

***INTERNATIONAL CYANIDE  
MANAGEMENT INSTITUTE***

***Gold Mining Operations***

***Summary Recertification Audit Report***

***Newmont Ghana Gold Ltd.  
Ahafo Gold Mine  
Ghana***

***12<sup>th</sup> – 16<sup>th</sup> May 2014***



Name of Operation: Ahafo Gold Mine

Name of Operation Owner: Newmont Ghana Gold Limited

Name of Operation Operator: Newmont Ghana Gold Limited

Name of Responsible Manager: Mr. Clinton van der Westhuizen  
Process Manager

Address: C825/26 Lagos Avenue  
East Legon  
ACCRA

Country: Ghana

Telephone: +233 30 701 1852 x 51806

Fax: +233 24 439 1484

E-Mail: [Clinton.VanDerWesthuizen@newmont.com](mailto:Clinton.VanDerWesthuizen@newmont.com)

**Location detail and description of operation:**

The Ahafo Gold Mine, owned and operated by Newmont Ghana Gold Limited (NGGL), is located in the Brong Ahafo Region of Ghana, approximately 300 kilometres northwest of the capital city, Accra, and 107 kilometres northwest of the Ashanti regional capital of Kumasi. The mine is 40 kilometres south of the Brong Ahafo regional capital, Sunyani. Access to the mine is by air from Accra to Sunyani and then by road to the mine, or by road from Accra via Kumasi. The Ahafo Gold Mine poured its first gold on July 18, 2006 and commenced commercial production in August 2006. Ahafo received its initial Cyanide Code Certification in March 2008 and its recertification in June 2011.

The mine currently operates three pits with a fourth pit undergoing a layback to expose future reserves. The process plant consists of a conventional mill and carbon-in-leach circuit. Ore is recovered from the pits using conventional surface mining techniques and is transported to a crushing, grinding and milling circuit. Ore processing consists, primarily, of carbon-in-leach cyanidation, followed by elution, and refining for gold recovery. Tailings remaining after completion of the processing and precious metals recovery are conveyed by pipeline to a counter-current decantation (CCD) plant where the tailings are rinsed with decant return water to reduce WAD CN concentrations to less than 50ppm WAD CN prior to final disposal. After the CCD circuit, the tailings are pumped, via a lined tailings trench, to an engineered, lined tailings storage facility (TSF) for permanent disposal. Tailings water is recovered from a decant pond, and recycled back to the process facilities for re-use. The entire process and tailings facilities are designed as a zero-discharge operation.



Sodium cyanide is supplied to the mine by Orica from its Yarwun manufacturing plant in Queensland, Australia. Cyanide in solid briquette form is packaged in one tonne plastic bags within plywood boxes and transported by sea in shipping containers to the port of Takoradi in Ghana. From Takoradi the containers are transported by road to Tarkwa by Stellar Logistics, which is subcontracted to Orica, where the cyanide briquettes are transferred into isotainers at the Orica cyanide repackaging facility, operated by Barbex. Cyanide is delivered to the Ahafo mine, in dry briquette form, in truck-mounted isotainers, for solid to liquid sparging by Stellar Logistics. The cyanide mixing facility at Ahafo is specifically designed to handle the sparging operations.

Sparging is a closed circuit mixing process that passes pH adjusted water from a mixing tank through the isotainer in a continuous circuit until the required concentration of liquid cyanide is achieved. On completion of the sparging process, the liquid cyanide is transferred from the mixing tank to a dedicated storage tank ready for delivery by pipeline to the process plant. All pipelines used for the transfer of cyanide to the process plant or within the process plant are either double piped or installed above containment facilities to prevent escape of leaks or spills to the surrounding surface.



***Auditor's Finding***

**This operation is**

**X in full compliance**

- in substantial compliance  
 not in compliance

with the International Cyanide Management Code.

This operation has not experienced compliance problems during the previous three year audit cycle.

Audit Company: Eagle Environmental


Audit Team Leader: Arend Hoogervorst

E-mail: [arend@eagleenv.co.za](mailto:arend@eagleenv.co.za)

Names and Signatures of Other Auditors:

Name : Dawid M. L Viljoen

Signature



Date: 18/12/14

Dates of Audit: 12<sup>th</sup> – 16<sup>th</sup> May 2014

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

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

Ahafo Gold Mine

Facility

Signature of Lead Auditor

22/12/14  
Date

Ahafo Mine

Signature of Lead Auditor

13<sup>th</sup> December 2014

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*Auditor's Findings*

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

*Standard of Practice 1.1: Purchase cyanide from manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.*

**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:*

There is a Sodium Cyanide Purchase and Sale Agreement in place between the seller, Orica Australia Pty Ltd, and the Ahafo mine. Orica's Yarwun facility, which supplies the sodium cyanide, was fully recertified as a producer on 29<sup>th</sup> October 2013. The Orica cyanide bag to bulk facility in Tarkwa, Ghana, is operated by Barbex Technical Services on behalf of Orica and is classified as a production facility and was recertified on 21<sup>st</sup> October 2014. Solid briquette cyanide is purchased directly from the producer, Orica, and the shipped sea containers from Orica are unloaded and the briquettes repacked in isotainers in the Orica Bag to Bulk production facility. The contract specifies that the cyanide briquettes are delivered in isotainers.

