



Orica Bag to Bulk Transfer Facility International Cyanide Management Code Recertification Audit

Summary Audit Report

Orica Ghana Limited

Prepared by:

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Basis of Report

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1.0 Summary Audit Report for Cyanide Production Operations

Name of Cyanide User Facility:	Orica Bag to Bulk Transfer Facility
Name of Cyanide User Facility Owner:	Orica Ghana Limited
Name of Cyanide User Facility Operator:	Orica Ghana Limited
Name of Responsible Manager:	Prince Boafo (Specialist, Distribution – Orica)
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2.0 Location and Description of Operation

Location detail and description of operation:

Orica is an Australian-owned, publicly listed company with global operations. Orica is managed as discrete business units that produce a wide variety of products and services. The Mining Chemicals unit is based in Australia and exports products to Asia, Africa and the Americas, as well as supplying the local Australian industry. This unit's main product is sodium cyanide, which is manufactured at Orica's Yarwun facility in Queensland, Australia.

Orica's Yarwun facility, which is located approximately eight kilometres by road from Gladstone, Queensland, commenced operations in 1989 and is engaged in the manufacture of cyanide (both solid and liquid forms), ammonium nitrate, nitric acid, chlorine, sodium hydroxide, sodium hypochlorite, hydrochloric acid and expanded polystyrene balls. The cyanide production facility at Yarwun was certified by the International Cyanide Management Institute (ICMI) as first being compliant with the Code on 28 November 2006 with the latest recertification on 31 October 2023.

Cyanide manufactured at Yarwun is repackaged at the Transfer Facility in Ghana.

Barbex was established in 1990 as a logistical support company. In 1997, Barbex constructed a warehouse complex (1200 m²) on the Teberebe Goldfields property near Tarkwa in the Western Region of Ghana. Barbex manage the Transfer Facility on behalf of Orica.

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The Transfer Facility is used to transfer cyanide briquettes (or “cyanoids”) contained within boxes to a sparge isotainer. The cyanide briquettes are manufactured at Orica’s Yawun Cyanide Facility in Queensland, Australia and transported to Ghana.

The Transfer Facility is comprised of the following areas and activities.

The cyanide Box to Sparge Transfer Facility adjoining the eastern section of Barbex’s Warehouse A. This Transfer Facility includes a dedicated intermediate bulk container (IBC) storage area, a staging area where the IBCs to be transferred are marshalled before the transfer operation begins, a sparge tank filling area, hoppers, and a hopper loading bay.

Warehousing activities:

- Warehouses A, B and C are used for the storage of boxes of solid cyanide briquettes. The eastern end of warehouse C is used for the transfer activities of the briquettes from boxes to sparge containers.
- The Annex at the eastern end of the warehouses is used for the dismantling and temporary storage of the empty boxes, bulk bag inners, and plastic bag liners before being taken by Vehrad Transport and Haulage (Vehrad) to dispose of this cyanide contaminated waste within their Ghanaian Environmental Protection Agency approved incineration facility at Tema.
- Other warehouses within the facility are used for the storage of quicklime.

The Facility is located on land occupied by Barbex Technical Services Limited (Barbex) at AngloGold Ashanti’s Tarkwa Gold Mine. Barbex operates the Transfer Facility under a Service Agreement with Orica and for the purposes of the Code, certain facilities owned by Barbex are also subject to this audit. The land occupied by Barbex is referred to in this report as the Site. The Bag to Bulk Transfer Facility (Transfer Facility) was first certified as being fully compliant with the Code on 8 March 2011.

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SUMMARY AUDIT REPORT

Auditors Findings

☒ in full compliance with

Orica Transfer Facility is:

☐ in substantial compliance with

☐ not in compliance with

**The International
Cyanide Management
Code**

Audit Company:

SLR Consulting (Ghana) Ltd

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Production Technical Auditor

Dawie Viljoen, Afritech (ICMI pre-certified Production
Technical Expert Auditor).



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Signature of Production Technical
Auditor

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Date

COMPLIANCE STATEMENT

The Orica Bag to Bulk Transfer Facility, Ghana has not experienced any cyanide incidents or compliance issues during the previous three year audit cycle.

NAME OF OTHER AUDITORS

Dawie Viljoen

DATES OF AUDIT

The Re-certification Audit was undertaken on 28 June 2024.

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 (ICMI) and that all members of the audit team meet the applicable criteria established by the International Cyanide Management 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



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accordance with the International Cyanide Management Institute Cyanide Production Verification Protocol and using standard and accepted practices for health, safety and environmental audits.

The “International Cyanide Management Code for The Manufacture, Transport, And Use of Cyanide In The Production Of Gold and Silver” (ICMC) was developed by a multi-stakeholder Steering Committee under the guidance of the United Nations Environmental Program (UNEP) and the then, International Council on Metals and the Environment.

The Code is a voluntary industry programme for gold and silver mining companies, and companies involved with the production and transport of cyanide to gold and silver mining companies; it focuses exclusively on the safe management of cyanide. Companies that adopt the Code must have their operations, which manufacture cyanide, transport cyanide or use cyanide to recover gold and silver, audited by an independent third party to determine the status of the Code’s implementation. Those operations that meet the Code’s requirements can be certified and are able to use a unique trademark symbol, which identifies the company as a certified operation. Audit results are made public to inform stakeholders of the status of cyanide management practices at the certified operation.

The objective of the Code is to improve the management of cyanide used in gold and silver mining and assist in the protection of human health and the reduction of environmental impacts (refer to www.cyanidecode.org). The Code is managed by the International Cyanide Management Institute (ICMI).

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Principle 1 – Operations

Design, Construct and Operate Cyanide Production Facilities To Prevent Release Of Cyanide

Standard of practice 1.1: Design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.

☒ in full compliance with

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

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 1.1; design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.

Due to the age of the facility the documents relating to the quality control and quality assurance (QA/QC) programs for the construction of the facility have not been retained. The QA/QC programs for the design of Transfer Facility were addressed during the March 2014 Certification Audit.

There have been no changes to the facility since the previous recertification Audit.

A further structural inspection was undertaken on the 10th February 2021 by I & P Global Limited. Observations were made with regards to structural steelwork, cladding, roofing, concrete, ventilation and illumination. All recommended remedial works have been completed. The report was signed off by Ing Obed Mensah (PE GhIE) Reg. No. 07493.

An appropriately qualified people inspected the facility in 2014 and 2021 and issued reports concluding that the continued operation of the facility, following identified remedial actions that were completed, will protect against cyanide exposure and releases. These reports have been retained.

The materials used for construction of cyanide production facilities are compatible with the reagents used and the processes employed. It was noted that stainless steel is used for process equipment that comes into contact with cyanide during the box to bulk transfer operations.

The only cyanide solution pipeline is when residual liquid within the isotainer is drained into an intermediate bulk container (IBC). The cyanide solution pump and associated hoses and

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pipework, are fabricated from a range of materials including polyvinyl chloride, mild steel and rubber. Floors used for key areas (transfer area, waste area and forklift transport route) are constructed of concrete with an epoxy sealed surface. Other areas are just concrete.

There are automatic systems or “interlocks” to shut down production systems and prevent releases due to power outages or equipment failures. There is a backup generator (100 kilovolt-amperes). The generator has sufficient capacity to power the entire facility. The electrician manually starts the generator in the event of a power failure. In the event of a power failure the following will occur:

- The facility remains in a safe situation. The hoist used to move bags remains in place regardless of location or load at the time.
- A reserve supply of compressed air remains under pressure in a receiver vessel. This enables the air filters on the transfer hoppers to continue to function correctly, with pulses of air delivered regularly to dislodge any dust accumulation back into the isotainer via the loading hopper.
- If the air compressor fails for reasons other than loss of power supply, there is provision to introduce an alternative source of compressed air to enable loading of an isotainer to be completed.
- The hydraulic systems that control the movement of the hopper assembly is configured so that on power failure the transfer hoppers will “stay put” which is a failsafe mode for the Transfer Facility. The transfer hoppers are interlocked with the hopper air extraction systems to ensure that extraction system is working when the hoppers are in use.

The transfer hoppers are aligned directly to the isotainer during transfer. This provides good visibility from the manned loading platform of any issues that may develop during filling. Because the hopper is large enough to hold an entire bag of solid cyanide, the operators can readily see if the hopper has sufficient capacity to hold another bag of solid cyanide before introducing it to the hopper. There is also a programmable logic controller (PLC), which helps control lateral movement of bags of product and vertical movement of the hoppers.

