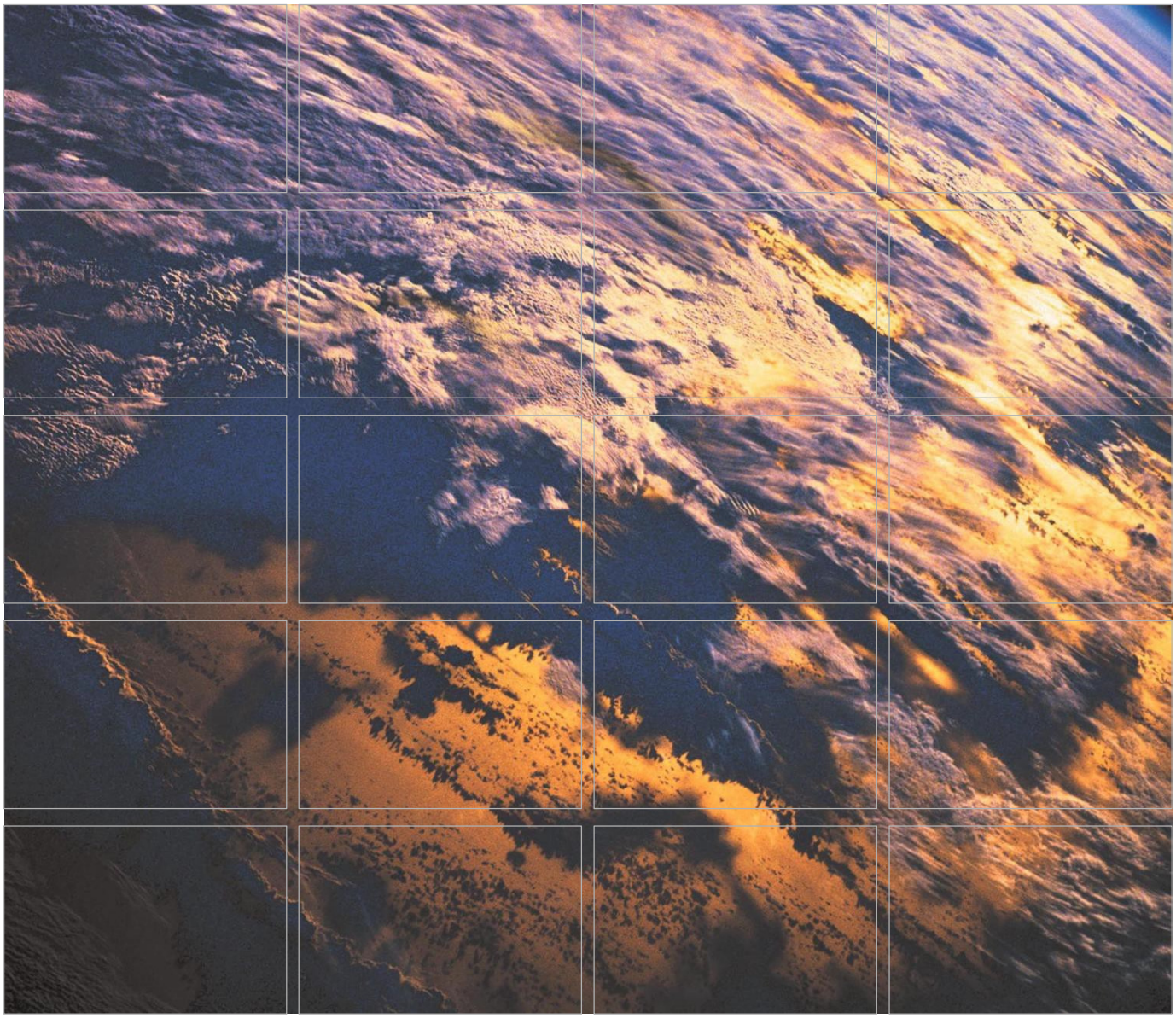

ICMC Recertification Audit of Damang Gold Plant - Summary Report

February 2018

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ERM Ref No: 0431822

GoldFields Ghana Limited

ICMC Recertification Audit of Damang Gold Plant -
Summary Report

23 May 2018

Prepared by: Environmental Resources Management (ERM)

For and on behalf of
Environmental Resources Management

Approved by: Don Gibson

Signed:

Mike Everett

Position: Partner

Date: May 2018

CONTENTS

1.0 SUMMARY AUDIT REPORT FOR MINING OPERATIONS

Name of Cyanide User Facility:	Goldfields Damang Plant
Name of Cyanide User Facility Owner:	Goldfields Ghana Limited
Name of Cyanide User Facility Operator:	Goldfields Ghana Limited
Name of Responsible Manager:	Catherine Kuupol Kuutor, Metallurgical Manager
Address:	Damang Mine P. O. Box 208, Tarkwa, Ghana
Country:	Ghana
Telephone:	+233 (0)362 22 416/7
E-Mail:	Catherine.Kuupol@goldfields.com

2.0 LOCATION DETAIL AND DESCRIPTION OF OPERATION

GoldFields Ghana 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 12,600 tonnes per day (4.2 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 and tertiary crushing stages in close circuit with two pebble crushers and subsequently 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 approximately 50% solid density. The thickened leach feed now reports to the eight CIL tanks of 3000 cubic metres each. The final leach tails report to two tails tanks and pumped to the tailings dam. 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 from the ILR reports to the Ball Mill for regrinding. 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 tanks;

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- 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.