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

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

**X in full compliance with**

**The operation is**       in substantial compliance with **Standard of Practice 2.1**  
  
 not in compliance with



*Basis for this Finding/Deficiencies Identified:*

The contract is with the producer for supplying cyanide and covers the production as well as the full transportation chain from the plant in Yarwun to the site in Ahafo. Section 6.1(a) of the contract covers labelling, and section 8.1 (a) to (c) and Section 8.2 (b) and (c) covers the responsibilities and requirements for transport, packaging, safety, security, unloading, emergency response (spills prevention and clean-up), route evaluation and assessments, training, community liaison, emergency response resource access and availability.

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

**X in full compliance with**

**The operation is**       in substantial compliance with Standard of Practice 2.2  
  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

The Contract requires that the seller shall comply with the ICMI Code production and transportation principles and standards of practice as published and amended from time to time by ICMI. Chain of custody documentation was sighted by the auditors. The Orica Australian supply chain from Yarwun to Brisbane was certified on 5 Oct 2010. The Orica West Africa Supply chain from Brisbane, Australia, to Tema and Takoradi, Ghana, was recertified on September 05, 2014. Barbex, the transporter in the West Africa Supply Chain, withdrew as a transport signatory on 13 June 2014. However, the replacement transporter, Stellar Logistics, was pre-operationally certified as an ICMI transporter on 6th March 2014. Stellar Logistics delivered its first sparge isotainer of cyanide briquettes on 6th June 2014. An operational audit was undertaken in August 2014 and the results are still awaited.

**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:*

No solid cyanide is stored on site as a sparge process is used to transport solid cyanide to the site and to make up liquid cyanide. The cyanide sparging and storage tanks are equipped with ventilation pipes at the top. The offloading, mixing and storage facilities were designed and built with materials appropriate for use with cyanide (Drawings were reviewed and confirmed.) and are located in concrete bunds away from people and surface waters. There are no incompatible materials nearby. Materials specifications that are identified on the drawings are relevant Australian Standards. These standards cover materials for storage tanks. Labelling of the reagent mixing tanks is in accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (generally abbreviated as the Australian Dangerous Goods Code). This Code covers the proper labelling of dangerous goods and is widely used for labelling of static storage. The reagent mixing area is constructed on concrete pads to prevent any discharges to the sub surface. The concrete pad on which the vehicle carrying the isotainer parks during sparging, is provided with containment bunding with all surface run-off directed into containment bunds that enclose the reagent tanks. The cyanide sparge tank has a high level alarm at 90%, and high-high level alarm at 95%, interlocked with the cyanide sparge pump. The sparge tank is equipped with an overflow pipe to the cyanide storage tank. The pre-fill operation includes interlocks with the tank level, allowing addition of pre-fill water. The operation is fully automated as per the make-up procedure. The cyanide storage tank is equipped with ultrasonic level detection with a high level alarm at 75% and a high high alarm at 92.5%, interlocked at 92.5%, tripping the transfer pumps from the sparge tank. Field level, display instruments are available and are confirmed by the process operator.

*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:*

Use is made of a sparging system where the iso-tainer is re-used for transporting dry solid cyanide briquettes and remains in the closed loop. The sparging procedure is detailed, spelling out PPE requirements, use of a buddy in the process, and clearly sequenced to prevent and manage spillages and accidental releases. Members of the Mine Emergency



Response Team is present during the sparging operation and provides for emergency response in case of any emergencies arising from the sparging operation.