The site only accepts solid cyanide that is stored and managed on a concrete surface that minimises seepage to the subsurface. All cyanide storage, transfers and the handling of waste packaging occurs in roofed warehouses on concrete floors. An epoxy coating has been applied to the surface of the concrete in the Transfer Area, Waste Storage Area and the traffic ways in the warehouse used by the forklift trucks.

The site only accepts solid cyanide that is stored and managed on a concrete surface that minimises seepage to the subsurface. All cyanide storage, transfers and the handling of waste packaging occurs in roofed warehouses on concrete floors. An epoxy coating has been applied to the surface of the concrete in the Transfer Area, Waste Storage Area and the traffic ways in the warehouse used by the forklift trucks.

The facility employs methods to prevent the overfilling of cyanide process and storage vessels. The delivery checklist used at customer gold mines prescribes and requires checks to verify that the liquid resulting from the dissolution of the briquettes has been drained from the isotainer before it leaves the mine. Any liquid remaining in the isotainer when arriving

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back at the Transfer Facility is drained into an IBC and the isotainer is subsequently allowed to dry before it is again filled with solid cyanide briquettes.

Filling is controlled on the basis that an isotainer can contain eighteen Orica boxes (1.135 tonnes each) of solid cyanide equalling 20.4 tonnes. The isotainer has the capacity to hold 23 tonnes. The solid cyanide is loaded through two of the hatches simultaneously with a defined number of boxes being loaded through each hatch. The operators loading the solid cyanide through the hoppers undertake a visual check to check that the briquettes are settling correctly within the isotainer confirming that there is sufficient capacity for further boxes of solid cyanide.

There are no storage tanks at the facility as the operation is for the loading of solid cyanide into isotainers. The isotainer is on the back of a lorry that is reversed into position under the hoppers prior to filling. The secondary containment for the isotainer during the filling is the concrete loading bay area (Level 1 of the facility). This area is constructed of epoxy coated concrete on the surface and sides in order to provide a competent barrier to leakage contain any solid cyanide spilled during the filling operation. The loading bay is more than sufficient to hold the contents of one 1.135 tonne box of solid cyanide, as overfilling the isotainer by one bag is a credible scenario.

The loading bay is enclosed from the weather on three sides by concrete to a height of approximately 1,200 mm above ground surface and by aluminium cladding to the top of the building, therefore a storm event does not need to be considered.

The loading bay also has sufficient capacity to contain the contents of both of the IBCs that are used to contain any solution drained from the isotainer, in the event that one of the IBCs were to leak. The IBCs are emptied on a regular basis and are therefore rarely full. The liquid in the IBCs is disposed of in accordance with procedure *EP-SOP-003 Disposal of Cyanide Contaminated Liquid Waste* with the IBC being taken away by an appropriately licenced waste management company so that the liquid can be disposed of.

The only cyanide solution pipeline is when residual liquid within the isotainer is drained into an IBC. This process is undertaken with the Loading Bay Area that will contain any spills.

Cyanide is stored with adequate ventilation to prevent the build-up of hydrogen cyanide gas. The solid cyanide is received in the boxes it was packaged in by the producer (Orica). These boxes are stored in naturally ventilated warehouses. The warehouses are roofed with solid sides and have a concrete floor to prevent contact with moisture.

The cyanide is stored in a secure area where public access is prohibited. Sparge isotainers are sealed and transported to customers once they have been loaded. The Transfer Facility is located within the Barbex facility. The Barbex site is fenced or walled along all four boundaries. All fences or walls are fitted with razor wire. Two sides the facility are bounded by the Iduapriem Gold Mine, with a masonry wall constructed along these boundaries. The other two boundaries (northern and eastern) which adjoin AngloGold Ashanti tenants are predominantly cyclone wire mesh. Three security guards are present throughout the day and night. The site also has CCTV.

The solid cyanide is stored within warehouses that do not contain any other materials. The only other material stored on site is quicklime that is stored in separate warehouses.

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Standard of practice 1.2: Develop and implement plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases.

☒ in full compliance with

The operation is ☐ in substantial compliance with **Standard of Practice 1.2**

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 1.2; develop and implement plans and procedures to operate cyanide production facilities in a manner that prevents accidental releases

The facility has procedures that describe the standard practices necessary for its safe and environmentally sound operation. The *Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022* is one of the main documents used that describes the standard practices necessary for the facility's safe and environmentally sound operation. This includes the following sections:

- Safety;
- Start up of Box to Sparge Facility;
- Normal Operation of Box to Sparge Facility;
- Shutdown;
- Abnormal Operating Instructions;
- Waste Management;
- Job Procedures; and
- Troubleshooting Guide.

In addition, there is the *Barbex Technical Services Ltd Management Policies and Standard Operating Procedures*. This contains 22 management policies, 24 standard operating procedures, and 5 environmental procedures. The policies and procedures describe specific operations undertaken at the facility.

The facility has contingency plans for non-standard operating situations that may present a potential for cyanide exposures or releases including the following.

Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022, which includes 'Abnormal Operating Instructions'.

Barbex Technical Services Ltd Management Policies and Standard Operating Procedures, which includes procedures such as when there is a spill, and disposal of cyanide contaminated waste. The procedures include *MP-SOP-008 Job Safety and Environmental Risk Assessment, rev 9, 20 February 2023*. This procedure defines the requirements to

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identify the hazards, and assess and manage the health and safety risks associated with all potentially hazardous work tasks using the Job Safety and Environmental Risk Analysis Procedure (JSERA). A full JSERA is required for any multiactivity task involving an activity for which there is no procedure.

The facility has a procedure to identify when the site's operating practices have or will be changed from those on which the initial design and operating practices were predicated. The procedure used is the Orica Group Procedure, *Safety, Health, Environment and Security Management of Change*, 08 February 2021, which includes the following:

- Management of change system;
- Safety, Health, Environment and Security acceptance and completion; and
- Temporary and emergency change.

Appendix 1 includes examples of the types of change covered by the group procedure. The procedure requires a change register to be completed, which includes the following: identification, description, timing, ownership, summary, workflow comments, analysis checklists. All of the Change Registers require approval by the environment, health and safety management.

Preventive maintenance programs are implemented and activities documented for equipment and devices necessary for cyanide production and handling. Barbex undertakes weekly and fortnightly checks. A planned maintenance system is operated by the Orica Active Tracker. This is comprised of an excel spreadsheet listing the equipment and the frequency of checks. The spreadsheet also shows the priority for the different actions.

The maintenance is undertaken once a job ticket/ clearance has been produced. The tracker also includes breakdown maintenance items. The planned maintenance is undertaken on a monthly, quarterly, half yearly and yearly basis. Spare parts are held on site for the most common replacements.

The nature of the operation is such that process instrumentation does not play a critical role in managing the risk of potential exposures and releases and so there are no instruments required to be calibrated according to manufacturer's recommendations with the exception of the cyanide monitors. Personal and fixed cyanide monitors are calibrated as required by the manufacturer's recommendations.

Procedures are in place and being implemented to prevent unauthorized/unregulated discharges to the environment of any cyanide solution or cyanide contaminated water that is collected in a secondary containment area.

The cyanide warehouses are enclosed, and stormwater is prevented from coming into contact with cyanide product or packaging including waste packaging. Stormwater within external sumps is managed in accordance with *EP-SOP-004 Disposal of Uncontaminated Liquid Waste*, rev 6, 25 January 2024.

This procedure requires Barbex to test the water quality within the sumps to confirm the Weak Acid Dissociable (WAD) Cyanide is less than 0.5 mg/l and the Free Cyanide is less than 0.022 mg/l before the stormwater is discharged to the environment. Testing is conducted by Crystal Scientifics, Tarkwa, with all observed results being compliant. If the testing shows that the levels are exceeded the solution is kept in the sump and treated in

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accordance with *EP-SOP-003 Disposal of Cyanide Contaminated Liquid Waste, rev 10, 25 January 2024*, prior to disposal by a certified waste management company.

