INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Code Compliance Audit
Gold Mining Operations

Summary Audit Report

Gold Fields
Kloof Gold Mine
Gold Plants 1 & 2
South Africa

29th September – 8th October 2008

Name of Operation:	Kloof Gold Mine
Name of Operation Owner:	Gold Fields Ltd
Name of Operation Operator:	Gold Fields Ltd
Name of Responsible Manager:	Gold Plant No 1 – Jan du Toit (Acting Plant Manager) Gold Plant No 2 –Ruan Vorster (Plant Manager)
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Location detail and description of operation:

Kloof is situated some 70 km west of Johannesburg, near Westonaria in the Gauteng Province of South Africa. The mine is accessed via the N12 highway between Johannesburg and Potchefstroom. Geologically it is located in the West Wits Line Goldfield of the Witwatersrand Basin.

The mine is a large, well-established intermediate to ultra deep level gold mine to 45 level (the lowest working level) some 3,347 metres below surface and consists of five shaft systems and two gold plants.

Kloof No 1 Gold Plant

Gold Fields Kloof No 1 Plant has 200 permanent employees and is subdivided in three main sections: Primary - Secondary Crushing, Milling and Cyanide leaching – Carbon in Pulp and Residue Disposal.

The Plant operates a conventional two stage milling process using rods and pebbles mills in open circuit with a double stage cyclonage (open circuit rod mill and a closed circuit pebble milling and cyclones). The section is divided in two units made up of a primary rod mill and two secondary pebble mills. The secondary cyclone overflows from milling section (68 - 72% passing 75 microns) passes over a belt filter to remove woodchips, and other foreign material and joins the thickener. The thickener underflow is then pumped to the leaching section with a pulp density and flow rate monitored at the Control room.

Gold is dissolved over 30 hours by a conventional cyanide leaching section using air agitation in 10 conical bottomed tanks. The pH of the slurry is raised to pH 10.8 - 11 using a lime product that emanate from the acetylene manufacturing process, at the thickener to ensure that when cyanide is added, toxic hydrogen cyanide gas is not generated and the cyanide is kept in solution to dissolve the gold. Two stage cyanide addition is employed in the head brown and middle brown leaching tanks.

The leaching of gold in aerated cyanide solutions can be represented by ELSNER reaction:

$$4Au+8CN^-+O_2+2H_2O \rightarrow 4Au(CN)_2^-+4OH^-$$

After leaching, the slurry with most of gold in solution is sent to the Carbon-in-Pulp adsorption section, which consists of eight carousel pump cells in series with a carbon inventory of about 32 tons, each cell having a carbon concentration of about 40g/l.

The gold content in the loaded carbon depends on the pumping cycle and is transported to Kloof No.2 gold plant for elution and stripping purposes, nevertheless, the carbon loading averages 10000 g/t of gold and a level of calcium that should not be more than 1.2%. The overall gold recovery of the plant is closer to 98%.

Kloof No 2 Gold Plant

Gold Fields Kloof No 2 Plant has 126 permanent employees and consists of the following unit operations: Primary Crushing, Milling, Thickening, Cyanide Leaching, Carbon in Pulp Adsorption, Carbon Treatment and Residue Disposal.

Underground Ore hoisted through the No.7 Shaft barrel is transported through a crusher section to reduce the Plant feed to smaller than 150 mm. This material is then transported on surface conveyor belts to a surge facility before it will be transported to the Mills. The primary function of this facility is to smooth the feed to the Mills and ensure planned Mill stops do not influence Shaft hoisting capacity.

The ore is then transported to two SAG Mills for further reduction in particle size from 150 mm to 80% passing 75μm. This is done to ensure the metal is sufficiently liberated for cyanide dissolution and to increase surface area of the ore for effective dissolution.

Steel balls are added to the Mills to assist in the grinding process at a rate determined by throughput and size requirements as measured on a continuous basis.

Thickeners are utilized between the Mill circuit and the leach circuit to reduce the volume of the mill product for effective reagent utilization and to act as a surge facility between the circuits. The thickeners also play an important role in effective water reticulation in the processing facility.

