INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Code Compliance Audit Gold Mining Operations

Certification Summary Audit Report

AngloGold Ashanti Iduapriem Gold Mine Ghana

30th November – 4th December 2015

Name of Operation:	AngloGold Ashanti Iduapriem Limited
Name of Operation Owner:	AngloGold Ashanti
Name of Operation Operator:	AngloGold Ashanti Iduapriem Limited
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Location Detail and Description of Operation

AngloGold Ashanti (Iduapriem) Limited is located in the Western Region of Ghana, about 17km southwest of Tarkwa.

The Iduapriem Mine started operating in June 1992. The original plant, designed to treat about 2.4Mtpa of ore, has undergone several expansions. The most recent expansion work was completed and commissioned in 2009 which incorporated a new 800tph 2-stage crushing plant, a second ball mill at the CIL plant together with a 24 meter diameter thickener, a second Knelson concentrator, and an upgrade of the oxygen plant capacity from 4.0 to 8.0 tonnes per day. The main objective of the expansion project was to increase plant throughput to 4.3Mtpa.

a) GRAVITY / ILR

A gravity circuit comprising of 2 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 1 Knelson and part of the cyclone underflow is bled to feed the Knelson.

The concentrator operates in batch mode. Once the preset time has elapsed, the unit goes through a flush cycle time to discharge accumulated concentrates. The concentrates are flushed to the concentrate tank 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 35-42% of gold produced from the Iduapriem gold treatment plant.

b) LEACH / ADSORPTION

There are four leach tanks and seven adsorption tanks in the CIP circuit. Cyanide concentration of 250-300ppm and an average dissolved oxygen level of about 24ppm are maintained in leach tanks #1and #2. Additional cyanide and oxygen points are

located in leach tanks #3 and #4 to ensure leaching of the gold into solution is maximized before the slurry enters the adsorption circuit. On average the leach contact time is between 18-22 hours and gold recovery about 93.5% - 95.0%. Oxygen supply to the leach tank is from an 8 tonnes per day plant which injects the oxygen to the leach tanks through oxygen spargers.
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 adsorption tank #1 for elution. Carbon can also be recovered from adsorption tank #2 should adsorption tank #1 be isolated or taken out of circuit for maintenance purpose or any other reason.

c) 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 electroplated onto steel wool cathodes in an electrowinning cell. The loaded carbon is recovered from adsorption tank #1 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 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 hot water is used to rinse 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 through a carbon sizing screen.

d) 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 pumped to the GTSF 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. Blocks 1, 2 and the ITSF have since been decommissioned and re-vegetated.
The Veolia Waste Water Treatment Plant (WWTP) is used to treat excess supernatant or decant water from the tailings dam to Ghana EPA-recommended standard limits and discharged into the environment as part of the Iduapriem water management system. The designed capacity of the waste water treatment plant is 300m^3/h.

e) CYANIDE USAGE

On the mine site, sodium cyanide, can be found either in the solid form as briquettes or in solution. The cyanide arrives on site as solids in briquette form and is stored in the Orica Tarkwa Facility yard. (The Orica Tarkwa Facility (OTF) is located on land owned by Iduapriem mine.) The OTF reagent yard is fenced off and is under lock and key to restrict public access. On request by the process plant for cyanide as scheduled, 20 tonnes of solid cyanide is charged into an isotainer at the OTF and transported to the process plant under security escort. At the plant, the 20 tonnes of solid cyanide is sparged or dissolved into a solution state using the new 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, desorption process and metallurgical test work.

Auditor's Finding

This operation is

X in full compliance

☐ in substantial compliance

☐ not in compliance

with the International Cyanide Management Code.

Audit Company: Eagle Environmental

Audit Team Leader: Arend Hoogervorst

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Names and Signatures of Other Auditors:

Name : Dawid M. L Viljoen Signature _____ Date: 13/3/2016

Dates of Audit: 30th November – 4th December 2015

I attest that I meet the criteria for knowledge, experience and conflict of interest for Code Verification Audit Team Leader, established by the International Cyanide Management Institute and that all members of the audit team meet the applicable criteria established by the International Cyanide Management Institute for Code Verification Auditors.

I attest that this Summary Audit Report accurately describes the findings of the verification audit. I further attest that the verification audit was conducted in a professional manner in accordance with the International Cyanide Management Code Verification Protocol for Gold Mine Operations and using standard and accepted practices for health, safety and environmental audits.

