



April 2015

## ICMI GOLD MINE RECERTIFICATION AUDIT - SUMMARY AUDIT REPORT

# Gold Fields Damang Plant

**Submitted to:**  
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REPORT

**Report Number.** 1402917-13459-4

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## 1.0 SUMMARY AUDIT REPORT FOR GOLD MINING OPERATIONS

**Name of Cyanide User Facility:** Damang Gold Plant  
**Name of Cyanide User Facility Owner:** Gold Fields Limited  
**Name of Cyanide User Facility Operator:** Abosso Gold Fields Limited  
**Name of Responsible Manager:** Vincent Frempong-Boakye  
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Tarkwa  
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## 2.0 LOCATION DETAIL AND DESCRIPTION OF OPERATION

Abosso Gold Fields Limited's Damang Mine is located near the village of New Damang, some 30 kilometres northeast of Tarkwa, in the western region of Ghana. Damang Mine operates a carbon-in-leach (CIL) processing plant which is fed run-of-mine (ROM) ore at approximately 14,000 tonnes per day (4.8 million tonnes per annum). Plant feed consists of 95% fresh (blasted) hard rock and 5% weathered (oxide) materials.

ROM ore is crushed using a gyratory crusher followed by a secondary crushing stage and stockpiled. Ore is then fed to a milling circuit consisting of SAG (Semi Autogenous Grinding) and Ball Mill. The milled ore is classified by means of cycloning with the overflow reporting to a pre-leach thickener for thickening to 55% solid density. The thickened leach feed now reports to the eight CIL tanks of 3000 cubic metres each. The cyclone underflow returns to the Ball mill for regrinding.

The underflow stream is also bled to feed 2 x 48" Knelson concentrators. The concentrate from the Knelsons is leached directly in an in-line leach reactor at high cyanide concentration. The leach tails report to two tails tanks and pumped to the tailing dam. The pre leach thickener overflow joins the process water pond as recycled water. Loaded carbon from the CIL is acid washed and eluted at high pressure and temperature. Gold is finally recovered by electrowinning of the pregnant solution and smelting of the cathodes with flux.

The cyanide facilities at Damang Gold Mine are as follows:

- solid cyanide storage area;
- mixing and storage tank;
- leaching facilities, including CIL tanks, carbon stripping and washing, and in-line leach reactor;

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

- tailings storage tanks; and
- tailings storage facility and tailings delivery pipeline.

Since the last recertification audit, the following changes to the operation have been implemented:

- Addition of a pre-leach thickener into the cyanide facility;
- Addition of a CIL tank (tank 8);
- Addition of 2 tailings tanks (Final tailings area); and
- Addition of an inline leach reactor.

Before the addition of the pre leach thickener, the cyanide levels in the process water ponds meant that it was a cyanide facility. However, since mid 2013, the WAD cyanide level in the process water pond have dropped below 0,5mg/L, which mean that neither the process water pond or the mill circuit have been considered a cyanide facility for this recertification audits.

The auditors were presented with and reviewed samples of more than 200 Standard Operating Procedures including more than 30 for cyanide related activities. There are also a number of specific health and safety procedures, emergency procedures, environmental procedures that falls into the scope of the Code that were also reviewed.

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## SUMMARY AUDIT REPORT

### Auditors Findings

**Gold Fields Damang Gold Plant is:**

in full compliance with **The International Cyanide Management Code**

in substantial compliance with

not in compliance with

**Audit Company:** Golder Associates Africa (PTY) Ltd  
**Audit Team Leader:** Ed Perry, Lead Auditor  
**Email:** [eperry@golder.co.za](mailto:eperry@golder.co.za)

Damang Gold Plant has not experienced any significant cyanide incidents or compliance problems during the previous three year audit cycle.

### Name of Other Auditors


Romain Girard, ICMI pre-certified Mine Technical Specialist

### Dates of Audit

The Re-certification Audit was undertaken between 13 October 2014 and 16 October 2014.

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 Cyanide Production and using standard and accepted practices for health, safety and environmental audits.

Damang Gold Plant  7 April 2015  
 Name of Facility Signature of Lead Auditor Date

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**PRINCIPLE 1 – PRODUCTION**

**Encourage Responsible Cyanide Manufacturing by Purchasing from Manufacturers that 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.**

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 1.1**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 1.1; to 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.

Orica's West Africa Supply Chain covers the transportation of solid sodium cyanide from the certified Yarwun production facility to the Port of Brisbane (Australia) and from there via the Mediterranean Shipping Company to the Ports of Tema and Takoradi (Ghana), Conakry (Guinea), Dakar (Senegal), Nouakchott (Mauritania). Cyanide is then transported by road to various mine sites within West Africa by Code certified transporters. Within Ghana, some solid sodium cyanide is transported from the Port of Takoradi by road to Orica's Tarkwa cyanide transfer facility, with subsequent road transportation to various mine sites within West Africa by Code certified transporters. Orica's Yarwun production facility was recertified on 29 October 2013.

Samsung is an independent distributor of cyanide sourcing sodium cyanide briquettes from a certified producer Tongsoh production facility - certified 11 March 2014 under the ICMI code. Samsung Africa Supply Chain includes the Port of Pusan, South Korea, ocean transport by shipping companies MSC, Maersk and Safmarine, the Ports of Takoradi and Tema, Ghana, Conakry, Guinea, Dakar, Senegal and Mombasa, Kenya, and Dar Es Salaam, Tanzania, Vehrad Transport and Haulage Ltd's repackaging operation in Tema, Ghana and is fully certified under the ICMI Cyanide Code (12 July 2011). Tongsoh Petrochemical Co., Ltd, production facility was certified under the ICMI code on 11 March 2014. Samsung was no longer used for the supply of cyanide after the 1 July 2014. Subsequent to this the cyanide supplied by Samsung was transported by Allship Logistics Ltd (recertified on 25 July 2013) from Takoradi Port or by Vehrad (recertification on 26 January 2015) from Tema Port. The cyanide was delivered in the shipping containers that were offloaded at the Port and therefore no repackaging was required.

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**PRINCIPLE 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.**

**in full compliance with**

**The operation is**

in substantial compliance with

**Standard of Practice 2.1**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 2.1; to establish clear lines of responsibility for safety, security release prevention, training and emergency response in written agreements with producers, distributors and transporters.

