Minerals Act 50 of 1991
- Mines Health and Safety Act 29 of 1996
- The Constitution of the Republic of South Africa Act 108 of 1996
- National Water Act, No. 36 of 1998
- National Environmental Management Act, No. 107 of 1998
- SANS10286:1998 Code of Practice for Mine Residue
- Mineral and Petroleum Resources Development Act of 2002

Mining in South Africa is regulated by the *Water Act*, 1998, the *Minerals Act*, 1991 and the *Mine Health and Safety Act*, 1996 and *Minerals and Petroleum Resources Development Act*, 2002. The Department of Minerals and Energy (DME) is responsible for implementing the provisions of the Acts.

A policy of 'self management' is applied which requires mines to prepare an Environmental Management Program Report (EMPR) at the planning stage. Thereafter, the requirements of the *Code of Practice for Mine Residue (SANS10286-1998)* apply to the TSF during its life cycle stages of design, construction, operation and closure. This code represents the results of a widely consulted process and therefore represents the consolidated view of the industry and the regulators.

The SANS10286 code set out objectives, principles and minimum requirements for all the phases in the life cycle of a residue deposit. It furthermore requires that a management system be put in place. An aim is to ensure that not unavoidable risks, problems and/or legacies are left to future generations. A process of continual management and continuous improvement throughout the life cycle is envisaged. The minimum requirement for the management system is that it must be documented. The structure is required to follow ISO14 001. The management system and the residue must be audited by qualified people. The frequency of audit is dependent on the hazard class.

In terms of safety, each TSF is classified as having high, medium or low safety hazard according to the spatial extent, duration and intensity of its potential impacts and is considered as either 'significant' or 'not significant'. These classifications determine the minimum requirements for investigation, design, construction, operation and decommissioning.

The code aims to provide control of mining activities from 'cradle to grave' and identifies five phases in the life cycle:

- Conceptualisation, planning and site selection.
- Investigations and tailings characterisation.
- Design.
- Construction and operation.
- Decommissioning and aftercare.

The South African Department of Minerals and Energy (May 2000) published *Guidelines for the Compilation of a Mandatory Code of Practice on Mineral Deposits*. It is therefore mandatory for every mine in South Africa to prepare a site-specific code of practice based on the SANS10286 code, risk assessment and the Chamber of Mines Guidelines on the design, operation and closure of TSFs.

DATE	AUTHORITY	AUTHOR	TITLE
1979	Chamber of Mines of South Africa		<b><i>Handbook of Guidelines for Environmental Protection, Volume 2/1979: The Vegetation of Residue Deposits against Water and Wind Erosion</i></b>
1992	Department of Minerals and Energy		<b><i>Aide-Mémoire for the Preparation of Environmental Management Programme Reports for Prospecting and Mining</i></b>
1994	Government Gazette		<b><i>Requirements for the Purification of Wastewater or effluent. Government Notice No. R991</i></b>
1995	Mine Metallurgical Managers' Association of South Africa	-	<b><i>The Management of Gold Residue Deposits – A Code of Practice</i></b>
1996	Chamber of Mines of South Africa		<b><i>Guidelines for Environmental Protection. The Engineering Design, Operation and Closure of Metalliferous, Diamond and Coal Residue Deposits. Volume 1/1979. Revised 1983 and 1995</i></b> <a href="#">Guidelines for Environmental Protection</a>
1997	SIMRAC	Tripartite Working Group on Risk Assessment	<b><i>Practical Guide to the Risk Assessment Process</i></b>
1998	Standards South Africa – A Division of South Africa Bureau of Standards	-	<a href="#">Code of Practice: Mine Residues Deposits</a> SANS10286: 1998. ISBN 0-626-11700-3
2000	Department of Minerals and Energy		<b><i>Guideline for the Compilation of a Mandatory Code of Practice on Mine Residue Deposits.</i></b> Reference No. DME16/3/2.2-A1
2001	Chamber of Mines of South Africa		<b><i>South African Guideline on Cyanide Management for Gold Mining (2001)</i></b>

### **UNITED STATES**

Regulation of mining in the USA is the responsibility of individual states. Jurisdictional processes vary from state to state with a focus on outcomes rather than operating procedures. For example, the Bureau of Mining and Reclamation (in cooperation with other state, federal and local agencies) regulates mining activities in Nevada under regulations adopted in 1989.

In 1994 the US Environment Protection Agency (US EPA) published a Technical Report titled *Design and Evaluation of Tailings Dam*. The document is intended for government land managers and the general public, and presents general features of TSFs 'particularly with regard to their ability to mitigate and minimise adverse effects to the government'. Sections of the document have been sourced from the book *Planning, Design and Analysis of Tailings Dams* by Steven Vick (1990).

The report provides an overview of the methods of tailings disposal and the types of storage facilities. General information is presented on the design of TSFs, including a discussion on design criteria and site-specific factors, such as site location, hydrology, geology, ground water, foundations and seismicity. Water control and management, is also presented, including discussions on hydrology, management of storm flows, infiltration and seepage control and tailings water treatment.

In 1999 EPA Region 10, which includes Alaska, Idaho, Oregon and Washington, issued draft guidelines for mining operation relative to permitting processes and environmental review requirements associated with the *Clean Water Act (CWA)* and *National Environmental Policy Act (NEPA)*. The document is titled *EPA and Hard Rock Mining: A Source Book for Industry in the Northwest and Alaska*. This document has three objectives as follows:

- Explain the requirements of the CWA and NEPA as they may pertain to new mines.
- Describe the types of information that EPA Region 10 needs to process to permit applications and perform environmental reviews.
- Promote predictability and consistency within Region 10 to ensure mine development, operation and closure occur in an environmentally sound manner.

The report includes large appendices that describe methods for characterising ore, waste rock and tailings, mine site hydrology, effluent quality, receiving waters, erosion and sedimentation, aquatic resources and wetlands and managing wastewater and solid waste.

DATE	AUTHORITY	AUTHOR	TITLE
1970	United States Army Corps of Engineers	-	<i>Stability of Earth and Rockfill Dams</i>
1973	United States Department of Agriculture	Soil Conservation Service	<i>A Guide for Design and Layout of Earth Emergency Spillways as part of Emergency Spillway Systems for Earth Dams</i>
1977	United States Bureau of Reclamation	-	<i>Design of Small Dams</i>
1978	United States Department of Labour	Mine Safety and Health Association	<i>Occupational Health Guidelines of Cyanide</i>
1979	Federal Coordinating Council for Science, Engineering and Technology	Ad Hoc Interagency Committee on Dam safety	<i>Federal Guidelines for Dam Safety</i>
1981	United States Department of Labour	Mine Safety and Health Administration	<i>Cyanide Mill Reagents, Work Practices Guidelines</i>
1981/ 92	United States Bureau of Reclamation	-	<i>Freeboard Criteria and Guidelines for Computing Freeboard Allowance for Storage Dams</i>
1983	National Research Council	Committee on Safety Criteria for Dams	<i>Safety Evaluation of Existing Dams. A Manual for the Safety Evaluation of Embankment and Concrete Dams</i>
		-	<i>Safety of Existing Dams: Evaluation and Improvement</i>
1983/ 91	Office of Arizona State	Mine Inspector	<i>Risk Assessment in the Federal Government: Managing the Process</i> <i>Cyanide Health and Safety Procedures</i>
1984	United States Committee on Large Dams	Leps, TM and Jansen, RB	<i>Proposed Guidelines for Dam Safety Assessment</i>
	United States Bureau of Reclamation	-	<i>Criteria and Guidelines for Evacuating Storage Reservoirs and Sizing Low Level Outlet Works</i>
	United States Army Corps of Engineers	-	<i>Shore Protection Manual</i>
	United States Department of Commerce	-	<i>Probable Maximum Precipitation Estimates – United States between the Continental Divide and the 103<sup>rd</sup> Meridian</i>
1985	National Research Council	Committee on Safety Criteria for Dams	<i>Liquefaction of Soils during Earthquakes</i> <i>Safety of Dams, Flood and Earthquake Criteria</i>
1987	United States Bureau of Reclamation	Water Resources	<i>Embankment Dam Instrumentation Manual</i>
	United States National Response Team	-	<i>Hazardous Materials Emergency Planning Guide</i>

1988	United States Bureau of Reclamation		<b><i>Downstream Hazard Classification Guidelines</i></b>
	American Society of Civil Engineers		<b><i>Evaluation Procedures for Hydrologic Safety of Dams</i></b>
1989	United States Bureau of Reclamation		<b><i>Policy and Procedures for Dam Safety Modification Decision-making. Interim Guidelines</i></b>
1990	United States Department of Energy		<b><i>Design and Evaluation Guidelines for Department of Energy – Facilities Subjected to Natural Phenomena Hazards</i></b>
	FMC Corporation		<b><i>Sodium Cyanide Safety Manual</i></b>
1992	California Mining Association	Hutchinson, IPG and Ellison, RP	<b><i>Mine Waste Management, A Resource for Mining Industry Professional, Regulators and Consulting Engineers</i></b>
1994	United States Environmental Protection Agency	-	<b><i>Design and Evaluation of Tailings Dams</i></b>
1995	Department of Conservation and Natural Resources	Division of Water Resources Turnipseed, RM	<b><i>Laws and Permitting Information Pertaining to Dams</i></b>
1996	Environmental Protection Agency	-	<b><i>Best Practice Environmental Management in Mining – Environmental Auditing</i></b>
1997	Nevada Mining Association Wildlife Subcommittee		<b><i>Wildlife Management Considerations and Best Management Practices at Mining Operations</i></b>
1998	Federal Emergency Management Agency Mitigation Directorate		<b><i>Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners</i></b>



# Waste Rock Management

## 1. INTENT

To ensure that AngloGold Australia operations effectively manage the placement, construction, rehabilitation and environmental impacts of waste rock generated from mining activities.

## 2. SCOPE

This standard identifies the key principles for managing waste rock to ensure that environmental risk and impacts are minimised and maintained at levels acceptable to the community and regulators.

## 3. PERFORMANCE REQUIREMENTS

### 3.1 INTRODUCTION

The management of waste rock is critical at all mining operations, from operational, financial and environmental perspectives. Effective planning at all stages of the operation will enable waste rock to be effectively placed and rehabilitated and the extent of double handling kept to a practical minimum.

All AngloGold Australia operations are required to manage the key environmental risks relating to waste rock management. Management practices need to effectively address the following risks:

- the potential for contaminated runoff and/or drainage such as acid mine drainage (AMD), heavy metal and/or salt release from poorly designed or managed facilities;
- potential stability of waste rock dumps, in order that erosion of these facilities is minimal over the long-term;
- rehabilitation of waste dumps to ensure that surface stability can be demonstrated, topsoil is reapplied and vegetation can be successfully established; and
- drainage control, that if inadequately designed, can result in significant erosion or failure of the structure over the long-term and/or exacerbate contaminated runoff / drainage issues.

All operations are expected to consider, plan and manage the following issues relating to waste rock management:

- the selection of appropriate sites for the location of waste rock dumps;
- the required land area, catchment drainage and surface relief;
- effective removal and placement of topsoil prior to constructing the waste dump;
- design of waste dumps to incorporate potentially acid forming materials;

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- the physical and geochemical characteristics of the waste material;
- site conditions such as climatic factors;
- the drainage design to be incorporated on waste dumps;
- the stability and erosion potential of waste dump slopes;
- revegetation requirements; and
- formulating an appropriate rehabilitation and closure strategy.

### 3.2 SITE SELECTION

The location of waste dumps is to be planned in accordance with the:

- location of the pit or underground facilities, the process plant and other site infrastructure;
- anticipated volume of waste rock proposed to be generated;
- location of environmentally or culturally sensitive area (ie. rare or priority plant or threatened vegetation communities);
- anticipated height of waste dumps; and
- location of surface drainage, topography and areas of environmental significance.

It is essential that baseline environmental surveys have been completed in order that disturbance to areas of significance are known and can be avoided.

### 3.3 TOP SOIL REMOVAL

It is essential that all operations effectively remove and stockpile topsoil, prior to the placement and construction of waste rock dumps.

Recovered topsoil should be immediately replaced on disturbed areas prepared for rehabilitation or stockpiled for later use.

### 3.4 SULPHIDE BEARING WASTE AND GEOCHEMICAL CHARACTERISATION

In the event that drilling samples indicate the presence of sulphide bearing ore and waste, then this material must be clearly identified in mine plans. Geochemical sampling and testing programs are to be undertaken to enable this material to be effectively characterised and managed. Records of testwork are to be retained.

Waste rock can be classified into a number of different categories, dependent on the geological and geochemical properties of rock on site. However some generic categories include:

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- potentially acid forming – high capacity (PAF-HC). Rock that is generally highly mineralised and most likely to oxidise aggressively and cause acid mine drainage if not managed.
- potentially acid forming – low capacity (PAF-LC). Rock that has a low levels of sulphide mineralisation that may or may not generate acid depending on local conditions and management.
- non-acid forming (NAF). Rock that does not have the propensity to generate acid.
- potentially acid consuming (PAC). Waste rock that contains alkaline mineralisation, and is found to consume acid after thorough testwork.

Operations should develop their own classifications to suit their needs, though it is important keep the system as simple as possible and with as few categories as practicable to promote effectiveness of the waste rock dumping strategy. Furthermore, whilst some rocks may not be likely to form acid they may still liberate metallic ions if acid generation from other rock occurs.

Standard operating procedures are to be developed, communicated and implemented by all operations for the effective identification, management and placement of this material in designated areas within the waste dump.

### 3.5 PHYSICAL CHARACTERISATION OF WASTE MATERIAL

Prior to the design and construction of waste rock dumps, the physical characteristics of the waste material must be tested and understood with regards its suitability for use on the surface of waste rock dumps and its erosion potential.

In the event that different grades of waste rock are encountered during the life of mine, then separate stockpiling could be considered for waste material that can be used on the surface of waste dumps to facilitate surface stability of dumps. It is critical that the geochemical nature of this material is known, to prevent potentially acid forming waste being placed on the surface of waste dumps. These strategies are to be defined in mine plans and closure and decommissioning plans.