The facility has environmentally sound procedures for the disposal of cyanide or cyanide contaminated solids. The facility handles solid cyanide and therefore does not dispose of cyanide. Solid waste contaminated with cyanide includes the boxes and bags the solid cyanide is received in, personal protective equipment (PPE), and filters for the hopper extraction system. The site has arranged with Vehrad Transport and Haulage to dispose of this cyanide contaminated waste within their Ghanaian Environmental Protection Agency (EPA) approved incineration facility at Tema. Vehrad are an ICMI certified transporter and cyanide producer (sparge facility). A trailer from Vehrad arrives regularly to site to transport the waste back to the incinerator in Tema. Use of this disposal method has been in effect since January 2014.

Procedural arrangements are in place to allow cyanide supplied by Orica and third parties in Ghana to be packaged as required by the political jurisdictions through which loads will pass. Orica monitors international legislation applicable to its supply of cyanide throughout the world.

All of the isotainers are currently transported within Ghana. Orica has determined that there is no specific legislation covering the transport of dangerous goods in Ghana at this time. However, Ghana is a signatory to the International Maritime Dangerous Goods Code, which establishes a reasonable expectation that dangerous goods transported within Ghana will be transported to international standards or higher. Before filling isotainers at Tarkwa, the isotainers are checked to ensure that placards are displayed on both the rear and the side of the vessel identifying the load in accordance with international standards. The isotainers are transported by Stellar Logistics who were first certified under the International Cyanide Management Code on 14 April 2015 and most recently recertificated on 22 November 2021.

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Standard of practice 1.3: Inspect cyanide production facilities to ensure their integrity and prevent accidental releases.

☒ in full compliance with

The operation is ☐ in substantial compliance with **Standard of Practice 1.3**
☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 1.3; inspect cyanide production facilities to ensure their integrity and prevent accidental releases

There are no tanks holding cyanide solution on site. The only secondary containment is the loading bay area and that is for spilled solid cyanide that is cleaned up immediately and is undercover. There is no cyanide solution on site and therefore no pipelines, pumps or valves except for the sump pump discharging stormwater that is inspected on a quarterly basis as part of the planned maintenance system.

The delivery checklist used at customer gold mines prescribes and requires checks to verify that the liquid resulting from the dissolution of the briquettes has been drained from the isotainer before it leaves the mine. The isotainer is inspected on return to the facility. Any liquid remaining in the isotainer when arriving back at the Transfer Facility is drained into an IBC and the isotainer is subsequently allowed to dry before it is again filled with solid cyanide briquettes.

Barbex undertakes weekly and fortnightly checks. The weekly inspections include; Transfer Hoppers, Hoist, PPE, Compressor. The Fortnightly inspection includes Hydraulics, Safety Showers, Sump Pump, Electrical, and Extractors Fans

A planned maintenance system is operated by Orica Active Tracker. This is comprised of an excel spreadsheet listing the equipment and the frequency of checks. The spreadsheet also shows the priority for the different actions.

The maintenance is undertaken once a job ticket/ clearance has been produced. The tracker also includes *ad hoc* maintenance items. The planned maintenance is undertaken on a monthly, quarterly, half yearly and yearly basis. Spare parts are held on site for the most common replacements.

Inspection frequencies are sufficient to assure that equipment is functioning within design parameters. Checklists are used for documenting inspections that occur weekly, fortnightly or as part of the planned maintenance system. There are no obvious deficiencies in the distribution of actions throughout these lists. Based on conditions observed during the audit, there is no evidence to suggest that inspections should be carried out more frequently than is currently the case.

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Inspections are documented. The documentation (internal inspection checklists) identifies specific items observed and includes the date of the inspection, the name of the inspector, and observed deficiencies. The inspections are undertaken as part of the Orica Activity Tracker i.e. the planned maintenance system are recorded electronically on an excel spreadsheet. They are also recorded through a job ticket system. The job tickets record the nature and date of any corrective actions.

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Principle 2 – Worker Safety

Protect workers' health and safety from exposure to cyanide.

Standard of practice 2.1: Develop and implement procedures to protect facility personnel from exposure to cyanide.

☒ in full compliance with

The operation is

☐ in substantial compliance with

Standard of Practice 2.1

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 2.1; develop and implement procedures to protect facility personnel from exposure to cyanide.

The facility has developed procedures that minimise worker exposure during normal plant operations, non-routine and emergency operations, and maintenance related activities. These are included in the following:

Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022. is one of the main documents used that describes the standard practices necessary for the facility's safe and environmentally sound operation. This includes the following sections:

- Safety;
- Start-up of Box to Sparge Facility;
- Normal Operation of Box to Sparge Facility;
- Shutdown;
- Abnormal Operating Instructions;
- Waste Management;
- Job Procedures; and
- Troubleshooting Guide.

In addition, there is the *Barbex Technical Services Ltd Management Policies and Standard Operating Procedures*. This contains 22 management policies, 24 standard operating procedures, and 5 environmental procedures. The policies and procedures describe specific operations undertaken at the facility.

The *Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022* includes the following for the non-routine operations:

- Plant Power Failure;
- Plant Air Failure;
- Sparge Isotainer Is Full And The Hopper/S Have Product Left Inside Them;

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- Bulk Bag Breaks During Operation; and
- Unable to Open Hatch Lids.

Orica Emergency Response Guide - Sodium Cyanide rev 10, Sept 2021 contains response to a cyanide emergency/ incident including specific Emergency Response Guides as follows:

- Dry Sodium cyanide Spill - Inside Buildings / Storage Facility;
- Dry Sodium Cyanide Spill -Outside Buildings/ Storage Facility;
- Dry Sodium Cyanide Spill - Inside a Shipping Container;
- Shipping Container Decontamination;
- Handling Wet Sodium Cyanide;
- Sodium Cyanide Spill to Waterway;
- Response to a Fire in the Vicinity of Stored Cyanide;
- Roll over of a Shipping Container; and
- Appendix 3 - Orica Response to a reported cyanide incident

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023 contains the following chapters;

- Activation;
- Response Task;
- Resources; and
- Preparedness, Toxicity First Aid, and Medical Treatment, and Maintenance.

The *Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022* includes section 10.2 Maintenance Procedures.

The *Barbex Technical Services Ltd Management Policies and Standard Operating Procedures* includes *MP-SOP-008 Job Safety and Environmental Risk Assessment, rev 9, 20 February 2023*. This defines the requirements to identify the hazards, and assess and manage the health and safety risks associated with all potentially hazardous work tasks using the JSERA. A full JSERA is required for any multiactivity task involving an activity for which there is no procedure such as maintenance activities.

The operation's maintenance procedures describe the specific steps necessary to decontaminate equipment that has been in contact with cyanide prior to its maintenance.

The facility solicits and considers worker input in developing and evaluating health and safety procedures. Monthly Safety, Health and Environment (SHE) Meetings are used to obtain input regarding its health and safety procedures. Employee input during these meetings is used in developing and evaluating the Facility's procedures.

The Orica representative attends the Monthly SHE Meetings and then the escalation of any issues follows the line management structure. The Monthly SHE Reports provide a summary of the meeting and weekly activities.

The facility has identified areas and activities where workers may be exposed to hydrogen cyanide gas and/or cyanide dust exceeding 10 parts per million (ppm) on an instantaneous basis or 4.7 ppm continuously over an 8-hour period, as cyanide, and it requires the use of

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personal protective equipment and/or use administrative controls as necessary in these areas or when performing these activities.

Personal hydrogen cyanide (HCN) monitors (Draeger) are available and used in designated areas. HCN Monitors are required when entering a blue operational areas, which includes the solid cyanide storage area, the waste storage area, and the Box to Sparge area. The devices are set to alarm at 4.7 ppm and 10 ppm. The facility requires that one individual in a team wear a personal HCN monitor when working at Level 1 (sump level), Level 2 (staging area) or the waste storage area. Individuals working at Level 3 (bag splitting area) must wear one HCN monitor per person in addition to other PPE.

Individuals working in the solid cyanide storage area must wear blue overalls that are taken off when exiting the area and put in a locker designated as dirty overalls. When working in the waste storage area individuals must also wear eye protection, gloves, and a dust mask. When working in the Box to Sparge area individuals must also wear gloves and a full face mask with canister. The use of PPE is detailed in the following procedure, *MP-SOP-019 Personal Protective Equipment, rev 6, 24 January 2024*.

There is a fixed monitor on Level 2 of the Sparge Facility at the level of the top of the isotainer when it is being loaded. If monitoring results suggest HCN levels are greater than the alarm level of 4.7 ppm the employees must be cautious and monitor the readings. If levels continue to increase up to 10 ppm then work must cease.