The contract with Orica includes transport and delivery of the cyanide to the mine site. Orica uses subcontractors for the transportation of Cyanide from the port of Takoradi to the mine. This includes; Barbex (until 13 June 2014 when they withdrew from the Cyanide Code), Vehrad Transport (recertification audit undertaken on 19-21 May 2014), Allship Logistics Ltd (recertified on 25 July 2013) and currently Stellar Logistics (certified 6 March 2014).

Samsung is an independent distributor of cyanide sourcing sodium cyanide briquettes from a certified producer Tongsuh production facility - certified 11 March 2014. Samsung Africa Supply Chain includes the Port of Pusan, South Korea, ocean transport by shipping companies MSC, Maersk and Safmarine, the Ports of Takoradi and Tema, Ghana, Conakry, Guinea, Dakar, Senegal and Mombasa, Kenya, and Dar Es Salaam, Tanzania, Vehrad Transport and Haulage Ltd's repackaging operation in Tema, Ghana and is fully certified under the ICMI Cyanide Code (12 July 2011). Samsung was also used for the supply of cyanide until the new contract with Orica was entered into. Samsung was no longer used for the supply of cyanide after the 1 July 2014. Subsequent to this the cyanide supplied by Samsung was transported by Allship Logistics Ltd (recertified on 25 July 2013) from Takoradi Port or by Vehrad (recertification on 26 January 2015) from Tema Port. The cyanide was delivered in the shipping containers that were offloaded at the Port and therefore no repackaging was required.

The previous contract with Orica and Samsung and the new contract with Orica include all the ICMI requirements.

**Standard of Practice 2.2:**

**Practice 2.2:**

**Require that cyanide transporters implement appropriate emergency response plans and capabilities and employ adequate measures for cyanide management.**

**in full compliance with**

**The operation is**

in substantial compliance with

**Standard of Practice 2.2**

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not in compliance with

### Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 2.2; to require that cyanide transporters implement appropriate emergency response plans and capabilities and employ adequate measures for cyanide management.

Gold Fields Ghana Limited currently obtains its solid cyanide from Orica International PTE Ltd. Contract for the Supply of Cyanide dated 1 July 2014 - 30 June 2017 was observed. The contract states in Appendix D that all third parties engaged by Orica for the manufacture, transport and use of cyanide will be a signatory to and comply with the requirements of the International Cyanide Code. The contract with Orica includes transport and delivery of the cyanide to the mine site. Orica uses subcontractors for the transportation of Cyanide from the port of Takoradi to the mine. This includes; Barbex (until 13 June 2014 when they withdrew from the Cyanide Code), Vehrad Transport and Haulage Ltd (recertification on 26 January 2015), Allships Logistics Ltd (recertified 25 July 2013), and currently Stellar Logistics (certified 6 March 2014).

The previous contracts that Gold Fields had with Orica and Samsung also required the transportation companies to be certified under the Code.

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**PRINCIPLE 3 – HANDLING AND STORAGE**

**Protect Workers and the Environment during 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.**

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 3.1**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 3.1; to 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.

Only solid cyanide is used at Damang

Since the previous recertification process, there has not been any changes in the process for the unloading, storing and mixing facilities and therefore all reviewed information from previous audits is relevant.

An external inspection of structural steelwork declaring the plant as being constructed in accordance with design documents and performing a quality survey on the cyanide mixing and storage facility has been conducted.

During the site inspection, the auditors verified that both the solid cyanide storage as well as the liquid cyanide mixing and storage tanks are located: away from people and located within the fenced, locked and guarded perimeter of the plant; and away from surface water. No surface water is present in the vicinity of these areas. The mixing and storage tanks are located in concrete bunded areas providing competent barrier to leakage.

The cyanide mixing and storage tanks are both equipped with level indicators and alarms linked to the control room.

The cyanide boxes in the storage area are stored in a shed under a roof, with adequate ventilation, on a concrete surface and stored on wooden pallets so that they are not in direct contact with the concrete flooring. The cyanide boxes are stored separately from incompatible material

The cyanide mixing and storage tanks are located within the fenced and locked areas which are located within the Gold Plant which is itself fenced, locked and guarded. The Gold Plant is located within the wider mine which also has access controlled.

**Standard of Practice 3.2:**

**Operate unloading storage and mixing facilities using inspections, preventative maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.**

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 3.2**

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not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 3.2; to operate unloading storage and mixing facilities using inspections, preventative maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

The empty solid cyanide containers are kept inside the cyanide storage area. The empty storage containers (comprising wooden boxes, bulk bag inners and plastic bags liners) are returned to the supplier by placing them back in the sea container in which they arrived. The sea container is then returned to Tema for the empty containers to be incinerated. This is approved by the Ghanaian EPA. No empty container is used for any purpose following the offloading of cyanide. No drums are used as cyanide containers.

A mixing event was observed with the auditors, checking implementation of the procedure by the operator performing the mixing task, as well as interview of the operators performing the mixing.

All of the procedures include the specification of PPE to be used. The actual mixing is performed by two individuals (one forklift driver that opens and prepares the cyanide bags, while the other operator manoeuvres the crane and empties the cyanide into the tank). A third person acts as buddy and observes the mixing.

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PRINCIPLE 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 including contingency planning and inspection and preventative maintenance procedures.

in full compliance with

The operation is

in substantial compliance with

Standard of Practice 4.1

not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.1; to implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and preventative maintenance procedures.

The current cyanide facilities at Damang Gold Mine are as follows:

- Solid cyanide storage area;
Mixing and storage tank;
Leaching facilities, including CIL tanks, carbon stripping and washing, and in line leach reactor;
Tailings storage tanks; and
Tailings storage facility and tailings delivery pipeline.

The mill circuit and process water pond ceased to be cyanide facilities in 2013 as the pre addition of cyanide to the mill circuit ceased at this time.

The Operation has 228 Standard Operating Procedures (this does not include additional safety procedures) describing how cyanide-related tasks such as unloading, mixing, plant operations, entry into confined spaces, and equipment decontamination prior to maintenance should be conducted to minimize worker exposure.

The operation has plans and procedures that identify the assumptions and parameters on which the facility design was based and any applicable regulatory requirements including; procedure for tailings management system, TSF operating manual, and TSF Raise to 1005 design report.

