

***INTERNATIONAL CYANIDE
MANAGEMENT INSTITUTE***

***Cyanide Code Compliance Audit
Gold Mining Operations***

Recertification Summary Audit Report

***Golden Star (Wassa) Limited
Wassa Gold Mine
Ghana***

7th – 11th October 2019

***For The
International Cyanide Management Code***



Name of Operation : Golden Star Wassa Gold Mine
Name of Operation Owner : Golden Star (Wassa) Limited
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Location detail and description of operation

The Golden Star (Wassa) Limited Wassa mine is located in the Mphor Wassa East District, in the Western Region of Ghana. The mine is approximately 80 km north of Cape Coast and 150 km west of the capital, Accra. The mine was originally a heap leach operation, but was converted to a conventional carbon-in leach (CIL) operation when GSR purchased the property in 2001. Golden Star commenced production from the surface operation at Wassa in 2005 and commercial production was achieved at Wassa Underground on January 1, 2017. In early 2018 Wassa transitioned into an underground-focused operation.

The Golden Star Plant consists of a conventional two (2) Ball mill and carbon-in-leach circuit. Ore from the underground mine is transported to a crushing, milling and classification circuit. Ore processing consists of carbon-in-leach cyanidation, elution and gold recovery. The cyanidation process is initiated in a pipe reactor feed line (PRF). This reactor feed line is covered in a lined trench.

Golden Star Wassa has a contract with Samsung to supply cyanide on Delivered Duty Paid (ddp) agreement. Solid cyanide is transported from the Port of Pusan in South Korea to Ghana by sea. Vhrad, a GSWL approved and ICMI certified agent for Samsung, is responsible for the delivery of cyanide from the Port of Tema (Ghana) to the Wassa mine site. The cyanide arrives at the port of Tema, where it clears customs and is then transported by road convoy to the Samsung facility in Tema. Cyanide destined for Wassa mines specific delivery is transferred into specially designed 20 feet-containers for transport to site. The 20 feet-containers are locked with security padlocks coded with a serial number. When the shipment arrives on site the 20 feet-container padlocks are checked by the plant security and a safety representative or a designate for integrity. No off load of cyanide is allowed if the locks have been tampered with.

The cyanide unloading, dosing and mixing facilities at the Wassa mines mine have been designed and constructed by Metallurgical Design and Management Pty Ltd (MDM), a South African engineering and construction firm. The plant has two cyanide facilities

located at the Mill and CIL areas, respectively, all of which are located in secondary containment. The mixing tank capacity is 17 m³ and that of the dosing tank is 16 m³.

The CIL - desorption circuit consists of six leach tanks of (2500 m³ each). The loaded carbon passes into a 12 ton acid wash column. The gold is recovered from the loaded carbon in 12 ton elution circuits. Gold is recovered from solution by electrowinning and smelted in the CIL smelt house in an induction furnace. In October 2019 a new intensive leach reactor (ILR) – Acacia CS3000 plant was installed at the Plant due to the increase in the amount of fine gold in the ore being supplied to the Plant.

Tailings material is conveyed by 450 mm pipeline in a lined tailings trench, to an engineered, tailings storage facility (TSF 2) for final disposal. The decant return water is pumped into a temporary holding ponds and later pumped into the plant for re-use in the process circuit. The Weak Acid Dissociable (WAD) Cyanide (CN) concentration levels have, on average, been below 50ppm WAD CN before disposal into the TSF dam.

The TSF (Tailings Storage Facility) facility and process plant are designed as a zero-discharge operation. TSF 1 and the TSF 1 EXT are currently full and not operational. They are currently under a decommissioning process with a trial palm plantation project located on the surface.

In October 2019 a new intensive leach reactor (ILR) – Acacia CS3000 plant was installed at the Plant due to increases in the amount of fine gold in the ore being supplied to the Plant.

Wassa is currently not discharging any process water out of the plant and hence since 2012 recertification, the detox plant has been in-active.



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 Supply Contract in place between Golden Star and Samsung for the Supply, Delivery, Customs Clearance & Transport of Sodium Cyanide. The contract does not refer to a requirement that the cyanide be produced at a facility that has been certificated as being in compliance with the Code. However, in the request for quotation of supply of sodium cyanide, the document stipulated as a requirement, accreditation by the International Cyanide Management Institute. Samsung is a certified consignor (recertified on 30th January 2018) and obtains cyanide from Tongsu (recertified 23 March 2017) and TaeKwang (recertified 19 June 2017), both of whom are included in the Samsung Africa Supply Chain.

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:

Samsung has been supplying and delivering cyanide since 2015 as an ICMI certified consignor under contract. It was confirmed by reviewing all cyanide orders since the last recertification, that cyanide was only ordered and supplied from Samsung, The written agreement between the operation and the consignor does not designate responsibilities listed from a) to m) in the verification protocol and is thus non-compliant. However, as the operation is using an ICMI certified consignor with a certified Africa Supply Chain and further is using a ICMI certified Transporter in Ghana, the operation is deemed compliant with the Standard of Practice.

The Vehrad Cyanide Transport Management Plan (covering normal, abnormal and emergency conditions) for cyanide transport to Golden Star Wassa Mine Site is in place and used for cyanide transport to the operation.

The operation purchases cyanide briquettes without dye from Samsung and adds dye during mixing. The addition of dye is clearly documented in the operation's mixing procedure.

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 operations supply and transport contract with Samsung does not refer to a requirement that the cyanide be transported by a transporter that has been certificated as being in compliance with the Code. However, in the request for quotation of supply and transport of sodium cyanide, the document stipulated as a requirement, accreditation by the International Cyanide Management Institute.

