INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Code Compliance Audit Gold Mining Operations

Summary Audit Report

Harmony Gold Mines Limited Kusasalethu Gold Plant South Africa

9^{th} – 13^{th} September 2013

Name of Operation:	Kusasalethu Gold Mine (previously known as Elandsrand Gold Mine)
Name of Operation Owner:	Harmony Gold Mines Limited
Name of Operation Operator:	Harmony Gold Mines Limited
Name of Responsible Manager:	Martin Bronn
Address:	Private Bag X2025, Carletonville
State/Province	North West Province
Country:	South Africa
Telephone:	+27 18 782 9344
Fax:	+27 18 782 1706
E-Mail:	martin.bronn@harmony.co.za

Location detail and description of operation:

The Harmony Kusasalethu Gold Plant is situated 18 km from Carletonville, which is 85 km from Johannesburg, South Africa.

The gold plant consists of the Milling section for grinding of ore, Thickeners for dewatering (pulping for leach feed), Leach section for dissolution of gold using liquid Sodium Cyanide as one of the reagents, Carbon in Pulp for adsorption of dissolved gold and Backfilling for producing support material for underground, of which only 30% is subjected to classification for backfilling, and the 70% is pumped to the tailings storage facility.

Ore Reception
Run of Mine (ROM) is conveyed from underground to the stock pile facility of 28 000 tons capacity. The stock pile material feeds to the three parallel silo bins of 2550 tons live storage capacity, from which ore is drawn from each silo to be taken to the three parallel run of mine mills for grinding to required size. Other surface source material is fed to the silos through a conveyor from an open stockpile feed grislier, taking the ore up into one of the three silos.

Milling
The milling section consists of three ROM mills with design capacity of 140 tons per hour (t/h). The three parallel and independent milling lines, each having a conveyor underneath each silo, get material delivered onto the conveyor via a Langlaagte chute.

Steel balls are used as grinding media, supplemented by wide range particle size of mill feed. The current feed rate is 75t/h. The mill feed and discharge pumps have variable drives to enable control of optimal efficiency for grinding and classification. There is two stage classification for each mill with each primary cyclone overflow combined into a common tank, the secondary cyclone feed tank, for second stage classification by secondary cyclone. The overflow of the secondary cyclone is further screened on a linear screen for the removal of coarse woodchips and tramp steel. The material passing through the linear screen is normally at a density of 1.1 -1.2 t/m^3 and a grind of 80% -75 micron and allowed to gravitate to the thickeners for dewatering.

Thickening
There are three thickeners, two of which are always online, fed from a distribution box of the thickeners feed launder, with the one thickener available as a standby in case of emergency. Calcium oxide (lime) is added at the thickeners for maintaining a level of alkalinity with a pH of 10.4 to prevent the generation of poisonous HCN (cyanide) gas at the leach section. Flocculant is added to aid with settling of solids, pulping the slime to densities of 1.5 to 1.6 t/m^3. Each thickener is equipped with variable speed drives to control leach feed densities which are linked to the installed densitometers that speeds or slows down the pump, based on the underflow densities. The overflow water of the thickeners gravitates to the two mill return tanks to be reused in the milling process.

Leach
The leach circuit consist of 12 tanks, each with a height of 20m and diameter of 9.0m Cyanide is automatically added to the first tank at a concentration of 240ppm, for dissolution of gold. Compressed air is used to agitate the slurry, suspending solids in pulp and raising dissolved oxygen to about 10ppm for optimal leach efficiencies. Retention time in each tank is 3.5 hours, totalling a 35 hour leach period for the 9 tanks online. Leach slurry flows from first tank through to the eleventh tank, while consuming 140ppm of cyanide in the process.

Carbon in pulp
The carbon in pulp (CIP) circuit is a carousel system design with eight tanks of 3.6m diameters and 9m height each. A cylindrical screen with 0.630mm apertures is used in every tank to retain activated carbon added at concentration of 50g/l. The first tank loads up to 10Kg/t by adsorbing the dissolved gold while allowable dissolved losses at the last tank on line is controlled at 0.01g/t. The loaded head tank is dropped and bagged to be transported to Evander Kinross plant for further refining process.