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 Weak Acid Dissociable (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 248 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

Goldfields Damang Gold Plant is:	☒ **in full compliance with**	**The International Cyanide Management Code**
	☐ in substantial compliance with	
	☐ not in compliance with	

Audit Company: Environmental Resource Management Southern Africa (Pty) Ltd
Audit Team Leader: Ed Perry, Lead Auditor
Email: ed.perry@erm.com

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

NAME OF OTHER AUDITORS

Marie Schlechter, ICMI pre-certified Mine Technical Specialist

DATES OF AUDIT

The Re-certification Audit was undertaken between 3 December 2017 and 7 December 2017.

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 for Mining Operations Verification Protocol and using standard and accepted practices for health, safety and environmental audits.

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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.

The operation is
- ☒ **in full compliance with**
- ☐ 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 International PTE Ltd's. (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 and again on 22 February 2017. GoldFields Ghana Limited has a contract with Orica for the supply of solid cyanide to Damang Mine.

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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.

The operation is

☒ **in full compliance with**

☐ 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 currently includes Stellar Logistics (certified 14 April 2015).

The contract designates responsibilities for the following:

a) Packaging as required by the United Nations for international shipments and by the political jurisdiction(s) the shipment will pass through.
b) Labelling in languages necessary to identify the material in the political jurisdiction(s) the shipment will pass through, and as required by these jurisdiction(s) and by the United Nations (for international shipments).
c) Storage prior to shipment.
d) Evaluation and selection of routes, including community involvement.
e) Storage and security at ports of entry.
f) Interim loading, storage and unloading during shipment.
g) Transport to the operation.
h) Unloading at the operation.
i) Safety and maintenance of the means of transportation (e.g. aircraft, vessels, trains, etc.) throughout transport.
j) Task and safety training for transporters and handlers throughout transport.
k) Security throughout transport.
l) Emergency response throughout transport.

The contract states 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.

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

The operation is

- ☒ **in full compliance with**
- ☐ **in substantial compliance with** **Standard of Practice 2.2**
- ☐ **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 was observed. The contract states 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 currently Stellar Logistics (certified 14 April 2015).

The operation has chain of custody records identifying all the elements of the supply chain that handle the cyanide brought to Damang Mine.

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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.

The operation is

- ☒ **in full compliance with**
- ☐ **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.

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 in April 2017.

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 incompatible materials. They are 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.

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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.

The operation is

- ☒ **in full compliance with**
- ☐ **in substantial compliance with Standard of Practice 3.2**
- ☐ **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 the Orica Storage Facility in Tarkwa. The sea container with the empty cyanide boxes is subsequently sent to the Vehrad incinerator in Accra 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.

The operation has developed and implemented plans or procedures to prevent exposures and releases during cyanide unloading and mixing activities. The procedures listed below were reviewed.

SOP- MT 0001 rev 1.0 I 08 June 2017 – Cyanide mixing and disposal of empty boxes - describes the handling of valves and couplings during cyanide mixing; SOP MT0002 1.0 G 18 January 2017 - Sodium Cyanide Transfer; which includes the operation and sequencing of feed and discharge valves during and after mixing; SOP- MT 0001 rev 1.0 I 08 June 2017 – Cyanide mixing and disposal of empty boxes; SOP- MT 0007 rev 1.0 J 08 June 2017- Procedure for unloading shipping container, which stipulates maximum stacking height of 3 boxes; SOP MT 0001 rev 1.0 I 08 June 2017 – Cyanide mixing and disposal of empty boxes; MT 0010 Rev 1.0 H 18 January 2017 - Procedure for handling dry sodium cyanide spill (Spilt Bag); MT 0011 Rev 1.0 G 08 June 2017 - Procedure for handling dry sodium cyanide spill (Sea Container); and MT 0012 Rev 1.0 H 01 December 2016 - Procedure for handling wet cyanide spills.

All of the procedures include the specification of Personal Protective Equipment (PPE) to be used.

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. 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.

The operation is

- ☒ **in full compliance with**
- ☐ **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.

Written management and operating plans or procedures have been developed for cyanide facilities including unloading, mixing and storage facilities, and tailings impoundments

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

- Solid cyanide storage area;
- Mixing and storage tanks;
- 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 Operation has 248 Standard Operating Procedures. There is currently 40 cyanide related 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 or procedures that identify the assumptions and parameters on which the facility design was based and any applicable regulatory requirements (e.g., freeboard required for safe pond and impoundment operation; the cyanide concentrations in tailings on which the facility's wildlife protection measures were based) as necessary to prevent or control cyanide releases and exposures consistent with applicable requirements.

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Standard Operating Procedure (SOP) MT 0049 1.0 G Procedure for Determination of pH & Free Cyanide Concentration in CIL Tanks. Procedure states that pH in CIL Tank 1 should be above 9.8

Procedure ML 06, rev number 2.0- Procedure for Tailings Management system details the actions for ensuring that the supernatant pond does not develop close to the dam walls, removing process water from the tailings, avoiding spillage and unplanned discharge into the environment, appropriately managing the tailings delivery, distribution and return water lines, maintaining a constant source of water supply to the mill, ensuring that: WAD cyanide at spigot or in supernatant does not exceed 50 ppm, requires an embankment freeboard in excess of 0.5m above the deposited tailings beach elevation, maximise water return and maintain the decant pond centred around the decant location. The pond shall not be permitted to approach within 50 m of upstream embankment crests and the operating sequence shall be adjacent as required to achieve this objective. The target beach length is 100m.

Knight Piesold Tailings Facility (TSF) operating manual (2004) refers to design standards to contain a 1:100 year storm event

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 including shiftly, daily, and monthly inspections.