The Samsung Africa Supply Chain, (Certified - January 30, 2018) "...includes transport from Manufacturers in Korea using SAM IK Logistics Co. Ltd. and Have Dong Logistics to Pusan New Port, South Korea, followed by ocean transport by shipping companies MSC, Maersk and Safmarine to the ports of Tema, Ghana, Conakry, Guinea, Dakar, Senegal and Mombasa, Kenya, Dar es Salaam, Tanzania, Abidjan, Cote D'Ivoire, and Monrovia, Liberia, followed by road transportation in Africa by certified transporters Bollore Africa Logistics, Transport Terrassement Minier, Vehrad Transport and Haulage Ltd., and Alistair James Company, Ltd..." In addition, Vehrad Transport and Haulage Ltd was recertified as a cyanide transporter and storage and repackaging facility on 8th January 2018.

The chain of custody records were checked in detail and found to be in compliance with ICMI requirements.



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:

Evidence from the previous re-certification audit in 2016 indicated that, "...There have been no substantive changes to the cyanide unloading, mixing, and storage areas since the 2012 recertification audit. The operation has two cyanide mixing/storage facilities, which each consist of a bag-spitting cabinet and mixing tank and storage tank situated within a concrete containment. The active facility is located at the mill, and another inactive facility is located at the CIL plant; the latter has not been used it since the 2012 recertification audit. Metallurgical Design and Management (Pty) Ltd. (MDM) design drawings for these facilities, and documentation of an independent review of same by Top Sky (Francis Mensah, Professional Engineer) as requested in the original 2009 audit remain on file. This Standard of Practice was evaluated via direct observation, discussion with the Golden Star Wassa Limited (GSWL) International Cyanide Management Code (ICMC) Coordinator, and review of the noted design records..."

The cyanide high strength facilities on site include the warehouse storing the cyanide boxes, cyanide mixing at the Mill and the cyanide mixing at the CIL. These were inspected and it was concluded that they were in a good condition. It was further reported during the interviews with the plant staff that no changes were made to the facilitates since the previous re-certification audit and thus the findings of this audit including the documents reviewed during 2012 were still valid and thus no review of the design and QA/QC documents was done, as per the International Cyanide Management Institute (ICMI) recertification guidelines.

The cyanide mixing and storage tanks are placed on solid concrete plinths and inside concrete bunds. The condition of the bunds are sound and no cracks were observed. The tank level sensors are included in the daily mill cyanide mixing checklist and inspections. It was further confirmed that the level measurements and alarms are included in the PRONTO planned maintenance system (PMS) computerised system.

The solid cyanide warehouse is open on the one side and ventilation is deemed adequate. The cyanide mixing tanks ventilate through the bag breakers and the solution storage tanks through the overflow pipes. The ventilation is also deemed adequate. The solid cyanide warehouse has a roof and is fitted with galvanised mesh sheeting on two sides.



The roof overhang and position of the boxes are placed to minimise the risk of rainwater combining into contact with cyanide boxes. The concrete floor is sloped towards a drain placed outside the building, with a hump beyond preventing solutions from escaping to the soil. The concrete slopes towards the antipollution pond. The warehouse and the mixing facilities are located within the fenced boundaries of the plant access control system. The facilities are also individually fenced and locked.

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:

Two procedures for cyanide box unloading, and cyanide mixing cover in detail all the steps involved in safe handling of cyanide from its arrival on site in briquette form, unloading, stacking (cyanide boxes to be stacked no more than two high in the warehouse), mixing, spill cleaning up, rinsing of packaging, return of packaging into shipping containers to return for incineration. Task steps for each of the various actions are clearly spelled out.

Once the cyanide boxes are empty after mixing, the procedure require that the used boxes are immediately transported to the cyanide storage facility where they are reloaded into the shipping containers. The containers with the cyanide boxes are transported by Vehrad back to their incinerator facilities in Tema where the empty packaging material is incinerated.

The mixing procedure requires that on completion of the addition of cyanide briquettes to the liquid in the mixing tank, red carmoisine dye must be added to the tank. The procedures contain details of the required personal protective equipment (PPE) and the necessary pre-work inspections and checklists to be used. Both off loading and mixing procedures require that a buddy (in full PPE) must be present at all times during the processes.

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

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



X in full compliance with

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

Basis for this Finding/Deficiencies Identified:

The site has 30 operating and cyanide procedures, including engineering-related preparation for maintenance procedures and a Tailings Storage facility (TSF) operating procedure. There are also three cyanide-related environmental procedures. TSF Quarterly Geotechnical Engineers Reports include recommendations to be considered for implementation to ensure the TSF is operated within design parameters and operational procedures. The TSF detailed design report spells out minimum freeboard, and TSF storm design capacity.

The site has used the PRONTO computerised Planned Maintenance System (PMS) since 2004 and holds full maintenance records since that date. The system was reviewed electronically and found to hold a schedule of critical cyanide equipment and full associated records. The plant has a weekly shutdown on a Tuesday and a multidisciplinary maintenance team carries out planned maintenance inspections. Job cards and associated checklists support the inspections. Mill and CIL Cyanide mixing and storage tanks are inspected weekly as part of the Tuesday shutdown. GSWL installed leak collection and recovery systems within the CIL tank ring foundations to allow for identification of any leakage prior to it entering the environment. These systems are monitored weekly. Operational checklists included: - Mill daily cyanide mixing safety checklists, supervisor's weekly housekeeping checklists for cyanide and reagent areas, daily inspection checklists for cyanide valves, pipes, and pumps, daily inspection of physical integrity of secondary containments for all cyanide facilities, and daily TSF inspection files. The plant is designed and equipped with bund walls, sump pumps and all spillages are returned to the process.

A change management procedure is in place and is operational. A management change exercise on the replacement of the mill cyanide mixing tank was sighted and reviewed. The documentation was signed off by safety and environmental representatives.

The contingency plan in the upset in the operation water balance and procedure 037, Monitoring and management water levels at the process pond were reviewed. The procedure does not require the plant to be stopped in the event of an upset in the water balance. The plant will be shut down temporarily in the case of a tailings line failure, equipment failure or planned maintenance shut down using the standard procedures for stopping and starting of the plant.

