INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Code Compliance Audit
Gold Mining Operations

Recertification Summary Audit Report

Ma'Aden Gold & Base Metals Company
Al Amar Gold Plant
Saudi Arabia

8th – 12th April 2018

Name of Operation	:	Al Amar Mine
Name of Operation Owner	:	Ma'aden Gold and Base Metals Co.
Name of Responsible Manager	:	Mr. Saleh A. Al-Tayyar
Address	:	Al Amar Mine, P.O. Box 84, Al Quwayiyah, Riyadh, 11971
Country	:	Kingdom of Saudi Arabia
Telephone	:	+966 11 656 4022
Fax	:	+966 11 656 0007
E-mail	:	TayyarS@maaden.com.sa

Location detail and description of operation

Al-Amar is in Ar Riyadh Province, approximately 250km southwest of Riyadh, in Saudi Arabia. It comprises an underground mine which processes a gold rich polymetallic ore at a rate of 200 ktpa ('000 tons per annum) to produce gold in doré and copper and zinc rich concentrates which are sold to third parties for toll smelting. Commercial production was achieved in January 2009.

The Process Plant commenced production in January 2008. The design capacity is set at 28 tons per hour (tph), processing a gold-rich polymetallic ore to produce gold in doré and copper and zinc in concentrates. The processing circuit includes the following main unit operations – crushing, milling, flotation, leaching (CIL), thickening and filtration, elution, electro winning and smelting. The ore from underground is classified into 5 different categories: super high grade, high grade, high copper, medium grade and low grade. Each grade classification is stockpiled separately on the Run-of-Mine (ROM) pad. The oversized rocks are broken into smaller sizes using a rock breaker. Different grades of ore are then blended to get the optimal crusher feed grade as per design (5.72g/t).

Crushing

Blended ore is fed into the primary jaw crusher which crushes the material to 80% passing 100mm, at a capacity of 90tph. From the primary crusher, the ore is screened and sent to the secondary and tertiary crushing stages where it is reduced to about 20mm and 6mm, respectively, with cone crushers. The final crushed product is conveyed to the Fine Ore Bin with a 1200 ton live capacity.

Grinding

Wet grinding takes place in the ball mill. From the Fine Ore Bin, the ore is transported to the ball mill, where grinding water and steel balls are added. The ball mill product is pumped to hydrocyclones for classification, in which the cyclone underflow is recycled back to the ball mill while the cyclone overflow goes to the flotation circuit for treatment.

Copper Flotation
The slurry is conditioned in the copper conditioning tank with suitable reagents before it flows into a bank of 2 rougher and 1 rougher scavenger cells. The rougher underflow is pumped to 2 scavenger cells. Zinc sulphate is dosed to depress the zinc metal from floating in the copper circuit. The concentrate is pumped to cleaner cells for upgrading and is then filtered into a dry concentrate cake.

Gold Leaching
The leaching circuit comprises of one leach tank and six Carbon-in-Leach (CIL) tanks. From the copper flotation, the copper tails are conditioned with lime before it is pumped to the leach feed thickener. There, it is thickened to at least 50% solids before pumping it into the leach tank for the cyanidation process to dissolve the gold.
The slurry gravitates down from one tank to the next while activated carbon is pumped counter-currently up the stream. The slurry leaves the last CIL tank to be pumped to the cyanide destruction tank. The loaded carbon is harvested from the first CIL tank and pumped to the elution circuit.
Copper is worth mentioning, since copper minerals will dissolve in cyanide solutions in preference to gold, and this causes an increased use of cyanide and oxygen. The copper-cyanide complexes formed by the dissolution will tend to inhibit the dissolution of gold in the cyanide solution. Zinc, an element used to precipitate gold from solution, if present in the ore, will bond with the cyanide to form a zinc-cyanide compound. Apart from consuming too much of the cyanide in preference to gold, the dissolved copper will also be adsorbed onto carbon in preference to gold.
To selectively recover gold in this environment, the cyanide concentration needs to be higher for the reasons stated above. Apart from the CIL circuit, cyanide is also used in the elution circuit for both cold stripping and hot stripping. The average cyanide consumption is about 3.45kg/t over a twelve-month period.

Acid Wash and Elution
Loaded carbon is firstly subjected to acid washing to remove acid soluble precipitates on the carbon. The adsorbed copper is then stripped in a cold elution stage. In this stage, a cyanide solution at 1.5% is circulated through the carbon for one hour. After cold elution, the loaded carbon is transferred to the stripping column ready for hot stripping, where a hot caustic-cyanide solution is then circulated through the column to recover a concentrated gold and silver solution.

Electro winning and Smelting
The concentrated gold and silver solution is pumped to two electro winning cells. Each cell contains anodes and stainless-steel cathodes, which precipitates the gold and silver. The precipitates are filtered and dried. The dried calcine cake is then mixed with flux and smelted into gold bullion bars in an induction furnace.

Zinc Flotation Circuit
The final CIL tails is subjected to cyanide destruction using Sodium Metabisulfite before being sent to the zinc conditioning tank – the objective is to lower the cyanide content from 800ppm to less than 100ppm. From the zinc conditioning tank, the slurry is mixed with relevant reagents and flows into the zinc flotation circuit. Like the copper flotation

circuit, the zinc flotation circuit also consists of rougher, scavenger and cleaner cells. The final zinc concentrate is pumped to Larox filters to produce a dry concentrate. The final tails from the zinc flotation circuit are pumped into the tails thickener.

Dewatering

The tails thickener overflow water is recovered and re-used as process water. Any excess water flows to the polishing ponds, which are designed to handle water with a WAD cyanide level above 50ppm. These ponds are covered with netting and hexagon tiles to prevent birds or mammals from gaining access to the water. The thickener underflow is pumped to the zinc tails stock tank and then to the disc filters to recover water and produce a filtered cake. The filtered material (the final tails) is collected by trucks and dumped on a safe designated dumping area – the Tailing Storage Facility (TSF).

Tailings Storage Facility

The filter cake produced from the disc filters contains approximately 20% moisture, locked up in the slurry matrix. It is transported to a fully lined containment area and stacked to dry. No return water dams exist due to the low moisture in the filter cake, thus no run-off occurs. There is also no other free-standing water in the facility as a result of the extremely low rainfall figures. Annual rainfall average is below 100mm per annum. If rain does occur, it is managed according to the TSF management procedures to prevent environmental release.