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

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

**X in full compliance with**

**The operation is**       in substantial compliance with **Standard of Practice 4.1**  
  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

The plant has 389 operating procedures (Standard Operating Procedures (SOPs), Standard Task Procedures (STPs), checklists and maintenance procedures) covering the cyanide facilities containing more than 0.5ppm WAD cyanide. The engineering procedures were updated within the Ellipse Planned Maintenance System (PMS) which has been replaced by the SAP system. The Tailings Storage Facility (TSF) operating parameters are contained in the Ahafo Tailings Management Plan of 2013, and operating and maintenance procedures are based on the Plan. Quarterly operations review meetings are held and operating parameters reviewed and changed if required. The Ahafo Gold Mine Independent TSF and WSF Inspection dated Sept 2013 by specialist engineers, F Wagener and Associates recommends and includes, " ....A number of measures and suggestions for optimisation of the facility but none (of-sic) these are essential to attain acceptance of the TSF in terms of this audit...(and)...to the best of our knowledge conforms to international best practice in terms of both construction and operation...The in-plant event pond operating scenarios specify a 1:25 year storm event as well as a thickener failure at the same time. TSF freeboard required is 0.5m, plus 1:100 year recurrence interval design pond volume below the spillway. The return precipitation event frequencies consider the 1:10, 1:25 and 1:100 year over 3, 12 and 24 hour storm events.

The events pond level is viewed as the critical level to be controlled at the plant as per the Events Pond procedure. The plant will be stopped at pond level of 52% in the Events Pond and will only restart if the safe operating level is restored to prevent potential overtopping. The plant is stopped for planned and breakdown maintenance using the standard stop / start procedures on the CITECT system.

All ponds are covered by daily inspections and level indicators are fitted to all ponds which show and alarm on the CITECT in the control room. A procedure states that the event pond must be operated at the lowest possible level. Routine daily, weekly, shiftly





inspections, and checklists for proactive and reactive management on the plant and TSF were sampled over the three year period to check the effectiveness of systems.

The Ellipse PMS system was replaced by the SAP system in Feb 2013. All maintenance plans, excluding the historical records were transferred to the SAP System. The Ellipse PMS records are kept on computer and are still available and functioning. Hard copy and on-line records were sampled and checked. Tank thickness testing for high strength cyanide tanks is done at least annually (records checked over the past three years). The plant has a change management procedure covering health, safety and environment in place and examples of exercises were sampled. Emergency power is required on the CCD (counter-current decantation) feed pumps, tails pumps, sump pumps, and events pond pumps. Emergency generator maintenance is done under contract and testing of the generator system is done during shutdowns. A power management system is in place to ensure that sufficient power is available to the critical pumps during emergencies. Consequently, a power prioritisation protocol is in place in the CITECT control system.

*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:*

An updated Cyanide Control and Optimisation Strategy is in place and test results for different ore types for the Apensu, Awonsu, Subika and Underground Mill feed samples were sighted covering 2013 to date. The Awonsu phase 4 metallurgical reports, dated April 2014, included ore characterisation and cyanide consumption optimisation and the test work did not identify any significant impact on cyanide consumption or copper mineralisation that would impact on cyanide in the tails. A Weekly mine to mill meeting is used to plan ore ratios, and efforts are made to keep ratios constant. The meeting is attended by the Mine Planners, Mine Production staff, Process Production Superintendent, Geologists as required, and meeting actions are added on the 3W action system. Weekly bottle roll tests are conducted at different cyanide concentrations and plotted against recovery. Reports of results are done weekly. Quarterly graphical result summaries show that no significant changes in cyanide optimisation were identified. Density control to the CIL is the main strategy to reduce cyanide consumption. The work was completed and the Expert system was commissioned and is running within the CITECT system. Cyanide control is now smoother and steadier. Cyanide is fed using a ratio control from the mass flow to the cyanide dosing system. The OCM 5000 on-line cyanide monitor is used to determine cyanide concentrations in the no1 CIL tank with

feedback control to the ratio controller. Free cyanide is monitored in the CCD tails tank for free cyanide monitoring purposes and manual titrations are used as back up for the OCM and to determine the free cyanide in the final CIL tank. Free cyanide is monitored in tank 10 using the OCM 5000 on-line cyanide monitor. A control to limit the maximum flow of cyanide to the leach is in place to prevent overdosing in case of measuring equipment failure.

*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 is using the Mine-wide GoldSim probabilistic water balance model, updated to May 2014, and the model is updated annually. Added containment capacity was added and software updated recently. The Events Pond water balance model (based on the Golder and Associates EPA Storm water management software model) includes the rainfall data and the design storm event. The model includes variation in rainfall events and the extra concrete surface created by additional secondary containment construction is included. The TSF is operated with a minimum freeboard of 1.2m (stated in the Ahafo Tailings Management Plan) plus a 1:100 year 24 hour storm event below the spillway and the events pond model design storm event uses a 1:100 year, 24 hour storm event. The models used historic rainfall data from the region where the mine is, data from before the plant was built obtained from the Sunyani weather station, and the latest data from the site's current weather station and TSF. With regard to other solutions losses, the TSF and the events pond are lined with HDPE, and retained interstitial water is calculated in the model. TSF daily, weekly and monthly inspections and quarterly reviews are conducted. Daily pond inspections, CCTV camera and ultrasonic level indicators showing on the CITECT system are in use, level alarms are set and back-up high level sensors and independent local alarms are also used. The Design freeboard of the events pond is specified in the events pond standard operating procedure which states that the event pond must be operated at the lowest possible level specifying freeboard parameters and alarms. The revised freeboard is based on the review of the probabilistic water balance model. Raw water and process water ponds are operated to accommodate the design rainfall events.