All tanks, bunds, pond, impoundments, pipelines, valves and pumps and other cyanide equipment are on the PRONTO system and are regularly inspected. The frequency includes daily, weekly, monthly quarterly, six monthly, and annually. Wildlife inspections are carried out daily and mortalities are reported by exception. The frequencies as reviewed in the planned maintenance and operational inspections are



deemed adequate to assure and document that they are functioning within design parameters.

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:

Procedure PM 010: Test Work for Cyanide Optimisation requires, "Testing for cyanide optimization will be carried out at least weekly according to the laboratory procedure" and also, "The Plant Senior Metallurgist is to forward a complete report to the Plant Operations Superintendent advising on the optimum cyanide concentration to be used based on the findings. Plant Metallurgist/Supervisor receives feedback from the Plant Operations Superintendent if any adjustments are made with documentation. This document is filed for reference purposes."

Bottle roll tests were reviewed as follows: -

- **2017:** Underground and Surface samples testing for cyanide addition at 150, 300 and 500 ppm cyanide concentrations. There was no significant recovery. Improvement was observed at higher cyanide concentrations and process parameters remain unchanged.

- **2019:** Results from 17/5/2019 testing for cyanide addition at 200 and 300 ppm cyanide was tested and no significant improvement in recovery was observed. The tests also included addition of lead nitrate and results are being evaluated.

Diagnostic tests done in **2018** by Anthony Intarmah were sighted. The tests indicate the ore is free milling with the residue mainly contained in Quartz.

A gravity gold recovery circuit, including an Acacia reactor, will be commissioned in the future to assist with gold recovery and reagent consumption improvements.

Cyanide is added to the CIL hopper at the mill section using positive displacement Bredel hose pumps. A TAC 1000 on-line free cyanide analyser is installed at the receiving CIL tank at the CIL section. The TAC 1000 results are fed to the SCADA system where the cyanide concentration in CIL tank 1 is set. The cyanide dosing rate is controlled by varying the speed of the Bredel cyanide dosing pumps using a frequency drive.

Currently, the plant is satisfied with the present technology and method of automatically controlling the cyanide addition and is not considering any other options for controlling the cyanide addition system.



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:

There are currently two probabilistic water balances in place. The first is a model developed by Knight Piésold Consulting and found in the TSF design manual. The second is a spreadsheet-based water balance used during the previous recertification audit currently in use and was used from the time since recertification.

The spreadsheet-based model considers the rate at which tailings are delivered to TSF 2 and is updated with actual rainfall data, collected daily from a rain gauge located at TSF 2. Design storm data is drawn from the assumptions identified in the design documentation of the TSF. Run on is managed through storm water cut-off trenches installed to minimise run on into the TSF and thus, the actual run on quantity is insignificant. Seepage from TSF 2 is collected in a cut-off trench and sump collection system and returned to the TSF to minimise seepages to subsurface.

The effects of potential power outages or equipment failures on the ability of the system to remove water from a facility is minimal. The Mine has 13 diesel-powered generators, which provide emergency power to operate the pumps at TSF2 and process water ponds during line outages. Milling and processing are suspended in the event of a power failure. Thus, potential power outages are catered for. Standby pumps are installed to cater for pump failure. No water is discharged from the operation to surface waters.

inspections of TSF are done as per Procedure and include daily, quarterly and annual inspections and reports. The procedure, Manage Cyanide Process Solutions addresses the containment of solutions in the process water ponds and collection of water level data.

The total TSF freeboard is obtained from the equation, 500mm minimum + 1:100 year 24 hour storm event. A 1:100 year, 24 hours storm event has been calculated to result in approximately 300 mm of water on the facility. Thus, the minimum total freeboard is estimated to be 800 mm below the spillway invert level. (lowest point on the perimeter of the facility). Quarterly TSF reports prepared by: Knight Piésold include pool data and measurements. The quarterly Knight Piésold reports include a review of the water balance and rainfall and makes conclusions and recommendations, as appropriate.

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:

ICMI Compliance point samples are taken and analysed for WAD cyanide at the TSF. The weekly samples from 4 January 2016 to 2 September 2019 were reviewed and no values exceeded the 50 mg/l WAD cyanide compliance limit. It was noted that during the period from 4 January 2016 to 15 January 2018, the values averaged 18.79. From 15 January 2018 to the last sample of 2 September 2019, the average was down to 1.52 with consistent low values. The change was attributed to the addition of lower pH process water as dilution to the tailings to reduce density and improve pumping characteristics to the new TSF which was a longer distance from the plant. The Monthly spigot check sample data from 2016 to date and the WAD cyanide check results from SGS Laboratories all show values below 50 mg/l WAD cyanide. The Monthly process water dam data from 2016 to date and the WAD cyanide check results from SGS Laboratories all show values below 1.5 mg/l WAD cyanide.

It is concluded that as result of the WAD cyanide values meeting the ICMI standards of less than 50 mg/l, no measures to restrict access by wildlife to the TSF and process water dams are required.

The Environmental Department wildlife monitoring inspections for 2017, 2018, 2019 were reviewed and it was noted that no cyanide-related wildlife mortalities have been reported. Below WAD Cyanide concentrations and the evidence of no cyanide-related wildlife mortalities indicate that cyanide management practices are effective in preventing mortalities.

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 discharges to surface water exist. Sighted samples of the Downstream Kumue river after the confluence from 2 January 2016 to 2 August 2019 and all WAD and Free cyanide values are below limits of detection of 0.005 mg/l. The results indicate that there is also no indirect discharge to the river.

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 2 base is lined with HDPE and the subsequent lifts are lined with clay. A cut off trench and seepage recovery system is installed downstream of the built wall to recover any seepage back to the TSF.

Beneficial use is reported as only mining. The Ghana Environmental Protection Agency (EPA) standard for WAD cyanide is below 0.6 mg/l WAD cyanide. All upstream and downstream borehole values from 2 January 2016 to 2 August 2019 for WAD and Free cyanide are reported as below limits of detection of 0.005 mg/l.

