

***INTERNATIONAL CYANIDE
MANAGEMENT INSTITUTE***

***Cyanide Code Compliance Audit
Gold Mining Operations***

Recertification Summary Audit Report

***Gold Fields
South Deep Gold Mine
South Africa***

24th – 28th October 2011



Name of operation: South Deep Gold Mine

Name of Operation Owner: Gold Fields Limited

Name of Operation Operator: South Deep is managed by Gold Fields

Name of Responsible Manager: Mr. Stephen Joseph, Metallurgical Manager

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Location detail and description of operation:

The South Deep Gold Mine is a key asset for Gold Fields and the flagship growth project in South Africa. The South Deep production build up is on track to deliver the required volume to achieve full production by December 2014, in line with Gold Fields long term stated vision, “To be the global leader in sustainable gold mining”.

Gold Fields limited holds a 100% interest in GFI Mining South Africa (Pty) Limited (GFIMSA), which holds a 100% interest in South Deep. The Mine, situated in the Magisterial District of Westonaria 45 kilometres southwest of Johannesburg is an intermediate to deep level gold mine comprising two shaft systems, the older South Shaft complex and the newer complex known as Twin Shafts. Ore is processed at a central metallurgical plant. The primary economic target is the Upper Elsburg Reef package with the Ventersdorp Contact Reef being a secondary economic target. The mining right area totals 4,232 hectares, which includes the area, known as “Uncle Harry’s”.

South Deep has been designated by Gold Fields as a developing mine, and a project to increase the ore mined per month to 330,000 tonnes is currently in progress. This project includes the establishment of a new tailings storage facility which is currently being commissioned, the deepening and equipping of the ventilation shaft at the Twin Shaft complex to hoist waste and reef, as well as to establish the underground infrastructure to access the Mineral Reserves to the south of the current workings. In order to be able to process the increased tonnage the metallurgical plant capacity is being increased to treat

an additional 110,000 tonnes per month. At the tail end of the process a full plant tailings plant is being built at the South Shaft to ensure that the backfill requirements as the underground mining increases can be met. In order to improve confidence in the Mineral Resources, a comprehensive surface drilling project is also underway.

It is planned that South Deep will be able to mine 330,000 tonnes per month by the end of 2014. At this production rate the mine will produce between 750 – 800koz per annum. It is estimated that this profile will be maintained until 2052 with end of life expected to be 2064.

The ore is processed at the South Deep Gold Plant which is currently designed to treat 220 000 tons per month. The plant currently treats a combination of underground reef and waste as well as any potential surface source.

The plant consists of an open plan stockpile feeding a SAG-BALL milling circuit with up to 30% of the plant feed reporting to a Gravity Recoverable Gold (GRG) Knelson concentration Circuit.

Mill circuit cyclone overflow at 80% -75 microns is directed to linear screens to remove tramp material before being thickened in preparation for cyanide leaching. The plant use liquid sodium cyanide and its consumption ranges between 0.3 – 0.35 kg/tonne of ore milled. Leached ore is then pumped to a carousel Carbon-in-pulp unit for adsorption of gold in solution on to activated carbon.

Loaded carbon is acid washed prior to elution in an AARL (Anglo American Research Laboratories) strip circuit. Pregnant eluate solution is electrowon in sludge reactors. The gold bearing sludge is filtered and dried before being smelted in an induction furnace to produce gold bars. Carbon is regenerated and screened prior to recycling to the CIP circuit. The plant recovers approximately 97% of the gold presented. Barren slurry from the CIP circuit is transferred to a Backfill plant for cyclone classification of material prior to transfer to the tailings dam. The classified material (CCT) is sent underground as backfill for the large stopes as well as the destress sections. This cyclone classification method will in future be replaced by the full plant tailings system with possibly the CCT only being used as backfill in the destress sections.

The focus on South Deep Gold Mine is placed on both the development and the mechanised destress mining in order to have in place the correct infrastructure suitable to serve the anticipated tonnage build up in the future.