The operation has ambient air quality and noise monitoring undertaken on an annual basis showing HCN gas levels to be zero.

Hydrogen cyanide monitoring equipment is maintained, tested and calibrated in accordance with manufacturer's requirements. The operation has two X-am 5000 multigas monitors and three Pac 7000 monitors from Draeger. There is one fixed monitor a Polytron 8000 that is calibrated on an annual basis. The monitors were observed to be stored, used and maintained in an effective manner during the site visit. The calibration certificates were observed for the last three years.

Orica has provisions to ensure that a buddy system is used, or workers can otherwise notify or communicate with other personnel for assistance, help or aid where deemed necessary. The *Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022*, Section 5.2.5 Transfer Supervisors Inspection Responsibility states that they "must act as a buddy together with the security personnel present during the operation." The role of the buddy is defined in Section 1.0 Definitions.

During the loading of the isotainers a member of the security team is present to confirm the number of boxes loaded, this person and the supervisor act as the buddies as they are not involved in the loading operation. The alarm can be raised either verbally due to the small size of the facility or by pressing one of the emergency buttons that raises the alarm.

For other operations such as unloading the shipping container a supervisor oversees the work crew and can raise the alarm verbally. Work crews are a minimum of two people (there is no lone working) plus a supervisor. Again an alarm can either be raised verbally or through the use of an emergency button.

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Medical Examination Policy BTSL_HRPOL 002 states that an offer of employment will be made "subject to a candidate passing a medical examination by a registered medical practitioner appointed by the company". It also states that existing employees shall undergo a medical examination at least once a year. Employees who are exiting the firm shall undergo medical checks 1 week prior to their exit date.

The *Barbex Employee Guide*, Section 3.4.1 Medical Examination and Prevention states "The commencement and continuation of employment is conditional on the employee satisfying the pre-employment and annual medical examination requirements and being found fit for work".

The facility has a clothing change procedure for employees, contractors and visitors to areas with the potential for cyanide contamination of clothing; *MP-SOP-020 Clothing Change Policy Rev 6, 24 January 2024*.

This stipulates that personnel working within designated blue areas i.e. the cyanide storage area, the waste management area, and the Box to Sparge facility need to wear blue coveralls and are required to change out of the overalls at the end of the day and for their meal break. Supervisors visiting the area are required to wear a blue overcoat which is removed once they have left the area. There are designate locations for changing and storing blue clothing required for these areas. The overalls are washed on a daily basis. The site visit confirmed that personnel working within the blue areas were wearing PPE and clothing in accordance with the procedure and signage displayed at the site.

Warning signs are placed at strategic locations around the facilities including the front entrance to the site, and entrance to the blue areas. Warning signs indicate that cyanide is present and the type of PPE required to be worn. This was observed by the auditors during the site assessment.

Procedure *MP-SOP-006 General Warehouse Safety Rules Rev. 9*, dated 20 February 2023 states that safety shoes, safety glasses, and safety helmets are the minimum PPE requirement in the warehouse. *The Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022* Section 4.2 Personal Protection Table 3 shows the task specific PPE to be worn. The use of PPE is detailed in the following procedure, *MP-SOP-019 Personal Protective Equipment, rev 6, 24 January 2024*.

Personnel are prohibited from smoking, eating and drinking, and having open flames within the Transfer Facility. Signage is displayed at the main gate and at the access point to the site office to communicate these prohibitions. Additional signs are displayed at the entrance to the Box to Sparge Facility building. These messages are reinforced in the Site Induction and is included in the Orica Cyanide Safety Training materials. These prohibitions were seen to be strictly adhered to during the site assessment.

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Standard of practice 2.2: Develop and implement plans and procedures for rapid and effective response to cyanide exposure.

☒ in full compliance with

The operation is

☐ in substantial compliance with

Standard of Practice 2.2

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 2.2; develop and implement plans and procedures for rapid and effective response to cyanide exposure. The facility has developed specific written emergency response plans or procedures to respond to cyanide exposures including the following.

Orica Emergency Response Guide - Sodium Cyanide rev 10, Sept 2021 contains response to a cyanide emergency/ incident including specific Emergency Response Guides as follows:

- Dry Sodium cyanide Spill - Inside Buildings / Storage Facility;
- Dry Sodium Cyanide Spill -Outside Buildings/ Storage Facility;
- Dry Sodium Cyanide Spill - Inside a Shipping Container;
- Shipping Container Decontamination;
- Handling Wet Sodium Cyanide;
- Sodium Cyanide Spill to Waterway;
- Response to a Fire in the Vicinity of Stored Cyanide;
- Roll over of a Shipping Container; and
- Appendix 3 - Orica Response to a reported cyanide incident

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023.

This contains the following chapters;

- Activation;
- Response Task;
- Resources; and
- Preparedness, Toxicity First Aid, and Medical Treatment, and Maintenance.

Emergency showers, low pressure eye washes and non-acidic fire extinguishers are located throughout the site including one on each of the three levels of the Box to Sparge facility. The safety showers have a dedicated water tank with two pumps to ensure the correct pressure one pump is operational and the second pump is a back-up.

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The Barbex Tarkwa Facility Weekly Inspections/ Maintenance checklist includes checking that safety showers are functional and have good pressure and that fire extinguishers are placed at the warehouses, office, blending plant, waste storage area, and maintenance area. The fire extinguishers are inspected on a monthly basis with the inspections marked on the body of the extinguisher. In addition, an annual service of the fire extinguishers takes place.

The operation has medical oxygen and resuscitator available at the administration office and at the Transfer Area. Water is available throughout the facility and in the Box to Sparge Facility through the safety shower system. The site is small enough that verbal communication can be used, in addition there are emergency buttons for raising the alarm at strategic locations including the Box to Sparge Facility.

The cyanide antidote is stored at the Sam Jonah Medical facility which is the clinic for Iduapriem gold mine and is located less than 10 minutes from the site. The clinic has staff who are trained to administer the antidote. The antidote available at the Sam Jonas medical facility (the clinic for Iduapriem Gold Mine adjacent to the site) consists of Sodium Nitrite and Sodium Thiosulphate injections and Amyl Nitrite inhalant. The expiry date for the antidote is September 2025.

The facility inspects its first aid equipment regularly to ensure that it is available when needed. First-aid and emergency response equipment are stored and/or tested as directed by their manufacturer and replaced on a schedule that assures they will be effective when used. The Barbex Tarkwa Facility Weekly Inspection / Maintenance Checklist includes checking the contents of the first aid kit, the contents of the emergency response container (including necessary PPE), and that the oxygen pressure is higher than 1000 psi. This confirms that the equipment is available and ensures they are effective if they need to be used. There is a monthly checklist for the contents of the Emergency Response Container and the Emergency Responders bags.

Safety Data Sheets (SDS) and first aid procedures on cyanide safety are in the language of the workforce (English) and are available to workers at the Transfer Facility. The SDS for solid cyanide is posted at various locations around the site including the storage warehouses and the Box to Sparge facility. The SDS states that the product may contain a dye / colouring agent. The SDS for Carmosine the red colourant added to the solid cyanide is available on site, it is classed as non-hazardous.

The first aid procedure is communicated to all site personnel during induction. Chapter 7 of the *Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023* includes the guidelines for first aid treatment. The Emergency Response Team (ERT) has additional certificated first aid training from St John Ambulance every 3 years.

There are no storage tanks, process tanks or piping containing cyanide on site. The only containers containing liquid cyanide are two, one cubic metre intermediate bulk containers used to store potential cyanide solution in the loading bay. The solution results from cleaning activities and draining any residual liquid from the isotainer on its return to the transfer facility. The IBC's are labelled to indicate that they contain cyanide.

The facility has the following decontamination policy for employees, contractors and visitors leaving areas with the potential for skin exposure to cyanide

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MP-SOP-020 Clothing Change Policy Rev 6, 24 January 2024.

This stipulates that personnel working within designated blue areas i.e the waste management area and the box to sparge facility need to wear blue coveralls and are required to change out of the overalls at the end of the day and for their meal break. Supervisors visiting the area are required to wear a blue overcoat which is removed once they have left the area. There are designate locations for changing and storing blue clothing required for these areas. The overall are washed on a daily basis. The site visit confirmed that personnel working within the blue areas were wearing PPE and clothing in accordance with the procedure and signage displayed at the site.