The mine makes no use of backfill.

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:

As noted during the previous recertification audit: "At the process plant, six CIL tanks are also situated on concrete plinths (ring beams) located within a concrete containment. Additionally, GSWL has constructed two ring foundations for future expansion of the CIL circuit, and the foundations do not currently have tanks mounted on them. Two sumps are located within the CIL containment area, which have automated pumps to return any collected solution back into the process (i.e., CIL tanks or tailings safety screen). As noted in the 2012 recertification audit, design drawings reviewed during the 2009 ICMC verification audit demonstrate that the ring beam foundations do not provide an impermeable barrier between the tank bottoms and the ground. Consequently, GSWL installed leak collection and recovery systems within the CIL tank ring foundations to allow for identification of any leakage prior to it entering the environment." Sighted report, "Installation of Cyanide Leakage Detection piezometers", by Earthtech Engineers, December 2009, with a cover letter signed by Ing. Emmanuel R K Avevor, Civil Engineer, Reg. No 01515.

The cyanide mixing and storage tanks are placed on concrete plinths providing an impermeable barrier to ground water and The CIL tanks, CIL feed sump, preleach thickeners and mills are placed inside concrete bunds, linked to lined events ponds.

It was confirmed during the site inspection that the cyanide mixing and storage tank bunds, CIL bund, CIL feed hopper bund, preleach thickener bund are equipped with sump and pump systems returning any spillage to the process. The events pond 1 is

equipped with a pump returning the water to the CIL feed hopper and events pond 2 is equipped with a pump, returning the water to the CIL bund. Procedures for the removal of precipitation and spillage collected in the Anti-pollution Pond have not changed since the previous re-certification audit and include: - Procedure PM No. 034 – Action Plan for De-Silting of Anti-pollution Pond in Front of Crusher Security; Checklist PM No. 003 – Weekly Crusher Gate Anti-Pollution Pond Discharge Monitoring Checklist; and Procedure EN 07 – Water Discharge from Process Water and Anti-Pollution Ponds.

The Mill cyanide dosing lines to CIL hopper are routed across concrete bunds from the dosing tank to the hopper. The new cyanide line routed to the Acacia Reactor (not commissioning at the time of the audit) was observed to be a pipe-in-pipe design. The slurry line from the CIL hopper to the CIL tanks (PRF line) is routed inside a plastic-lined trench, draining into plastic lined spillage ponds.

The Tailings lines to the No 1 TSF are placed over an area where leaks will be recovered to the CIL area and further placed within a lined trench to the no 1 TSF. The Line running across the No 1 TSF is placed inside a lined trench, but also placed inside the No 1 TSF Footprint. The tailings line running to the No 2 TSF is placed inside a lined trench and slopes towards the No 2 TSF to direct any spillage into the TSF. The return water lines run inside the lined trench together with the tailings lines.

As reported in the previous recertification audit, "a short section of the PRF pipeline crosses over a natural drainage, which discharges directly to the receiving environment. GSWL has wrapped the section of the PRF crossing the drainage with a welded HDPE sleeve. By design, the pipeline slopes towards the lined secondary containment basin provided for the lined PRF containment channel. Any leakage collected by the pipe sleeve will report to this catchment basin."

It was confirmed that GSWL uses steel, rubber-lined steel, HDPE, and PVC primary containment pipelines for conveyance of cyanide solutions and slurries. Cyanide mixing, storage and process tanks are fabricated of carbon steel. All of these materials are compatible with cyanide and high pH solutions.

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 previous re-certification audit noted the following: "...Please also see the 2009 Detailed Audit Findings Report (DAFR) for the initial ICMC verification audit and the DAFR for the for the quality assurance/quality control (QA/QC) documentation provided for the cyanide facilities in operation at that time. All QA/QC packages referenced in the two previous DAFR's were confirmed to be available on file.



Modifications to existing cyanide facilities installed or constructed subsequent to the 2012 ICMC verification audit include:

- Construction of a new warehouse structure near the mill (mill reagent shed) for solid cyanide storage and/packaging residue accumulation service.

The current site inspection observed the above functioning facilities and noted no further additions.

The TSF 2 Stage 2 raise QA/QC documentation was sighted, including monthly construction reports covering October to December 2018 and January to August 2019 by Knights Piésold Consulting. Also reviewed were QA/QC documents covering field density testing using nuclear density gauge, sand replacement tests, laboratory tests on soils samples from potential borrows and placed material. QA/QC monitoring of ongoing works to ensure meeting of required specifications was also reviewed. A table of various materials suitability tests undertaken was also observed.

The reports and documentation were signed off that the construction was conducted appropriately by the Group Projects and Construction Services Department of Wassa Mines. From the construction and contractors' side, the reports were signed off by the Knight Piésold Project Engineer, the Knight Piésold Construction Engineering Manager, and the Knight Piésold Project Manager.

On-going QA/QC on the operation of the TSF was undertaken through the Quarterly TSF inspections and reports and the Annual TSF Safety Audit. The latest report covering 2018 and prepared in March 2019 concluded: -

- All embankments appear structurally stable with no signs of structural and/or material distress.
- Monitoring instrumentation and protocols are adequate to provide early warning signs in case of failure
- Downstream slope faces of all embankments are adequately vegetated to prevent erosion
- Safety protocols are adequate
- The facility is generally well managed according to regulatory and design requirements.

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:

The operation was noted to have procedures covering Surface Water Monitoring, Groundwater Monitoring, Monitoring Fauna Mortality, and Sampling of Tailings. The procedures were developed by an environmental scientist with graduate and post-graduate environmental qualifications and approved by the Ghana Minerals Commission



to produce and amend monitoring procedures. The reviewer and departmental manager also have graduate and post graduate science and environmental qualifications.