*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:*

TSF Spigot samples are taken on a shiftly (twice daily) frequency as a grab sample from the tailings pipeline leading to the spigot delivering to the TSF. The samples are pH stabilised and sent to the on-site laboratory the same day for WAD cyanide analyses as per procedure. The WAD cyanide spigot sample results for 2011, 2012 and 2013 were as follows:- 2011 - WAD cyanide maximum 48.4mg/l, lowest 0.374mg/l, 2012 - WAD cyanide maximum 59.2ppm lowest 0.94mg/l (The single 5 Aug exceedance was investigated, concluding lower consumption of cyanide by the ore treated on the day, leading to higher residual cyanide in the spigot sample. The recommendations were implemented and no further exceedances were noted.), 2013 - WAD cyanide maximum 42.44mg/l, lowest 2.14mg/l, and 2014 - WAD cyanide maximum 40.34mg/l lowest 2.14mg/l. The Decant return pond at TSF returned values for period 2011 to May 2014 at less than limits of detection of 0.001mg/l WAD cyanide. As the WAD cyanide results indicated that the TSF spigot is less than 50 ppm WAD cyanide, no protective measures are thus required.

The process water pond receives the CCD (counter-current decantation) overflow water and decant return, and could contain more than 50ppm WAD cyanide. Thus, the process water pond surface is covered with bird balls to restrict birds from access to the pond. The process water pond was off line for extended repairs during the re-certification audit. It was confirmed during the site inspection that the process water pond still contained the bird balls. Wildlife inspection reports for the 3 years confirmed that no mortalities had been recorded.

*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:*

No direct discharge to surface water takes place. The Environmental Control Dam (ECD) WAD cyanide values for sampled data for 2011 to 2014 are below the limits of detection (0.003mg/l). Surface water down stream of the ECDs is sampled and analysed for WAD cyanide and all values show below levels of detection. Monitor wells are placed below and around the TSF, and boreholes are sampled for groundwater cyanide contents. The TSF is equipped with under drains returning TSF seepage to the process water circuit. Seepage from surrounding area enters the stream into ECD 4 and is monitored for



cyanide although all cyanide values were shown to be below detection limits. Down stream samples are taken from the ECD 4 and the stream and analysed for cyanide with all cyanide values showing below detection limits. Process water ponds and events ponds are lined to prevent seepage from entering the storm water system flowing into the ECD. No physical evidence of indirect discharges to surface water was observed.

*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 TSF is fully lined with a clay liner and partially lined with a synthetic liner in the ponding areas. Secondary under drains are installed under the synthetic liner. Monitor wells are placed below and around the TSF, boreholes are sampled for groundwater cyanide contents. The TSF is equipped with under drains returning TSF seepage to the process water circuit. Finger drains are installed to dewater the TSF walls. Process water ponds and events ponds are fully lined to prevent seepage. Leak detection and recovery systems are installed on the Process Water and Event Ponds. Pond liners and leak detection systems are inspected regularly as part of the operational inspections system. Borehole monitoring is done around the plant area.

Potential beneficial uses for groundwater include drinking water. The jurisdictional Ghana EPA standards for ground water cyanide levels are 0.2 mg/l free cyanide and 1.0 mg/l for total cyanide. No exceedances of the 0.2 mg/l free cyanide were detected.

*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:*

Site drawings indicate standard ring beam drainage arrangements and details showing HDPE liner detail with leak detection, applying to all ring beams on the plant. CIL tanks are placed on ring beams and equipped with an impervious HDPE liner. The lean eluate tank, treated water tank, and pregnant solution tank foundations are equipped with a HDPE impervious layer between the tank base and the compacted section inside the ring beam.



All cyanide solution containing tanks are placed on concrete spillage containment areas which drain to the events pond. Reagent strength cyanide storage tanks are placed in a concrete bund.

The events pond size can accommodate the operating volume of the thickener, as well as the 1:25 year rainfall event, with continued pumping of the Events Pond to the TSF, where adequate storage freeboard exists. All secondary containments are equipped with pumps and pumping systems returning the contents to the process, confirmed during the site inspections. Emergency power is available on the critical pumps.