The capital infrastructure projects currently in progress are on target to ensure that the 2014 deadlines can be met. Without this, and together with the Current Mine reserves being depleted, the mine will not be able to increase its tonnage and therefore gold profile going forward.

Auditor's Finding

This operation is

X in full compliance

in substantial compliance

not in compliance

with the International Cyanide Management Code.


This operation has not experienced compliance problems during the previous three year audit cycle.

Audit Company: Eagle Environmental

Audit Team Leader: Arend Hoogervorst

E-mail: arend@eagleenv.co.za

Names and Signatures of Other Auditors:

Name : Dawid M. L Viljoen Signature  Date: 7/2/2012

Dates of Audit: 24th – 28th October 2011

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.

South Deep Gold Plant

Facility


Signature of Lead Auditor

7/2/2012
Date

South Deep Gold Plant


Signature of Lead Auditor

7th February 2012

Auditor's Findings

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

Standard of Practice 1.1: 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:

There is a Gold Fields cyanide supply contract, covering Gold Fields Gold Plants, including South Deep Gold Plant, in place with Sasol Polymers, as the sole supplier of liquid Sodium Cyanide, delivered by bulk tanker. The contract requires that the producer or supplier of cyanide must be a signatory to the ICMI Code and the producer or supplier must be ICMI certified. Sasol Polymers is a signatory to the Cyanide Code and was re-certified as a fully compliant Production Facility with the ICMI Cyanide Code on 2 March 2010.

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:

There is a signed Memorandum for transportation and offloading of sodium cyanide solution, for Sasol Polymers at Gold Fields sites, in place. The supply contract between Goldfields Shared Services on behalf of all Gold Fields South African Mines and Sasol

Polymers specifically covers the responsibilities and requirements for transport, 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 Gold Fields supply contract requires that the producer/supplier of cyanide must be a signatory to the ICMI Code and the producer supplier and transporter must be ICMI certified. SASOL Infrachem SiLog was re-certified on 13 January 2010 as a fully ICMI Code compliant transporter, thus meeting all the requirements for appropriate emergency response planning and cyanide management. Sasol Polymers changed its transporter from SiLog to Tanker Services and deliveries of cyanide by Tanker Services commenced from July 2011. Tanker Services is an ICMI Signatory and was audited by an accredited ICMI Lead Auditor and Transport Auditor and became a certified ICMI transporter on 13 December 2011. Thus there was a break in deliveries of cyanide to site by an ICMI certified cyanide transporter between July and December 2011 until Tanker Services were certified as transporters. The auditors deem the break to be acceptable for Cyanide Code mine compliance purposes for the following reasons:-

- 1) The change of transporters was beyond the control of the mine,
- 2) There was only one ICMI certified transporter and one ICMI certified liquid cyanide supplier in South Africa and the mines were bound to the producer/transporter conditions,
- 3) Finding a replacement/alternate supplier/transporter in the short term was not feasible because the mine can only handle liquid cyanide on site and does not have the facilities to mix their own cyanide from briquettes,
- 4) The mine applied pressure upon the supplier to organise ICMI certification for the replacement transporter as soon as possible, and
- 5) The interim cyanide risk was minimal because the new transporter took over all of the transporter resources of ICMI transport certified SiLog (dedicated bulk cyanide liquid tankers, trained and experienced owner-drivers and contract drivers, assessed route risk assessments, cyanide documentation and systems) and was, and still is, covered in terms of Sasol's Product Stewardship and Responsible Care policies by the Sasol cyanide emergency response system (24 hour emergency control room, network of cyanide trained, emergency response spill and medical response service providers), dedicated cyanide tanker storage area and cyanide tanker decontamination facilities.

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:

The operation uses only liquid cyanide, delivered by bulk tanker, and no mixing or storage of solid cyanide takes place on site. The offloading and storage facilities were designed and built, in accordance with sound and accepted engineering practices, with materials appropriate for use with cyanide and are located in concrete bunds away from people and surface waters. The cyanide is also stored away from incompatible materials. The Cyanide offloading area is located on a concrete surface sealed with epoxy sealant to prevent seepage. Drainage flows from the offloading area into the main bund area.