The Surface Water Monitoring and Groundwater Monitoring procedures provide guidance for calibration of field equipment, water level measurement and well purging (for groundwater), sampling procedures and field information, sample identification (including chain of custody procedures), quality control, sample preparation and preservation, sample shipment, analysis of samples and data management. The Environmental Monitoring Matrix provides the sample locations and frequencies, and monitoring parameters, including cyanide species.

The Groundwater and Surface Water Monitoring procedures both require recording field data on data sheets, representative samples of which were provided for review. Field measurements recorded include the date, time, sampling location, stream flow, water colour, rainfall for previous 24 hours, pH, temperature, conductivity, TDS, TSF and general comments. The operation monitors for cyanide in discharges to surface water and in surface and ground water up gradient and down gradient of the site. All WAD and Free cyanide values, since the last recertification audit are below limits of detection of 0.005 mg/l (upstream and downstream).

The operation monitors for Fauna mortalities on site which are recorded, by exception. No wildlife mortalities related to cyanide have been observed since the last recertification audit.

Ground water and surface water is sampled weekly, bi weekly and monthly. Wildlife mortality inspections are part of a weekly survey. The auditors deem the frequencies adequate to characterize the medium being monitored and to identify changes in a timely manner.

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:

The June 2015 Golden Star Resources Limited, Decommissioning Plan and Associated Asset Retirement Obligations for Golden Star Wassa Limited was reviewed. Appendix B Asset Retirement Obligation, Section 1.8.1 Decontamination states that



“...decontamination of demolition waste, cyanide plant washed down in situ prior to demolition and slurry washed down to TSF...”.

Section 7.4, Tailings storage facility, covers decommissioning of the TSF. (The Closure measures, adopted from the Knight Piésold report, dated, March 2014). Section 6.1 Closure scenario Wassa Concession, pages 15 to 33, includes a detailed closure schedule. The Plan is reviewed every three 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:

GSWL updates the cost estimate annually using up to date contractor information and taking into account inflation and changes in operations and conditions. Contractor costs are independently verified by consultants, Golders Associates. The cost estimate also includes allocation for cyanide-related decommissioning activities.

The financial assurance mechanism comprises a Reclamation Security Agreement dated 27 April 2012 between the EPA and GSWL and is implemented through a guarantee with CAL Bank and a cash deposit. Sighted; -

- CAL Bank Note: Reclamation Programme of Golden Star Resources (Wassa) Limited Extension of Bank Guarantee, dated 4/4/2016 extending the guarantee to 30 June 2016 for USD 9 572 231.00. The document is signed by CAL Bank Limited and the Director on 31 March 2016.

- CAL Bank Note: Reclamation Programme of Golden Star Resources (Wassa) Limited Extension of Bank Guarantee, dated 30 June 2017 extending the guarantee to 30 June 2018 for USD 9 572 231.00. The document is signed by CAL Bank Limited and the Director on 30 June 2017

- CAL Bank Note: Reclamation Programme of Golden Star Resources (Wassa) Limited Extension of Bank Guarantee, dated 27 June 2018 extending the bank guarantee from 30 June 2018 to 30 June 2019 for USD 9 572 231.00. The document is signed by CAL Bank Limited and the Director on 27 June 2018

- CAL Bank Note: Reclamation Programme of Golden Star Resources (Wassa) Limited Extension of Bank Guarantee, dated 30 June 2019 to 30 September 2019 for USD 9 572 231.00. The document is signed by CAL Bank Limited and the Director on 28 June 2019.

- Stanbic Bank Ghana Limited: Corporate and Investment Banking note to The Environmental Protection Agency of the Republic of Ghana, Attention: The Executive Director, dated 1 October 2019. The Bankers Guarantee for Reclamation Programme of Golden Star (Wassa) Limited (GSWL) totals USD 9 572 231.00. The Guarantee is valid

for 12 months from October 1 2019. The letter was signed by the Manager: IBC and Payment, and Manager: Global Market Operations, on 1 October 2019.

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:

Operating and Cyanide procedures total 30 procedures, including Engineering-related preparation for maintenance procedures. There are three Environmental procedures in place which relate to cyanide. All procedures included required personal protective Equipment (PPE), tools required, where relevant, and pre-work checks and inspections.

A change management procedure is in place and is operational. A management change exercise on the replacement of the mill cyanide mixing tank was sighted and reviewed. The documentation was signed off by safety and environmental representatives.

Toolbox talks are held every day before the shift starts. All near misses and incidents appropriate to the shift are discussed during the meetings and, as necessary, procedures will be modified as required. It was confirmed that safety issues are discussed and hazards and near misses are also discussed during the meetings. It was reported that supervisors react on safety issues brought up during toolbox talks.

An example includes a parked Bulldozer (engine running) being searched at the plant security exit gate. Although the Blade and the Ripper had been put down, it moved inadvertently during the search as a result of an accelerator engagement. The operator quickly jumped onto the moving Bulldozer to shut down. The practice was changed to turn engine off before a search at the gate.

“Take Five” pre-start, mini risk assessments are used by workers before a task is done. This was confirmed during the interviews. Sighted examples of risk assessment books used and it includes procedural task JHA's. These solicit worker input on safety and procedural matters. Planned task Observations (PTO's) are used as part of the system to solicit worker input. Examples of PTO's were reviewed.

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 in the CIL feed is controlled at 10.5 by lime addition to the Mill before the cyanide is added to the CIL hopper. 10.5 is the general industry standard for ores not high in other minerals and solutions not high in dissolved solids. The cyanide mixing procedure includes the requirement to add Sodium Hydroxide to the mixing solution to adjust the pH and prevent HCN gas formation.