In the instance of skin exposure to cyanide, the emergency response process is initiated. This includes the person being placed in an emergency shower which are located in the cyanide work areas.

The Transfer Facility has its own on-site capability to provide first aid, but not medical assistance to workers exposed to cyanide. All Transfer Facility personnel are trained in the First Aid procedure including the administration of oxygen as part of annual emergency response training. In the event that medical treatment is required, the casualty would be transported to the Sam Jonah medical facility at the Iduapriem Gold Mine adjacent to the site. The Gold Mine has an ambulance for the transportation of patients. It was observed that Appendix 1 of the *Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023* contains an Emergency Contact List which includes the contact number for the Sam Jonah Clinic.

The facility has developed procedures to transport exposed workers to locally available qualified off site medical facilities. *Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023* Section 4.4.7 Transport of Exposed Workers or Victims, details the procedures to be followed in the event of transporting exposed workers to locally available qualified off site medical facilities. The procedure states that "the response coordinator or ERT Leader will immediately organise urgent ambulance transfer to the nearest medical facility. Barbex utilises the Sam Jonah Clinic for medical emergencies."

In the event that medical treatment is required, the response coordinator makes telephone contact with the Sam Jonah Clinic to raise the alert. Meanwhile, oxygen administration is continued whilst the affected person is transported to the medical facility. The Sam Jonah medical facility provides the ambulance services and has 2 equipped ambulances for this requirement. One is an advanced life support ambulance and the other a basic life support ambulance. The hospital has confirmed that they will provide the ambulances when required.

The Transfer Facility has alerted two local hospitals (Sam Jonah Hospital and Tarkwa Municipal Hospital) of the potential need to treat patients for cyanide exposure, and the operation is confident that the medical facility has adequate, qualified staff, equipment and expertise to respond to cyanide exposures. Barbex has established a relationship with the hospitals to provide routine medical support, including medical assessment of employees. The letter sent to the hospitals was followed up with a meeting where provision of support was discussed. A response from the Sam Jonah medical facility was observed confirming

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their availability. The ambulance and clinic were involved in the mock drill on the 27 June 2024.

The Hospital also has the following procedures:

- *Procedure for First Aid and Medical Treatment for Cyanide Reagent Exposures.*
- *Procedure for Response to Emergency Conditions.*

Procedures are in place to investigate and evaluate cyanide exposure incidents to determine if the Transfer Facility's programmes and procedures, to protect worker health and safety and to respond to cyanide exposures, are adequate or need to be revised.

The Site has a formalised incident reporting procedure *MP-SOP-009 Incident Management Rev 9, 20 September 2023*. Incidents in the Transfer Facility are reported to Orica as well as to Barbex management. In the first instance an Incident Flash Notification is sent to Orica which triggers the start of the investigation and the corrective action system, Enablon, operated by Orica. A full report is then produced by Barbex which is loaded on to the Enablon system generating actions and prompts ensuring the actions are closed out.

There have been no cyanide exposures since the last recertification audit.

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Principle 3 – Monitoring

Ensure that process controls are protective of the environment.

Standard of practice 3.1: Conduct environmental monitoring to confirm that planned or unplanned releases of cyanide do not result in adverse impacts.

☒ in full compliance with

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

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 3.1; conduct environmental monitoring to confirm that planned or unplanned releases of cyanide do not result in adverse impacts. The facility does not monitor for cyanide in surface water as stormwater is only allowed to be discharged if the monitoring shows that the concentration of free cyanide is below 0.022 mg/l.

The site has a direct discharge to surface water from a sump that collects stormwater from the site. Stormwater within external sumps is managed in accordance with *EP-SOP-004 Disposal of Uncontaminated Liquid Waste, rev 6, 25 January 2024*. The water is held in the sump where it is sampled before being allowed to be discharged to a local stream. The water is sampled by Crystal Scientifics, Tarkwa to ensure that WAD cyanide is <0.5 mg/l and free cyanide is <0.022 mg/l. If the results come back showing these levels have not been exceeded the water is allowed to be discharged. This happens approximately once a month. All observed test results compliant.

If the testing shows that the levels are exceeded the solution is kept in the sump and treated in accordance with *EP-SOP-003 Disposal of Cyanide Contaminated Liquid Waste, rev 10, 25 January 2024*, prior to disposal by a licenced waste disposal company.

There are three boreholes on site that monitor the groundwater upstream and downstream of the Box to Sparge Facility and associated waste storage area, which are MBOH1, MBOH2, and MBOH3.

The borehole monitoring data was all <0.005 mg/l total, free cyanide, and WAD cyanide which is acceptable for the Ghanaian EPA standard for groundwater is 0.6 mg/l total cyanide.

The Site does not have an indirect discharge to surface water.

The site only accepts solid cyanide that is stored and managed on a concrete surface that minimises seepage to the subsurface. All cyanide storage, transfers and the handling of

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waste packaging occurs in roofed warehouses on concrete floors. An epoxy coating has been applied to the surface of the concrete in the Transfer Area, Waste Storage Area and the traffic ways in the warehouse used by the forklift trucks.

WAD cyanide concentrations (or other species of cyanide for which there is a numerical standard established by the applicable jurisdiction) in groundwater at compliance points that are below or downgradient of the facility are at or below levels that are protective of identified beneficial uses of the groundwater. Monitoring results were all below the detection limit of 0.005 mg/l for total, free and WAD cyanide.

The closest groundwater extraction to the Transfer Facility is determined to be the dewatering of the Iduapriem Mine Pit for the beneficial use of mining and/or processing purposes.

Seepage from the facility has not caused the cyanide concentration of the groundwater to exceed that necessary to protect its beneficial use. The Transfer Facility is therefore not engaged in any remedial activity to prevent further degradation and restore beneficial uses. The concentrations of cyanide in groundwater do not exceed the concentrations necessary to protect its beneficial use.

The Box to Sparge Facility is involved with the transfer of solid cyanide from boxes arriving to site in shipping containers into isotainers. The opportunity for the production of HCN gas is limited given the protection provided to the solid cyanide from coming into contact with moisture i.e. in a warehouse. The cyanide hoppers used for the filling of the isotainers have extraction fans and filters to move air away from operators and capture cyanide dust from the air stream before the air is discharged to the atmosphere high on the side of the building. The Ghana EPA does not provide numerical limits for atmospheric emissions of cyanide. The exposure limits adopted for hydrogen cyanide at the Transfer Facility are based on the standards applicable to sodium cyanide as published on the Orica Safety Data Sheet. Those limits are 4.7 ppm over an eight hour period and 10 ppm peak limitation. The Orica Safety Data Sheet is based on the Australian National Occupational Health and Safety Commission where Orica's headquarters are based.

Ambient air monitoring is reported in Environmental Compliance Monitoring Report by Legamine Solutions, dated February 2024. The results of 24 hour monitoring showed the levels of HCN gas to be 0 ppm.

Personal HCN monitors are available and used in designated areas. HCN monitors are required when entering a blue operational areas, which includes the Box to Sparge Facility and the waste storage area. The devices are set to alarm at 4.7 ppm and 10 ppm. The facility requires that one individual in a team wear a personal HCN monitor when working at Level 1 (sump level), Level 2 (staging area) or the waste storage area. Individuals working at Level 3 (bag splitting area) must wear one HCN monitor each.

There is a fixed monitor on Level 2 of the Sparge facility at the level of the top of the isotainer when being loaded. If monitoring results suggest HCN levels are greater than the alarm level of 4.7 ppm the employees must be cautious and monitor the readings. If levels continue to increase up to 10 ppm then work must cease.

MP-SOP-006 General Warehouse Safety Rules Rev 9, dated 20 February 2023 states that as a daily practice the gates of all of the warehouses must be opened for cross ventilation.

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Monitoring is conducted at frequencies adequate to characterise the medium being monitored. The monitoring of stormwater is undertaken prior to it being discharged. The monitoring of groundwater is carried out monthly. Health and safety monitoring for cyanide in air is undertaken through the use of personal monitors. The personal detectors are used daily for the duration that a worker is handling cyanide. In addition, a third party undertakes ambient air monitoring over a 24 hour period annually.

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Principle 4 – Training

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

Standard of practice 4.1: Train employees to operate the facility in a manner that minimizes the potential for cyanide exposures and releases.