The operation has plans and procedures that describe the standard practices necessary for the safe and environmentally sound operation of the facility including the mine water balance model and report. The mine undertakes a number of operational inspections as well as health and safety inspections to ensure the facility is being operated in a safe and environmentally sound manner and that the cyanide facilities are functioning within the required design parameters including; CIL shiftly inspection, daily TSF inspection, daily cyanide reagent inspection, and monthly safety officer inspection.

Handwritten signature of the Lead Auditor

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# ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

Inspections are documented, including the date of the inspection, the name of the inspector, any observed deficiencies, the nature and date of corrective actions. All records are maintained.

The operation has a procedure to identify when changes in a site's processes or operating practices may increase the potential for the release of cyanide and to incorporate the necessary release prevention measures.

The operation has cyanide management contingency procedures for situations where there is an upset in a facility's water balance, when inspections and monitoring identify a deviation from the design or standard operating procedures, and/or when a temporary closure or cessation of the operation may be necessary. This includes procedures for the following; failure of TSF delivery pipeline, spigot failure, process water pond failure, emergency shutdown, WAD management, and tailings management. In addition the SAP system records the corrective actions and corrective maintenance that is being undertaken when inspections or monitoring identifies a problem.

The operation inspects the unloading, storage, mixing and process areas. The operational inspections includes reporting of any signs of deterioration of structural integrity, corrosion and leakage for tanks. The preventive maintenance system includes a weekly visual inspection for tanks integrity. In 2014 a third party structural audit was undertaken on CIL tanks, caustic tank, cyanide mixing and storage tanks. In addition there was a civil structures integrity test report in 2014.

Preventative maintenance programs are implemented and activities documented to ensure that equipment and devices function as necessary for safe cyanide management. Preventive maintenance activities are programmed in SAP which schedules all preventive maintenance activities for the mine. While all work orders issued on SAP are being kept in the system to track the maintenance history of each piece of equipment, the maintenance planning department also keeps a hard copy of all critical maintenance activities.

The operation has the necessary emergency power resources to operate pumps and other equipment to prevent unintentional releases and exposures in the event its primary source of power is interrupted. The entire plant can be run with the 21 Gensets that are onsite. In addition The plant is designed with sumps and sump pumps to contain spillages and return spillages to process tanks that occur during any power outages.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.2**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 4.2; to introduced management and operating systems to minimise cyanide use, thereby limiting concentrations of cyanide in mill tailings.

The operation conducts a program to determine appropriate cyanide addition rates in the mill and evaluate and adjust addition rates as necessary when ore types or processing practices change cyanide requirements. The Damang Gold Mine is processing a particularly complex ore meaning that the cyanide addition is extremely variable and the set point has to be altered for optimisation. On tank 1, free cyanide titration is undertaken manually every 2 hours and automatically every 15 minutes with a cyanoprobe, and on

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# ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

tank 8 there is a free cyanide manual titration every 2 hours and an automatic WAD cyanide titration every 15 minutes using the cyanoprobe.

The set point at the time of the audit was 180 ppm free cyanide. In tank 1 (where cyanide addition occurs), free cyanide concentrations were around 300 ppm in 2011, from 300ppm down to 200 ppm during 2012, ranging from 140 to 280 ppm during 2013, 280 being in March and 140 in September, and always below 200 ppm during 2014. This clearly indicates that the mine is adjusting cyanide addition rates and has achieved a reduction in overall cyanide consumption in the leach circuit

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.3**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 4.3; to implement a comprehensive water management programme to protect against unintentional releases.

The operation has implemented a comprehensive water management programme to protect against unintentional releases.

The latest revision of the Mine Water Report was reviewed and confirmed that the water balance modelling is using the Goldsim software which is comprehensive and probabilistic, as it includes all parameters required including:

- Tailings deposition rates;
- Precipitation, evaporation and seepage rates;
- Undiverted runoff from external catchment areas;
- Potential power outages, and
- The capacity and availability of treatment system for surface discharges.

The operating procedures incorporate inspection and monitoring activities to implement the water balance and prevent overtopping of ponds and impoundments and unplanned discharge of cyanide solutions to the environment. The tailings management procedure details the target beach length of 100 m with a minimum allowable of 50 m and a beach freeboard in excess of 0.5 m. The design pond freeboard is 1.3 m.

The water balance is updated on an annual basis with update of parameters as required by the operation and the operational changes.

Precipitation is measured at the site weather station, and in addition, freeboard and beach length (direct incidence of the precipitation) are measured on a monthly basis and fed back to the mill department and the dam designers.

Signature of Lead Auditor

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.4**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 4.4; to implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions.

The operation has implemented measures to restrict WAD cyanide in open waters to less than 50 mg/l. In addition the Process Water Pond has been fenced to prevent access by wildlife. The Process Water Pond is located in the middle of the Mine and therefore there is no livestock present.

The operation demonstrated to the auditors that the cyanide concentration in open water in TSFs, and solution ponds does not exceed 50 mg/l WAD cyanide. There are no heap leach facilities at the Mine.

There has not been any cyanide related mortality during the recertification period.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.5**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 4.5; to implement a comprehensive water management programme to protect against unintentional releases.

The operation does not have a direct discharge to surface water. It was also confirmed during the audit that there are no indirect discharges to surface water.

The auditors reviewed the entire set of environmental data available for the measurement of free cyanide in the nearby Beni River (1 km south of the TSF) from May 2011 to October 2014. There were no concentrations of free cyanide higher than 0.022 mg/l in the surface water measurements.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.6**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

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The operation is in full compliance with Standard of Practice 4.6; to implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of groundwater.

The operation implements specific water management measures to manage seepage to protect the beneficial uses of groundwater down-gradient of the operation. Specific water management measures have been put in place to protect groundwater including the following: borehole monitoring on the tailings dam; HDPE lining of the process water pond and detoxification pond; concrete lining of channel from Gold Plant to Process Water Pond; and tailings distribution and return water pipeline located in a trench the majority of which is lined with HDPE.

There are no numerical standards for WAD cyanide or other species of cyanide in groundwater, in Ghana. The free and WAD cyanide values in the groundwater monitoring boreholes upstream and downstream of the TSF are below detection limits.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.7**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 4.7; Provide spill prevention or containment measures for process tanks and pipelines.