Backfill
The backfill plant consists of four modules. Each module comprises of a primary, scavenger and cleaner cyclone. All four modules draw feed from the common tank with a level sensor linked to the splitter box for directing flow from CIP. The feed tank level is set at 80% to subject material to classification and material is pumped to the TSF when the feed tank is above 80%. An automatic WAD cyanide analyser is installed at the residue line (feed to the backfill) to sample and analyse WAD cyanide levels for environmental compliances of allowable discharge levels of WAD from mine process circuit in case of spills and water overflows. The underflow of the primary cyclone is further subjected to classification by a cleaner cyclone, producing a final product of 1.7t/m^3 and permeability of over 200mm/s. The overflow of the cleaner cyclone and the

underflow of the scavenger cyclone are recycled to the primary feed tank for reclassification while the overflow of the scavenger gravitates to the reject tank and it is pump to Ultracep, where flocculent is added to aid in settlement of solids to increase the relative density to the required standard (1.4t/m^3) for tailings deposition the slime dam tank. About 0.11ppm of ferrous sulphate is added to neutralise the cyanide concentration of backfill product to less than 10ppm free cyanide concentration.

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: 24/4/14

Dates of Audit: 9th – 13th September 2013

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.

Kusasalethu Gold Plant

Facility

Signature of Lead Auditor

29/4/2014
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 Harmony Group-wide, cyanide supply contract, covering all Harmony Gold Plants, in place with Sasol Polymers, as the sole supplier of liquid Sodium Cyanide, delivered by bulk tanker. This supply contract includes Kusasalethu Gold Plant. Sasol Polymers is a signatory to the Cyanide Code and was re-certified as a fully compliant Production Facility with the ICMI Cyanide Code on 2 March 2010 and again, on 7th May 2013.

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:
A Group-wide cyanide supply contract covering all Harmony Gold Plants (including Kusasalethu) is in place with Sasol Polymers as the sole supplier of liquid Sodium Cyanide. Sasol Polymers is also responsible for the transport of cyanide solely using

Tanker Services, who started transporting Sasol Polymers-produced cyanide from July 2011. Tanker Services became a certified ICMI transporter on 13 December 2011. A Memorandum of Agreement (MOA) for the offloading of liquid sodium cyanide in terms of SANS 10231:2006 between Tanker Services Specialised Products Division and Harmony Gold Mining Company is in place. The supply contract and MOA cover the responsibilities and requirements for safety, security, unloading, emergency response (spills prevention and clean-up), route planning and risk assessments, community liaison, emergency response resource access and availability, training, and communication.

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 Group wide cyanide supply contract covering all Harmony Gold Plants (including Kusasalethu) in place with SASOL Polymers as the sole supplier of liquid Sodium Cyanide requires cyanide to be supplied by road tankers and the seller as well as the transporter will be ICMI Compliant over and above national regulations. Offloading is covered by a Memorandum of Agreement (MOA) for the offloading of dangerous goods between Tanker Services Specialised Product Division and Harmony Gold Mines Kusasalethu Gold Plant. The supply contract and MOA cover the responsibilities and requirements for safety, security, unloading, emergency response (spills prevention and clean-up), route planning and risk assessments, community liaison, emergency response resource access and availability, training, and communication.
There is a break in deliveries of cyanide to site by a ICMI certified cyanide transporter between July and December 2011.The auditors deem the break to be acceptable for Mine Code compliance purposes for the following reasons:-
1) The change of transporters was beyond the control of the mines,
2) There was only one ICMI certified transporter and one ICMI certified liquid cyanide supplier in South Africa and the mines were bound to the producer/transporter conditions,
3) Finding a replacement/alternate supplier/transporter in the short term was not feasible because the mines can only handle liquid cyanide on site and do not have the facilities to mix their own cyanide from briquettes,
4) the mines applied pressure upon the supplier to organise ICMI certification for the replacement transporter as soon as possible,
5) The interim cyanide risk was minimal because the new transporter , Tanker Services, took over all of the transporter resources of ICMI transport certified Sasol SiLog (dedicated bulk cyanide liquid tankers, trained and experienced owner-drivers and contract drivers, assessed route risk assessments, cyanide documentation and systems)

and was, and still is, covered in terms of Sasol's Product Stewardship and Responsible Care policies by the Sasol cyanide emergency response system (24 hour emergency control room, network of cyanide trained, emergency response spill and medical response service providers), dedicated cyanide tanker storage area and cyanide tanker decontamination facilities.

