INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Code Compliance Audit Gold Mining Operations

Recertification Summary Audit Report

AngloGold Ashanti Iduapriem Gold Mine Ghana

4th – 8th March 2019

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Location Detail and Description of Operation

INTRODUCTION

AngloGold Ashanti Iduapriem Gold Mine is located in the Western Region of Ghana, about 17km southwest of Tarkwa.

The original Iduapriem Gold Mine started operating in June 1992 and was designed to treat approximately 2.4Mtpa (million tons per annum). The plant has undergone several expansions carried out since original commissioning. The most recent expansion works were completed and commissioned in November 2017, where the process was changed to a fully operational CIL(carbon-in-leach) process. The process plant now has a capacity to treat approximately 5.1 Mtpa, at a recovery of 96%, to produce about 253,000 ounces of gold per annum. The operation utilizes two SAG Mills and two Ball Mills which run in two parallel closed circuits.

CRUSHING PLANT

Ore mined from “Ajopa”, Blocks 7 and 8, and “block 3 valley” is hauled by means of 777 dump trucks to the Crushing Plant. Conventionally, the dump trucks do direct tipping into a 400 m^3 Run-of-mine (ROM) bin that feeds a MK11 54-75 primary crusher (gyratory Crusher) or is stockpiled (ROM stockpile) and fed to the ROM bin at a later time when not hauling from the pit. The crushed product is conveyed to a primary screen with a double deck, top deck screen size 100mm x 100 mm and lower deck screen size 50 mm x 50 mm to improve mill throughput with intensive high powder factor blast material. The oversize material from the screen is conveyed to a secondary stockpile of 30,000 tons capacity. The undersize product joins a 5.1 km conveyor which sends the material to the CIL upgrade stockpile. With the help of apron feeders, feed is sent from the secondary stockpile to two GP550 secondary gyratory crushers. The secondary crushers operate in closed circuit with two sets of secondary screens. Screen sizes are 65 x 40 mm. The oversize material goes back to the secondary crusher for further size reduction. The undersize joins the 5.1 km conveyor to the 8,800 ton CIL upgrade stockpile. A pebble crushing plant (Scats Crusher) is mounted close to the 9000-tonne capacity CIL stockpile to treat scats generated from the mills.

MILLING

Iduapriem is running a CIL system with two conventional SABC (Semi-Autogenous Ball mill Crusher) circuits and pre-leach thickening. Each circuit is in closed circuit with one XD48 Knelson concentrator. Circuit # 1 has two dedicated thickeners (16 metre diameter supaflo) for pre-leach thickening, whilst circuit # 2 has one 24 metre diameter thickener also for pre-leach thickening.

A dual reclaim apron feeder, conveyor tunnel system is used to deliver the crushed product to two SAG Mills operating in parallel. The SAG Mill #1, (5.2 m Ø x 6.0 m EGL, 2500 kW motor) and Ball Mill #1, discharge into a common hopper. Slurry from the hopper is pumped to cyclone cluster # 1. In the same way, the SAG Mill # 2 (5.55 m Ø x 7.3 m EGL, 3750 KW motor) and Ball Mill # 2, have a dedicated discharge hopper, pumps and cyclones (cyclone cluster # 2). The cyclone overflow from each cluster reports to respective trash screens and underflows to respective distributor boxes.

Distributor box # 1 for circuit # 1 has three outlets, with the largest flow to the ball mill for further size reduction. The second outlet bleeds a stream to the gravity circuit scalping screen, while the third outlet allows SAG # 1 to be run in closed-circuit when Ball Mill # 1 is down for planned maintenance. The same arrangement is replicated for circuit # 2.The Ball Mill # 1 is a 4.3 m Ø x 7.0 m EGL overflow mill, with 2250 kW motor and Ball Mill # 2 is a 4.26 m Ø x 7.32 m Hardinge with 2250kW motor.

The cyclone overflow material is de-trashed using two 25-meter square Delkor Linear Screens. The de-trashed slurry, known as thickener feed material, then reports to their respective thickeners which operate in parallel to allow density of slurry to be raised from 28% solids to 52% solids before it reports to the Leach Circuit.

GRAVITY / ILR (In-line Leach Reactor)

A gravity circuit comprising two XD48 centrifugal (Knelson) concentrators and an In-line Leach Reactor (ILR – Series 1000) recovers free gold (gravity gold) by processing the dense particles from the cyclone underflow slurry. Each circuit has one Knelson concentrator and part of the cyclone underflow is bled to feed the Knelson concentrator.

The concentrator operates in batch mode. Once the preset cycle time (of 60 mins) has elapsed, the unit goes through a flush cycle time to discharge accumulated concentrates. The concentrates are flushed to the feed cone of the ILR for further treatment by intensive cyanidation through a batch-type In-line Leach Reactor (ILR-Series 1000), where the gold is dissolved and electrowon onto steel wool cathodes in a dedicated electrowinning cell. Gravity gold accounts for approximately 38-40% of gold produced from the Iduapriem gold treatment plant.

LEACH / ADSORPTION

There are eleven CIL (Carbon-in-Leach) tanks with the first tank serving as a pre-leach tank. The CIL method of metal recovery involves leaching and absorbing gold in solution with activated carbon at the same time. Cyanide concentration of 260ppm (set point) and an average dissolved oxygen level of about 24ppm are maintained in leach tanks # 1 and # 2. Cyanide and oxygen levels drop down stream. Additional cyanide and oxygen points (hydrogen peroxide) are located on leach tanks # 3 and # 4 to ensure leaching of the gold into solution is maximized. On average the leach contact time is between 14-18 hours and total gold recovery about 96%.

Two Pressure Swing Adsorption Oxygen generators (AS 3000 and AS 4400) are used to generate about 8 tons of oxygen per day at purity of 92% to supply the CIL tanks for leaching.

Carbon is used in the adsorption tanks to recover the gold cyanide complex ions out of solution as the carbon moves in counter current direction to the flow of the slurry.

Carbon is continuously moved from tank to tank via recessed impeller pumps accumulating higher gold values in the process. Carbon is then recovered from leach tank # 2 for elution. Carbon can also be recovered from leach tank # 3 when leach # 2 is isolated or taken out of circuit for any reason.

DESORPTION

The Anglo American Research Laboratory (AARL) method is employed to get the adsorbed gold on the carbon back into solution form using about 3-5% caustic solution. The gold is then electrowon onto steel wool cathodes in an electrowinning cell.

The loaded carbon is recovered from leach tank # 2 into the acid wash column. This is then acid washed using 3% strength hydrochloric acid followed by water rinsing. The rinsed carbon is then transferred to the elution column where a caustic solution of 3-5% is circulated through the elution column via the heat exchangers until an elution temperature between 110°C – 120°C and an operating pressure of 300-400Kpa is attained in the column.

The caustic solution is then directed into a pregnant electrolyte tank and water is used to wash the solubilised gold from the carbon into the pregnant electrolyte tank. The pregnant electrolyte is pumped through two electrowinning cells for gold deposition. Once or twice weekly the loaded steel wool cathodes are removed, calcined and smelted into Doré bullion. The barren carbon is transferred to the adsorption circuit or to the carbon regeneration kiln where it is thermally reactivated at 650°C in a horizontal, diesel-fired kiln. The reactivated carbon is collected in a quench tank and hydraulically transferred into adsorption tank # 7 (last CIL tank) through a carbon sizing screen.