Iduapriem Gold Mine

Facility

Signature of Lead Auditor

16/3/2016

Date

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 covers the supply of cyanide from the manufacturers in Korea to the Orica Tarkwa Storage and Bag to Bulk facility (OTF) in Tarkwa. Samsung as a consignor, purchases cyanide from certified producers: TaeKwang (certified under the ICMI Code on 22 May 2014) and Tongsuh (certified on 11 March 2014 under the ICMI Code). 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.

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. 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. The Samsung West Africa (consignor) supply chain was ICMI certified on 4 November 2014, 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 OTF to the Iduapriem site by Stellar Transport (ICMI certified on 6 March 2014).
There is also a Samsung Transport Management Plan in place which covers normal, abnormal and emergency situations during cyanide transportation.

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 West Africa (consignor) supply chain was ICMI certified on 4 November 2014, covering the complete supply chain from the producers in Korea to the Orica Tarkwa Storage and Bag to Bulk facility. There is also a Samsung Transport Management Plan in place which covers normal, abnormal and emergency situations during cyanide transportation.

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. 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.

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 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 tanks are located in the open air with ventilation pipes. 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.

Standard of Practice 3.2: Operate unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

X in full compliance with

The operation is

□ in substantial compliance with **Standard of Practice 3.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:

All cyanide packaging is disposed of via the Orica contract related to the cyanide bag to bulk repackaging process which is separately ICMI certified. There is a cyanide sparging procedure in place 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".

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 34 cyanide specific operational and maintenance procedures. The TSF management and operating plans in place include the AngloGold Ashanti Regional TSF Operating Code and the SRK Greenfields TSF Operating Manual. Annual reviews and reports are also used for review of TSF operating parameters. These include an annual review by the AngloGold Ashanti Geotechnical Engineer and an annual TSF audit done by an independent auditor in terms of the Ghanaian EPA regulatory requirements. The reports all concluded that the TSF is being operated satisfactorily. 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, including that WAD cyanide must not exceed 50ppm in the plant tailings tank. 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 procedure is in place regulating the pumping and management of water levels on the mine.
All tanks, bunds, pond, impoundments, pipelines, valves and pumps in the plant and on the TSF are listed on the EMESA Planned Maintenance System (PMS) and are inspected on a regular basis. Two weeks before the physical inspection component of the certification audit, the SAP system replacing the EMESA system, went "live". An electronic review of the SAP system confirmed that critical cyanide equipment is included in the SAP system. With the review of inspections, and with the information available in the SAP system, plus the previous information from the EMESA system used before the SAP implementation, it is the opinion of the auditor that the combined engineering and operational inspections are sufficient to assure that the facility operates within design parameters.
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 (Asset Integrity Assessment Template - AIAT) is produced and associated planning included in the

budget for implementation of findings and recommendations. The Leach and CIP tanks on ring beams form part of the Risk Based Inspection (RBI) program (using" API Recommended Practice 580 Second Edition, November 2009" as a guideline). Tank electronic annual inspection checklists and Gantt charts were sampled. The inspections are documented and cover e.g. thickness testing, visual inspections, checks for corrosion and leakage, as well as non-destructive testing, ultrasonic inspections, radiography inspections, magnetic practice inspections, liquid penetrant inspections, visual inspections, above ground storage tank inspections, and weld coupon verification and qualification, as well as vacuum box inspection of bottom welds, magnetic particle inspection of bottom peripherals, ultrasonic thickness measurement of bottom plates and first course shell plates and visual inspection of tank base and peripheral welds. AIAT also monitors all bunds annually. 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). It was reported that back-up power is required by local legislation. 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 health, safety and environmental officials.

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.
Ongoing leach amenability tests from pit samples are done which help to predict cyanide requirements from different sections of the pit. Grind test work bottle roll tests at addition rates of 150 and 250 ppm for Adjopa, Block 7 and Block 8 were also sighted. Indications are that a cyanide addition rate of 150 ppm is adequate and no significant variability was