The Leach circuit comprise of a number of tanks in series to, depending on the volumetric flow rate of pulp, provides a fixed residence or contact time between the pulp stream and reagents for effective gold dissolution. Cyanide and Lime are added to the pulp stream in the leach circuit that dissolve the gold and transfer 97.5 % of the “solid” gold into the aqueous state.

The tail of the leach stream reports to the Carbon in Pulp section for the final extraction and gold concentration step. The carbon in pulp section comprise of eight tanks in series equipped with screens to retain the carbon in the tank. Pulp gravitates through the circuit whilst carbon is pumped in a counter current fashion. The granular activated carbon absorbs the gold and concentrates the gold on carbon.

The loaded carbon is removed from the tanks and separated from the pulp using screens with spray water to wash the carbon. The washed loaded carbon is then transferred to the Elution columns for further processing.

In the Elution column the gold is removed from the carbon via a hot caustic soda wash to yield the carbon ready for re use and to transfer all the gold into an electrolyte to be used for the electro-winning process. During electro-winning an electric current is passed through the solution that forces the gold and other base metals present in the solution to plate onto stainless steel mesh. The mesh is cleaned with high-pressure water to recover the gold sludge concentrate to be smelted. The concentrate is dried and then smelted in an electric induction furnaces to produce gold bullion at a purity of around 93% fine gold per bullion bar. The barren pulp stream from the carbon in pulp section is pumped to the slimes dam disposal facility.

Auditor's Finding

This operation is

☐ in full compliance

X in substantial compliance *(see below)

☐ not in compliance

with the International Cyanide Management Code.

* The Corrective Action Plan to bring an operation in substantial compliance into full compliance must be enclosed with this Summary Audit Report. The plan must be fully implemented within one year of the date of this audit.

Audit Company: Eagle Environmental

Audit Team Leader: Arend Hoogervorst

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Names and Signatures of Other Auditors:

Name : Dawid M. L Viljoen Signature _____ Date: 22/07/2009

Dates of Audit: 29th September – 8th October 2008

I attest that I meet the criteria for knowledge, experience and conflict of interest for Code Verification Audit Team Leader, established by the International Cyanide Management Institute and that all members of the audit team meet the applicable criteria established by the International Cyanide Management Institute for Code Verification Auditors.

I attest that this Summary Audit Report accurately describes the findings of the verification audit. I further attest that the verification audit was conducted in a professional manner in accordance with the International Cyanide Management Code Verification Protocol for Gold Mine Operations and using standard and accepted practices for health, safety and environmental audits.

Kloof Gold Mine

Facility | Signature of Lead Auditor | Date 24/7/09

Certified/notarized:-

LYNETTE HEATHER LAUDERDALE
Conveyancing Paralegal
Ewing Mckeown Inc.
(Formerly Ewing Adams & Associates)
Commissioner of Oaths RSA
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REF: 9/1/8/2 Pinetown, 18/11/2004

Auditor's Findings

1. PRODUCTION: Encourage responsible cyanide manufacturing by purchasing from manufacturers who operate in a safe and environmentally protective manner.

Standard of Practice1.1: Purchase cyanide from manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 1.1**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The plants' cyanide manufacturer and supplier, Sasol, is an ICMI Code Signatory and has achieved full compliance in a verification audit against the ICMI Cyanide Code. Sasol only supplies liquid cyanide, delivered by bulk tanker, to the mine.

The supply contract stipulates that the supplier must be a signatory to the ICMI and must be ICMI Code compliant.

2. TRANSPORTATION: Protect communities and the environment during cyanide transport.

Standard of Practice 2.1: Establish clear lines of responsibility for safety, security, release prevention, training and emergency response in written agreements with producers, distributors and transporters.