To prevent overfilling, the reagent cyanide storage tank level is displayed at the offloading area and the offloading procedure checks that the cyanide tank level is <65%. The tank level interlocks with the offloading air valve and activates at 90% tank level. The air valve will only be available to open at <65%. The SCADA (Supervisory Control and Data Acquisition – computer based process controls) pop-up alarm at the control room displays at the 85% storage tank level. Secondary cyanide storage at the leach is equipped with an ultrasonic level measurement unit, displaying on the SCADA, interlocked with transfer pumps, tripping at 95% level. Secondary storage overflows back to the main cyanide storage tanks. A high level alarm will sound at 90%, tripping at 95%. A cyanide transfer procedure from storage to secondary storage is in place. The procedures covering cyanide unloading and transfer were reviewed and found to be effective. Cyanide areas are within the access controlled plant security area which is securely fenced.

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 and is delivered via bulk tanker to storage tanks and no mixing or storage of solid cyanide takes place on site. The cyanide offloading and transfer procedures are detailed, spelling out PPE requirements, use of a buddy in the process, and clearly sequenced to prevent spillages and accidental releases during off-loading.

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 site has 49 cyanide process and 44 engineering procedures in place, plus 26 general emergency procedures, supported by TSF contractor operating and management procedures and a mandatory Code of Practice covering TSF operation for the old and new TSFs. TSF Operations and maintenance manuals were also reviewed and found to be effective. Routine daily, weekly, monthly and quarterly inspection reports, legal inspections, and checklists for proactive and reactive management were sampled to check the effectiveness of systems. These inspections cover tanks, pipes, pumps, valves, secondary containments, ponds and impoundments located in the plant and the TSFs (old and new) complex. The plant pollution control dam level and all water storage levels are shown on the SCADA and used to manage the water usage. There is a GOLDSIM probabilistic water balance in place, and no scenario has been identified where the need has been highlighted to shut down the plant to prevent overtopping. The plant is designed to contain any spillages in the plant pollution control dam and thus no back up power is required in case of power failures.

A new PRAGMA PM (Planned Maintenance) system was commissioned in Jan 2010. The lists of equipment on the prior PM spreadsheet system were copied into the PRAGMA system. Operational inspections include: Safety Officer inspection working place roster, Safety officer monthly workplace inspection, planned general inspection. Job cards are issued through the PM system on faults recorded during inspections. Tank

thickness testing is done on a planned basis for all high and low strength cyanide tanks. A change management procedure covering health, safety and environment is in place and operational and examples of major and minor change management exercises indicated that the process is used effectively.

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:

The use of pre-oxidation was tested and found to reduce cyanide consumption. Cyanide profiles were monitored over the leach train to determine cyanide consumption over time. Currently, the plant feed is variable and the feed rate is around 90-100% of design throughput. Bottle roll tests are conducted for the various ore feed types to determine extraction efficiencies and cyanide consumption. The results are used to determine cyanide parameters. Reef geology is consistent, but surface material can be variable. MINTEK (A South African quasi-governmental organisation providing accredited laboratory testing and consulting services on cyanide and cyanide speciation tests) were, and will be, conducting tests to characterise surface material. A Gold Fields Group project is in progress with Wits University, which includes leaching and milling optimisation and cyanide optimisation.

Two stage cyanide addition was evaluated to be used together with the TAC1000 and the WAD analyser. A report from South Deep was sighted where split cyanide addition was tested and resulted in a reduction in cyanide consumption. Cyanide primary feed control is done using a TAC 1000 system in tank 1, backed up with secondary control in tank 4 and monitoring free cyanide using a TAC 2000 in tank 3 and 5. A WAD 1000 WAD CN analyser is installed to monitor WAD in the tailings pumped to the backfill and the TSF. Oxygen injection was implemented lowering cyanide consumption. The two stage cyanide control strategy was implemented and manual free cyanide titrations are done as a back up for the on line TAC systems.

