INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Production Summary Audit Report (Repackaging Plant No 2 and Incinerator)

Vehrad Transport & Haulage Tema, Ghana

21st – 23rd May 2014

For The International Cyanide Management Code

Name of Operation:	Vehrad Transport & Haulage
Name of Operation Owner:	Vehrad Transport & Haulage
Name of Operation Operator:	Vehrad Transport & Haulage
Name of Responsible Manager:	Mr Ghassan Husseini
Address:	Heavy Industrial Area, plot #A/46/30, Tema
Country:	Ghana
Telephone:	00233-303-205521
Fax:	00233-303-205524
E-Mail:	ghass_ghana@vehradtransport.com

Location detail and description of operation

A new screw feed, cyanide repackaging facility (Number 2 Plant) has been designed, and constructed on a subsidiary site within 5 kms of the main Vehrad site, at Tema Heavy Industrial Area, plot #A/46/30. The site also contains the new, Ghana Environmental Protection Agency-approved incinerator used to incinerate cyanide packaging. The facility is not currently operating full-time and therefore there are only three staff on site permanently. When sparging is undertaken, there are twelve staff on site. The facility has 24 hour security presence and coverage. The facility is currently supporting the work of the No 1 cyanide repackaging facility located at the main Vehrad site but will ultimately replace it, as the technology is much improved, based upon the practical experiences from the Number 1 repackaging plant.

Consignors deliver their sea containers to the main Vehrad site where they are de-stuffed of cyanide boxes containing cyanide briquettes. These boxes are stored in the Cyanide Warehouse, whilst they are awaiting repackaging into sparge (ISO) tanks at the Number 1 and Number 2 repackaging plants. Each consignor's cyanide boxes are stored separately in the warehouse and the ISO tanks are filled in client specific batches. Cyanide boxes to be repackaged at the No 2 plant are delivered by road along the 5km route from the main Vehrad site to the No 2 facility location.

The cyanide briquettes are repackaged from cyanide boxes into ISO tanks. These ISO tanks are delivered by the ICMI certified transporter, Vehrad Transport and Haulage, to mine sites in West Africa for sparging.

All waste cyanide packaging (wooden boxes, plastics and polypropylene bags) is taken directly to the adjoining Government-licensed incinerator facility and disposed of.

The Number 2 repackaging plant is located inside an enclosed shed which is well-ventilated and has circulation fans. The plant consists of an enclosed bag splitting facility, a screw conveyor and a gantry-based discharge point discharging into one of two 20 ton, ISO-tanks loaded on a 60 ton capacity trailer, located immediately below the gantry discharge point. An elevated hopper is installed, above the base of a screw conveyor. The hopper is located on an impervious concrete platform from which a forklift will operate, lifting the woven polypropylene bags containing cyanide briquettes into the hopper. The forklift handles 40 one ton cyanide briquette boxes required for each sparging. There is space, at the back of the shed, to store cyanide boxes awaiting repackaging.

The cyanide boxes are not stored permanently in the No 2 packaging plant but are brought over, as required, in containers from the Cyanide Storage Warehouse adjoining the No 1 Repackaging Plant at the main Vehrad site. On arrival, a maximum of 40 boxes are stored in the No 2 plant shed awaiting sparging, for the maximum period of a week. The cyanide boxes are stored in owner-dedicated areas in the Cyanide Storage Warehouse at the Vehrad site, after having been de-stuffed from their delivery containers.

A forklift moves a box into position. The bag handles are attached to the forklift hooks and the forklift raises the bag and moves it into the centre of the hopper. The bag is dropped onto the bag cutter which slits the base of the bag, allowing the cyanide briquettes and any associated fragments and dust to fall into the screw feeder hopper. The screw feeder transports cyanide briquettes up an enclosed shaft to the gantry discharge point and into the ISO-tank. Once the bag is empty, the bag is lifted and dropped 3 times to ensure there is no excess in the bag. The bag is then pulled back up by the forklift and put back into its original box. Above the ISO tank compartment, there is a connector attached to the gantry which is lowered over the access hatch of the compartment and sealed to prevent the escape of solids and dust.

