

***INTERNATIONAL CYANIDE
MANAGEMENT INSTITUTE***

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

***Summary Recertification
Audit Report***

***Goldfields Ghana
Tarkwa Gold Mine
Ghana***

10th – 16th May 2011



Name of Operation: Tarkwa Gold Mine
Name of Operation Owner: Gold Fields Limited
Name of Operation Operator: Gold Fields Ghana Limited
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Location detail and description of operation:

Tarkwa Gold Mine, majority owned and operated by Goldfields Ghana Limited (90%) and the Ghanaian Government (10%). It is situated in the Western Region of Ghana, approximately 350km by road from the capital, Accra. Site conditions are tropical with annual rainfall of approximately 2,000 mm and temperature ranging between 25°C and 35°C.

Mining activities around Tarkwa date back to the late 19th century. Activities expanded progressively until 1960 when all the workings in the area were abandoned and allowed to flood due to financial constraints. The assets were purchased by the state in 1963 and became known as Tarkwa Goldfields Limited. In June 1993 the Government of Ghana entered into an agreement with Gold Fields Ghana in terms of which the mine would be operated under a management contract by Gold Fields Ghana Limited (GFGL). Having reviewed the large, low grade deposit adjacent to the existing operations in 1996, Goldfields Ghana Limited was able to add 20 years of life to the mine by developing a heap leach surface mining operation.

The initial open pit/heap leach development, Tarkwa Phase 1, was completed in April 1998 processing 4.7Mtpa heap leach feed ore. An expansion, Phase 2, was completed in July 1999 increasing ore production to the heap leach to 7.2Mtpa. Process improvements and optimisations resulted in the throughput increasing to 9.4Mtpa. In August 2000, GFGL acquired the northern part of the Teberebie lease. These facilities increased ore production to the heap leach to 16Mtpa. The north heap leach has had a number of pad expansions, the latest Phase 5, to enable current production capacity to be sustained up to 2011.

The Tarkwa mine is located near the southern end of the Tarkwa Basin. The basin is N-NE trending, approximately 220 km long by 40 km wide within the West African Craton and is also referred to as the Tarkwa syncline or Ashanti Belt. The Tarkwaian is underlain by the Birimian System, which comprises primarily metavolcanics and

metasediments. These lithologies form part of a greenstone belt noted for its shear hosted gold mineralisation. Within the Tarkwaian, gold is almost exclusively found in the conglomerates of the Banket Formation. These gold bearing conglomerates bear many similarities to those found in the Witwatersrand in South Africa. At Tarkwa Mine, gold occurs in a free state with other heavy minerals, predominantly haematite, in the matrix of the quartz pebble conglomerate. Apart from very small amounts of sulphide minerals observed near fault zones, there are no significant sulphides associated with the conglomerates.

Tarkwa Gold Mine is an Owner Miner, utilising a mining fleet of Tamrock drills, Liebherr 984 and 994 excavators, Caterpillar 785 haul trucks and mostly Caterpillar ancillary equipment. Mining activities are based around a number of pits and the selective excavation of shallow dipping reefs that are blasted on a 6m bench height but excavated in two 3 meter flitches. The current overall mining rate is approximately 112Mtpa, containing some 16Mtpa of heap leach ore and 5 Mtpa CIL ore.

Heap leach operations are carried out at two main locations designated as the North and the South sections. At the South, ore is crushed down to a size of 9mm through four stages of crushing, while at the North, ore is crushed down to a size of 80% passing 12mm through 3 stages of crushing. Prior to placement on the heaps, the ore is agglomerated using cement and lime to minimize the migration of loose fines into the heap as well as subsequent blocking of drainage channels. Cyanide solution is added on the top of the heap through dripper tubes and percolates through the heap dissolving the gold particles. At the end of the percolation cycle, the pregnant solution is pumped to the Adsorption Desorption Recovery (ADR) plants (one each at South and North) where the soluble gold is adsorbed onto activated carbon. At the South, the gold is recovered by an elution and electrowinning process, while at the North, recovery is by elution and zinc precipitation. All gold sludge is smelted into doré bars at the North smelt house facility. Barren solution exiting the adsorption plant is upgraded with cyanide and returned to the heap leach pads to recommence the leach cycle. Eluted carbon is thermally regenerated prior to return to the adsorption tanks. The heap leach cycle extends for up to 280 days before all the extractable gold has been recovered.