### 3.6 WASTE DUMP WATER MANAGEMENT

All AngloGold Australia operations are required to effectively engineer drainage controls for all waste dump designs. Engineering design is required to consider:

- the bearing capacity of underlying foundation materials;
- the permeability and drainage characteristics;
- the geotechnical properties of the waste rock;
- groundwater levels;
- slope length, batter angles and slope angle of proposed waste dumps;

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- the drainage channels and paths to be constructed on dumps;
- the material to be used for drainage channels (should they be required); and diversion of surface waters away from the sides of dumps to prevent gully erosion.

### 3.7 STABILITY AND EROSION OF WASTE DUMP SLOPES

All operations are required to design and construct waste dumps for long-term stability and minimal gully and sheet erosion from the face of dumps and within drainage channels.

Operations could consider conducting tests for:

- stability analysis to determine the slope angles to ensure that factors of safety are acceptable for the final landuse;
- profile gauges to assess the depth of soil lost from monitored areas; and
- sediment movement and runoff data.
- gully erosion using a quantitative measure such as the Gully Assessment Analysis (GAA) technique as utilised by Landloch ( R.Loch ).

Trials using variable depths of hard surface rock and topsoil could be considered as a means of reducing erosion, facilitating slope stability and encouraging the growth and sustainability of vegetation covers.

Once waste dumps, or sections of waste dumps, are available for rehabilitation, then a suitable vegetation cover should be established as soon as possible. Where practical, locally collected native species should be used to revegetate waste dumps.

### 3.8 MONITORING REQUIREMENTS

All operations are required to implement monitoring programs to assess and manage the environmental risk of these structures:

- the geotechnical stability of constructed waste dumps;
- erosion and sediment deposition rates;
- permeability;
- the quality of runoff and groundwater
- particle size distribution and compaction densities;
- geotechnical and geochemical characterisation; and
- any other relevant data.

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### 3.9 REHABILITATION AND CLOSURE STRATEGY

The design, construction and rehabilitation of waste dumps must be clearly defined in all operation's Rehabilitation Plans and Closure and Decommissioning Plans.

The progressive rehabilitation of waste dumps is strongly encouraged for all completed waste dumps, whilst earthmoving machinery is available. Progressive planning of rehabilitation should be discussed with and based on annual and long-term mining plans.

### 3.10 INSPECTIONS

All rehabilitated waste dumps should be periodically inspected to identify:

- areas of excessive erosion or failure of drainage structures;
- the progress or failure of revegetation;
- areas of potential or actual contaminated runoff or drainage; and
- level of stability of waste dump surfaces.

## 4 REFERENCES

- Leading Practice Sustainable Development Program for the Mining Industry – Managing Acid and Metalliferous Drainage (<http://www.ret.gov.au/sdmining>)
- Leading Practice Sustainable Development Program for the Mining Industry – Mine Rehabilitation (<http://www.ret.gov.au/sdmining>)
- Leading Practice Sustainable Development Program for the Mining Industry – Mine Closure and Completion (<http://www.ret.gov.au/sdmining>)
- Minerals Council of Australia. 1998. Mine Rehabilitation Handbook.

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# Emissions Management

## 1 INTENT

To ensure AngloGold Ashanti Australia (AGAA) business units effectively manage emissions in accordance with the requirements of this standard. This standard aims to ensure AGAA and contractors minimise or avoid the creation of emissions that may (if they impact they don't have to be negatively, an impact is an impact) impact the environment or stakeholders.

## 2 SCOPE

The intent of this standard shall apply to all personnel and contractors involved with any AGAA managed activity. This standard applies only to environmental and stakeholder impacts of emissions. Occupation Health and Safety (OHS) impacts are addressed in AGAA's OHS standards.

## 3 PERFORMANCE REQUIREMENTS

### 3.1. INTRODUCTION

Many activities associated with mining from exploration to mine decommissioning have the potential to generate emissions of pollutants and noise that may impact both the environment and stakeholders. Emissions may range from damaging native flora and fauna and causing human health impacts to cause a nuisance to local stakeholders. Contamination may be a result of localised changes in air, soil or water quality as a result of emissions of gases, particles or liquids from mining activities. Emissions that cause a nuisance to local stakeholders (eg noise, dust, odour etc) must be managed.

Sources of emissions generated by exploration and mining include;

- Drilling – dust, noise
- vegetation clearing and ground disturbance activities - dust
- mining (dust, GHG, waste dump AMD etc)
- blasting activities – noise, dust
- ore milling, processing and disposal – noise, odour,dust
- construction - noise, dust
- transportation – road and rail using access corridors to the mine or process plant;

Emissions in Australia are regulated by several State and Federal Acts (refer references). In addition, emissions are managed by a series of National Environmental Protection Measures (NEPMs) implemented by the Environmental Protection and Heritage Council (EPHC). NEPMs are designed to ensure there is a consistent and co-ordinated approach to emissions (air, soil, water and noise) across all states. NEPMs typically contain goals, standards, protocols and guidelines. Refer to <http://www.ephc.gov.au/nepms/nepms.html> for detailed information regarding NEPMs. Several NEPMs are currently in place and are of relevance to AngloGold's activities. These include;

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National Pollutant Inventory (<http://www.npi.gov.au/index.html>) and ([http://www.ephc.gov.au/nepms/npi/npirev2002\\_intro.html](http://www.ephc.gov.au/nepms/npi/npirev2002_intro.html))

Ambient Air Quality ([http://www.ephc.gov.au/nepms/air/air\\_nepm.html](http://www.ephc.gov.au/nepms/air/air_nepm.html))

Diesel Vehicle Emissions ([http://www.ephc.gov.au/nepms/diesel/diesel\\_intro.html](http://www.ephc.gov.au/nepms/diesel/diesel_intro.html))

Air Toxics ([http://www.ephc.gov.au/nepms/air/air\\_toxics.html](http://www.ephc.gov.au/nepms/air/air_toxics.html))

AngloGold Ashanti Managers shall be educated in the standards, protocols and reporting requirements contained in the NEPMs.

### 3.2. EMISSIONS MANAGEMENT STRATEGY

All business units that have the potential to generate emissions that can impact on community, as determined via risk assessment, or those that generate emissions that have a statutory reporting requirement, are required to develop and implement a documented Emissions Management Strategy. Emissions management strategy should include the following:

- Identify legal and company obligation associated with emission management, refer to business units legal and other obligations register.
- Identification of all key sources of emissions based on an understanding of site conditions including the equipment used, nature of the material being disturbed (i.e. drilled, mined and processed etc), methods of materials handling and processing, local geology and soil type, the extent of vegetation cover, and meteorological conditions (eg wind, temperature inversions). Consideration should be given to emissions modelling if applicable.
- Identify potential impacts of emissions on surrounding ecosystems, communities and stakeholders. Impacts include emissions generated both directly and indirectly by the activity eg noise generated by the operation of a processing plant and the noise generated by removing processed material from site.
- Identification of opportunities for adopting leading practice technologies to avoid or minimise the generation of emissions.
- Set measurable and achievable targets for emissions reductions.
- Engage with relevant stakeholders to determine community concerns where applicable.
- Implement and adopt appropriate emission management and reduction strategies that take into consideration all of the above information. The strategy must take into consideration the site conditions, proximity and location of nearby neighbours.
- Document responsibilities and accountabilities for emissions management.

The Emission Management Strategy should also take into consideration the requirement of the AGAA Energy Efficiency and Climate Change Standard. Where appropriate a combined process should be established.

The strategy can take the form of either a specific Emission Management Plan or integrated into the business units existing documents. The format of the strategy will be determined by the significance of the issue.

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## Emissions Management

### 3.3. EMISSION MONITORING

To demonstrate that each business unit has their emissions under control emissions monitoring or emissions prediction calculation must be implemented. The monitoring program should be tailored to meet the requirements of each business unit and must take into consideration statutory monitoring obligation, Global Reporting Indices requirement and other corporate reporting requirements. The frequency of the monitoring will be dependent on statutory requirement but where they do not exist emissions monitoring or emission predictions should be undertaken on a quarterly basis.

### 3.4. EMISSION REPORTING

Depending on the size and nature of a business unit, there may be a requirement to comply with external reporting obligations such as the Environmental Protection License, National Pollutant Inventory or other National and International Environmental Protection Measures eg GRI . Where this is the case a report must be developed and submitted to the relevant government department in accordance with statutory requirements. Specific detail on the NPI reporting obligation can be obtained from Department of Environment and Conservation – Emissions Inventory Section. Exploration activities are not required to submit NPI reports.

## 4 REFERENCES AND ADDITIONAL INFORMATION

- AGA Air Quality Management Standard, Environmental Standard 003, September 2008-09-21
- AGAA Energy Efficiency and Climate Change Standard
- Australian Standard AS2724.3 *Determination of TSP*
- *Environmental Protection (Noise) Regulations 1997* (Western Australia)
- Environment Australia. 2000. *Best Practice Environmental Management in Mining Series – Cleaner Production* (<http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=BF645BCB-964A-B247-A9E94E25110BDA2E>)
- Environment Australia. 1998. *Best Practice Environmental Management in Mining Series – Dust Control* (<http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=BF645BCB-964A-B247-A9E94E25110BDA2E>)
- Environment Australia. 1998. *Best Practice Environmental Management in Mining Series – Noise Vibration and Airblast Control* (<http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=BF645BCB-964A-B247-A9E94E25110BDA2E>)
- Environment Australia. 2002. *Best Practice Environmental Management in Mining Series – Non Dust Atmospheric Emissions from Minerals Processing*. (<http://www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=BF645BCB-964A-B247-A9E94E25110BDA2E>)
- Minerals Council of Australia. 2004. *Enduring Value – The Australian Minerals Industry Framework for Sustainable Development, Guidance for Implementation*.

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- Ministerial Council on Mineral and Petroleum Resources. 2005. *Principles for Engagement with Communities and Stakeholders*

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# *Environmentally Hazardous Substance and Contamination*

## 1 INTENT

To ensure AngloGold Ashanti Australia (AGAA) business units effectively manage contamination and environmentally hazardous materials in accordance with the requirements of this standard. This standard aims to ensure AGAA transport, store, use, manage and dispose of environmentally hazardous materials to prevent the potential generation of contaminated sites.

## 2 SCOPE

The intent of this standard shall apply to all personnel and contractors involved with any AGAA managed activity. This standard excludes cyanide management, tailings management and the disposal of environmentally hazardous substance as they are managed by other standards. This standard applies only to environmental and stakeholder impacts from hazardous materials. Occupation Health and Safety (OHS) impacts are addressed in AGAA's OHS standards.

## 3 PERFORMANCE REQUIREMENTS

### 3.1 INTRODUCTION

Environmentally hazardous substances (EHS) are products used or substances generated by exploration and / or mining related activities that have the potential to affect the natural environment or neighbours directly or indirectly. EHS will not affect the environment is managed correctly.

Environmentally hazardous substances include but are not limited to:

- Chemicals (coolants, acid, flocculants)
- Hydrocarbons (fuels, lubricants, greases)
- Minerals and / or mineral processing by products (waste rock with elevated mineral, tailings, fibrous minerals)
- Waste products (drill spoils, contaminated soils, waste oil, contaminated water)
- Use of radioactive sources

Poorly managed EHS can result in contaminated sites.

Contaminated sites have the potential to create significant and long lasting damage to the environment. Contamination can affect vegetation growth; soils, groundwater, surface water and can result in the release of pollutants to the air, which may cause local impacts in air quality. Impacts on the environment can occur because of the direct uptake of contaminants by plants and animals and by the migration of contaminants through ground and surface water.

A contaminated site is a site at which a substance is above background concentrations that presents, or has the potential to present, a risk of harm to human health, the environment, or any environmental value.

Common types of contamination occurring during exploration / mining include:

- Hydrocarbon;

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## ***Environmentally Hazardous Substance and Contamination***

- Salinisation;
- Above background concentration metals;
- Acidification;
- Radiation
- Tailings

Environmentally Hazardous Substances are legislated in Australia to ensure that they are transported, stored, handling and use in an appropriate way. In Western Australia EHS are regulated by:

- *Environmental Protection Act 1984* and associated regulations
- *Dangerous Goods Safety Act 2005* and associated regulations

In Australia several states (including Western Australia) have Acts and associated regulations that provide an enforceable framework for contaminated site assessment and management (e.g. Western Australia - *Contaminated Sites Act 2003*). Pollution of the environment is also regulated e.g. the Western Australian *Environmental Protection Act 1984*. In addition the transport, handling, use, treatment, storage and disposal of hazardous materials (including Dangerous Goods) is regulated by numerous regulations (refer references). Non compliance with regulations can result in severe financial penalties and expose AngloGold to potential future liabilities.

### **3.2 ENVIRONMENTALLY HAZARDOUS SUBSTANCES AND CONTAMINATION MANAGEMENT STRATEGY**

All business units that use EHS or that have the potential to create a contaminated site (as determined via risk assessment) are required to develop and implement a EHS and contamination management strategy. This strategy can either be integrated into existing procedures or exist as a separate stand-alone document. Either way the strategy should incorporate:

- Identify legal and company obligation associated with EHS and contamination management, refer to business units legal and other obligations register.
- Establish an EHS register
- Set measurable and achievable targets for preventing environmental harm.
- Engage with relevant stakeholders to determine community concerns where applicable.
- Establish an auditable process for assessing and approving the use or possible generation of environmentally hazardous substances
- Strategic planning and management commitment to preventing or minimising the use and the potential generation of contamination throughout the life of the project, from conception, through construction, operation and decommissioning phases.
- Identify the potential impacts on the environment or neighbours through the use of EHS or the generation of contaminated sites in consultation with stakeholders.