Once the empty bag has been lowered into the box, the operator will remove the bag from the forklift hooks and ensure that all packaging is in place. The box is then moved to the back of the shed, ready to be transferred to the incinerator located outside the shed, 18 meters away. The empty packaging is transported to the incinerator using a transplate (manual forklift). The bag splitting and screw feed process is repeated until the ISO tank compartment is full.

The trailer is then moved so that the next ISO Tank Trailer can be located under the discharge point and the process repeated until all the ISO tanks are filled with cyanide briquettes. It takes a batch of 40 boxes of cyanide briquettes to fill the 2 ISO tank compartments of the two 20 ton capacity ISO-tanks located on one 60 ton capacity trailer. The maximum flow rate is about 5 kg of cyanide briquettes per second. Sufficient boxes for each 2 ISO-tank trailer load are stored at the No 2 repackaging plant before commencing the process.

Auditor's Finding

This operation is

X in full compliance
☐ in substantial compliance *(see below)
☐ not in compliance

with the International Cyanide Management Code.

* For cyanide production operations seeking Code certification, the Corrective Action Plan to bring an operation in substantial compliance into full compliance must be enclosed with this Summary Audit Report. The plan must be fully implemented within one year of the date of this audit.

Audit Company: Eagle Environmental

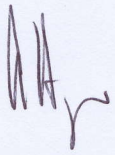
Audit Team Leader: Arend Hoogervorst & Production Auditor
E-mail: arend@eagleenv.co.za

Date of Audit: 21st – 23rd May 2014

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

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

Vehrad Transport & Haulage



29 NOVEMBER 2014

Name of Facility | Signature of Lead Auditor | Date

1. OPERATIONS: Design, construct and operate cyanide production facilities to prevent release of cyanide.

Production Practice1.1: Design and construct cyanide production facilities consistent with sound, accepted engineering practices and quality control/quality assurance procedures.

X in full compliance with

The operation is □ in substantial compliance with Production Practice 1.1

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
The design drawings pack for the Bulk Bag Repacking Cyanide Debagging And Tanker Loading Facility (No 2 Repackaging Facility) was prepared by Kempe Engineering of Australia. The general arrangement drawings and screw conveyor general arrangement drawings were sampled. The Drawings of the completed Cyanide Debagging System, were signed off by the Quality Control Engineer, and the Quality Control Manager of the fabrication company. The final inspection report was also signed off by the registered engineer of the fabrication company. The repackaging facility has three emergency stop buttons:- two at ground level, and one on top of the gantry. If power fails, the equipment will automatically shut down. The facility is located on an impervious base throughout the inside of the building.
The incinerator was built from a standard Chinese design for incinerators and design drawings for on-site incinerator were sighted. As the drawings were annotated in Chinese, a local registered engineer, verified the drawings' details through sample measurements, visual inspection, thickness testing, an operational specifications audit and a materials specifications review. As there were no quality control and quality assurance documents available, a registered engineer from the fabrication company has reviewed the drawings and physical structure and confirmed the "as-built" status of the incinerator and "fit-for-purpose" for incinerating cyanide packaging. The incinerator has an emergency shutdown procedure in case of circumstances requiring this. The process is a batch feed process and emergency responses would be based upon the status of the incinerated batch and so feeding would stop until the problem has been corrected. The incinerator is located on an impervious concrete base and the route from the gate to the repackaging plant building and the area adjoining the incinerator is all concrete based.