The weathering of the gold bearing conglomerates at Tarkwa is critical to the viability of the mine due to its effect on the gold extraction in the heap leach process. The closer to the surface, the more weathered the ore, the higher the porosity and the higher the gold recovery. Over the years, depletion of the more porous ores has taken place with a subsequent drop in recovery. The heap leach operations are experienced progressively lower recoveries due to having to treat lower porosity ores. The economics reached the point where a conventional milling plant was feasible to process the low porosity ores. This is particularly evident at the South section where recoveries have dropped to 64%.

The Tarkwa CIL plant was commissioned in October 2004 and utilises a single low aspect 27' x 42', 14MW dual pinion drive SAG mill, designed to mill 4.2mtpa (525tph). The plant was designed and constructed in a manner that would facilitate its expansion to 8.4mtpa (1,050tph). Since the plant was commissioned in September 2004, the SAG mill has consistently exceeded its nameplate throughput by up to 25%. Through the installation of a 26' x 36' 14MW dual pinion drive Ball mill, along with additional upstream and downstream equipment, the plant will now be expanded to 12mtpa (1,500tph).

Tailings from the plant is deposited on the Tarkwa tailings storage facilities (TSF's), which is a paddock type impoundment located approximately 3.0 km north west of CIL plant site and immediately due south of the existing North leach pads. These facilities are also being upgraded to cope with the additional tonnage expected from current expansion project.



Auditor's Finding

This operation is

in full compliance

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.

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

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: 19/10/2011

Dates of Audit: 9th – 14th May 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.

Tarkwa Gold Mine



19/10/2011

Facility

Signature of Lead Auditor

Date

Tarkwa Mine

Signature of Lead Auditor

16th October 2011

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:

Gold Fields Ghana, on behalf of Tarkwa Gold Mine, obtains its cyanide supplies from two sources, Orica and Samsung. Contracts are in place with both Orica and Samsung, who are both certified fully compliant with the ICMI Code, requiring that the producer must be a signatory and comply to the provisions of the ICMI Cyanide Code. Orica's Yarwun production facility is certified as a cyanide producer and the Tongsoh Petrochemical Co. Ltd. production facility, fully certified under the ICMI code, is sub-contracted by Samsung to supply solid sodium cyanide to Goldfields Ghana.

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

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:

Design and quality control/quality assurance documentation audited during the certification audit was confirmed for the CIL Plant, North and South Heap Leach operations, i.e. detailed, professionally designed, drawings for the cyanide mixing and storage areas were sighted which clearly indicated the structures were designed and located on concrete and away from people and surface waters. Cyanide areas are fenced and security controlled with adequate controls and separation to prevent mixing with incompatible materials. Procedures covering cyanide unloading, mixing, transfer and handling of full and empty cyanide boxes were reviewed and found to be effective.

CIL Plant

The solid cyanide storage area is in a roofed structure, with a concrete base and open sides, allowing for adequate air circulation and prevention of weather impacts. All mixing and storage tanks have high-level sensors and are located in a bund. Level sensor stop the water valve at that mixing tank at 90% and the level sensor stops the transfer pump from the mixing tank to the storage tank inside the plant at 85% tank level, and automatically closes the valves to prevent syphoning. Secondary containments built from concrete provide a competent barrier to leakages and provide adequate and appropriate containment.

It came to light from newly revealed technical drawings since certification that the CIL cyanide storage and mixing tanks are placed on ring beams with the foundation filled with clean, compacted, selected fill with a 75mm thick, oil impregnated, sand trowelled finish. This layer is not deemed impervious. The ICMI Cyanide Code changed in 2009 to the specific requirement of an impervious layer between the tank base and the subsoil for storage and mixing tanks containing free cyanide solutions of 10,000 mg/l (1%) or greater. The site had an action plan in place to replace the tanks and, at the same time, insert an impervious layer between the base of the tank and the subsoil. The timetable set the end of September 2011 as the deadline for the completion of the tank replacement and impervious layer insertion. The work was completed before the finalisation of the recertification audit reports.