TAILINGS DISPOSAL

Tailings from the processing plant was previously deposited in three disused mining open pits, namely Blocks 1, 2 and 3, until February 2010 when deposition in the pits was stopped. Deposition then continued at the Interim Tailings Storage Facility (ITSF), constructed on the western end of the Old Tailings Dams until May 2011, when phase 1A of the Green Fields Tailings Storage Facility (GTSF) was commissioned after 6 months construction work, which was started in November 2010. The tailing discharge is approximately 45-48% solids where it is allowed to settle out. The decant water from the slurry is continuously pumped back to the plant for reuse in the processing operation to minimize accumulation of water on the dam. The tailings discharge pipes are 450 mm in diameter and the decant return water pipes are 500mm diameter HDPE.

The Veolia water treatment facility is used to treat excess supernatant or decant water from the GTSF to EPA-recommended quality standard which is then discharged into the environment as part of the Iduapriem water management system. The designed capacity of the Veolia water treatment plant is 400m^3/h.

CYANIDE SAFETY AND MANAGEMENT

Of all the hazardous chemicals/substances used on the mine site, sodium cyanide, the chemical used to dissolve gold in the ore, is the most potentially poisonous.

On the mine site, sodium cyanide can be found either in the solid form as briquettes or in solution. The cyanide arrives on the mine site as a solid in briquette form and is stored in the Orica Bag-to-Bulk facility. The Orica Bag-to-Bulk facility is fenced off, under lock and key, and public access is restricted. On request from the process plant, requirements for cyanide are scheduled, and batches of 20 tonnes of briquette cyanide are transferred from boxes into isotainers and transported to the process plant under security escort. At the plant, the 20 tonne batches of solid cyanide are sparged

(dissolved) into a solution at the cyanide sparging facility. The solution cyanide can then be used for gold cyanidation processes.

On the treatment plant, cyanide solution is used in the leaching process in the leach tanks and gravity circuits, and desorption process. Cyanide safety is maintained using various worker health, safety, and environmental management systems.

Appropriate personal protective equipment is required when handling cyanide safely at the various stages of its usage. Adequate warning signs are provided at areas where cyanide is stored, used or handled.

Cyanide specific training is conducted periodically to create and refresh the knowledge of employees. Cyanide emergency antidote, first aid kits and spill clean-up kits are available on site to manage any cyanide emergency. Cyanide drills are conducted periodically to test emergency preparedness. Hydrogen cyanide gas monitors are available for monitoring the working environment to ensure worker safety.

A Process Analytical TAC 1000 instrument is utilized to control cyanide addition in the process. A Mintek Cynoprobe WAD 1000 instrument is utilized to monitor the WAD (Weak Acid Dissociable) cyanide levels to the tailings storage facility. Written safe work procedures are in place for storing, mixing, using and handling cyanide safely. A red dye (carmoisine) is added to all cyanide solutions during sparging to distinguish them from all other solutions. All solutions exiting the plant end up firstly in a containment area. Water in the containment is pumped back to the plant for reuse. Emergency response teams have been trained to respond to cyanide emergencies. Cyanide transport from the Orica Bag-to-Bulk facility to the process plant is done under security escort. Transfer of briquette cyanide from boxes into isotainers at the Orica Bag-to-Bulk facility is done under supervision by AGA Iduapriem personnel.

Auditor's Findings

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

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Samsung contract includes the supply of cyanide from the manufacturers in Korea to the Orica Tarkwa Storage and Bag-to-Bulk facility (OTF) in Tarkwa. Samsung is a consignor (recertified against the Cyanide Code on 30th January 2018), purchasing cyanide from certified producers: TaeKwang (recertified to the ICMI Code on 19th June 2017) and Tongsuh (recertified on 23rd March 2017 under the ICMI Code). The contract requires that Samsung and all sub-contractors must also be certified under the Cyanide Code. A contract is in place with Orica covering the storage of cyanide boxes, repackaging and transport of the sparge isotainers from the Orica repackaging facility in Tarkwa (located on Iduapriem property) to the sparge facility in the Iduapriem processing plant. Orica's Storage and Bag-to-Bulk facility in Tarkwa was recertified against the Cyanide Code on 9th April 2018.

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

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Samsung contract covers the supply (and transport) of cyanide from the manufacturers in Korea to the Orica Tarkwa Storage and Bag-to-Bulk facility in Ghana. The contract requires that Samsung must be certified by the ICMI Cyanide Code and all sub-contractors must also be certified under the Cyanide Code. Vehrad is responsible for transport from Tema to the Orica Tarkwa Storage and Bag-to-Bulk facility and is fully certified as a transporter (8th January 2018). The Vehrad production certification includes their storage facility. (Published on the ICMI website on 8th January 2018.) A contract is also in place with Orica covering the storage of cyanide boxes, repackaging and transport of the sparge isotainers from the Orica Tarkwa Storage and Bag to Bulk facility to the sparge facility at Iduapriem. Orica's Bag-to-Bulk facility was ICMI production recertified 9th April 2018. Samsung's West Africa (consignor) supply chain was ICMI recertified on 30th January 2018, covering the complete supply chain from the producers in Korea to the Orica Tarkwa Storage and Bag to Bulk facility. The cyanide is transported from the Orica Bag-to-Bulk facility to the Iduapriem site by Stellar Logistics (ICMI transport recertified on 9th August 2018). There is also a Samsung Transport Management Plan in place which covers normal, abnormal and emergency situations during cyanide transportation.
Labelling conforms to IMDG (International Maritime Dangerous Goods Code) requirements and there are no additional labelling requirements from Ghanaian legislation. Packaging requirements are spelled out in the Samsung contract. It was confirmed during the site inspection that Carmoisine red dye is added at the Sodium Hydroxide addition point in the mixing tanks. The addition of dye is part of the cyanide sparging procedure and identified in the task steps.
The Samsung/AngloGold Ashanti contract specifies that Samsung is responsible for the goods until delivery at the Orica Storage and Bag to Bulk facility. Samsung stores its cyanide at the Vehrad Warehouse and Vehrad is fully certified as an ICMI production facility. Orica is responsible for storage prior to bag-to-bulk repackaging into isotainers (ICMI Production recertified 9th April 2018), from where Stellar Logistics transports the cyanide to the Plant Sparge facility. The plant is responsible for the on-site sparging operations. The Orica Tarkwa storage and packaging facility is located on land owned by Iduapriem and the sparge container is transported via mine roads to the Iduapriem processing plant.
The Samsung contract refers to selection and evaluation of routes and Vehrad's Road Hazard mapping documentation to Iduapriem was sighted, as was the Stellar Logistics route risk assessment from the Orica Bag-to-Bulk facility to the mine site.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Samsung (consignor) Africa supply chain was ICMI recertified on 30th January 2018, covering the complete supply chain from the producers in Korea to the Orica Tarkwa Storage and Bag-to-Bulk facility. In addition, the two Ghana transporters are both ICMI certified Transporters and have their own Transport Management Plans covering normal, abnormal and emergency circumstances. (Vehrad – ICMI recertified on 8th January 2019 and Stella Logistics – ICMI recertified on 9th August 2018.) There is also a Samsung Transport Management Plan in place which covers normal, abnormal and emergency situations during cyanide transportation.
Samsung manages the supply chain process until the product arrives on site. Samsung therefore brings in the cyanide and stores it in a bonded warehouse in Tema and facilitates delivery of economic quantities against purchase orders, as and when instructed by the mine, to the Orica Bag-to-Bulk repackaging facility at Iduapriem, Tarkwa. At the Orica facility, cyanide boxes are removed from their original container and stored in a warehouse. The removal of the boxes from the container is observed by Iduapriem warehouse processing and security staff. When Iduapriem requires sparged cyanide, Iduapriem staff observe transfer of briquettes from the boxes to the isotainer. Orica facilitates delivery of the sparge containers to the Iduapriem Site sparge facility where the cyanide is dissolved for use in the production process. Samsung maintains copies of shipping documents. Iduapriem Stores have copies of waybills and convoy documents which are signed off by Iduapriem confirming arrival and departure of convoy after receiving the product on site. Iduapriem warehousing staff maintains full records of destuffing of the containers, transfer of briquettes to isotainers, delivery of isotainers to the plant sparging facilities, and disposal of cyanide packaging. A procedure is in place to cover the dispatch of cyanide from Tema, receiving and issuing on site, and cyanide issuing, handling and transport, including the handling and disposal of empty cyanide boxes at Orica. Registers, waybills, and container details were reviewed to check that the process is documented. In view of the fact that shipments are drawn down and delivered at different times, it is difficult to isolate individual container loads. However, the Auditors are satisfied that an effective and documented control and monitoring system is in place.

