INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Code Compliance Audit
Gold Mining Operations

Summary Audit Report

AngloGold Ashanti
Continental Africa Region
Obuasi Gold Plant
Ghana

28th August – 4th September 2023

For the
International Cyanide Management Institute

Name of Operation:	Obuasi Gold Mine
Name of Operation Owner:	AngloGold Ashanti
Name of Operation Operator:	AngloGold Ashanti Ghana Ltd
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Location detail and description of operation:

Location

Obuasi Gold mine is located in the Ashanti Region of Ghana, West Africa. Obuasi is some 280 km northwest of the capital, Accra. It is 320 km, by road, from Accra.

Mining

Obuasi Mine is primarily an underground operation with a recent history of open pit mining that currently operates to depths of up to 1,500 m (metres). Ore is currently hauled from the southern sections of the underground working areas (i.e., Sansu, GCS and KRS Shafts) onto a run-of-mine (ROM) stockpile close to the 6,000 tpd (tons per day) Processing Plant from where it is fed to the crushing unit. Crushed ore product is conveyed onto an in-plant stockpile prior to being fed to the milling circuit of the Processing Plant. The Mine was placed under temporary care and maintenance in November 2015 pending the completion of a Feasibility Study (FS) from July 2014 to March 2016 and the implementation of the "Obuasi Redevelopment Project" (ORP). The redevelopment of the Obuasi Mine, which commenced in December 2018 was to improve the Obuasi mining methods and refurbish the process plant for future operations through the application of improved resource models, mine design, underground development, including ground support using paste fill, long hole drill designs, new model long hole drills with improved drilling accuracy, improved long hole charging and blasting practices and full mechanization of the mining method using development jumbos. The ORP Phase 1 of the mining operations commenced in 2019, delivering 2,000 tons per day (tpd) to the Processing Plant. This was subsequently ramped up to 4,000 tpd (Phase 2) in December 2020. The ORP Phase 3, which involves the refurbishment and recommissioning of the KMS shaft and other underground workings, would ramp the total underground ore delivery to the Processing Plant to nameplate design of 6,000 tpd by the end of 2024.

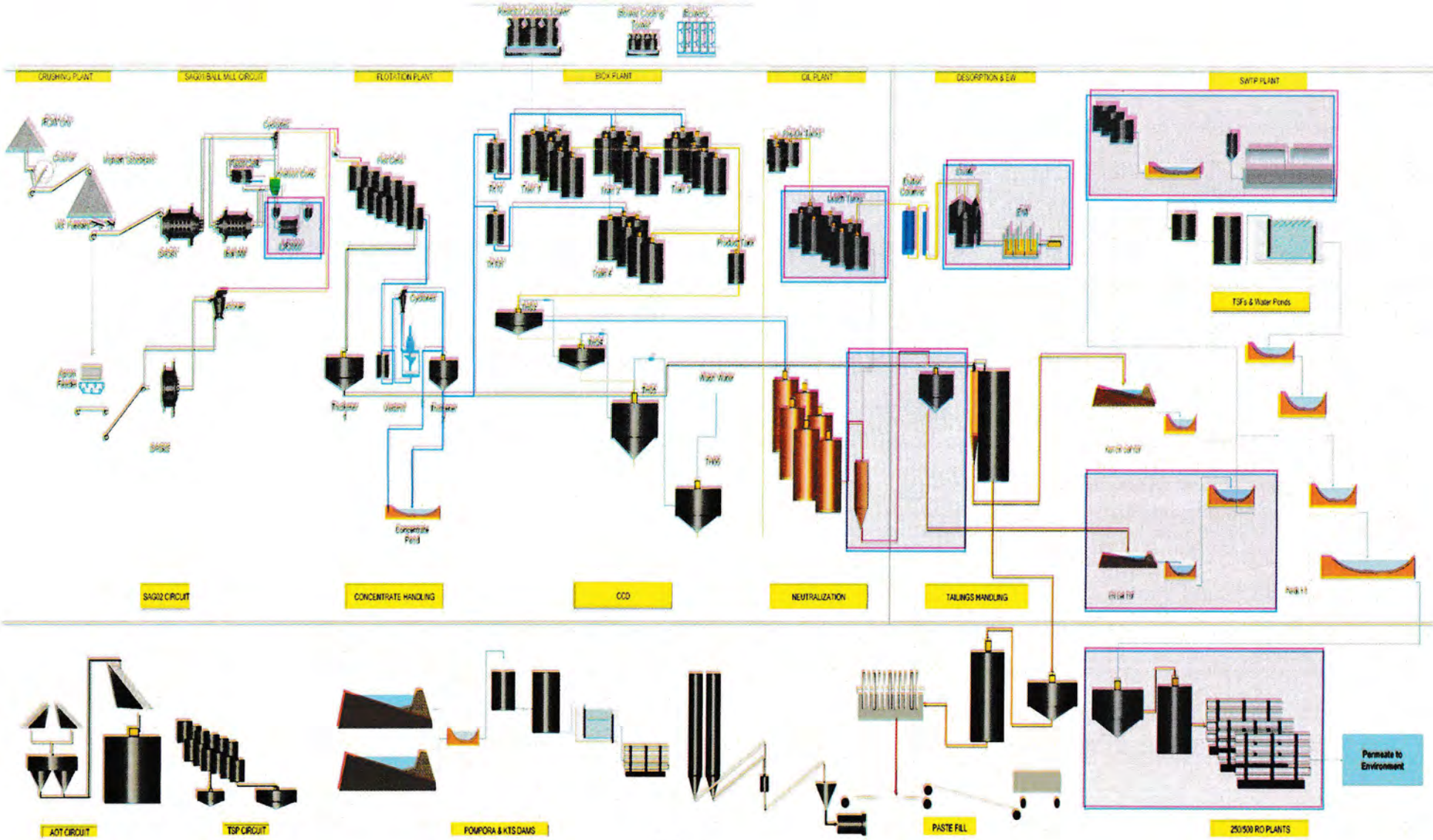
Processing

The South Processing Plant (SPP) complex of AGAG (AngloGold Ashanti Ghana) Obuasi Gold Mine encompasses cyanide facilities, including the Sulphide Treatment Plant (STP), Tailings Sulphide Plant (TSP), Alternative Ore Treatment (AOT) Plant and the Process Water Treatment Plant (PWTP). The STP, which was commissioned in November 1993, was designed to process refractory sulphide and transitional gold ores and the PWTP consisting of the rotating bacterial contactors ("RBC"), carbon-in-solution ("CIS") and Actiflo™ units (commissioned in 2009). The TSP was commissioned in 2010 to treat low-grade sulphide underground and tailings material, as well as the AOT commissioned in 2013 to treat tailings material, are both currently offline. The ORP Phase 1 of the STP circuit commenced operations in October 2019, with the corresponding first gold pour in December 2019. The ORP Phase 2 of the STP circuit was brought into operation in December 2020.

The STP has a design capacity of 274 tph (tons per hour) of refractory transitional and primary sulphide ores, yielding 30 tph of sulphide flotation concentrate for processing in the incorporated bio-oxidation (BIOX®) facility. The treatment process flow includes primary crushing, semi-autogenous/ball milling incorporating a gravity recovery, Gekko (proprietary name) In-Line Leach Reactor (ILR) and an Outotec Skim-air 240 flash flotation unit, a conventional flotation, biological oxidation (BIOX®), Carbon-in-Leach (CIL), a Split Anglo-American Research Laboratory (AARL) elution and electrowinning for final gold recovery.

A schematic representation of the STP is shown below.

STP Process Flow Diagram



Division/Section	Summary of Scope of Activities and Process Description
1. ROM PAD AND CRUSHING CIRCUIT	Crushing is done through an open circuit single toggle jaw crusher with an upstream ROM (Run-of-Mine) bin fed by front-end loaders and a vibratory scalping grizzly. The purpose of the crushing circuit is to reduce the coarse particles into smaller sizes (P_{80} of 110 mm) which is suitable as feed for the milling circuit. The crushed product is conveyed onto the in-plant stockpile by means of a belt conveyor with a tramp magnet to remove unwanted metallic materials. Water for dust suppression on the crusher belt is the plant raw water (sourced from UG (underground) dewatering operations with Pond 3 as a make-up water) which is required to be cyanide-free (<0.03ppm WAD (Weak Acid Dissociable) CN-) due to downstream flotation and Biox ® operations.
2. MILLING, GRAVITY & FLASH FLOTATION CIRCUIT	There are two milling circuits: the SAG (Semi-Autogenous Grinding) Mill #01 - Ball Mill circuit and the SAG Mill #02 circuit. The SAG Mill #01 – Ball Mill circuit is comprised of 3-off vibratory feeders, a conveyor belt, 2-off slurry pumps, a SAG mill (6.15 m ø x 7.60 m Effective Grinding Length (EGL) with 3,800 kW motor), a Ball Mill (5.20 m ø x 7.80 m EGL with 3,800 kW (kilowatt) motor), a set of hydrocyclones, a SkimAir 240 outlet flash flotation cell, scalping screen and 3-off gravity concentrators (Knelson (proprietary name) Concentrators. The SAG Mill #02 circuit is comprised of only a SAG mill, a cluster of hydro cyclones and 2-off slurry pumps with the hydro cyclones overflow stream as the only product in that circuit. This milling is currently dedicated for tailings material treatment. Steel balls in addition to the feed ore and water are introduced into the rotating mills to grind to the desired finer sizes. Milling water is sourced primarily from underground dewatering with make-up from Pond 3. Milling water is required to be cyanide-free (<0.03ppm WAD cyanide) due to the negative effect of cyanide on the flotation process and its toxicity to the Biox ® bacteria. The milled product is transferred to the hydrocyclones cluster for separation into fine fractions (overflow) and coarse fractions (underflow). The hydrocyclones overflow stream feeds the conventional flotation circuit. The hydrocyclones underflow stream (circulating load) splits into 3-off portions. Two portions of the underflow feed both the flash flotation unit (10 m^3 Skim-air flotation cell) and a gravity circuit consisting of 3-off 1.2 m (48 inch) Knelson Concentrators. The tails from both the flash and gravity units combine with the final split portion of the main underflow stream to feed the Ball mill. The flash concentrate, as well as the conventional flotation concentrate streams are further grounded in a Metso regrind Vertimill™ in closed circuit with a cluster of hydrocyclones for classification.