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 2.1**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
Liquid cyanide in bulk tankers is transported to the mine by Sasol Infrachem SILog, a subsidiary of Sasol. Sasol Infrachem SILog is a signatory to the ICMI Code and was certified as a transporter on March 8th 2007.
The contract stipulates in detail, the responsibilities and requirements for packaging and labeling, safety, security, unloading, emergency response (spills prevention and clean-up), route planning and risk assessments, community liaison, emergency response resource access and availability, training, and communication

Standard of Practice 2.2: Require that cyanide transporters implement appropriate emergency response plans and capabilities and employ adequate measures for cyanide management.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 2.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The contract requires that appropriate emergency response plans are put in place and that training to deal with identified cyanide emergencies is undertaken. Control measures are appropriate to deal with the transportation, handling, delivery, and off loading of liquid cyanide. The bulk liquid cyanide tanker travels by road from the Sasol factory at Sasolburg to the mine and does not cross any national or international boundaries.

3. HANDLING AND STORAGE: Protect workers and the environment during cyanide handling and storage.

Standard of Practice 3.1: Design and construct unloading, storage and mixing facilities consistent with sound, accepted engineering practices, quality control/quality assurance procedures, spill prevention and spill containment measures.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 3.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Detailed, professionally designed, drawings for storage area were sighted which clearly indicated the structures for both plants were designed for cyanide and located on concrete

and away from people and surface waters. The unloading areas for both plants are designed to drain any tanker leakages during unloading back into the cyanide bund area. Formal Sasol (producer) Facilities Inspection Reports were sighted for both plants. Inspections by a professional engineer further declared both plants "fit for purpose". Secondary containments built from concrete provide a competent barrier to leakages and provide adequate and appropriate containment. Cyanide tanks in both plants are equipped with level indicators and interlocks (to prevent overfilling), and are also linked to the control room. Cyanide areas in both plants are fenced and security controlled with adequate controls and separation to prevent mixing with incompatible materials.

Standard of Practice 3.2: Operate unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 3.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Only liquid cyanide is used, delivered in bulk tankers and thus there is no packaging or containers to be dealt with. Procedures are in place in both plants to cover all liquid spill responses. All procedures include step by step task and hazard identification, including PPE requirements, and appropriate actions for normal, abnormal and emergency occurrences. The off-loading procedures for both plants are thorough and detailed and includes sequenced offloading detail for pipes, valves and tanks. The "buddy" system forms an integral part of all cyanide procedures. Inspection checklists were sighted and interviews conducted which confirmed cyanide awareness and competency. Regular documented inspections are undertaken by shift staff and these are supported by regular legal inspections by safety officers and management. All reagent cyanide facilities are covered in the preventative maintenance system (PRAGMA computerised system), with defined maintenance frequencies for both plants.

4. OPERATIONS: Manage cyanide process solutions and waste streams to protect human health and the environment.

Standard of Practice 4.1: Implement management and operating systems designed to protect human health and the environment utilizing contingency planning and inspection and preventive maintenance procedures.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 4.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The plants have a comprehensive range of operational, engineering and environmental procedures, including key design assumptions and operating parameters, for normal, abnormal and emergency conditions. These procedures were extensively sampled, reviewed and found to be effective. The TSF operating manual (developed from the original design documentation and parameters for the facility), associated water management procedures, contractor operational procedures and appropriate supporting technical information were sighted, reviewed and found to be appropriate. The TSF is shared between the two plants. Daily, monthly and quarterly inspections of the TSF facilities are undertaken to ensure integrity and safety. A change management procedure is in place and functioning. Preventative maintenance and inspection is controlled by an electronic system called "PRAGMA". Key pumps, tanks, bunded areas and equipment were checked on the system and found to be systematically maintained through visual and mechanical checks, thickness tests and historical reviews. Diesel pumps and alternative power sources are available in the event of power failures to prevent unintentional releases. Routine daily and monthly operational and engineering inspection reports, legal inspections, and checklists were sampled and employees interviewed to check the effectiveness of systems and ensure that ensure proactive and reactive management. Specifically, inspections covered tank integrity and signs of leakage and corrosion, integrity of secondary containment, ponds, phreatic levels and freeboard on the TSF.

Standard of Practice 4.2: Introduce management and operating systems to minimize cyanide use, thereby limiting concentrations of cyanide in mill tailings.