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 operation uses only liquid cyanide, delivered by bulk tanker, and no mixing takes place on site. Design drawings for the cyanide off-loading and storage area were sighted, signed by the consulting civil and mechanical engineer. The facilities are located away from people, away from incompatible materials, built with materials appropriate for use with cyanide and high pH conditions and no surface water is present in the area. The concrete unloading slab is sloped and drains into a sump equipped with a pump delivering the spillages into the main cyanide bund. The cyanide tanks are equipped with ultrasonic level indicators and alarms. The high level alarm set on 75% of cyanide tanks' physical capacity. An automatic offloading air valve shut off mechanism is activated at 90% of the operating capacity. An offloading procedure is in place, specifying activities by the off-loader to prevent cyanide tanks overtopping. The cyanide storage area is situated inside the plant equipped with access control and the storage area is within a fence and behind locked gates. The key is kept at security with a key procedure and register controlling use.

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:
Only liquid cyanide is used which is delivered via bulk tanker to storage tanks. The offloading procedure is detailed, spelling out PPE requirements, use of a buddy in the process, and clearly sequenced to prevent spillages and accidental releases during off-loading.

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 78 cyanide specific procedures, covering both operations and engineering. These are supported by the Mandatory Code of Practice (COP) for Tailings Disposal, and 9 procedures for TSF (Tailings Storage Facility) operations. Routine daily, weekly, monthly, quarterly and annual inspection reports, legal inspections, and checklists were sampled to check the effectiveness of systems and ensure that proactive and reactive management takes place.
The plant maintenance and inspection schedule includes preventative maintenance inspections on cyanide critical equipment (tanks, pipes and pipelines, secondary containments, pumps, valves, ponds and impoundments), using a computerised Planned Maintenance System (PMS) called the DMS system. Quarterly technical inspections with consultants of the TSF facilities are undertaken to ensure integrity and safety in addition to the monthly TSF inspections involving the site staff and TSF contractors. A change management procedure covering health, safety and environment is in place and operational.
There is a probabilistic water balance in place, and no scenario has been identified where the need has been highlighted to shut down the plant to prevent overtopping, as there is sufficient freeboard in return water dams. Although there is no need for emergency power to prevent cyanide releases as all solutions and slurries require pumping and the process plant does not use gravity flow in the design, a backup generator is in place to run the

thickener tunnel pumps to enable pumping of spillage and prevent discharge to the spillage dams. All spillages will be contained in bunded areas when power trips occur.

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 plant receives ore from a single shaft system with consistent Witwatersrand type gold ore. Surface reclaim material is treated at times and increased cyanide requirements have been noted with the Deelkraal feed. A report entitled "Optimisation of Cyanide Consumption" has set objectives to optimise CN Consumption, identified high consumption of cyanide causes, reviewed optimising of recovery, and highlighted decrease WAD CN to less than 50 mg/l to ensure adherence to ICMI requirements. The project also evaluated cyanide control. The results indicate a reduction of cyanide consumption from 0.397 to 0.337 kg/t. Further ongoing optimisation test work is being conducted. Bottle roll test work was done on spillage pond material, Stockpiles 1#, 2# and 3#, spillage, and waste to enable better prediction of cyanide consumption.
TAC 1000 on line cyanide measurement and control is used and a WAD 1000 on-line analyser on the plant tails is used for cyanide control and for WAD cyanide monitoring purposes.