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## *Environmentally Hazardous Substance and Contamination*

- Training to identify processes/activities/materials that may use EHS or lead to generation of a contaminated site.
- Avoidance of contamination through management systems, tools, effective inventory controls, monitoring, and managed disposal leading to compliance with transport, storage and disposal regulations including:
  - Developing an understanding of the composition of all materials used, generated or stored and the actual and potential risks and environmental impacts of each;
  - Identifying the likely sources of contamination during the life of the project;
  - Maintaining a contaminated sites register including hydrocarbon storage areas, tailings and landfill;
  - Minimising and monitoring all discharges to the environment to detect any acute or chronic environmental impacts;
  - Maintaining adequate and effective records so that due diligence (duty of care) can be demonstrated; and
- Seek alternatives to the use and / or disposal of hazardous materials such as reuse, recycling and treatment that eliminates or minimises environmental impacts.
- Minimise the onsite storage of EHS and / or generation of EHS or potential contaminants during AGAA activities.
- Identify opportunities for adopting leading practice technologies to avoid or minimise the use of EHS or generation of EHS or contamination.
- Develop Emergency Response Plans and test to minimise environmental impacts.
- Provide and maintain storage and secondary containment facilities that will contain leakages and spillages of product in all foreseeable circumstances and in accordance with relevant regulations.
- Provide, maintain and use facilities with adequate EHS and contamination control mechanisms e.g. wash down bays with sediment traps, triple gravity interceptors, plate separators etc.
- Evaluate the effectiveness of operational procedures, remedial works and the mine plan by auditing EHS register and contamination management.
- Document responsibilities and accountabilities for emissions management
- Plan and manage EHS before closure and ensure that all applicable plant / equipment is decontaminated.
- Validate and document the final condition of land and groundwater after cleanup or closure.

### 3.3 MONITORING

To demonstrate that each business unit has their EHS and contamination issues under control, an EHS monitoring inspection program and contaminates site register must be implemented. The monitoring program should be tailored to meet the requirements of each business unit and must take into consideration statutory

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## ***Environmentally Hazardous Substance and Contamination***

monitoring obligation, Global Reporting Indices requirement and other corporate reporting requirements.

### **3.4 REPORTING**

To ensure effective management of EHS and contamination, all events that result in the unplanned EHS spill or monitoring that identifies contamination has occurred as a result of AGAA activities must be recorded as an incident.

In addition all known or potentially contaminated sites will be recorded in the business units contaminated sites register. Depending on the size and nature of the contamination issue a business unit, there may be a requirement to comply with external reporting obligations

## **4 REFERENCES**

- Environmental Protection Authority. 2005 *Environmental Guidance for Planning and Development Environmental Protection Authority Pollution Management. Draft Guidance Statement No.33 Part C.*
- AGA ENV-STD-004 *Chemicals Management Standard, September 2008*
- *Dangerous Goods Safety Act 2004*
- *WAContaminated Sites Act 2003 and regulations.*
- Leading Practise Sustainable Development Program for the Mining Industry – Stewardship, Mine Rehabilitation and Mine Closure and Completion handbooks  
([http://www.ret.gov.au/resources/mining/leading\\_practice\\_sustainable\\_development\\_program\\_for\\_the\\_mining\\_industry/Pages/LeadingPracticeSustainableDevelopmentProgramfortheMiningIndustry.aspx](http://www.ret.gov.au/resources/mining/leading_practice_sustainable_development_program_for_the_mining_industry/Pages/LeadingPracticeSustainableDevelopmentProgramfortheMiningIndustry.aspx))
- *WA Environmental Protection Act 1986 and associated regulations*
- Environmental Protection Authority. 2006. *Guidance for the Assessment of Environmental Factors (in Accordance with the Environmental Protection Act 1986) - Rehabilitation of Terrestrial Ecosystems. Guidance No. 6.*
- Minerals Council of Australia. 2004. *Enduring Value – The Australian Minerals Industry Framework for Sustainable Development, Guidance for Implementation.*
- Department for Environment Water Quality Guidelines for Mining and Minerals Processing – No. 10 Above Ground Fuel and Chemical Storage  
([http://portal.environment.wa.gov.au/portal/page?\\_pageid=55,735656&\\_dad=portal&\\_schema=PORTAL](http://portal.environment.wa.gov.au/portal/page?_pageid=55,735656&_dad=portal&_schema=PORTAL))

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# Decommissioning and Closure

## 1 INTENT

To ensure AngloGold Ashanti Australia (AGAA) business units adopt an effective strategy for decommissioning and closure planning throughout the life of each project. This standard aims to ensure that closure and decommissioning is undertaken in a cost-effective way while minimise adverse post-closure environmental, community & shareholder impacts.

## 2 SCOPE

The intent of this standard shall apply to all personnel and contractors involved with any AGAA managed activity. This standard covers the key requirements that apply to all AGAA business units when developing and implementing a Decommissioning and Closure Plan.

## 3 PERFORMANCE REQUIREMENTS

### 3.1. INTRODUCTION

Project closure planning typically commences during the pre-feasibility stage of a project and culminates in tenement relinquishment, (it also includes process decommissioning and rehabilitation activities). Mine decommissioning usually occurs at the point in a project when the economic recovery of minerals has ceased.

AGAA acknowledges that each project is unique and this ultimately determines what is left behind as a benefit (or legacy) for future stakeholders. All AGAA business units are expected to prevent or minimise adverse long-term environmental, physical, social and economic impacts, and to create a stable non-polluting landform suitable for the agreed post-mining landuse. AGAA must ensure decommissioned sites are rehabilitated and left in a safe and stable condition, after taking into account beneficial uses of the project site and surrounding land.

The implementation of a Decommissioning and Closure Plan should adopt the principle of *Enduring Value - the Australian Minerals Industry's Sustainable Development Framework* (Minerals Council of Australia, 2004) and the ICMM Principles of Sustainable Development. AGAA mine closure and decommissioning planning should ensure:

- Environmental resources are not subject to physical and chemical deterioration;
- The post-mining use of the site is beneficial and sustainable in the long term;
- Any adverse socio-economic impacts are minimised; and,
- The opportunity is taken to maximise socio-economic benefits.

### 3.2. DECOMMISSIONING AND CLOSURE STRATEGY

The implementation of a Decommissioning and Closure Plan should be consistent with leading practise mine decommissioning objectives and principles such as those outlined in the *Strategic Framework for Mine Closure* (ANZMEC/MCA 2000) and Department of Industry Tourism and Resource's Leading Practice Handbook.

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## Decommissioning and Closure

Rehabilitation should also be considered with reference to AngloGold's Rehabilitation Standard (ENV-STD-003) and any applicable decision making authority publications (i.e. EPA Guidance Statement No. 6). The mine decommissioning process should be integrated with the overall mine planning process to achieve a sustainable outcome and to reduce the overall cost of closure.

AGAA business units must address the following key requirements when developing a Decommissioning and Closure Strategy:

### 3.2.1 Stakeholder Involvement

It is critical that community and other stakeholder engagement occur throughout the project closure planning process. At the mineral exploration stage it is important that AGAA develops a Community Engagement Plan to develop relationships with local stakeholders, regulators and community.

During the project and within 2 years of the closure, all stakeholders need to be consulted.

### 3.2.2 Planning

Appropriate planning for closure should occur during the feasibility, design and permitting phase of the project, and be upgraded during the operational life of the project to take into consideration expansions or project changes. The broad aims of closure planning must be:

- Protect the environment and public health and safety by using safe and responsible closure practices;
- Ensure the efficient use of resources to minimise waste;
- Use proven rehabilitation techniques to trial new techniques during operation where required;
- Minimise or eliminate significant environmental impacts once the project ceases operation;
- Establish conditions which are consistent with the pre-determined end land use objectives;
- Ensure adequate financial provisioning;
- Facilitate tenement relinquishment post-closure and
- Reduce the need for long-term monitoring and maintenance by establishing effective physical and chemical stability of all disturbed areas.

The objective of closure planning is to ensure the process of closure occurs in an orderly, consultative, cost-effective and timely manner and should incorporate the following:

- Ensure closure is integral in the life of mine planning.
- A risk-based approach with the objective to reduce both cost and uncertainty.
- Closure plans should be developed to reflect the project or operation and should include at least the following two components:
  1. A Conceptual Plan for use during exploration, feasibility, development and detailed design; and,
  2. A Closure Plan for use during construction, operation and post-operation.

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## *Decommissioning and Closure*

- Closure feasibility planning is required to ensure that closure is technically, economically and socially feasible;
- Regular and critical review is required to reflect changing circumstances.

### **3.2.3 Financial Provisions**

The objective of financial provisioning is to ensure the cost of closure is adequately represented in company accounts and that stakeholders are not left with a liability.

### **3.2.4 Implementation**

Effective management and coordination of project closure planning will enable well designed, systematic, safe and cost-effective project closure. The roles, responsibilities and accountabilities for implementation of the Decommissioning and Closure Plan must be clearly identified, adequately resourced, involve community consultation, on-going management and monitoring after closure should be assessed and adequately provided for.

### **3.2.5 Completion Criteria**

All AGAA managed projects are required to establish site-specific criteria to demonstrate the successful completion of the final closure process. These are to be established as an agreed set of environmental indicators, which upon being met, will demonstrate successful rehabilitation of the site and enable lease relinquishment to be achieved. Completion criteria should be established during mine planning and follow leading practice guidelines such as those published by ANZMEC (2000) and DITR 2006).

### **3.2.6 Statutory Requirements**

To obtain acceptance from government departments, it is critical to ensure that the closure plan documents all closure related obligation, legislation and the requirements of industry codes. Wherever practically possible, the AGAA project should aim to exceed these requirements.

### **3.2.7 Relinquishment**

The aim of relinquishment is to meet the agreed success criteria to the satisfaction of the Regulatory Authority (usually the State Department of Mineral Resources or equivalent) and the community. Records of mine closure, decommissioning and rehabilitation must be preserved for due diligence

### **3.2.8 Post-Closure Monitoring**

All projects are required to develop a post-closure environmental monitoring strategy and program, to:

- Identify any ongoing environmental impacts or risks;
- Confirm that completion criteria has been achieved; and
- Closure strategies have been effective in reducing and eliminating adverse long-term environmental impacts, for example such as erosion, acid rock drainage and tailings stability.

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## ***Decommissioning and Closure***

### **4 REFERENCES**

- ANZMEC/Mineral Industry Discussion Paper. 2002. *Strategic Framework on Mine Closure*.
- Department of Industry Tourism and Resources. 2006. Leading Practice Sustainable Development Program for the Mining Industry. *Mine Closure and Completion*.
- Environmental Protection Authority. 2006. *Guidance for the Assessment of Environmental Factors (in Accordance with the Environmental Protection Act 1986) - Rehabilitation of Terrestrial Ecosystems. Guidance No. 6*.
- Environment Australia. 2002. *Best Practise Environmental Management in Mining Series – Mine Decommissioning*  
<http://www.deh.gov.au/settlements/industry/minerals/index.html>
- International Council on Mining and Metals. 2006. *Sustainable Development Framework*.
- International Council on Mining and Metals. 2006. *Guidance Paper Financial Assurance for Mine Closure and Reclamation*.
- Minerals Council of Australia. 2004. *Enduring Value – The Australian Minerals Industry Framework for Sustainable Development, Guidance for Implementation*.
- Minerals Council of Australia. 2001. *Guidelines for Mine Closure and Decommissioning*.
- Minerals Council of Australia. 2002. *Strategic Policy for Mine Closure*.
- Western Australian Department of Mines and Petroleum Resources. 2001. *Mine Closure and Decommissioning Guidelines*.

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INTEGRATED MANAGEMENT SYSTEM

***Tropicana Gold Project  
Integrated Management System Manual***

***Appendix 3 – Safety and Health Standards***

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## Standard 1 – Fit for Work

### 1 INTENT

Processes shall be developed, implemented and maintained to ensure that all personnel at the AngloGold Ashanti Australia (AGAA) business unit are:

- Provided with appropriate resources and support regarding the promotion and facilitation of a healthy lifestyle; and
- Ensuring employees are Fit for Work while at work to eliminate or minimise risk to their occupational health and safety.

### 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, on the AGAA business unit. site.

### 3 PERFORMANCE REQUIREMENTS

The business unit shall provide a safe workplace by adopting a positive approach to fitness for work and thereby assisting to eliminate any contributing factors to poor performance and work incidents. To achieve this, the operation shall:

- Provide a fatigue management program to all employees outlining work requirements on hours worked;
- Have a drug and alcohol program in place;
- Provide healthy lifestyle promotion programs for all employees to be involved in;
- Provide an occupational rehabilitation program to assistance employees through a range of rehabilitation measures to address problems that can impact fitness for work;
- Provide an Employee Assistance Program (EAP) to employees to assist in measures and educational programs to address problems at both work and home;

### 4 REFERENCES

- *OSHAS 18001: 1999 Occupational Health and Safety Management - Systems Specification*
- *Code of Practice Working Hours 2006 – Commission for Occupational Safety and Health*

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## **Standard 2 – Equipment & Machine Guarding**

### **1 INTENT**

Processes shall be developed, implemented and maintained on AngloGold Ashanti Australia (AGAA) business unit to control the risks associated with Equipment & Machine Guarding.

### **2 SCOPE**

The intent of this standard shall apply to all personnel, including contractors, on the AGAA business unit.

### **3 PERFORMANCE REQUIREMENTS**

#### **3.1 Guarding Needs Survey**

Each business unit shall conduct a formal survey of work areas, plant and equipment to identify potential hazards related to moving parts, etc.

All identified hazards shall be assessed to determine the level of risk in accordance with the IMS-STD-002 Risk and Change Management

This survey shall include the identification of related legislative requirements and standards.

A competent person shall undertake this survey.

#### **3.2 Installation of Guards**

All machines and equipment shall be fitted with guards where required to prevent access to parts that may present a risk to personnel (eg. moving parts, etc).

Guards fitted to parts where access is not necessary for operation, inspection, maintenance or cleaning shall be fixed.

The design and installation of guards shall be such so as not to interfere with the normal operation or maintenance of the equipment.

Guards may be, as appropriate in each situation:

- fixed guards,
- automatic guards, and
- interlock guards.

When guards are installed in narrow access ways or other cramped spaces, consideration shall be given to ensuring that means of escape are not restricted and that the guarding does not create any new hazards (eg. barriers with sharp edges).

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## ***Standard 2 – Equipment & Machine Guarding***

Guards shall be designed, constructed, installed, maintained and inspected in accordance with the principles of AS 4024, parts 1 and 2.

### **3.3 Record of Guarding Requirements**

All business unit guard requirements shall be recorded.  
This record may be a register, inspection checklist or plan.

The record shall detail the type of guard, its location and interlocking details if applicable.

These records shall be maintained in accordance with the IMS-STD-007 Documentation & Records Management.