X in full compliance with

The operation is

□ in substantial compliance **with Standard of Practice 4.2**

□ not in compliance with

□ not subject to

Basis for this Finding/Deficiencies Identified:

Kloof 1

Mineralogy of the ore processed is relatively stable and therefore the basic test work, including bottle roll tests and external laboratory diagnostic leach tests, established the original cyanide and pH set points. Subsequently, trials using two stage cyanide addition were conducted successfully and implemented which led to the reduction of Cyanide CIP residues from 90ppm to 30 ppm between July 2007 and September 2008. The use of a TAC 1000 electronic system is the primary cyanide additional control mechanism at Kloof 1. A WAD 1000 in line monitoring system is used in the tails and the two systems, in the process and at the tails, before going to the TSF, are the primary WAD cyanide control mechanisms, used in conjunction with manual sampling and free cyanide titrations.

Kloof 2

Similarly, mineralogy of the ore processed is relatively stable and therefore the basic test work, including bottle roll tests and external laboratory diagnostic leach tests, established the original cyanide and pH set points. Kloof 2 also uses the TAC 100 and WAD 1000 electronic systems for cyanide monitoring and control. Two stage cyanide addition has also been implemented and has led to lower cyanide consumption. Copper in the ore is monitored daily and tests have been conducted on the effect of oxygen on WAD cyanide reduction. Cyanide optimisation programmes have succeeded in reducing WAD cyanide levels from 53ppm in July 2007 to 19 ppm at the time of the audit.

Standard of Practice 4.3: Implement a comprehensive water management program to protect against unintentional releases.

☐ in full compliance with

The operation is X in substantial compliance with Standard of Practice 4.3

☐ not in compliance with

Basis for this Finding/Deficiencies Identified:

Kloof 1 and Kloof 2

A Plant and TSF probabilistic water balance using the Goldsim computerised model has been developed for both Kloof 1 and 2 which includes consideration of rainfall, design storm events and solution deposition, solution losses and evaporation, up-gradient run on and infiltration. The model has been used by the plants to optimise water management using simulations covering managing water, spillage and return dam emergency storage. The model is linked to a site wide REMIS (Resource Monitoring and Information System) electronic database system which consolidates all environmental data (including daily precipitation measurement) and makes it readily available for all mine requirements. Both plants undertake daily solution and spillage dam level measurements and procedures are in place to cover normal, abnormal and emergency circumstances.

Kloof 1

Whilst Kloof 2 was found to be compliant, simulations on Kloof 1 showed that containment to prevent overtopping of the TSF return water dams was insufficient owing to silting of the return water dams and insufficient water pumping capacity. Work is underway to de-silt the return water dam and increase the water pumping capacity and size of the return water pipeline. (Although not complete, the progress in cleaning the dams has created sufficient capacity to contain abnormal events.)This has been included in a Corrective Action Plan. The contents of the risk assessments, plans and associated controls has provided the auditors with sufficient assurance that there are no immediate and substantial or increased risks to health, safety and the environment during the implementation of the Corrective Action Plan.

Standard of Practice 4.4: Implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 4.4**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:

Both plants have a control strategy to manage WAD cyanide at the plant residues to a maximum of 35 ppm WAD cyanide, before it goes out to the TSF. This is achievable as both plants have on-line WAD 1000 analysers which report via SMS to Management at a trigger level of 40ppm WAD cyanide and procedures are in place to stop the plant should levels reach 50ppm WAD cyanide. WAD cyanide control has stabilised since the use of the on-line WAD cyanide analysers on both plants and no cyanide related bird mortalities have been reported since code signing. A Baseline Wildlife study and observations have been undertaken and are recorded and accessible in the REMIS environmental database.

Standard of Practice 4.5: Implement measures to protect fish and wildlife from direct and indirect discharges of cyanide process solutions to surface water.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 4.5**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The plants have no direct or indirect discharge to surface water. Samples are taken and analysed for WAD cyanide from the Leeuwspruit and the Loopspruit ("spruit" is "stream") which show cyanide levels at, or below, the limits of detection. There are procedures in place to manage spills and releases to prevent discharge to surface water.