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

X in full compliance with

- The operation is**
- in substantial compliance with **Standard of Practice 4.3**

not in compliance with

Basis for this Finding/Deficiencies Identified:

There is a comprehensive, site wide, GoldSim, computerised probabilistic water balance model in place, including all underground water, reservoirs, return water dams, new and old TSF's, the backfill plant and the Gold Plant. The model uses a climate model to generate stochastic probabilities. A catchment module, dam/pond module, Gold Plant and underground modules are included in the probabilistic water balance (PWB). The PWB includes an Operating Rule specifying priorities of water usage to prevent overtopping. The model is run for a minimum of hundred realisations over a hydrological year October to September. Spills and overtopping are continuously assessed using regulation 704 of the South African National Water Act which requires focus on frequency of spill events, rather than design storm events. Rainfall data is collected daily and 61 years of actual data was used in the model. The PWB indicated a risk of overtopping of 1 in 53.3 years, for the 1 000 000m³ Return Water Dam capacity, thus no need for emergency power was identified. Electricity failure of one day was included in the modelling. The result used a 90 mm, 10 year rain event indicating a risk of less than 1 in 1000 to be at maximum capacity. Furthermore, the mine is provided with two separate sources of power from ESKOM and thus it was concluded that no emergency power is required in case of power failure. Phreatic levels are measured and discussed as part of the monthly and quarterly TSF meetings. All water storages are equipped with level indicators and displayed on the SCADA. A comprehensive set of water flow measurement systems are in place to assist with the use of the water model to balance water consumption. Model rules and operating procedures are revised annually based on the actual data and outputs of the PWB.

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:

The WAD compliance point used is at the backfill plant residue tank, using an on-line WAD1000 analyser. In 2009, there were three exceedances of 51, 57 and 57 ppm WAD CN and investigations identified a red sludge material treated as the cause. In 2010, WAD cyanide exceedances were noted for September, November and December, as result of the treatment of environmental clean-up materials, as a special activity resulting in high cyanide consumptions. Reports investigating the exceedances noted the reasons as due to the characteristics of the clean up materials processed. This was a temporary arrangement to fill the mill gap (resulting in the underground / clean-up ore feed blend ratio change) with clean up material containing gold. As a result of the investigations,

procedures were revised. In 2011, exceedances were noticed during March and July and investigations confirming the cause as being the impact of the environmental clean-up material treated during the previous two months. Samples from the return water dams open water sighted for the 3 years values varied between 0.1 and 5.8 mg/l WAD CN. This was as a result of the low pH of less than 4.5 in the return water dams.

The TSF and return water dam WAD was shown to be generally less than 50 ppm WAD CN. Periods where the WAD CN on the TSF exceeded the 50 mg/l occurred and were investigated and identified as being caused by the environmental clean-up material treated temporarily to fill the mill gap and as required by the environmental rehabilitation program. Special measures to protect wildlife included:

1. Risk assessments were conducted to quantify the risks to wildlife and human exposure and these also identified control measures;
2. Special procedures (emergency procedure for Elevated levels in plant residue, and a revised Safe work procedure) were developed;
3. Wildlife mortality inspections were conducted daily with no bird deaths being recorded;
4. TSF Pool levels were kept at a minimum to prevent risk of wildlife access to open water;
5. The treatment of historical clean-up material, causing the high WAD values, was completed; and
6. MINTEK diagnostic tests, including cyanide speciation will be conducted on any new source to characterise the material and put special measures in place to maintain a compliant WAD CN value in the backfill tails pumped to the TSF (includes increased detoxification capacity recently installed).

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:

No direct discharges to surface water from cyanide facilities exist or are licensed. An indirect discharge to the Leeuwspruit (stream) is possible. Seepage has been observed and as a result, a cut off drain/collection system was installed returning seepage to the process. Surface water samples of the Leeuwspruit are taken as a precaution and results from 2009 to Oct 2011 indicate no values exceeded the 0.5mg/l WAD CN. Ground water samples are taken from boreholes and are below limits of detection for the analytical method used: less than 0.5ppm WAD CN.