Reagent strength pipelines are routed over concrete trenches draining into the Events Pond which is the secondary containment. All flanges are equipped with flange covers to prevent spraying of the cyanide solution. All process pipelines are placed in pipe racks over concrete containment areas. Spill prevention measures include flange covers on the CCD feed line and deflection panels are used (where a risk exists to storm water). A planned maintenance program is in place supported by shiftly inspections. The process water dam feed pipe line and suction lines are placed over an HDPE liner. All TSF pipelines are placed inside an HDPE lined trench, draining to the events pond. Flange covers and deflection panels are also used. All cyanide tanks and pipelines are constructed of materials that 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:*

The original certification audit covered the quality control/quality assurance of the whole plant. A Counter Current Decantation (CCD) section was constructed and the CCD thickener design is a duplicate of the leach feed thickener using the Ahafo Quality Management Plan. The close out report, which includes handover to Operations, signed off by the Lycopodium Project Manager with the civil work signed off by Project Manager: Infrastructure of Consar, was sighted. Quality control/quality assurance records for the CCD were kept and were made available during the audit.

The TSF lifts 7 and 8 were done in 2012 and the quality control plan, handover certificates, as-build data, calibration certificates and inspection records which included checklists and test results including compaction tests were sighted. Quarterly TSF operations review meetings are held and operating parameters reviewed and changed if required. A TSF and WSF audit dated September 2013 by Engineers was sighted which recommends and concludes, "...A number of measures and suggestions for optimisation of the facility but none of these are essential to attain acceptance of the TSF in terms of

this audit...The TSF and WSF at Ahafo Mine, to the best of our knowledge, conforms to international best practice in terms of both construction and operation..."

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

**X in full compliance with**

**The operation is**  in substantial compliance with **Standard of Practice 4.9**  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

A site wide, water resources monitoring plan describing monitoring activities is in place. Sampling and analytical protocols were developed by consultant hydro-geologists and reviewed by the site environmental manager who is a qualified science laboratory technologist with 15 years' experience. Sampling conditions (e.g. weather, livestock/wildlife activity, anthropogenic influences, etc.) are included on field sampling sheets. Sampling points are identified on a sampling map and procedures are in place which cover how and where samples should be taken, sample preservation techniques, chain of custody procedures and which cyanide species are to be analysed. Boreholes are placed and sampled upstream and downstream of the plant. Boreholes are sampled monthly, surface waters monthly, and daily wildlife mortality inspections take place. Sampling frequencies are deemed adequate to characterize the medium being monitored. Wildlife inspections form part of the daily checklist of the TSF operator. No cyanide-related wildlife mortalities were recorded in the period since the last recertification.

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

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

**X in full compliance with**

**The operation is**  in substantial compliance with **Standard of Practice 5.1**  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

A reclamation and closure plan, which includes cyanide decommissioning procedures, is in place. The procedures cover low, as well as high, strength cyanide solution sections.

The procedures require disposal of cyanide solutions to the TSF and rinsing to where cyanide solution in rinse water is less than 0.5mg/l WAD cyanide. A decommissioning schedule is included in the plan and covers all process components from Mill to the TSF. Review is required every 3 years.

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

**X in full compliance with**

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

*Basis for this Finding/Deficiencies Identified:*

A site estimates document was sighted which includes a decommissioning breakdown. A table in the document, entitled “Facilities demolition / decommissioning”, includes a column for decommissioning/cleaning and detoxification, which represents 20% of the installation cost. This estimate is reviewed annually. A letter of credit has been issued from the JP Morgan Chase Bank in Chicago Illinois, dated 12 Feb 2013 to the Ghana Environmental Protection Agency which covers the cost of closure and cyanide decommissioning.

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

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

**X in full compliance with**

**The operation is**             in substantial compliance with **Standard of Practice 6.1**  
  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

The plant has 389 operating procedures (Standard Operating Procedures (SOPs), Standard Task Procedures (STPs), checklists and maintenance procedures) covering the cyanide facilities containing more than 0.5ppm WAD cyanide. The engineering procedures were updated within the Ellipse Planned Maintenance System (PMS) which has been replaced by the SAP system. All procedures include risk assessment references, pre-task checklists, PPE requirements, references to linked procedures, training pre-requisites, and licence and permit requirements. The Tailings Storage Facility (TSF) operating parameters are contained in the Ahafo Tailings Management Plan of 2013, and operating and maintenance procedures are based on the Plan. Quarterly operations review