identified. The results are used to direct cyanide set point decisions. Residence time, however, is reported to currently restrict cyanide addition rates to 250 ppm.
An optimisation report, "Pathway to WAD cyanide reduction - reduced pH with coagulant addition", was considered in Aug 2015 and the resulting trials resulted in reducing the pH parameter by the effective use of coagulant to achieve the required thickener performance. The lowering of the leach pH resulted in lowering of the WAD cyanide levels to less than 50 mg/l in the tailings without affecting leach efficiency. This was achieved as a result of the increased cyanide hydrolisation in the Leach, CIP and TSF pool.
The replacement of the TAC 2000 analyser with the more advanced TAC 1000 on-line free cyanide analyser was considered, including the use of a variable speed drive on the peristaltic dosing pumps for cyanide dosing control, using a feedback control loop from the TAC output. This system will ultimately replace the automatic valve control system.
A TAC 2000 analyser is currently used to measure and control cyanide addition. A variable speed drive was fitted on one cyanide dosing pump as a prototype system and it was demonstrated to be controlling cyanide addition more efficiently. The upgraded TAC 1000 unit was received and installed and is currently awaiting commissioning by the supplier. The remaining peristaltic dosing pumps will be fitted with variable speed drives and the dosing points piping is planned to be installed in permanent engineered positions.

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, and calibrating for, the new Opsim Water Balance. The Opsim is a 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. 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 Opsim model is updated and simulations run monthly. This includes evaluating actual rainfall history in the predictions. The model is used to simulate wet and dry season scenarios and the appropriate water management strategy is developed from the predictions. The model uses a 1:100 year 24 hour storm event and is calibrated with

actual site precipitation data (5 years history) and 32 years of historical precipitation data from Tarkwa. The minimum TSF freeboard is specified at 1.5m by the Ghana EPA and the current freeboard is 2.6 m. TSF water levels and freeboard are monitored daily and flow meters are used to measure input volume. Dams are surveyed monthly and all pond levels are manually measured daily and inputted into the spreadsheet data base.

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. An on-line WAD analyses (WAD1000 analyser) is used for monitoring WAD cyanide. The mine implemented a process change to reduce the WAD cyanide in the tailings to less than 50 mg/l in April 2015. WAD cyanide analyser results between April and November 2015 were compliant with one incident where the value exceeded 50 mg/l. The reason for the exceedance was a malfunctioning control system which was corrected. For the same period, values at the spigot and in the Decant pond were below 50mg/l WAD cyanide.
As the TSF is operated at less than 50 ppm WAD cyanide, no special measures are needed to protect wildlife. No cyanide-related bird mortalities have been reported indicating effective management. The site's heap leach was decommissioned in 2000.

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. Results from January to August 2015 indicated that the discharge values were all below 0.005mg/l WAD cyanide, which is the limit of detection. The samples are taken daily when discharges occur.

Samples are taken downstream of the discharge every second day while discharging. Downstream of the discharge point samples between January and August 2015 while discharging, were reviewed and values between 0.001 and 0.006 mg/l free cyanide and WAD cyanide noted, all less than the limits of detecting of 0.005 mg/l, apart from one "outlier" sample.
The TSF is lined up to the first lift to prevent any seepage and possible indirect discharges to the ground and surface water. Boreholes are sampled downstream of the TSF, as is the surface water and no values exceeded the background, indicating that no indirect discharge takes place to 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. 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 samples downstream of the new TSF from January to October 2015 indicated free cyanide values between 0.001 and 0.005 mg/l. No 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 API 650 as the basis for its methodology. For detail on the RBI inspection reviews of the Leach and CIP tanks, refer to 4.1 above.

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. Process lines are placed above concrete bund areas and concrete-lined surfaces. The tailings pipelines are placed inside HDPE lined trenches. 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. 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, and operational inspections. The PMS system includes the tailings lines which are installed inside the pipelines trench.
All cyanide pipes are made of HDPE and the tanks constructed of mild steel. 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:
A new cyanide sparging and dosing facility was constructed as a turnkey project, designed by Orica (a certified cyanide producer) and a QA/QC program was used. The QA/QC procedures and documentation such as design files, P&IDs, 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 new Green Fields Tailings Storage Facility (GTSF) is operational and covered by Geotechnical Engineers quarterly and annual inspections. 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 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 writing parameters consistent with the Code's principles and standards of practice.

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) 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, produced by external consultants was sighted which included line items on the cyanide sparging plant decommissioning costs and the remaining plant cyanide decommissioning including dismantling of process plant, decontaminating of the Leach, CIP, Elution, and Electrowinning, Intensive leach, water tanks and thickeners. The Closure Estimate is revised quarterly by applying an escalation factor and updates for 2015 were sighted.
There is a Ghana EPA reclamation security agreement in place which serves as a financial surety. The bond is paid up fully and the linked guarantee expires on 31 May 2016. The supporting documentation was sighted.