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 Doornpoort Tailings Dam has an under drainage system and groundwater seepage from below the liner will be monitored for quality to detect any potential leaks from the return water dams. The applicable jurisdiction does not identify any beneficial uses or down gradient compliance points, but mining is deemed as the beneficial use. There are also no jurisdictional numerical standards contained in any relevant legislation. A full study of water users was reviewed and the water use identified is predominantly drinking water and livestock. Bore hole samples for 2009 to 2011 are less than 0.01mg/l WAD CN. The new Doornpoort TSF was commissioned since certification and a baseline groundwater study was conducted and borehole values, since commissioning, are all less than 0.01mg/l WAD CN.

WAD analyser installed on the batched backfill going underground and a high pH binder is added to the batches. Currently Ferrous Sulphate is used to form SAD (Strong Acid Dissociable) CN before sending the batch underground. Sampling is also done underground. Mine process water sampled and analysed for WAD CN and values are less than 0.01 ppm WAD CN. A MINTEK study was conducted and concluded that, based on available results, there was very little risk of HCN gas being present underground. A subsequent Peer Review concluded full support of the conclusions in the MINTEK report. The Mine uses 50 mg/l WAD CN as cut-off values for backfill batch certification before release to underground sections. Underground water samples from 2009 to 2011 indicate all values are less than 0.5 ppm WAD CN (limits of detection).

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:

The cyanide reagent solution strength tanks are situated inside a bunded area and all Leach tanks are placed on ring beams with a 100mm impervious concrete layer. Leach, CIP, elution, and tailings tanks are all placed inside concrete bunds. The Plant is designed

with bunds and sump pumps returning all spillages back to the process. Blocking of the spillage trench below the milling plant is done during the construction phase of the plant extension project. Interim risk measures include the placement of a submersible pump and routing any spillage through existing trenches to the spillage containment dam. A “work in progress” document detailing spillage management, and links between bunds and spillage trenches were sighted. HCL levels were reduced to prevent spillage in the spillage trenches during the construction period.

Reagent strength pipes from storage to the cyanide dosing tank run over concrete surface draining to the leach bund. The reagent strength pipeline from the offloading area runs across soil, but is used only twice per week for 45 min. The pipeline drains into a reagent strength bund and the offloading procedure requires draining of the pipeline following offloading. The pipeline pressure is not higher than the pressure of the offloading air and tanker (175 kPa). Regular thickness tests are conducted to determine maintenance requirements / pipe replacements. All other slurry pipelines are situated above concrete or tarred surfaces, draining into the bunds or into the concrete pollution control dam. A concrete slab is constructed underneath the drain lines from the cyanide offloading area. A risk where the lines cross the Kariegaspruit (stream), flowing to the Leeuwspruit (river) was identified and special spillage prevention measures are in place with the pipes running over the Spruit (stream) being placed inside a concrete crossing. The TSF pipelines are lined with HDPE lining to reduce risk of pipe leaks due to erosion or corrosion. Cyanide tanks and pipelines are manufactured from materials compatible with cyanide and high pH conditions.

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.

X in full compliance with

- The operation is**
- in substantial compliance with **Standard of Practice 4.8**
 - not in compliance with

Basis for this Finding/Deficiencies Identified:

The new TSF Project Manager, verified that a QA/QC program was implemented during the whole project. A Quality Assurance Plan was sighted and Quality Control Plans were sighted for the following subcontracted companies: WBHO (civil earth works, platforms); Delra QCP (Gold Plant pipelines and tanks); Bambanani (peripheral pipe fittings); Isizwe (Platforms); APE pumps (vertical spindle return water pumps); Abeyla (backfill plant pipe fittings and pipe work); D&R (small pipe work); Kemix (agitator and slurry tank); Deltras (welding); Weir Minerals Africa (slurry pumps); Blue Consult (tailings tank); Boshtech (Tailings tank); and Pierre Van Dalen (3rd party inspections all mechanical and piping). QA/QC records were sampled from the various companies involved in the TSF construction. The old dams were decommissioned and the new Doornpoort TSF commissioned in 2011.