Auditor's Findings

This operation is

X **in full compliance**

☐ in substantial compliance

☐ not in compliance

with the International Cyanide Management Code.

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

Audit Company: Eagle Environmental

Audit Team Leader: Arend Hoogervorst

E-mail: arend@eagleenv.co.za

Names and Signatures of Other Auditors:

Name : Dawid M. L Viljoen Signature _____ Date: 25 Oct 2018

Dates of Audit: 8th – 12th April 2018

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

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

Al Amar Gold Plant

Facility

Signature of Lead Auditor

30 October 2018

Date

Auditor's Findings

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

Standard of Practice1.1: Purchase cyanide from manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
There is a Purchase Order Agreement in place between Ma'Aden Gold and Base Metals (MGBM) and Professional Chemicals & Ind. Equipment Co. Ltd. (Pro-Chemie) for the Supply, Delivery, Customs Clearance & Transport of Sodium Cyanide. MGBM obtains cyanide on behalf of all of its gold mines, including Al Amar. Cyanide is purchased from cyanide producer, AGR/CSBP, which was certified as fully compliant with the ICMC (International Cyanide Management Code) on 3 August 2017.
The agreement confirms that Pro-Chemie and its appointed sub-Contractors, including the cyanide producer, shall be certified as being in compliance with the International Cyanide Management Code for the manufacture, transportation and storage of cyanide as to be ultimately used in the production of gold.

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

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 2.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
There is a Purchase Order Agreement in place between Ma'Aden Gold and Base Metals (MGBM) and Professional Chemicals & Ind. Equipment Co. Ltd. (Pro-Chemie) for the Supply, Delivery, Customs Clearance & Transport of Sodium Cyanide. The Purchase Order Agreement specifically covers the responsibilities and requirements for transport to the operations, safety, security, unloading at operations, maintenance of means of transport, emergency response (spills prevention and clean-up), route planning and risk assessments, storage and security at ports of entry, interim loading, storage and unloading during shipment, community liaison, emergency response resource access and availability, training, and communication.
It was also confirmed that AGR adds a carmoisine dye to the cyanide briquettes at the point of manufacture, before being transported to Al Amar mine.

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

X in full compliance with

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

Basis for this Finding/Deficiencies Identified:
The Purchase Order Agreement confirms that Pro-Chemie and its appointed sub-Contractors, including the cyanide producer, shall be certified as following the International Cyanide Management Code for the manufacture, transportation and storage of cyanide.
AGR/CSBP cyanide road transport from production site to shipping port (Freemantle) is covered in the AGR Western Australian Supply Chain, and was ICMI recertified on 26 September 2016. International Shipping from Freemantle, Australia, up to the King Abdullah Port (Saudi Arabia), and the handling of the containers from the vessel onto the wharf and into the designated storage area at the King Abdullah Port (Stevedore Company - National Container Company Limited which is part of the larger Group, International Port Management) is covered by the AGR Ocean Freight Supply Chain covering cyanide transport by ship from Freemantle using MSC and MAERSK Australia to various interstate or international ports. The Ocean Freight Supply Chain recertification was published on the ICMI website on 19th December 2017.
MGBM is a consignor signatory to the Cyanide Code covering the Saudi Arabia Supply Chain from the King Abdullah Port (Saudi Arabia) to the various MGBM mine sites in Saudi Arabia. The Saudi Arabia Supply Chain certification was published on the ICMI website on 8th December 2014. The Consignor re-certification was recertified on 10 May 2018.

3. HANDLING AND STORAGE: Protect workers and the environment during cyanide handling and storage.

Standard of Practice 3.1: Design and construct unloading, storage and mixing facilities consistent with sound, accepted engineering practices, quality control/quality assurance procedures, spill prevention and spill containment measures.

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The cyanide mixing and storage plant was designed by SNC Lavalin of Montreal Canada, according to accepted engineering principles, during 2004. Original design files in archives were reviewed and sampled and were audited in the original certification audit. The new cyanide mixing tank is operational and drawings and designs (tank design according to API 650), including mechanical drawings of the new cyanide mixing tank, the internal rubber lined coating, the Australian specifications for the steel plates, and weld specifications, were sighted. All valves are made of stainless steel and the pipes made of mild steel.
The cyanide mixing and storage tanks are placed on impermeable foundations inside concrete bunds. The new cyanide storage tank drawing indicated an octagonal foundation plan with the foundation of an impervious design including a 200 mm concrete slab and a 50mm concrete blinding. The mixing and storage / dosing tanks are equipped with level indicators for High and High-High level alarms on both the mixing and storage tanks. The mixing tank level is interlocked with the water feed valve and the dosing tank level is interlocked with the transfer pump from the cyanide mixing tank. The redlined Piping and Instrument Drawing was signed by a registered Metallurgical Engineer.
The Cyanide mixing and transfer procedure requires the cleaning of the cyanide containing bag inside and outside by hosing with water after emptying.
The dry cyanide solid briquette store (a dedicated cyanide store with no other chemicals) is equipped with vents in the upper section of the side walls, and with the side sheeting designed to direct water to the outside of the floor. The floor is equipped with a secondary containment to contain any possible spillages. The cyanide mixing tank is open at the bag cutter area for ventilation, and a ventilation fume extraction system is used on the tanks to ventilate any cyanide gas generated in the tanks. The plant is situated inside an access, security-controlled area and the dry solid cyanide store is additionally fenced and locked and Security Staff control any entry to the store. Both are located away from people and surface waters.