Standard of Practice 4.6: Implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of ground water.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.6**

□ not in compliance with

Basis for this Finding/Deficiencies Identified
The dams are equipped with under drains and catchment paddocks to contain any runoff from the dams and reduce seepage. Kloof 1 plant also has French drains in place to collect localised seepage and has further planted Eucalyptus trees to absorb any additional seepage. No jurisdictional beneficial users of groundwater have been identified. However, the mine has conducted a detailed land use survey to identify users and the deemed use for ground water is drinking water for animals and humans. A full borehole monitoring program is in place and cyanide levels have been shown to be at or below levels of detection. The mine makes no use of backfill. Studies have found no evidence of seepage causing cyanide concentrations in groundwater to exceed that necessary to protect its beneficial use.

Practice 4.7: Provide spill prevention or containment measures for process tanks and pipelines.

□ in full compliance with

The operation is **X in substantial compliance with Standard of Practice 4.7**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Following Professional Engineer's inspections, Kloof 1 had identified bund areas that required repair, additional bund capacity to meet Code requirements and a short section of reagent strength pipeline that required secondary containment. Work had already commenced on these various upgrades and repairs and completion has been made the subject of a Corrective Action Plan. Minor cracking was identified in the residue tank bund area of Kloof 2 and this will be repaired in terms of a Corrective Action Plan. The

contents of the risk assessments, plans and associated controls has provided the auditors with sufficient assurance that there are no immediate and substantial or increased risks to health, safety and the environment during the implementation of the Corrective Action Plan.
The site's design includes bunding and containment for all cyanide tankage and piping. Cyanide tanks and pipelines are manufactured from materials compatible with cyanide and high pH conditions. TSF pipelines are inspected daily and are part of the PRAGMA PMS system. Spill prevention is primarily managed through the use of procedures, preventative maintenance and training. Solutions and liquids in secondary containment are pumped back into the circuit and all secondary containment areas are maintained empty. Effective procedures were also sighted which manage cyanide spillages, leaks, decontamination and transferring spillage from cyanide sumps. Procedures were sighted covering pond inspections, solution water management, and stormwater management.

Standard of Practice 4.8: Implement quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.

□ in full compliance with

The operation is X in substantial compliance with Standard of Practice 4.8

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
There have been no new developments on the plants since signing to the ICMI Code. Inspections by a professional mechanical and civil engineer on both plants required repairs on some structures and some civil work at the residue tank bund, CIP tank bund and leach bund area. The repairs form part of a Corrective Action Plan for both Kloof 1 and Kloof 2 plants. The contents of the risk assessments, plans and associated controls has provided the auditors with sufficient assurance that the identified SHE risks under normal, abnormal and emergency conditions can be managed using existing plans and procedures.
A PRAGMA PMS system is in place which guides daily, weekly and monthly operational inspections covering all the operations involving cyanide equipment. The quarterly inspections and annual audit (including the stability review) for the TSF were sighted and reflected appropriate on-going engineering controls and checks on construction, stability and safety.

Standard of Practice 4.9: Implement monitoring programs to evaluate the effects of cyanide use on wildlife, surface and ground water quality.

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 4.9**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
A monitoring program is in place to sample both surface and groundwater for cyanide. An electronic map on the REMIS environmental database was sighted which showed the locations of all sampling points up and downstream of the plants. Monitoring, sample preservation and custody and chain of custody procedures were developed by competent persons as per MINTEK (South African Quasi-governmental organisation providing accredited laboratory testing and consulting services on cyanide and cyanide speciation) procedures. Monitoring and inspections (including checks for bird mortalities and bird species on the TSFs) are guided by appropriate procedures and guidelines. The plants' water quality sampling regime was sighted which indicated sample sites, samples types to be taken, and frequency. Frequencies range from daily to weekly, biweekly and quarterly. Detail on sample points was reviewed and found adequate for sample point circumstances. The mine's Environmental Department investigates all wildlife mortalities and injuries which are formally reported as environmental incidents in the site EMS.

5. DECOMMISSIONING: Protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities

Standard of Practice 5.1: Plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife and livestock.

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 5.1**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
Specific procedures and closure plans for both plants are in place to ensure that planning adequately covers cyanide decommissioning and closure. An implementation schedule forms a part of the procedure. Cyanide decommissioning is reviewed annually as a part of the mine-wide closure plan.