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. Job cards are also raised where ad hoc maintenance is required by the plant inspections or observations from foremen and the control room.

The operation inspects cyanide facilities on an established frequency sufficient to assure and document that they are functioning within design.

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 implements OHS RM 02 Rev.8 dated 26 August 2017 - Change Management Procedure. The purpose of the procedure is to detail the change management process used at Goldfields so as to ensure that; a structured approach is applied to the management of change on site; and information relating to changes to the business is communicated to all interested and affected parties.

The operation has developed a number of procedures for contingencies and non-standard operating conditions, including upset in water balance, corrective action, and either planned or emergency shutdowns including a temporary closure or cessation of operations.

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The operation inspects the unloading, storage, mixing and process areas including the following; daily cyanide reagent area checklist, daily checklist for TSF, and Report on Structural Integrity Audit / Test for Abosso Goldfields Mine, Report No: IE/2017/SA/GF001, 28 July 2017, conducted by Inspectors & Engineers Co. LTD. The following areas were inspected:

- Thickener and overflow pumps;
- CIL tanks and platform;
- Cyanide storage, mixing and caustic mixing tanks;
- Tailings tanks and platform;
- Tank thickness testing.

All facilities were found to be in good condition. The structural integrity audits, which includes the inspection of process solution tanks for structural integrity and signs of corrosion, are undertaken on an annual basis. Inspection of the process solution tanks for leakage is undertaken on a daily basis.

There is no requirement for surface water diversions to manage run-on.

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

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 back-up generating equipment is maintained and tested.

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

The operation is	☒ **in full compliance with**	**Standard of Practice 4.2**
	☐ **in substantial compliance with**	
	☐ **not in compliance with**	

Summarise the basis for this Finding/Deficiencies Identified:

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

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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.

Practically, a cyanide reduction programmes consists of having a set point, monitoring cyanide content and undertaking cyanide addition control. 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.
The operation receives very variable ore from the various pits. Ore is fed into the plant based on grade and not location of ore. If it is observed there is high consumption of cyanide due to ore being treated, it is possible to adjust the feed from a different stockpile.

They check the WAD analyser in No. 8 to see the level of WAD cyanide then go back to the No.1 tank and check the set point at the cyanoprobe. Above 80ppm WAD in the No.8 tank will need an adjustment at No. 1 tank.

The set point is normally 150 ppm at the No. 1 tank. Setpoint is manually changed on the cyanoprobe. The cyanoprobe does an automatic check of the cyanide concentration every 45 minutes, every 2 hours manually titration to verify the cyanide concentration in both No. 1 and 8 tanks. The control checks the cyanide levels in both tanks every hour and notes on a logsheet. Shiftly testing of the cyanide profile in all the tanks are done in the plant lab by means of manual titration.

Assay is done on the final residue in tank 8 to determine the residue gold to ensure optimum recovery. This is balanced by checking the WAD received at the spigot to ensure conservation of wildlife.

30 % from the cyclone underflow reports to the Knelson Concentrators that feeds the Intensive Leach Reactor (ILR). The feed grade and residue grades are checked to determine the set point for the ILR. The ILR setpoint varies between 1.5 to 1.8%. From the ILR the barren eluate reports to the No. 1 CIL tank. The cyanide is pumped at a configured flow rate from the cyanide storage tank as per the setpoint.

The operation previously added cyanide to the mill circuit prior to it entering the leach tanks. This was then reviewed and it was ascertained that there was minimal benefit from this and this practise then ceased leading to a reduction in cyanide used during 2013.

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**	

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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 1.5 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.

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

The operation is

- ☒ **in full compliance with**
- ☐ **in substantial compliance with** **Standard of Practice 4.4**
- ☐ **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 4.4 to implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions
There is no heap leach currently being operated.

There are no open waters where WAD cyanide exceeds 50 mg/L WAD cyanide therefore the operation has not needed to implement measures to restrict access by wildlife and livestock.

Proc ML 06 Procedure for Tailings Management, Rev 2.0 – Ensure that WAD on Tailings Dam does not exceed 50 mg/l.

The following analytical results were observed:
WAD monitoring results for 2015, 2016, and 2017. Fifteen exceedances occurred in 2015. One exceedance in 2016. (20 June 2016 – 60.77 mg/l) and one in 2017 (4 Jan 2017 – 51.35 mg/l). WAD samples are collected on a weekly basis at the TSF spigot.

The exceedances in 2015 occurred throughout the year. This lead to increased analysis and adjustment of the set point as described in 4.2.3.

Observed WAD monitoring results for 2015, 2016, up to Oct 2017 for the Process Water Pond, which accepts runoff from the plant that is re-used in the process. All of the readings were below 0.5 mg/l with the exception of a single reading in June 2016 of 40.8 mg/l. The Process Water Pond is HDPE lined and does not discharge to the environment. The reading in July 2016 was again below 0.5 mg/l.

No wildlife mortalities have been observed in the past three years.

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

The operation is

- ☒ **in full compliance with**
- ☐ **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.

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Monitoring data was observed for surface water monitoring of the nearby Beni River, the TSF seepage sumps, and the groundwater boreholes.

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

The operation is

- ☒ **in full compliance with**
- ☐ **in substantial compliance with** **Standard of Practice 4.6**
- ☐ **not in compliance with**

Summarise the basis for this Finding/Deficiencies Identified:

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; High Density Polyethylene (HDPE) lining of the detoxification pond; concrete lining of channel from Gold Plant to Process Water Pond; and tailings distribution and return water pipeline located in a trench 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 except for June 2015 and Feb 2016 where the highest levels were 0.021 mg/l WAD cyanide.