Standard of Practice 3.2: Operate unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 3.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Solid cyanide is delivered in briquette form, packed in a plastic bag inside a bulk bag. The bags are packed into 1 ton wooden boxes, and are transported from the manufacturer to the site in sea-tainers. By procedure, the cyanide packaging is destroyed as soon as practically possible after use and the sea-tainers are cleaned out and returned to the shipping company. If the containers cannot be burned on the same day, the empty containers must remain locked in the mixing area in the interim. The cyanide burning checklist notes the number of boxes used and the number of boxes burned. Thus, it is confirmed that the boxes are not being used for any other purpose than holding cyanide.
There are detailed, procedures and checklists covering cyanide mixing and transfer, and cyanide packaging disposal, which spell out PPE requirements, use of a buddy, and tasks are clearly sequenced to prevent spillages and accidental releases during mixing, packaging disposal, storage and transfer processes. Any critical work conducted in the cyanide areas requires a buddy to be present.
In terms of cyanide box offloading and storage, only one box is removed at a time, boxes are stored at maximum of 3 high, and all forklift truck drivers are trained and only authorized drivers are allowed to drive fork lift trucks.
In the cyanide and mixing procedure, the addition of Carmoisine dye to the cyanide mixing tank is required, in a case when the colour of the mixture does not change to pink and red as a result of the dye not having been added to the briquette by the producer. However, it was noted that the cyanide manufacturer has confirmed that the dye is added at the point of manufacture.

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

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The site has 10 cyanide Standard Operating Procedures including the appropriate engineering procedures and a Tailings Storage facility (TSF) procedure. The original Lavalin process design criteria and operating manual documentation are available and used as guidelines in developing and updating Standard Operating Procedures. All procedures were reviewed in 2017 and were signed off. There were no changes made to the principles and tasks in the procedures, but mostly in the quality of the language.
The Al Amar TSF is a plastic-lined dam with the residue being filtered using disc filters. The residue cake at around 20% moisture (which is bound water and thus no water release other than evaporation takes place) is loaded onto trucks and delivered to the TSF via a tarred road. The filter cake residue is tipped in a manner to evenly distribute the tails onto the TSF. No discharge to surface water takes place, and no open water or return water ponds or TSF pool is present. A new TSF was commissioned in 2015. The old TSF is still used as there is still spare capacity. The new TSF was designed to the same specifications of the old TSF, including plastic lining, and cut off trenches. The gold plant is located in a water deficit (desert) area and water is recovered from the residue and recycled to the process.
The gold plant lined polishing ponds are used as a water storage facility. No discharge to surface water takes place from the plant. The polishing pond freeboards and rainfall events are covered in the inspection procedures.
A spreadsheet-based Planned Maintenance System (PMS) is in place and inspection forms and job cards are documented, including the date of the inspection, the name of the inspector, and any observed deficiencies, the nature and date of corrective actions are documented, and records are retained. If a deficiency is identified during the operational and planned maintenance inspections, a job card is raised.
Housekeeping monthly general safety inspections, using a formal checklist, are carried out which include representatives from the Mill Department, Maintenance Department, Warehouse Section and the Senior Safety Engineer. The shift bosses are required to undertake daily, visual inspections and report substandard conditions in the shift report logbook.
A change management procedure is in place and is operational, and is one of the 11 cyanide procedures. Two management change exercises were sighted and reviewed.
The water balance does not indicate a need for the plant to be stopped in case of a water balance upset, which is an improbable scenario. The plant is stopped for normal planned maintenance or when breakdowns occur which needs the plant to be stopped to prevent spillage and affect repairs.

All tanks, bunds, pond, impoundments, pipelines, valves and pumps and other cyanide equipment are on the spreadsheet-based PMS and are regularly inspected. The frequency includes daily, weekly, quarterly, six monthly, and annually. Wildlife inspections are carried out daily and mortalities are reported by exception. The frequencies as reviewed in the planned maintenance and operational inspections are deemed adequate.
The plant is designed and equipped with bund walls, sump pumps and all spillages are returned to the process. No emergency power is required to prevent unintentional releases as rainfall is extremely low with the Mine being situated in a very dry region. Furthermore, the TSF is a filtered cake disposal system with no water being returned to the plant. A freeboard of one metre is maintained on the polishing ponds to prevent the risk of overtopping.

Standard of Practice 4.2: Introduce management and operating systems to minimize cyanide use, thereby limiting concentrations of cyanide in mill tailings.

X in full compliance with

The operation is
- □ in substantial compliance **with Standard of Practice 4.2**
- □ not in compliance with
- □ not subject to

Basis for this Finding/Deficiencies Identified:
The ore currently mined from the west side of the underground mine is different from the design and highly variable in terms of grade. Thus, ore blending takes place to achieve targeted grades. A polymetallic ore is mined and Zinc and Copper recovered in float circuits and Gold in a CIL Circuit. The high levels of copper impacts significantly on cyanide optimisation and usage and soluble copper sulphides similarly are affecting cyanide consumption. However, Mill Department Cyanide optimisation documents dated March 2017 and January 2018 recommended a reduction of cyanide concentrations in leach 1 from 1 500 to 1 300 ppm of Sodium Cyanide.
Bottle roll tests are conducted under standard leach conditions. The plant implemented process improvements, planned to result in improved flotation of copper minerals and thus reduce the cyanide consumption in the CIL. The changes included the splitting of the process water from the copper stripping solution. By doing so, the solutions high in copper and cyanide are separated from the process water, resulting in improved copper flotation from 67 to 73%, in turn reducing cyanide concentration in the CIL from 2 200 ppm to 1 600 ppm of Sodium Cyanide.
The TAC 1000 is operational and used currently to manually control cyanide addition but will, in future, be used as the input signal to control the pump speeds. Cyanide addition control was improved by using a peristaltic pump with the speed controlled by a

frequency drive with input from the TAC 1000 reading from leach tank 1. Cyanide concentrations are reported to be less variable.
Results from the cyanide leach optimisation tests as mentioned above are used to determine set points and any changes are recorded in the daily checklists.