The plant use 4 BW Technology “GasAlert” Extreme HCN personal gas monitors which alarms at a gas value of 4.7 ppm and 10 ppm. MSA Fixed HCN gas monitors are used at:- Mill cyanide mixing, CIL cyanide mixing area, CIL feed hopper, Tank 1 CIL, Tails hopper, and Carbon Recovery screen. The fixed monitors also alert at 4.7 ppm and 10 ppm HCN gas. An initial HCN Gas risk assessment was carried out and potential hot spots were identified and fixed alarms fitted in the areas identified.

Maintenance and calibration records of HCN gas monitoring equipment was sighted. The manufacturers require 6 monthly calibrations. Records showed that personal and fixed monitors ha been repaired, tested, and calibrated for the last 12 months.

Placement of warning signs at the cyanide warehouse and mixing areas was noted during the site inspection. The plant has dedicated eating areas where eating and drinking is allowed. The induction training stipulates that workers may not smoke, eat or drink in the plant unless in dedicated areas. The site inspection also confirmed placement of signage in the plant meeting the requirements of the Cyanide Code.

The cyanide mixing procedure includes the following: - “...On completion of the addition of the cyanide, add Carmoisine dye to the cyanide-mixing tank...” During the site inspection, the placement of safety showers, eyewash stations and fire extinguishers at strategic locations on the plant was observed.

The Mine has a trained Emergency Response Team and Fire Station within 5 minutes from the plant which are used for any fire or emergency on the plant. The fire extinguishers inspection files and records and external servicing records for 2017 and 2019 to date were reviewed. Recently, approximately 700 units were serviced including CO₂, Dry powder and foam extinguishers. During the servicing, 23 dry powder units were discarded due to rust and failing the hydrostatic tests. The hydrostatic tests service is done every 3 years. An external Contractor does the fire extinguisher pressure testing and maintenance and the recent report of servicing fire extinguishers was sighted. Safety showers and eye washes are inspected weekly as per the PRONTO PMS system.

The site inspection confirmed that the tanks are labelled and the reagent strength cyanide pipes are colour coded purple, labelled and the direction of flow indicated on the lines. Material Safety Data Sheets (MSDSs) were noted in the plant at the mixing areas and the cyanide warehouse. Cyanide emergency contact notice boards at the cyanide mixing area and the cyanide warehouse were also observed.

The Mine uses and incident / accident investigation procedure. The Golden Star Incident Management Standard, including competency, incident reporting and investigation, planning, emergency preparedness, inventory management and control, emergency

response and environmental incident managements was also sighted. As an example, an underground fatality on 5 May 2017, including incident description, route cause analyses, key findings using the PEEPO (**P**eople-**E**nvironment-**E**quipment-**P**rocedures-**O**rganisation) analyses, recommendations and corrective actions, and sign off, was reviewed to confirm the approach to reporting and investigation of a cyanide incident.

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:

During the site inspection, it was confirmed that the Mine has radios available for communicating emergencies on Channel 2, Audible alarms for cyanide man down incidents, and Cell phones, when available, are used calling an emergency number. Life medical oxygen kits are available at the plant office, the CIL top titration cabin, Emergency Response Centre, Emergency Response Room, Mill Mixing area, and the SCADA room. Medical Oxygen is also available at the Clinic, in the ambulance and the Mine Emergency Rescue Centre. (The mine rescue centre has two CARvent oxygen resuscitation kits.) Three Cyanide antidote kits (expiring July 2020) are held at the Clinic and a further three are available at the neighbouring Bogoso Mine (two hours' drive away), if required.

Clinic electronic inspection records for clinic cyanide equipment including the Cyanokit, cyanide PPE, and oxygen were sighted. The pharmacy uses a software package called "Stockcheck", for controlling consumables and other drugs, which is managed by the pharmacist and new cyanide antidote kit stock is re-ordered 6 months before expiry. The Ambulance inspection checklists were sighted and sampled. The Plant cyanide emergency cabin inspection checklists and the checklists of the mill emergency response inventory were sighted and sampled, covering January and June 2017 and March, August 2019.

The mine has a fully equipped medical clinic with nursing staff and two on-site doctors, operated by contractor, ISOS (Ghana), on contract (sighted), which can provide first aid or medical assistance to workers exposed to cyanide. The clinic has an emergency room equipped with oxygen, and Cyanokit antidotes (3 kits, expiry date July 2020, with access to a further 3 kits at nearby Bogoso clinic 2 hours away), It also has a two-bed ward which can provide overnight observation of cyanide patients, if required. The clinic is situated approximately 1.5 Km from the process plant and has trained medical staff and equipment to respond to cyanide medical emergencies.

The Plant security operations procedure was reviewed and section 11 instructs that sick people in ambulances will be joined by security personal at the gate to the clinic and section 12 Search protocols, states that searches are not applicable to all emergency

equipment and vehicles during emergencies. Ambulance transport of patients on the mine site are practiced during emergency drills.

The ISOS Medical Evacuation Response Plan (MERP), is used to evacuate all medical emergencies, including cyanide, to any specialist hospitals (local, national or international) depending upon the specialist requirements. Air Ambulance is contracted to ISOS if air evacuation is required. ISOS has identified the Cape Coast Teaching Hospital, the Takoradi Effia Nkwanta Regional Hospital, and the Tarkwa Government Hospital as having adequate, qualified staff, equipment and expertise to respond to cyanide exposures.

Mock emergency drills conducted periodically to test response procedures for various cyanide exposure scenarios, and any lessons learned from the drills are incorporated into response planning. Two drill reports relating to a solid cyanide spill and a mandown HCN gas exposure were reviewed. Both included learning points, corrective actions and good points noted.