meetings are held and operating parameters reviewed and changed if required. The Ahafo Gold Mine Independent TSF and WSF Inspection dated Sept 2013 by specialist engineers, F Wagener and Associates recommends and includes, " ....A number of measures and suggestions for optimisation of the facility but none these are essential to attain acceptance of the TSF in terms of this audit...(and)...to the best of our knowledge conforms to international best practice in terms of both construction and operation...The in-plant event pond operating scenarios specify a 1:25 year storm event as well as a thickener failure at the same time. TSF freeboard required is 0.5m, plus 1:100 year recurrence interval design pond volume below the spillway elevation. The return precipitation event frequencies consider the 1:10, 1:25 and 1:100 year over 3, 12 and 24 hour storm events. All ponds are covered by daily inspections and level indicators are fitted to all ponds which show and alarm on the CITECT in the control room. A procedure states that the event pond must be operated at the lowest possible level. Routine daily, weekly, shiftly inspections, and checklists for proactive and reactive management on the plant and TSF were sampled over the three year period to check the effectiveness of systems.

The IntelliPermit system is a software based system implemented during 2012 used for all permits (clearance, hot work, cold work, scaffolding, etc.) required, with electronic records kept of each permit issued.

The Ellipse PMS system was replaced by the SAP system in Feb 2013. All maintenance plans, excluding the historical records were transferred to the SAP System. The Ellipse PMS records are kept on computer and are still available and functioning. Hard copy and on-line records were sampled and checked. Tank thickness testing for high strength cyanide tanks is done at least annually (records checked over the past three years). The plant has a change management procedure covering health, safety and environment in place, including a form for smaller changes, and examples of exercises were sampled. Safety meetings are held where the safety representatives are present and include feedback and recommendations by Operators. Risk assessments involve appropriate staff from all levels. Workers are given the opportunity to raise their concerns or comments during pre shift safety meetings and toolbox talks.

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

**X in full compliance with**

**The operation is**       in substantial compliance with **Standard of Practice 6.2**  
  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

The pH set point in the leach is 10.5 and controlled via lime addition on the SAG feed, based on the pH measured in the pre leach thickener. Alarms are set High at 11.0, Low at 10.0. Back-up pH is measured in CIL tank 1, alarming high at 11.0 and low at pH 9.5. A



fixed gas monitor is installed at the No 1 CIL tank. A baseline gas survey was undertaken and hotspots identified with ongoing checks being made for potential new hotspots. Fixed cyanide gas monitors are placed at the following locations: Reagent area (2), Security (1), Intensive Cyanide Reactor (1), Grind circuit (2), CIL(3), Elution (2), CCD (2) and Goldroom (2). There are 27 personal cyanide gas monitors in use (register in place for use, maintenance and calibration), with 4 held by the Emergency Response Team. Gas monitors are set for 10 parts per million on an instantaneous basis and 4.7 parts per million continuously over an 8-hour period and calibrated monthly, although the manufacturer requires only 6 monthly calibration. Calibration and maintenance are managed by a spreadsheet system. Technicians are trained to perform calibrations using standards obtained from the supplier. External calibrations are done annually. On-going inspections and checks are also used to monitor and check facilities and emergency response equipment functioning and checklists covering three years since certification were sampled. Safety equipment such as safety showers, low pressure eye wash stations (inspected weekly), and fire extinguishers (inspected monthly) are numerous, and adequately signposted. Adequate warning signs advising workers that cyanide was present and that smoking, open flames and eating and drinking are not allowed were noted.

Labelling and flow direction is indicated on cyanide lines and slurry lines. The workforce is trained that all slurries and waters inside the plant contains cyanide. MSDSs are available at the reagent storage area, the website at ChemAlert service which is available to everyone with computer access, and cyanide safety and first aid signs are located widely in the plant. English is the working language for the site as well as the official national language and used in operational documentation. Formal employee interviews were used to check awareness and sensitivity to health and safety measures and the response from employees and contractors alike, was found to be appropriate and acceptable. Accident and incident reporting and investigation procedures, based upon the site safety reporting requirements, were found to be in place and effective.

*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:*

Running water is available on the plant, cyanide antidote is kept in a fridge and transported in a cooler bag to the emergency by ERT. SCBA(Self Contained Breathing Apparatus) sets are available at the cyanide mixing and storage area and at the control room, as well as with the Emergency Response Team (ERT). Life Emergency Oxygen sets are available at the control room and the ERT base, radios are used for communication in case of emergencies. The Pharmacy ensures that the cyanide antidotes

are all current and replaced using a spreadsheet schedule, ordering 3 months before expiry date. First aid inspections are conducted and documented by ERT. On site, there is a fully equipped Emergency Response Team and clinic. Patients will be stabilised in the clinic. The on-site medical doctor in charge will make a decision on further advanced medical care and evacuation. Cyanide equipment is regularly checked and tested and mock drills are held regularly on site.