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

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The cyanide sparging and storage facility and dosing lines to the leach section at Iduapriem were designed by Orica, an ICMI certified cyanide producer, which is also the owner of the cyanide bag-to-bulk repackaging facility supplying the cyanide to the Iduapriem sparging plant. No solid cyanide is stored at the Iduapriem process plant site. At the previous certification audit, the cyanide sparging and storage facility and dosing lines design drawings (including the Piping & Instrumentation Drawings (P&IDs)), general layouts, civil general layouts, Quality Assurance/Quality Control files, process data sheets for equipment, cyanide tank specifications, and flange, coupling and valve specifications were sampled, reviewed and found appropriate. Since the certification audit, the cyanide dosing pumps have been replaced with new peristaltic pumps and the pulse dampeners were replaced with new stainless steel units, as part of the planned maintenance system. The cyanide dosing distribution system was upgraded using stainless steel pipes and valves. The individual HDPE dosing pipelines were repositioned and placed under the air grating to better protect the pipes against physical damage from activities at the previous position. The stainless steel pipelines are tied to the steel structure using "U" bolts. Sound engineering practices were noted on the upgrades.
The sparging and storage tanks are equipped with electronic level indicators linked to the PLC (programmable logic controller). Interlocks in the dissolving tank are in place to prevent the tank from running empty (7%). The tank is filled to 57% of capacity using an automated process. Dry sodium hydroxide is added into the hopper. The Sparge pump "pulls" the tank level to 42% to enable the Isotainer mixing process to commence. On completion, the drain empties the isotainer to the dissolving tank taking the level to 68%. The dissolved cyanide is then transferred to the dosing tank to a maximum of 78%. There is an automated process with interlocks to the transfer tank. Transfer to the dosing tank can only start from the 50% level in the dosing tank. High level alarms are also in place. The sparging bay drains into the concreted cyanide storage tank bund. The bund is equipped with a sump and pump system to recover any spillage. All secondary containments are constructed of concrete and sealed with suitable material resistant to caustic cyanide solutions. The dosing tank is equipped with a high pipe vent and the sparge tank with a water pot-equipped vent pipe to prevent cyanide gas from entering the atmosphere.
The liquid cyanide sparge and storage area is located in the process plant and is fenced and located inside a security area where access is controlled 24 hours per day. The facility is separate from incompatible materials. No solid cyanide is stored on site. Solid cyanide is delivered in isotainers from the Orica Bag-to-Bulk facility when sparging needs to be carried out.

Standard of Practice 3.2: Operate unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to

prevent or contain releases and control and respond to worker exposures.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 3.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Orica Bag-to-Bulk facility is certified under the ICMI as a production facility to store solid cyanide and repack the cyanide into isotainers. Orica is contracted to dispose of the cyanide packaging via the Vehrad incineration facility at the Vehrad site in Tema. Vehrad is a certified warehouse, production and incineration facility. An Iduapriem procedure includes details and responsibilities for handling and disposal of empty cyanide boxes and bags. (Responsibilities cover Vehrad, Iduapriem, and Orica Mining.) There is a cyanide sparging procedure in place including reference to appropriate personal protective equipment (PPE), but the sparging process is automated and run by the PLC (programmable logic controller). The procedure also includes reference to the involvement of a standby person ("buddy") and includes specific reference to opening and closing of valves, as well as valve and pump numbers. The site adds carmoisine red dye to the sparge vessel through the caustic hopper and this is a requirement in the sparging procedure.

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

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The site has 50 cyanide specific operational and maintenance procedures, 9 environmental procedures relating to cyanide, 11 emergency preparedness procedures and 12 general emergency procedures. The TSF (Tailings Storage Facility) management and operating plans in place include the AngloGold Ashanti (AGA) Regional TSF Operating Code and the SRK (Stefan Roberts and Kirsten) Greenfields TSF Operating

Manual (updated in June 2018). Annual reviews and reports by regional and corporate AGA Geotechnical Engineers are also used for review of TSF operating parameters. These reports include an annual TSF audit done by an independent auditor in terms of the Ghanaian EPA (Environmental Protection Agency) regulatory requirements. The AGA Senior Manager: Geotechnical Engineering Tailings and Heap Leach Management, in his Tailings and Heap Leach audit report of June 2017, indicated in the Conclusions section that the TSF is managed effectively to the required standards. The AGA Senior Manager: Geotechnical Engineering Tailings and Heap Leach Management, in his June 2018 audit report noted developments related to the TSF life up to 2023 and the plans for a new TSF. The TSF Operating Manual refers to the 1.5m freeboard (a Ghana EPA requirement), the design storm provision for a 1:100 year, 24 hour storm event. The procedure to follow when high WAD cyanide levels are measured in the residue slurry requires that if the WAD cyanide in the residue slime rises above 50 ppm, the control room operator will notify the shift metallurgist on duty immediately and will stop the cyanide dosing pump. The design freeboard of the in-plant process water pond is 90%. (A level indicator is installed and an audible alarm sounds at 85%.) A Water Management Plan, dated August 2018, is in place regulating the pumping and management of water levels on the mine. The cyanide management section of the Plan requires the treatment of waste water to conform to EPA standards for community drinking water of 0.07 ppm free cyanide. The OPSIM software probabilistic water balance model includes the calculation of the volume of clean treated water discharge to the environment via the waste water treatment plant sized at 400 m^3/hr. The plant is equipped with duty and standby pumps for all critical pumping systems.

All tanks, bunds, ponds, impoundments, pipelines, valves and pumps in the plant, and on the TSF, are listed appropriately on the SAP (software company) Planned Maintenance System (PMS) which has been used since 16 November 2015. An electronic review of the SAP system confirmed that critical cyanide equipment is included in the SAP system and is inspected on a regular basis. The review of inspections and inspection histories confirmed to the auditors that the combined engineering and operational inspections are sufficient to assure that the facility operates within design parameters. The plant is doing 6 weekly planned maintenance shutdowns using standard operating procedures.