Spill containment measures are provided for all cyanide unloading, storage, mixing and process solution tanks. The solid storage area is equipped with concrete flooring and a concreted channel on one side that allows for any liquid to be directed to the process water pond adjacent to the fenced area of the Plant. The mixing and storage tanks are located in concrete bunds providing a competent barrier to leakage.

The secondary containments for cyanide unloading, storage, mixing and process tanks are sized to hold a volume greater than that of the largest tank. The reagent strength bund area (216 m<sup>3</sup>) is sized to contain the 110% volume of the largest tank (150 m<sup>3</sup>). The largest tank in the linked bund areas in the Plant is the CIL tank (2850 m<sup>3</sup>). Linked bund volumes provides a total bund area of 3,050 m<sup>3</sup>.

In addition any overflow from the linked bund area flows to the process water pond with a volume of 11,902 m<sup>3</sup>. This is therefore adequate to accommodate the largest tank plus the 1:100 year 24 hr storm event of 407 m<sup>3</sup>. There are no process tanks without a secondary containment area.

Procedures are in place and being implemented to prevent discharge to the environment or any cyanide solution or cyanide-contaminated water that is collected in the secondary containment areas. The secondary containment pumps all spills back in to the process.

Spill prevention and containment measures are provided for all cyanide process solution pipelines to collect leaks and prevent releases to the environment. Process slurry and solution pipelines are installed in pipe racks above concrete areas where spillage will be contained in the bunded areas and returned to the process tanks. Reagent strength pipeline is contained in a pipe in a pipe system where running across areas where concrete bund is in place.

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A new route for tailings distribution pipeline and return water line was selected and pipeline corridor and pipeline build and commissioned in September 2013. The majority of this line is located in a HDPE lined trench. Daily inspections of the pipeline are being undertaken to check for pipe conditions and alert on any problems. The pipes are also equipped with pressure sensors that would alarm in the control room should there be a sudden failure or rupture of these pipes.

Cyanide Pipelines do not cross or come in close proximity to any surface water and therefore do not pose a risk to any surface water. All cyanide tanks and pipelines and associated equipment are constructed of material that are compatible with cyanide and high pH environment i.e. steel for the reagent strength cyanide and HDPR for the tailings pipe line.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.8**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 4.8; to implement quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.

Quality control and quality assurance programs have been implemented during construction of all new cyanide facilities and modifications to existing facilities, including cyanide unloading, storage, mixing facilities and other cyanide facilities. They also addressed the suitability of materials and adequacy of soil compaction and records retained.

The 2008 recertification audit report stated that "Quality control and quality assurance records were sighted for the Number 7 Cyanide tank project, the only new development on site since signing to the ICMI Code. QA/QC tests and checks sighted included:- concrete cube tests on concrete work, completion and handover of works rock infill to 7 CIL tank foundation and photographic records of welds and the tank.

The following cyanide facilities were constructed since the last recertification audit:

- CIL Tank 8;
- In Line Leach Reactor;
- Tailings Tanks; and
- New Tailings pipeline.

Appropriate QA/QC documentation was reviewed by the Auditors for CIL Tank 8, In Line Leach Reactor and Tailings Tanks.

Where there is no available quality control and quality assurance documentation or as-built certification for cyanide facility construction, an appropriately qualified person has inspected those elements of the facility involving cyanide and issued a report concluding that its continued operation within established parameters

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will protect against cyanide exposures and releases as detailed in the following inspections reports that were reviewed during the audit:

Knight Piesold Civil Engineering: Cyanide facilities inspection report 21 April 2010 Ref AC301-00005/13-1. Report covers cyanide dry storage, mixing and leach and CIP tank farms.

Civil structures integrity test report- Visual inspection and compressive strength testing at DGL CIL plant, undertaken by Topsy ventures (equipment inspectors), dated 05<sup>th</sup> November 2014, confirming that the concrete structures within the plant is of sufficient strength, and recommending several actions for some items (columns, tank bases) which were subsequently undertaken and visually checked.

Tailings delivery line integrity test report- QA/QC inspection of the tailings facilities from the process plant to the TSF at DGL, undertaken by Topsy ventures (equipment inspectors), dated 20<sup>th</sup> October 2014 including HDPE slurry pipes, HDPE return water pipe, tailings booster pump station and tailings spigot system, and concluding that the inspection of the above structures indicated that they are all in good working conditions and are serving the intended purposes, and that the quality of the tailings facilities from the process plant to the TSF is assured. It is to be noted that recommendations were made on repairs to the secondary containment HDPE corridor and that these were subsequently repaired and checked.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 4.9**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 4.9; to implement monitoring programs to evaluate the effects of cyanide use on wildlife, surface and groundwater quality.

The operation has developed written standard procedures for monitoring activities including the following: EN 11- Procedure for Surface Water Monitoring, and EN 11- Procedure for Surface Water Monitoring.

Sampling and analytical protocols been developed by appropriately qualified personnel. The procedures were developed internally by the environmental officers, checked by the environmental superintendent John Adingeloh (BSc in chemistry (2003) and MSc in Environmental Sciences (2009), University of Kumasi), and finally approved by the environmental manager Francis Nyame (MSc- Water and environmental management from Staffordshire University, 2006).

The procedures specify how and where samples should be taken, sample preservation techniques, chain of custody procedures, shipping instructions, and cyanide species to be analysed. Sampling conditions and procedures are documented in writing.

There are no discharges of process water to surface water. The auditors reviewed the entire set of environmental data available for the measurement of free cyanide in the nearby Beni River (1 km south of the TSF) from May 2011 to October 2014. There were no concentrations of free cyanide higher than 0.022 mg/l in the surface water measurements. The concentrations of free cyanide and WAD cyanide in groundwater boreholes upstream and downstream of the TSF are all below detection limits.

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The operation inspects for and records wildlife mortalities related to contact with and ingestion of cyanide solutions. No cyanide related mortalities have occurred since the last recertification audit.