South Heap Leach

The South ADR cyanide mixing area is not used for cyanide make up, storing and dosing and was put on care and maintenance for possible use in future. It was verified during site inspection that the replacement tanks and pipes are made of steel, compatible with cyanide and high pH conditions. The South Heap Leach was going to be closed by October 2008 but due to revised economic considerations and new technology, its life has been extended. A new South Ponds solid cyanide storage shed and new pipes, pumps and

valves were installed, replacing the old equipment. Appropriate design documentation for this facility was sighted and reviewed.

All mixing and storage tanks have overflow lines and are in bunds overflowing to lined ponds. Level indicator and audio alarms installed at the ponds and a procedure is in place for action in case of alarms.

Tarkwa North Heap Leach

Design and quality control/quality assurance documentation for the completion of the Phase 5 development of the operation, including engineer sign offs of drawings for tanks, and bundwall civil designs, was sighted and reviewed.

High level alarms are in place which trigger audible alarms to which the supervisor responds. Phase 5 cyanide storage tank level is controlled by a radio signal interlocked with the cyanide mixing tank at the ADR (Adsorption Desorption Recovery) plant.

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:

All empty solid cyanide containers including wooden crate, plastic liner and bulk bags are collected by and returned to the transporter/distributor (Barbex which is subcontracted by Orica to do incineration), which is certified under the ICMI code as fully compliant. Samsung subcontracts Barbex who incinerate the empty containers and packaging on their behalf. Procedures covering offloading from containers, mixing and disposal of packaging were sighted, reviewed and found to be effective. Mixing of cyanide is only carried out at the CIL plant and the North Heap Leach. No liquid cyanide is delivered and all cyanide used is mixed from solid briquettes.

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 mine's cyanide management is covered by 62 CIL procedures, 52 North and South Heap Leach procedures, 1 common Community Affairs procedure and 2 general cyanide engineering procedures. A TSF operating manual (developed from the original design documentation and parameters for the facility) and 12 additional TSF procedures and 7 Cyanide special safety procedures are in place. Quarterly technical inspections of the TSF facilities are undertaken to ensure integrity and safety. A change management procedure is in place and functioning and change management exercises are signed off by Health, Safety and Environmental officials. The site has cyanide destruction systems in place which are supported by appropriate inspections and preventative maintenance.

Preventative maintenance and inspection has been controlled by an electronic spreadsheet-based, Planned Maintenance System (PMS) and the site is in the process of moving over to a SAP Planned Maintenance System. The CIL Plant (which includes the TSF) has fully completed the transition, South Heap Leach is 25% complete and North Heap Leach is 40% complete. The latter two operations have both manual and electronic records to cover the transition. 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. Routine daily and monthly inspection reports, legal inspections, and checklists for the TSF, CIL Plant and North and South Heap Leach operations were sampled and employees interviewed to check the effectiveness of systems and ensure that ensure proactive and reactive management. No emergency power is required for the TSF but provisions for contract-maintained generators are in place for the CIL Plant, North and South Heap Leach operations.

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:

Tarkwa CIL Plant

The plant has a cyanide reduction program with the target of reducing consumption by 20%, including weekly updates to stakeholders. Program involves managing set points and monitoring results. The Set points were reduced from 230ppm sodium cyanide in

first tank to 200 ppm in tank 7. The cyanide consumption was reduced from 230g/t to 190 g/t. Initial test work on the ore indicated 500 g/t consumption, start up was done at 350g/t and current consumption is at 190g/t, indicating that the plant is now running at optimal consumption. A TAC 2000 cyanide addition control and analyser is used currently. Ore is not variable and cyanide consumption by ore is relatively constant, making the value of an on line unit on the last CIL tank marginal.