The risk-based, Asset Integrity Management system is responsible for assets with a life beyond 5 years: which includes structures such as tanks, foundations, and the thickness testing of the leach, CIP, cyanide, caustic-cyanide, eluate and spent electrolyte tanks. Inspections also include structural evaluation. An annual report is produced and associated planning included in the budget for implementation of findings and recommendations. The Leach and CIP tanks on ring beams form a part of the Risk Based Inspection (RBI) program (Using AIC-ITP-01-18, API 653, API 650 and in accordance with AAIL (Anglo American Inspection Laboratory) criterion for Non Destructive Testing (NDT)). Tank electronic annual inspection checklists and Gantt charts for various tanks were sampled and planned future inspection schedules were also sighted. The inspections are documented and include: - Vacuum box Inspection of Bottom Welds; Magnetic Particle Inspection of Bottom welds; Ultrasonic Thickness measurement of Bottom Plates and first course shell plates; Visual inspection of tank bases, and peripheral welds. Although the TSF freeboard is sufficient to accommodate run-off in case of power

failure, the pipelines are equipped with valves to close flows in case of power failure and a standby Genset is in place in case of power failure to provide power for the return water pumps (a standby pump is also available). The emergency generator provides power to the tailings pumps to prevent overflowing of the tailings hopper during power failures. It was reported that back-up power is required by local legislation. Maintenance history on the emergency generator was checked electronically during the electronic SAP System review. Emergency ponds inside and outside the plant are in place to contain any run-off water from the plant and TSF. No scenarios were identified in the OPSIM probabilistic water balance that would require a plant shutdown due to any water balance risk for overtopping.
A change management procedure was noted to be in place and requiring sign off by the Senior Manager: Health, Safety and Environment. Management of change reviews were carried out on the relaying of the cyanide dosing line and the replacement of mild steel with stainless steel on the cyanide installation pipes.

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

X in full compliance with

The operation is

- □ in substantial compliance **with Standard of Practice 4.2**
- □ not in compliance with
- □ not subject to

Basis for this Finding/Deficiencies Identified:
Ore variability is negligible and historical data was used to determine the current cyanide addition rate. The original cyanide addition rate was 250 ppm. Lower concentrations are, however, possible due to the improved cyanide control. Cyanide addition rates are documented in an instruction book by the senior metallurgist and records were noted to have been kept since 2002.
Cyanide amenability and reagents consumption studies on pit samples from AngloGold Ashanti Iduapriem Limited (AAIL) dated October 2016 covering ore characterisation from the Pits were sighted. The tests were done by the Minerals Engineering Department of the University of Mines and Technology, Tarkwa. The tests included reagent consumption, cyanide optimum addition rates and grindability tests. The test work did not predict any increase in cyanide consumption.
A report, "CIL Cyanide Addition Rate" by Research & Development Team, dated 31 January 2019 was reviewed. The conclusions include that optimum cyanide consumption is 0.26 kg/t (current rate is 0.27kg/t) and emphasises the importance of effective and consistent cyanide control. The conclusions also include the importance of cyanide addition control and the importance of improving leach and recovery parameters such as dissolved oxygen concentration and grind in the leach tanks.

A report by Maelgwyn Mineral Service Africa: Characterisation, pre-oxidation and Aachen Assistant Leach Testwork Iduapriem, Tarkwa, No. 18-027, was sighted. The conclusions include that the cyanide and oxygen consumption for the ore is low and gold is dissolved within 8 hours. Grinding was also identified as an issue and finer grinding would increase gold recovery.
The TAC 1000 on-line, free cyanide analyser was installed and commissioned and confirmed during the site inspections. The cyanide dosing flow rate to the leach is controlled by the measurement from the TAC 1000. The pressure in the ring main system is a controlled constant using a pressure transmitter and a pressure control valve on the return line. The peristaltic pump speed is further controlled from the pressure transmitter signal to prevent over pressuring of the return line. The current control system is considered adequate by the process plant staff for current circumstances.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Mine uses a spreadsheet, daily data-based, water balance, including the inputs into the OPSIM Water Balance. The OPSIM is a software based, probabilistic water balance model and is used to predict TSF pool levels under various rainfall and seasonal variation scenarios. The OPSIM includes modelling the plant water balance. The model is also used to predict water balance scenarios for wet and dry seasons and develop plans to manage the water balance. Simulations for November 2018 and February 2019 were sighted. Information from the model is also used for reporting water management performance to the Environmental Protection Agency (EPA) of Ghana. The model was used to simulate a TSF decant pump power or pump failure. An emergency penstock / lined dam system is in place to cater for high rainfall period emergencies. The model did not indicate any need for stopping the plant in case of high rainfall events to restore the water balance.
The inputs to the OPSIM PWB (Probabilistic Water Balance) are obtained from the spreadsheet which is updated daily. The spreadsheet is a supply / demand water balance and the OPSIM is a predictive model used for predicting scenarios and assisting with water management decisions. A monthly water report is generated from the OPSIM model using the actual daily data inputs.
The OPSIM model includes all the elements required to function as a probabilistic water balance. The TSF is equipped with Piezometers and these are monitored as per the TSF inspection checklists and quarterly reviews. The TSF annual and quarterly reports noted the criticality of pool water control to manage and prevent high phreatic levels and dam stability issues. The recommendations were implemented and the OPSIM model is used

in an improved manner in the water management report. The report is used for management decisions and implemented, as appropriate, by the Management Team. The TSF freeboard is specified at 1.5m by EPA and the current freeboard is 3.38 m. TSF water levels and freeboard are monitored daily, flow meters are used to measure input volume, dams are surveyed monthly, all pond levels are manually measured daily and inputted into the spreadsheet data base, which is used as input into the OPSIM model.

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

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 4.4**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Process Plant compliance point is the tailings hopper sample pumped to the TSF. A Mintek WAD 1000 analyser is in place to measure WAD cyanide leaving the CIP section tank 7 of the Plant. A graph from 1 January 2016 to 25 February 2019 showed the average WAD cyanide mg/l for the period was 32.34 mg/l and maximum was 50.98 mg/l on one occasion. The minimum was 13.08 mg/l. As the TSF is operated at less than 50 mg/l WAD cyanide, no special measures are needed to protect wildlife. However, the TSF is fenced and no wildlife, except birds, are present inside the fence at the TSF. No cyanide-related bird mortalities have been reported. The site's heap leach was decommissioned in 2000.
A procedure is in place to increase manual WAD cyanide sampling, should the WAD analyser become faulty, and any WAD cyanide exceedances that may occur are investigated.