☒ in full compliance with

The operation is

☐ in substantial compliance with

Standard of Practice 4.1

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 4.1; train employees to operate the facility in a manner that minimizes the potential for cyanide exposures and release

The Transfer Facility trains workers to understand the hazards of cyanide and refresher training is periodically conducted. The *Cyanide Safety Awareness Presentation* is provided to all staff as part of their induction and on a yearly basis as a refresher after that. This includes the necessary first aid to be undertaken in the case of an exposure and the PPE that must be worn. The purpose of the training course is to:

- illustrate the properties and potentially hazardous nature of cyanide; and
- demonstrate the appropriate precautions and safe handling techniques to minimise the possibility of an incident occurring.

This was shown as mandatory on the training matrix i.e. a person cannot start work without having undertaken this training. Additional training includes Emergency Response, Box to Sparge operation, and Spill Clean-up. The cyanide awareness training includes recognising the cyanide materials present at the facility and the symptoms of cyanide exposure.

The facility trains workers in the use of PPE and when and where this equipment is required. The primary training provided on PPE is through the induction process (including induction and cyanide awareness training) and through site signage, showing what PPE needs to be worn in which areas.

The operation conducts training of personnel in the use of PPE through toolbox style presentations. Employees also go through a worker evaluation where experienced employees review their activities.

Workers are trained to perform their normal production tasks (including cyanide related tasks) with a minimum risk to worker health and safety and in a manner that prevents unplanned cyanide releases. Toolbox sessions are also used to train staff on specific issues

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identified, issues that need raised awareness, or that require refresher training. This training includes a practical demonstration.

The materials used for Sodium Cyanide Box to Sparge Training are comprehensive. They include photographs of key equipment and steps involved in its use (PPE, sparge isotainer, flange guards, Transfer Facility hatch access point, transfer hopper and chute, crane hoist including bag lifter and bag splitter).

Toolbox sessions are also used to train staff on specific issues identified, issues that need raised awareness, or that require refresher training. This training includes a practical demonstration.

Barbex in consultation with Orica personnel have developed a training matrix to manage the training requirements for all employees. This shows the training required for each position, whether it is mandatory (must be completed prior to starting work), required (must be completed but this can be done after starting work), or optional, and how often individuals are required to undertake this training. Another matrix shows the training that has been undertaken for each person, and the date it was undertaken.

Personnel at the operation have been trained by suitably qualified personnel. The initial training of operators was undertaken by Orica at the time of establishing the operation in a Train the Trainer forum. If there are any changes to the Box to Sparge Facility e.g. use of stationary HCN monitor, Orica undertakes the initial training. Subsequent training on the subject was undertaken by the Barbex SHE Officer (Dennis Akakpo) until June 2023 when the SHE Co-ordinator (Eric Ampong) was promoted to SHE Manager and took over the training, both of whom are suitably qualified and experienced.

The operation utilises external trainers for certified first aid training (St Johns Ambulance), undertaken every 3 years for the Emergency Response Team.

The facility evaluates the effectiveness of cyanide training by testing. The evaluations are conducted in English, which is the official language of the facility.

In addition to formalised training, the operation also undertakes informal workplace observations and more formalised audits where deviations from procedures are identified and corrected. An initial evaluation is undertaken by the relevant supervisor with further evaluation by the Health, Safety and Environment Manager.

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Standard of practice 4.2: Train employees to respond to cyanide exposures and releases.

☒ in full compliance with

The operation is

☐ in substantial compliance with

Standard of Practice 4.2

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 4.2; train employees to respond to cyanide exposures and releases.

Emergency Response training is required for all site personnel as shown by the training matrix and is provided as part of the annual refresher on Cyanide Awareness Training. Cyanide Awareness Training attendance registers for refresher training and training for new people were observed.

The site has an Emergency Response Team (ERT) which is comprised of 5 people. Section 6.2. of the *Barbex - Sodium Cyanide Emergency Response Plan* states that the ERT will be given the following training:

- Fire/ Fire Extinguishers / Emergency Evacuation;
- Emergency Response;
- First Aid (certified every 3 years);
- Sodium Cyanide Awareness;
- MSDS Training;
- Incident Management; and
- PPE Training.

This is undertaken annually with the exception of the First Aid training, which is undertaken every 3 years. First Aid certificates were observed for the First Aid training by St Johns Ambulance

The facility trains workers to respond to worker exposure to cyanide and routine drills are used to test and improve their response skills. The main component of training for workers is the Cyanide Awareness Training package that provides information on response actions.

The operation has an emergency response team that has completed first aid training and training on the updated emergency response plan in addition to undertaking mock emergency response drills.

The mock emergency response drill reports include the following:

- Purpose;
- Participants;
- Drill Equipment and Materials;

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- Drill Synopsis;
- What went right;
- What went wrong; and
- Evaluation.

A man down mock drill was undertaken 27th June 2024 that involved the Sam Jonah Clinic and their ambulance. Other mock drills have included the spillage of solid cyanide and fires at the facility.

Training attendance/participation records are retained throughout an individual's employment documenting the training they have received, including the names of the employee and the trainer, the date of training, the topics covered. The records indicate whether an employee demonstrated an understanding of the training materials. This is done either through a question and answer sheet or through the trainer's observations after verbalising the questions. Each worker also carries a passport detailing the training they have undertaken.

The evaluations are conducted in English, which is the official language of the facility. In addition to formalised training, the operation also undertakes informal workplace observations and more formalised audits where deviations from procedures are identified and corrected. An initial evaluation is undertaken by the relevant supervisor with further evaluation by the Health, Safety and Environment Manager.

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Principle 5 – Emergency Response

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

Standard of practice 5.1: Prepare detailed emergency response plans for potential cyanide releases.

☒ in full compliance with

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

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 5.1; prepare detailed emergency response plans for potential cyanide releases. The facility has developed an Emergency Response Plan to address potential releases of cyanide that may occur on site or may otherwise require response.

Orica Emergency Response Guide - Sodium Cyanide rev 10, Sept 2021 contains response to a cyanide emergency/ incident including specific Emergency Response Guides as follows:

- Dry Sodium cyanide Spill - Inside Buildings / Storage Facility;
- Dry Sodium Cyanide Spill -Outside Buildings/ Storage Facility;
- Dry Sodium Cyanide Spill - Inside a Shipping Container;
- Shipping Container Decontamination;
- Handling Wet Sodium Cyanide;
- Sodium Cyanide Spill to Waterway;
- Response to a Fire in the Vicinity of Stored Cyanide;
- Roll over of a Shipping Container; and
- Appendix 3 - Orica Response to a reported cyanide incident

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023.

This contains the following chapters;

- Activation;
- Response Task;
- Resources; and
- Preparedness, Toxicity First Aid, and Medical Treatment, and Maintenance.

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The Plans consider the potential failure scenarios appropriate for its site-specific environmental and operating circumstances. The site only manages the transfer of solid cyanide briquets and therefore some of the scenarios are not applicable.

Orica Emergency Response Guide - Sodium Cyanide rev 10, Sept 2021 contains response to a cyanide emergency/ incident including specific Emergency Response Guides as follows:

- a) Catastrophic release of hydrogen cyanide.
Section 3.7 Response to a Fire in the Vicinity of Stored Cyanide. This is considered as part of a fire at the facility due to the facility only storing solid cyanide briquettes.
- b) Releases of solid or liquid cyanide during packaging, storage, loading and unloading operations.
Section 3.1 Dry Sodium Cyanide Spill - Inside Buildings / Storage Facility.
Section 3.2 Dry Sodium Cyanide Spill -Outside Buildings/ Storage Facility.
Section 3.3 Dry Sodium Cyanide Spill - Inside a Shipping Container.
- c) Releases during fires and explosions.
Section 3.7 Response to a Fire in the Vicinity of Stored Cyanide.
- d) Pipe, valve and tank ruptures.
The facility does not involve the management of liquid cyanide and therefore pipes, valves and tank ruptures are not included.
- e) Power outages and equipment failures.
The *Orica Mining Chemical Systems Ghana Transfer Facility, Rev 12, October 2022* includes the following for the non-routine operations:
 - Plant Power Failure;
 - Plant Air Failure;
 - Sparge Isotainer is full and hopper/s have product left inside them;
 - Bulk Bag breaks during Operation; and
 - Unable to Open Hatch Lids.
- f) Overtopping of ponds, tanks and waste treatment facilities.
There are no ponds, tanks or waste treatment facilities on site and therefore these are not included.