Standard of Practice 4.3: Implement a comprehensive water management program to protect against unintentional releases.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The plant is a water deficit plant located in a very low rainfall area of Saudi Arabia. The polishing pond area dams are at a lower level than the plant and separated from the plant run-off storm water by cut-off trenches and berms. Very small quantities of storm water may enter the settling pond, which acts as a silt trap. These dams are the only potential area of overtopping during rain storms and thus are included in the probabilistic water balance (PWB). The dams are double-lined with no seepage occurring. The dams are further covered by dense shadow netting to prevent access of wildlife to ponds as the solution may contain higher than 50mg/l levels of WAD cyanide. The run-on from the process plant area to the polishing ponds is deemed insignificant due to the installation of cut-off trenches directing the storm water away from the ponds. The plant is equipped with concrete bunds collecting any rainfall in the bunds from where it is returned to the plant processes.
A filtration test on the TSF (Tailings Storage Facility) tailings material, to determine the infiltration rate and thus any run down to the surrounding lined area, resulted in a 100% infiltration of 50mm water in 15 seconds. Zero run off is thus assumed and will consequently have no effect in the Water Balance. The filtration test was repeated on 22 February 2018, confirming the results of the first test. The analyses of the rainfall events from 1999 to 2017 never exceeded 50 mm. The maximum 24-hour rainfall event was 4mm.
The old and new TSFs were inspected following a short intensive rainfall event the previous evening of 6 April 2018. The storm water cut-off trenches were effective in diverting the rainwater away from the TSF and process plant and thus preventing contamination with any cyanide containing material. The top of the decommissioned TSF was inspected and no evidence of pooling or any water erosion was seen. This confirmed that the assumptions that were made during the certification audit are valid from the storm event of the 6 April 2018.
The new TSF surface was also inspected and minor evidence of pooling was observed. This is deemed insignificant from an environmental risk point of view. The bottom section of the TSF between the cake toe and the liner on the side walls was inspected

where this area was visible and no water accumulation was observed. The conclusion was that any water in the liner wall catchment was absorbed by the tailings at the bottom of the TSF. The TSFs are lined paddock facilities' receiving a filtered cake at 20% moisture from disc filters, and thus no phreatic levels exist, or are relevant, in the dam design.
Historical weather data was obtained from the weather station in Riyadh. The on-site, automatic weather station was commissioned in 2014 and the data is included in the rainfall data tables. Daily data tables for 2015, 2016, 2017 to March 2018, are included in the reports of Exova, an external service company. The 24-hour evaporation volume from the ponds is deemed insignificant as the ponds are covered in netting.
The old and new polishing ponds are both operated at 1m freeboard (33% empty or 67 % full). This was confirmed in PWB calculations and inspection records.

Standard of Practice 4.4: Implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions.

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 4.4**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
The water feed to the polishing ponds routinely exceeds 50 mg/l WAD cyanide and thus measures to restrict wildlife access to the polishing ponds are required. The site is not expected to consistently reduce the solutions feeding the polishing ponds to less than 50 mg/l due to the copper present in the solutions as a result of the polymetallic ore body being mined and processed. It was confirmed that the polishing ponds are covered completely with dense netting where the values are above 50 mg/l WAD cyanide. The only pond lower than 50 mg/l WAD cyanide is the sewerage pond. However, this is not part of the site's cyanide equipment as total cyanide is not detectible in the routine samples. The ponds are fenced in, gated, and locked to prevent any access by wildlife.
The TSF is a filter cake (20% moisture) deposition site with no return water going back to the plant. It is lined and the tailings are sun dried before being levelled by bulldozer. There is never a pool on the TSF and no return water ponds exist and no return water goes back to the plant.
Bird mortality inspections are done routinely and investigated if observed. No cyanide-related mortalities have been observed. There is no heap leach facility on the site.

Standard of Practice 4.5: Implement measures to protect fish and wildlife from direct and indirect discharges of cyanide process solutions to surface water.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.5**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
No permanent surface water or rivers exist in the area of the mine. The mine is located in a desert area in Saudi Arabia. It is a water deficient plant with a closed water system due to the extreme water shortages and does not discharge any water.

Standard of Practice 4.6: Implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of ground water.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.6**

□ not in compliance with

Basis for this Finding/Deficiencies Identified
The plant uses a disc filter residue filtration system to produce a low moisture (20%) filter cake for deposition on the TSFs. The plant equipment containing cyanide is placed inside concrete bunds with sumps and pumps to return spillage to the process and prevent seepage. The plant polishing ponds are fully lined.
The TSF is fully lined to prevent any seepage. The road used by the trucks to transport the filter cake residue to the TSFs is tarred to assist with preventing seepage into the soils. The TSFs are equipped with leak detection pipes. A second TSF has been completed, is operational, and is also fully lined. Boreholes are drilled to sample and monitor for any cyanide related leaks.
Ground water is found at 45 m and below. The water is not used for any defined purpose, thus no beneficial uses for the water are identified. Legislation defines water quality parameters, and requires cyanide samples to be taken monthly. Samples taken from surrounding monitoring wells from January 2016 to March 2018 show values that were less than 0.002 mg/l total cyanide. The maximum allowed groundwater level, according to legislation, is 0.1 mg/l total cyanide. The mine makes no use of backfill.

Practice 4.7: Provide spill prevention or containment measures for process tanks and pipelines.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.7**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
All tanks are installed inside concreted bunds and inspections confirmed the bunds are competent. The CIL tanks are placed on solid concrete foundations. The new cyanide storage tank has a hexagonal concrete tank foundation with reinforcement on top forming an impermeable layer between the tank base and the soil.
The bunded areas: zinc tail thickener, CIL Bund, CIL feed thickener, and copper and zinc filtration area, are all linked with a combined capacity of 661.5m^3. The largest tank in the linked bunds is a CIL tank at 265 m^3, thus the bund capacity is 249.6% of the largest tank, well exceeding Code requirements. All bunded areas are equipped with sump pumps from where any spillages and water is returned to the process. All process solution pipelines containing cyanide are routed above competent bunds and/or are inspected as part of spill prevention measures. All reagent strength cyanide pipelines are routed above competent bunds as secondary containment. The process water trench to the polishing pond was widened to accommodate the additional pipelines.
The cyanide mixing tank is lined with fibre reinforced plastic and the cyanide storage tank is constructed of steel and is rubber lined. All reagent strength cyanide pipelines and valves are made of stainless steel. The materials of construction are deemed compatible with cyanide and high pH solutions.