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

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 4.5**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
TSF excess pool water during the rainy season is treated in a detoxification plant before being released into a surface stream. The authority (Ghana Environmental Protection Agency) has set a maximum cyanide concentration of 0.6 mg/l WAD cyanide. The samples from the actual discharge to the river show that all levels are below limits of

detection of 0.005 mg/l WAD cyanide. Only two exceedances were noticed during the three years and these were deemed as outliers. Samples are taken downstream of the discharge every second day while discharging. As there is no formal mixing zone, the compliance of less than 0.022 mg/l free cyanide is met.
Downstream of the discharge point, samples while discharging between January 2016 and January 2019 were reviewed and values between 0.002 and 0.006 mg/l free cyanide and WAD cyanide were noted.
Boreholes downstream of the new TSF were reviewed. From February 2016 to February 2017, values were between 0.001 and 0.015 free cyanide; from February 2017 to February 2018 all values were less than limits of detection of 0.005 mg/l WAD cyanide; and February 2018 to February 2019, WAD cyanide levels were below limits of detection of 0.005mg/l. (Ghana EPA limit is 0.6 mg/l WAD cyanide). There has been no change in the positions of the sampling points. The groundwater results are below maximum standards and indicate that no indirect discharge is present in the surface water.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified
The floor and first rise of the TSF is HDPE-lined and designed with leak detection and herring bone drains for seepage management and control and the plant is equipped with concrete bunds to manage seepage. The step-in and current lift has not been lined and phreatic monitoring, together with monitoring boreholes downstream of the TSF, is in place to monitor the TSF for seepage. The leak detection sumps are sampled for cyanide on a daily basis to determine if any cyanide solutions leak from the TSF. Investigations are done in the case of increased cyanide levels in the samples. No cyanide has been detected to date.
Environmental monitoring undertaken meets Ghana EPA, WHO, and World Bank Standards and samples are analysed for total, free and WAD cyanide. The site permit requirements are: Free cyanide: 0.2ppm, WAD cyanide: 0.6 ppm, and Total cyanide: 1ppm. The permit assumption is for domestic use and livestock watering.
Boreholes downstream of the new TSF were reviewed. From February 2016 to February 2017, values were between 0.001 and 0.015 free cyanide; from February 2017 to February 2018 all values were less than limits of detection of 0.005 mg/l WAD cyanide; and February 2018 to February 2019, WAD cyanide levels were below limits of detection of 0.005mg/l. (Ghana EPA limit is 0.6 mg/l WAD cyanide). No underground backfill is used and there have been no seepages that have increased cyanide concentrations.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The leach and CIP tanks are placed on ring beams and are all included in the Asset Integrity Program which is a risk-based inspection program. The Mine uses AIC-ITP-01-18, API 650, and API 653 as the basis for its methodology, which is conducted by independent contractors. A document entitled "Asset Integrity process - a stepwise approach", was sighted which details the risk identification process and the steps taken to develop mitigation and accommodate budget requirements.
All secondary containments for cyanide unloading, storage, mixing and process 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.
No solutions from any spillage containments are released to the environment. The plant is designed with bund areas and sumps and pumps returning any spillage to the process. The plant has newly concreted areas which further assist with containment of spillages. There are no tanks without secondary containment. Process lines are placed above concrete bund areas and concrete lined surfaces. The TSF pipelines are placed inside HDPE-lined trenches draining back to the TSF or into a concrete spillage control dam next to the plant. Spill prevention measures include the design of the HDPE-lined residue slurry line, operational inspections; and the PMS system includes the tailings lines. The HDPE residue lines are placed inside a steel pipe from the plant to the top of the hill overlooking the TSF from where it becomes only a HDPE line down to the TSF. Operational inspections coupled with the PMS program are in place as preventative measures.
The cyanide dosing pipelines are placed inside a launder as secondary containment and all spillages will drain back into a concrete sump equipped with a level indicator and sump pump to transfer the spillage to the process. None of the cyanide dosing or TSF pipelines are situated close to surface water or pose a risk to surface water.
All plant cyanide pipes are made of HDPE and the tanks constructed of mild steel. The residue lines are constructed of an HDPE pipe inside a steel pipe, return water lines are HDPE lines and are thus compatible with high pH conditions. The cyanide sparging and storage facility was designed and constructed as per the specifications of the cyanide producer, Orica. Dosing pipelines are made of a combination of mild steel, stainless steel and HDPE.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.8**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The cyanide sparging and dosing facility was constructed as a turnkey project, designed by Orica (a certified cyanide producer) and a QA/QC (Quality Assurance/Quality Control) program was used and audited in previous ICMI audits. The QA/QC procedures and documentation such as design files, P&IDs (Piping and Instrumentation Drawings), radiographic inspections reports, concrete cube and pour test results, daily site reports, general layouts, civil general layouts, process data sheets for equipment, cyanide tank specifications, flange, and coupling and valve specifications were sampled and reviewed. The plant QA/QC documentation was reviewed and confirmed in previous audits. The Green Fields Tailings Storage Facility (GTSF) is operational and covered by Geotechnical Engineers quarterly and annual inspections. The TSF is in the process of constructing raises as part of normal operations at various compartments. Various QA/QC reports covering raises for compartments 16 a and b to 18 b for the period April 2017 to January 2019 were sampled and reviewed. Quarterly and Annual reports were sighted and reviewed. The records showed that facility construction was monitored by appropriately qualified persons.
An Asset Integrity Management System (AIMS) is used to conduct regular inspections of major equipment on the mine, including the process plant. The internal Assessment team consists of Civil Engineers, Mechanical Engineers, and Process plant staff. A validation of the inspection by AGA Corporate Office is conducted by a qualified Structural Engineer. The assets inspected are entered into a risk matrix and ranked by the validation team. The Items are then ranked for repairs / maintenance / replacement to maintain the integrity of the plant. The overall responsibility rests with the Engineering Manager.
The AIMS system is deemed to be an inspection, review and planning system including Civil, Mechanical and Structural staff, ensuring that the facilities could continue to be operated within parameters consistent with the Code's principles and standards of practice.
The design of the new TSF has commenced and it is anticipated that the facility will be ready for commissioning by the time of closure of the current TSF in 2023. Following an interview with the Senior Manager Processing and review of the available documents and the detailed action plans and implementation of plans, the current TSF is deemed to be fit for purpose to operate until its closure in 2023.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
Wildlife and bird mortalities are monitored daily by TSF personnel and included in the daily log sheets. The Environmental Department also conducts weekly wildlife activity observations which are done during sampling exercises. An environmental sampling program (including both surface and groundwater sampling) is in place, as are procedures for environmental monitoring (including sample preservation, cyanide species sampled, and chain of custody procedures and the sample sheet which includes a Code compliant record of sampling conditions) of surface water and borehole water. These were all developed from a US EPA Handbook for sampling and sample presentation of water and waste water and reviewed by an appropriately qualified scientist. Sample frequencies are deemed adequate by auditors to characterise the medium monitored.

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

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
There is a cyanide decommissioning procedure (which includes a generic implementation schedule covering activities 12, 6 and 3 months before closure) and which includes reference to the appropriate section in the AngloGold Ashanti Cyanide Guidelines, Revision 6. The procedure is a controlled document and review is required every two years.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 5.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
A Closure and Reclamation Plan Update Iduapriem document dated April 2017, produced by external consultants was sighted which includes Design features: Decontamination of infrastructure, "Plant equipment will be rinsed with clean water, and if contaminated with cyanide, hydrogen peroxide treatment will be used to remove cyanide. The mill circuit will be flushed with water to remove solid deposits and residual chemicals." The closure plan notes under the Closure action plan: "… decontaminate infrastructure and deposit effluent at the GTSF tailings storage facility…" The Closure Estimate is revised quarterly and Iduapriem Environmental Liability Q4 2018 estimates were sighted.
There is a Ghana EPA reclamation security agreement in place which serves as a financial surety. Current bank guarantees (to October and November 2019) from Ecobank Ghana, United Bank of Africa and Barclays Bank of Ghana were sighted and it was confirmed that all guarantees may be renewed on expiry. The supporting documentation was sighted.
Following the evaluation of the data presented, the Auditors are of the opinion that the estimate includes adequate funds for cyanide-related decommissioning and decontamination activities.