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 Emergency Response Plan and Emergency procedures, including site specific, cyanide emergency cyanide scenarios. The scenarios are broken down into various categories such as:- Hazardous Chemical Release (cyanide) – HCN Gas; Transport/Road Accident; Hazardous Chemical Release (Cyanide) at mine site (land release); Hazardous Chemical Release (Liquid Cyanide) at mine site (land release); Major Fire/Explosion (surface); Cyanide Poisoning; Tailings Transfer System Failure; Process Water Pond Failure; Prolonged Loss of Utilities; Process Water Pond Failure; and Hazardous Chemical Release (Cyanide) during transport. Each category includes specifically identified Threats and the Plan includes responses to the various scenarios. Transport cyanide emergency scenarios are covered in the Samsung/ Vehrad Cyanide Transport Management Plan (covering normal, abnormal and emergency conditions). The Plan includes the clearing of site personnel from the area of exposure and notification of communities as applicable. The Plan notes that Only a Registered Medical Doctor can administer cyanide antidote (Hydroxycobalamine).



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 Plan is briefed, appropriately, to the workforce during the cyanide awareness and refresher training. Approximately 10 Community members were briefed / informed about emergency response procedures in case of potential emergencies. The Emergency Response Team and the medical Clinic are involved in mock drills.

Sensitization training is done annually to educate the towns and villages along the routes where Golden Star transports cyanide, in order to create awareness on the risks associated with the chemical and its implications. Training also includes dignitaries such as the Ghana National Fire Service, the Chief Police commander, Teachers, Students, chiefs, opinion leaders, GSWL staffs and other members from the surrounding communities and its environs. In the training carried out in November 2018, a field version of a desktop drill covering a cyanide transportation accident scenario was played out involving a truck accident and a student. This was used to illustrate to the stakeholders the risk associated with the accident and the correct responses carry out in the event an accident occurred.

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

X in full compliance with

- The operation is**
- in substantial compliance with **Standard of Practice 7.3**
 - not in compliance with

Basis for this Finding/Deficiencies Identified:

The Plan details roles and responsibilities of the emergency response team and the emergency response coordinators. The emergency equipment and resources are included in the Plan and all equipment is regularly inspected. Emergency Response Teams Lists are posted on all notice boards and are updated, as necessary. An Emergency Notification and Communication System is in place and the Plan includes an Internal Telephone Directory. Contractor, ISOS, is managing the medical clinic and their role is described in their contract with the mine. Periodic drills involving 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 Plan includes details for appropriate emergency notification and reporting (internal and external) and the call-out procedure and contact information lists which are updated regularly. Internal and external communication is dealt with in the Plan.

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

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 7.5**
 not in compliance with

Basis for this Finding/Deficiencies Identified:

The emergency response documentation covers clean-up, remediation and a neutralisation methodology and cross references to the appropriate site procedures. The use of neutralization processes and materials is clearly covered, as is the disposal of contaminated materials.

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 states, "... The HSEC manager will be responsible for initiating annual reviews of the ER Plan and associated procedures, and integrating up-to-date information as it becomes available. In addition, a review of the ER Plan must be undertaken after the occurrence of an accident or emergency incident. Again, a review of the ER Plan must be

undertaken when structural or physical alterations or layout changes and finally, when a new technology, process, equipment or training methods become available to the mine." Mock emergency drills conducted periodically to test response procedures for various cyanide exposure scenarios and to evaluate the Plan. Any lessons learned from the drills are incorporated into response planning. Two drill reports relating to a solid cyanide spill and a mandown HCN gas exposure were reviewed. Both included learning points, corrective actions and good points noted.

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 that might come into contact with cyanide on the Mine receive cyanide safety awareness training. All employees working on the plant receives detail cyanide awareness training as part of their task training. All new Mine employees receive chemical Safety Training, which includes a section on Cyanide. Refresher training on induction, including cyanide, is done. Training records go back to 2010, electronically.

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:

All employees are given general plant induction including main hazards in the area. Detailed cyanide awareness is then given to all employees working with cyanide including process, engineering, warehouse, and security. The induction includes forms of cyanide, packaging, pH and gas generation, where cyanide is found, cyanide dosing points, no drinking, no eating, hazard signs, PPE, exposure routes, cyanide action in

body, cyanide first aid and antidote, symptoms, emergency response and first aid. The cyanide awareness training is followed by an assessment.

The plant training matrix was reviewed and includes cyanide procedures for Plant Maintenance, Plant Metallurgy, Contractors, non-plant staff and reagent operators. The matrix includes specific procedures required for each group. The Plant operations manual covers plant operations including the operation of the CIL feed hopper, CIL section, Elution, electrowinning. The Plant Trainer trains operators on the relevant section of the operations manual that they are working on. The Plant has four trainers, all of whom are competent to train with appropriate qualifications and experience.

Planned Task Observations (PTO's) are conducted on reagent operators including mixing and offloading operators. The Operator PTO was rolled out in late 2018. A minimum of three PTO's in a 6 day shift cycle must be done by the shift supervisors. A sample of PTOSs conducted was reviewed.

Records are kept in hard copy and are backed up in the Human Resources records. Electronic records are recorded in the training matrix. Records are available from 2013.

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:

First Responders are trained who work in the plant, who will respond first in case of cyanide emergencies on the plant. A main Mine Emergency Response Team (ERT) is in place which will respond to emergencies in the plant. The ERT includes members working in the plant and all ERT members are trained in cyanide response. Currently, 16 members are trained and are available on Day (06:00 to 18:00) and Night (18:00 to 06:00). A minimum number of around five members per shift is available.

The ERT training matrix, including all the members and the required training courses and elements as well as indicating training completed, was sighted.

Weekly training sessions are held, including use of necessary response equipment and emergency responses including confined space training. The weekly training schedule was sighted and includes refresher training. Plant First Responders also received SCBA and Firefighting training. First aid and cyanide awareness refresher training is done annually.

Mock emergency drills conducted periodically to test response procedures for various cyanide exposure scenarios and for ERT training purposes. Any lessons learned from the drills are incorporated into response planning. Two drill reports relating to a solid cyanide spill and a mandown HCN gas exposure were reviewed. Both included learning points, corrective actions and good points noted. A trainer is always present for all cyanide drills,



including the planning of the drills. Training programs have been revised as result of drills in the past.

Records are retained in both soft and hard copy format. It was confirmed that the records are up to date in the training matrix.