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	The Knelson concentrate (free gold) feeds the 2-ton Gekko (proprietary name) Inline-Leach-Reactor (ILR) where high concentration of cyanide, hydrogen peroxide and caustic soda are utilized to leach the gravity concentrate. The ILR pregnant solution is transferred to a dedicated 25m³ eluate tank for recovery at the gold room.
FLOTATION CIRCUIT	The conventional flotation plant consists of flotation cells, hoppers, pumps, blowers and reagent mixing and dosing facilities. The Flotation process utilizes chemical reagents and air to concentrate and recover the gold-bearing sulphide minerals. Two products are obtained in the process; flotation concentrate and tails.
3. CONCENTRATE & TAILS HANDLING	The concentrate and tails handling circuit is an extension of the conventional flotation circuit. It comprises of the concentrate and tails thickeners, process water tank & slurry pumps, flocculant mixing and dosing facility. The purpose of this circuit is to thicken / dewater the flotation products for reuse in the milling circuit and in addition remove excess residual flotation reagents from the flotation concentrate prior to the BIOX® circuit. The thickened concentrate feeds the BIOX® circuit and the tails feeds Backfill / Pastefill storage tanks. This section also has a Concentrate Storage Pond which is utilized for temporarily storing extra flotation concentrate when the BIOX® is not readily available to receive feed.
4. BIOX® CIRCUIT	The BIOX® circuit is comprised of 2-off surge tanks, the BIOX® reactor tanks, Cooling towers, Blower units, nutrient and reagents mixing facilities and the CCD (Counter Current Decantation) circuit. The BIOX® reactors are set up as four parallel trains, with each train consisting of 6-off reactors (895 m³ live volume per tank), the first three operating in parallel (primary reactors) and the remaining three operating in series (secondary, tertiary and quaternary reactors). A final secondary reactor is also available to all the four trains achieving a total capacity of 1,050 tpd of flotation concentrate treated or oxidised. The function of the BIOX® reactor circuit is to oxidize the flotation concentrate sulphide minerals with the aid of specialised bacteria strains, generating a highly oxidized acidic concentrate. The process is exothermic and heat exchangers and cooling towers are installed to optimise the heat exchanging process.

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	The residual acidic constituents are removed by means of washing and thickening using a series of thickeners in the Counter-Current Decantation unit. The two products generated are the oxidized thickened concentrate and the effluent acidic liquor. The concentrate feeds the CIL (Carbon in Leach) circuit whereas the acidic liquor is neutralized in the Neutralization circuit.
5. CIL CIRCUIT	The CIL (Carbon in Leach) circuit is comprised of 3-off Pre-oxidation (356 m^3 tank) and 8-off leach tanks (712 m^3) and a 2-off 5-ton capacity each oxygen generating facility. The function of the CIL circuit is to dissolve (leach) the gold in the oxidized concentrate from the BIOX® process. Leaching is preceded by a two-stage pre-oxidation process for pH adjustment to 5.5 and 10.5 respectively and oxygen conditioning. During the leaching process, the carbon in the leach tanks adsorb the dissolved gold particles which is later recovered from the tanks and stripped. Sodium cyanide and oxygen are also introduced from the cyanide sparging plant and the oxygen plant respectively. The carbon containing the dissolved gold (loaded carbon) is recovered from the process by means of a recovery screen & pump and sent for further recovery in the elution process. The tails product is pumped for preparation and transfer to the tailing's facility.
6. DESORPTION & ELECTROWINNING CIRCUIT	The desorption circuit is comprised of the acid wash and elution columns, Caustic Mixing Facility, heaters, carbon regenerating facility and eluate tanks. Loaded carbon is treated in a desorption circuit employing the Split AARL (Anglo American Research Laboratories) system using cyanide and sodium hydroxide as strip solutions. The function of the elution process is to dissolve the gold which had been adsorbed onto the carbon from the CIL process into a small easy to handle pregnant solution volume. The process uses extremely high temperatures and pressures coupled with caustic solutions. Cyanide was previously used in the elution process. However, this has been discontinued since March 2023. The product from the elution process is a gold solution concentrate (eluate) and the stripped carbon (barren carbon). The barren carbon is regenerated using high temperatures in the carbon regenerating facility to improve its activity for reuse.

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	The pregnant solution (eluate) is passed through electrowinning cells located in the STP Gold Room in which the gold is recovered from the eluate by electroplating onto steel mesh cathodes. The gold precipitates on the cathodes are washed, filtered and calcined in electric calcine ovens. The dry calcines are then smelted in a diesel-powered furnace to produce ingots or bullion bars. Barren eluate solution at an average pH of 12 is generated during the electrowinning process. This solution is recycled into the leach tanks or used for making up cyanide solution for cyanide sparging.
	Eluate from the CIL elution circuit makes use of four electrowinning cells while the ILR uses two cells with a standby unit. Pregnant eluate from the elution circuit is cyanide-free, the eluate from the ILR circuit contains significant concentrations of cyanide.
7. NEUTRALISATION	The wash acidic liquor from the BIOX® CCD circuit is neutralized in a series of neutralization tanks with the introduction of limestone/seashell and lime slurry. The circuit is comprised of 6-off 290 m3 tanks in series operated in two stages, with limestone / seashell neutralisation in the first stage and lime neutralisation in the second. . The neutralized product is mixed with the CIL tails and pumped to the Backfill circuit for thickening and transfer to tailings impoundment at the BIOX® TSF (Tailings Storage Facility).
8. CYANIDE SPARGING PLANT	The Cyanide Sparging Facility consists of a sparging bay, a pair each of cyanide dissolving tanks (85.3 m^3 each) and storage / dosing tanks (127.9 m^3 each) with their cyanide circulation and dosing pumps all within a containment bund with spillage system and secondary containment for all pipelines carrying cyanide solution. The facility receives up to 2-off Isotainers, each containing 17 - 20 tons of cyanide briquettes at the sparging bay for dissolution. The isotainers are coupled unto circulation system in which the circulation pumps pump barren eluate or high-pH solution from the circulation tanks through the isotainers tanks and back to the circulation tanks continually until all the cyanide is dissolved, after which the isotainers are emptied and flushed into the circulation tanks. The cyanide solution is then transferred into the storage / dosing tanks after samples have been taken to confirm the pH and cyanide concentration. From the storage tanks, cyanide is transferred to the CIL in a ring-main circulating system and to the ILR in batches.

Division/Section	Summary of Scope of Activities and Process Description
9. BACKFILL	The backfill circuit / tailings handling circuit is comprised of a thickener, storage tanks and transfer Pachuca tank, including flocculant mixing and dosing facility. One part of the Backfill circuit handles the feed to the tailings impoundments, and the other handles the feed to the Pastefill plant. The storage tanks receive, store and transfer the thickened flotation tails to the Pastefill plant for underground paste generation.
	The CIL tailings and the neutralized effluent are introduced into the thickener for water recovery prior to transfer into the BIOX® Cell TSF. The recovered water gravitates into the OTP (Oxide Treatment Plant) pond for water treatment.
10. PASTEFILL	The function of the Pastefill plant is to generate cemented paste material and transport via pipes for the filling of underground voids. The chemicals used in the plant are cement as a binder and flocculants. The products generated are the paste material and the return water from the thickening process to the OTP pond.
11. TAILING STORAGE FACILITIES	The operational TSFs comprise of the Flotation Tails TSF (South TSF) and the BIOX® TSF and their respective ancillary holding ponds, seepage sumps, catchment sumps and associated pumping facilities. The TSF also encompasses the pipe corridor with laterite and HDPE (High Density Polyethylene) lining, 7-off seepage collection sumps stretching from the process plant to the location of the TSFs, which are about 6 km apart. The BIOX® Cell TSF stores the BIOX® CIL tails and the neutralization tails streams, whereas the Flotation Cell TSF stores all other non-cyanide tails from the processing plant. A network of water ponds/dams receive, store and transfer the decant water from the TSFs to the various wastewater treatment plants. These are: • East Holding Pond 1 – receives decant water from the Flotation TSF for transfer to Pond 1B or Actiflo™ WTP (Water Treatment Plant) for treatment; • East Holding Pond 2 – receives decant water from the BIOX® TSF for transfer to the OTP Pond for treatment;

Division/Section	Summary of Scope of Activities and Process Description
	• OTP Pond – receives cyanide-contaminated overflow from the BIOX® tails thickener and the BIOX®TSF return water from the Holding Pond 2, for transfer to the STP PWTP (Process Water Treatment Plant); • Pond 1A – receives treated water from the STP PWTP as a cyanide compliance pond; • Pond 1B -- receives overflow from Pond 1A and transfer from Holding Pond 1 for treatment through the RO (Reverse Osmosis) 250 and RO 500 Plants; • Pond 2 – receives overflow from Pond 1B or transfer from Holding Pond 2 for treatment through the RO 250 and 500 plants; and • Pond 3 – is a raw water source for make-up at the plant.
12. WATER TREATMENT FACILITIES (WWTP)	The water treatment facilities are grouped into STP Water Treatment Plant, Pompora Water Treatment Plant, RO 250/500 Plants and South & North Domestic Water Treatment Plants. STP wastewater treatment plant is composed of the CIS, RBC and the Actiflo™ units. The CIS unit which is currently offline is used to recover residual gold and some amount of dissolved heavy metals. The function of the RBC unit is to degrade the cyanide species in the plant effluent water into acceptable limit suitable as feed for the RO operations. The function of the Actiflo™ circuit is to oxidize and precipitate arsenic species in the water into more stable forms for disposal. The RO 250 / 500 Plants is composed of settlers, RO facilities, Brine Storage Tank and associated pumps. The RO plants take feed source from the OTP pond, Pond 1B, Pond 2 and Pond 3. The process involves removal of macro particulates from the feed stream before sending the pre-treated feed material to the RO membranes for separation. The permeate generated is discharged into the environment or reuse at the process plant or underground operations, whereas the brine is returned to the OTP pond. Similar facilities are located at the Pompora treatment plants, which include both the Actiflo circuit and the RO circuit.

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
and Technical Auditor: Mining

E-mail: arend@eagleenv.co.za

Date of Audit: 28th August – 4th September 2023

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

Facility	Signature of Lead Auditor	Date
Obuasi Gold Plant		15/03/2024

Auditor's Findings

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

Standard of Practice1.1*: Purchase cyanide from certified 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:
Sodium cyanide is purchased directly by AGA (AngloGold Ashanti) Obuasi Gold Mine from Orica Australia Pty Ltd (Orica) via Orica Ghana. The Agreement to Supply Cyanide Products between Orica (Ghana) Limited and AngloGold Ashanti Ghana Ltd (AGAG) states that "…Both Parties are signatories to the ICMI (International Cyanide Management Institute) Code for the production and transport of cyanide and agrees to comply with the ICMI Code as published and amended from time to time by ICMI…The Company and the Supplier acknowledge that the ICMI Code may change during the term of the Agreement and agree that they will maintain compliance with the most current version of the ICMI Code…."
Cyanide purchased from Orica Ghana is produced at the Orica Yarwun Plant, Australia, and this plant was recertified as a Code compliant production facility on 31 October 2023.

Principle 2. TRANSPORTATION:
Require that cyanide is safely managed through the entire transportation and delivery process from the production facility to the mine by use of certified transport with clear lines of responsibility for safety, security, release prevention, training and emergency response.