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:
A probabilistic water balance for the TSF and for the plant is in place. Information is included on rainfall, storm events, phreatic levels and solution deposition. Rainfall data is collected daily on the TSF and at the plant. The probabilistic water balance includes precipitation: maximum, minimum, and average running totals which are incorporated in revising storm frequencies against the 1:50 and 1:100 year storm event scenarios. Return

water pond freeboard is determined using the water balance and rainfall scenarios consider seasonal variation. It is not permitted to store any storm water in the TSF supernatant pool. The TSF freeboard is measured monthly and quarterly and return water dam levels are measured by a level indicator and inspected by artisans and Environmental Department. Storm water diversion trenches are formally inspected and cleaned.

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 compliance point used is the feed tank from the CIP to the Backfill tanks. The assumption is that this value is the worst case scenario and all cyanide in solutions at the TSF will be at least below the sample value. An on-line WAD 1000 analyser is used to measure the WAD cyanide on a continuous basis, backed up by daily manual samples analysed at the External Performance Laboratories. WAD 1000 analyser values for the period since certification were reviewed and all values are below 50 mg/l WAD cyanide. Thus, no special measures are needed for the protection of wildlife and livestock. Daily wildlife inspections are conducted by TSF contractors and reported to plant management and no mortalities have been recorded since certification.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
No direct discharge to surface water occurs. No established mixing zone exists as there is no discharge to surface water. Indirect discharge to the Loopspruit stream is possible during abnormal conditions, from the bottom of the return water dam. However, provision is made for a pump to return seepage from the trench back to the return dams. The Loopspruit is sampled monthly downstream of the TSF and analysed for WAD cyanide. Values sampled since certification indicate values all less than 0.5ppm WAD cyanide. Level monitoring of the seepage pump sump is done, together with inspections carried out three times per week. A seepage catchment and pumping system to contain

and return any dam seepage to the process and prevent seepage to the Loopspruit across the road is in place.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified
The TSF is equipped with toe drains flowing into the return water dam. A seepage catchment and pumping system, to contain and return any dam seepage to the process and prevent seepage to the Loopspruit across the road, is in place. No jurisdictional beneficial use of groundwater is established. Borehole samples are taken down stream of the TSF to establish WAD cyanide in groundwater. Values of mg/l WAD cyanide from the two significant boreholes noted to be at the limits of detection of 0.5.
A back fill plant is in place at the Gold Plant. A MINTEK study of 2010 included evaluation of health impacts of backfill and concluded, "…The backfill section furnishes a product of sufficiently low cyanide to eliminate risks underground. …" The Report further commented, "…The backfill product contains low enough cyanide levels to rule out Safety & Heath as well as groundwater issues resulting from the seepage water…" A procedure specifies free cyanide to be 0.001% and batches are sampled and titrated before being released. Ferrous sulphate is used to reduce free cyanide to the required standard.

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:
The cyanide storage tanks are placed on plinths above the bund floor inside a concrete bund. The leach tanks are placed on solid concrete foundations on a slope and the bund is not designed for tank containment, but only for draining tanks. However, the bund is linked to the spillage containment dams via gravity flow. Containment bunds were sighted for the CIP area, cyanide storage section, and backfill area. All secondary containments for cyanide unloading, storage, and process tanks are sized to hold a volume greater than that of the largest tank within the containment and any piping