There is a total of 86 water monitoring points, and the frequency (detailed in Environmental monitoring matrix EN11 A03) varies from daily, weekly, monthly, quarterly to annually, depending on the suite of analyses to be undertaken, and where the sampling occurs. Free and WAD cyanide environmental measurement are all undertaken monthly, and all monitoring data are sent, on a monthly basis, to the Ghana EPA. The frequency of both the environmental and operational monitoring is deemed adequate by the auditors.

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**PRINCIPLE 5 – DECOMMISSIONING**

**Manage Cyanide Process Solutions and Waste Streams to Protect Human Health and the Environment**

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

**in full compliance with**

**The operation is**  in substantial compliance with **Emergency Response Practice 5.1**  
 not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 5.1; to plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife and livestock.

The operation has developed written procedures to decommission cyanide facilities at the cessation of operations including EN 02 - Procedure for Rehabilitation and Closure, rev 1.9, detailing the methods used for the rehabilitation and closure planning programme.

The Damang Gold Mine costed reclamation plan for the tailings storage facilities (SLR, Feb 2014), and the Damang Gold Mine costed reclamation plan for the process plant and surrounding areas, (SLR, Feb 2014) includes an implementation schedule for the decommissioning activities, including the reclamation phase, the active and passive maintenance, aftercare phases, and the monitoring phase.

The costed reclamation plans are reviewed every three years, while the decommissioning procedure is reviewed on a yearly basis.

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

**in full compliance with**

**The operation is**  in substantial compliance with **Standard of Practice 5.2**  
 not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 5.2; to establish an assurance mechanism capable of fully funding cyanide related decommissioning activities.

The operation has developed an estimate of the cost to fully fund third party implementation of the cyanide-related decommissioning measures as identified in its site decommissioning or closure plan. The cost estimate is reviewed by SLR (previously Metago) every 3 years, and the 2008, 2011 and 2014 costs estimates were reviewed.

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It is a legal requirement to have a cash deposit and a bank guarantee. The auditors reviewed an updated Barclays letter of credit. A Stanbic Bank account statement for account named Abosso Gold Fields EPA fixed deposit was also reviewed.

The cash deposit and letter of credit are sufficient to cover the cyanide related decommissioning measures as identified in the site reclamation plans.

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**PRINCIPLE 6 – WORKER SAFETY**

**Protect Workers’ Health and Safety from Exposure to Cyanide**

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

**in full compliance with**

**The operation is**

in substantial compliance with

**Standard of Practice 6.1**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 6.1; to identify potential cyanide exposure scenarios and take measure as necessary to eliminate, reduce and control them.

The operation has developed procedures describing how cyanide-related tasks such as unloading, mixing plant, operations, entry into confined spaces, and equipment decontamination prior to maintenance should be conducted to minimise worker exposure. The Operation has 228 Standard Operating Procedures (this does not include additional safety procedures) describing how cyanide-related tasks such as unloading, mixing, plant operations, entry into confined spaces, and equipment decontamination prior to maintenance should be conducted to minimize worker exposure. It was confirmed by reviewing these that the procedures require the use of PPE and address pre-work inspections.

The operation implements a procedure to review proposed process and operational changes and modifications for their potential impacts on worker health and safety, and incorporate the necessary worker protection measures.

The operation implements SW RM 02 Rev.3 dated 1 February 2013 - Change Management Procedure to review proposed process and operational changes and modifications for their potential impacts on worker health and safety, and include the necessary worker protection measures.

Prior to drafting a procedure the Training Coordinator meets with operators from the relevant area. The draft procedure is then presented to the Mill Management for comment. The operators are then trained on the procedure by the Training Coordinator at which time the can provide additional feedback on the health and safety procedures

**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.**

**in full compliance with**

**The operation is**

in substantial compliance with

**Standard of Practice 6.2**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 6.2; to operate and monitor cyanide facilities to protect worker health and safety and periodically evaluate the effectiveness of health and safety measures.

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The operation has determined that the appropriate pH for limiting the evolution of HCN gas during mixing and production activities is 10.5.

A hotspot survey was undertaken from 20 October 2014 to 04 November 2014, which identified four areas with mean readings above 4.7 ppm,: Cyanide Mixing Area, CIL tank 1, In-line Leach Reactor Area, and the Trash Screen Area. Fixed monitors are in place at these locations.

The alarms on all of the monitors are set at 4.7 for first alarm whereby the operator should cease activities and leave the area. The second alarm is set at 10 ppm and gives rise to instant evacuation. This is detailed on the notice boards in these areas, in SOP-MT0229 Procedure for Evacuation in Cases of High HCN Gas Detection and from personal communication.

Personal monitoring devices are used when undertaking specific tasks such as Cyanide Unloading, Cyanide Mixing, etc. as stipulated in the procedures e.g. SOP MT 0001 1.0 H 31 Mar 2014 – Cyanide mixing and disposal of empty boxes; SOP MT0002 1.0 F 31 March 2014 -Sodium cyanide transfer; SOP MT0007 1.0 I 31 March 2014-Sodium Cyanide Unloading Procedure; SOP MT0010 1.0 H 31 March 2014 - Dry Cyanide Spill Handling Procedure; SOP MT0014 1.0 G 31 March 2014 -Sodium Cyanide Leakage or Pipe Rupture Procedure.

The hydrogen cyanide monitoring equipment i.e. the Polytron 7000 fixed monitors (x4) and the Pac 7000 personal monitors (x11) are maintained, tested and calibrated in accordance with the manufacturers requirements i.e. serviced every 6 months.

Warning signs have been placed at the solid cyanide storage area, the cyanide mixing and storage tank area and the In-Line Leach Reactor, which are the locations where reagent strength cyanide is used, advising workers that cyanide is present, that smoking, open flames and eating and drinking are not allowed, and what personal protective equipment must be worn.

Showers, low-pressure eye wash stations and dry powder or non-acidic sodium bi-carbonate fire extinguishers are located at strategic locations throughout the operation where cyanide is used. This includes the solid cyanide storage area (dry powder fire extinguisher), cyanide mixing area, Liquid cyanide storage area, In-Line Leach Reactor; and the top of the CIL.

Reagent strength cyanide tanks and distribution pipes are colour coded purple in accordance with colour coding board observed during site visit, In addition the pipes have the direction of their flow indicated on them.