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

The operation is

- ☒ **in full compliance with**
- ☐ **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 to provide spill prevention or containment measures for process tanks and pipelines.

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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 storage and mixing tanks are sized to hold a volume greater than that of the largest tank.

Secondary containments for cyanide storage and mixing tanks are sized to hold a volume greater than that of the largest tank within the containment and any piping draining back to the tank, and with additional capacity for the design storm event. The bund for the process tanks does not have sufficient capacity. In the event of the bund overflowing it will flow to the Plant perimeter trench from where it will be pumped back to the process. Should the perimeter trench overflow it will flow across the plant perimeter to the SAG Mill Scat stockpile where it will be trapped until such time as it is cleaned up.

The procedures for undertaking a clean-up include the following:
SOP MT0012 1.0H 01 December 2016- Procedure for cleaning wet cyanide spillage – clean-up of wet cyanide briquettes;
SOP MT0014 1.0H 08 September 2017 Procedure for sodium cyanide leakage or pipe rupture – clean-up of spills inside and outside bunded areas; and
SOP MT0015 1.0 L 08 June 2017 Procedure for Tailings Delivery Failure.

There is a Plant wide Procedures for Emergency Preparedness and Response SP08 Rev. 18, dated 10 January 2017 – Section on Tailings Dam or Line Failure p10. In addition there is a specific cyanide related procedure SP ER 2 rev. 13 dated 12 May 2017- Emergency Cyanide Incident Procedure.

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.

The pipeline to the TSF is contained in a HDPE lined trench with a pipe in pipe solution where it goes under the haul road.

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 HDPE for the tailings pipe line.

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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.

The operation is

- ☒ **in full compliance with**
- ☐ **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.

Quality control and quality assurance programs were implemented during construction of all new cyanide facilities and modifications to existing facilities, including cyanide unloading, storage, mixing facilities and other cyanide facilities

The 2015 recertification audit report stated:
"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. Quality Assurance/ Quality Control (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

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elements of the facility involving cyanide and issued a report concluding that its continued operation within established parameters will protect against cyanide exposures and releases."

The only moderation since the previous audit is a new raise to the TSF.

The auditors observed the Knight Piesold Consulting, Damang Gold Project, Report on East Tailings Storage Facility 1007.5m RL Raise Construction Report, 26 July 2017.

- Section 3.1 Construction Materials addresses the suitability of materials.
- Section 6. Certification, certifies that the raise construction meets the design intent of the Damang East Tailings Storage Facility 1007.5m RL Raise. Signed by Project Engineer: Abdul-Rahman Agyeman, Approved by: Regional Manager / Principal Engineer: Jeffrey Coffin.

Quality control and quality assurance records have been retained for cyanide facilities

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 will protect against cyanide exposures and releases.

The TSF and Tailings pipeline undergo quarterly inspections via a third party. The auditors observed the following reports:

- Damang Gold Mine, East Tailings Storage Facility, Quarterly Inspection Report, 2nd Quarter 2017, Knight Piesold Consulting. – Approved by Principal Engineer: Jeff Coffin.

- Damang Gold Mine, East Tailings Storage Facility, Quarterly Inspection Report, 4th Quarter 2016, Knight Piesold Consulting – Approved by Principal Engineer: Jeff Coffin.

The plant is inspected on a regular basis. The auditors observed the following reports:

- Report on: QA/QC Inspection of Cyanide Facilities in the Process Plant and Tailings Storage Facility – Gold Fields Ghana, Damang Mine, dated 12 April 2017, conducted by Topsky Ventures (Equipment Inspectors). Signed by the Engineer: Francis Mensah.
- Report on Structural Integrity Audit / Test for Abosso Goldfields Mine, Report No: IE/2017/SA/GF001, 28 July 2017, conducted by Inspectors & Engineers Co. LTD. Signed by the Inspection Engineer: Simon Andoh Acquah.

All facilities were found to be in good condition

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

The operation is

- ☒ **in full compliance with**
- ☐ **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:

- Proc EN 11 Procedure for Surface Water Monitoring Rev 2.2 ; and
- Proc EN 12 Procedure for Ground Water Monitoring Rev 2.0

The procedures were developed internally by the environmental officers, checked by the Unit Manager Environment John Adingeloh (BSc in chemistry (2003) and MSc in Environmental Sciences (2009), (Kwame Nkrumah University of Science and Technology, Kumasi), and finally approved by the health, safety and environmental manager Francis Nyame(MSc- Water and environmental management from Staffordshire University, 2006)

The testing is being undertaken by SGS Maslab laboratories in their laboratory facilities in Tema.

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 in the sample logbook. The operation monitors for cyanide in surface and groundwater down-gradient of the site. There are no discharges of process water to surface water.

The operation inspects for and records wildlife mortalities related to contact with and ingestion of cyanide solutions. The TSF Daily Checklist includes a requirement to note any wildlife mortalities. Procedure SW05- Fish and Wildlife Protection Rev 1.9 states that any wildlife incident must be reported as an environmental incident, and investigated. No wildlife mortalities have been observed in the past 3 years.

Monitoring is conducted at frequencies adequate to characterise the medium being monitored and to identify changes in a timely manner. Surface and groundwater sampling is conducted on a monthly basis.

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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.