Tarkwa North and South Heap Leach

The cyanide optimisation strategy for the heap leaches is to automate addition of cyanide and to conduct further test work to optimise agglomeration solution concentration and irrigation solution cyanide concentration. Routine test work indicated optimisation of the pre leach in the agglomeration drum by varying cyanide from 1000 to 3000 ppm with fixed leach spray concentration and fixing the Agglomeration cyanide with varying leach spray concentration. The conclusion reached is that current parameters at 1000 ppm to Agglomeration drum and 100 ppm leach spray solution is the optimal. A TAC 1000 unit is used at the North heap leach operation and is fully commissioned to run automatic cyanide addition control. A TAC 1000 unit for the South heap leach has been delivered and installation will be undertaken.

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:

A comprehensive, probabilistic water balance was prepared and updated for the TSF by external consultants and a corresponding probabilistic water balances for the two heap leach plant operations were sighted. The CIL Plant footprint relating to cyanide is currently small and the event pond capacity is sufficient when empty. The practice is to keep events pond empty. Information is available on rainfall, storm events, solution deposition, and cyanide destruction capacities, should they be required. Rainfall records used for the water balance are sourced from the Tarkwa Meteorological Station and historical data collected from 1939 - 2005 by the School of Metallurgy and Mining and Goldfields Ghana. TSF water management procedures and operating plans for the TSF were developed, based upon the direction given in the design data and studies. North and South Heap leach pond levels are managed to levels as required by the dry or wet season in such a way that it would not be necessary to stop any of the plants in cases of upset of the water balance. Daily checklists are in place for the TSF, North and South heap leach operations, and the CIL event pond. Procedures and plans are in place to manage normal and emergency conditions. The minimum freeboards and operating capacities of ponds are identified and documented. All relevant procedures, plans and initiatives were

reviewed and found to be appropriate in managing to prevent overtopping and unintentional releases.

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:

WAD cyanide values for discharges to the TSF and open process solution ponds have been shown to be significantly less than 50 ppm WAD cyanide. On the heap leach operations, no solutions sampled on the operations contains in excess of 50ppm WAD cyanide and, as such, no permanent restrictions were necessary. However, in case of abnormal ponding, the operations use netting to prevent wildlife from access. On the heap leach operations, the normal stacking method used is the grasshopper deposition method, without flattening the surface, thus preventing ponding. No cyanide-related bird, or wildlife mortalities have been experienced at the TSF or the CIL plant but there was one incident of a wildlife fatality at the North heap leach facility at the blue ridge heap during formation of a small pond on top of the heap and one other isolated occurrence of ponding resulted in four bird fatalities being recorded.

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 site has no direct discharges to surface water.

Tarkwa CIL Plant

A system is in place, including pumps and an emergency diesel pump to return any solution from the spillage trench back to the plant. Any overflow from this trench is captured in the environmental control dam, where manual detoxification can take place in emergencies, or the water can be pumped back into the process plant ponds.

North and South Heap Leach Operations

Transfer to the Environmental Control Dam (ECD) of surface water takes place following detoxification reducing WAD CN values to less than 0.05 ppm free CN. A Quality

control procedure is in place to manage detoxification. Water is discharged from the ECD following sampling of the water as per the detoxification procedure. Subject to a permit approval from the Environmental Department and a maximum legal limit of 0.2 ppm Free cyanide, the North Heap leach operation may discharge from the ECD and the South Heap leach operation may discharge to the River Catchment Area (RCA). The Ghana EPA designates water quality standards of 0.2 ppm free CN and 0.6ppm WAD CN before permitting release into the stream. The site has an internal Metallurgical standard of 0.05ppm free CN before release.

TSF

No direct discharge to surface water from the TSF exists, excess solution is pumped to the North Heap leach operation where detoxification is done before transferring to the Environmental Control Dam.

Based upon borehole results no indirect discharge to surface water is present from CIL plant, TSF or North and South heap leach operations.

There are procedures in place to manage spills and releases to prevent discharge to surface water and ongoing surface and groundwater monitoring takes place. No beneficial use of groundwater has been identified specifically in the mining licence. There is no specific identified use for groundwater in the mine's catchment area.