The Emergency Response Plans describe the following:

- i. Specific response actions, as appropriate for the anticipated emergency situations, such as evacuating site personnel and potentially affected communities from the area of exposure. The *Orica Emergency Response Guide - Sodium Cyanide rev 10, September 2021* includes specific response actions for the anticipated emergency situation such as evacuating site personnel, control of releases at their source, containment, assessment, mitigation and future prevention of releases. The nearest

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community is 5 km from site and therefore will not be affected by any emergency scenario on-site.

- ii. Use of cyanide antidotes and first aid measures for cyanide exposure. Cyanide antidotes are not kept on site but are administered by the near-by Sam Jonas Clinic to which any patients suffering from exposure to cyanide will be taken. The Clinic has it's the following procedures: *Procedure for First Aid and Medical Treatment for Cyanide Reagent Exposures*, and *Procedure for Response to Emergency Conditions*. *Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023* Section 7.2 Guidelines for First Aid Treatment contains details of the first aid treatment provided at the Transfer Station.
- iii. Control of releases at their source. *Orica Emergency Response Guide – Sodium Cyanide rev 10, Sept 2021* includes controlling releases at their source as part of the scenarios detailed above.
- iv. Containment, assessment, mitigation and future prevention of releases. *Orica Emergency Response Guide - Sodium Cyanide rev 10, Sept 2021* includes containment, assessment, mitigation and future prevention of releases as part of the scenarios detailed above.

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Standard of practice 5.2: Involve site personnel and stakeholders in the planning process.

☒ in full compliance with

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

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 5.2; involve site personnel and stakeholders in the planning process.

The Transfer Facility has involved its workforce and stakeholders in the emergency response planning process. Monthly SHE Meetings are used to obtain input from employees regarding the emergency response planning process.

The Orica representative attends the Monthly SHE Meetings and then the escalation of any issues follows the line management structure. The Monthly SHE Reports provide a summary of the meeting and weekly activities.

Communities have not been consulted with regard to specific emergencies at the facility as no neighbouring communities have been identified as likely to be affected with the nearest community approximately 5 km from the facility.

Communities are consulted with regards to the transportation of solid cyanide to and from the facility as part of the International Cyanide Code certification of the transport company involved, Stellar Logistics Limited. Stellar Logistics were first certified on 14 April 2015 and their latest certification was on 22 November 2021.

Local response agencies such as outside responders and medical facilities have been involved in the emergency planning and response process. External responders include medical facilities, the EPA and mine emergency response teams. Letters have been sent to key stakeholders (Fire Service, EPA, and Iduapriem gold mine) with Barbex completing a follow up discussion with the local hospitals (Sam Jonah Medical Facility, and Tarkwa Municipal Hospital) each year. The Sam Jonah Medical Facility was part of a full chain mock emergency drill in June 2024.

The roles and responsibilities of the police are consistent with their normal duties associated with traffic and crowd control. Fire services for the Transfer Facility are provided by the Ghana National Fire Service Tarkwa District (Western Region). The Fire Services were included in a mock drill October 2021 and May 2023 regarding a fire in the waste storage area where old cyanide boxes and packaging are kept before being transferred off site. The Emergency Response Plan was discussed with the Fire Service at that time.

Copies of the emergency response plans have been sent to the Ghana EPA and the Minerals Commission, Ghana during the audit period.

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The Box to Sparge Facility has engaged in regular consultation and communication with stakeholders to assure that the emergency response Plans address current conditions and risks.

Section 6.6 (Updating) of the *Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023* states the following “the Plan shall be reviewed and evaluated as changes take effect or at least annually and will be issued to stakeholders if amendments to the Plan are relevant to them.”

The site representative had a discussion with the stakeholders when the Plan was given to them. It was discussed with the EPA when they come to site as part of their regular inspections.

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Standard of practice 5.3: Designate appropriate personnel and commit necessary equipment and resources for emergency response.

☒ in full compliance with

The operation is ☐ in substantial compliance with **Standard of Practice 5.3**
☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 5.3; designate appropriate personnel and commit necessary equipment and resources for emergency response.

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023 includes the following:

- a) Section 3.3 Authority and Resource Mobilisation, designates authority to the emergency response coordinators. It states that "The emergency response coordinators in Barbex Technical Services (BTS) have the explicit authority to commit resources necessary to implement the plan during an emergency situation".
- b) Tables 3.1 and 3.2 lists the Internal Emergency Numbers including the ERT members and numbers. In addition, Appendix 1 lists all of the relevant external and internal ERT contacts and their contact details (mobile, office and email).
- c) Section 6.2 details the required training modules and their training frequency for the ERT personnel. Section 6.3 also details the requirements for emergency response stimulation drills to be held yearly and includes the required participants (internal and external).
- d) Tables 3.1 and 3.2 list the Internal Emergency Numbers including the 24 hour contact information for the emergency response coordinators and team members. Section 3.1 details the internal notification mechanism. Figure 4.1 details the response action flowchart.
- e) Section 5.5.1 (Emergency Response Duties) and 5.5.2 (Emergency Response Procedures) details the duties and response actions required for individual persons involved in the management of the emergency.
- f) Section 5.4.1 Emergency Equipment List provides a list of available emergency equipment.
- g) There is a monthly checklist for the contents of the Emergency Response Container and the Emergency Responders bags to ensure their availability when needed

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- h) Section 5.5.1 Emergency Response Duties details the role of internal and external responders, medical facilities, or other entities having designated roles in emergency response procedures. Local communities do not have any role in an emergency as the nearest community is 5 km from the site.

The facility has confirmed that outside entities included in the Plan are aware of their involvement and are included as necessary in mock drills or implementation exercises. However, the nature of the Transfer Facility operation, and limited local availability of qualified external responders means that emergency response is largely self-contained.

The site representative had a discussion with the stakeholders when the Plan was given to them. It was discussed with the EPA when they come to site as part of their regular inspections.

The Transfer Facility has alerted two local hospitals (Sam Jonah Hospital and Tarkwa Municipal Hospital) of the potential need to treat patients for cyanide exposure. Barbex has established a relationship with the hospitals to provide routine medical support, including medical assessment of employees. The letter sent to the hospitals was followed up with a meeting where provision of support was discussed. The first point of call for medical support is the Sam Jonah Hospital who were part of the emergency mock drill on the 27 June 2024.

The roles and responsibilities of the police are consistent with their normal duties associated with traffic and crowd control. Fire services for the Transfer Facility are provided by the Ghana National Fire Service Tarkwa District (Western Region). The Fire Services were included in a mock drill October 2021 and May 2023 regarding a fire in the waste storage area where old cyanide boxes and packaging are kept before being transferred off site.

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Standard of practice 5.4: Develop procedures for internal and external emergency notification and reporting.

☒ in full compliance with

The operation is ☐ in substantial compliance with **Standard of Practice 5.4**

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 5.4; develop procedures for internal and external emergency notification and reporting.

The Plan includes procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities of the emergency, as appropriate.

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023 (ERP) includes the following:

Procedures and contact information for notifying the shipper (Orica), the receiver/consignee (various mines), regulatory agencies (Ghana EPA), outside response providers (Municipal Fire Service), medical facilities (Sam Jonah Medical Facility, and Tarkwa Municipal Hospital) and potentially affected communities of an emergency are all contained in Appendix 1 (Emergency Call List) of the Barbex ERP.

Section 3.1 Internal Notification Mechanism details the process to be followed and the contact numbers for notifying the facility's management.

Section 4.2 External Notification Mechanism details the process to be followed in the event of an emergency. Contact information for notifying potentially affected communities of incidents and/or response measures in the event of a transportation incident is contained in Section 5.5.1.

The Box to Sparge Facility is located on the Iduapriem mining lease adjacent to the Goldfields Tarkwa mining lease. The closest community is approximately five kilometres from the Transfer Facility gate. Due to the nature of activities on site and the distances involved communities are unlikely to be impacted and have not been consulted within regard to the Box to Sparge Facility specific emergencies. Responsibilities have been allocated within the ERP for communicating with the media. Section 5.6 (Media) designates the Barbex Tarkwa Site Manager as the media contact.