The operation is

☒ **in full compliance with**

☐ **in substantial compliance with Standard of 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 the following written procedures to decommission cyanide facilities at the cessation of operations:

Proc EN 02 Procedure for Rehabilitation and Closure Rev 2.3, which is reviewed on an annual basis; and

Damang Gold Mine, Main Report – Damang Gold Mine Costed Reclamation Plan, SLR Consulting Report No: 710.01049.00003, Report No: 01-Final, October 2015.

The plan includes an implementation schedule for decommissioning activities.

Table A3-1: Life of Mine Reclamation Plan for the Tailings Storage Facilities. Indicates the various decommissioning steps to be performed in 4 quarters per year spanning to Quarter 1 2025.

Table A4-1: Life of Mine Reclamation Plan for the Process Plant and Surrounding area. Ore processing is planned until 2020. Decommissioning and reclamation of the plant commence in 2021 with final completion in first quarter of 2025.

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

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

The operation is

☒ **in full compliance with**

☐ **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 Consulting every 2 years, and the 2015 and 2017 cost estimates were reviewed.

It is a legal requirement to have a cash deposit and a bank guarantee. The auditors reviewed an Stanbic Bank 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.

The operation is

- ☒ **in full compliance with**
- ☐ **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 procedures require, where necessary, the use of personal protective equipment and address pre-work inspections.

The operation implements OHS RM 02 Rev.8 dated 26 August 2017 - Change Management Procedure. The purpose of the procedure is to detail the change management process used at Goldfields so as to ensure that:

a) A structured approach is applied to the management of change on site; and
b) Information relating to changes to the business is communicated to all interested and affected parties.

The operation solicits and actively considers worker input in developing and evaluating health and safety procedures

Any changes to existing procedures are discussed during the toolbox meetings at specific sections. This is presented by the Training Coordinator and the Section Leader. Input from the employees are considered before the procedure is finalised, distributed and Planned Task Observations (PTOs) performed on the updated procedure.

In addition, procedures may be updated in response to an incident investigation and as part of this worker input solicited.

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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.

The operation is

- ☒ **in full compliance with**
- ☐ **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.

The operation has determined the appropriate pH for limiting the evolution of Hydrogen Cyanide (HCN) gas during mixing and production activities.

SOP MT 0001 1.0 I Procedure for Mixing Cyanide and Disposal of Empty Boxes, procedure states bags of caustic is added to cyanide-mixing tank to ensure that the pH of the solution in the mixing tank is 10.5 (measured via inline pH meter).

SOP MT 0049 1.0 G Procedure for Determination of pH & Free Cyanide Concentration in CIL Tanks. Procedure states that pH in CIL Tank 1 should be above 9.8. (Measured with in line pH meter).

The operation uses ambient or personal monitoring devices to confirm that controls are adequate to limit worker exposure to HCN gas and sodium, calcium or potassium cyanide dust to 10 ppm on an instantaneous basis and 4.7 ppm continuously over an 8-hour period, as cyanide where the potential exists for significant cyanide exposure.

Currently four fixed HCN monitors have been installed in the following areas:

- Cyanide mixing area
- ILR
- 2 CIL tank No.1 and No.2.

Currently fifteen (15) personal monitors are available for use at any time on the plant and TSF.

SOP MT0229 1.0B 01 December 2016 Procedure for evacuation in cases of High HCN Gas Detection
Procedure stipulates the following alarm levels:

- 4.7 ppm – high alarm
- 10.0 ppm – high high alarm

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Procedure stipulates the actions to be taken upon hearing the high and the high high alarm.

The operation has identified areas and activities where workers may be exposed to cyanide in excess of 10 ppm on an instantaneous basis and 4.7 ppm continuously over an 8-hour period, and require the use of personal protective equipment in these areas or when performing these activities.

Personal HCN monitors are required when entering the cyanide storage area, ILR, or when specific work is performed on the reagent strength lines at the CIL, when working in the cyanide mixing and storage area working at the TSF deposition point, or when conducting titration tests at the Met Lab. The PPE required for these activities is specified in the relevant SOPs.

Hydrogen cyanide monitoring equipment is maintained, tested and calibrated as directed by the manufacturer, and records are retained for at least one year.

Warning signs have been placed where cyanide is used advising workers that cyanide is present, and that smoking, open flames and eating and drinking are not allowed, and that, if necessary, suitable personal protective equipment must be worn.

Showers, low pressure eye wash stations and dry powder or non-acidic sodium bicarbonate fire extinguishers are located at strategic locations throughout the operation and they are maintained, inspected and tested on a regular basis.

Unloading, storage, mixing and process tanks and piping containing cyanide are identified to alert workers of their contents, and the direction of cyanide flow in pipes is designated.

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 TSF pipes states they are 'poisonous' with the flow direction.

The operational language for the mine and Plant is English in written and verbal communications. This was confirmed through interviews. The Material Safety Data Sheet and first aid procedures are located at the Cyanide storage area, Cyanide Mixing Area (including storage tank for liquid cyanide), ILR and CIL.

SP 10 Procedure for Incident Management rev10, 12 August 2017 is in place and being implemented to investigate and evaluate cyanide exposure incidents to determine if the operation's programs and procedures to protect worker health and safety, and to respond to cyanide exposures, are adequate or need of revising.

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

The operation is

☒ **in full compliance with**

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

☐ **not in compliance with**

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 The operation has water, oxygen, a resuscitator, antidote kits, radios, cell phone, and alarmed safety showers readily available for use at unloading, storage and mixing locations and elsewhere in the plant. There are first aid cabinets at strategic locations in the Plant and the TSF containing appropriate PPE, oxygen and antidote for use in a cyanide emergency.