draining back to the tank, and with additional capacity for the design storm event and are linked where capacity is short. All bunds are constructed with sumps and sump pumps designed to pump spillages back to the process. The reagent strength cyanide dosing lines are equipped with secondary containment from the cyanide dosing pumps up to the leach tank dosing points. Slurry and process water pipelines are subject to the PMS system as part of the spill prevention measures. Most of the pipelines run across concrete or tar roads to assist with prevention of releases to the environment. The pipeline running next to the TSF was moved into the TSF footprint which is an effective secondary containment. The Slurry line is inspected weekly by a boilermaker and valves and pumps are inspected daily. The TSF contractors inspect the valves and pipes inside the TSF ring feed daily. Thickness testing of pipelines is also conducted. Reagent strength cyanide tanks are made of mild steel and reagent strength cyanide lines are HDPE with valves being a mix of Saunders and other suitable valves with stainless steel. Slurry pipes, leach and CIP tanks are made of steel.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The detailed drawings of the original plant are available, but no new cyanide facilities or modifications to existing facilities have been built and commissioned since the certification audit. The Kusasalethu Tailings Storage Facility Annual Stability Assessment, July 2012, signed by competent persons, covers the 2011 and 2012 annual audit report periods as the previous Geotechnical Consulting Company was replaced by the current external consulting Geotechnical Engineers. These engineers conduct the current review of the TSF in terms of the external quarterly and annual reviews. The current quarterly report by the external Geotechnical Engineers covers the critical parameters and TSF conditions to ensure that the TSF can be safely operated as per the operating parameters at the time of the report.
Structural inspections were conducted on the all cyanide storage tanks, leach tanks, and CIP tanks by competent persons. Their report concluded in the executive summary that some supports need to be replaced and some corrosion protective paint refurbishing was required with the specifics being contained in the detail for each section and equipment unit. With ongoing maintenance, the report thus inferred that the plant could continue to be operated within established parameters consistent with the Code's Principles and Standards of Practice. The inference comes from the fact that confirmations of completion or prioritisation of work are included in the breakdown of the individual

sections of the report, rather than an overriding statement at the end of the report. Work progress and completion was within the time frames included in the report.
In the initial certification of the operation, the plant had no QA/QC records and therefore reports by competent persons were used to confirm "fit for use". The operation has continued with this regular inspection approach.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
A procedure for environmental monitoring (including sample preservation and chain of custody procedures) of surface water and borehole water, developed by a competent person, was sighted and checked. Sampling conditions are documented on the sampling log sheet. There are no discharges to surface water but boreholes are in place downstream of the plant. There are no upstream boreholes as the site is located on top of the hill on a catchment and watershed boundary. Boreholes are sampled weekly, the stream is sampled weekly, open waters are sampled weekly, and wildlife is monitored daily.

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

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
A Cyanide Decommissioning Procedure for cyanide facilities at Kusasalethu is in place which includes a closure schedule and sequence of decommissioning activities. The Cyanide Decommissioning Procedure is reviewed annually.

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, "Closure Cost Assessment for Harmony Gold Mining Limited 2013 Kusasalethu and Deelkraal", dated June 2012, contains a line item of R450,070, being the allocation for cyanide decommissioning of the cyanide facilities. The Elandsrand and Deelkraal Rehabilitation Trust Fund Financial Statements for the year ending 30 June 2012 were sighted. This trust fund is established by legal requirement in terms of the Minerals and Petroleum Resources Development Act.

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 78 cyanide specific procedures, covering both operations and engineering. The procedures include PPE requirements and appropriate pre-work inspections. These are supported by the Mandatory Code of Practice (COP) for Tailings Disposal, and 9 procedures for TSF (Tailings Storage Facility) operations. Routine daily, weekly, monthly, quarterly and annual inspection reports, legal inspections, and checklists were sampled to check the effectiveness of systems and ensure that proactive and reactive management takes place.
The plant maintenance and inspection schedule includes preventative maintenance inspections on cyanide critical equipment (tanks, pipes and pipelines, secondary containments, pumps, valves, ponds and impoundments), using a computerised Planned Maintenance System (PMS) called the DMS system. Quarterly technical inspections with consultants of the TSF facilities are undertaken to ensure integrity and safety in addition to the monthly TSF inspections involving the site staff and TSF contractors. A change

management procedure covering health, safety and environment is in place and operational.
Monthly Health and Safety Representatives meetings include safety, cyanide and permit issues. The weekly plant communication (and Safety) meeting includes periodic presentations on cyanide-related issues. Daily section toolbox talks also touch of issues which can be escalated to safety meetings. Risk assessments are also used to involve workers who may be operators, supervisors or safety representatives.