### **3.4 Minimum Standard**

Design, construction and installation of all equipment and plant guarding shall be in accordance with the relevant Australian Standards including those listed in Section 4.

### **3.5 Safety Devices and Interlocks**

Where guarding is considered insufficient or easy to tamper with, the erection of barriers or fences shall be considered.

Guards to parts where access may be required shall be fitted with interlocks (mechanical, electrical or electronic), which would prevent the starting or operation of the machine or equipment if the guard is removed or tampered with.

Interlocks shall be designed so that they are cannot be tampered with or bypassed.

Interlocks shall also be fitted to all items of equipment that may present a hazard if removed or changed (eg. openings on tanks under high pressure or high temperature, etc). Such interlocks shall prevent the cover, door or lid from being opened whenever hazardous conditions exist.

Remotely started or operated plant or equipment shall be fitted with a warning sign, a flashing light and a loud warning sound which operate for at least 10 seconds prior to starting.

### **3.6 Removable Guards**

Where a guard has been designed to be removed for the purpose of inspection, testing or maintenance, there shall be a formal check and inspection system implemented to ensure that correct isolation procedures are being followed so that guards are replaced prior to operation or re-energising the equipment.

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## ***Standard 2 – Equipment & Machine Guarding***

This requirement shall be recorded on all operating procedures, work instructions etc.

### **3.7 Tampering with Guards and Interlocks**

Permit to work, isolation, rules or work procedures shall be prepared and issued, to prohibit tampering with guarding or interlocks.

### **3.8 Emergency Stop Systems**

All plant and equipment shall have emergency stop systems fitted in accordance with the relevant Australian Standard and legislative requirements. These systems include lanyards and mushroom buttons, etc.

### **3.9 Signage**

All removable guards shall display a warning sign that identifies the need for isolation prior to removal and replacement of the guarding before operation or re-energising of the equipment.

### **3.10 Maintenance, Inspections and Records**

Business units shall develop and implement a formal inspection, test and maintenance program for Machine Guarding, Interlocks, Emergency Stops and related Safety Devices.

This equipment shall be included as part of an operations preventative maintenance program and shall be inspected, tested and maintained in accordance with the relevant Australian Standards.

Full records of inspections, tests and maintenance shall be kept in accordance with the IMS – STD – 007 Documentation & Records Management..

### **3.11 Operational Inspections**

Each business unit shall develop and implement a formal guarding system inspection including specific checklists. This inspection shall be included as part of the operations regular inspection program.

In addition to this requirement, line management and supervisors shall conduct informal inspections of guarding systems on a daily basis.

Machines or equipment shall not be operated if guards are missing or are not securely fixed.

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## **Standard 2 – Equipment & Machine Guarding**

No person shall stand upon any machinery or equipment guard, use the guard as a work platform or use the guard as a means of access or egress to a work situation. In addition to this requirement, line management and supervisors shall conduct informal inspections of guarding systems on a daily basis.

Machines or equipment shall not be operated if guards are missing or are not securely fixed

### **3.12 New or Modified Plant & Equipment**

Any new or modified equipment shall be inspected for guarding compliance in accordance with this standard prior to being introduced or commissioned.

This inspection shall be recorded in accordance with the IMS – STD – 007 Documentation & Records Management and the guarding shall be included in the business units inspection register.

### **3.13 Lifting of Guards**

Manual handling considerations shall be taken into account when installing guards that need to be regularly lifted (eg. on vertical tracks or hinges).

### **3.14 Training**

An awareness of the sites Machine Guarding requirements shall be provided as part of the General Induction program. This shall include:

- hazards related to moving parts, etc,
- isolation prior to removal of guarding,
- replacement of guarding prior to operation, and
- inspection and awareness of guarding.

In addition employees who are required to work on guarded equipment (eg electricians, fitters, etc) shall be adequately trained.

### **3.16 Assessment**

Assessments/inspections of the Machinery Guarding management requirements in this standard shall be undertaken at least annually.

Management shall review the results of the assessment and any deficiencies rectified to ensure continuous improvement.

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## ***Standard 2 – Equipment & Machine Guarding***

### **4 REFERENCES**

AS 1788.1-1987	Design, Construction and Safeguarding
AS 4024.1-2006 Series	Safety of machinery – design, ergonomics, distances & gaps, displays, controls and signals, Indication, marking, actuation
AS 1755 - 2000	Conveyors – Safety Requirements

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SAF-STD-002 – Equipment & Machine Guarding	4.0	M LeRoy	11/06/2008	5 of 5

## 1 INTENT

Processes shall be developed, implemented and maintained on AngloGold Ashanti Australia (AGAA) business unit to eliminate the risk of injury to persons and /or damage to machinery, plant and equipment due to incorrect or unauthorised operation of primary isolation devices or incomplete, incorrect isolation or equipment being operated or energised while people are working on or in close proximity to it.

## 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, at an AGAA business unit .

## 3 PERFORMANCE REQUIREMENTS

### 3.1 ISOLATION PRACTICE

The business unit shall develop and implement an isolation and tag out/lock out procedure to ensure employees work safely. Isolation and tag out/lockout applies to all activities and energy sources.

Equipment isolation and tag out/lock is required whenever employees need access to plant or equipment for maintenance or any other reason.

Machinery and equipment shall be effectively isolated from all sources of power whenever personnel are required to work and may be exposed to danger from:

- Moving unguarded machinery;
- Exposed electrical conductors; and
- Other dangers if electrical power was applied.

Isolation Tags shall be applied at each point of isolation to indicate the date and purpose of the isolation and the person who performed the isolation.

Specific procedures shall be developed for modification or maintenance activities undertaken by qualified personnel on equipment that has the potential to restart.

### 3.2 PERSONNEL AND TRAINING

The business unit shall have a register of all employees who are authorised to undertake isolations and/or tag out/ lock out processes. These employees shall be trained and competent through knowledge, training and experience and have written permission from line management to perform isolation and tag out for specific areas.

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## ***Standard 3 - Workplace Isolations***

All personnel shall be trained and tested in the use of and application of the tag out / lock out procedure.

### **3.3 LABELLING ISOLATION DEVICES**

The business unit shall ensure that equipment is clearly labelled to allow safe and efficient isolation. Labels shall be permanently attached on or adjacent to both the means of isolation and the equipment to be isolated.

Labels shall contain the equipment title and /or equipment number and the point of power supply.

### **3.4 TYPES OF TAGS**

Standard Out of Service Tags and Personal Danger Tags shall be used.

Out of Service Tags shall be:

- Used on plant and equipment to advise why they may not be operated or used;
- Contain relevant information on the tag; and
- Only be removed by an authorised tagger or a person authorised and qualified to repair the plant or equipment, and only after the plant or equipment has been restored to a state fit for purpose and / or use.

Personal Danger Tags shall be:

- Used as personal protection when working on or in close proximity to plant or equipment that is out of service; and
- Only be attached to primary isolation devices to which a completed “Out of Service Tag” is attached or to an authorised common or group tagging point when one is being used.

No person shall operate, move or interfere with any primary isolation device that has another person’s” Personal Danger Tag” attached.

Information Caution Tags shall:

- Provide information to others
- Be placed or removed by anyone
- Must be filled out correctly
- Cannot be used to protect equipment or people

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## Standard 3 - Workplace Isolations

### 3.5 COMMON TAGGING POINT

The business unit shall develop a procedure for the use and set up of a common or group tagging point where multiple tagging is required to be undertaken. All steps undertaken in establishing a common or group tagging point shall not compromise the minimum requirement of the basic isolation and tag out / lock out requirements.

### 3.6 REMOVAL – SPECIAL CIRCUMSTANCES

The business unit shall develop a procedure for use when an employee has left a “Personal Danger Tag” and lock on an isolator and/or the piece of equipment is required for operation.

### 3.7 INDUCTION

An overview of the isolation and tag out/ lock out procedure shall be provided as part of the General Induction program. The training shall include:

- The purpose and application of the tags;
- Types of tags to be used, when and where to be applied; and
- The procedure to remove other personnel’s tags under special circumstances.

### 3.8 NON COMPLIANCE

The business unit shall develop a procedure that addresses non-compliance of the removal of Personal Danger Tags and locks.

## 4 REFERENCES


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## Standard 4 - Working at Heights

### 1 INTENT

Processes shall be developed, implemented and maintained at all AngloGold Ashanti Australia (AGAA) business units to control the risks associated with working at heights.

### 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, at the AGAA business unit.

### 3 PERFORMANCE REQUIREMENTS

#### 3.1 INTRODUCTION

The definition of 'height' for the purposes of this standard shall be locations from where there is a risk of an injury to a person (or damage to property) if they (it) fell.

#### 3.2 RISK IDENTIFICATION

The business unit shall identify and assess the risks of all tasks that require working at heights, in accordance with *IMS-STD-002 - Risk and Change Management*. The controls required to minimise the levels of risk shall be listed.

#### 3.3 PRINCIPLES FOR PREVENTION

The business unit shall implement controls, using the Hierarchy of Controls principle, to prevent and/or minimise the impact of any potential fall from heights. This principle outlines the preferred order of control measures:

- **Elimination** of the hazard - eliminate the risk of a fall;
- **Substitution** of the work method - use of EWP's and scissor lifts;
- **Engineering** controls - modify tools to prevent slippage, tie – off ladders;
- **Administration** controls - signs, bunting, JSA's, procedures, site rules; and
- **Personal Protective Equipment (PPE)** - fall restraint harness and shock absorbing lanyards.

#### 3.4 MEASURES TO PREVENT FALLS

Work shall not be undertaken where there is a risk of falling unless adequate fall prevention and/or fall arrest measures are in place. Fall restraint equipment shall always be used when working at heights. Where ever practicable, appropriate work platforms and access equipment shall also be used when working at heights.

Work platforms may be either permanent or temporary.

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## Standard 4 - Working at Heights

Access equipment may include ladders, stairs, lifts, scaffolding or elevators. Access equipment shall not be used as work platforms.

Risk assessments shall be conducted before commencing work where the scope of work changes or the risk of a fall increases.

When designing new or modifying existing facilities, designers shall:

- Consider excavation, construction, operating, modification and maintenance activities for the life of the asset;
- Ensure that designs conform to statutory regulations; and
- Identify provisions to prevent falls.

### 3.5 MANAGING FALL PREVENTION EQUIPMENT

The business unit shall develop, implement and maintain a procedure on fall prevention. The procedure shall include:

- Anchorage points;
- Setting up static lines;
- Use of lanyards and inertia reel arrest devices;
- Safety harnesses;
- Safety climb system;
- Inspection and servicing fall restraint equipment and anchorage points; and
- Records of acquiring, inspecting, servicing and disposing of fall restraint equipment.

The procedure shall identify that only competent personnel may use this equipment.

### 3.6 COMPETENCIES

Personnel that may work where there is a risk of falling shall have the following competencies:

- Be able to carry out a risk assessment of the work, and
- Know the types of equipment and fall prevention equipment and techniques to be used.

A person qualified and authorised for the purpose and deemed to be competent shall assess individuals.

### 3.7 INDUCTION TRAINING

All personnel shall be informed on the requirements for competency training for working at heights at induction training.

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## Standard 4 - Working at Heights

### 3.8 WORKING ON ROOFS

The structural integrity of a roof shall be determined and confirmed to be sound before moving and storing materials onto it and rigging from it. Where the integrity of the roof cladding cannot be determined and the support structure appears sound, access onto the roof shall be by boarding installed by a competent and authorised person.

Access onto a roof shall be from a scaffold or a permanent ladder with a purpose built platform.

While on a roof all persons shall maintain three-point contact (eg. two limbs and fall arrest equipment).

### 3.9 EMERGENCY RESPONSE

The business unit shall ensure that the provisions of the site Emergency Preparedness and Response Plan has the capability to rescue people who are suspended by their fall arrest equipment in a timely fashion to prevent 'suspension trauma' (conditions arising from loss of blood circulation through the body as a consequence of pressure applied by the fall arrest harness).

## 4 REFERENCES

- *IMS-STD-002 – Risk and Change Management*
- 

AS 1891.4-2000	Industrial Fall Arrest System and Devices – selection, use & maintenance.

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## Standard 5 - Mobile Equipment

### 1 INTENT

Processes shall be developed, implemented and maintained on an AngloGold Ashanti Australia (AGAA) business unit site to eliminate or control hazards associated with the use of mobile equipment.

### 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, on an AGAA business unit.

### 3 PERFORMANCE REQUIREMENTS

#### 3.1 RISK ASSESSMENT

Line management shall conduct a risk assessment on mobile equipment for each specific operating area where mobile equipment is used. The risk assessment shall be conducted in accordance with *IMS-STD-002 – Risk and Change Management* and include:

- Mobile equipment specifications;
- Operator training and competency assurance;
- Operation and maintenance procedures;
- Roadway design, construction and maintenance;
- Traffic and pedestrian control; and
- The interfaces between operating areas.

The results of the risk assessment shall be incorporated in to the relevant department risk register.

#### 3.2 EQUIPMENT SPECIFICATIONS

All mobile equipment shall have documented minimum safety requirements.

#### 3.3 EQUIPMENT ACQUISITION & ASSESSMENT

All mobile equipment purchased or otherwise acquired shall meet the documented equipment specifications including the minimum safety requirements.

All mobile equipment shall be assessed by a competent person prior to use to ensure compliance with specifications and that it is fit for use.

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## Standard 5 - Mobile Equipment

### 3.4 EXISTING EQUIPMENT

A gap analysis shall be conducted for all existing mobile equipment against the minimum requirements (see section 3.2). Where deficiencies are identified a risk assessment shall be undertaken and an action plan developed in accordance with *IMS-STD-002 – Risk and Change Management*.

### 3.5 EQUIPMENT AND TASK ALLOCATION

A system shall be implemented to ensure that the use of mobile equipment is undertaken by qualified and competent personnel.

### 3.6 TRAINING AND COMPETENCY

A training and competency assessment system shall be implemented to include:

- Operator competency standards for each type of mobile equipment being used;
- Competency standards for persons who maintain mobile equipment;
- Training and formal competency assessments for all of the above personnel;
- Recording of all competency assessments; and
- Regular assessment of competencies.