Full cycle mock drill reports were sighted which covered, man-down drills (A drill report included full analyses of the drill, with emergency response plan revision required and implemented.), and table top drills. Drill reports are copied to the training department for further consideration.

***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:*

In place, there is a Mine Wide Ahafo Mine Emergency Response Plan (ERP), the Ahafo Process Plant Emergency Plan and an Emergency cyanide spill response procedure. The Emergency Preparedness Plan for Water and Tailings Dams Storage Facilities needs to be read in conjunction with the Ahafo Process Plant Emergency Plan. The plans combined, cover the full range of cyanide emergency scenarios likely to be experienced on site.

Transportation spills are dealt with in the contract with producer, Orica. The Ghana transporter, Barbex, is an ICMI Cyanide Code certified transporter and has a sodium cyanide emergency response plan for transportation incidents. Transport accidents may involve larger scale community evacuation. Stellar Logistics, an ICMI certified transporter, replaced Barbex as the cyanide transporter and the Stellar Logistics Emergency Plan for the Transportation of Sodium Cyanide was sighted.

The mine ERP covers general evacuation. Process site personnel evacuation is included in the process plant evacuation procedure. There is a separate Community evacuation procedure. The cyanide first aid procedure is included in the Plant ERP. Small hamlets may be affected by cyanide release from the plant. All incidents are investigated as per Ahafo incident reporting/ incident investigation procedure.

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

**X in full compliance with**

**The operation is**                       in substantial compliance with **Standard of Practice 7.2**  
  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

The workforce is involved in the planning process through emergency drills. No outside stakeholders have designated responsibilities but are informed on the Plan's contents during dialogue sessions. Development and changes in the Plan are communicated down to the workforce through supervisors and the Plan is also included in monthly safety meetings. Emergency response requirements are covered in induction training and feedback is obtained from the workforce receiving induction. The Incident / accident process is also used for feedback into the emergency plans. A Memorandum of Understanding is in place with local Police, and no other local response agencies are directly involved with the ERP. The on site medical clinic is involved with the ERP. Drills are used to involve clinic, ERT, ambulance and paramedic staff in planning and review processes.

*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:*

A dedicated, full time, Emergency Response Team is in place and available. If an event needs to be escalated, the online Corporate driven Rapid Response System will be activated involving rapid high level structures as per the [www.emqnet.com](http://www.emqnet.com) webpage. The Team has clear duties, roles and responsibilities for the various emergency scenarios. Appropriate training is defined and described in the Process Plant Emergency Plan and the Mine Emergency Response Plan. Contact numbers are contained in the procedures, backed up by the weekly updated process standby schedule. The process plant emergency profile (inventory) and the process plant emergency equipment listing, details lists as well as the position of emergency equipment and frequency of inspection. Periodic drills involving relevant stakeholders ensure that roles and responsibilities are understood and clearly implemented.



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

**X in full compliance with**

**The operation is**  in substantial compliance with **Standard of Practice 7.4**  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

The Ahafo Process Plant Emergency Plan covers notification requirements to the regulatory agencies and management. The community evacuation procedure covers community and media communication. The Rapid Response procedure includes rules for communication with authorities and the media.

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

**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:*

Emergency management plan cross references to the Cyanide emergency spill procedure which covers solutions, soils, and disposal of spill clean-up debris, as well as recovery and disposal of spillages as appropriate to the site-specific identified scenarios. A local water supply company is on contract to supply water as needed. The cyanide emergency spill procedure requires that neutralising agents are prevented from entering a storm water drain or water course and may only be used under the direction of the process superintendent or above. Emergency sampling locations are indicated on the sampling map in the Emergency Environmental Monitoring Plan and sampling methodologies and parameters are contained in the environmental sampling management plan.

*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 Plan is required to be reviewed annually, following incidents and emergency drills or when new information regarding cyanide becomes available. Evidence was sighted of reviews as a result of learning points from drills and incidents. Drills are required to be undertaken at least twice per year, in terms of the cyanide management plan.

**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 persons entering the plant receives cyanide awareness induction training covering cyanide hazard recognition and emergencies which is refreshed annually. A card system control prevents personnel from entering the plant if the induction was not completed. A training matrix is used to track training progress as part of the PDC (People Development Centre) system. The cyanide hazard training course file covering cyanide hazard recognition and safety was reviewed. An assessment is done after the training. Training records are kept at the PDC.