Standard of Practice 2.1: *Require that cyanide is safely managed through the entire transportation and delivery process from the production facility to the mine by use of certified transport with clear lines of responsibility for safety, security, release prevention, training, and emergency response.*

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:
Chain of custody records, including waybills from Stellar Logistics and Mediterranean Shipping Company S.A. (MSC) sea waybills, identifying all transporters and supply chains responsible for transporting cyanide from the producer to the operation, were sighted and reviewed. Obuasi only purchases sodium cyanide from Orica.
The components of the supply chain from Orica, Yarwun, Australia, to Obuasi Gold Mine, Ghana, consist of the following: -
- Orica Australian Supply Chain (ICMI Transport recertified 4 February 2022)
- Orica Global Marine Supply Chain (ICMI Transport recertified 16 June 2021)
- Orica Bulk to Bag Facility, Tarkwa (ICMI Production recertified 16 August 2021)
- Vehrad Transport and Haulage (ICMI Production was recertified 15 September 2021)
- Stellar Logistics Limited (ICMI Transporter was recertified on 22 November 2021)

Principle 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:
LogiProc, a South African Engineering design consulting firm, designed the cyanide dissolving and storage area. A LogiProc Tank General Arrangement titled, "Tank General Arrangement, Area 6, Cyanide Dissolving Area," which included the two cyanide storage tanks and the two cyanide dissolving tanks and the cyanide dissolving bay were sighted and reviewed. The drawing, dated 4 October 2011, was approved by Vic Lines, (ECSA-Engineering Council of South Africa registration number 840172).
The LogiProc Process Flow Diagram titled "Cyanide Dissolving Area 01." dated 4 October 2011, was approved by R Britz. The LogiProc P&ID (Piping and Instrument Drawing) titled, "The Cyanide Sparging Area P&ID", dated 4 October 2011, approved by R Britz, was sighted and reviewed. The LogiProc Foundation General Layout Section and Detail, showing details on the concrete foundations was sampled and reviewed. This drawing includes the requirement for a plastic liner beneath the concrete.

Also sighted and reviewed was the Orica – AGA Obuasi Transition Guide, describing the Sparge Alignment for the isotainer at the sparge facility and the wet commissioning by Orica to confirm isotainer alignment at the sparge facility.
The cyanide unloading, dissolving and storage facilities are located away from people and surface waters. There are no workers operating nearby. The nearest surface water is approximately 1.5 km away. This was confirmed during the site inspection.
No liquid cyanide is unloaded from a tanker. An isotainer containing solid cyanide briquettes is parked on a concrete pad, which is sloped towards the concrete pipes channel leading to the concrete bunds and cyanide sump to collect any potential leakages. The cyanide is dissolved using pipes connected to cyanide dissolving tanks. The pipes are contained in concrete channels, and the dissolving tanks are located within concrete bunds. Any cyanide spillage entering the concrete channel is flushed into the bunds and collected in the bund sump. From there, it can either be pumped into the circulating (dissolving) tanks or pumped to the Tailings Hopper for disposal.
There are level sensors and transmitters on all four cyanide tanks (dissolving and storage). The transmitters report to the Control Room in real time. The levels alarm at High (85%) and High High at 90%. The tank is calibrated as 100% to the overflow pipe. There is a 3 monthly Planned Maintenance (PM) inspection carried out by the instrument technician for calibration and pneumatic testing, drift, and electronic testing. All the tanks also have load cells beneath them, which can measure the weight in the tanks. The load cells are included in the 3 monthly PM inspections.
The cyanide dissolving and storage tanks are located in bunds made of concrete, which prevent any seepage to the subsurface. All secondary containments for cyanide storage and dissolving tanks are constructed of concrete, which provides a competent barrier to leakage.
There is no solid cyanide stored on site. Briquette cyanide is sparged from a sealed isotainer to on-site cyanide dissolving tanks. The dissolving area is sloped and concreted to collect any liquid cyanide leakage. All liquid cyanide storage and dissolving tanks are located in an open-air environment and have vents at the top of the tanks to prevent HCN (Hydrogen Cyanide) HCN gas build-up. The Sparge Area is separately fenced and secured within the main mine-fenced and security-controlled area. The area has 24 hours/7-day security monitoring. There is no public access to the area, and employee access is controlled to only trained and authorised employees. Cyanide is stored away from incompatible materials such as acids, strong oxidizers and explosives and apart from foods, animal feeds and tobacco products. No other products are stored with cyanide. This was confirmed during the site inspection.

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 mine does not handle or dispose of empty cyanide packaging because its cyanide is delivered in briquette form in isotainers. The cyanide is dissolved using the sparging facilities on the mine. The resultant dissolved liquid cyanide is stored in dedicated cyanide storage tanks. The supplier and his sub-contractors dispose of the cyanide box packaging. (The cyanide boxes in sea containers are delivered by sea to the port of Takoradi. Stella Logistics transports the containers from Takoradi to the Tarkwa Orica Mining Chemicals Bag to Bulk Transfer Facility (ICMI production certified 16 August 2021). Orica repacks the briquettes into isotainers, and Stellar Logistics (ICMI transporter certified 22 November 2021) transports the isotainers to Obuasi for on-site sparging.) The empty cyanide packaging is transported by Stella Logistics from Tarkwa to the Vehrad incineration facilities in Tema for disposal via incineration. The Operating procedure OBPROC-CSP-PRO-2.2-034 details spillage management. Offloading equipment is checked in the offloading checklist before offloading commences.
After the sparging process is complete, the piping system is thoroughly flushed of any cyanide before the couplings are disconnected. There is no residual cyanide on the outside of the isotainer when it arrives on site. There is no liquid cyanide on or in the pipes and couplings when the isotainer leaves the site.
The Cyanide Delivery and Sparging Procedure, states in Section 3.3.2, Disconnect isotainer covers cleaning cyanide residues. In the section, the SQP (Site Qualified Person) details the task steps to disconnect the tanker from the flexible hoses and clean up the equipment and the outside of the isotainer. Task compliance and sequencing is checked during PTOs (Planned Task Observations). All sparging pipes, valves and pumps are listed on the SAP (proprietary name) PMS (Planned Maintenance System). Pumps, valves, instruments, and pipes are inspected monthly by fitters, electricians, instrument technicians and condition monitoring technicians. Sparge hoses and coupling are included on critical spares list and minimum stock maintained at the warehouse.
Cyanide briquettes for Obuasi are delivered in isotainers and sparged at the Obuasi Cyanide Sparging Facility. The custom-designed facility enables the dissolution of the cyanide in a safe manner without the risk of spillage or leakage. The procedure, Cyanide Delivery and The Sparging Procedure details the complete cyanide delivery and sparging process. This includes the sequential connection of the couplings, prior to sparging, and the task steps to disconnect the tanker from the flexible hoses and clean-up. There are no cyanide containers susceptible to puncturing because the isotainer is a pressure vessel that is difficult to puncture, and there are no cyanide containers that need to be stacked. As the sparging process ends with a thorough flushing of the flexible hose and lines before disconnection, it is unlikely that there will be any spills from the lines. However, Section 3.3.2.6 of the Cyanide Delivery and Sparging Procedure requires the hosing down of the isotainer for a final time, before hose disconnection. A buddy is required to be in place during the sparging process, and his actions are dictated by the Procedure for Buddy System. A red colorant

Dye #40 is added by Orica during the filling of the sparge isotainer at the Orica Bulk Transfer Facility at Tarkwa. This requirement is included in the Purchase Agreement between AGA and Orica in Section 5.4.

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

Standard of Practice 4.1: *Implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and 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:
Obuasi's written management and operating plans or procedures include 35 cyanide procedures, 10 engineering procedures and 3 cyanide equipment inspections. The TSF (Tailings Storage Facility) is managed using the Operational Manual – Biox® and South Tailings Storage Facilities, updated in September 2022. Third Party Annual Audit Reports are required by the Ghana Regulator and the latest Report by Knight Piésold, dated 28th October 2022 was sighted and reviewed. There are quarterly meetings and inspections held, chaired by the Tailings Manager and attended by the new Engineer of Record, Jones and Wagner, and associated stakeholders. TSF operation is discussed, and feedback is received from the TSF (Tailings Storage Facility) operations contractor, Fraser Alexander Tailings. The eight TSF operating procedures used were signed and reviewed.
The facility design includes the following assumptions and parameters: -

- The Biox® TSF requirement is for a minimum freeboard of 1.2 m, which is included in the Biox and STSF (South Tailings Storage Facility) Operational Manual.
- The maximum WAD (Weak Acid Dissociable) cyanide concentration of 50mg/l is included in the Procedure, Management of Cyanide in Residue,
- Expected rainfall for Biox® TSF is calculated at 1m plus 193 mm rainfall. This is specified in the Biox® and STSF Operational Manual, Section 4.2.3_BIOX® Freeboard and Emergency Spillway.
- The 1:50 year 24-hour storm is identified as 169 mm. The 1:100 year 24-hour storm is 193mm. and the 1:1000 year 24-hour storm, required by the Regulator, is 289 mm. (Sourced from Obuasi Redevelopment Project).

- Further assumptions and parameters are included in the Biox® and Flotation Tailings Storage Facilities Detailed Design Report, Report No.: JW141/20/H683-40 - Rev 0, Jones and Wagner, dated November 2020.

The operation has a full set of procedures that describe the standard practices necessary for the safe and environmentally sound operation of the facility.

All cyanide critical equipment is included in the SAP (proprietary name) computerised Planned Maintenance System (PMS). The operation carries out operational inspections and planned maintenance inspections on frequencies ranging from shiftly, daily, weekly, monthly, 3 monthly, 6 monthly and annually. Two specific cyanide procedures were identified and sampled: -

- The Procedure – Spillage and stormwater management. This procedure is applied by the Process Operators for the management of cyanide spillage and stormwater monitoring and control installations on the plant.
- The Sodium Cyanide Environmental Management Procedures: These procedures describe the general procedure for sodium cyanide environmental management and sampling.

There is a change management procedure in place entitled, "Change Management on Cyanide Installations". The procedure requires sign-off of any change management document by both the Safety and Environmental Managers. An example of a change management exercise was reviewed which covered the relocation of an Emergency Assembly Point. The document was signed by Safety and Environmental Officials.

There is a cyanide management contingency procedure for non-standard operating situations. The procedure, Procedure for Cyanide Management During Major Upsets, describes the steps to follow for cyanide management if the Plant stops for an extended period for whatever reason. Upsets may include, but are not limited to: -

- Work stoppages
- Lack of ore or other essential materials
- Economics, civil unrest
- Legal or regulatory actions
- Failure of the water supply to the plant for an extended period
- Upsets in the operational water balance that present a risk of exceeding the design containment capacity
- Tailings Dam failure, impacting on production for an extended period
- Extended services failure (such as compressed air/electricity)
- Any event that may cause significant delay.
- Health situations (Pandemics e.g., COVID-19).

The Procedure for Cyanide Management, Section 2.1 – Major Upsets, requires that during major upsets, the procedure will be activated. More specifically, any major upsets or actions must be risk assessed and procedures developed if not already in place. Section 2.2.2 Specific Requirements, states that the requirements of the AGA CAR (Continental Africa Region) Cyanide Code Guidelines Rev 06, Chapter 38 will be implemented and adhered to for all cyanide-related work.