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 plant controls the pH at 10.5 which is optimal for the type of ore treated and the process water used. The plant controls the pH using slaked lime by measuring pH by meters at the thickeners, and leach tank no 1 which is backed up by manual pH measurements.
Two fixed HCN gas monitors are in place at the cyanide storage and the leach dosing area at top of leach (no 1 and 2 Leach tank). Three PAC 7000 personal HCN gas monitors are in use, alarming at 4.7 ppm 8 hour exposure and 10 ppm instantaneous HCN gas value. One PAC 5000 personal HCN monitor is used at the TSF. Formal hot spot surveys were conducted and documented in 2001, 2012 and 2013. Known hotspots from experience are identified and marked. Calibration records were sighted.
Safety showers and eye wash baths with diffusers are located at appropriate places throughout the plant and inspected regularly. The use of dry powder fire extinguishers was confirmed during site inspections. Fire extinguishers are checked monthly and before offloading. The Gold Plant working language of the work force is English and appropriate MSDSs were available at the cyanide storage area and control room. First aid procedures in English were available in first aid cabin.
The plant uses colour coding and direction flow for reagent strength cyanide lines, other lines and launders and labelling was observed. Slurry lines include “no drinking water” and “water contains cyanide” signs. Colour coding signage is displayed in the plant. Accident and incident reporting and investigation procedures, based upon the site safety reporting requirements, were found to be in place and effective.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
Cyanide emergency cabin at cyanide storage, at the top of leach, and the Clinic have medical oxygen, resuscitators and antidote kits. Telephone, radios, man-down alarms and cell phones are used for communication. Water is also available. The Hospital Sister inspects the antidote kits, in addition to the chemical off-loader. Antidote kits are stored inside fridges at the dressing station, cyanide offloading emergency cabin and top of leach cabin according to manufacturer's recommendations. The Safety Officer is responsible for re-ordering antidote kits and replacement is undertaken by the hospital pharmacy and replaced before expiry date. The cyanide equipment is regularly checked and tested and mock drills are held regularly on site.
Emergency teams are available on each shift, trained to administer oxygen and cyanide first aid. Cyanide emergency cases are transported by Netcare 911 ambulance (private service provider) to the appropriate hospital (St Albert hospital in Randfontein and Leslie Williams Hospital). An Agreement between Harmony and Leslie Williams hospital is in place which covers:- 1. Provision of primary health services to mine employees and contractors, and 2, That the Leslie Williams is equipped to receive serious cyanide patients from Harmony Mines. An email was sighted from Clinical Manager SA Operations Harmony, to Dr Ellis Cole at Leslie Williams Hospital, which confirmed a telephonic discussion that the Hospital is able to accommodate a cyanide drill and cyanide patients. Emergency exercises are conducted periodically from the plant to the hospital and additional cyanide drill training is done regularly and documented. Netcare 911 is the contracted ambulance service undertaking patient transport.

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:
The plant has developed site-specific emergency scenarios and responses for its emergency response plan. The emergency preparedness plan combines existing

procedural 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. These preparations are regularly reviewed in the light of changes, mock drill learning points and employee feedback.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The workforce is involved in the Emergency Response Plan process through safety meetings, shift meetings, training and emergency drills and emergency drill feedback sessions. The community is not directly involved in the Plan but is informed on its contents during dialogue sessions. Drills are used to involve hospital and ambulance staff in planning processes.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Emergency Response Plan details clear duties, roles and responsibilities for the various emergency scenarios. The control room operator is the primary response coordinator, authorised to call ambulance, security, and plant management. 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 where external resources and skills might be needed. Periodic drills involving internal and external stakeholders ensure that roles and responsibilities are understood and clearly implemented.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Emergency Response Plan includes details for appropriate emergency notification and reporting (internal and external) and the call-out procedure and contact information lists which are updated regularly. Media communication is dealt with in the Plan.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 7.5**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The environmental monitoring of surface water, liquid cyanide spillage, and use of ferrous sulphate procedures cover clean-up and remediation relating to releases, pipeline failures and spills, as appropriate to the site-specific identified scenarios. Use of neutralization processes and materials is clearly covered, as is disposal of contaminated materials and the use of treatment chemicals such as ferrous sulphate in surface water which is prohibited.