Standard of Practice 4.8: Implement quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.8**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Quality Assurance/Quality Control documents of the Al Zamil metal work factory, dated July 2005 to January 2006, for the leach tank, and CIL tanks 2, 3, 4, 5, 6 and 7 were sighted and reviewed at the original certification audit. The hard copy mechanical records were reviewed and deemed comprehensive and covered the standard Quality Assurance/Quality Control requirements and records. These were signed off by Engineers as competent persons.
The Quality Assurance/Quality Control file including a cover note from SNC Lavalin (plant constructors) and which included the CIL holding tailings tank, process water tank, zinc tailings filter feed tank, zinc concentrate filter feed tank, mill process water tank, fine ore silo, zinc tails thickener, CIL feed thickener were also signed off by the same Engineers.
There were no civil construction Quality Assurance/Quality Control documents but this was covered in a competent persons report, "Refurbishing of mill plant at Al Amar Mine

- Concrete repairing and structural integrity report" dated 1 April 2014. This included method statements for concrete structural repairs both minor and major and includes a warranty statement of 5 years for the repairs. Subsequent to this, the "Structural Integrity Assessment Report", dated 4 March 2018 by Ronaldo G Valdestamon, a Registered Civil Engineer, PRC licence No. 80177 registered on 18 Dec 1997 evaluated the condition of the Plant and identified areas requiring maintenance. An interview with the Engineer confirms that no critical issues were identified during the inspections and thus the plant is deemed fit for purpose. Longer term maintenance items were identified and it is planned to do repairs in the future. Tanks thickness tests were conducted and tank thicknesses are reported acceptable within engineering parameters. The priority items for replacement are budgeted for replacement and the cold strip tank was replaced, with the barren tank scheduled for replacement.
The Geotechnical inspection for the tailings dam at Al Amar Mine" was signed off by the Ma'aden Geotechnical Specialist in Dec 2013. The conclusions state that no maintenance is required at this time, only the South West section requires some support and more compaction. An updated Geotechnical Engineers inspection report covering both the old and new Tailings facilities, "Al Amar Tailings Dam Geotechnical Inspection", March 2018, signed by Kahled Al Ahmadi, Senior Geotechnical Specialist, Ma'aden Gold Company was sighted. A summary of inspection item 4 concludes, "…Currently there is no impediments (sic) to the operation, no need any maintenance work for the dam compliance with the system of continuous inspection…"

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 4.9**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Laboratory procedures from the Environmental Laboratory and Consultation Branch of Musa Jamman Al. Muwald Group were used and contracted to do all sampling and analyses of all samples for the Al Amar Mine. This Group was used until 1 July 2015. Documents from Musa Group Laboratories containing extracts from various EPA manuals covering the taking of samples, sample preservation, chain of custody and sample analyses methodology were reviewed. The laboratory Quality Assurance/Quality Control document containing extracts from various EPA manuals covering taking of samples, sample preservation, chain of custody and sample analyses methodology was reviewed and confirmed. Samples analysed are total cyanide, WAD cyanide and free cyanide.
The new service provider from July 2015 has been Exova Middle East and Asia. An Exova Procedure for the sampling of groundwater, based on Technical Standard, USEPA

40CFR part 264.97: General Groundwater monitoring requirements, ISO 5667-11 "Water quality part 6 section 6.11 guidance on sampling of groundwater, BS3930 Code of Practice for site investigations, in addition to regulatory guidance described in RCER2010 vol. 2, was sighted and reviewed.
Both service providers specify how samples should be taken, sample preservation techniques, chain of custody procedures and cyanide species to be analysed. The hydro geological report, "Geophysical, Hydrogeological and Environmental study, Location Al Amar Mine", prepared by the Saudi Geophysical and Environmental Consulting Office, Nov 2012: indicates in Fig 1 the position of the TSF's three groundwater monitoring points, as well as the polishing pond monitoring point. This is as per certification audit, with no change. Both service providers also cover sampling conditions and field observations covering weather, livestock/wildlife activity and anthropogenic conditions, as per Code requirements.
There is no surface water in the area to monitor and ground water samples are taken down stream of the TSF and polishing ponds. This was confirmed in the hydro geological report. The hydro geological report did not identify the need for upstream sampling. Boreholes are sampled monthly and the frequency is deemed adequate considering the specific site and arid/desert circumstances. TSF daily inspections and shiftly reports would make reference to bird or animal mortalities but none have been reported since the previous certification audit.

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

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The site has a cyanide decommissioning procedure which includes an implementation schedule for 12, 6 and 3 months prior to closure, including specific tasks to be undertaken during each period. Part of the procedure states, "...This procedure must be reviewed annually and from the latest Life of Mine data, the estimated closure date must be determined, for the timeously implementation of the procedure…".

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The document, "Gold Mine closure costs updates during Mine Closure and rehabilitation Plan and cost Estimation Training" prepared by Green Environment & SRK Danismanlik, dated November 2017, covering Mahad, Al Amar, Bulgah, Sukhaybarat and As Suq Mines. Mine Closure Costs were reviewed and it was noted that estimates increased from the 2014 amount of Saudi Riyals (SAR) 15 828 856 to SAR 15 868 856 for Al Amar in the 2017 estimate. Page 7 under cost estimation, states that costs will include disposal of cyanide reagents, decontaminating of equipment, rinsing of heaps and activities to prepare tailing storage facilities for closure, removal of water from pond surfaces, or reduction of the cyanide concentration to a level protective of human health and wildlife. Costs described are for third party implementation, and the bases for the estimates, such as rates quoted by or applicable to an outside contractor.
A Statement of Financial Strength from PWC, dated 9 February 2015, signed by Auditor, Ali A Alotaibi (Licence No 3790), is in place, confirming MGBM's ability to implement cyanide-related decommissioning activities for Mahad, Al Amar, As Suq, Sukhaybarat and Bulgah gold mines. It is reported that reviews will be undertaken at least once every five years.
Ma'aden Gold and Base Metals Company uses a self-guarantee as a financial assurance mechanism to cover its estimated costs for the cyanide-related decommissioning activities identified in its decommissioning and closure strategy. A Statement of Financial Strength from PWC, dated 11 March 2018, signed by Auditor, Mufadda Ali (Licence No 447), confirming MGBM's ability to implement cyanide-related decommissioning activities for Mahd, Al Amar, As Suq, Sukhaybarat, Ad Duwayhi and Bulgah gold mines was sighted. This statement was prepared according to ICMI guidelines.