The training and competency assessment system shall comply with the requirements of *IMS-STD-005 – Competence, Training and Awareness*.

Inductions for new personnel shall include an appropriate level of instruction and assessment in the site's traffic rules and relevant mobile equipment hazards.

### 3.7 SAFE SYSTEMS OF WORK

Appropriate safe systems of work shall be developed and implemented for activities or areas where mobile equipment is used or maintained. The systems of work shall be based upon completed risk assessments on mobile equipment.

The business unit shall implement a process to ensure that persons who operate mobile equipment are fit to perform their duties.

### 3.8 MAINTENANCE & INSPECTION

Each area shall have a formal preventative maintenance and inspection program in place that includes:

- Regular services of maintenance equipment according to original equipment manufacturer specifications, as a minimum;
- Documented pre-start checks for all equipment, including checks of safety-critical components; and

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## Standard 5 - Mobile Equipment

- Documenting maintenance and inspection results.

No modifications to mobile equipment shall be undertaken unless assessed to reduce the level of risk and approved by the responsible maintenance supervisor of the operating site. All modifications shall be recorded.

### 3.9 ROADWAY DESIGN, CONSTRUCTION AND MAINTENANCE

All roadways used by mobile equipment shall be properly designed based on:

- The type of equipment likely to be used;
- The expected frequency of use;
- Expected maximum speeds of equipment;
- Likely environmental conditions; and
- Consideration of other hazards.

All roadways shall be constructed according to the design requirements and include appropriate sign posting.

Sign posting of roads is to be consistent with the use of the road, the type of vehicle using the thoroughfare and the hazards and dangers associated with the proper and safe flow of traffic. Speed limits shall be displayed.

All roadways shall be regularly inspected and maintained to an acceptable standard consistent with the task required and the nature of vehicles using them.

### 3.10 TRAFFIC AND PEDESTRIAN CONTROL

Separation of traffic and pedestrian control shall be considered in the relevant department risk registers.

The business unit shall develop and implement specific traffic rules to minimise pedestrian exposures and control traffic flows and speeds.

### 3.11 STANDARDS OF DRIVING

The standard of driving on site shall be monitored at regular intervals.

Legal requirements shall apply on sites and will include the wearing of safety helmets whilst riding motorised or manual bicycles and the wearing of seatbelts in all other mobile equipment. Any exceptions to this requirement shall be supported by a risk assessment and approved by the Operations Manager.

### 3.12 LOADING OF VEHICLES

Large trucks and semi trailers during loading need to be positioned in an area where the use of a forklift, crane or other loading/unloading device has adequate room to move.

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# Standard 5 - Mobile Equipment

Only personnel who have certified competency in the use of vehicle loading cranes are permitted to use these devices to unload vehicles.

Semi trailers are to be loaded with the prime mover attached to the trailer.

When loading vehicles, the person undertaking the task shall satisfy themselves that the vehicle is of a design suitable for the load to be carried and has adequate load space and load capacity. The vehicle's load shall be adequately secured before the vehicle transports the load. The load shall not overhang the vehicle in a way that could danger a person, damage property or be non compliant to road rules.

The driver is the only person permitted to stand or walk on top of the load. This is only permitted when the load is capable of taking the weight and a risk assessment of the situation has been carried out.

When covering a load, ensure that that the pallet loads are of equal height.

### 3.13 UNLOADING AND REMOVING TARPAULINS

The person unloading the vehicle shall:

- Check that the load has not moved during transit, and that loose objects will not fall to the ground when the tarpaulin is removed,
- Check if there are any spills or leaks amongst the load, and
- Ensure that the floor of the vehicle is clean before being released from the area or site.

## 4 REFERENCES

- *IMS-STD-002 – Risk and Change Management*
- *IMS-STD-005 – Competence, Training and Awareness*

AS 5062-2006	Fire Protection for Mobile & Transportable Equipment.

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## Standard 6 - Driving Safety

### 1 INTENT

Processes shall be developed, implemented and maintained on AngloGold Ashanti Australia (AGAA) business unit to ensure that all vehicles are maintained and driven safely.

### 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, at the AGAA business unit within the defined scope of the IMS.

### 3 PERFORMANCE REQUIREMENTS

#### 3.1 REGISTRATION, LICENSING AND INSURANCE

The business unit shall establish a system to ensure that applicable vehicles are:

- Covered by current registration and insurance; and
- Driven only by drivers holding a current manual driving license and other applicable licenses for the types of vehicle being driven on gazetted roads.

#### 3.2 SAFETY FEATURES

Where possible, vehicles shall be purchased or fitted with approved safety features such as air bags and anti-lock brakes.

#### 3.3 INSPECTION AND MAINTENANCE

All vehicles shall be included in the business units preventative maintenance program and inspected at least monthly by a competent person.

Drivers of vehicles shall conduct a pre-start inspection of the vehicle at least weekly, which includes checking of key safety items such as lights and indicators.

Any deficiencies detected, which may affect safety, shall be immediately repaired.

#### 3.4 AWARENESS TRAINING

The business unit shall include basic road safety rules and procedures in their General Induction program. Regular road safety and driver awareness programs shall also be conducted.

#### 3.5 DRIVER TRAINING

Personnel required to drive vehicles in isolated areas and potential high risk situations shall undergo appropriate driver training program.

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## Standard 6 - Driving Safety

Personnel required to drive vehicles for long distances or long periods of time shall undergo an awareness program on the hazards of driver fatigue and on the measures to prevent the adverse effects of fatigue.

Personnel required to tow a trailer or other equipment shall receive training and be assessed as competent with regard to:

- Determining if the towing vehicle and means of attachment are adequate for the task;
- Correctly attaching the trailer/equipment to the towing vehicle;
- Distributing the load to be towed; and
- Driving techniques when towing.

### 3.6 JOURNEY PLANNING

Journey plans shall be prepared where company vehicles and personnel are required to travel over extended distances or into remote areas.

The business unit shall define the maximum distance of travel time frame before journey plans are required based upon the locality of the operation, type of roads, weather patterns and any other site specific factors.

The journey plan shall be provided to the relevant supervisor prior to commencing the journey and shall include agreed call in or contact times and methods to confirm safe travel and arrival.

### 3.7 INCIDENTS

Any vehicle incident, whether resulting in injury or not, shall be reported and investigated in accordance with *IMS Standard 11 Non-conformance Management*.

### 3.8 SITE ROAD MANAGEMENT

Traffic signs used for site roads shall be in accordance with the appropriate part of *Australian Standard AS 1742*.

Speed limits shall be imposed throughout the site, as appropriate. Other speed deterrents such as traffic islands, roundabouts and speed humps shall be utilised where necessary to ensure drivers do not exceed the nominated speed limit.

The use of marked and sign-posted pedestrian crossings and safety barriers shall be located where required.

Drivers of delivery vehicles and visitors, who are permitted to enter the site with their vehicle, shall be informed of the site traffic rules, as part of their site induction, before they are allowed to enter the site.

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## ***Standard 6 - Driving Safety***

### **3.9 GENERAL SAFETY REQUIREMENTS**

General safety requirements for the operation include:

- No persons shall travel in any vehicle unless seated.
- Seat belts shall be fitted and maintained for all seating positions and worn at all times whilst the vehicle is in motion.
- Only hands free mobile phones shall be used by the driver whilst vehicles are in motion.
- Vehicles shall be fitted with an appropriate first aid kit and fire extinguisher that are accessible to personnel inside the vehicle.
- Other essential emergency equipment shall be maintained on vehicles for specific tasks.
- Vehicles shall have restraints that will prevent loads from becoming dislodged during both normal transport and emergency conditions.
- Vehicles shall drive to the conditions of the road at all times.
- Vehicle speeds shall be maximum of 100km/hr on sealed roads and 80km/hr on dirt roads.
- High range 4WD shall be engaged on all wet, dirt roads at all times.
- Night driving shall be minimised at all times and pre journey plans shall have overnight stays.
- Other specific site/location driving rules shall be identified and developed where necessary.

### **4 REFERENCES**

- Nil

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## **Standard 7 - Occupational Health & Industrial Hygiene**

### **1 INTENT**

Processes shall be developed, implemented and maintained on an AngloGold Ashanti Australia (AGAA) business unit site to control occupational health and industrial hygiene risks in the working environment.

### **2 SCOPE**

The scope of this standard shall apply to all employees and contractors employed at an AngloGold Ashanti Australia business unit.

### **3 PERFORMANCE REQUIREMENTS**

#### **3.1 HEALTH & HYGIENE SURVEY**

The business unit shall conduct a survey (including baseline sampling or monitoring as required) of its work areas and activities to identify potential or actual occupational health & industrial hygiene hazards. This survey shall include the identification of relative legislative requirements and exposure standards and shall be undertaken by a suitably qualified occupational hygienist.

#### **3.2 RISK ASSESSMENT**

All exposures and potential hazards identified during the hygiene survey shall be assessed to determine the level of risk in accordance with *IMS-STD-002 - Risk and Change Management*. These risks shall be included in the relevant department risk registers.

#### **3.3 OCCUPATIONAL HEALTH & INDUSTRIAL HYGIENE REGISTER**

The survey results and subsequent risk assessment shall also be recorded in an occupational health & industrial hygiene register. The register shall contain the:

- Type of exposure or hazard;
- Exposure level for the hazard including the reference (e.g. NOHSC Guideline, Code of Practice, Standard, etc), STEL (Short Term Exposure Level), and TWA (Time Weighted Average);
- Location of the hazard;
- Related activities / tasks for the hazard;
- Actual exposure frequency for the hazard;
- Monitoring measures for the hazard, including the method, frequency and analysis; and
- Control measures for the elimination or management of the hazard.

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## Standard 7 - Occupational Health & Industrial Hygiene

### 3.4 WORKPLACE MONITORING & CONTROL

All significant workplace occupational health & industrial hygiene hazards (i.e. those with a high or extreme risk rating) shall have formal monitoring schedules and control programs developed and implemented.

Results of workplace monitoring shall be maintained, compared against the relevant legislative or exposure standard requirements and made available to personnel who work in the relevant workplace.

An action plan shall be developed and reviewed regularly for non-conformance with the relevant requirements.

### 3.5 INSTRUMENTATION AND CONTROL SYSTEMS

A controlled schedule for the inspection and testing of critical instrumentation and systems shall be maintained. This inspection schedule shall consider systems and instruments that provide protection against significant events such as explosions.

Following inspection, testing and calibration, instruments and controllers shall be tagged with the next due maintenance date.

### 3.6 CALIBRATION OF INSTRUMENTS

The accuracy level of instruments, particularly for detection and measurement of emissions and discharges to the environment shall be defined and documented. The instruments shall be calibrated at appropriate intervals in accordance with *IMS-STD-010 - Monitoring and Data Management*.

### 3.7 EMPLOYEE HEALTH SURVEILLANCE

The business unit shall develop, implement and maintain formal employee health surveillance schedules and programs. The development of these surveillance programs shall consider and be based upon:

- The identification and compliance with relevant legislation and other requirements;
- Health and hygiene surveys; and
- Risk assessments.

Results of the monitoring shall be:

- Maintained in accordance with *IMS-STD-007 - Documentation & Records Management*;
- Controlled in a confidential manner;
- Available to individual personnel who have been subjected to monitoring or sampling; and
- Compared against the relevant legislative or occupational health standards.

An action plan shall be developed and corrective actions progressed for non-compliances with requirements.

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## **Standard 7 - Occupational Health & Industrial Hygiene**

### **3.8 ANALYSIS**

Each business unit shall ensure that a system is implemented and maintained to analyse and compare monitoring results and map trends in work groups or workplaces.

### **3.9 TRAINING & COMPETENCY**

Personnel shall be provided with training relating to occupational health & industrial hygiene hazards, exposures and risks. This training shall include the:

- Type of hazards;
- Methods of exposure;
- Controlling exposure sources; and
- Identification, use and maintenance of PPE.
- PPE used shall conform to the relevant Australian Standard for that piece of equipment.

Only suitably trained and qualified personnel shall perform workplace monitoring and employee health surveillance monitoring.

### **3.10 ASSESSMENT & REVIEW**

Assessments of the occupational health & industrial hygiene management system shall be undertaken at least annually. Management shall review the results of this assessment and rectify deficiencies to ensure continuous improvement.

## **4 REFERENCES**

- *Worksafe Australia (2005) Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2005)]*
- *Worksafe Australia (1991) Exposure standards for atmospheric contaminants in the occupational environment [NOHSC:3008 (1991)]*
- *Worksafe Australia (1995) National Exposure Standards [NOHSC:1003 (1995)]*
- *IMS-STD-002 - Risk and Change Management*
- *IMS-STD-010 - Monitoring and Data Management.*
- *IMS-STD-007 - Documentation & Records Management*

AS 1800-1987	The Selection, Care & Use of Industrial Safety Helmets
AS 1801	Industrial Safety Helmet
AS 1336 - 1997	Recommended Practice for Occupational Eye Protectors.
AS 1270 - 2002	Acoustics – Hearing Protectors
AS 2161.1 - 2000	Occupational Protective Gloves

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## **Standard 8 - Work Permits**

### **1 INTENT**

Processes shall be developed, implemented and maintained on AngloGold Ashanti Australia (AGAA) business unit to ensure work that constitutes a safety, health, environment or community, risk is carried out in a controlled manner and that work permits identify all the relevant hazards, precautions and means of control.

### **2 SCOPE**

The intent of this standard shall apply to all personnel, including contractors, of AGAA business unit..

### **3 PERFORMANCE REQUIREMENTS**

#### **3.1. MANDATORY TASKS REQUIRING A WORK PERMIT**

Mandatory tasks that require work permits include:

- Work in the vicinity of power lines and power line corridors;
- High voltage switching;
- Work on LPG equipment;
- Working with chemicals;
- Confined space entry;
- Excavation;
- Hot work in areas not designated as hot work areas; and
- Working on density gauges.

#### **3.2. INCLUSION IN PROCEDURES**

Tasks, which require a work permit before they can be performed, shall be clearly documented in relevant operating or maintenance procedures, work instructions and other relevant documentation.

#### **3.3. AUTHORISATION TO ISSUE A WORK PERMIT**

Issuers of work permits shall be trained and assessed as competent in the requirements of the specific permit and its related procedures. All such persons shall be authorised in writing by the relevant statutory Mine Manager or delegate and such authorisation shall be recorded.