The operation has water, oxygen, a resuscitator, antidote kits and a radio, telephone, alarm system or other means of communications or emergency notification readily available for use at cyanide unloading, storage and mixing locations and elsewhere in the plant.

There is an emergency PPE cabinet within the Plant area close to the mixing area. This is stocked with appropriate PPE including face mask with canister and oxygen and amyl nitrate, which is kept in a fridge as per manufacturers instructions. In addition there is appropriate PPE including face mask with canister and oxygen at the top of the CIL.

The personnel on site are equipped with radios and will communicate on Channel 2. In addition there are telephones, which can be used to contact the Control Room or Emergency Response Team.

The Mines Emergency Response Team (3 people per shift) or the Hazchem Team inside the Plant (3 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 currently equipped with 2 full sets of PPE including face masks and canisters. The clinic also has two antidote (Cyanokit) to be administered by the medical staff.

The Clinic is staffed by 2 Doctors, and 3 nurses (operating on a shift basis, a Health Assistant and an Admin Assistant). The clinic is equipped to manage 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 Accra Medical Centre. If necessary and decided by the mine management the patient will be medivacked to an appropriate facility in Accra.

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The operation inspects its first aid equipment regularly to ensure that it is available when needed and materials such as cyanide antidotes are stored and/or tested as directed by their manufacturer and replaced on a schedule to ensure that they will be effective when needed.

GoldFields Tarkwa Mine Hospital in Tarkwa supplies the Cyanokit and amyl nitrate to the Damang clinic and maintains a schedule for its regular replacement.

The operation has developed specific written emergency response plans or procedures to respond to cyanide exposures.

There is SP 08 Procedure for Emergency Preparedness and Response rev 18, 10th January 2017.

In addition there is a Plant Specific procedure; SP ER 02 Emergency Cyanide Incident Procedure, rev 13, 12th May 2017.

The Clinical Coordinator was interviewed 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 June 2017. The mine provides cyanide awareness training to the medical staff. The Protocol for Treatment with Cyanokit was observed – Cyanide Poisoning

Mock emergency drills are conducted periodically to test response procedures for various cyanide exposure scenarios, and lessons learned from the drills are incorporated into response planning

ERT and HazChem take part in mock drills to test their response to emergency situations. All other employees are evacuated.

Mock drills are conducted annually for both worker exposures and environmental releases. The Met Training Coordinator observes the response from the response teams and will recommend additional training in the event that such training is required.

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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.

The operation is

☒ **in full compliance with**

☐ **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.

The operation has developed an Emergency Response Plan to address potential accidental releases of cyanide.

There is a Plant wide Procedure for Emergency Preparedness and Response SP08 Rev. 18, dated 10 January 2017.

In addition there is a specific cyanide related procedure SP ER 2 rev. 13 dated 12 May 2017 - Emergency Cyanide Incident Procedure.

The Plans consider the potential cyanide failure scenarios appropriate for its site-specific environmental and operating circumstances, including the following, as applicable.

- Catastrophic release of hydrogen cyanide from storage or process facilities;
- Transportation accidents;
- Releases during unloading and mixing;
- Releases during fires and explosions;
- Pipe, valve and tank ruptures;
- Overtopping of ponds and impoundments;
- Power outages and pump failures;
- Uncontrolled seepage;
- Failure of cyanide treatment, destruction or recovery systems (not applicable as no cyanide treatment undertaken); and
- Failure of tailings impoundments, heap leach facilities and other cyanide facilities.

Transport related emergencies outside the mine are the responsibility of Orica as manager of the supply chain, 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 transport vehicle as part of the route risk assessment.

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In addition the SP ER 2 rev. 13 dated 12 May 2017 - Emergency Cyanide Incident Procedure includes a requirement to provide aid in the event of an off-site incident – Section 5. Off Site Incident.

The Plan 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.

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

The operation is

- ☒ **in full compliance with**
- ☐ **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 involving site personnel and stakeholders in the planning process.

The operation has involved its workforce and stakeholders, including potentially affected communities, in the cyanide emergency response planning.

The draft Emergency Response Plan is circulated to the various Head of Departments (HODs) for comment. HOD's will obtain comments from the respective departments.

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 Reponses 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).

These meetings provide the opportunity for community representatives to communicate issues of concern, these are detailed in the minutes. No issues were raised regarding the management of cyanide in the 2015 meeting.

The Met Training 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.

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

ERT and HazChem take part in mock drills to test their response to emergency situations.

The operation engages in communication with stakeholders to keep the Emergency Response Procedures current through internal meetings and mock drills and community meetings.

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

The operation is

- ☒ **in full compliance with**
- ☐ **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.

The cyanide related elements of the Emergency Response Plan designate appropriate personnel and commit necessary equipment and resources including the following.

SP08 Procedure for Emergency Preparedness and Response rev. 18 dated 10 January 2017 includes designated primary and alternate emergency response co-ordinators. The overall Primary Response Coordinator is the General Manager who has the authority to commit resources necessary to implement the Plan. The primary response coordinator for Metallurgy (the Plant) is Catherine Kuupol – Metallurgical Manager and the alternate coordinator is Sampson Arthur – Metallurgical Unit Manager.

The Emergency Response Teams (ERT) and HazChem Teams are identified, with both consisting of 3 members per shift.

The nine members of the ERT 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.

ERT Members are notified through Channel 2 on the site radio system. The call out procedure is included in SP08 Procedure for Emergency Preparedness and Response rev. 18 dated 10 January 2017 Section 5.1 Emergency Reporting and Response.