Initially, if PM or operational inspections highlight problems, job cards are raised to implement repairs. If this is insufficient, the responsible supervisors will initiate more

significant actions with the support of Management. If this is still insufficient, the Procedure for Cyanide Management During Major Upsets, will be activated.
The operation has inspection requirements for all cyanide critical equipment: -

1. **Tanks**
   All tanks are listed on the SAP (proprietary name) PMS (Planned Maintenance System). The condition monitoring technician carries out annual visual tank inspections. An inspection checklist, which includes structure integrity, corrosion, damage, and weaknesses, was sighted, and examples reviewed. In addition, tank thickness testing is undertaken, both internally and externally (three yearly). The third-party thickness testing contractor is preceded by internal visual inspections by the condition monitoring technician. The results of the visual inspections generate hotspots and the motivation for the third-party thickness testing work. Examples of internal visual integrity inspection reports and Third-Party Thickness Testing reports were sighted and reviewed. Operational weekly visual inspections are done using the Sparging Plant & other Cyanide Facilities Inspection Checklists.
   The Report on Structural Integrity and Visual Condition Assessment – SIMM (Structural Inspection and Maintenance Management) Inspection Report, prepared by Inspectors and Engineers, Report, dated 5 April 2023 was sighted. The report did not refer specifically to concerns regarding tanks but highlighted some concrete issues. Evidence of corrective works on concrete defects was in progress at the time of physical audit. Work was contracted to Kilion Constructions Ltd. The Report suggested follow-up NDTs (Non-Destructive Tests) in certain areas, and the Sparging Plant has also been identified for follow up. NDT (Non-Destructive Testing) work done on four Sparging Tanks detailed in "NDT Inspection Report on Cyanide Sparging Tanks", by Inspectors and Engineers, dated 24 August 2023 was sighted. No problems were identified on the four tanks. The plant is starting MPI (Magnetic Particle Inspection) inspections following a recently completed baseline study. This will be followed by annual inspections in the future.
2. **Secondary Containments**
   Inspecting Secondary containments provided for tanks and pipelines forms part of the annual visual integrity inspections undertaken. (referred to above). The Sparging Plant & other Cyanide Facilities inspection Checklist includes secondary containments for tanks and pipelines. Flood Tests for sparging bunds are carried out quarterly. There are no drains from the bunds to the outside. All secondary containments contain sumps and sump pumps to return liquids to the process.
3. **Leak Detection and Collection Systems**
   There are leak detection systems on all of the leach tanks, which are located on ring beams. These are inspected annually as a part of the yearly tank inspections. The Spillage and Stormwater Management Procedure, contains Section 3.5 – Procedure for Monitoring Leak Detection Pipes in the CIL Tanks with Concrete Ring Beams. Examples of CIL Leak Detection Pipes Inspection checklists were sighted and reviewed.
4. **Pipelines, Pumps and Valves**

Baseline thickness testing has been carried out on all pipelines in advance of assessing priorities for a program of regular testing. There are PM (Planned Maintenance) inspections on pumps on a monthly basis covering mechanical, electrical and instrumentation. Most valves are run to breakdown, but there are some that undergo thermographic testing, as appropriate. Annual Test Certificate and Calibration Reports of Pressure Valves on the Cyanide Sparging Plant were sighted. Also sighted electronically was the PM inspection history for pumps on the SAP PMS system.

The Third-Party External NDT Inspection Report on TSF Pipelines by Inspectors and Engineers, dated 24 August 2023, covering Carbon pipes and HDPE pipes was sighted. The TSF pipeline has a leak detection system monitoring flow, pressure and temperature for possible leaks. These will alarm in the plant and automatically shut down the Tailings pumps if a leak is detected. The trip parameters have been calibrated by testing to minimise false alarms. The flow switches and control equipment are all included on PM inspections carried out by the instrument technicians.

5. **Ponds and Impoundments**

Channel 13 is a stormwater diversion channel that takes stormwater around the plant and into streams to avoid being contaminated by process water and wastewater. A Stormwater Channel Inspection Checklist used to inspect Channel 13 was sighted. The checklist, dated 22 February 2023, recommended making budget provisions for desilting and repair of cracks. There is a stormwater channel running through the centre of the plant, which is informally inspected by Operations.

On the TSF, the STP (Sulphide Treatment Plant) to STSF Pipeline Corridor Inspection Checklist includes sump levels #1 to #7, and any leakages in pipelines and sumps. Examples were sampled. TSF contractors, Fraser Alexander Tailings have a Tailings Facility Daily Inspection Checklist, which includes fencing, roads, gates, access roads, stormwater control, outer slopes, pool walls and freeboard, tailings delivery return, vegetation and pollution, safety, and piezometers. Examples were sighted and sampled. The Fraser Alexander Tailings South and Biox® TSF Daily Report Log includes parameters, Pumping Drain Pipes, seepage, and mortality counts. East Holding Pond 2 and spillage sumps along the pipeline corridor are routinely inspected using shift operational log sheets and daily checklists, respectively. The Operating plan is detailed in Appendix 1 of the STSF and Biox TSF Operation Manual. The Mortality Count (MC) is the daily indicator of wildlife mortality checking on the form.

Tanks are inspected on an annual basis internally and three-yearly by a third-party external contractor. Bunds are inspected as a part of the visual inspections of the tanks. Pumps, valves, instruments, and pipes are inspected monthly by fitters, electricians, instrument technicians, and condition monitoring technicians. The auditor deems the inspection frequency sufficient to ensure and document that they are functioning within design parameters.

The planned maintenance (PM) and breakdown maintenance documentation identifies specific items to be observed and includes the date of the inspection, the name of the inspector, and any observed deficiencies. A new job card would be raised to address any deficiencies and this was confirmed during the review of a sample of Artisan PM reports. The SAP PMS system retains the nature and date of corrective actions electronically. The site has a PMS system in place developed by SAP (proprietary name). The system has been used since 2019. All assets are listed, numbered, and grouped by area, identified by functional location, and by equipment identity number. Cyanide-critical equipment is identified within the system. The system records both planned and breakdown histories of all equipment.
The mine runs using Ghana National Grid power. However, there are generators (10 in total) in place to run the whole mine and on a priority basis. The Process Plant is allocated a portion for critical load. That critical load includes: - the Biox® blower, cyanide sump pump, tailings thickeners and pumps, cyanide circulation pumps, plant instrumentation, and fire pumps. The TSF has its own diesel-powered backup pump for excessive rainfall on the TSF. All generators are on the PMS system for PM maintenance.

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:
The operation treats one primary ore, which is sulphurous. The ore has been characterised, and leach tests have been conducted. The operation also re-treats tailings. The report, "Optimised Obuasi Feasibility Study" Obuasi Metallurgy Department, dated January 2018 was sighted. The report included the test work done on the various ore blocks, such as Block 8 and Block 10. It also indicated the optimised rates for all reagents for these blocks. The dosing rates for Block 8 identified were: - ILR – 373 kgs per kg of gold and 1.32kg per ton on the leach. For Block 10, the tests indicate 3.41 kg per ton.
A Cynoprobe is used to manage cyanide flow rates, with the main probe located in the head tank (Tank 4) and the second probe in Tank 5. There is a third optional probe in Tank 11. Optimisation is always based on Tank 4 or Tank 5.
Bottle roll tests are undertaken daily and weekly. An extended leach test is carried out on the tailings solutions to assess if there is a need to vary cyanide dosing rates. The external laboratory, Intertek, carries out diagnostic leach tests on both feed and tails to check for under or over-dosing.

Bottle roll and leach tests have been carried out to establish dosing rates for tailings, and 0.22kgs per ton has been confirmed as the dosing rate for re-treating tailings.
The control philosophy for cyanide optimisation is coordinated through the use of the SCADA (**S**upervisory **C**ontrol **A**nd **D**ata **A**cquisition), ongoing bottle roll tests and extended leach testing on the tailings. Continuous monitoring and adjustments using the Cynoprobe, controls the cyanide dosing valve.
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 operation has an OPSIM (proprietary name) software probabilistic water balance model. The model covers the entire mine and is used as both a probabilistic and supply/demand model. The model has been used on-site since 2012. The model considers the uncertainty and variability inherent in the prediction of precipitation patterns.
Flow meters measure tonnes of slurry from the various inflows in real-time deposited on the TSF. Chemical constituents of the slurry are also fed into the model. In the model, one can run a simulation of various options and design storm durations and storm return intervals. In the TSF design phase, the Ghana EPA (Environmental Protection Agency) required a 1:10000 option to test the containment of the TSF. The model makes use of 84 years of actual precipitation data from the Obuasi area. Current data on-site comes from 4 weather stations located at the TSFs and the water ponds and this has been collected since 2017. Evaporation and precipitation data is measured by a DataHog2 SDL5350 weather station installed on site at the STSF. The Instrument is serviced and calibrated annually by the OEM (original equipment manufacturer). OPSIM has an in-built facility to accommodate the runoff and infiltration of the catchment. Any run-on is also catered for. The model uses the original design freeboard for the TSF and ancillary process ponds and impoundments i.e., the Biox TSF Holding Pond 2 and the Oxide Treatment Plant Pond, and can generate revised freeboard predictions based on varying rainfall scenarios. Additionally, levels in the East Holding Pond 2 are monitored on shift basis using the STSF and Biox TSF daily monitoring Log; and the OTP Pond levels on the Backfill tailings and Water monitoring log sheet to ensure compliance.
The effects of potential freezing and thawing conditions on the accumulation of precipitation within the facility are not considered because the mine is situated in a tropical area. The model accommodates decant, drainage, allowable seepage to the subsurface, and allowable discharges to surface water. Evaporation and seepage rates are also included. This data covers all the storage facilities and transitional facilities. The model can run shutdown/power outage simulations to test their subsequent effect on storage and the risks of overtopping. The Model currently also recognises the existence of the Water Treatment

Plant (WTP), including RO (Reverse Osmosis) facilities, and these form a part of the model's parameters. It can simulate the changes in the phreatic surfaces in the TSF, influenced by rainfall.
There are daily freeboard measurements, and the pond is surveyed annually. The model measures precipitation and compares the results to design assumptions automatically. There is a weekly water management meeting (Obuasi Major Projects Weekly Update – WTP Improvement & Arsenic Trioxide Disposal Meeting) which monitors water management projects. Sighted meeting minutes for 13 June 2023, 27 June 2023, 11 July 2023, 25 July 2023, and 8 August 2023.

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 Code Compliance Point is the Tailings transfer hopper on the Plant at the beginning of the TSF pipeline, which is 4.5 km from the deposition spigot. WAD cyanide sampling is done using a cynoprobe (which takes samples every 5 minutes, but results are daily averages) and manual WAD cyanide sampling is done 6 hourly. Check manual WAD cyanide sampling at the spigot is taken once per day. The daily average WAD cyanide sample results from the Tailings Hopper were sighted. The results show that the levels are consistently below 50 mg/l and averaged 6.55 mg/l between 1 December 2022 and the 25th August 2023.
Cyanide-affected open-water ponds are indicated below: -

- Biox® TSF Supernatant water – average 0.189 mg/l, high – 8.23 mg/l,
- Biox® TSF Holding Pond 2 – average 0.059 mg/l, high 0.12 mg/l.
- OTP Pond (in plant) – average – 9.8 mg/l, high – 43.1m/l.