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 34 cyanide specific operational and maintenance procedures. Individual procedures include special requirements, environmental aspects, PPE requirements and hazards and their related controls and task specific pre-work inspections. Procedures sampled included: entry into confined space, procedure for decontamination and removal of cyanide-contaminated or redundant equipment for the cyanide area, cyanide sparging,

the Buddy procedure, the risk assessment procedure, and the procedure for examination of PPE prior to use.

The TSF management and operating plans in place include the AngloGold Ashanti Regional TSF Operating Code and the SRK Greenfields TSF Operating Manual. Annual reviews and reports are also used for review of TSF operating parameters. These include an annual review by the AngloGold Ashanti Geotechnical Engineer and an annual TSF audit done by an independent auditor in terms of the Ghanaian EPA regulatory requirements. The reports all concluded that the TSF is being operated satisfactorily. 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 be operated in line with the Code requirements, including that WAD cyanide not exceed 50ppm in the plant tailings tank. The design freeboard of the plant process water pond is 90%. (A level indicator is installed and an audible alarm sounds at 85%.) A water management procedure is in place regulating the pumping and management of water levels on the mine.

All tanks, bunds, pond, impoundments, pipelines, valves and pumps in the plant and on the TSF are listed on the EMESA Planned Maintenance System (PMS) and are inspected on a regular basis. Two weeks before the physical audit, the SAP system replacing the EMESA system, went “live”. An electronic review of the SAP system confirmed that critical cyanide equipment is included in SAP system. 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 (Asset Integrity Assessment Template - AIAT) is produced and planning included in the budget for implementation of findings and recommendations. The Leach and CIP tanks on ring beams form part of the Risk Based Inspection (RBI) program (using" API Recommended Practice 580 Second Edition, November 2009" as a guideline). Tank electronic annual inspection checklists and Gantt charts were sampled. The inspections are documented and cover e.g. thickness testing, visual inspections, and checks for corrosion and leakage. The site also uses non-destructive testing, ultrasonic inspections, radiography inspections, magnetic practice inspections, liquid penetrant inspections, visual inspections, above ground storage tank inspections, and weld coupon verification and qualification, as well as vacuum box inspection of bottom welds, magnetic particle inspection of bottom peripherals, ultrasonic thickness measurement of bottom plates and first course shell plates and visual inspection of tank base and peripheral welds. AIAT also monitors all bunds annually. 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).

A change management procedure covering health, safety and environment is in place and operational and an example of a major change management exercise (New cyanide sparging facility, signed off by Safety, Health and Environmental officials) was reviewed and indicated that the process is used effectively.

Worker inputs on developing and evaluating health and safety procedures is solicited through Weekly Toolbox meetings which include centralised topics for the whole mine. Monthly Safety Health and Environmental committee meetings are held where worker safety and health is included. Risk Assessments undertaken 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 pH was changed from 11.5 to 10.2 and a full risk assessment was conducted on the change to quantify the risk of potential hydrogen cyanide evolution. Electrowinning is conducted at a pH of 14 and the intensive leach reactor leachate is run at a pH 13.8. Four bags of sodium hydroxide are added to the sparge tank to increase pH and reduce the risk of HCN evolution during sparging operations.
There are 2 fixed HCN (Hydrogen Cyanide) gas monitors at the tails hopper and on top of the leach tanks. There are 6 PAC7000 personal HCN gas monitors, 4 X-am 5000 and 2 XAM 5600 personal HCN gas monitors used by the personnel. Hotspot surveys are conducted monthly by the Environmental Department. A sample hotspot monthly graph for the different areas showed the adsorption tanks, electrolyte tanks and ILR with the highest HCN gas values at 3 ppm and the leach tanks at 2.7ppm with the tailings hopper at 2.7ppm during acid washing. All values are less that 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 directives. The units are serviced and calibrated by the manufacturer on contract. Calibration reports for both the portable and fixed hydrogen cyanide gas monitors dated 26 Oct 2015 were sighted. 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 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 file register and replacement register for 2015 was sighted.
MSDSs were sighted at the sparge facility and at the caustic cyanide make-up tank. The cyanide first aid procedure and MSDSs were also available in all the cyanide emergency cabins. Active use of signage was observed. No eating, drinking, and smoking signs adjoining cyanide equipment, were observed, where appropriate. Warning signs indicating presence of cyanide are placed on the tanks and PPE requirements are placed at all sections. 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. 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 Tripacks which are stored in fridges. Tripacks 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 Tripacks. It was verified during site inspections of the plant and the clinic that the Tripacks 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, and a dedicated cyanide emergency team who are available per shift. The Sam Jonah on-mine clinic is fully equipped to handle cyanide emergencies. A Medical Doctor and Medical Assistant are available or 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. A second standby ambulance is available at the clinic and equipped for emergencies.
E-mails were sighted between the Sam Jonah clinic resident doctor and the Executive Chairman of the Accra Medical Centre (AMC) (the operators of the previously known Gold Fields Hospital Tarkwa) indicating their willingness and abilities to handle cyanide emergencies at the hospital. Negotiations are ongoing regarding formalised arrangements after change of ownership of the hospital.
Emergency cyanide drill documentation (which included the clinic and the hospital) were reviewed and included: a Liquid cyanide spill drill at the cyanide sparge facility in February 2014. The report included photographs; Dam wall failure scenario in May 2015. (The scenario was described as well as the reporting of the incident). The report identified deviations, corrective action log, including deviation actions, completion dates, responsible persons and status. The drill was observed by the cyanide champion, the