Standard of Practice 5.2: Establish an assurance mechanism capable of fully funding cyanide related decommissioning activities.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 5.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Department of Minerals & Energy approved Gold Fields Environmental Trust Fund is in place to fund mine closure costs, including third party cyanide decommissioning. The costs are reviewed annually and the latest (2008) financial documentation relating to this was sighted.

6. WORKER SAFETY: Protect workers' health and safety from exposure to cyanide.

Standard of Practice 6.1: Identify potential cyanide exposure scenarios and take measures as necessary to eliminate, reduce or control them.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 6.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
There is a full and detailed set of operational and engineering procedures in place and functional which covers the minimising of worker exposure to cyanide during all cyanide-related tasks for both plants. These include unloading, mixing, plant operations, permits to work, decontamination of equipment and the buddy system. PPE matrices prescribe the appropriate protection for different tasks. Site procedures were extensively checked through examination and interview and records relating to risk assessments checked for worker input and involvement. Change management is covered procedurally on site and examples of exercises were sighted. Appropriate PPE and pre-work inspections are specified in procedures for all cyanide-related tasks. Checks and balances are in place through worker involvement in risk assessments, employment and use of full-time Health & Safety Representatives, through consultations in monthly Health & Safety Committee meetings, discussions in tool box talks and during weekly Workplace Safety Representatives meetings.

Standard of Practice 6.2: Operate and monitor cyanide facilities to protect worker health and safety and periodically evaluate the effectiveness of health and safety measures.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 6.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
pH control is regulated through lime addition to the thickeners. On Kloof 1, pH is measured in Leach tank 1 and 5 using the TAC 1000 and in the final residue using the WAD 1000. There are alarms on the SCADA which trigger at 10 – 10.2. In Kloof 2, the pH set point is 10.5, with pH being measured in leach tank 2, and a separate lime feed to Leach tank1 controlling at pH 11.0. Interlocks are in place with the cyanide dosing pumps which stop the pumps at pH 10 and alarm in the control room SCADA. There is an interlock of pH with cyanide dosing pumps at pH 10 with alarming to the control room. On both plants, there are cyanide warning signs and PPE requirements at appropriate positions, "hot spots" have been identified and clearly demarcated and procedures indicate PPE required, and personal monitoring that needs to be carried out and precautions that must be observed. Both plants make use of both fixed and portable Cyanide monitors which are calibrated and maintained according to procedures using manufacturers recommendations. On-going inspections and checks are also used to monitor and check facilities and emergency response equipment functioning. Safety equipment such as safety showers, low pressure eye wash stations, and fire extinguishers are numerous and adequately signposted. A site wide pipe colour coding system is in operation which includes cyanide pipe colour coding and directional flow signage. MSDSs were found to be in place and in English, the working language of the workforce. Formal employee interviews were used to check awareness and sensitivity to health and safety measures and the response from employees and contractors alike, was found to be appropriate and acceptable. Accident and incident reporting and investigation procedures were found to be in place and effective.

Standard of Practice 6.3: Develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 6.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Both plants have cyanide first aid rooms with Emergency first aid equipment, antidotes, medical oxygen and BA sets. Emergency Response Teams are in place on every shift

and have training in cyanide first aid, use of breathing apparatus and confined space rescue. Advanced life support paramedics with cyanide training are available within 8 -10 minutes response time of the mine site. Exposed workers are transported to the Leslie Williams captive mine hospital 35 kms away which is equipped to handle cyanide cases. Equipment is regularly checked and tested and mock drills are held on site and in conjunction with the hospital, to check response, readiness and organizational preparedness. Interviews confirmed employee knowledge of cyanide hazards, and emergency response.

7. EMERGENCY RESPONSE Protect communities and the environment through the development of emergency response strategies and capabilities.

Standard of Practice 7.1: Prepare detailed emergency response plans for potential cyanide releases.