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

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 6.1**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The site has 10 cyanide Standard Operating Procedures including the appropriate engineering procedures and a Tailings Storage facility (TSF) procedure. The original Lavalin process design criteria and operating manual documentation are available and used as guidelines in developing and updating Standard Operating Procedures. All procedures were reviewed in 2017 and were signed off. There were no changes made to the principles and tasks in the procedures, but mostly in the quality of the language.
The Al Amar TSF is a plastic-lined dam with the residue being filtered using disc filters. The residue cake at around 20% moisture (which is bound water and thus no water release other than evaporation takes place) is loaded onto trucks and delivered to the TSF via a tarred road. The filter cake residue is tipped in a manner to evenly distribute the tails onto the TSF. No discharge to surface water takes place, and no open water or return water ponds or TSF pool is present. A new TSF was commissioned in 2015. The old TSF is still used as there is still spare capacity. The new TSF was designed to the same specifications as the old TSF, including plastic lining, and cut off trenches. The gold plant is located in a water deficit (desert) area and water is recovered from the residue and recycled to the process.
The gold plant lined polishing ponds are used as a water storage facility. No discharge to surface water takes place from the plant. The polishing pond freeboards and rainfall events are covered in the inspection procedures.
A spreadsheet-based Planned Maintenance System (PMS) is in place. Housekeeping monthly general safety inspections, using a formal checklist, are carried out which include the Mill Department, Maintenance Department, Warehouse Section and the Senior Safety Engineer. The shift bosses are required to undertake daily, visual inspections and report substandard conditions in the shift report logbook.
A change management procedure is in place and operational and is one of the 11 cyanide procedures. Two management change exercises were sighted and reviewed.
Departmental weekly toolbox talks (including a weekly safety topic) are held and attendance lists are kept. It was confirmed during the interviews with the personnel that the weekly safety meetings take place and that they are given opportunity to report and discuss any safety issue and or procedure, including cyanide related issues. The monthly toolbox topic schedules for 2016, 2017 and 2018 were reviewed and included cyanide-related issues and concerns.
In a survey document dated January 2018, Process Plant workers were asked to list their most dangerous tasks and cyanide mixing came out as the highest risk task as part of the fatality prevention program. The Hemaya (Meaning "Protect" in Arabic) program and system (initially implemented in 2017) is a database system in place to record and manage accidents, incidents and near misses and substandard conditions. This is a mechanism for worker input on developing and evaluating health and safety procedures.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 6.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Leach pH is controlled above 11.0 to prevent HCN gas formation. On-line pH meters are used in the leach circuit, backed up by manual pH meter readings. Electro winning is done at a high pH above 12. The Cyanide Mixing pH is adjusted to between 11 and 11.5.
There are 7 fixed Polytron 8100 HCN gas monitors in place: one in the Gold room, two at the Cyanide Mixing area, one at carbon stripping, two at the CIL, and one at the zinc thickener area. The Plant has 14 Portable Dräger PAC 7000 HCN gas monitors available: 5 are issued to operators working in the cyanide areas, and 9 units are spare units issued, as needed. There are also four XAM 5600 Dräger Multigas monitors (Ammonia and HCN gas measurement) used. The Polytron fixed monitors alarm at 5 and 10 ppm HCN and the PAC 7000 portable monitors alarm at 1.8 ppm HCN gas and evacuation is carried out at 3.8 ppm. The alarm sounds are different for the two levels.
All fixed Polytron 8100 gas monitors were replaced and the units installed in Dec 2017. This calibration is still current and the seven original Dräger factory calibration certificates dated 27 Dec 2017 were sighted. The next calibration is due 27 June 2018. The PAC 7000 personal monitor calibration certificates were sighted and sampled against monitors inspected in the field. The XAM 5600 Dräger Multigas monitors calibration certificates were also sighted.
Monthly safety inspections monitor and check facilities and emergency response equipment to ensure that it is functioning and available. Safety equipment such as safety showers, low pressure eye wash stations, and fire extinguishers are numerous and adequately signposted. The language of the workforce is English and Arabic. Full 16 point MSDSs in Arabic and English for Sodium Cyanide are available electronically and in hard copy at the cyanide warehouse, the cyanide mixing area and the top of the CIL. The Manufacturer adds a carmoisine (red vegetable dye) dye to the cyanide briquettes at the cyanide manufacturing facility in Kwinana, Australia, before being transported to the site at Al Amar.
Warning signs on the plant include no eating and drinking, cyanide hot spots, no smoking, cyanide warning signs, and PPE requirements and are in English and Arabic. Tanks are colour coded and/or labelled to indicate that they contain cyanide. Pipelines are labelled and show direction of flow. Accident and incident reporting and investigation procedures, based upon the site safety reporting requirements, were found to be in place and effective. No cyanide incidents have been reported since certification.

Standard of Practice 6.3: Develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 6.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Telephones and radios are used currently to raise emergency alarms. Panic buttons coupled to audible alarms are installed at the cyanide mixing and at the top of the CIL.
Medical oxygen emergency kits are available in the emergency cabins at the Cyanide Mixing area and the top of the CIL. A portable oxygen cylinder is available in the clinic, and two large medical oxygen bottles are also located at the clinic.
Four cyanide antidote kits (Troikaa Pharmaceuticals (India) Kit containing Sodium nitrite injection USP 300mg. in 10 ml. – 2 ampoules per box; Sodium Thiosulfate injection USP 25g. in 50ml. – 1 vial; and, Amyl Nitrite inhalant – 12 durules.), expiring in August 2019, are stored at the clinic in a fridge and one antidote kit is kept in the Mill Shift boss's Office in a fridge. The antidote is ordered 12 months before the expiry date by the doctor to ensure timeous delivery and replacement of the antidote.
The cyanide emergency equipment is located in the clinic close to the plant. Monthly inspections check cyanide emergency equipment, including cyanide antidote and oxygen bottles.
A clinic is established at the mine site and there is a formal cyanide treatment protocol flowchart in place. The resident Doctor has indicated that the clinic is equipped to stabilise the cyanide patient before transporting him by mine ambulance to the local hospital. The patient would, after stabilisation, be taken to Quwayiyah hospital, half an hours' drive (50km) away. The mine doctor will accompany the patient to the hospital, if the situation so requires, and the required cyanide emergency equipment, including antidote, will also accompany the patient.
The Doctor has made the local hospital aware of the need for cyanide treatment. He made two visits to the hospital in August and October 2017 where presentations were given to Medical Doctors, ICU staff and ER doctors at the hospital on cyanide treatment. The hospital has a cyanide antidote kit.
A full cycle cyanide spillage and man down drill was conducted on 14 March 2018, involving a delivery truck accident with a cyanide box falling off the truck and the driver being incapacitated. The second truck driver tried to help but was gassed by cyanide. The drill was attended by Government HCIS officials, various authority representatives, Civil Defence officials, the whole ERT Team, Technical Compliance Superintendent, Safety Engineer, Safety Specialist, Mine Manager, and Mine Security staff. Also attending were two drivers from Globe Logistics (Cyanide Transporter), the Pro-Chemie Operations Manager, Al Amar Clinic staff including the Doctor and Nurse, and a representative from