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

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 6.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The site has 50 cyanide specific operational and maintenance procedures, 9 environmental procedures relating to cyanide, 11 emergency preparedness procedures and 12 General Emergency procedures, all of which include personal protective equipment (PPE) and pre-work inspection requirements, as appropriate. The TSF (Tailings Storage Facility) management and operating plans in place include the AngloGold Ashanti (AGA) Regional TSF Operating Code and the SRK (Stefan Roberts and Kirsten) Greenfields TSF Operating Manual (updated in June 2018). Annual reviews

and reports by regional and corporate AGA Geotechnical Engineers are also used for review of TSF operating parameters. These reports include an annual TSF audit done by an independent auditor in terms of the Ghanaian EPA (Environmental Protection Agency) regulatory requirements. The AGA Senior Manager: Geotechnical Engineering Tailings and Heap Leach Management, in his Tailings and Heap Leach audit report of June 2017, indicated in the Conclusions section that the TSF is managed effectively to the required standards. The AGA Senior Manager: Geotechnical Engineering Tailings and Heap Leach Management, in his June 2018 audit report noted developments related to the TSF life up to 2023 and the plans for a new TSF.

The TSF Operating Manual refers to the 1.5m freeboard (a Ghana EPA requirement), the design storm provision for a 1:100 year, 24 hour storm event, and refers to the ICMI requirement that the TSF is to be operated in line with the Code requirements. The procedure to follow when high WAD cyanide levels are measured in the residue slurry requires that if the WAD cyanide in the residue slime rises above 50 ppm, the control room operator will notify the shift metallurgist on duty immediately and will stop the cyanide dosing pump. The design freeboard of the in-plant process water pond is 90%. (A level indicator is installed and an audible alarm sounds at 85%.) A Water Management Plan, dated August 2018, is in place regulating the pumping and management of water levels on the mine. The cyanide management section of the Plan requires the treatment of waste water to conform to EPA standards for community drinking water of 0.07 ppm free cyanide. The OPSIM water balance model includes the calculation of the volume of clean treated water discharge to the environment via the waste water treatment plant sized at 400 m3/hr. The plant is equipped with duty and standby pumps for all critical pumping systems.

All tanks, bunds, ponds, impoundments, pipelines, valves and pumps in the plant, and on the TSF, are listed appropriately on the SAP (software company) Planned Maintenance System (PMS) which has been used since 16 November 2015. An electronic review of the SAP system confirmed that critical cyanide equipment is included in the SAP system and is inspected on a regular basis. The review of inspections and inspection histories confirmed to the auditors that the combined engineering and operational inspections are sufficient to assure that the facility operates within design parameters. The plant is doing 6 weekly planned maintenance shutdowns using standard operating procedures.

The risk-based, Asset Integrity Management system is responsible for assets with a life beyond 5 years: which includes structures such as tanks, foundations, and the thickness testing of the leach, CIP, cyanide, caustic-cyanide, eluate and spent electrolyte tanks. Inspections also include structural evaluation. An annual report is produced and associated planning included in the budget for implementation of findings and recommendations. The Leach and CIP tanks on ring beams form a part of the Risk Based Inspection (RBI) program (Using AIC-ITP-01-18, API 653, API 650 and in accordance with AAIL (Anglo American Inspection Laboratory) criteria for Non Destructive Testing (NDT)). Tank electronic annual inspection checklists and Gantt charts for various tanks were sampled and planned future inspection schedules were also sighted. The inspections are documented and include: - Vacuum box Inspection of Bottom Welds; Magnetic Particle Inspection of Bottom welds; Ultrasonic Thickness measurement of Bottom Plates and first course shell plates; Visual inspection of tank bases, and peripheral welds.

Although the TSF freeboard is sufficient to accommodate run-off in case of power failure, the pipelines are equipped with valves to close flows in case of power failure and a standby Genset is in place in case of power failure to provide power for the return water pumps (a standby pump is also available). The emergency generator provides power to the tailings pumps to prevent overflowing of the tailings hopper during power failures. It was reported that back-up power is required by local legislation. Maintenance history on the emergency generator was checked electronically during the electronic SAP System review. Emergency ponds inside and outside the plant are in place to contain any run-off water from the plant and TSF. No scenarios were identified in the OPSIM probabilistic water balance that would require a plant shutdown due to any water balance risk for overtopping.
A change management procedure was noted to be in place and requiring sign off by the Senior Manager: Health, Safety and Environment. Management of change reviews were carried out on the relaying of the cyanide dosing line and the replacement of mild steel with stainless steel on the cyanide installation pipes.
Weekly Toolbox meetings provide an opportunity to dialogue on health and safety procedures. Examples noted include discussing emergency evacuation drill, spill clean-up procedures, and spill response including PPE. Monthly SHE committee meetings are held where worker safety and health is included. Risk Assessments (RA) include worker input.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 6.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The plant pH is set at 10.2 in the leach. The cyanide dosing points are interlocked with the cyanide pH in the dosing tank. Electrowinning is conducted at pH of 14. 4 bags of Sodium Hydroxide are added to the sparge tank to increase pH and reduce risk of HCN (Hydrogen Cyanide) gas evolution during sparging operations. The intensive leach reactor leachate is run at a pH of 13.8.
There are 3 fixed HCN gas monitors at the tails hopper, on top of the leach tanks and at the sparging area. There are 7 PAC7000 personal HCN gas monitors, 3 X-am 5000 and 3 XAM 5600 personal HCN gas monitors available for use by the personnel. Evacuation will occur if HCN gas levels alarm at 4.7ppm over an 8 hour period or if monitors alarm for instantaneous 10ppm gas levels. Hotspot surveys are conducted monthly by the Environmental Department. Sighted hotspot monthly graphs for the different areas and sampled the Tailings hopper at 0.6ppm April 2017, and January 2019 0.ppm, ILR (Intensive Leach Reactor) indicates elevated levels with a maximum of 3.8 ppm HCN