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 7.1**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The plants used risk assessments to develop site-specific emergency scenarios and responses for its emergency response plan. Their emergency preparedness plans combines existing procedural responses and emergency provisions to deal with the various scenarios and includes and identifies the emergency response team and coordinators who are on all shifts. These preparations are regularly reviewed in the light of changes, mock drill learning points and employee feedback. The Plans also link to procedures and resources in other mine systems (e.g. ISO 14001 and OSHAS 18001), should they be required. TSF staff are also included in the provisions of the emergency response plan and drill with the plants. Producer and transporter, Sasol, have their own emergency plans which the plants have access to. The Plans include reference to cyanide antidotes and first aid, clearing of site personnel, control of releases and containment.

Standard of Practice 7.2: Involve site personnel and stakeholders in the planning process.

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 7.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Health and Safety Committee and weekly plant safety meetings are used to communicate developments and changes in all cyanide activities, including emergency response. Representatives of the workforce (employees, Health & Safety Representatives (full-time and part-time) and Union representatives) were involved in the risk assessment to develop the emergency scenarios and response in the emergency response plan and procedures. Full cycle drills are used to involve hospital staff and paramedics in planning processes. Joint presentations by Sasol and the plant personnel were given to local authorities, emergency personnel, and Unions. Sasol and the Plants have established a joint stakeholder forum to inform and negotiate with stakeholders on cyanide and emergency issues.

Standard of Practice 7.3: Designate appropriate personnel and commit necessary equipment and resources for emergency response.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 7.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Emergency Preparedness Plan details clear duties, roles and responsibilities for the various emergency scenarios and the high level incident commander and his alternate (Metallurgical Manager and Plant Manager) have full authority to commit necessary resources. Emergency equipment lists were checked and site inspections confirmed availability and readiness. The Plan includes contact references (telephone, cell phone, etc) of internal and external resources for the various scenarios, particularly with detail where external resources and skills might be needed. Emergency Team members were checked and training records and assessments showed the individuals to be well prepared and well equipped for cyanide emergencies. Periodic full scale drills involving internal and external stakeholders ensure that roles and responsibilities are understood and clearly implemented.

Standard of Practice 7.4: Develop procedures for internal and external emergency notification and reporting.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 7.4**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Emergency Preparedness Plan includes full details for appropriate emergency notification and reporting and the call-out procedure and contact information lists which are updated regularly. Media communication is done via the formal corporate communications protocol and the Kloof Crisis Management procedure.

Standard of Practice 7.5: Incorporate into response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 7.5**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Plants' Emergency Preparedness Plans cross-references to detailed and specialised procedures which cover clean-up and remediation relating to releases, pipeline failures and spills, as appropriate to the site-specific identified scenarios. Use of neutralization processes and materials is clearly covered, as is disposal of contaminated materials and the use of treatment chemicals such as ferrous sulphate in surface water is prohibited. Sampling procedures also cover remediation issues. In the event of contamination of water supplies, the mine will provide water to farmers. There are also cross references to the centralized environmental procedures which form part of the Environmental Management System. In the event of a spill, a water quality analyses program will be set up, based upon the existing framework and modified according to site and event specific requirements.

Standard of Practice 7.6: Periodically evaluate response procedures and capabilities and revise them as needed.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 7.6**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Plans are required to be reviewed following incidents and emergency drills, or when the Plans are invoked. Various mock drills include day and night man-down drill documentation was sighted. Evidence was sighted of learning points emerging from the various cyanide drills. Lessons learned are recorded and remedial action taken where necessary. Full cycle drills are undertaken rotationally between Kloof 1 and 2 and with other Gold Fields mines in the area such as South Deep and Driefontein.

8. TRAINING: Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner.

Standard of Practice 8.1: Train workers to understand the hazards associated with cyanide use.

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 8.1**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
All plant, hospital, EMS (Emergency Medical Services), TSF and Asset Protection staff receive cyanide awareness training and cyanide first aid training.. Written competency tests are taken, requiring a 100% pass mark. Plant cyanide training programs were reviewed and checked. Randomly selected employees from both plants were checked in interviews on their understanding of cyanide hazards, first aid and emergency response and this was verified through the checking of their training records. Refresher training for employees is conducted annually. E-learning records are kept on site for two years and then archived for 50 years.