the Government Hospital at Al Quwayiyah. A full detailed report prepared in Arabic was submitted to the HCIS. A follow up meeting with the HCIS covered learning points. A summary report in English was sighted, which included positive observations and learning points. The learning points noted were that the decontamination area was too small, the road was not effectively closed off and the wind direction changed more than once during the drill.
There is an MGBM Emergency and Management Response Standard (EMRS) and an Emergency Response Team Manual (ERTM) in place and a site specific Al Amar Emergency Response Plan (ERP) in place which cover formal response to cyanide exposures.

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

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

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 7.1**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
There is an MGBM Emergency and Management Response Standard (EMRS) and an Emergency Response Team Manual (ERTM) in place and a site specific, Al Amar Emergency Response Plan (ERP) in place to deal with cyanide accidents and incidents. The Plan, now in its third revised issue, combines existing documented responses and emergency provisions to deal with the various scenarios and includes and identifies the emergency response team and coordinators who are on all shifts. The tailings are stored in a lined impoundment and consist of filter cake, dried out and flattened following tipping. Rainfall is insignificant in terms of TSF stability risk. The TSF failure scenario was thus not identified as a potential emergency scenario. Transport cyanide scenarios are covered in the Ma'Aden Consignor Cyanide Transport Emergency Response Plan.
The ERP includes the clearing of site personnel from the area of exposure but there are no potential affected local communities that need to be catered for. The use of cyanide antidotes and first aid measures for cyanide exposure are covered in the corporate procedure "Cyanide First Aid & Medical Treatment".

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 7.2**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The EMRS involves the workforce in the evaluation, testing and updating of the plan using mock drills. Local communities are outside the zone of influence of the mine and evacuation is thus not an issue. The government hospital and mine ambulance are involved in mock drills.
The Mine Doctor has made the local hospital aware of the need for cyanide treatment and has given two presentations to Medical Doctors, ICU (Intensive Care Unit) staff and ER (Emergency Response) doctors at the hospital on cyanide treatment.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 7.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The ERP details roles and responsibilities of the emergency response team. The emergency equipment inventory was checked and site inspections confirmed availability and readiness. The Plan includes contact references (telephone, cell phone, etc.) of internal and external resources for the various scenarios, particularly with detail on where external resources and skills might be needed. Periodic drills involving stakeholders ensure that roles and responsibilities are understood and clearly implemented. Feedback sessions and documents from drills assist with continuous improvement. No outside responders are used during emergency situations. Communities do not take part in the emergency responses, but are given information on cyanide.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 7.4**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The ERP includes details for appropriate emergency notification and reporting (internal and external) and the call-out procedure and contact information lists which are updated regularly. Internal and external communication is dealt with in the Plan and "Ma'aden Crisis Management" - a 34-page corporate booklet containing the guidelines, duty cards, and action checklists associated with a crisis command centre was sighted and reviewed.

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

X in full compliance with

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

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

Standard of Practice 7.6: Periodically evaluate response procedures and capabilities and revise them as needed.

X in full compliance with

The operation is
- □ in substantial compliance with **Standard of Practice 7.6**
- □ not in compliance with

Basis for this Finding/Deficiencies Identified:
The ERP includes the requirement for review and revision annually or after an actual cyanide emergency or a mock drill which identified deficiencies. Mock drills are scheduled at least annually. Drills incorporate identification of problems, action and follow up on completion.

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

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

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 8.1**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
All personnel that may come into contact with cyanide including operators, security, warehouse, laboratory, and Ex-Pats (Ex-Patriot workers) are trained in cyanide awareness. Training course material used is based upon the cyanide producer's training material and has been translated into Arabic. A Training matrix is in place which documents training records and identifies training modules required by various job types. The training is done in Arabic for the staff not understanding English. Refresher training is done 6 monthly. Training records are kept for three years.

Standard of Practice 8.2: Train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.

X in full compliance with

The operation is in substantial compliance with **Standard of Practice 8.2**

 not in compliance with

Basis for this Finding/Deficiencies Identified:
A Ma'aden Head Office trainer for the group is in place, and he does task training for the Group, attending the Al Amar Mine approximately twice per year or as required. On-the-Job task training is done through the Plant Superintendent and the Site Safety Specialist. Cyanide specific task training is done as per the Standard Operating Procedures (SOP's) listed in the training matrix. The training matrix specifies the elements required for each job. The Plant Superintendent carries out training. He is a Metallurgist with a BSc Metallurgical Engineering from the University of Science and Technology in Kumasi and with 27 years process experience.
Arabic training is presented by a chemical engineer with a BSc Chemical Engineering from King Saud University. The Safety Specialist, who also trains, has a BSc in Mechanical Engineering with 16 years gold mining and 37 years' experience in safety and environment.
New employees go through induction before being allowed on the plant. Process training for the applicable section is done and then the new employee is placed on a section