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

CIL Plant

All CIL plant equipment is installed within concrete bund areas and is equipped with an Events pond (emergency catchment) to cater for emergencies.

North & South Heap Leach Operations

Floor of the leach pad and ponds were constructed with impermeable HDPE material to minimize seepage flow into groundwater. Monitoring boreholes were provided and monitored to establish early warning in the event of any seepage occurring.

TSF

The floor of TSF was constructed with impermeable material to minimize seepage flow into groundwater. Monitoring boreholes were provided and monitored to establish early warning in the event of any seepage occurring.

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:

CIL Plant

The CIL plant cyanide mixing and storage tanks are located inside bunds. New CIL tanks are placed on solid concrete foundations inside a concreted bund. The old CIL tanks are placed on ring beams, filled with compacted filling and topped with an oil impregnated trowel sand finish. The old CIL tanks have been retrofitted with leak detection devices. All pipelines are placed within a concrete spillage channel or above a concrete bund area. All bunded areas are interlinked with each other and overflow to the events pond.

South Heap Leach Operation

The South Pond mixing tanks are placed in bunds on solid concrete foundations. ADR cyanide mixing and storage tanks are placed within a bund on solid concrete foundations (system put on care and maintenance, not used for cyanide anymore), Adsorption tanks, elution columns are placed inside a concrete bunded area. All pipelines are placed within a plastic lined area (solution trenches) draining into the solution ponds. Solution trenches are illuminated at night and they are security patrolled 24hours pr day, 7 days per week. All secondary containments can contain 110% of the volume of the largest tank.

North Heap Leach Operation

ADR(Adsorption Desorption Recovery) cyanide mixing, storage, adsorption and eluate tanks placed on solid concrete foundations inside concreted bund, Phase 1 to 4 cyanide storage tanks are placed on concrete foundations inside bunds overflowing to the lined solution ponds. Phase 5 cyanide storage tanks are placed on a Geomembrane inside bunds. Any overflow runs into the lined solution ponds. All reagent strength cyanide pipes are contained either inside a pipe or situated on top of the pond plastic liners. Solution trenches are illuminated at night and they are security patrolled 24hours pr day, 7 days per week. All bunds can contain 110% of the largest tank or are interlinked with adequate capacity ponds.

TSF

The TSF pipeline is contained inside TSF footprint, acting as secondary containment. TSF residue lines and return water lines are placed inside concrete channels draining back to the plant or inside earth channels draining into the TSF valley area, in case of leaks. The TSF is equipped with a pipeline to the detoxification excess return solution pond at the North Detoxification facility

All Cyanide tanks and pipelines are manufactured from materials compatible with cyanide and high pH conditions. 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.

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 CIL plant extensions were commissioned and the quality control and quality assurance (QA/QC) documents were checked in Dossier 9 of the Tarkwa Phase IV documentation. QA/QC assurance records were sighted for Stage 5 extensions on the pads of the North Heap Leach operation.

The quarterly and annual reports 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 which forms a part of the site's Water quality monitoring and quality assurance program which was reviewed. Monitoring, sample preservation and custody and chain of custody procedures were developed internally by competent persons and checking by external certified laboratories. Samples are analysed at an in house environmental laboratory for WAD and free cyanide, with an external private laboratory being used as back up and for quality control. Monitoring and inspections (including checks for bird mortalities and bird species on the TSFs) are guided by appropriate procedures and guidelines. Sampling frequencies range from weekly to monthly to quarterly. Detail on sample points was reviewed and found adequate for sample point circumstances. The site's Environmental Department investigates all wildlife mortalities, injuries or stress incidents which are formally reported as environmental incidents in the site Environmental Management System.

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 are in place to ensure that planning and costing adequately covers cyanide decommissioning and closure of the CIL plant and the North and South Heap Leach operations, within the Tarkwa Gold Mine Rehabilitation and Mine Closure planning procedure. The procedure includes the decommissioning tasks and a decommissioning schedule. Tarkwa Gold Mine Rehabilitation and Mine Closure is reviewed annually or as necessary.