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

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 1.2**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
Twenty five Operating Procedures have been developed for repackaging plant No 2. The procedures cover pre-, post-, and basic operation, cyanide repackaging plant and warehouse management, transport from warehouse to repackaging plants, guidelines for vital components, inspections, a manual of authority, decontamination of equipment, the buddy system, a change management procedure and a process flow diagram. The Procedures all include relevant pre-work inspections and appropriate PPE. The procedures cover normal, abnormal and emergency situations and include:- overfilling, power outages, blockages, damage to bags and broken or damaged handles, and residues in the bag and hopper. A change management exercise was carried out prior to operation of Repackaging Plant No 2. The company uses the ADKAR model:- **A**wareness of the need for change, **D**esire to support and participate in the change, **K**nowledge of how to change, **A**bility to implement change, **R**einforcement to sustain change.
The Plant Maintenance Plan describes the maintenance and inspection to be carried out monthly and annually using detailed checklists. The Incinerator Maintenance Plan includes daily, weekly, monthly, and yearly inspections. There is also a detailed pre-operational incinerator checklist which includes operational and maintenance checks.
The site has 4 portable Pac 7000 HCN monitors and a portable 3M EVM gas and particulate monitor. The EVM monitor is calibrated six monthly and calibration is recommended by the manufacturer annually. The Pac 7000s are calibrated six monthly but the manufacturer's recommend annual recalibration.
Under normal operating conditions, the process is a dry process. However, washings from the containment area will be collected, placed into a container and either returned to the mine for disposal or added to the incinerator, depending upon the risk assessment covering the actual event. All solid cyanide spillage is contained and sent to the mine.
With respect to hydrogen cyanide gas management, in the repackaging facility**,** no cyanide is stored in the repackaging facility building but the building has been specifically modified to encourage adequate ventilation and air circulation using circulation fans and gaps between the top of the wall and the roof. The main building doors remain open during the repackaging. The facility is under a high roof and protected from the weather. No boxes are stored permanently in the repackaging facility but are drawn from the cyanide warehouse, adjoining repackaging No 1 Plant, for each repackaging process and transported to the No 2 Facility. Repackaging does not take place under rainy conditions. The entire area (repackaging facility and incinerator) is fenced and access controlled by security guards 24 hours per day. No persons are permitted in the facility without authorisation and appropriate PPE. The area is locked up when repackaging operations are not taking place. Prior to repackaging, cyanide boxes are received from the producer in sea containers and packed according to international specifications. The Producer, consignor and supply chain are all ICMI certified.

Production Practice 1.3: Inspect cyanide production facilities to ensure their integrity and prevent accidental releases.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 1.3**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
In the repackaging facility, inspections for the sparge (ISO) tanks have been developed. No tanks, pipes or valves are involved in the process but inspection routines are in place for the hoppers and related bag and box handling facilities. The repackaging plant is inspected in terms of the Plant Inspection Procedure and Checklist. Inspections are undertaken daily, weekly, monthly and annually and before every repackaging exercise. The Incinerator Maintenance Plan includes daily, weekly, monthly, and yearly inspections. Inspection documentation identifies all items to be observed, date of the inspection, the name of the inspector, and any observed deficiencies and corrective actions are documented and records retained.

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

Production Practice 2.1: Develop and implement procedures to protect plant personnel from exposure to cyanide.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 2.1**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
Twenty five Operating Procedures have been developed for repackaging plant No 2. The procedures cover normal, abnormal and emergency scenarios and their responses and specifically pre-, post-, and basic operation, cyanide repackaging plant and warehouse management, transport from warehouse to repackaging plants, guidelines for vital components, inspections, a manual of authority, decontamination of equipment, the buddy system, a change management procedure and a process flow diagram. The Procedures all include relevant pre-work inspections and appropriate PPE. A Buddy System Procedure is in place and operational and includes specifics on when a Buddy is necessary, the required PPE and equipment, the role of the buddy and actions for emergency response. The procedures cover normal, abnormal and emergency situations and include:- overfilling, power outages, blockages, damage to bags and broken or damaged handles, and residues in the bag and hopper. A change management exercise was carried out prior to operation of Repackaging Plant No 2. The company uses the ADKAR model:- **A**wareness of the need for change, **D**esire to support and participate in the change, **K**nowledge of how to change, **A**bility to implement change, **R**einforcement to sustain change.