The operational language for the mine and CIL Plant is English in written and verbal communications. This was confirmed through interviews. The MSDS and first aid procedures are located at the Cyanide Mixing Area (including storage tank for liquid cyanide) and the Solid Cyanide Storage Area.

No cyanide incidents have occurred in the last 3 years. Incident Reports are completed on all incidents. The investigations include an evaluation to determine if the operation's programs and procedures to protect worker health and safety are adequate or need to be revised.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 6.3**

not in compliance with

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### Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 6.3; to develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

There is an emergency PPE cabinet within the Plant area. This is stocked with appropriate PPE including face mask with canister and oxygen for first aid treatment. The personnel on site are equipped with radios and will communicate on Channel 2. The Mines Emergency Response Team (3 people per shift) will attend the incident and transport them to the site clinic. The site clinic is less than 500 m from the plant entrance. The clinic is current equipped with 2 full sets of PPE including face masks and canisters. The clinic also has antidote (Cyanokit) to be administered by the medical staff.

The operation inspect its first aid equipment on a monthly basis to assure that it is available when needed and replaced on a schedule that assures they will be effective when required. The clinic inspects the equipment during training sessions, at least 4 training sessions annually to ensure that the 4 shift nurses are covered. The Cyanokits were observed to be stored as directed by their manufacturer and are within their expiry date.

There is a Plant wide procedure for Emergency Preparedness and Response SP08 Rev. 11, dated 11 April 2014. In addition there is a specific cyanide related procedure SP ER 2 rev. 10 dated 24 August 2014 - Emergency Cyanide Incident Procedure.

The Operation has an on site clinic run by International SOS, which is approximately 500 m from the plant entrance. The Clinic is staffed by a Chief Medical Officer, a National Doctor, and 4 nurses (operating on a shift basis). The clinic is equipped to managed patients with cyanide exposure in the short term. If treatment is required in the longer term the patient will be transferred to the on site hospital at Tarkwa mine one hour away, also operated by International SOS. If necessary and decided by International SOS and the mine management the patient will be medivacked to an appropriate facility in Accra.

The Procedure for Emergency Preparedness and Response SP8 Rev 11, dated 11 April 2014 states that mock drills should be undertaken quarterly. This covers mock drills for all types of incidents not just cyanide but does include cyanide. Reports for the cyanide mock emergency drills were observed. The observation from the dill on the 21 February 2014 that the Reagent workers needed additional training has lead the operation to send the relevant workers on basic and advanced first aid training.

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**PRINCIPLE 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.**

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.1**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 7.1; to prepare detailed emergency response plans for potential cyanide releases.

There is a Plant wide Procedures for Emergency Preparedness and Response SP08 Rev. 11, dated 11 April 2014. In addition there is a specific cyanide related procedure SP ER 2 rev. 10 dated 24 August 2014 - Emergency Cyanide Incident Procedure, which describes specific response actions, as appropriate for the anticipated emergency situations, such as clearing site personnel and potentially affected communities from the area of exposure, use of cyanide antidotes and first aid measures for cyanide exposure, control of releases at their source, and containment, assessment, mitigation and future prevention of releases.

The Emergency Cyanide Incident Procedure SP ER 2 rev.10 dated 24 August 2014 considers potential failure scenarios appropriate for its site-specific environmental and operating circumstances as follows:

The catastrophic release of hydrogen cyanide gas is unlikely to happen, due to the separation of solid cyanide and acids, except in the event of a fire. Section 4.1.3 includes the scenario of Fire near Cyanide Storage Area. Section 5.0 Off Site Incident - 'in the event of an incident en route' to Damang. Section 4.1.1 Dry Cyanide Spill (applicable to unloading as solid cyanide is used). Section 4.1.2 Wet Cyanide Spill (this is applicable to mixing). Section 4.1.3 Fire near Cyanide Storage Area. Section 4.1.2 Wet Cyanide Spill including potential failure scenarios e.g. failure of the tailings pipeline.

Procedure for Emergency Preparedness and Response - Fire/Aircraft Accident. Procedure for Emergency Preparedness and Response - Accidental Explosion.

SOP MT0023 Process Water Pond Liner Failure Procedure. SOP MT0098 Procedure for Process Water Pond Operation on Planned Shutdown. The Knight Piesold, East Tailings Storage Facility Operations Manual, ref. 918/25 dated January 2004 includes potential failure scenarios e.g. tailing overflow, failure of TSF and seepage management.

There is a manual Detox Pond in the event that there is a leak/ spill that is routed to the Process Water Dam. The Detox pond then allows for the detoxification of this water before it is returned to the process.

Power outages occur on a regular basis due to the local electricity grid and are not deemed to be an emergency situation. The Plant has enough generator capacity to run the entire Plant.

Transport related emergencies outside the mine are the responsibility of Orica as manager of the supply chain as detailed in 2.1, which will have considered the transportation route, physical and chemical form of the cyanide, method of transport (e.g., rail, truck), the condition of the road or railway, and the design of the

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transport vehicle. In addition the SP ER 2 rev. 10 dated 24 August 2014 - Emergency Cyanide Incident Procedure includes a requirement to provide aid in the event of an off site incident.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.2**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 7.2; to involve site personnel and stakeholders in the planning process.

The workforce are included in the emergency response planning process through the following: induction and refresher training where they are trained on the use of the emergency response process; through the monthly health and safety meetings; and through the testing of the Emergency Responses by undertaking the Mock Emergency Drills.

Consultative meetings held with local communities including chiefs, government officials, district assembly persons, and District Environmental Health Officer, etc. This is called the Damang Mine Community Consultative Committee (DMCCC).

In addition the ICMI Coordinator undertakes a community engagement programme, travelling to the neighbouring communities (Amoanda, Bompieso, K. Gyasi, Mahuntem, Ntsiakokrom, Subri and Koduakrom to discuss cyanide and what happens in an emergency.

The main response agencies are the Emergency Response Team, and the on-site clinic (operated by International SOS). These have all been involved in the emergency planning and response process as confirmed through interviews.

The operation engages in communication with stakeholders to keep the Emergency Response Procedures current. The most recent communication was through the mock drill on the 25 September 2014 which involved the Emergency Response Team, the on-site clinic, and the relevant staff of the CIL Plant, the Stellar Logistics driver, and the neighbouring local community

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.3**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 7.3; to designate appropriate personnel and commit necessary equipment and resources for emergency response.