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## Standard 8 - Work Permits

### 3.4. POTENTIAL HAZARDS & PRECAUTIONS

The issuer shall consider all potential hazards associated with the work environment before issuing a work permit. The work permit shall clearly specify precautions and hazard control measures that need to be employed.

### 3.5. WORK PERMIT REGISTER

The business unit shall maintain a work permit register. Work permits shall be recorded in the register by the work permit issuer. Responsible managers shall check the register at the end of each work period and resolve those that have not been closed out.

### 3.6. PERSONNEL PERFORMING WORK

The issuer of the work permit shall ensure that persons assigned to perform the work are qualified and properly trained.

The issuer shall explain the hazards and the control measures to the persons assigned to do the work, prior to the commencement of the work and ensure that hazards, precautions and personal protective equipment to be used, are thoroughly understood by the workers.

### 3.7. COMPLETION OF WORK

Once a work permit has been issued, the work shall be carried out as specified in the permit, at the completion of the job, the permit shall be returned to the issuer and closed out. This shall be recorded in the work permit register. Any difficulties with the process or unforeseen hazards need to be documented and followed up for future reference.

Records of all work permits shall be kept in accordance with *IMS-STD-007 - Records and Documentation Management*.

### 3.8. TRAINING

An overview of the site work permit system shall be provided as part of the General Induction program.

Employees required to work under a specific work permit shall be trained and assessed as competent in the following:

- Work permit systems and isolation procedures;
- Specific site procedures;
- Personal protective equipment;
- Emergency response procedures;
- First aid treatment;
- The requirements of this standard;
- Relevant legislative requirements; and

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## ***Standard 8 - Work Permits***

- Regular refresher training.

Records of training shall be kept in accordance with the *IMS Standard 7 Records and Documentation Management*.

### **3.9. ASSESSMENTS & INSPECTIONS**

Supervisors shall conduct routine inspections on a daily basis to ensure that the work permit system requirements are being followed.

A formal assessment and review of the work permit system for effectiveness shall be conducted annually or sooner if deficiencies are noted.

## **4 REFERENCES**

- *IMS-STD-007 - Records and Documentation Management*.

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# Standard 9 – Manual Handling and Ergonomics

## 1 INTENT

Processes shall be developed, implemented and maintained on AngloGold Ashanti Australia (AGAA) business unit site to control the risks associated with Manual Handling and Ergonomics.

## 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, on the AGAA business unit.

## 3 PERFORMANCE REQUIREMENTS

### 3.1 New Projects, Design and Modifications

An assessment of planned manual handling tasks and ergonomic factors shall be carried out during the design phase of new projects to identify potential risks.

Ergonomic factors shall be incorporated in the design (including design reviews) for new projects and, changes and modifications. Similar assessment shall be carried out for plant modifications.

### 3.2 Manual Handling Survey

Each business unit shall conduct a formal survey of its work areas and activities to identify manual handling and ergonomic hazards.

This survey shall include the identification of related legislative requirements.

A suitably qualified and competent person shall undertake this survey, (eg. Occupational Therapist, Ergonomist etc).

### 3.3 Risk Assessment

All hazards that are identified during the Manual Handling survey shall be assessed to determine the level of risk in accordance with the IMS – STD – 002 Risk & Change Management.

The results of the survey and the subsequent risk assessment shall be recorded in the operations Hazard Register.

### 3.4 Control Measures

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## **Standard 9 – Manual Handling and Ergonomics**

Control measures to manage and reduce manual handling or ergonomic risks shall be implemented on the basis of the above assessment.

Control measures shall be prioritised in accordance with the Hierarchy of Controls. For example, sites shall ensure that alternative or mechanical means are used instead of manual handling practices wherever practicable.

Control measure shall be introduced only after consultation with the employees concerned.

### **3.5 Training**

An overview of manual handling practices shall be provided as part of the General Induction program. In addition:

- all personnel shall be trained in ergonomic factors and ergonomically sound work practices specifically related to their task or activity;
- all personnel who are required to perform specific manual-handling task, shall be properly trained in performing the task safely (e.g. load sharing, using mechanical lifting aids, etc); and
- training shall focus on using alternative or mechanical means to undertake manual handling tasks.

### **3.6 Task Review**

Manual-handling or ergonomic hazards may be identified from the review of developing specific standard operating procedures, outcomes of incidents or by task observations.

### **3.7 Assessments**

An assessment of the Manual Handling and Ergonomics management requirements from this guide shall be undertaken at least annually. Management shall review the results of the assessment and any deficiencies rectified to ensure continuous improvement

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# Standard 10 - Fire Prevention & Management

## 1 INTENT

Processes shall be developed, implemented and maintained on an AngloGold Ashanti Australia (AGAA) business unit site to control the outbreak of fire through effective prevention, monitoring and contingency management.

## 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, at any AGAA business unit .

## 3 PERFORMANCE REQUIREMENTS

### 3.1 FIRE RISK

The business unit shall conduct a formal fire risk assessment.

This assessment shall be conducted and recorded in the relevant department risk register, in accordance with *IMS-STD-002 - Risk and Change Management* and shall be used for the daily management of fire risk.

The risk assessment shall include details of each fire risk and the mechanisms of control, including prevention, monitoring, and contingency preparedness.

### 3.2 TRAINING & COMPETENCY

All personnel shall be trained and assessed for competency in:

- Basic fire prevention methods;
- Understanding surface fire potentials;
- Use of basic fire fighting equipment;
- Methods for reporting fire emergencies; and
- Emergency procedures.

Regular refresher training shall be undertaken for these competencies at not less than 12 monthly intervals.

Personnel shall be trained in accordance with *IMS-STD-005 - Competence, Training and Awareness*.

#### 3.2.1 Training for Underground Personnel

In addition to section 3.2, underground personnel shall be trained and assessed for competency in:

- Understanding of underground fire potentials;

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## Standard 10 - Fire Prevention & Management

- Fire behaviour in the underground environment; and
- Emergency procedures, including use of self-rescuers and refuge chambers.

### 3.3 FIRE DETECTION EQUIPMENT

Fire detection equipment shall be installed in accordance with legislative requirements and relevant Australian Standards. Positioning of such equipment shall be determined so as to ensure early detection of fire.

### 3.4 FIRE PROTECTION EQUIPMENT

Fire protection equipment shall be installed in accordance with legislative requirements and the requirements of the local fire authority, as a minimum standard.

### 3.5 INSPECTIONS

Both fire detection and fire protection equipment shall be inspected every six months to ensure they are in working order at all times.

A fire safety specialist shall be engaged, at regular intervals, as indicated by the insurance company to conduct a specialist inspection of the site and provide recommendations for fire safety improvements.

### 3.6 MAINTENANCE

The business unit shall have a formal preventative maintenance and inspection program that includes:

- Regular servicing of equipment in accordance with the original equipment manufacturer specifications as a minimum;
- Regular testing of the effectiveness of onboard or fixed suppression systems; and
- A system for recording all inspections, testing and maintenance results.

Inspection, testing and maintenance of fire monitoring and suppression systems including portable extinguishers shall be conducted in accordance with industry and legislative requirements. Where relative industry and legislative requirements do not exist, it shall be conducted in accordance with the relevant Australian Standards (AS 1851.1 and AS 2030).

### 3.7 HOUSEKEEPING

A formal system shall be implemented to ensure the clean up and removal of all flammable waste or other materials.

### 3.8 HOT WORK PERMIT SYSTEMS

Each business unit shall have a formal hot work permit system in accordance with *SAF-STD-008 - Work Permits*.

No hot work shall be performed in a high fire risk area or underground (except in designated hot work areas) without an authorised permit.

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## Standard 10 - Fire Prevention & Management

### 4 REFERENCES

- *IMS-STD-002 - Risk and Change Management*
- *IMS-STD-005 – Competence, Training and Awareness*

Australian Standards as specified in the table below

AS 1674	Safety in welding and allied processes
AS 1940	The storage and handling of flammable and combustible liquids
AS 2030	The approval, filling, inspection, testing and maintenance of cylinders for the storage and transport of compressed gases
AS2419	Fire hydrant installations
AS2865	Safe working in a confined space
AS 3000	SAA wiring rules
AS 4242	Earth-moving machinery and ancillary equipment for use in mines — Electrical wiring systems at extra-low voltage
HB 37	Handbook of Australian fire standards
AS1851.1 - 1995	Maintenance of Fire Protection Equipment.

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## ***Standard 11 - Electrical Safety***

### **1 INTENT**

Processes shall be developed, implemented and maintained on an AngloGold Ashanti Australia (AGAA) business unit to ensure that electrical equipment is maintained and operated safely and that static electricity hazards are minimised.

### **2 SCOPE**

The intent of this standard shall apply to all personnel, including contractors, at any AGAA business unit .

### **3 PERFORMANCE REQUIREMENTS**

#### **3.1. ELECTRICAL EQUIPMENT REGISTER**

All electrical equipment shall be registered for the purpose of ensuring its inspection and testing. The register shall include information related to the type of equipment, location of the equipment, and the person responsible for the equipment.

The Register shall cover all cord-connected electrical equipment, including:

- Portable electrical tools;
- Extension cords;
- Portable outlets;
- Portable residual current devices;
- Portable isolation transformers;
- Crib room, kitchen equipment; and
- Office equipment.

#### **3.2. PURCHASING AND USE**

Purchasing specifications of electrical equipment shall specify and ensure compliance with relevant Australian Standards. Only equipment compliant with relevant Australian standards shall be purchased and used at the business unit .

Electrical equipment shall only be used for the purpose for which it was designed and intended, and in accordance with the manufacturer's instruction.

#### **3.3. INTRODUCTION OF EQUIPMENT TO SITE**

All electrical equipment (including contractor's equipment) shall be inspected, tested, tagged and included on the sites electrical equipment register prior to being used at the business unit .

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## Standard 11 - Electrical Safety

### 3.4. EARTH LEAKAGE PROTECTION

Earth leakage protection shall be installed on all circuits (excluding domestic lighting) where there is a risk of persons coming into contact with live conductors.

### 3.5. INSPECTION, TESTING AND MAINTENANCE

A schedule for the inspection and testing of all registered equipment shall be prepared and issued to personnel responsible for this equipment. The schedule shall nominate the month or week during which the inspection shall be carried out.

Frequency of testing shall comply with Table 1 of *Australian Standard AS 3760* or other relevant legislation.

Equipment that has been repaired shall be re-tested and tagged where required prior to being placed back in service.

### 3.6. TRAINING AND COMPETENCY

Electrical testing or maintenance work shall be conducted by suitably licensed electricians in accordance with the relevant statutory requirements.

### 3.7. METHOD OF TESTING

Testing shall be carried out in accordance with *Australian Standard AS 3760*.

### 3.8. TAGGING

Following inspection and testing, equipment shall be tagged, clearly identifying the due date for the next inspection. Tags shall be colour coded to provide easy identification of the currency of testing.

### 3.9. NON-CONFORMING EQUIPMENT

Equipment, which has failed to pass a test must not be used by personnel and shall be tagged out of service for the purpose of being repaired or disposed of in accordance with the *AGAA-SAF-STD-003 – Workplace Isolations*.

### 3.10. ELECTROSTATIC EARTHING

Electro-static earthing must be provided for situations where sparking may present a hazard, or for structures which may be subject to a lightning strike. Earthing shall be regularly inspected and maintained.

### 3.11. OVERHEAD LINES

Warning signs shall be posted at locations where there is a potential of contact with overhead lines.

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## Standard 11 - Electrical Safety

### 3.12. WORK ON LIVE EQUIPMENT

All items of equipment connected to or driven by electricity shall be effectively disconnected from all sources of electrical power prior to the commencement of any work on the equipment.

If work on live equipment or a system is unavoidable, a work permit must be issued prior to commencing work in accordance with the *SAF-STD-008 – Work Permits*.

### 3.13. SAFE SYSTEMS OF WORK

Appropriate safe systems of work shall be developed and implemented for areas or tasks where there is a potential for contact with live conductors exceeding 32 Volts.

### 3.14. TRAINING

An overview of the site electrical safety requirements shall be provided as part of the General Induction program.

Employees required to work on electrical equipment shall be trained and assessed as competent in the following:

- Work permit systems and isolation procedures;
- Specific site procedures;
- Personal protective equipment to be used;
- Emergency response procedures;
- First aid treatment for electrical shock (including CPR);
- The requirements of this guide; and
- Relevant legislative requirements.

Periodic refresher training for these shall be conducted. Training records shall be kept in accordance with *IMS-SYS-007 - Documentation and Records Management*.

### 3.15. ASSESSMENT

Assessments of electrical safety shall be undertaken at least annually. Management shall review the results of the assessments and any deficiencies rectified to ensure continuous improvement.

## 4 REFERENCES

- *SAF-STD-003 - Workplace Isolations*
- *SAF-STD-008 - Work Permits*
- *IMS-SYS-007 - Documentation and Records Management*

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AGAA SAFETY & HEALTH STANDARD

***Standard 11 - Electrical Safety***

AS3760 - 2005	In Service Safety Inspection & Testing of Electrical Equipment.

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## Standard 12 - Hearing Conservation

### 1 INTENT

Processes shall be developed, implemented and maintained on AngloGold Ashanti Australia (AGAA) business unit to manage noise exposure to personnel and prevent occupational noise induced hearing loss.

### 2 SCOPE

The intent of this standard shall apply to all personnel, including contractors, at an AGAA business unit.

### 3 PERFORMANCE REQUIREMENTS

#### 3.1 EXPOSURE LEVELS

Noise exposure shall be adequately controlled to ensure that people are not exposed to noise on site or arising from the business unit that exceeds:

- An eight hour equivalent continuous sound pressure level of 85dB(A) or 82 dB(a) for 12 hours; and
- A peak sound pressure level of 140 dB(lin).

#### 3.2 NOISE EXPOSURE

Noise levels shall be assessed by trained and experienced personnel:

- At defined intervals for work areas where the sound pressure level may exceed the exposure limits;
- At defined intervals for tasks which may result in exposure above one tenth of the exposure limits;
- Where results from audiometric testing reveal evidence of work related noise induced hearing loss;
- During the design of all new plant and equipment; and
- Following the introduction of new equipment or modifications to existing equipment or replacement, which are likely to affect noise exposure.