gas. All values are less than the ICMI exposure criteria of 10 parts per million on an instantaneous basis and 4.7 parts per million continuously over an 8-hour period.
All gas monitors are calibrated 6 monthly as per manufacturer recommendations. The units are serviced and calibrated by the manufacturer on contract. Calibration reports for both the portable and fixed hydrogen cyanide gas monitors were sighted. Calibration reports for 3 X-AM 5000 (2 March 2019), 10 PAC 7000, 3 Polytrons (26 Feb 2019), 5 X-AM 5000 (18 Jun 2018), for 5 PAC 7000, and 3 Polytrons (18 Jun 2018) were sighted.
Warning signs usage was confirmed during the site inspection. The sparge area includes no smoking, no eating, no drinking, no open flames and the required PPE as well as warning signage that cyanide is present. Warning signs indicating presence of cyanide are placed on all the tanks containing cyanide solutions and appropriate PPE requirement signs are placed at all sections in the plant.
The cyanide sparging procedure requires the addition of red carmoisine dye to the sparge vessel through the caustic hopper. It was observed during the site inspection that the cyanide solution being dosed to the leach is red.
The use of safety showers at strategic locations was confirmed during the site inspection. All safety showers were tested and checked for adequate pressure as verified in inspection records. The checklists for the years 2017 and 2019 were sampled. Deviations are reported by exception and repaired by job request. The eye wash stations were all equipped with diffusers to prevent injury to eyes during use. Fire extinguishers are numerous and the process plant fire extinguisher monthly inspection registers were sampled for 2019 to date and for 2017, January to November. The register (Remedial Action Form) for replacement of fire extinguishers (when a fault is found, the unit is replaced) was also reviewed. It was verified during the site inspection that the monthly inspections labels on sampled units were up to date.
MSDSs (Material Safety Data Sheets) were sighted at the sparge facility. The cyanide first aid procedure and MSDSs were also available in all the cyanide emergency cabins. It was verified during the site inspection that cyanide and TSF pipelines are labelled with flow direction indicated on reagent strength pipelines.
A Group-wide Workforce Management Reporting System (WMRS) is used as an electronic reporting platform for all safety and environmental incidents, inspections and deviations as per the Iduapriem Mine accident / incident management procedure.

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

X in full compliance with

The operation is
- ☐ in substantial compliance with **Standard of Practice 6.3**
- ☐ not in compliance with

Basis for this Finding/Deficiencies Identified:
The alarm is raised using radios, mandown alarms, manual alarms, telephones and cell phones. Five public address-based emergency radios were installed on the plant which

are also used to communicate any emergencies. Four emergency cyanide cabinets are placed on site and 1 emergency trailer is available. The emergency cabinets all contain oxygen, with all 4 stations equipped with antidote Tripacs which are stored in fridges. Tripacs are supplied as part of a Corporate contract to continue indefinitely until the agreement is formally terminated with a specific delivery date tied into the expiry dates of the old Tripacs. It was verified during site inspections of the plant and the clinic that the Tripacs are stored in fridges as per manufacturer's requirements.

Various inspection checklists are used, including emergency response facility inspection lists containing comments columns. The Cyanide Champion also carries out weekly inspections on cyanide emergency equipment which are documented.

There is a site-wide General Response Plan and a Cyanide Emergency Preparedness Response Plan. The on-site capability includes four in-plant cyanide emergency cabins, a cyanide emergency trailer, and a dedicated cyanide emergency team who are available per shift. The Sam Jonah on-mine clinic is fully equipped to handle cyanide emergencies and can handle up to 3 cyanide patients at one time. A Medical Doctor and Medical Assistant are available on call-out 24 hours per day to react to cyanide emergencies. One ambulance is on standby at the Emergency Response Centre to transport emergency patients from the plant to the clinic and from the clinic to the local Accra Medical Centre (AMC) hospital in Tarkwa. The clinic has the ability to house patients for cyanide observation overnight if necessary. It was further confirmed than the MDS-Lancet laboratories located at the Tarkwa Hospital are capable of processing cyanide blood analyses. The AMC hospital can handle up to 10 patients and is available as back-up. A second standby ambulance is available at the clinic and equipped for emergencies.

The Sam Jonah on site clinic is involved in the emergency drills. This was confirmed during the interview with the Doctor. The Clinic has an ongoing medical retainership program / medical collaboration agreement with Goldfields Tarkwa Mine Hospital (AMC hospital), which is linked to the Goldfields Tarkwa Mine, an ICMI certified Mine. In an e-mail from the resident Medical Doctor of the hospital dated 4th February 2019, he confirmed that the agreement is still active and the facility has adequate qualified staff and equipment and expertise to respond to cyanide emergencies. The Sam Jonah Clinic resident Doctor further confirmed in an interview that in terms of the Ghana National Medical Protocols, he can call upon Accra based hospitals for additional assistance, should he require them.

The drill schedules for 2017, 2018, 2019 were sighted. Drills include cyanide spill and exposure scenarios. Drill reports sighted include one dated 11th June 2018 which was a cyanide gas release in front of the acid mixing area. The purpose of the drill was to remind staff what to do during cyanide emergencies and to test employee skills relating to SCBA (Self-Contained Breathing Apparatus) in emergencies and to determine response times. The drill was a partial drill and included the plant Emergency Response Team. A full cycle drill report to the Sam Jonah Clinic dated 2nd Nov 2018 on a HCN gas exposure at the cyanide sparging plant was reviewed. The purpose of the drill was to remind staff what to do during cyanide emergencies and to test employee skills in case of cyanide exposure and to check response times. The findings from the drill included that the Mine Emergency Response Team (MERT) did not wear cyanide PPE to attend to the casualty; the victim was not showered before or given oxygen before transportation. Corrective

action included re-training of the MERT. A follow-up, full cycle drill was undertaken on 13th March 2019 and the drill report confirmed that the re-training had the required effect and rectified the issues identified during the November drill.

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

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
There is a mine-wide General Response Plan in place and a Plant-specific, Cyanide Emergency Preparedness and Response Plan. The plant specific cyanide plan will default to the mine wide emergency plan on mine wide issues such as mine evacuation and media communication and any community related issues. The Plan includes specific procedural responses to a range of site-specific cyanide failure scenarios. The Plan also 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.

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The workforce is involved in the ERP (Emergency Response Plan) process through emergency drills. The plant provides the opportunity for input and information to the community on the Plan through dialogue discussions with the community. No local or external agencies are involved in the Plan and the hospital, clinic and emergency

response team are involved through mock drills and other communications. Outside responders' or communities do not have roles in the ERP.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The ERP details responsibilities for the Emergency Response Controller and alternates and details management roles and responsibilities. The outside responders' or communities do not play roles in the ERP. The Plan identifies emergency response teams whose members are in place on every shift and are trained to respond to plant emergencies. Procedures and checklists are in place to ensure that cyanide emergency equipment is checked weekly. The Plan includes contact references (telephone, cell phone, etc) of internal and external resources for the various scenarios, particularly with detail where external resources and skills might be needed. Periodic drills involving internal and external stakeholders ensure that roles and responsibilities are understood and clearly implemented. There is a specific Training Matrix which details ERT training programmes. No outside responders are used during emergency situations, Communities do not take part in the emergency responses, but are given information on cyanide.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The Emergency Response Plan includes details for appropriate emergency notification and reporting (internal and external) and the call-out procedure and contact information lists which are updated regularly. Internal and external communication (including the Media) is dealt with in the Plan. During cyanide emergencies, the Managing Director is responsible for communication with external media and the Safety Manager is responsible for communicating with regulatory agencies. Community contact lists are in place and any communication will be done through the Community Affairs Manager. Currently no communities will be affected or required to be contacted or notified.

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

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 7.5**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The Emergency Response Plan covers clean-up, remediation and a neutralisation methodology linked to operational and environmental procedures. The use of neutralization processes and materials is clearly covered, as is disposal of contaminated materials. There is no scenario whereby drinking water would need to be supplied. Use of chemicals such as sodium hypochlorite, ferrous sulphate and hydrogen peroxide to treat cyanide that has been released into surface water is prohibited in the Plan and is prohibited in cyanide procedures. Emergency sampling is covered in procedures. Detailed information to back up procedures is also available in the AngloGold Ashanti Africa Cyanide Guidelines, Revision 6.