WAD cyanide levels are thus below the specified limits. There are no areas on the TSF where WAD cyanide levels exceed 50mg/l; thus, no additional measures are required. However, the Biox® TSF is fully fenced to restrict access by wildlife and livestock.
There have been no recorded cyanide-related wildlife mortalities on the plant or the TSF. Therefore, it is concluded that maintaining a WAD concentration of 50 mg/l or less in open water effectively prevents significant wildlife mortality. TSF staff monitor for wildlife and bird mortalities daily and have not recorded any mortalities for at least the past 5 years. There are no heap leach facilities on site.

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:
There is only one direct discharge point to surface water that could potentially contain cyanide. However, this discharge is only after having been through a Water Treatment Plant. There is daily monitoring of the discharge point, and the Treatment Plant also carries out internal monitoring of the internal storage tanks. The parameters monitored are primarily legal guidelines covering different substances, including WAD, Free, and Total cyanide. The Ghana legal limit for WAD cyanide is 0.6 mg/l, Free cyanide – 0.2 mg/l, and total cyanide, 1.0 mg/l. The internal discharge parameters used are Free cyanide – 0.01 mg/l, and Total cyanide – 0.05 mg/l. The Treatment Plant (which is run by third-party contractor, Veolia) has procedures to monitor cyanide levels during treatment to ensure compliance levels are maintained. The Procedure for Managing Contaminant Triggers at RO500 Plant, was sighted and sampled.
The site monitors cyanide in surface water (river Nyankumasu) downstream of the discharge point. There are three downstream monitoring points, one at the boundary of the mine property, and two outside. One at the confluence with the river Adeosua and the second on the river Nyam. Sampling at the mine property boundary is carried out daily and at the other two downstream points on a monthly frequency. Laboratory limits of detection are 0.005 mg/l for CN-, WAD cyanide and Total cyanide using a Skalar Segmented flow analyser. The analyser is serviced and calibrated annually by the OEM and internally as part of the operational validation procedure. The STSF (non-cyanide) has seepage return sumps to return any seepage to the dam. The Biox® TSF (which may contain cyanide) is a lined TSF and does not have seepage. Seepage coming from the leak detection system is returned to the dam. Thus, no cyanide-containing seepage enters groundwater or indirectly discharges to surface water. The previous 12 months of surface water sampling data for the three monitoring points was reviewed, and all samples are below the limits of detection.
No exceedances have occurred which require remedial activity to prevent further degradation and restore beneficial use. Beneficial use of groundwater is domestic use and stock watering, and sampling indicates levels of cyanide are below the limits of detection and do not affect beneficial use.

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 plant has all of its tanks bunded with sumps and sump pumps, returning liquids to the process. Cyanide pipes are located above concreted areas and/or within launders to prevent releases. South TSF (STSF) (non-cyanide) has seepage return sumps to return any seepage to the dam. The Biox® TSF is a lined TSF and does not have seepage. Seepage coming from the leak detection system is returned to the TSF. Thus, no cyanide-containing seepage enters groundwater or indirectly discharges to surface water.
The flotation Tailings, which constitute up to 85% of Tailings, contain no cyanide, are used for backfill. No other tailings would be used for backfill. The operation does not use leach tailings as backfill in the underground mine workings.
No exceedances have occurred which require remedial activity to prevent further degradation and restore beneficial use. Beneficial use of groundwater is domestic use and stock watering. Sampling indicates levels of cyanide are below the limits of detection and do not affect beneficial use.

Standard of 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:
All cyanide tanks are in bunded areas with sumps and sump pumps to return any solution to the process.
The CIL tanks are built upon ring beams. However, construction drawings showing CIL Tanks Bund Details, have shown that there is a 1 mm thick impermeable HDPE (High Density Poly Ethylene) membrane on top of the clean sand layer. Above the membrane is another sand layer, which includes a leak detection mechanism to pick up leakages from the tank base.
The tank and bund capacities are as follows: -

- CIL largest tank -712 m^3, bund capacity – 852.2m^3
- Sparge Storage Tank – 128 m^3, bund capacity – 494 m^3
- Neutralisation Tails Hopper – 10 m^3, Bund capacity - 364m^3
- Backfill hopper – 10m^3, Bund capacity – 691 m^3
- ILR Pregnant Solution Holding Tank – 25m^3, Bund capacity – 158m^3
- Water Treatment Plant RO Settling Tank – 1000m^3, Bund capacity – 1,126 m^3.

This demonstrates that the bunds can hold at least 110% of the largest tank in the bund.
All bunds contain sumps and sump pumps, which pump any cyanide solution or cyanide-contaminated water collected in a secondary containment area automatically back to the process. There are no cyanide process tanks without secondary containment.

The only exception is the Sparging Area tank bund. The sump pump is set to manual operation, and a procedure is in place to decide where the solution should be sent, depending upon the cyanide concentration, in the solution. The Spillage and Stormwater Management procedure includes Section 3.6.1 – Pumping Spillage from the sparging plant bunded area. The decision on the endpoint of the solution is based upon the results of tests on a sample of the solution. Depending upon the level of cyanide, the solution may be pumped to the Tails hopper tank (for disposal) or the circulation tank (for reuse).
All cyanide pipelines have a pipe-within-a-pipe design and/or are contained within a launder. All launders have drains to collect any leaks that may occur. Tailings delivery and return pipelines are contained in concrete or HDPE-lined pipe trenches, linked to collection sumps to collect any leakages. Tailings delivery and return water pipes are also fitted with leak detection systems based on flow, pressure and temperature measured at the exit of the plant and inlet to the TSF with visible alarm on the plant SCADA. There are no areas where cyanide pipelines present a risk to surface water.
Tanks are constructed of mild steel and are rubber-lined. Pipes are made of HDPE (High Density Polyethylene) and carbon steel, which are compatible with cyanide and high pH conditions.

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:
After the Care and Maintenance period that the Mine went through, an all-embracing "Obuasi Cyanide Improvement Project" was instituted, including further development of the Biox® CIL Tanks and the new Sparging Plant. An overarching IQS (Inspection Quality Services) International Ltd., Project Quality Plan, QCP No. 120216-LP110-001 dated 16-02-2012, was implemented and used throughout the project.
The quality control and quality assurance program for the Obuasi Cyanide Improvement Project addressed: - welds, pressure tests, X-ray checks, function tests, material tests, mechanical tests, magnetic particle inspections (MPIs), spark tests on rubber linings, hydraulic tests, liner weld tests, concrete cube tests, soil compaction tests and electrical and instrumentation tests. QA/QC (Quality Assurance/Quality Control) testing was carried out by independent QA/QC, inspection, and quality services contractors.
Complete electronic records of all QA/QC records developed for the Obuasi Cyanide Improvement Project have been retained.
The following were sighted and sampled: -

- Quest Technical Services Tank Section Weld Testing Report, Report No: QTS-

2012-510, on Time Mining Cyanide Tanks, April 2012

- Forge STP Makeover Project Carbon in Leach Pre-Oxidation and Flotation Mechanical Plate Work – Manufacturing of Chutes, Hoppers, Launders and Tank. Quality Control Pack dated 10 April 2013.
- Forge - Hydrostatic Testing of Tanks- Acid wash Column -18-03-2013
- Sighted books 1-8 - CIL Ring Beam QA/QC Pack comprising: - Request for inspection, pre-pour survey report, concrete pre-pour checklist, as-built drawings, concrete compression test results, and post concrete checklists.
- IQS QA/QC pack for Sparging tanks and launder, 22-02-2012 – 04-06-2012.

AngloGold Ashanti Ghana (AGAG) requirements are that all contractors and subcontractors adhere to QA/QC requirements and make use of appropriately qualified inspectors to confirm QA/QC requirements. A review of the QA/QC records shows that qualified and competent persons were used to institute and review fabrication and construction. Contractor, subcontractor, and AGAG representatives signed off as-built drawings.

The" Inspector and Engineers" company prepared a 302-page, "Report on Structural Integrity and Visual Condition Assessment – SIMM (Structural Inspection and Maintenance Management) Inspection Report for AngloGold Ashanti Obuasi Mines", Report, dated 5th April 2023. The inspections were carried out by Ing. Simon Andoh Acquah (Professional Engineer (PE), GhIE No 07417) and Ing. Lemuel Thompson (Professional Engineer PE 04370 (IET Ghana) using SIMM (Structural Integrity Management Monitoring) Guidelines for Structures BPG S003 – Edition 05.

The report is primarily an engineering visual inspection which is conducted on the Plant structures (Steel and Concrete) in order to assess the current condition of the plant structures with reference to their original strength and condition and to ensure that the appropriate structural maintenance would be carried out where significant deterioration of the structures has occurred. The SIMM scope requires visual inspection because many aspects of the condition of structures can be determined by visual inspection.

The Reports are carried out annually to guide ongoing structural maintenance and fit for purpose. The scope covers the entire mine, including cyanide facilities.

Whilst some QA/QC records of the older plant structures are available, the SIMM Report is an ongoing check of mine structural integrity and prioritises on-going maintenance work. Structural integrity inspections and NDT (Non-destructive testing) conducted by both internal team (annually) and third party (3-yearly) include Tailings delivery and return pipelines, secondary containments and water ponds containment. Sighted NDT report on BIOX TSF delivery and return water pipelines

QA/QC on the Biox Cell TSF as built was conducted by WBHO (construction & Engineering Company) covering among others Dynamic Cone penetrometer tests on foundation base, field density tests on clay lining, NDT tests on HDPE lining materials, and cube compressive strength on bunded concrete slabs.

There are also quarterly audits by the Engineer of Record, Jones and Wagner, who inspect and certify the Biox TSF as fit for service. The Obuasi gold mine Biox TSF Quarterly report dated April 2023, the Obuasi Gold Mine Biox TSF Quarterly Report Second Quarterly Report For 2023, were sighted. In addition, an independent third-party audit by

GeoSystems Consulting Ltd is done quarterly to assess the integrity of the TSF and reported to the Ghana Environmental Protection Agency (EPA). Sighted Tailings Storage Facility Environmental Audit report; dated August 2023.This report stated, "…Geosystems considers the STSF and BIOX TSF to be generally structurally stable and fit for operation…"

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

Sampling on-site is carried out by a third-party contractor, SGS Ghana. The SGS sampling procedure is entitled, Procedure for Water Sampling, dated 07/06/2023.

Animal mortalities are monitored by daily checks carried out by TSF staff. The operational procedure, Management of Cyanide Residue, contains Section 2.2 – Procedure for reacting and investigating unnatural animal deaths in and around the plant and tailings storage facility. The section describes the action to take on the discovery of an unnatural animal death.

The SGS procedure was developed by Eunice Anane Antwi ((M.Sc. Water Supply and Sanitation from KNUST (Kwame Nktumah University of Science and Technology (Ghana) and reviewed by Berko Asamoah Boateng (B.Sc. Chemistry KNUST).