working under supervision (for approximately 2 months) with the shift boss (normally starting at the ball mill and the crusher section). The Operator and the Coach (shift boss) are interviewed before the trainee is appointed as an Operator. Operators receive a certificate of competence before being allowed to work in the cyanide area (Cyanide SOP's training is also completed). A new approach to theoretical training is to send the employee to the Saudi Mining Polytechnic for 18 months before being employed as a trainee on the process plant. He then follows the normal trainee program which includes practical and SOP training which is site specific.
Annual SOP Assessment, followed by refresher training, where required, is done and updated in the task training matrix. Refresher training is also done when an individual PTO (Planned Task Observation) indicates the need for refresher training. A person is assessed by the Ma'aden Trainer or the General Foreman, evaluating the effectiveness of his cyanide training, before recommending appointment as an Operator. PTO's are carried out on an ad hoc basis on individuals using the cyanide SOP's.
Attendance records are kept and records include the name of the trainer, the date of training, the topics covered and assessment scores.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 8.3**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
A fully trained Mine wide ERT (Emergency Response Team) is in place (19 members) on the mine which includes cyanide release as well as exposure scenarios. The person discovering the emergency will communicate the emergency to the ERT by calling 3333 or use the radio to report the emergency. Process staff report spillages to the ERT and selected Operators are trained and form part of the Mine ERT. All other personnel that may come into contact with cyanide receive cyanide hazard awareness training covering emergency response in case of cyanide incidents. All employees are refreshed 6 monthly on their roles in cyanide emergencies.
The site Doctor is either at the clinic next to the process plant or on standby in the village 5 minutes away from the site. He is trained to treat cyanide emergencies in the clinic. The patient is taken to a triage point where medical staff will administer additional medical attention. This location depends on where the emergency and patient are.
ERT training is an ongoing monthly activity and training drills are used. The ERT are given additional training, including the training in the use of response equipment, SCBA (Self Contained Breathing Apparatus) cylinder refilling, donning and doffing of SCBA, rope rescue, firefighting equipment, and Biopak Oxy Cylinder refilling. External ERT and HAZMAT training was conducted and completed in 2015. Refresher training is

required in the EMRS (Emergency and Management Response Standard) through testing of the ERP annually using desk top as well as mock exercises. Mock drills are currently also used for refresher training.
A formal cyanide treatment protocol flowchart is available in the clinic. The clinic is not equipped with an IC (Intensive Care) unit, but the hospital is used for treating ICU (Intensive Care Unit) patients. The Mine emergency approach is to decontaminate, give oxygen, followed by cyanide antidote in the clinic where a Doctor competent to handle cyanide emergencies is available. The external hospital at Al Quwayiyah (50km away) is equipped with an ICU unit. The Mine Doctor will accompany the patient to the hospital taking with him the appropriate cyanide antidotes and emergency equipment.
A man down emergency drill report dated 1 August 2017 was reviewed. The scenario was an Operator who was found unconscious in the cyanide mixing area. The drill report includes positive observations and learning points noted. The Emergency and Firefighting Specialist (also responsible for training) was present. Other drill reports were sighted and included compulsory drills attended by the regulatory authorities. Training records include the name of the trainer, the date of training, the topics covered, and how the employee demonstrated an understanding of the training materials. ERT training schedules, attendance registers and drill records were reviewed for 2016, 2017 and 2018.

9. DIALOGUE: Engage in public consultation and disclosure.

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

X in full compliance with

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

Basis for this Finding/Deficiencies Identified:
Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide.
The Mine facilitates visits including various schools. Visit records were sampled for the secondary school Mizael Village - 22 May 2016 (12 visitors), Al Amar School - 5 April 2016 (11 visitors), University students Mining Geology - 21 April 2016 (19 visitors). The evidence of visits was in Arabic and was randomly translated. A cyanide orientation during 3 Feb 2016 for HCIS (Higher Commission for Industrial Security) visitors was given by Mine Manager Saleh A. Al-Tayyar and the attendance list (in Arabic) of 14 HCIS cyanide committee members was sighted. Induction video presentations are given by the President in English, Arabic and other local languages. These are the same presentations that were sighted in the certification audit. An animation-based video induction is available for use with schools' visits.

Stakeholders were involved in a full cycle cyanide spillage and man down drill involving a delivery truck accident with a cyanide box falling off the truck and the driver being incapacitated. The second truck driver tried to help but was gassed by cyanide. The drill was attended by a Government HCIS official, various representatives Civil Defence officials, the whole ERT Team, the Al Amar Technical Compliance Superintendent, Safety Engineer, Safety Specialist, Mine Manager, Mine Security staff. Also in attendance were two drivers from Globe Logistics (the Cyanide Transporter), the Pro-Chemie Operations Manager, Clinic staff including the Doctor and Nurse, and representatives from Government Hospital Al Quwayiyah. The drill was followed by a presentation on cyanide to all the parties present.

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

X in full compliance with

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

Basis for this Finding/Deficiencies Identified:
Dialogue meetings are two-way dialogue sessions involving both dissemination of information and the answering of questions on cyanide.
The Mine facilitates visits including various schools. Visit records were sampled for the secondary school Mizael Village - 22 May 2016 (12 visitors), Al Amar School - 5 April 2016 (11 visitors), University students Mining Geology - 21 April 2016 (19 visitors). The evidence of visits was in Arabic and was randomly translated. A cyanide orientation during 3 Feb 2016 for HCIS (Higher Commission for Industrial Security) visitors was given by Mine Manager Saleh A. Al-Tayyar and the attendance list (in Arabic) of 14 HCIS cyanide committee members was sighted. Induction video presentations are given by the President in English, Arabic and other local languages. These are the same presentations that were sighted in the certification audit. An animation-based video induction is available for use with schools' visits.
Stakeholders were involved in a full cycle cyanide spillage and man down drill involving a delivery truck accident with a cyanide box falling off the truck and the driver being incapacitated. The second truck driver tried to help but was gassed by cyanide. The drill was attended by a Government HCIS official, various representatives Civil Defence officials, the whole ERT Team, the Al Amar Technical Compliance Superintendent, Safety Engineer, Safety Specialist, Mine Manager, Mine Security staff. Also in attendance were two drivers from Globe Logistics (the Cyanide Transporter), the Pro-Chemie Operations Manager, Clinic staff including the Doctor and Nurse, and representatives from Government Hospital Al Quwayiyah. The drill was followed by a presentation on cyanide to all the parties present.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
It is reported that most of the local population can read and write, mostly in Arabic. The AGR cyanide awareness presentations are given in English and Arabic and other local languages.
No cyanide incidents requiring reporting under legal requirements occurred and thus none was reported on in the subsequent annual reports. The Ma'Aden Gold Annual Report 2014, pages 17- 18, refers to Cyanide Code, certification progress on mines and consignor/transportation certification of MGBM. The Ma'Aden Gold Annual Report 2016 includes reference to Cyanide Code progress and activities on page 21.
The mine is obliged to report accidents to the Ma'aden Gold Corporate Office in Riyadh. They will decide on further reporting to Government as per the Higher Commission of Industrial Security requirements and the Government Social Insurance System and/or Presidency of Meteorology and Environmental Protection. All incidents are additionally reported via "Hemaya" which is a Ma'aden software program to report and manage incidents and accidents.