#### 3.3 NOISE ASSESSMENT

Where an assessment reveals that noise exposure may exceed the exposure limit, a documented plan for controlling noise exposure shall be established using the Hierarchy of Control And in accordance with *IMS-STD-002 - Risk and Change Management*.

- The following priority on control measures needs to be established when dealing with noise:

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## Standard 12 - Hearing Conservation

- Engineering controls shall be implemented as the preferred control option – such as elimination to replace the equipment with quieter operation, install noise barriers, enclosures;
- If reduction of noise exposure to below the exposure limit through engineering controls is not practicable, consideration shall be given to administrative controls – such as increase separation between personnel and noise source, keeping personnel out of noisy areas; and
- Where engineering and administrative controls cannot practicably reduce the noise exposure to below the exposure limit, hearing protection shall be used.

### 3.4 HEARING PROTECTION SIGNS

Hearing protection signs conforming to *AS 1319 Acoustics – Hearing Conservation* shall be displayed to indicate areas where noise levels exceed 85dB(A) and the use of hearing protection is required.

### 3.5 TRAINING

Training shall be provided to personnel with potential exposure to noise in excess of the exposure limit. The Hearing Conservation training program shall consist of the following elements:

- Explanation of the nature of noise;
- Explanation of how the ear works;
- The effects of noise on the ear;
- Other causes of loss of hearing;
- The control measures utilised to reduce exposure to noise; and
- The selection, use, fit, maintenance and limitations of the use of personal protective equipment.

Training shall be provided in the General Induction and thereafter at intervals of no greater than two years. Records of the training shall be maintained in accordance with *IMS-STD-007-Documentation & Records Management*.

### 3.6 AUDIOMETRY

An Audiometry program shall be established for employees potentially exposed to noise in excess of the limit.

Audiometry shall be performed:

- Before commencing employment on site;
- At intervals of two years or more frequently if indicated on clinical grounds or required by legislation; and
- Upon termination of employment, where applicable audiometry shall be performed in accordance with statutory requirements by an appropriately qualified and authorised person.

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## Standard 12 - Hearing Conservation

Results of audiometry shall be provided to the employee. Grouped reports excluding confidential medical information shall be provided to management.

### 4 REFERENCES

- *IMS-STD-002 - Risk and Change Management*
- *IMS-STD-007- Documentation & Records Management*

AS 1270 - 2002	Acoustics – Hearing Protectors
AS 1319 - 1994	Acoustics – Safety Signs for Hearing Conservation

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# Standard 13 - Aviation

## 1 INTENT

Processes shall be developed, implemented and maintained on an AngloGold Ashanti Australia (AGAA) business unit to minimise the risks associated with air travel including requirements for approval of the use of chartered airlines and their selection.

## 2 SCOPE

This risk standard shall apply to all personnel, including contractors, at all AGAA business units.

Performance requirements of this standard shall apply to all facilities, activities, equipment and services associated with the air transport of AGAA employees and contractors for which AGAA is responsible.

Air service providers will be assessed on the safety (risk) of their operations. Risk assessments are conducted cost effectively by adjusting the rigor of risk assessment to AGAA's exposure to the hazard. Providers are categorised as A, B or C according to the level of use by AGAA. The process is described at *Appendix C*.

Company requirements may sometimes demand operations that are not fully compliant with this standard.

Deviation from the standard is likely to result in increased risk and should only be accepted after a risk assessment is conducted with appropriate input from aviation experts. In this situation, an equivalent safety measure should be adopted, to ensure risk is contained to an acceptable level.

### 2.1 PRECEDENCE

Any notice, publication act or regulation issued by a relevant regulatory body that is more limiting than the standards set in this document, shall take precedence.

Air charter providers approved to provide services to AGAA must be able to demonstrate compliance with applicable aviation safety legislation as well as the requirements of this standard, SAF-STD-013 – *Aviation*.

## 3 PERFORMANCE REQUIREMENTS

### 3.1 IDENTIFICATION

AGAA shall clearly identify activities that may require or involve the use of aircraft and apply the relevant parts of this standard.

### 3.2 PREFERRED AIR TRAVEL

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## Standard 13 - Aviation

Scheduled flights with airlines operating regular public transport services are the preferred choice for air travel by AGAA staff. Overseas flights are preferred with airlines who are members of the International Air Transport Association (IATA). Member airlines of the International Air Transport Association (IATA) are required to comply with stringent rules and regulations as dictated by IATA.

If a scheduled airline service is not available, air charter providers included on the AGAA approved list, or providers who meet the minimum of this standard, *SAF-STD-013 – Aviation*, may be used subject to the requirements of this standard.

Company travel on private flights is not permitted without prior approval of the General Manager Operations (GMO).

### 3.3 APPROVAL OF CHARTER COMPANIES

Air Charter Providers will not be accepted onto the AGAA approved list unless they have been assessed in accord with the requirements of this policy.

Approval of an air charter provider will require completion of a satisfactory risk assessment by AGAA or their aviation consultant.

### 3.4 FLIGHT SAFETY & AIRWORTHINESS

An approved air charter provider must: -

- Hold a current Air Operator's Certificate (AOC) approving all of the types of operations to be conducted;
- Hold current Certificates of required insurances;
- Maintain an appropriate Safety Management System (SMS);
- Maintain an appropriate Emergency Response Plan (ERP);
- Hold current certificates of registration for the aircraft;
- Undergo a risk assessment and audit of compliance with this standard;
- Undergo an assessment of the suitability of maintenance arrangements;
- Have successfully demonstrated an acceptable safety performance and service history.

Where an external maintenance provider is used, the evidence of the arrangements shall be provided in writing. Additionally, the charter company shall maintain a quality programme to ensure regulatory compliance by the external maintenance provider.

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### 3.5 AIRCRAFT SELECTION

The choice of aircraft for AGAA operations shall have regard to:

- Safety of passengers and crew;
- Business needs;
- Operational requirements
- Availability of the most suitable aircraft; and
- Cost.

The following order of preference shall be used when selecting aircraft

- Multi engine, turbine powered aeroplanes;
- Multi engine, piston powered aeroplanes;
- Single engine, turbine powered aeroplanes (in consultation with the approved external auditor);

NOTES:

1. Single engine, piston powered aeroplanes should not normally be used for transport of passengers.
2. Single engine aeroplanes should not be used for night flights.

- Helicopters used for passenger transport shall be turbine powered.
- Twin-engine helicopters shall have a crew of at least two pilots.
- Single engine helicopters, in a single crew environment, shall only be used for passenger transport when:
  - (a) Flights are conducted under daytime Visual Flight Rules (VFR);
  - (b) Flights are conducted with scheduled position reports, logged with an approved ground facility;
  - (c) Search and Rescue (SAR) capability is established in the area of operations and;
  - (d) Emergency response procedures are in place.
- Helicopters used for passenger transport shall be fitted with upper torso restraint.
- For over water flights and flights at night, special operational requirements will be specified by the aviation advisor.

#### 3.5.1 OVER-WATER OPERATIONS

Single engine helicopters and single engine aeroplanes will not normally be approved for operations over water. If especially approved, a condition will be the carriage of life rafts capable of accommodating all persons on board and with an overload capacity of 125% of the maximum load, together with the carriage of a life jacket for each person on board.

Multi engine fixed wing aircraft shall carry life jackets for each passenger and crew member and sufficient life rafts to meet regulatory requirements.

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In addition to the requirements for carriage of life jackets and life rafts specified in the Civil Aviation Orders (CAO), AGAA has the following additional requirements:

- For flights over water in single engine aircraft, beyond gliding distance from land, all passengers and crew shall wear life jackets at all times.
- For helicopters operating over water approved flotation equipment shall be fitted; and
- When a helicopter is operating over water, all passengers and crew on board shall wear approved, constant-wear, inflatable life jackets.

### 3.5.2 AIRCRAFT EQUIPMENT

Aircraft will be compliant with Civil Aviation Order 20.18 with regard to aircraft equipment.

In addition: -

- Multi engine turbine powered aircraft should be fitted with engine fire extinguisher systems.
- Aircraft are to be fitted with, at least one GPS unit, which meets the standards for primary means of navigation.
- For all single-pilot flights, the autopilot must be serviceable.
- Emergency Locator Transmitter (ELT), is to be fitted or carried which meets TSO C126 (406 MHz operation) specifications unless otherwise approved for specific operations.

### 3.5.3 OPERATIONAL REQUIREMENTS

Operations with more than six passengers shall normally be conducted under the Instrument Flight Rules (IFR).

The air charter provider will develop a fuel management policy that addresses all aspects of fuel provision and management.

The policy will be audited to ensure compliance with a safe operating environment.

Charter flights are not to be sub - contracted without the specific approval of AGAA.

### 3.6 AIRCREW

Unless otherwise recommended by the AGAA aviation advisor, the applicable experience and training requirements for flight crew detailed in *Appendix A and Appendix B* are to apply.

Casually employed aircrew shall not be used without the prior agreement of the AGAA aviation advisor.

Crewmembers shall be qualified and approved to operate all equipment and electronic navigational instrumentation installed in the aircraft.

Aircraft shall have a crew of at least two pilots when:

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- Flights operate under Instrument Flight Rules (IFR);
- Night flying operations are carried out; or
- An assessment or audit has determined that the operations should be carried out by more than one pilot.

For two pilot operations, both pilots shall be endorsed on the aircraft type and the operator shall have acceptable two crew procedures included in the company Operations Manual.

The operator shall have pilot training and checking organisation acceptable to the aviation adviser. An appropriate policy statement should be given in the company operations manual.

Each crewmember should undergo a company flight check to a satisfactory standard at least every 6 months.

Both a proficiency check and a line (route) check will be conducted every six months. If the proposed operation involves specific skills, then it will be requirement that flight crew undergo specific training in those skills.

Flight crew duty time shall not exceed that approved by the Civil Aviation Safety Authority (CASA).

Notwithstanding the limitations imposed by CASA, flight crew operating aircraft for AGAA are not to exceed:

- 8 hours flight time in any 24 hour period;
- 30 hours flight time in any 7 consecutive days;
- 100 hours flight time in any 30 consecutive days; and
- 900 hours flight time in any 365 consecutive days.

Any proposal to utilise flight crew who do not meet the minimum qualifications and experience levels as depicted in *Appendix A* or *Appendix B*, or any proposal to exceed the flight and duty limits should be referred to the aviation advisor for specific assessment.

### 3.7 AERODROMES

Operations in aircraft above 5700 Kg MTOW shall only be conducted at certified or registered aerodromes meeting the CASA standards described in Manual Of Standards (MOS) 139.

Operations at non-registered or non-certified aerodromes (Approved Landing Areas) shall comply with the standards recommended in Civil Aviation Advisory Publication CAAP 92-1. For operations at 'Aeroplane Landing Areas' (ALA's) the operator shall have acceptable documented procedures in the company operations manual to ensure the continued serviceability and suitability of the ALA.

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Design, construction, operation and maintenance of aerodromes, landing areas and heliports shall conform to the requirements of CASA MOS 139 or to International Civil Aviation Organisation (ICAO) Annex 14 (Aerodromes and Heliports) as well as any local regulatory requirements.

### 3.8 MANIFESTS

A manifest shall be promulgated for every flight and presented to the pilot prior to departure. Contents of the manifest shall include, but is not limited to:

- Names of the passengers;
- Weights of the baggage, freight and passengers;
- Aircraft call sign;
- Names of the flight crew; and
- Departure and destination airports
- It will be the pilot's responsibility to ensure the information provided in the flight manifest is accurate.
- Standard passenger weights are not to be used in aircraft with less than 10 passenger seats.

#### 3.8.1 WEIGHT & BALANCE

The air charter provider will have a documented procedure for the pilot to confirm before every takeoff and landing that the aircraft weight is:

- Within the prescribed limits of the Load and Balance charts; and
- The weights for take off and landing are such that all regulatory performance criteria are met.

The air charter provider will have documented suitable procedures for the pilot to confirm before every take-off, and during all stages of flight, that the aircraft is within the safe trim envelope.

### 3.9 PROCEDURES FOR GROUND FACILITY OPERATIONS

Aerodrome Ground Facilities utilised by AGAA and/or under the jurisdiction of an air charter provider shall have procedures for the administration and handling of passengers, baggage and freight. The procedures shall include controls to prevent unauthorised approach to the aircraft.

The operator shall establish procedures to ensure the safety of passengers during embarkation and disembarkation. These procedures shall be included in the company operations manual.

Procedures shall be established and conveyed to aerodrome operators to ensure that permission is obtained for facility use and that there is understanding of and compliance with AGAA requirements.

#### 3.9.1 SECURITY MEASURES

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Aerodrome operators shall employ security measures relevant to address any identified risks. These may include but not limited to:

- Luggage screening
- Identification checks
- Metal detection
- Other checks.

### 3.10 PASSENGER SAFETY

#### 3.10.1 BRIEFINGS

Passengers shall be briefed by a crew member before each flight in accordance with the aviation regulatory requirements. This briefing should normally be conducted by the aircraft crew. Alternatively, video briefings may be conducted in the terminal prior to flight.

Details of a standard briefing format are to be documented in the air charter provider's operations manual and shall include all items listed in the Civil Aviation Order (CAO) 20.11

Briefings should cover:

- Identification of typical Dangerous Goods (Restricted Articles);
- Hazards presented by rotating propellers and jet blast, as is appropriate, while passengers are embarking and disembarking;
- Restriction on smoking in, and near aircraft; and
- Safety and passenger comfort during flight.
- 

Passenger emergency briefing cards shall be provided in each passenger seat as a means of supplementing the oral briefing. Both shall be in a language understood by the passengers.

The briefing cards shall be specific to the type and cabin configuration of aircraft used.

#### 3.10.2 HEARING PROTECTION

Prolonged exposure to a noise level environment exceeding 84 dB (A) is hazardous to hearing. Hearing protection shall be supplied by the air charter provider when aircraft cabin noise levels exceed this limit.