The operational procedure, Management of Cyanide Residue, was originally prepared by Edward Foster Nyarko (BSc Chemical Engineering (KNUST, Ghana 2009) and MSc Environmental Resources Management, (KNUST, Ghana, 2022); Professional Engineer, Ghana Institution of Engineering (GHIE No. 10028) and reviewed by Ebenezer Asare Opong (BSc Metallurgical Engineering (KNUST, Ghana, 2001) and MSc Environmental Resources Management (KNUST, Ghana, 2015); Professional Engineer, GHIE (GHIE No. 6304).

The Procedure for Water Sampling, dated 07/06 2023, includes: -

- Where samples are taken is dictated by the client, and the sampling map (sighted)
- Sample preservation is using Sodium hydroxide pellets in dark bottles with completed samples kept in cooler bags.
- Chain of custody procedures noted in the document for dispatch to the laboratory.
- SGS Ghana QA/QC procedures are also referenced.
- Cyanide species to be sampled and analysed are indicated in the purchase order for the work.

The SGS Sampling Procedure Environmental Field Monitoring Sheet was sighted and includes the requirement for comment on the presence of wildlife and livestock activity, weather conditions, and anthropogenic activities.

Surface water monitoring is done daily, weekly or monthly and groundwater monitoring is done monthly, and wild mortality monitoring is done daily. Monitoring is conducted at frequencies which the auditor deems adequate to characterize the medium being monitored and to identify changes in a timely manner.

Principle 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, livestock, and the environment.*

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:
In the Procedure, Procedure for Cyanide Management During Major Upsets, dated 04/07/2023, there is a section 2.2 Decommissioning Procedure (CN45). This includes 2.2.1 – Safety and Health (including safety health and environmental protection and pre-operational risk assessments and HAZOPs (Hazard and Operability studies)), and 2.2.2 – Specific Requirements: activities 12 months before Closure, 6 months before closure, and 3 months before closure. Furthermore, Cyanide waste streams which exit the Metallurgical Plant must meet the limits as detailed in the AngloGold Ashanti CAR (Continental Africa Region) Cyanide Code Guidelines – Rev 06, Chapter 49 and where required must be treated by other oxidation methods. The procedure must be reviewed annually.

Standard of Practice 5.2: *Establish a financial 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:
The 2023 total decommissioning estimates to fully fund third-party implementation of the cyanide-related decommissioning measures, as identified in the site decommissioning procedure, are US$2,815,555.20. The costs include: - equipment, labour, water treatment costs, and decommissioning infrastructure costs. Estimates are updated quarterly, or when

a revision to the decommissioning procedure warrants update, and/or review of the estimates.
In compliance with Ghana Environmental Protection Agency (EPA) requirements, the operation has established two bank guarantees, jointly administered with the Ghana EPA, to cover the estimated costs for cyanide-related decommissioning activities as identified in the cyanide-related decommissioning measures as identified in the site decommissioning procedure.
They are: -
1. Bank Guarantee No. UBAG/BG02/02/2023, between AngloGold Ashanti Ghana Limited, Obuasi Mine (AGAG), Ghana EPA, and the United Bank for Africa Ghana for US$8,000,000 (Eight million US Dollars), valid from 1st February 2023 until 31st January 2024. (sighted)
2. Bank Guarantee No. UBAG/BG03/03/2023, between AngloGold Ashanti Ghana Limited, Obuasi Mine (AGAG), Ghana EPA, and the United Bank for Africa Ghana for US$5,000,000 (Five million US Dollars), valid from 1st February 2023 until 31st January 2024. (sighted)

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

Standard of Practice 6.1: *Identify potential cyanide exposure scenarios and take 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:
In order to verify that procedures were in place to ensure that cyanide-related tasks are conducted in a manner which minimises worker exposure, certain procedures were sighted and sampled: -

- *Procedure for ILR Sequence Operations*. The purpose of the procedure is to eliminate, control, or minimise all hazards associated with the operation of the ILR (Intense Leach Reactor) circuit. The procedure outlines the processes involved in ILR operation and measures to ensure the safety of the employees and equipment.
- *Cyanide Delivery and Sparging Procedure*. The procedure describes the safe acceptance of cyanide briquettes in isotainers, the subsequent safe sparging and full dissolution of the solid cyanide into a liquid form, and its subsequent storage in dedicated cyanide tanks.
- *Procedure for Maintenance on Cyanide Installations.* This procedure describes the general procedure for the maintenance of cyanide equipment, including the preparation

for maintenance and decontamination prior to maintenance, confined space entry, and applying for clearance certificates.

- *Procedure for sampling of cyanide and cyanide streams.* The procedure applies to Operators who sample cyanide concentrations, cyanide solution streams or plant streams containing potentially high concentrations of cyanide in a safe and responsible manner.
- *Procedure – Management of Cyanide in Residue.* This procedure describes the action to be taken when high cyanide levels are detected in the residue slurry. The aim of this procedure is to prevent people from being exposed to toxic cyanide emissions or contamination of the environment.

All procedures include the requirement for appropriate PPE (Personal Protective Equipment), as per the Procedure for Cyanide PPE Levels and Emergency Equipment Inspections, dated 04-07-2023. Where appropriate, procedures also include the necessary pre-work inspections and checks.

The operation solicits worker input into developing and evaluating health and safety procedures in a number of ways. There is a weekly SHE (Safety, Health & Environment) meeting where the workforce can input their views on safety issues. Concerns about the cyanide PVC suits were raised by operators, and the Cyanide Champion sent through a reminder of PVC (Polyvinyl chloride) suit minimum specifications to the Procurement Department so as to prevent tearing in July/August 2023. Sighted minutes dated 24 July 2023 where ICMI Cyanide Code principles 1, 2 and 3 were discussed. At the same meeting, employees complained about damage to their prescription spectacles, and the company agreed to supply safety goggles with prescription lenses.

There is a monthly SHE Committee meeting consisting of SHE reps from the workforce. There are also monthly meetings of Trade Union reps where safety issues can be raised. There is a monthly MD's (Managing Director's) Safety meeting where safety issues of all kinds can be raised by the workforce.

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 minimum pH for CIL operations is 10.5, which is included in the Standard Operating Procedure for CIL Tanks Startup, dated 15-12-2022). The minimum pH for sparging is 10.5, which is included in the Cyanide and Sparging Procedure, dated 28-02-2022).

Cyanide hot spots (i.e., areas and activities where workers may be exposed to hydrogen cyanide gas or cyanide dust in excess of 10 parts per million (ppm) (11mg/m^3) on an instantaneous basis and 4.7 ppm (5mg/m^3) continuously over an 8-hour period, as cyanide,)

have been identified within the plant and are signed accordingly. (Sighted hot spot signage during site inspection). Hot spot areas include: - the sparging bay, the sparging plant, ILR (In-Line Reactor), CIL (Carbon in leach Tanks), CIL Tails hopper, and CIL Biox TSF (Tailings Storage Facility).
HCN (Hydrogen Cyanide) gas fixed monitors are installed at appropriate locations in all hot spots. The wearing of appropriate PPE is described in the Procedure for Cyanide PPE and Emergency Equipment Inspection, dated 07-07-2023. Protection levels range from Level 0 to Level 3.
The Plant uses both fixed HCN gas and portable HCN gas monitors. The plant has 9 fixed Dräger Polytron 6 HCN gas monitors, and 12 personal Dräger Pac HCN gas monitors.
In Operating Procedure for CIL Tanks Start-up, dated 14-12-2022, Section 3.4, it states that in the event of a first alarm (4.5 ppm), the operator will wear full PPE and check the lime pump, Cynoprobe automation and valve opening and report to the supervisor. If the second alarm (10 ppm) sounds, he will evacuate.
There is a calibration and maintenance contract with the Dräger Ghana agents, Riess and Co. The manufacturers recommend calibration on a 6-monthly basis. The Calibration Reports dated 28 July 2023 (2 portable monitors failed and were replaced), 20 February 2023 (Storage Tank alarm had to be replaced, 30 September 2022 (Polytron at Storage Tank 3 had to be replaced and neutralisation alarm not functioning but replaced in July.) were sampled. Records have been kept since March 2022.
During the site inspection, various warning signs advising workers that cyanide is present, of any necessary personal protective equipment that must be worn, and that smoking, open flames and eating and drinking are not allowed, were sighted. These were in good condition and well-located.
High-strength cyanide is dyed red for identification by the cyanide producer, Orica. The requirement for the dying of cyanide is included in the cyanide purchase agreement.
Appropriately located safety showers and low-pressure eye wash stations were sighted during the site inspection. The Procedure for Cyanide PPE Levels and Emergency Equipment Inspection, dated 04-07-2023, includes a procedure for checking Emergency Safety Showers. The monthly PM Safety Shower inspection in the Biox® CIL by Mechanical Technician, No. 204569846 dated 9/2/2023 – no issues; and the monthly PM Safety Shower inspection in the sparging bay by Mechanical Technician, No. 204623643 dated 08-05-2023- no issues; were sighted and sampled.
During the site inspection, dry powder fire extinguishers were sighted strategically located throughout the operation. Fire extinguishers are inspected by the site EMS (Emergency Management Services) Department, and inspections are recorded on tags attached to the extinguishers.
Monthly electronic fire extinguisher records for March 2023 and July 2023 were sighted and sampled. If the EMS Department finds extinguisher faults, they swap out the extinguishers and replace them with new units. Minor repairs, such as refilling or replacement of hoses or re-pressurising with nitrogen, are done by the EMS Department. Non-repairable extinguishers are disposed of securely via the mine salvage yard.
During the site inspection, it was noted that storage, dissolution and process tanks and piping containing cyanide are identified to alert workers of their contents, and the direction

of cyanide flow in pipes is clearly indicated. TSF pipelines are marked with the word "Cyanide", and the flow direction is indicated. Sometimes, "skull and crossbones" are used as a warning indicator.
Orica Sodium Cyanide Safety Data Sheets (SDSs) were sighted strategically located around the plant. SPP (South Processing Plant) Emergency Communication Flow Charts were also sighted around the plant on fencing and noticeboards. The working language on site is English, and all signs are written in English.
The Obuasi Mine Incident Management Procedure, dated 17-04-2023, was sighted. The procedure requires the initial reporting of any incident that occurs, plus the investigation thereof, and the final reporting and recommendations. This is the management procedure that would be used for reporting, investigation and evaluation purposes, should a cyanide incident occur. There have been no cyanide exposures in the plant in at least the past five years. Incident Number ISIMS – 75821 INC-0009705 dated 22nd April 2023 was sampled and reviewed to confirm reporting and investigation requirements.