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:

Tarkwa Gold Mine Rehabilitation and Mine Closure was prepared externally and includes cost estimates which are reviewed every two years and the next review is due in October 2012. A Reclamation Bond has been posted with the Ghana Environmental Protection Agency ("Reclamation security agreement for the Tarkwa Gold Mine - Gold Fields Ghana Limited and Environmental Protection Agency of the Republic of Ghana" of 15 Nov 2010) and an updated Bank guarantee with Stanbic Bank is included as an appendix.

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 mine's cyanide management is covered by 62 CIL procedures, 52 North and South Heap Leach procedures, 1 common Community Affairs procedure and 2 general cyanide engineering procedures. A TSF operating manual (developed from the original design documentation and parameters for the facility) and 12 additional TSF procedures and 7 Cyanide special safety procedures are in place. Quarterly technical inspections of the TSF facilities are undertaken to ensure integrity and safety. A change management procedure is in place and functioning and change management exercises are signed off by Health, Safety and Environmental officials. Appropriate PPE and pre-work inspections are specified in procedures for all cyanide-related tasks. Worker input is solicited through worker involvement in risk assessments, through consultations in Health & Safety Committee meetings and during shift shop floor 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:

Procedures for the CIL plant, and the North and South heap leach operations require that pH be maintained above 10.5. In the CIL Plant, hotspot areas were identified and demarcated as on top of CIL tanks, tank 410, cyanide dosing tank 612, and cyanide mixing tank 601; at the South Heap leach area, hot spot areas were identified and demarcated as at the Agglomeration Drum and at cyanide mixing, and at North Heap Leach area, at the Agglomeration drum and the ADR cyanide mixing. All three facilities make use of fixed and portable HCN gas monitors which are calibrated and maintained according to manufacturers requirements. During the site inspections, adequate warning and informational signage was noted regarding the presence of cyanide, no eating and drinking, no smoking and no open flames.(Reinforcement of this is included in induction training.) 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 which is included on the PMS. 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:

First aid kits, oxygen units, and antidote kits were observed throughout the site. Antidote kits are only used by medical staff, with plant staff being trained in the use of oxygen. Two way radios are used to communicate emergencies with mobile cell phones available as back up. Cyanide first aid room has been commissioned since certification. On the heap leach operations, team leaders' vehicles are equipped with medical oxygen units. Cyanide first aid equipment is inspected daily by shift staff and monthly by the Safety Officer. Cyanide emergency procedures form part of the site-wide emergency preparedness plan which covers the whole site and includes the cyanide facilities. The scope of the Emergency Response Plan includes site-based responses, the use of a mine emergency response team ("Mike Romeo"), and includes provision for evacuation of patients by ambulance to the mine local hospital in Tarkwa which is adequately staffed by appropriately trained personnel. Equipment is regularly checked and tested and mock drills are held on site and in conjunction with the hospital. 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:

There is a mine wide Emergency Preparedness and Response Plan (Rev 3: dated 22 June 2010) which has a cyanide specific response attachment (covering the TSF, CIL Plant and

North and South Heap Leach operations) which is used in conjunction with the mine wide plan. A risk assessment was used to develop site-specific cyanide emergency scenarios and responses for its emergency response plan. The various scenarios include appropriate actions such as evacuation, use of PPE, neutralisation, bunding, decontamination, gas monitoring, sampling and appropriate prohibitions. Cyanide first aid procedures are included in the Plan. Site based safety and environmental systems, ISO 14001 and OHSAS 18001, include investigation, evaluation and continuous improvement considerations. Spill response teams are in place for CIL, North and South, where the emergency spillage response trailers are stationed. The mine ambulance team deals with personnel cyanide exposures. Emergency teams are in place on each shift on each plant. Supervisors are given special environmental response competency training. The Plan 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.