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SP08 Procedure for Emergency Preparedness and Response rev. 11 dated 11 April 2014 includes designated primary and alternate emergency response co-ordinators. The Primary Response Coordinator is the General Manager who has the authority to commit resources necessary to implement the Plan.

The Emergency Response Teams (ERT) are identified, with the ERT comprised of 3 people for each shift. The nine members in addition to being trained in the Emergency Response Procedure during their initial Induction and regular refresher training also have training in First Aid, Fire Fighting Equipment and use of Emergency Equipment.

Response Team Members are notified through Channel 2 on the site radio system. SP08 Procedure for Emergency Preparedness and Response rev. 11 dated 11 April 2014 Section 5.1 Emergency Reporting and Response includes; the call out procedure, specific duties and responsibilities of the coordinators and team members

The Emergency Response Equipment including PPE kept in the first aid cabinet in the Plant is listed on a checklist. This equipment is checked on a monthly basis. SP ER 2 Emergency Cyanide Incident Procedure rev 9 dated 24 August 2014 states that the emergency equipment must be available and monthly inspections undertaken. Monthly inspections were observed.

The initial response is from the Emergency Response Team who then transfers the patient to the on-site clinic. The on-site clinic treats the patient and is either sent home after treatment or evacuated from site. SP ER 2 Emergency Cyanide Incident Procedure rev 9 dated 24 August 2014 Section 13 Medical Evacuation states the role of International SOS.

In the event of a fire the response is from the Emergency Response Team who operates a fire tender. The communities are not involved in emergency response. In the event of an Emergency the community affairs manager liaises with the community to ensure they are aware of the situation and do not get involved.

The Chief Medical Officer and the National Doctor were interviewed together with one of the nurses confirming the actions to be undertaken in the event of a cyanide exposure. The hospital was recently involved in a full cyanide exposure drill on 25 September 2014. The mine provides cyanide awareness training to the medical staff. All other response is from the internal Emergency Response Team who were also part of the drill.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.4**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 7.4; to develop procedures for internal and external emergency notification and reporting.

SP08 Procedure for Emergency Preparedness and Response rev. 11 dated 11 April 2014 states that the General Manager is responsible for determining responses to major emergencies and deciding on external notification processes. In the event of a spill the Environmental Manager will contact the relevant authorities.

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SP08 includes contact details for the relevant authorities. The Community Affairs Manager will liaise with the local communities at the direction of the General Manager.

**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.**

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.5**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 7.5; to incorporate in response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.

The recovery or neutralisation of solutions or solids is described in SOP MT0012 1G dated 31 March 2013 Procedure for Handling Wet Cyanide.

The decontamination of soil or other contaminated media is described in SOP MT0012 1G dated 31 March 2013 Procedure for Handling Wet Cyanide.

SOP MT0012 1G dated 31 March 2013 Procedure for Handling Wet Cyanide states that after the decontamination of the area the contaminated material is disposed of at the TSF or if appropriate to Feeder 004.

Provision of alternate drinking water supply is not required as local surface water is not in proximity to where process solution strength cyanide solution is used, solid cyanide is stored, or the TSF is located.

ENV11 Surface Water Monitoring Rec. 2.0 includes "special monitoring to be conducted in the event of spills, incidents or emergency management situations". This procedure includes sampling methodologies and parameters. The sampling locations were observed on a map of the site and surrounding areas.

Procedure ML09 rev 1.8 Procedure for Management of Cyanide Contaminated Materials states that "If the water is not completely contained and completely under control, detoxification with chemicals will not be attempted."

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.6**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 7.6; to periodically evaluate response procedures and capabilities and revise them as needed.

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SP ER 2 Emergency Cyanide Incident Procedure rev 9 dated 24th August 2014 states "this procedure will be reviewed at least annually, but also following incident, emergency drills or when new information regarding cyanide becomes available". The Procedure for Emergency Preparedness and Response SP8 Rev 11, dated 11 April 2014 states "the Protection Services Superintendent and the OHS Manager are responsible for evaluating and providing technical guidance related to response plans".

SP08 Procedure for Emergency Preparedness and Response rev 11 dated 11 April 2014 is also reviewed on a regular basis with this document being on revision 11.

The Procedure for Emergency Preparedness and Response SP8 Rev 11, dated 11 April 2014 states that mock drills should be undertaken quarterly. This covers mock drills for all types of incidents not just cyanide but does include cyanide. Reports for mock emergency drills were observed.

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**PRINCIPLE 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.**

**in full compliance with**

**The operation is**

in substantial compliance with

**Standard of Practice 8.1**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 8.1; to train workers to understand the hazards associated with cyanide use.

All personnel on the mine are trained in cyanide hazard recognition through the initial induction for the mine. More detailed cyanide training is provided for those individuals who are likely to encounter cyanide. There is a training matrix showing the training that is required for the different area of the mine e.g. CIL. All personnel interviewed confirmed attendance at initial cyanide induction and refresher training. In addition training files were observed.

The ICMI Cyanide Awareness Training that is provided to all individuals is refreshed on a periodic basis (i.e. when individuals return from annual leave, approximately every 12 months) for those personnel that may encounter cyanide.

All training records including those regarding cyanide training are retained.

**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.**

**in full compliance with**

**The operation is**

in substantial compliance with

**Standard of Practice 8.2**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 8.2; to train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.

The operation trains workers to perform their normal production tasks, including unloading, mixing, production and maintenance with minimum risk to worker health and safety and in a manner that prevents unplanned cyanide releases. The training elements/procedures for each job are identified for each area/team on the training matrix. This includes undertaking formal training in specific procedures.

All personnel on the mine are trained in cyanide hazard recognition through the initial induction for the mine. More detailed cyanide training is provided for those individuals who are likely to encounter cyanide. There is

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a training matrix showing the training that is required for the different area of the mine e.g. CIP. All personnel interviewed confirmed attendance at initial cyanide induction and refresher training.

In addition Planned Task Observations (PTOs) are undertaken with a number of PTOs being reviewed by the auditors.

Carl Agbemenya - Senior Metallurgist Training is the main trainer for personnel within the metallurgy department. His training file was observed and is assessed to be an appropriately qualified to provide task training related to cyanide management activities.