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:
Three cyanide emergency cabins are located at the Sparge plant, ILR, and the CIL. In addition, there are two fully equipped cyanide emergency trailers, one located at the sparge plant and the other next to the regent store. There is also a first aid post adjoining the training section, manned by an ER (Emergency Response) nurse 24/7, with equipment for cyanide emergencies. The EMS team is located 2 minutes' drive from the site, and they have a fully equipped ambulance, rescue vehicle and fire tender and are fully cyanide-trained. Awareness of response to cyanide exposure through ingestion, inhalation and absorption through the skin and eyes is covered in section 2.2 - Procedure for first aid and medical treatment, as well as in the cyanide induction program. The first aid Post on site or the ambulance can be used to stabilise the cyanide patient.
The cabins and trailers have medical oxygen, resuscitators, PVC suits, gloves, boots, respirators, SCBA (Self-contained breathing apparatus) sets, and other equipment to deal with cyanide emergencies. Cyanide TriPac Antidotes are stored in fridges in the cabins.
Cell phones and portable radios are the primary communication means for raising cyanide alarms. Internal telephones can also be used to raise the alarm.
The Procedure for Cyanide PPE Levels and Emergency Equipment Inspection, dated 04-07-2023, which includes the checklists for the various cyanide equipment, was sighted.
The following checklists were sampled: -

- Cyanide Emergency Equipment – Acid Wash Cabin checklist, dated 1-4-2022-no issues.
- Cyanide Emergency Equipment – ILR Cabin checklist dated 01-04-2022 – no issues.
- Cyanide Emergency Equipment – Sparging Plant Trailer, dated 01-04-2022 – no issues.

TriPac Cyanide antidotes are valid for 12 months. Fresh supplies are ordered, 6 months in advance of expiry, from suppliers in South Africa, and it is the Cyanide Champion's responsibility to ensure that orders are placed timeously.
The Procedure for Response to Cyanide Emergencies, dated 04-01-2023, is used to respond to cyanide exposures.
In the procedure for Response to Cyanide Emergencies, section 2.4 is a procedure for access by an ambulance in the event of a cyanide emergency. The ambulance would transport the cyanide patient to the AGAG Health Foundation Hospital in Obuasi, which has adequate, qualified staff, equipment and expertise to provide care for a cyanide patient.

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

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

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 an Obuasi Mine Emergency Preparedness and Response Plan, dated 01/01/2021. The Plan includes references to cyanide emergencies and includes Community evacuation as a result of tailings dam failure. The Mine Plan only refers to generic containment of chemical spills under Duty Card 14 – Chemical Spill. The SPP (South Processing Plant) Emergency Preparedness and Response Plan, dated 20-06-2023, relates to general emergencies (including cyanide) and includes evacuation of plant employees. Under the Plan's Section 9.4 – General Chemical Emergency Preparedness, provision is made for a laterite stockpile to be used for barricading and containment. There is also a Plant Procedure for Response to Cyanide Emergencies, dated 04-01-2023, which is SPP cyanide specific. There is also a Plant Procedure for Spillage Handling.
The two Plans and the Procedure contain specific response actions for the scenarios: -

- Catastrophic release of hydrogen cyanide from storage, process or regeneration facilities;
- Transportation accidents occurring on-site or in close proximity to the operation;

- Cyanide releases during unloading and sparging;
- Cyanide releases during fires and explosions;
- Pipe, valve and tank releases, leaks and ruptures;
- Overtopping of ponds and impoundments;
- Power outages and pump failures;
- Uncontrolled seepage;
- Failure of cyanide treatment, destruction or recovery systems; and
- Failure of tailings impoundments, heap leach facilities and other cyanide facilities.

Transport-related emergencies are the responsibility of the ICMI-certified transporter (Stellar Logistics) and are covered in their Cyanide Transport Management Plan, dated 16 February 2023, Section – Emergency Response Procedures.
The use of cyanide antidotes and first aid measures for cyanide exposure is included in Duty Card 9 – Cyanide Poisoning of the Obuasi Mine Emergency Preparedness and Response Plan, in the SPP Emergency Preparedness and Response Plan, Section 8.2 – Injury Preparedness, which includes information availability of Cyanide first aid equipment in the Plant cyanide emergency cabins; and in Section 2.2 – Procedure for First Aid and Medical Treatment, of the Plant Procedure for Response to Cyanide Emergencies.
The Obuasi Mine Incident Management Procedure, dated 17-04-2023, is used for medical and environmental releases and incidents. The procedure requires the initial reporting of any incident, the investigation, and the final reporting and recommendations for prevention of future 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 Community is not directly involved in emergency response. They may be made aware and trained, but only as bystanders. Cyanide Education for Emergency Response is undertaken for the Emergency Services who may be invited to be involved in mitigating cyanide incidents.
Training sessions undertaken include: -

- National Disaster Management Organisation -27-28 July 2023, 23 attendees.
- Ghana Police Service, National Fire Service, Ambulance Service – 2-3 August 2023 – and 16 – 17 August 2023, and including Ghana Health Service (66 attendees).
- Cyanide Education for Community Forum was provided to 13 Communities as an awareness exercise. - 27 June 2023 (46 attendees).

The updating process is ongoing, and awareness and training sessions are continuously updated and revised as changes occur.

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:
In the SPP Emergency Preparedness and Response Plan, Section 5.1 – Emergency Coordinator – An emergency response coordinator shall be appointed to assist the Process Manager in developing, maintaining and implementing the processing emergency preparedness response plan. The STP Processing Plant Emergency Response Organogram dated 01-07-2023, indicates who the emergency response coordinator and his alternate are, as well as the identities of the Emergency Response Team (ERT). Section 2.7 – Roles and Responsibilities, which includes positions from the Managing Director down to employees and external responders, in the SPP Emergency Preparedness and Response Plan. Section 5.3.2 – Training of the Plant ERT (Emergency Response Team), in the SPP Emergency Preparedness and Response Plan, dictates ERT training requirements.
Every shift on the Plant has at least five emergency responders who are available to respond to cyanide emergencies. In the SPP Emergency Preparedness and Response Plan, Section 6 – Emergency Communication Plan, Section 6.1- Emergency Communication Procedure, indicates the order of communication in the plant for emergencies.
In the SPP Emergency Preparedness and Response Plan, Section 5 – Emergency Management Personnel, starts with the duties of the Emergency Coordinator and leads on to the duties of the Emergency Response Team.
The inventory of Emergency Response Equipment is maintained as an Excel spreadsheet record on the Processing Shared Drive and as a read-only document. It is updated on a monthly basis after the monthly facilities inspections. (Inspections are covered in the Procedure for Cyanide PPE Levels and Emergency Equipment Inspections, dated 04-07-2023.) The latest (September 2023) printout of the Excel spreadsheet – Total Emergency Equipment Count, was sighted.
The engagement and updating of the external entities with roles and responsibilities identified in the Emergency Response Plan have been commenced through the training and awareness raising of the entities such as Police, Fire, Ambulance, and Disaster Management. This will be continued as situations change or are updated. Two drills were arranged involving the external entities carried out on 3 August 2023 and 27 July 2022.

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:
Procedures and contact information for notifying management, regulatory agencies, external response providers and medical facilities of the cyanide emergency is covered by the Cyanide Emergency Communication and Reporting Procedure, dated 12-09-2023. In addition, the Obuasi Mine Emergency Preparedness and Response Plan, dated 01/01/2021, includes Emergency Telephone Numbers (Internal and external) on Page 13.
Communication with potentially affected communities is handled by the Sustainability Department, which keeps an updated contacts list for communities and interested and affected parties. This procedure also covers communication with the media. (Sighted External Stakeholder Contact Register, dated 01/01/2023, including lists of Unit Committee Chairmen, Assembly members, Community Leaders, Overlords, Divisional Heads, Paramount Chiefs, NGOs (Non-Government Organisations) and CBOs (Community-Based Organisations), Government Institutions, Members of Parliament, Religious Leaders, and Media representatives.)
The Cyanide Emergency Communication and Reporting Procedure, dated 12-09-2023, includes a section, 2.2 Procedure for notifying the ICMI of Significant Cyanide Incidents. This section includes a process to report any significant cyanide incident or suspected significant cyanide incident, to the ICMI within 24 hours and the results of a fuller investigation within 7 days.
Also included in the procedure is Section 2.3 – Procedure for notifying the ICMI of non-certified cyanide, and 2.4 Procedure for notifying the ICMI of modification to a Cyanide Supply Chain. The procedure also includes definitions of "significant cyanide incidents", as defined in ICMI's Definitions and Acronyms document.

Standard of Practice 7.5: *Incorporate remediation measures and monitoring elements into response plans and 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 Procedure for Response to Cyanide Emergencies, dated 04-01-2023, Section 2.6.1.2 – Detoxification of Cyanide Waste/Spillage, includes task steps for the recovery, detoxification, and disposal of spilt solid or liquid cyanide or cyanide-contaminated

material. The Procedure for Using Ferrous Sulphate, dated 01-05-2022, includes the formula for mixing ferrous sulphate (20kg /50 litres of 33% strength liquid cyanide spilt), the characteristics of ferrous sulphate, excavation of contaminated soil and disposal, disposal options and bunding and berming of the spill. Allowable residual cyanide concentration is stated in Section 2.6.1.2 as 0.5mg/L. Ferrous sulphate is stored in the chemical store and in dedicated containers at the Cyanide Sparging Plant. Location of Ferrous sulphate is indicated in Section 9.2.4 of the SPP Emergency Preparedness and Response plan OBPROC-GEN-PRO.2.2-001. The Procedure: Spillage and Stormwater Management, dated 07-09-2023, includes section 3.3 – Spillage Handling and section 3.6 - Use of Ferrous Sulphate, both of which cover the handling of liquid cyanide spillages, neutralisation of the spillage with ferrous sulphate (and the ferrous sulphate mixing formula) and the prevention of a spillage or neutralised spillage from entering natural waters.
In the Mine Wide Plan, under Duty Card 17 – Tailings Dam Embankment Failure, it states, "...IMMEDIATELY arrange tanker water supplies to the communities that are likely to be affected by the spill irrespective of boreholes being available at the areas...." It further states in Duty Card 17 "...Mobilise a team of samplers (from Metallurgical and Environmental Departments) to the area and commence taking duplicate samples for cyanide analysis..." The sampling locations would be determined, based upon the extent of the spillage incident. The Procedure, Sodium Cyanide Environmental Management Procedures, dated 04/07/2023, includes Section 2.2 – Procedure for Environmental Sampling and Section 2.3 – Soil Sampling.
In the Procedure for Using Ferrous Sulphate, dated 01-05-2022, it states that Ferrous Sulphate, Sodium Hypochlorite and Hydrogen Peroxide should never be used to neutralise cyanide spilt into clean-water rivers, dams or surface water.

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 Obuasi Mine Emergency Preparedness and Response Plan (EPRP) is reviewed every five years, according to the document control procedure. (The current document is dated 01-01-2021 and is due for review by 01-01-2026). The SPP Emergency Preparedness and Response Plan is reviewed annually as per the document control system. The Plant Cyanide Emergency Procedure is also reviewed annually as per the document control system.
Section 2.3.1 of the SPP Emergency Preparedness and Response Plan OBPROC-GEN-PRO.2.2-001 specifies that cyanide emergency drills shall be conducted at a minimum of 6 months intervals.