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:

Representatives of the workforce were involved in the risk assessment to develop and review the emergency scenarios and responses in the emergency response plan and procedures. There is a complex structure of planned meetings with community leaders and individual villages (specifically the eight neighbouring villages) which has been used to maintain communication with communities on cyanide, cyanide emergencies and to raise awareness and answer questions and concerns. Due to high illiteracy, much of the communication is done verbally and via local radio stations. Presentation materials and documentation on the communications was sighted. Full cycle drills are used to involve hospital staff and communities in the planning processes. The Tarkwa hospital, a captive mine hospital, is involved in emergency cyanide response and treatment.

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 ERP designates emergency controllers, site controllers and an overarching cyanide emergency response team which consists of multidisciplinary cyanide site management. The relationship and roles of the controllers and team are defined in the Plan. The emergency response team will commit the resources necessary to deal with the emergency. General Plant Supervisors and Shift Supervisors are trained in the emergency response procedure and act as emergency response coordinators. Competency as emergency response coordinators is checked through PTO's (Planned Task Observations) and mock drills. The site training matrix requires that emergency response training be undertaken. 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 contact list and reporting and the call-out procedure and contact information lists which are updated regularly. Media communication is done via a formal 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 Emergency Preparedness Plan includes a generic procedure which covers neutralisation of solid or solution spills. Separate plant procedures covering spills, PPE and materials to be used are used. The use of treatment chemicals such as ferrous sulphate and hypochlorite in surface water is prohibited. The Plan also refers to the provision of alternative drinking water supplies and the communities that may be directly affected by cyanide spills. The sampling procedure includes an emergency sampling sheet and refers to the sampling map.

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 Preparedness Plan is reviewed annually as a part of OHSAS 18001 requirements and the procedures are reviewed after every incident or drill. A full cycle drill to hospital involving a cyanide splash man down was undertaken, as well as a gassing drill and a spill drill which also involved the community, the Environmental Protection Agency and the mine emergency services. Reports were sighted of learning points emerging from the various drills.

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 staff (CIL plant, TSF, North and South Heap Leach operations) receive cyanide hazard recognition training and workers inside the cyanide area receive more advanced cyanide training. Written competency tests (80% pass mark required) are taken, supported by oral checks and evaluations. Site cyanide training programs were reviewed.

Fifteen randomly selected employees were checked in interviews on their understanding of cyanide hazards, first aid and emergency response and this was verified through checking of their training records. Refresher training is conducted when employees return from annual leave.

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 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 are used as the training source material. The Metallurgy Department has a Cyanide Training Officer 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. Full records are kept of training and induction training records are kept for two 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 working with cyanide, including the emergency response team, receive training on the emergency response plan. 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 are undertaken and training personnel attend these drills and formally evaluate response and performance. Training records were checked to confirm attendance and successful completion. General cyanide worker refresher training is scheduled annually. Specialised Emergency Team refresher training (including relevant external responders) is done annually as per the site's Training Matrix.

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:

Quarterly consultative meetings are held with local communities including chiefs, and government officials, public affairs officials, and district assembly persons (councillors). These will periodically cyanide and cyanide awareness. Community meetings periodically include cyanide awareness presentations specifically mentioning operations and emergency response at Tarkwa. A radio program on "Space FM" spoke about cyanide issues, awareness, cyanide in mining, precautions, the Galamseys (illegal miners), and the role of EPA on cyanide. Regular monthly meetings with stakeholder communities held and cyanide issues recorded when raised. Community notice boards are used to display information on cyanide in eight neighbouring communities.

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:

Quarterly consultative meetings are held with local communities including chiefs, and government officials, public affairs officials, and district assembly persons (councillors). These will periodically cyanide and cyanide awareness. Community meetings periodically include cyanide awareness presentations specifically mentioning operations and emergency response at Tarkwa. A radio program on "Space FM" spoke about cyanide issues, awareness, cyanide in mining, precautions, the Galamseys (illegal miners), and the role of EPA on cyanide. Regular monthly meetings with stakeholder communities held and cyanide issues recorded when raised. Community notice boards are used to display information on cyanide in eight neighbouring communities.

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:

Owing to literacy problems, most of the cyanide information is supplied through verbal briefings of community leaders who then take the information back to villages. All reports to government are publicised via the Press. All cyanide releases are reported according to a specific site procedure covering potentially affected communities and the Press.