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:

Procedures for environmental monitoring (including sample preservation and chain of custody procedures) of surface water and borehole water, developed by competent persons, were sighted and checked. Boreholes are placed and sampled upstream and downstream of the plant. Wildlife inspections are conducted daily. Surface water is sampled weekly, underground water (boreholes) are sampled quarterly as per DWA (Department of Water Affairs) requirements.

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:

The South Deep Gold Mine Interim Closure Plan, 2011, includes a decommissioning section for cyanide-related facilities. There is a broad implementation schedule, supported by a more detailed schedule containing cyanide decommissioning items, in the Plan. The Mine Closure Plan is reviewed every year and the reviewed document of 25 October 2011 was sighted.

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:

Cost estimates for cyanide decommissioning for 2008, 2009 and 2010 were reviewed. The Environmental Trust Fund contribution by South Deep Gold Mine to the Placer Dome - Western Areas Joint Trust (The Trust has not been renamed to reflect the current 100% ownership by Gold Fields) was sighted and included a line item providing for cyanide related decontamination of the gold plant.

There is a jurisdictional requirement is for the establishment of a trust fund to cover the closure costs of the mine. The plant closure costs form part of the estimate. A document, dated 29 June 2011 from Anita Jungbluth, was sighted describing the guarantees put in place to cover shortfalls in all the GFA mining operations (including South Deep) rehabilitation funding.

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:

The site has 49 cyanide process and 44 engineering procedures in place, plus 26 general emergency procedures, supported by TSF contractor operating and management procedures and a mandatory Code of Practice covering TSF operation for the old and new TSFs. TSF Operations and maintenance manuals were also reviewed and found to be effective. Routine daily, weekly, monthly and quarterly inspection reports, legal inspections, and checklists for proactive and reactive management were sampled to check the effectiveness of systems. These inspections cover tanks, pipes, pumps, valves, secondary containments, ponds and impoundments located in the plant and the TSFs (old and new) complex. The plant pollution control dam level and all water storage levels are shown on the SCADA and used to manage the water usage. There is a GOLDSIM probabilistic water balance in place and no scenario has been identified where the need has been highlighted to shut down the plant to prevent overtopping. The plant is designed to contain any spillages in the plant pollution control dam and thus no back up power is required in case of power failures. A change management procedure covering health, safety and environment is in place and operational and examples of major and minor change management exercises indicated that the process is used effectively. The project

management documentation of the new Doornpoort TSF includes EIA, project management requirements and HAZOP'S.

Worker input is considered in Health and Safety meetings, Safety Reps meetings, mock cyanide drills, TSF meetings, and Plant Committee bi-weekly 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:

West Wits ore is treated on the plant where a pH of 10.5 is standard. The original design and optimisation study report specifies pH to be run at 11. Plant pH set point is set at 11.00, controlled in two stages. The Metallurgy Manager gives instructions when pH set points are changed in the PLC by the Instrumentation Technician. Hotspot surveys for the periods between 2009 and 2011 were sampled and reviewed. Plant and outside sections use 25 personal monitors. 11 fixed monitors are located at the Leach (2); cyanide cage (1); CIP feed (3); tailings (1); Smelt house (1); elution column (1); and backfill (2). Plant ERT makes available personal gas monitors to the Gold Fields EMS unit when arriving at the plant. Sighted warning signs where hotspots were identified, and sighted the personal monitor register. The calibration record index and certificates from Gas Monitoring Services for the fixed monitors and plant personal monitors were sampled and reviewed for 2010 and 2011.

On-going inspections and checks are also used to monitor and check facilities and emergency response equipment functioning and checklists covering three years since certification were sampled. Safety equipment such as safety showers, low pressure eye wash stations, and fire extinguishers are numerous and adequately signposted. MSDS and first aid information is available in English.