### 3.11 RESTRICTED ARTICLES

AGAA personnel or contractors on AGAA charter flights shall be made aware of restricted articles which are not permitted on board aircraft or which are permitted only in limited quantities.

Such items shall be transported on charter flights only in accordance with the requirements of the International Air transport Association (IATA) regulations.

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### 3.12 DANGEROUS GOODS

Items or materials classified as dangerous goods shall not be offered for transport by air, except in accordance with the approvals of the specific air charter provider.

A number of airlines and air charter providers do not accept dangerous goods for carriage by air. If the air charter provider is approved to carry dangerous goods, then they must be carried in accordance with:

- The quantities, packaging and storage requirements documented in the IATA Regulations; and
- Specific procedures developed and agreed between AGAA and the aircraft operator.

These procedures shall incorporate controls for the hazards associated with air transport of dangerous goods, which are permitted under the requirements of the Air Navigation Act and subordinate legislation.

In all cases, it is a legal requirement that dangerous goods be declared to the air charter provider.

### 3.13 AUTHORITY OF CREW

The pilot in command has full authority in matters concerning the operational safety of the aircraft, conduct of the flight, loading and refuelling of the aircraft and control of embarked passengers.

Unless an emergency exists, passengers should normally refrain from becoming involved in flight operational matters. If AGAA personnel are dissatisfied with any aspect of a flight they are to advise the management of AGAA.

### 3.14 PASSENGER RESPONSIBILITY

Smoking is not permitted on the aircraft at anytime or in the vicinity of the aircraft while it is on the ground.

Personnel on AGAA charter flights shall wear clothing that offers protection against possible hazards and appropriate for the local conditions.

### 3.16 FUEL SUPPLY AND HANDLING

Where provision of aviation fuel is the responsibility of AGAA, procedures shall be documented covering supply, storage and dispensing of such fuel. Air charter providers and their crews are to be conversant with the procedures.

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Where these three functions are the responsibility of external parties, AGAA will audit the external party to ensure compliance with regulatory requirements.

### 3.17 STANDARD WORK PROCEDURES

Where applicable, the air charter provider shall develop procedures for:

- The inspection and maintenance of runways and/or helipads;
- The storage, quality testing and handling of fuel;
- The refuelling of aircraft;
- Ground communications with aircraft;
- Aircraft baggage control and handling; and
- The consignment and handling of dangerous goods by air.

When applicable, these functions will be audited to ensure compliance with regulatory requirements.

### 3.18 EMERGENCY RESPONSE PLAN

Ground facilities managed by AGAA and all air charter providers approved by AGAA shall have a formal "Emergency Response Plan" (ERP) which details the response procedures for safety incidents or accidents.

The ERP shall include emergency procedures to cover:

- Missing aircraft;
- Abnormal operations of aircraft;
- Aircraft damage.
- Fire

In addition, the Emergency Response Plan shall detail:

- Identification of potential emergency situations;
- Responsibilities of individuals and organisations;
- Communication procedures including those between the air charter provider, AGAA, Air Traffic Control and the media.
- Contacts with relevant regulatory authorities, including the Air Transport Safety Authority (ATSB) and Rescue Coordination Centre (Canberra)..
- Contact numbers for emergency and medical services including fire services, hospitals, and doctors;
- Resources available (people, equipment, training etc) and their disbursement during aircraft movements;

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- A schedule for training and emergency exercises including an Initiation of search or rescue action and methods of search and rescue.

### 3.19 SAFETY MANAGEMENT SYSTEM (SMS)

Aircraft operators are expected to have a formal Safety Management System appropriate for the scale of operations and size of the organisation. The SMS will include hazard/incident/accident reporting with a formal process to identify deficiencies and implement remedial action.

### 3.20 REPORTING INCIDENTS

Any occurrences, incidents or accidents applicable to AGAA shall be notified to AGAA in writing in a timely manner.

Aviation related incidents must be reported and investigated in accordance with the *IMS-STD-011 - Non-conformance Management*.

Serious incidents or those having implications for AGAA shall be notified to the Health, Safety, Environment and Community Manager who shall take appropriate action.

### 3.21 ARRIVING AND DEPARTING FROM AIRPORTS

AGAA personnel and contractors shall allow adequate time for travelling to and from the airport.

Personnel shall take into account the hazards associated with proposed journeys, particularly by road, and schedules, which can give rise to increased risks caused by excessive speed and fatigue.

### 3.22 INSURANCE

Personnel travelling on regular scheduled chartered aircraft to and from site are covered by normal worker's compensation provisions whilst aboard the aircraft.

Before travelling by air, every person shall ensure that they have appropriate insurance coverage especially if travelling overseas.

### 3.23 JOINT VENTURE TRAVEL

AGAA personnel will at times be required to fly in aircraft chartered by Joint Venture Companies. Such travel can be approved if AGAA is satisfied that a risk assessment appropriate to the exposure, the aircraft operator, and the aircraft type, has been conducted by the Joint Venture Company.

### 3.24 ASSESSMENTS

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Air charter providers shall undergo a risk assessment on a regular basis by an approved aviation advisor.

Recommendations and findings of the assessment must be provided to the company in writing.

Facilities and aerodromes managed by AGAA will also be subject to operational audit and corrective action will be instigated as is appropriate.

The periodicity of assessments will depend upon the frequency of use and the results of the previous assessments.

Charter flights arranged on an ad-hoc basis shall be subject to operational and technical risk assessment as is appropriate, depending on the exposure and the availability of suitable providers.

Categorisation of risk assessment is provided in *Appendix C* of this standard.

### **REFERENCES**

- *IMS-STD-011 - Non-conformance Management*

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**Standard 13 - Aviation**

**APPENDIX A - COMMAND EXPERIENCE REQUIREMENTS**

	AEROPLANE				HELICOPTERS		
	> 5700 Kg MTOW & all (Turbo-Jet)	< 5700 Kg MTOW (Turbo-Prop)	< 5700 Kg MTOW (Piston Eng)	Single Engine (Piston Eng)	> 5700 Kg MTOW (Multi Eng)	< 5700 Kg MTOW (Multi Eng)	Single Engine
<b>Pilot</b>							
Licences	ATPL	ATPL	CPL	CPL	ATPL (H)	ATPL (H)	CPL (H)
Type rating/contract type	Current	Current	Current	Rating for class	Current	Current	Rating for class
Current IR contract a/c	<b>(1)</b> Command	Command	Command	Command	Command	Command	(2)
CIR renewals - minimum	3 Renewals	3 Renewals	3 Renewals	2 Renewals	3 Renewals	3 Renewals	(2)
<i>Experience not less than</i>							
Total hours	3,000	2,500	2,000	1,500	3,000	2,500	1,500
Total hours command	<b>(3)</b> 2,500	1,500	1,500	1,000	2,500	1,500	1,500
Total hours multi-engine >5700 kg	1,500				1,500		
Total command - multi engine	<b>(3)</b> 500	500	500		500	500	
Total hours command - gas turbine or jet aircraft	<b>(3)</b> 500	300			500	300	500
Hours command contract type	100	100	100	100	100	100	100

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**APPENDIX B - COPILOT EXPERIENCE REQUIREMENTS**

	AEROPLANE				HELICOPTERS		
	> 5700 Kg MTOW & all (Turbo-Jet)	< 5700 Kg MTOW (Turbo-Prop)	< 5700 Kg MTOW (Piston Eng)	Single Engine (Piston Eng)	> 5700 Kg MTOW (Multi Eng)	< 5700 Kg MTOW (Multi Eng)	Single Engine
<b>Co-Pilot</b>							
Licences	CPL	CPL	CPL		CPL (H)	CPL (H)	(4)
Current IR contract a/c	(1) Co-pilot (5)	Command	Command (2)		Co-pilot	Co-Pilot	
Type rating contract a/c	Current	Current	Current				
<i>Experience not less than</i>							
Total hours	500	250	250		500	250	
Total gas turbine aircraft	(3) 250	50			250	50	
Total command multi	(3)						
Total command hours	(3)						
Total contract type	(3) 10	10	10		10	10	

Notes: (MTOW refers to the aircraft maximum take off weight.)

(Pilots are to have flown as a crewmember at least 50 hours in the last 90 days, with at least 10 hours on the specific aircraft type)

- Instrument ratings are required to be tested at periods not exceeding 13 months. Periodic proficiency checks should be conducted at 6 monthly intervals
- Requirement for Instrument Rating depends on role or task. However, in all cases, proven and current instrument competence is required
- These hours to be fully on either aeroplanes or helicopters as appropriate. Up to 10% may be achieved in a flight simulator approved for the purpose by the regulatory authority
- It is unlikely that a Co- pilot will be required.

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## Standard 13 - Aviation

### APPENDIX C - CATEGORISATION OF RISK ASSESSMENTS FOR ANGLOGOLD ASHANTI

A competent aviation consultant shall carry out an extensive aviation audit on the company utilising the following details to evaluate the carrier.

#### CATEGORY A

Operators used frequently (usually the prime contractor for the region or area).

#### Audit Tasks:

1. An entry meeting to be conducted at the operator's facility (GM or CEO, Chief Pilot, Engineering Manager & Quality Safety Manager)
2. Inspections and surveys conducted:
  - Aviation Risk Assessment
  - Controlled Flight into Terrain 'CFIT' Risk Assessment
  - Edkins 'Safety Culture Survey'
  - 'Audit of SMS (Small Companies)'
  - 'Line Safety Audit'
  - 'Reason's Accident Resilience'
3. Flight Check requested
4. Inspection of aircraft, maintenance schedule and program
5. Exit meeting and review of recommendations
6. Preparation of report

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## Standard 13 - Aviation

### CATEGORY B

Operators used **occasionally** (usually the standby contractor for the region or area).

Audit Tasks:

1. Entry meeting (GM or CEO, Chief Pilot, Engineering Manager & Quality Safety Manager)
2. Abbreviated inspections and surveys
3. Flight check - if convenient.
4. Inspection of Aircraft
5. Exit meeting and review of recommendations
6. Preparation of report

### CATEGORY C

Operators used **infrequently** (usually as last resort).

Audit Tasks:

1. Call the company and gain understanding of their safety, performance and reliability. Check validity of Aerospace operator certificate (AOC) and coverage for intended operations.
2. Follow-up with operator on any missing or incomplete items.
3. Check website for accident history.

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***Standard 13 - Aviation***

4. Undertake risk assessment and seek other information from mining companies.

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INTEGRATED MANAGEMENT SYSTEM

***Tropicana Gold Project***  
***Integrated Management System Manual***

***Appendix 4 – Community Standards***

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## *Public Relations & Community Interactions*

### 1. INTENT

To present AngloGold Ashanti Australia (AGAA) and its activities in the best way to the general public.

To build constructive relationships with the communities in which we operate.

### 2. SCOPE

The intent of this standard shall apply to all personnel and contractors involved with any AGAA managed activities within the region.

### 3. PERFORMANCE REQUIREMENTS

#### 3.1 Develop a Public Relations Strategy

All AGAA business units are required to develop a proactive public relations / community management plan relevant to their activities.

This management plan is known as 'IDEAL'

- Identify – our stakeholders
- Design – our approach/strategy
- Engage – with stakeholders and local community
- Address – the concerns and potential opportunities
- Learn – from our relationships and experiences, we learn and modify our approach.

#### 3.2 Strategy Elements

The strategy should contain the following elements:

- Objectives and Targets – clearly-defined aims or objectives
- Stakeholder register – a list of key stakeholder and contact people for the communities located close to the company's activities. This should include, but not be limited to, local indigenous communities, councils, schools, special interest groups and clubs;
- Media Register - a list of applicable local media groups and liaison people. The General Manager Corporate is the main point of contact for any discussion with media groups and should be used to identify the applicable organisations;
- Communication Strategy – the proposed process to be used for communicating with the community and media outlets; and
- Public Relation Strategy – the proposed range and frequency of public relations activities. The activities may include visits by community groups to the our operations, talks to local schools, community groups and clubs, targeted media releases, distribution of fact sheets; and sponsorships and involvement in local arts, sports and community activities.

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## *Public Relations & Community Interactions*

### 3.3 Foster Relations

The business units and region office (note some of this needs to be done on an organisation wide basis – eg the Wongatha community is common to SDGM, Tropicana and other exploration activities) are required to foster constructive, positive relationships with their key stakeholders. These can be achieved by:

- Providing stakeholders with contact information for the business unit and the regional office;
- Delivering requested information accurately and quickly if it is within the scope of the business unit. Otherwise, immediate referral of request to the General Manager - Corporate;
- Keeping stakeholders informed of activities of note or interest;
- Extending invitations to visit other AGAA operations or activities;
- Providing corporate information where appropriate, including annual reports, quarterly reports, HSE reports and relevant press releases;
- Providing information about community activities and initiatives, across the region, and
- Providing stakeholders with the opportunity to voice concerns or other feedback regarding AngloGold Ashanti activities.

### 3.4 Communicate Internally

All business units and the region office are required to communicate this standard internally. All business units should also develop and disseminate a protocol to guide staff wishing to contribute items of note or interest for publication internally or to the community.

### 3.5 Designated spokesperson

The designated spokesperson for the Australia region is the Region Head - Australia and all media queries should be directed to the manager or in his absence to the General Manager Corporate.

For communication with local media on non material and non controversial issues, a spokesperson should be designated for each business unit. This person should inform the Perth Office about the intended media interaction and provide feedback after the interview.

### 3.6 Training

The General Manager Corporate should coordinate training of relevant personnel in the requirements of this standard. (Needs to encompass secretarial staff, personal assistants, senior managers and other individuals who are likely to communicate with and interact with members of the community and external organisations).

## 4. REFERENCES/RELATED DOCUMENTS

- Standards Australia/Standards New Zealand. 1996. Australian/New Zealand Standard AS/NZS ISO 14001: 1996 Environmental Management Systems – Specification with Guidance for Use.

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- Minerals Council of Australia. 2004. Enduring Value – The Australian Minerals Industry Framework for Sustainable Development, Guidance for Implementation.
- Leading Practice Sustainable Development Program in Mining Industry - Community Engagement & Development. [www.industry.gov.au/sdmining](http://www.industry.gov.au/sdmining)
- Com – Pro – 001 Community & Stakeholder Engagement
- Com – Pro – 002 Communication & Consultation Engagement.

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