9. DIALOGUE: Engage in public consultation and disclosure.

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

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 9.1**
 not in compliance with

Basis for this Finding/Deficiencies Identified:

Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide.

The Mine's main catchment communities are Akyempim, Kubekro, Old Subri, Nsadweso and Akosombo. These communities have monthly meetings with the Community Department when a variety of issues including cyanide are discussed. Sometime after the topic has been introduced at the monthly meeting, a recap is undertaken at a subsequent meeting to check understanding and to answer any questions that may arise. The members who attend the meetings are opinion leaders and representatives of the community such as the Chief, Youth (Male and Female), Farmers Representative, Women's Group of Community, Religious Group, An Appointed influential person, Chairman of the Local Unit Committee and an Elder.

The notes of a meeting at Akosombo for the month of February, 2017. date: 14th February, 2017 were sighted. The purpose of the meeting was "Cyanide Education (Cyanide poisoning)". The notes included questions and answers given. At a subsequent follow up meeting it was noted that the community had a greater awareness of cyanide and specifically recognised the significance of the UN 1689 number on the transport vehicle.

A Meeting held on 16th April, 2019, at the Community of Akosombo had the topic, ICMC Cyanide Waste Management. It focused specifically on disposal of cyanide packaging. Questions asked were, why packaging cannot be made available to the communities for building and furniture purposes. The response was that there was no guarantee that the wood could be adequately decontaminated to make it safe and ICMI requirements prohibit reuse of the packaging.

For those communities and stakeholders that are outside the main catchment areas but along the cyanide transport routes, Accra Town, Ateiku, Togbekrom, Sarpornso 1 and 2, Abaasa, Anyinase and Praso, a separate forum has been established to communicate appropriate information including cyanide awareness.



A drill report on “2018 MOCK DRILL TRAINING” was reviewed. The sensitization training is done annually to educate the towns and villages along the routes where Golden Star transports cyanide, in order to create awareness on the risks associated with the chemical and its implications. The gathering of the training included dignitaries such as the Ghana National Fire Service, the Chief Police commander, Teachers, Students, chiefs, opinion leaders, GSWL staffs and other members from the surrounding communities and its environs” A field version of a desktop drill covering a cyanide transportation accident scenario was played out involving a truck accident and a student. This was used to illustrate to the stakeholders the risk associated with the accident and the correct responses carry out in the event an accident occurred.

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

X in full compliance with

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

Basis for this Finding/Deficiencies Identified:

Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide.

The Mine’s main catchment communities are Akyempim, Kubekro, Old Subri, Nsadweso and Akosombo. These communities have monthly meetings with the Community Department when a variety of issues including cyanide are discussed. Sometime after the topic has been introduced at the monthly meeting, a recap is undertaken at a subsequent meeting to check understanding and to answer any questions that may arise. The members who attend the meetings are opinion leaders and representatives of the community such as the Chief, Youth (Male and Female), Farmers Representative, Women's Group of Community, Religious Group, An Appointed influential person, Chairman of the Local Unit Committee and an Elder.

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

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 9.3**

 not in compliance with

Basis for this Finding/Deficiencies Identified:

A Golden Star Wassa Mine Safety / ICMC Community handout in English containing information on cyanide emergency response contact telephone numbers, cyanide exposure routes to the body, cyanide spill control, and steps to take in the event of an accident or spill, was sighted. If necessary, this leaflet can be used to brief stakeholders in the local language, Twi. Printed copies of the English PowerPoint presentations on cyanide including photographs are also made available. Most of the Community is illiterate and most of the presentations are made in Twi.

It was reported by the Mine staff interviewed that there were no changes to the evidence as per the previous re-certification audit:

"...GSWL has an environmental incident classification and reporting procedure which defines and classifies incidents on the basis of five levels. GSWL has committed to reporting any level 3 (e.g. tailings spill, exceedance of water quality standards, limited groundwater pollution, persistent groundwater contamination), level 4 (e.g. groundwater pollution with potential for serious biological damage, contamination of potentially potable groundwater sources) or level 5 incidents (major tailings dam failure, contamination of potable groundwater sources and discharge of tailings or cyanide contaminated water to uncontrolled surface water systems) to the relevant regulators (Environment Protection Agency and the Inspectorate of Mines) and at a GSR Corporate level.

The GSR Incident Management Standard (2014) also defines and classifies incidents with respect to injuries and assigns a level of 1 to 5 depending on the impact severity to health or safety. As for environmental incidents, incident notification to GSWL Management is



required for Level 3 to Level 5 classified Health and Safety Incidents. The standard also requires that all fatalities, serious injuries and dangerous occurrences (including Level 3, 4 and 5 environmental incidents) are reported to the Chief Inspector of Mines to meet the requirements of Section 26 of the Ghana Mining Regulations (2012). The incident reporting processes would include reporting on the cyanide release or exposure scenarios indicated.

Monthly environmental monitoring data are submitted to the Ghana EPA as part of the EPA AKOBEN programme which evaluates GSWL environmental performance. Performance ratings are posted on the EPA webpage and are available for public viewing. In addition to the lines of communication established through GSWL's outreach programme and established lines of communication with regulatory authorities, GSR has also committed to publish annual reports on environmental and safety performance. Information on health and safety (Lost Time Injury Frequency Rates), and environmental performance indicators (e.g. percentage of water samples within guidelines) is provided within the sustainability report. Other information contained in the sustainability report includes a summary of GSR's goals and progress, environmental initiatives, community relations and development, health and safety initiatives, local employment and content initiatives and economic development initiatives, social."

Any incidents or accidents relating to cyanide would be reported in the annual Corporate Responsibility Report.

(http://s1.q4cdn.com/789791377/files/doc_downloads/CSR/Golden_Star_2018_Corporate_Responsibility_Report_Final.pdf) Reference is made to the Cyanide Code on page 25 of the 2018 Report.