Slurry pipelines are marked as cyanide containing water. Eating and drinking is only allowed in dedicated areas and this is indicated on signs and trained and reinforced during annual induction of contractors and plant staff. Cyanide pipelines are colour coded, and labelled with appropriate description and directional flow. 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, based upon the site safety reporting requirements, 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.

The operation is in substantial compliance with **Standard of Practice 7.1**
 not in compliance with

Basis for this Finding/Deficiencies Identified:

The operation's Emergency Response Plan is contained in the integrated "South Deep Mine, Gold Plant; Backfill Prep & TSF Emergency Response Plan. The Index (which functions as a "user road map") consists of 12 sections:- .1. Contact details; 2. Call out procedures; 3. First Aid procedures; 4. Community Response; 5. Mine Emergency Response Plan, including Cyanide; 6. Cyanide Release and Spillage; 7. Cyanide and Humans; 8. Other Emergency Procedures, Standards and Safe Work Procedures; 9. Cyanide Transportation; 10. Explosions and Fires; 11. Environmental Procedures; and 12. User Manuals. The emergency response plan is linked to specific emergency situations and the appropriate procedures and responses within the site's systems.

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:

A team from plant and the TSF contractors is involved with the Risk Assessments for the Emergency Response Plan (ERP). The Environmental department and the Gold Fields medical emergency services were also involved. The ERP is also on the agenda for safety meetings for feedback and appropriate discussion. Communities are not directly involved but informed through dialogue sessions. A Land Use Survey, based upon AA1000 template, identified the zone of influence and interviews and questionnaires were completed, establishing contact information and communication needs and concerns. Due to the lack of skills, capacity and the availability of local response agencies and the availability of well equipped mine response teams and hospitals, no local agencies are involved in the ERP. However they are kept informed. Liaison meetings with Sasol Polymers were held Aug 2008 over cyanide incident response and planning.

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 Response Plan details clear duties, roles and responsibilities for the various emergency scenarios. The Plant Manager has the authority to commit the necessary resources and his alternate is the senior metallurgist. The site controller is designated in the plan. The Plant Emergency Response Team is listed and a team is available on each shift with an additional day shift team. The EMS (medical) team details are posted in the plant and backfill control rooms. The emergency equipment inventory was 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. Periodic 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 Response Plan includes details for appropriate emergency notification and reporting (internal and external) and the call-out procedure and contact information lists which are updated regularly. Internal and external communication (including the Media) is dealt with in the Plan. (Communication with Communities and Authorities during cyanide emergency situations, Gold Fields Crisis Communication Procedure and Gold Fields Corporate Affairs Policy)

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 Emergency Response Plan covers this in the Environmental Procedures, referring to the Environmental Incident Response Procedure, which includes 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, which is prohibited.

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 Emergency Response Administrative procedure includes the requirement for review and revision on an annual basis or after an actual cyanide emergency or a mock drill which identified deficiencies in the plan. Drills incorporate identification of problems, action and follow up on completion. Feedback sessions are also held.

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:

An induction video is given to all employees, contractors and plant visitors before being allowed to pass through security onto the plant. Module A “Cyanide Awareness” is also used for all site personnel working on the gold plant. Annual refresher training is conducted on return from leave for all. The sign off of the route form (tracking of returning of ex leave employees, new employees and contractors) includes the signature of the training officer. An E-learning cyanide training module is also in place. Training records are retained for the working life of the employee.

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:

A training matrix for all positions on the plant is in place, detailing the required training (including cyanide safety) for all plant employees. A Training task occupation inventory list exists for each occupation. Training progress is indicated on the occupation inventory matrix. Control is the use of entry control clock card which is only issued once induction training is completed. Sign off of the route form (tracking of returning of ex leave employees, new employees and contractors) includes the signature of the training officer. Training effectiveness is tested by using the national unit standards and the competency assessment document. Planned Task Observations (PTOs) are conducted according to a critical task list. Annual refresher training is conducted on return from leave for all. The sign off of the route form (tracking of returning of ex leave employees, new employees and contractors) includes the signature of the training officer. Employee Records are retained for 50 years. The Training Officer is a qualified training assessor.