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Specific duties and responsibilities of the coordinators and team members are included in SP08 Procedure for Emergency Preparedness and Response rev. 18 dated 10 January 2017 Section 5.1 Emergency Reporting and Response and in SP ER 2 Emergency Cyanide Incident Procedure rev 13 dated 12 May 2017.

The Emergency Response Equipment including PPE is kept in the first aid cabinet in the Plant, and is listed on a checklist. SP ER 2 Emergency Cyanide Incident Procedure rev 13 dated 12 May 2017 states that the emergency equipment must be available and monthly inspections undertaken.

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 13 dated 12 May 2017 Section 13 Medical Evacuation states the process for medical evacuation coordinated by Accra Medical Centre.

In the event of a fire the response is from the Emergency Response Team and the HazChem 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 on-site clinic is involved in the mock drills. Outside entities are not involved in emergency responses.

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

The operation is

- ☒ **in full compliance with**
- ☐ **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.

The Plan includes procedures and contact information for notifying relevant stakeholders.

SP08 Procedure for Emergency Preparedness and Response rev. 18 dated 10 January 2017 lists contact information for the various individuals and departments required as part of the emergency response including the on-site clinic.

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Section 4a states "The General Manager is responsible for determining responses to major emergencies and for ultimately deciding on external notification procedures."

Outside response providers are not required as part of the emergency response.

Proc 06 Procedure for External Environmental Communication rev 2.2 section 4.6 b states that "In the event of incidents involving hazardous materials , such as cyanide, petroleum products or other chemicals that could result in injuries or potential damage to workers, the environment or local people, the company will make factual information publicly available."

Section 4.5 c states that "The General Manager will, where appropriate, gain prior corporate approval before issuing any release to the media."

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 Plan describes specific remediation measures as appropriate for the likely cyanide release scenarios.

The recovery or neutralisation of solutions or solids, and the decontamination of soil or other contaminated media is described in SOP MT0012 1.0 H dated 01 December 2016 Procedure for Handling Wet Cyanide. This procedure also states that after the decontamination of the area the contaminated material is disposed of at the TSF or if appropriate to Feeder 004.

The procedures state that following the clean-up of contaminated material, ferrous sulphate is to be used for decontamination. Ferrous sulphate is kept and used in its solid form and stored with the other emergency response equipment. Spillage on to soil is unlikely as the plant is covered in concrete and the tailing pipeline is in an HDPE lined trench. Therefore, it is not considered necessary to define the final concentration allowed in residual soil.

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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

Procedure ML09 rev 2.7 Procedure for Management of Cyanide Contaminated Materials section 4.5 Cyanide Contaminated Water states that "If the water is not completely contained and completely under control, detoxification with chemicals will not be attempted."

The Plan address the potential need for environmental monitoring to identify the extent and effects of a cyanide release, and include sampling methodologies, parameters and, where practical, possible sampling locations.

ENV11 Surface Water Monitoring Rec. 2.2 Section 4.0 Procedure and Responsibilities states " in the event of a spill or environmental emergency a water quality sampling and analysis program will be set up to investigate the cause of the incident and/or to monitor the extent and degree of environmental contamination or impact'. This procedure includes sampling methodologies and parameters. The sampling locations were observed on a map of the site and surrounding areas.

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

The operation is

- ☒ **in full compliance with**
- ☐ **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.

The operation reviews and evaluates the cyanide-related elements of its Emergency Response Plan for adequacy on a regular basis.

SP ER 2 Emergency Cyanide Incident Procedure rev 13 dated 12 May 2017 section 10 states "this procedure will be reviewed at least annually, but also following incident, emergency drills or when new information regarding cyanide becomes available".

SP08 Procedure for Emergency Preparedness and Response rev 18 dated 10 January 2017 is also reviewed on a regular basis with this document being on revision 18.

Mock cyanide drills are conducted periodically as part of the Emergency Response Plan evaluation process.

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The Procedure for Emergency Preparedness and Response SP8 Rev 18, dated 10 January 2017 states that mock drills should be undertaken bi-annually. This covers mock drills for all types of incidents not just cyanide but does include one cyanide drill per annum within the Plant.

There have been no cyanide related emergencies within the last three years. SP ER 2 Emergency Cyanide Incident Procedure rev 13, 12 May 2017 section 10 states "this procedure will be reviewed at least annually, but also following incident, emergency drills or when new information regarding cyanide becomes available".

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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.

The operation is
- ☒ **in full compliance with**
- ☐ **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. Employees working in cyanide areas need to achieve 100% pass rate.

The Metallurgy Department Training Matrix includes the names and required training, as well as status of completion, for each employee working in the Metallurgical Department.

All employees or contractors working inside the plant or at the TSF need to attend the Cyanide Awareness Training Module and have an annual refresher. The module is presented by Gladys O. Sarkpoh the ICMC Coordinator.

Active employee files are kept on site. Resigned / retired / trenched employees are archived.

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.

The operation is
- ☒ **in full compliance with**
- ☐ **in substantial compliance with** **Standard of Practice 8.2**
- ☐ **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 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. This includes undertaking formal training in specific procedures.

All employees or contractors working inside the plant or at the TSF need to attend the Cyanide Awareness Training Module and have an annual refresher. The module is presented by the ICMC/ Met Training Coordinator.

The module covers the following sections:

- Description and use of cyanide;
- Health Hazards;
- Hotspots;
- Symptoms of Cyanide Poisoning;
- PPE's and Safety Devices for Cyanide;
- Emergency Response;
- First Aid and Medical Treatment; and
- Cyanide Management and Safe handling procedures.