Standard of Practice 8.2: Train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 8.2**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
The site's Training Matrix (Occupational Task Inventory) details training requirements for all cyanide workers in the plant. New employees are trained and passed out before being allowed to work in the Plant. Standard Operating Procedures and risk assessments are used as the training source material. The two plants share a training centre and a Plant Instructor who is responsible for all cyanide training. The Trainer assesses employees after training and also carries out on-the-job observations and Planned Task Observations (PTOs) to test training effectiveness and application. PTOs are conducted according to task criticality. Full records are kept of training and induction training for 50 years.

Standard of Practice 8.3: *Train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.*

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 8.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
All employees receive cyanide training which includes man-down response, and protecting themselves. A separate emergency response team will deal with incidents and workers are trained to barricade and raise the alarm and use of appropriate PPE. Advanced training is given to the emergency response teams. Periodic mock drills involving on and off sight responders are undertaken and training personnel attend these drills and formally evaluate response and performance. Training records were checked to confirm attendance and successful completion. Refresher training is scheduled annually.

9. DIALOGUE: Engage in public consultation and disclosure.

Standard of Practice 9.1: Provide stakeholders the opportunity to communicate issues of concern.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 9.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The AA1000 Stakeholder Engagement Standard was used to identify stakeholders specific to Kloof 1 and 2. The sustainable development superintendent, cyanide coordinator and the environmental manager identified stakeholders based upon risk

assessments. Stakeholders included the Westonaria municipality, Emergency Medical Services, local police, Dept of Education, cattle grazers, youth representatives, Contractors running the TSF, Fochville municipality, and 7# shaft married quarters. A community complaints book was established and individual and group meetings were held to give the opportunity to raise issues. More recently, the mines, Sasol and the local authorities established a stakeholder forum to discuss mine issues, including cyanide.

Standard of Practice 9.2: Initiate dialogue describing cyanide management procedures and responsively address identified concerns.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 9.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The stakeholder interaction initiative was developed as a two way exercise and thus stakeholder communication of concerns and the provision of cyanide information was done within the same dialogue exercise. Thus the evidence in 9.1 above also applies here.
The AA1000 Stakeholder Engagement Standard was used to identify stakeholders specific to Kloof 1 and 2. The sustainable development superintendent, cyanide coordinator and the environmental manager identified stakeholders based upon risk assessments. Stakeholders included the Westonaria municipality, Emergency Medical Services, local police, Dept of Education, cattle grazers, youth representatives, Contractors running the TSF, Fochville municipality, and 7# shaft married quarters. A community complaints book was established and individual and group meetings were held to give the opportunity to raise issues. More recently, the mines, Sasol and the local authorities established a stakeholder forum to discuss mine issues, including cyanide.

Standard of Practice 9.3: Make appropriate operational and environmental information regarding cyanide available to stakeholders.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 9.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:

Incident information is provided to government officials according to legal reporting requirements. The Procedure for emergency response classifies incidents from levels 1 - 3. Level 1: Emergency involving no injuries and / or has not resulted and does not pose an imminent threat of significant environmental damage. Level 2: Emergency which involves minor injuries requires appropriate communication externally and poses an imminent threat of environmental damage. Level 3: Emergency involving major injuries or worse and which has resulted in significant environmental damage. Policy requires all level 3 to be reported to central and provincial government and to local government structures (which is relayed to local communities) from level 2. A Procedure for external environmental communication in place.

Environmental: All level 3 and above is reported to Department of Water Affairs and Forestry. Weekly all incidents are reported to Corporate Head Office with detailed descriptions of all level 2 and above. Quarterly reporting on incidents is made to the Rietspruit water management forum (a public water user's forum). Environmental statistics are reported in the Corporate annual report with level 3 incidents and above including a description. Safety and Health: SAMRASS (South African Mine Reportable Accidents Statistics System) are reported to the Department of Minerals and Energy which include all lost time injuries and fatalities, serious incidents e.g. TSF failures, gassing incidents, loss of consciousness, All Safety, Health and Environmental statistics are included in annual report which is publicly available. Focus is placed upon verbal communication because of high illiteracy in certain sectors (local language presentations to cattle herders and some miners requested presentations in the mine language, Fanakalo) and a mine employee is dedicated to this communication. Written material (which is also used to brief verbal presentations) has been developed and is widely distributed.