The site has 4 portable Pac 7000 HCN monitors and a portable 3M EVM gas and particulate monitor. The EVM monitor is calibrated six monthly and calibration is recommended by the manufacturer annually. The Pac 7000s are calibrated six monthly but the manufacturer's recommend annual recalibration. Hot Spot Surveying for HCN gas and particulates using ICMI standards during sparging operations has not registered detectable levels. Hot Spot surveys continue to be undertaken. The company nurse operates a wellness program and the staff are given medical examinations and screening annually.
Full cover PPE is always used (full suit, gloves, rubber boots, full face mask and canister) during repackaging. Thus there is no deemed need for a clothing change policy as clothes do not come into contact with cyanide. Appropriate warning signs and PPE requirements are located inside the building and outside the gate.
The existing policy covers consulting with the workforce through risk assessment, toolbox talks, Planned Task Observations, change management, and health and safety meetings which include the No 2 repackaging facility. Sighted tool box talk minutes and attendance list dated 28th July 2014 discussing fork lift safety. Employees are involved in HAZOPs, and management of change exercises.

Production Practice 2.2: Develop and implement plans and procedures for rapid and effective response to cyanide exposure.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 2.2**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
The Facility has its own Emergency Response Deployment Plan and Guide to respond to cyanide exposures. A safety shower and eye wash is located outside the building and fire extinguishers are placed strategically in the building. A potable water supply is readily available. Oxygen is available via an "oxygen concentrator" ("Oxygene") and an Oxy-viva oxygen bottle. Emergency communication is via the man down alarm and cell phones. Antidote is stored in a fridge at the main plant for transport with the patient to Tema General hospital. Antidote is also supplied to Tema General hospital. Cyanide first aid equipment is inspected monthly. Cyanide antidote is stored in a fridge according to manufacturer's specifications and the company nurse manages a schedule for replacement of the antidote. Inspections of emergency equipment are undertaken monthly. English is the working language of the site and MSDSs are included in the Emergency Response Plan and procedures. Operators go through the shower and decontaminate their PPE. Visitors and contractors are not permitted in the area during repackaging. A trained nurse and 5 trained cyanide first-aiders are available at the main site and the No 2 plant has four first aiders present during repackaging operations. Representatives of local hospitals and clinics and other stakeholders have participated in training and briefing seminars and training material included a detailed description of the repackaging facility along with diagrams and process flow charts, Cyanide Awareness

and Cyanide First Aid Training, and the Cyanide Emergency Response Plan. The latest seminar conducted on 30th January 2014 for stakeholders included site staff, representatives from the Ghana Red Cross, Ghana National Fire Service, and the National Disaster Management Committee. A spill and mandown drill was conducted at the No 2 plant. The evaluation report indicated that the drill went well and recommended drills should be undertaken quarterly. An Incident and Accident Reporting and Investigation Procedure covering the cyanide warehouse and No1 and No 2 repackaging facilities is in place.

3. MONITORING: Ensure that process controls are protective of the environment.

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

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 3.1**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
There is no direct or indirect discharge to surface water. Only storm water discharges from the site. The small quantities of liquids generated are collected and returned to the mines. Monitoring and testing shows results at or below limits of detection. The repackaging facility has extraction fans with filtration equipment. The hopper is enclosed to ensure any dust is kept within the hopper facility.
Regular portable gas and particulate monitoring checks levels under normal, abnormal and emergency conditions. Existing monitoring has indicated all levels below limits of detection. Monitoring is established, based upon the risks identified and the results noted. This is under continuous review by the site and the authorities and will be adjusted if changing circumstances arise.

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

Production Practice 4.1: Train employees to operate the plant in a manner that minimizes the potential for cyanide exposures and releases.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 4.1**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
Workers at the No 2 repackaging facility have been trained in cyanide awareness and hazards and cyanide emergency response. PPE training is included in Cyanide Awareness Training. Training for the process and procedures was conducted on an "on the job" basis and PTOs (Planned Task Observations) were conducted to check conformance. The facility is newly established and training is based upon the twenty five operating procedures. Additional training was provided by appropriately qualified internal and external trainers. No one is permitted to work in the repackaging plant until they have been appropriately trained.