The Metallurgy (CIL) Department Skill Development Program was observed by the auditors. This lists the individual development needs for each worker level within the Metallurgical Department. All levels must attend the Cyanide Awareness training.

The training elements/procedures for each job are identified for each area/ team on the training matrix. The individuals for that particular team/ area are trained in the relevant procedures in addition to the general and area specific inductions and refresher.

Appropriately qualified personnel provide task training related to cyanide management activities. The Training Records for, ICMC / Met Training Coordinator were observed.

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. The Metallurgy (CIL) Department Skill Development Program lists the individual development needs for each worker level within the Metallurgical Department. All levels must attend the Cyanide Awareness training.

The ICMC Coordinator stated that employees rotate between sections in the plant. Before an employee starts working in a new section, they are trained on the relevant operational and cyanide related procedures. The training on the content of the procedures are presented by the ICMC Met Training Coordinator.

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The operation evaluates the effectiveness of cyanide training by testing, observation or other means. The ICMC and Met Training Coordinator stated that PTO's are performed on all relevant procedures annually to evaluate the effectiveness in the training of the various procedures.

Records are retained throughout an individual's employment documenting the training they receive. The records include the names of the employee and the trainer, the date of training, the topics covered, and if the employee demonstrated and 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.

The operation is

- ☒ **in full compliance with**
- ☐ **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.

All cyanide unloading, mixing, production and maintenance personnel are trained in the procedures to be followed if cyanide is to be released.

The general induction covers the necessary steps to following in the event that cyanide is released.

The HazChem team (3 employees per shift) has been trained and will respond in the event of a cyanide release / incident. A team is available during each shift. An ERT Team (3 employees per shift) has been trained in emergency response specifically related to cyanide emergencies and will respond from the clinic that is located next to the plant entrance.

Both the HazChem and ERT Teams has been trained by Orica. "Cyanide Safe Use and Handling Awareness Program".

Site cyanide response personnel, including unloading, mixing, production and maintenance workers, are trained in decontamination and first aid procedures as part of the Cyanide Awareness Training Module, which is refreshed annually.

ERT and HazChem Teams take part in mock drills on a regular basis to test their response to emergency situations. All other employees are evacuated.

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Emergency Response Co-ordinators and members of the Emergency Response Team are trained in the procedures included in the Emergency Response Plan regarding cyanide, including the use of necessary response equipment e.g. Plant wide Procedures for Emergency Preparedness and Response SP08 Rev. 18, dated 10 January 2017 and Emergency Cyanide Incident Procedure SP ER 2 rev. 13 dated 12 May 2017. This includes the use of any necessary response equipment.

No community members, local responders or off-site medical providers will respond to emergencies related to cyanide.

Refresher training for response to cyanide exposures and releases is conducted annually as part of the Induction training refresher.
Simulated cyanide emergency drills are periodically conducted for training purposes covering both worker exposures and environmental releases.

Cyanide emergency drills are evaluated from a training perspective to determine if personnel have the knowledge and skills required for effective response. Mock drills are conducted annually. The Met Training Coordinator observes the response from the response teams and will recommend additional training in the event that such training is required.

Records are retained documenting the cyanide training, 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.

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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.

The operation is

☒ **in full compliance with**

☐ **in substantial compliance with Standard of Practice 9.1**

☐ **not in compliance with**

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 9.1 to provide stakeholders with the opportunity to communicate issues of concern.

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

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). These meetings included Cyanide Awareness and its Emergency Response Procedure.

These meetings are undertaken quarterly however only one meeting in the year has a presentation regarding cyanide awareness. These meetings provide the opportunity for community representatives to communicate issues of concern, these are detailed in the minutes.

In the 2017 meeting remarks were raised regarding the safe distance from a cyanide incident, the disposal of cyanide boxes, and cyanide education in schools.

The following community engagements were undertaken:
Amoanda, Bompieso, Huni Valley, Kyekyewere, Mile 10, Subri, Abosso, Bompieso, Damang, Huni Valley, Koduakron,.

These engagements were conducted in the local language Twi.

This 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 local community members to raise any issues regarding the Emergency Response Plan.

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SOP 006 rev 4 20/02/2017 Damang Mine Grievance Mechanism February 2017. This procedure provides a mechanism for the host communities and interested parties to raise complaints and grievances against Damang.

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

The operation is

- ☒ **in full compliance with**
- ☐ **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.

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). These meetings included Cyanide Awareness and its Emergency Response Procedure.

These meetings are undertaken quarterly however only one meeting in the year has a presentation regarding cyanide awareness. These meetings provide the opportunity for community representatives to communicate issues of concern, these are detailed in the minutes.

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

The operation is

☒ **in full compliance with**

☐ **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 written descriptions of how their activities are conducted and how cyanide is managed. These descriptions are available to communities and other stakeholders. The presentation that was given to the communities and the DMCC is held by the Community Affairs Department and is available on request to any member of the community.

The operation has disseminated information on cyanide in a verbal form where a significant percentage of the local population is illiterate. The presentations given as part of the community engagements were given verbally and in the local language of Twi to allow for any persons who were illiterate.

The operation makes information publicly available on confirmed cyanide release or exposure incidents. The community affairs department is responsible for communicating any information with the local communities.

Any cyanide incident is required to be reported to the Minerals Commission. The Minerals Commission with then communicate information regarding the incident to the media.

Safety and environmental incidents are also communicated through the annual reports and the company website.

There have been no cyanide incidents to date.

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