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

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 7.6**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The ERP is a controlled document which is required to be reviewed every two years or after an actual cyanide emergency or a mock drill which identified deficiencies in the plan under the section entitled Plan Maintenance. Drills incorporate identification of problems, action and follow up on completion.

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

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 8.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
All site personnel receive induction (which includes cyanide hazard recognition) including TSF, contractors, security and all plant personnel. Cyanide hazard recognition training was reviewed and included the elements: What is cyanide, cyanide uses, why is it toxic, cyanide exposure routes to the body, cyanide poisoning symptoms, first aid and medical treatment, and safe handling procedure for sodium cyanide.
Refresher training is conducted annually, or on return from annual leave for all personnel, and the access card system will block staff who are not up to date with refresher training. Refresher training was checked during interviews and review of the interviewee training records. Records are retained as per the AngloGold Ashanti corporate standard (5 years). The training records of the interviewees were sampled, confirming training, including assessments, task training, induction training, and cyanide hazard awareness training, as applicable.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 8.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The training matrix shows the required training modules needed for each job, including TSF and engineering, and covers the total process plant workforce. Staff are trained on safe working procedures and task procedures by the Training Officer and the Supervisors. The training matrix for all plant departments, including modules required for each job, was sighted, as well as training records for each person. The matrix includes completion dates for the modules for each person. The senior training officer is a qualified metallurgist and is experienced in operations. He is reported to have completed the train-the-trainer certificate while at Newmont. Refresher training is given when a need is identified by planned task observations (PTOs) or incidents, which will trigger review for refresher training. The training records of the interviewees were sampled, confirming training, including assessments, task training, induction training, cyanide hazard awareness training, as applicable.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
All plant staff are trained on how to respond in case of a cyanide release by moving away from the release and raising the alarm. The Plant Emergency First Responders (PEFR) will then react to the emergency. There are at least two trained Plant Emergency First Responders (PEFR) on each shift. The sparge operators and cyanide emergency responders receive advanced cyanide emergency safety training which includes cyanide releases. The attendance registers for cyanide awareness and emergency response training including cyanide information and background, cyanide hazards, cyanide management at Iduapriem, cyanide first aid and medical treatment and spill response, presented from 13 to 20 June 2018 for 48 members, were sighted.
The Mine Emergency Response Team (MERT), including the Ambulance and Paramedic, will take over from the First Responders in the case of cyanide incidents. The MERT is given advanced training, including: Rescue at heights, Confined space, Fire response, Vehicle extrication, Cyanide rescue training, Cyanide first aid and awareness, Fire tender and equipment training, Defensive driving training, Spill management, Basic and Advanced first aid training. The training is done according to an annual schedule. A training matrix is in place and updated, as appropriate. The MERT responds to a cyanide emergency with first the fire truck, followed by the ambulance and Paramedic, as appropriate to the reported incident. The MERT training matrix was sighted and reviewed electronically for 2017 and 2018. The MERT staff fall under the mine Health, Safety and Environment Department. Mock training drills are conducted involving the PEFRs and the MERT and the Training Officer (who acts as an observer). Drill reports include problem areas identified and corrective action recommended. Training procedures will be revised where appropriate. No Community members are directly involved in the emergency response plan. Records are retained as per the AngloGold Ashanti corporate standard.

9. DIALOGUE: Engage in public consultation and disclosure.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide.
Stakeholder Engagement and Communication Platforms include: Community Consultative Committees (19 Communities involved) and meetings are held quarterly; the Community Forum: ("Town hall" meeting) which is an open public session, where all issues may be raised and discussed, including cyanide; Quarterly Community Liaison Group meetings which includes Regulators where environmental disclosures, including cyanide, are made.
The Quarterly Community Liaison Group meeting includes Chiefs, Chairmen of the Community Consultative Committees, Ghana EPA, and the Minerals Commission. This is chaired by someone from the Commission on Human Rights and Administrative Justice. The objective is to disclose Environmental reports for the quarter. Cyanide information is also disclosed.
Presentations are given in Twi (official indigenous language of Ghana) and are available in English. Additional translations can also be made, as required. A number of Community disclosure reports were sighted and sampled, including that of May 3 2016 when there were explanations on cyanide, modes of exposure, use of cyanide, first aid, symptoms of cyanide poisoning, community and environmental risk of cyanide, and measures by Iduapriem to prevent release of cyanide to the environment. A series of questions and concerns were raised by stakeholders covering prevention of pollution during transport, control measures relating to the TSF, symptoms, and why the Company imports poisonous chemicals for their operations.
A Media engagement workshop dated 30 Aug 2018 at Iduapriem Gold Mine clubhouse was attended by news representatives from Ghana Broadcasting Corporation, TSV Africa, Joy News, Adom TV, Business and Financial Times Takoradi, Daily Graphic Takoradi, Ghanaian Times Takoradi, Daily News Takoradi, Ghana News Agency Tarkwa, Golden Newspaper Tarkwa and five radio stations from Tarkwa.
The minutes and attendance lists of various forums were sampled. These included the Sustainability Department Quarter 1 Environmental Monitoring Disclosure Report dated 13/6/2017, including names of attendees, designation / community, contact numbers. Attendees include the EPA, Water Research Commission, Community representatives, Mile 7 Chief, CHRAJ Director. The minutes includes Safety video, Matters Arising, Response, and Action by (date). A question asked was whether cyanide also spills in water bodies which was answered and discussed. Cyanide levels are also disclosed during the meeting.
The AGA Iduapriem Gold Mine Engagement and Communications Strategy, No 1, effective date: - 25/05/2018 was sighted. This 62-page document contains: - Vision, Mission, values, and Business Objectives, Objectives of engagement and communications Strategy, Guiding Principles, Key Business risks, projects Communication and an Approach. The Approach describes internal and external engagement and communication, External stakeholder engagement, Engagement and communication plans, Media Engagement and Crisis Communication. A major part of

the document includes the identification of stakeholders and detailed descriptions of engagement and communication ideas and plans.

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

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 9.2**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide.
Stakeholder Engagement and Communication Platforms include: Community Consultative Committees (19 Communities involved) and meetings are held quarterly; the Community Forum: ("Town hall" meeting) which is an open public session, where all issues may be raised and discussed, including cyanide; Quarterly Community Liaison Group meetings which includes Regulators where environmental disclosures, including cyanide, are made.
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Standard of Practice 9.3: Make appropriate operational and environmental information regarding cyanide available to stakeholders.

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 9.3**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
Briefing notes are used to direct cyanide information given to communities in the local dialects (Twi and Nzema, supported by photos and diagrams). A significant portion of the communities are illiterate. Electricity is not always available to enable the use of electronic media.
An AngloGold Ashanti Group-wide Workforce Management Reporting System (WMRS) is used as an electronic reporting platform for all safety and environmental incidents, inspections and deviations as per the Iduapriem Mine accident / incident management procedure. Incidents are classified as Minor, Moderate, High, Major and Extreme. The appropriate incidents are reported in the AngloGold Ashanti annual report which is publically available and contains information on environmental and safety incidents, including any cyanide related incidents.
Iduapriem has not had any cyanide incidents (health, safety or environmental) in the 3 years since certification that required reporting on a public level and thus no reports were made in the AGA annual reports since the certification in 2016.