*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:*

A training matrix is in place for production tasks and jobs. The matrix specifies training modules required for each job. Training received is updated to reflect current training and training needs. Training requirements and records were verified during sample interviews with staff. Sighted training matrix specifying training modules required for each job. The reagents training sessions plan was reviewed and a pass mark of 90% is required for

theory and 100% for practical. Training refers to SOP (Standard Operating Procedure) and Standard Task Procedures (STP) for the tasks. Training elements as well as references are included in the session plan. All task training is done on the same format and using the matrix to identify required modules. On the job training together with an operator is undertaken. The trainer completes the workplace assessment to confirm the trainee is trained and competent and the results are recorded in the PDC system. Task training is repeated formally and annually for refresher purposes. Supervisors carry out 4 planned task observations per shift.

Trainers are qualified work place training assessors with the appropriate experience. Supervisors are required to undergo leadership training which includes training and communication skills. Training records are kept in the SAP system.

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

**X in full compliance with**

**The operation is**       in substantial compliance with **Standard of Practice 8.3**  
  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

All plant staff are trained in cyanide spill response, the corporate rapid response system will kick in for spills classified as a significant spill event. Plant staff are trained in the reaction to a man down, first responders are trained in SCBA, chemical suit and re-breathers. The ERT 5 man crew are trained in emergency response, including cyanide first aid. A qualified paramedic accompanies the ERT team and the cyanide patient is removed to a fully equipped on-site clinic.

Emergency response team is trained by 3rd party specialist trainers in the use of response equipment. Drills are used to train plant staff in the emergency response plan, the ERT and clinic staff. Annual induction and refresher training includes cyanide awareness / Orica training, and the ERT receives ongoing practical and theory training. Evidence of emergency drills was sighted. Drill reports and videos are copied to the training department and used in the training programmes.

**9. DIALOGUE: Engage in public consultation and disclosure.**

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

**X in full compliance with**

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



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not in compliance with

*Basis for this Finding/Deficiencies Identified:*

Dialogue meetings or “one-on-one’s” are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide. Community information centres, manned by community relations officers, are situated in the various communities around the mine including Kenyasi No1, Kenyasi No 2, Ntotroso, Gyedu, Wamahinso, Adrobaa, Yamfo, Terchire, Afirisipakrom, Susuanso. These centres all have cyanide fact sheets available. Guided plant tours are conducted involving local communities and stakeholders. The main stakeholder groupings identified are traditional authorities, youth groups, faith-based groups, schools, NGO's and community organisations (CGO's), regulators and government authorities, media, and various consultative forums. Stakeholders are mapped annually, updating contacts and groupings. Communities are afforded the opportunities to raise issues and records of feedback are documented in the electronic system. No specific cyanide complaints have been raised to date. Contact numbers are available for the Mine but face to face communication is preferred. There is also a formal grievance / complaint management procedure which stakeholders can make use of.

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

**X in full compliance with**

**The operation is**  in substantial compliance with **Standard of Practice 9.2**  
 not in compliance with

*Basis for this Finding/Deficiencies Identified:*

Dialogue meetings or “one-on-one’s” are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide. Community information centres, manned by community relations officers, are situated in the various communities around the mine including Kenyasi No1, Kenyasi No 2, Ntotroso, Gyedu, Wamahinso, Adrobaa, Yamfo, Terchire, Afirisipakrom, Susuanso. These centres all have cyanide fact sheets available. Guided plant tours are conducted involving local communities and stakeholders. The main stakeholder groupings identified are traditional authorities, youth groups, faith-based groups, schools, NGO's and community organisations (CGO's), regulators and government authorities, media, and various consultative forums. Stakeholders are mapped annually, updating contacts and groupings. Communities are afforded the opportunities to raise issues and records of feedback are documented in the electronic system. No specific cyanide complaints have been raised to date. Contact numbers are available for the Mine but face to face communication is preferred. There is also a formal grievance / complaint management procedure which stakeholders can make use of.



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

**X in full compliance with**

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

*Basis for this Finding/Deficiencies Identified:*

Regular tours are conducted which include plant visits and presentations. The plant process including description and use of cyanide is explained and a presentation entitled "Cyanide Management" was sighted. Tours are attended by a wide range of people and stakeholder groupings: traditional authorities, youth groups, faith based groups, schools, NGO's and community organisations (CGO's), regulators and government authorities, media, and various consultative forums. During 2013, 29 stakeholder engagement meetings were held attended by 881 stakeholders. This was confirmed when reviewing the extensive lists of attendees. Tours are conducted in the local language, Twi, as well as English. Newmont globally reports specifically on the Cyanide Code on their global website, [HTTP//sustainabilityreport.newmont.com/environmental-cyanide.php](http://sustainabilityreport.newmont.com/environmental-cyanide.php)