The operation has a written procedure for notifying ICMI of any significant cyanide incidents. This is detailed in the Orica Emergency Response Flowcharts for Cyanide Spill or Leakage, and Cyanide Handling Incident. These flowcharts state that the relevant emergency response coordinator must liaise with the Orica Global Cyanide Manager in Australia who will undertake the relevant reporting to the ICMI.

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Standard of practice 5.5: Incorporate remediation measures and monitoring elements into response plans and account for the additional hazards of using cyanide treatment chemicals.

☒ in full compliance with

The operation is ☐ in substantial compliance with **Standard of Practice 5.5**

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 5.5; incorporate remediation measures and monitoring elements into response plans and account for the additional hazards of using cyanide treatment chemicals.

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023 includes specific, appropriate remediation measures, such as recovery or neutralisation of solutions or solids and management and/or disposal of spill clean-up debris, as appropriate.

The ERP does not include decontamination of soils. The facility does not store any liquid cyanide on site. All of the cyanide stored is in the form of solid briquettes and this is all stored on concrete such that spills will not contaminate any soils. The only time soils may be contaminated is when there is an incident when transporting the solid cyanide which is addressed by the Emergency Response Plan of the transportation company.

Section 4.4 (Clean-up and Decontamination) details the steps for cleaning up and decontaminating an area including the following:

- personnel;
- clothing including PPE; and
- contaminated areas and equipment.

In addition, there is the following procedure, *EP-SOP-003 Disposal of Cyanide Contaminated Liquid Waste, Rev 10, 25 January 2024* that details how any contaminated liquid is to be disposed of to the Iduapriem Gold Mine tailings facility. This is normally due to any contaminated stormwater that cannot be discharged to the environment.

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023 in Section 4.4.6 Sodium Cyanide Spill to Water includes the following: "Prohibits the use of chemicals such as sodium hypochlorite, ferrous sulphate, hydrogen peroxide, etc. to treat cyanide spills into water bodies".

Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023 addresses the potential need for environmental monitoring to identify the extent and effects of a release.

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Section 4.5 (Environmental Monitoring) of the ERP states that Barbex shall arrange for the incident area to be monitored in conjunction with the Ghana EPA and in accordance with direction from the Ghana EPA and the product manufacturer (Orica). The ERP details a monitoring programme to be implemented in the event of an accident or incident involving a cyanide release.

This is only likely to be required if there is a spill during transportation as within the Transfer Facility the solid cyanide is handled and stored on concrete surfaces where the material will not contaminate the sub-surface.

The following procedures detail the sampling methodologies and parameters to be used:

EP-SOP-001 Surface Water Sampling, Rev 7, 22 March 2023;

EP-SOP-002 Water Quality Monitoring and Quality Assurance Program Rev 7, 15 May 2023;

EP-SOP-005 Air Monitoring Rev 8, 25 January 2024

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Standard of practice 5.6: Periodically evaluate response procedures and capabilities and revise them as needed.

☒ in full compliance with

The operation is ☐ in substantial compliance with **Standard of Practice 5.6**

☐ not in compliance with

Summarise the basis for the findings/deficiencies identified.

The operation is in full compliance with Standard of Practice 5.6; periodically evaluate response procedures and capabilities and revise them as needed.

The *Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023* contains provisions for periodically reviewing and evaluating the Plan's adequacy, including following an emergency requiring its implementation, and that they are being implemented.

Section 6.6 (Updating) of the ERP states: The Safety Health & Environmental Coordinator is responsible for updating and reviewing the Plan including contact telephone numbers and informing all Plan holders of any changes. A record of amendments shall be kept. The Plan shall be reviewed and evaluated as changes take effect or at least annually and will be issued to stakeholders if amendments to the Plan are relevant to them.

The Plan is reviewed annually and mock drills are performed twice a year. The Plan was last reviewed on 15 August 2023.

The *Orica Emergency Response Guide - Sodium Cyanide* was last reviewed on 10 September 2021. Section 4.0 Review states "This guide shall be reviewed as a minimum on a biennial basis and following incidents, where the guide is utilised." The Guide is currently being updated.

It is stated in *Barbex Technical Services Ltd, Sodium Cyanide Emergency Response Plan, Rev 25, 15 August 2023* that mock drills will be undertaken twice a year. This includes cyanide and non-cyanide scenarios. The report on the drill includes the following:

- The Scenario;
- Participants;
- Drill Synopsis;
- What Went Wrong;
- What Went Right;
- Actions Recommendations and Issues;
- Evaluations; and
- Photos.

The operation has simulated the entire emergency response process i.e. a cyanide spill and a worker exposure through the mock drills undertaken.

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The operation evaluates the adequacy of training provided for responses to cyanide releases and worker exposure by undertaking the mock drills. No changes to the training have been identified.

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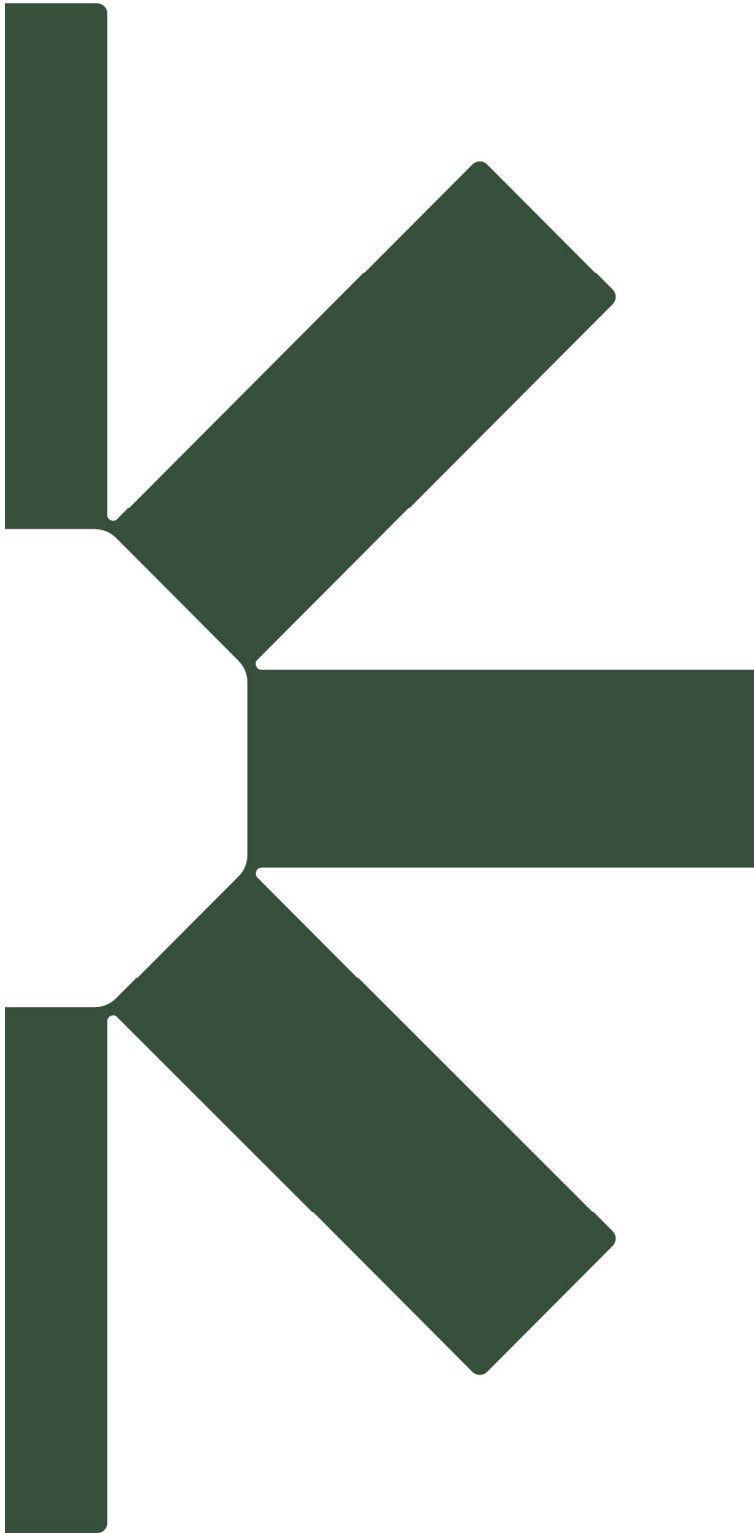

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