Records are retained throughout an individual's employment documenting the training they have received and including the names of the employee and the trainer, the date of training, the topics covered, and how the employee demonstrated an understanding of the training materials.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 8.3**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 8.3; to train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.

The operation train workers to perform their normal production tasks, including unloading, mixing, production and maintenance with minimum risk to worker health and safety and in a manner that prevents unplanned cyanide releases. This includes undertaking formal training in specific procedures.

All cyanide unloading, mixing, production and maintenance workers are trained in decontamination and first aid procedures as part of the initial Plant Induction before they start work and as part of the refresher training. The workers also take part in mock emergency drills to test and improve their response skills.

3 Members of each shift (x3) are identified as Members of the Emergency Response Team (ERT) in addition to 20 other voluntary members. The nine members in addition to being trained in the Emergency Response Procedure during their initial Induction and regular refresher training also have training in First Aid, Fire Fighting Equipment and use of Emergency Equipment.

Consultative meetings held with local communities including chiefs, government officials, district assembly persons, and District Environmental Health Officer, etc. This is called the Damang Mine Community Consultative Committee (DMCCC). The meeting held on the 29 October 2013 included a presentation by the Metallurgical Training and ICMI Coordinator on cyanide awareness including the actions to be undertaken in an emergency. This provides an opportunity for the external stakeholders including off site emergency responders to raise any issues regarding the Emergency Response Plan.

The Procedure for Emergency Preparedness and Response SP8 Rev 11, dated 11 April 2014 states that mock drills should be undertaken quarterly. This covers mock drills for all types of incidents not just cyanide but does include cyanide. Reports for mock emergency drills were observed including environmental and worker exposure.

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The Senior Metallurgist Trainer attends the Mock Emergency Drills to determine if there is any additional training required. The observation from the drill on the 21 February 2014 that the Reagent workers needed additional training has lead the operation to send the relevant workers on basic and advanced first aid training.

All of the training records include the name of the employee, the name of the trainer, the date of the training, the topics covered and how the employee demonstrated an understanding of the training materials

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**PRINCIPLE 9 – DIALOGUE**

**Engage in Public Consultation and Disclosure**

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 9.1**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation provides the opportunity for stakeholders to communicate issues of concern regarding the management of cyanide.

The workforce are included in the emergency response planning process through the following; the induction and refresher training where they are trained on the use of the emergency response process, through the monthly health and safety meetings, and through the testing of the Emergency Response by undertaking the Mock Emergency Drills.

Consultative meetings held with local communities including chiefs, government officials, district assembly persons, and District Environmental Health Officer, etc. This is called the Damang Mine Community Consultative Committee (DMCCC). The meeting held on the 29 October 2013 included a presentation by the Metallurgical Training and ICMI Coordinator on cyanide awareness including the actions to be undertaken in an emergency. This provides an opportunity for the external stakeholders including off site emergency responders to raise any issues regarding the Emergency Response Plan.

In addition the ICMI Coordinator undertakes a community engagement programme, travelling to the neighbouring communities (Amoanda, Bompieso, K. Gyasi, Mahuntem, Ntsiakokrom, Subri and Koduakrom to discuss cyanide and what happens in an emergency

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 9.2**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 9.2; to initiate dialogue describing cyanide management procedures and responsively address identified concerns.

The workforce are included in the emergency response planning process through the following; the induction and refresher training where they are trained on the use of the emergency response process, through the monthly health and safety meetings, and through the testing of the Emergency Response by undertaking the Mock Emergency Drills.

Signature of Lead Auditor

**Damang Gold Plant**  
Name of Facility

7 April 2015  
Date







## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

Consultative meetings held with local communities including chiefs, government officials, district assembly persons, and District Environmental Health Officer, etc. This is called the Damang Mine Community Consultative Committee (DMCCC). The meeting held on the 29 October 2013 included a presentation by the Metallurgical Training and ICMI Coordinator on cyanide awareness including the actions to be undertaken in an emergency. This provides an opportunity for the external stakeholders including off site emergency responders to raise any issues regarding the Emergency Response Plan.

In addition the ICMI Coordinator undertakes a community engagement programme, travelling to the neighbouring communities (Amoanda, Bompieso, K. Gyasi, Mahuntem, Ntsiakokrom, Subri and Koduakrom) to discuss cyanide and what happens in an emergency.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 9.3**

not in compliance with

**Summarise the basis for this Finding/Deficiencies Identified:**

The operation is in full compliance with Standard of Practice 9.3; to make appropriate operational and environmental information regarding cyanide available to stakeholders.

The operation has developed a written description of how their activities are conducted and how cyanide is managed in the form of a presentation. This presentation was given to the DMCC on the 29 October 2013.

The main form of communication with surrounding communities is in a verbal format by the 4 members of the Community Affairs Department due to the high level of illiteracy in the local area. This includes three consultative meetings a year with the DMCCC, school visits to the mine, and other informal discussions with the community.

In addition the ICMI Coordinator undertakes a community engagement programme, travelling to the neighbouring communities (Amoanda, Bompieso, K. Gyasi, Mahuntem, Ntsiakokrom, Subri and Koduakrom) to give the presentation.

Any incident of cyanide exposure that results in the following; hospitalisation or fatality, releases off the mine site that require response or remediation, releases on or off the mine site resulting in significant adverse effects to health or the environment, releases off the mine site requiring reporting under applicable regulations, or releases that cause exceedance of applicable limits for cyanide, have to be reported to the Ghanaian EPA. There has not been any such incident or event in the last 3 years. If such an event were to happen this would subsequently be discussed at the quarterly DMCCC meetings.

**Damang Gold Plant**  
Name of Facility

\_\_\_\_\_  
Signature of Lead Auditor

7 April 2015  
Date



## Report Signature Page

**GOLDER ASSOCIATES AFRICA (PTY) LTD.**

A handwritten signature in black ink, appearing to read 'Ed Perry'.

Ed Perry  
Lead Auditor

A handwritten signature in blue ink, appearing to read 'Romain Girard'.

Romain Girard  
Gold Mine Auditor

Date: 7 November 2015

EP/RG/agep

Reg. No. 2002/007104/07

Directors: SA Eckstein, RGM Heath, SC Naidoo, GYW Ngoma

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