A Cyanide spillage and evacuation drill was conducted in Nov 2021. A cyanide spillage during transportation and a cyanide poisoning drill were conducted in August 2022.
A full cycle cyanide mock drill was carried out on 26 February 2023. The scenario is a mandown in the CIL moving right through to the hospital including on-site and Hospital personnel expected to respond to cyanide incidents.

Strengths

- The Patient was in the ambulance within 11 minutes of reporting
- The procedure was followed for decontamination of the patient.
- The Hospital was ready to receive the patient by the time the ambulance arrived (the staff was fully dressed, and an isolation ward was available.)

Weaknesses

- Done on a Sunday, which illustrated some weaknesses, such as not all the team were fully dressed.
- There was a delay of four minutes by Security before the ambulance was allowed into the plant.
- Non-ERT members who joined in the rescue without PPE.
- There was a 5-minute delay before a call went through to the hospital. (Telephone number engaged).

Corrective Action Plan

- Conduct general emergency response refresher training for all employees
- Refresher training for ERT.
- ERT training for Security
- The Hospital was advised to dedicate a phone line for a mine emergency.

Section 2.8 - Plan Maintenance and Change Management, of the SPP Emergency Preparedness and Response Plan states: -
"Changes to the document will be made when the following changes occur:
a. Regulatory changes – If the legal requirements of the country change to enforce a certain layout, inclusion or reporting format, then the EPRP will be reviewed. Legal requirements may also indicate that a certain process or element contained on the plant is particularly hazardous and a risk assessment needs to be conducted, it may be required to be included in the EPRP.
b. New risk identified, or existing risk changed – Risk identification and assessment is an ongoing process. As new risks are identified or as new equipment or processes are implemented, risk assessments will be conducted according to IDP/HSE/P/019– Change Management Procedure and the EPRP updated accordingly.
c. Resources or organizational structure change – Due to ongoing organisational changes.
d. After drills / exercises – When gaps or deficiencies have been identified during drills and changes have to be made to the EPRP accordingly.
e. After the EPRP is used for an actual event – In the event where the EPRP was used for an actual event or another Plant / TSF used their site specific EPRP, and short comings / failures / findings being identified.

f. After corporate Technical Group review – The Corporate Technical group may receive updates from global industry standards or from other organisations that may be applicable to AGA Obuasi Mine Metallurgy.
g. Funding or budget level changes – If changes are experienced in budget financing which may have an effect on the availability of certain emergency services or levels of protection, the EPRP must be corrected accordingly.
h. Technology Changes – As new technology become available that may have improvements to processes and working / response conditions changes, the EPRP must be updated.
i. Major Changes – If any major change occur (closing down of sections etc.) of sites / plants or any other neighbouring business changes.
There have been no instances arising from cyanide drills that have necessitated changes to procedures
No changes were made to the Plans and procedures, but the Corrective Action Plan above was implemented.

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

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

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 employees working in the plant receive cyanide hazard awareness training. The training includes: -

- identifying cyanide hazards
- cyanide process management
- safe cyanide practices
- managing cyanide exposures
- cyanide exposure routes to the body
- symptoms of cyanide poisoning
- cyanide emergency evacuation
- management of cyanide casualties

Refresher training is conducted on return from an absence from the site for two weeks or more. Additional awareness training might be undertaken where a specific cyanide job is to be done on a cyanide facility, and the team would be additionally refreshed. A training matrix was sighted, showing names of attendees, job location, trainer, assessment scores

and percentage results. The pass mark is 70%. If the attendee fails to achieve the pass mark, they are given three repeat tries. If they fail thereafter, they are not deemed fit to work on the plant. The matrix also provides a link to the actual test assessment.

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 Plant uses the Standard Operating Procedures (SOPs) as a basis for task training. Training elements necessary for each job involving cyanide management are included in the SOPs. Operators study and familiarise themselves with procedures, and then the supervisor provides on-the-job training on the procedures and tasks. Additional technical and modular training on areas (e.g., sparging, elution, CIL) is provided based on skills needs, employee assessments, incident investigations, and job observations.
The plant has a Training Officer and the Cyanide Champion also conducts training. The Training Officer is a metallurgist by training, has 19 years' experience in the plant and has undertaken a St. Johns "Train the Trainer" course. The Cyanide Champion is a metallurgist with 6 years of experience in the plant and plant experience in training.
Employees are trained in the SOPs, and the supervisor will use assessment, on-the-job training, and PTOs (Planned Task Observations) to confirm that the individual is competent to undertake the task identified. Employees also sign training acknowledgement forms, countersigned by the trainer. Sighted examples of completed forms (Samuel Kumah trained on Flotation Operations by Kwadwo Ntiamoah-Donkoh on 15-7-2022, and Michael Amoako trained on Leaching and Adsorption operations by Kwadwo Ntiamoah-Donkoh on 02-09-2021.) Refresher training is carried out based on needs identified by formal and informal observations, incident investigations, and assessments.
The plant undertakes Planned Task Observations (PTOs) to evaluate the effectiveness of cyanide training. Supervisors are required to undertake at least 2 PTOs per month.
Examples of PTOS were sighted and sampled: -

- PTO on Sodium Cyanide Sampling – employee – Michael Darkel, Observer – Edward Foster Nyarko, carried out on 20-07-2023 – found competent.
- PTO on Sodium Cyanide Sparging – employee -Michael Darkel, Observer - Edward Foster Nyarko. Carried out on 20-07-2023 – found competent.

Records in the training record files and attendance registers were sighted. The Attendance Register for Cyanide Sparging/Management SOP Training carried out by Frank Mensah on 18-05-2023 with 8 attendees, was sighted. The form includes the names of the employee and the trainer, the date of training, and the topics covered. Not all training includes assessment of understanding. However, some training will include assessments in the form

of quizzes or multiple-choice assessments. Task training records are retained indefinitely, throughout an employee's employment and after.

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:
Although all employees are trained in cyanide awareness emergency response and basic first aid, the only employees who would apply decontamination and first aid procedures are the trained first responders on each shift. (Normally, five on each shift).
Section 5.3.2 of the SPP Emergency Preparedness and Response Plan specifies the training requirement for emergency responders including:
• First aid (intermediate level)
• competency in cyanide first aid treatment
• Fire fighting
• Hazardous materials incident response
• Use of emergency communication equipment
• Other training as dictated by the identified risk.
The Attendance Registers for First Responder Advanced Cyanide Training given by Edward Foster Nyarko to the shifts on 16-03-2023 and 25-03-2023 were sighted. This training includes training in cyanide decontamination of patients, oxygen administration, transporting casualties, and decontamination of PPE and cyanide equipment. The five permanent members of the site Emergency Response Team are trained in advanced cyanide training and first aid. The Advanced Cyanide Handling and Management Training Course Attendance Register for the ERT, presented by the Cyanide Champion (Frank Mensah), held on 22-05-2023, was sighted. The engagement and updating of the external entities with roles and responsibilities identified in the Emergency Response Plan has been commenced through the training and awareness raising of the entities such as Police, Fire, Ambulance, and Disaster Management. This will be continued as situations change or are updated. Two drills were arranged involving the external entities on 3 August 2023 and 27 July 2022.
First Responders receive refresher training annually and as and when the need is identified in cyanide mock drills. Refresher training includes training on all emergency response procedures as covered in Section 5.3.2 of the SPP Emergency preparedness and Response Plan. The Mine Rescue Brigade Call Out Training Programme 2023, was sighted. The cyanide-specific components include: -

- develop skills in taking gas readings with portable gas detectors,

- identifying the gases that may be present in certain mine rescue situations and interpreting the hazards that these gases present. The gases Include but are not limited to HCN Gas, H2S, Oxygen, and Carbon Monoxide,
- develop skills in managing cyanide casualties using the correct methods and procedures, and
- Familiarization with the sparging plant- understanding the use of cyanide and corresponding antidotes at the processing plants.

Competency testing is undertaken by means of drilling and practice to test understanding of the training materials and use and function of emergency equipment. Training records include: - the names of the employee and the trainer, the date of training, and the topics covered. Task training records are retained indefinitely, throughout an employee's employment and after cessation of employment or their demise.

Principle 9. DIALOGUE AND DISCLOSURE: 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:
The Sustainability Department, who are responsible for stakeholder engagement, have four main areas of focus: -

1. Broad Engagement Strategy for Mine.
2. Community Safety Program
3. Cyanide Education
4. Educating key stakeholders

In 2023, there were security challenges, but the program is ongoing.
Presentations on Cyanide Education for Emergency Response were made to: -

- National Disaster Management Organisation -27-28 July 2023 23 attendees.
- Ghana Police Service, National Fire Service, Ambulance Service – 2-3 August 2023 – and 16 – 17 August 2023 including Ghana Health Service (66 attendees)
- Cyanide Education presentations for Community Forum (13 Communities) 27 June 2023 (46 attendees) - Assembly members. Chiefs. Unit Committee Chair and Youth, Representatives representing Anyinam Community, Sanso Community, Nhyieso Community, Apitikooko Community, New Dokyiwaa Community, Binsere Community, Ntonsua Community, Abompekrom Community, Kokoteasua Community, Sampsonkrom Community, Aboagyekrom

Community, Boate Community, Brahabebome Community.

Questions on cyanide

- Is there cyanide in the tailings dam?
- Are the produce of farms close to the TSF being contaminated?
- Are river bodies on the tailings dam and around it contaminated or not and healthy for drinking?
- Is the quality of air within communities contaminated by emissions from AGA?

***Standard of Practice 9.2**: 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 9.2**

not in compliance with

Basis for this Finding/Deficiencies Identified:

Copies of Cyanide Education presentations are printed out and made available to all. Sighted presentation, which includes: -

- History of cyanide,
- International and local laws governing the use of cyanide,
- Why is cyanide toxic?
- Cyanide exposure routes to the body,
- symptoms of cyanide poisoning,
- First Aid and medical treatment,
- Safe Cyanide practices and environmental management.

The presentations are produced in English but presented in the local language, Twi. The media presentations are produced in English but presented in the local language, Twi. The percentage of illiterate persons is not known.

There is a procedure for communication with interested parties and the Media that permits only the Process Manager to communicate the information to the Managing Director, who can then make it publicly available. In addition, there is the Cyanide Emergency Communication and Reporting Procedure, dated 12-09-2023. Communication with potentially affected communities is handled by the Sustainability Department, which keeps an updated contacts list for communities and interested and affected parties. This procedure also covers communication with the media. The External Stakeholder Contact Register, dated 01/01/2023, including lists of Unit Committee Chairmen, Assembly members, Community Leaders, Overlords, Divisional Heads, Paramount Chiefs, NGOs (Non-Governmental Organizations) and CBOs (Community–Based Organizations), Government Institutions, Members of Parliament, Religious Leaders, and Media representatives was sighted.

There have been no incidents of cyanide release or exposure in the last 5 years or more. Incident communications are done using approved templates provided by the Ghana Minerals Commission and the Ghana Environmental Protection Agency. Incident briefs

are also shared on the company's intranet, website, and in the company's annual reports, and health, safety and environmental reports. Section 5.1 of The Stakeholder engagement plan defines the Strategy and timelines for sharing information and consulting with each key stakeholder group.