safety officer and the training officer and a transport-related drill with Stellar Logistics dated 3 July 2015. The scenario involved a truck making a delivery of cyanide to Iduapriem and included a cyanide briquette spill as well as a mandown drill. The drill included the Sam Jonah clinic. A full report was completed for the drill. Both the Mine and the transporter's teams took part in the drill. The drill schedule for 2015 for each quarter was also reviewed.

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. 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. Treatment chemicals use is prohibited in cyanide procedures. Emergency sampling is covered in procedures. Detailed information to back up procedures is 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, 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.

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. Each worker is included in the Circuit on the Job Assessment Gap Matrix that identifies a required task training plan for the year. Refresher training is given when a need is identified by planned task observations (PTOs) or incidents, which will trigger review for refresher training. Supervisors are scheduled to do PTO's monthly with the Training Department doing job assessments. Records are retained for 5 years.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
All 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 Emergency Response Team (ERT) will then react to the emergency. The sparge operators and cyanide emergency response team receives advanced cyanide emergency safety training which includes cyanide releases. Cyanide release and spill drills were reviewed and confirmed to be used for the ERT training. In the case of a cyanide emergency, the ERT will react and apply first aid and decontaminate the patient.
There are at least two trained Emergency Response Team (ERT) members on each shift. These members will act as first responders who will attend to the emergency. The control room will notify the emergency response centre who will send the ambulance and additional ERT members to assist the first responder ERT members in the plant. Mock training drills are conducted involving the ERT's 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.
Community meeting notes and photographs taken during the meetings held during 2015 were sighted. Attendance lists are kept of each meeting. All meetings include presentations on cyanide awareness as well as notes and feedback. The stakeholder communities total 16 which includes 3 communities who were displaced by the Mining Operations. A list of communities and distribution lists of community leaders was sighted. Presentations are given in Twi (local language) during the meetings and notes used for the presentations were reviewed. The presentations include information on cyanide covering dangers, risks and responses. Notes on individual community presentations which includes detailed questions on cyanide issues were reviewed. Questions by small scale miners from the communities were also noted.

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.
Community meeting notes and photographs taken during the meetings held during 2015 were sighted. Attendance lists are kept of each meeting. All meetings include presentations on cyanide awareness as well as notes and feedback. The stakeholder communities total 16 which includes 3 communities who were displaced by the Mining Operations. A list of communities and distribution lists of community leaders was sighted. Presentations are given in Twi (local language) during the meetings and notes used for the presentations were reviewed. The presentations include information on cyanide covering dangers, risks and responses. Notes on individual community presentations which includes detailed questions on cyanide issues were reviewed. Questions by small scale miners from the communities were also noted.

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 for meetings and presentations are made available to stakeholders on request. A large part of the community is not literate and electricity is not always available to enable the use of electronic media. Briefing notes are used to direct cyanide information given to communities in the local dialect (Twi and Nzema), supported by circulated photographs. An estimated 60% of the communities are illiterate.
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. The website location is under "Responsible Use of Cyanide" at http://www.anglogoldashanti.com/en/sustainability/Pages/Hazardous-Waste-Management.aspx

Iduapriem has not had any cyanide incidents (Health, Safety or Environmental) in the last 12 months that required reporting on a public level. Any incidents would be reported on the website.