Production Practice 4.2: Train employees to respond to cyanide exposures and releases.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 4.2**

□ not in compliance with

□ not subject to

Summarize the basis for this Finding/Deficiencies Identified:
Training on the Plant Emergency Response Deployment Plan and Guide is given to all operators at the No 2 Repackaging Plant. which covers both cyanide releases and worker exposures. A spill and mandown drill was conducted at the No 2 plant attended by the Deputy Managing Director who also conducts training. The evaluation report indicated that the drill went well, no changes to training procedures were noted as being necessary and recommended drills should be undertaken quarterly. Training records are kept in the form of individual "Passports to Operate" (kept on site, not with employees) as well as training course attendance lists. All records are kept permanently.

5. EMERGENCY RESPONSE: Protect communities and the environment through the development of emergency response strategies and capabilities.

Production Practice 5.1: Prepare detailed emergency response plans for potential cyanide releases.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 5.1**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
The No 2 Repackaging Plant Emergency Response Deployment Plan and Guide (The Plan) includes 20 scenarios that may require a response. The scenarios considered in the Plan include:- roof collapse and impact of rain on stored cyanide; release during loading whilst repackaging; releases during fires and explosions; and evacuation plans. The limited nature of operations means that the scenarios are limited. The Plan includes assessment, mitigation and investigation to prevent future releases.

Production Practice 5.2: Involve site personnel and stakeholders in the planning process.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 5.2**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
Representatives of local hospitals and clinics and other stakeholders have participated in training and briefing seminars and training material included a detailed description of the repackaging facility along with diagrams and process flow charts, Cyanide Awareness and Cyanide First Aid Training, and the Plan. The latest seminar conducted on 30th January 2014 for stakeholders included site staff, representatives from the Ghana Red Cross, Ghana National Fire Service, and the National Disaster Management Committee. The seminars are undertaken on a periodic basis, approximately every two years, as a part of the stakeholder communications for all the Vehrad cyanide facilities.

Production Practice 5.3: Designate appropriate personnel and commit necessary equipment and resources for emergency response.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 5.3**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
The Emergency Response Deployment Plan and Guide designates the Deputy Managing Director, Safety Manager and Site Supervisor with explicit authority to commit the resources necessary to implement the Emergency Response Deployment Plan and Guide. All repackaging operators are trained as emergency response team members and their training is included in the Training Matrix and the Training Plan. Call out information, duties and responsibilities and a list of emergency response equipment is also included in the Plan.
The role of outside responders, such as Police, medical staff, EPA officers, and fire officers, in emergency response procedures is included in the Emergency Response

Deployment Plan and Guide and detailed under different scenarios, where appropriate. The role of outside responder is confirmed during periodic stakeholder seminars.

Production Practice 5.4: Develop procedures for internal and external emergency notification and reporting.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 5.4**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
The Emergency Response Deployment Plan and Guide includes procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities for any emergency, and detailed, as appropriate, for the various scenarios.

Production Practice 5.5: 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 **Production Practice 5.5**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
The Plan describes specific, appropriate remediation measures, such as disposal and neutralization of solutions and solids, decontamination of soils and other contaminated media and management and disposal of spill clean-up debris. The Plan prohibits the use of chemicals such as sodium hypochlorite, ferrous sulfate and hydrogen peroxide to treat cyanide that has been released into surface water but this is unlikely as there is no surface water likely to be affected.

Production Practice 5.6: Periodically evaluate response procedures and capabilities and revise them as needed.

X in full compliance with

The operation is □ in substantial compliance with **Production Practice 5.6**

□ not in compliance with

Summarize the basis for this Finding/Deficiencies Identified:
The Plan includes provisions for reviewing and evaluating its adequacy on an annual basis or after any actual event or after lessons learned during a mock drill.