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 plant personnel are trained how to react during cyanide releases. The emergency response team on shift reacts to emergency alarms. The Plant Emergency Response Teams are trained in decontamination and first aid procedures. Gold Fields internal first aid training is conducted by an on-site, qualified paramedic. Medical responders are made aware of the ERP using mock drills. TSF contractor and the teams from plant are involved with the Risk assessments for the ERP. The ERP is on the agenda for safety meetings for feedback. Mock drills are evaluated by the training department and learning points noted and debriefed. Videos are filmed and analysed, with feedback and learning points recorded. Employee Records are retained for 50 years.

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:

Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide. The Environmental Impact Assessment for the new Doornpoort TSF provided opportunity for stakeholders to communicate with the mine and to establish dialogue. Stakeholders such as the Department of Water Affairs, Gauteng Department of Agriculture and Rural Development, local schools, town councils, Trade Unions, farmers, informal settlements, neighbouring mines, fire brigades, SAPS, and the Traffic Department were identified using the AA1000 template. The Database of key people around the mine was updated using a Land Use Survey which identified stakeholders, their concerns, and their preferred methods and means of being communicated with. The Rietspruit Forum was re-introduced via the Land Use Survey. Land Survey stakeholder engagement form returns included notes from recipients on issues and concerns. The Land Survey included the issuing of a leaflet entitled "Cyanide information bulletin". A procedure entitled "Communication with communities and authorities during cyanide emergency situations" was also reviewed.

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:

Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide. The Environmental Impact Assessment for the new Doornpoort TSF provided opportunity for stakeholders to communicate with the mine and to establish dialogue. Stakeholders such as the Department of Water Affairs, Gauteng Department of Agriculture and Rural Development, local schools, town councils, Trade Unions, farmers, informal settlements,

neighbouring mines, fire brigades, SAPS, and the Traffic Department were identified using the AA1000 template. The Database of key people around the mine was updated using a Land Use Survey which identified stakeholders, their concerns, and their preferred methods and means of being communicated with. The Rietspruit Forum was re-introduced via the Land Use Survey. Land Survey stakeholder engagement form returns included notes from recipients on issues and concerns. The Land Survey included the issuing of a leaflet entitled "Cyanide information bulletin". A procedure entitled "Communication with communities and authorities during cyanide emergency situations" was also reviewed.

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:

The Land Survey included the issuing of a leaflet entitled "Cyanide information bulletin". An introductory letter for the Land Use Survey included information on cyanide and the cyanide emergency procedure community evacuation. The presentation at the annual "take a girl child to work" day of 29 May 2009 included information on cyanide uses. A University Student visit of 3 Sept 2011 included cyanide information in the presentation. A Presentation was given by Paramedics on cyanide to the staff of the Leslie Williams Hospital, Gold Fields EMS and regional paramedics on 12 Oct 2011. A leaflet covering haul roads and cyanide spills in English and Zulu was also sighted.

All environmental incidents are classified as Levels 1, 2 or 3, depending upon their severity. All water-related level 3 incidents and above are reported to the national Department of Water Affairs. There is a monthly dashboard report and quarterly Directors review of all incidents of level 2 and above with detailed descriptions. The Rietspruit Forum (public water user's forum) receives reports on level 3 and above incidents and water quality reports. Environmental statistics (including cyanide) will be reported in the corporate annual report with level 3 incidents and above, including a description. In terms of safety and health, there is a legal requirement for the reporting to the Department of Mineral Resources of all lost time injuries and fatalities, and serious accidents e.g. TSF failures, gassing incidents, loss of consciousness, via SAMRASS (South African Mines Reportable Accidents Statistical System). All SHE statistics are included in the corporate annual report, available in hard copy and on the web site. All significant cyanide incidents are reported to the ICMI.

The Gold Fields Corporate website includes the annual report which includes Environmental incidents levels 2 and 3, and injuries. No cyanide exposures, hospitalisation or fatalities occurred or were reported during the period since certification.