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

X in full compliance with

The operation is □ in substantial compliance with **Standard of Practice 7.6**

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The Plan is required to be reviewed annually, following incidents and emergency drills or when new information regarding cyanide becomes available. The report of a drill which included a cyanide spill and cyanide related injury was sighted. Evidence was sighted of learning points emerging from the various cyanide man-down drills.

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 plant personnel inside the plant fence (including security and TSF contractors) are trained in basic cyanide awareness. The training matrix includes a flagging system to timeously indicate need for training and refreshers. This was confirmed during interviews with staff. Refresher training is done annually, based on schedules using a training shift system (which is also used for routine update training). Selected employees were checked in interviews on their understanding of cyanide hazards, first aid and emergency response and this was further verified through checking of their training records. Records are retained for 40 years on the Plant, after which the records are sent to the central Harmony archive.

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:
Plant specific standard operating procedures are used for training as per the training matrix, the latest of which was reviewed. The training matrix includes Process and appropriate Engineering staff. Not all engineering staff are trained and authorised to work on cyanide equipment. Each person's specific job training requirements are detailed in the training matrix. All Trainers are trained and registered as Assessors and the Harmony Metallurgy training establishment is formally ISO 9001 accredited. An ID card for time and attendance is only issued after training is received. All employees are trained before being allowed to work on a cyanide section. Assessments are used to test knowledge and competency. PTOs (Planned Task Observations) are used for on-the-job competency evaluation as per schedule. The current requirement is for 4 PTOs per Supervisor per

month. Records are retained for 40 years on plant, after which the records are sent to a central archive.

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:
The training matrix includes specific training for the emergency response team (sighted training matrix containing training elements covering cyanide releases and cyanide exposures). Unloading, Production and Maintenance personnel are trained in the procedures to follow if cyanide is released and in cyanide exposure incidents. The plant has a dedicated emergency response team per shift, and the shift workers are trained in the response in case of any cyanide release / spillage after hours. Cyanide section staff are trained in cyanide releases and exposures using emergency drills as per procedure. The training matrix includes all training elements to cover cyanide release and cyanide exposure incidents.
Offsite emergency responders include Leslie Williams and Sir Albert Hospitals, as well as the Netcare 911 ambulance services. The local community is not involved with designated duties in the ERP (Emergency Response Plan). The responders are included in the full cycle mock drills. Periodic mock drills are undertaken and training personnel attend these drills and formally evaluate response and performance. Refresher training is done annually. Records are retained for 40 years on plant, after which the records are sent to a central archive.

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. Meetings with stakeholders were initiated, including Wedela Primary School dated 6 September 2013, and a farmers

meeting - dated 4 September 2013, where fliers were issued. Questions were asked about tanker trucks with the 1935 label on and swimming in the return water dam. The presentation given, which included information on the ICMI Code, use of cyanide at the mine, what to do at an accident scene, symptoms of cyanide poisoning and cyanide transportation, was reviewed.

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. Meetings with stakeholders were initiated, including Wedela Primary School dated 6 September 2013, and a farmers meeting - dated 4 September 2013, where fliers were issued. Questions were asked about tanker trucks with the 1935 label on and swimming in the return water dam. The presentation given, which included information on the ICMI Code, use of cyanide at the mine, what to do at an accident scene, symptoms of cyanide poisoning and cyanide transportation, was reviewed.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
A cyanide PowerPoint presentation was developed and given at stakeholder meetings. The majority of the general population is literate however presentations are given in English, Tswana and Afrikaans, as appropriate. Copies of presentations were made available to stakeholders who requested them.
Reporting on incidents has not been done because there have been no incidents. Injuries must be reported to the Department of Minerals Resources who do not necessarily make the information publically available. Similarly, spills and releases must be reported to the Department of Water Affairs and Environment. Transport related incidents are reported by Sasol Polymers and the transporter, Tanker Services, through their own reporting mechanisms.

The Harmony Group communication policy is followed. Cyanide incident response would need to be prepared by the Corporate Communications Department. The Harmony website contains an item, "Harmony and the Cyanide Code". The Cyanide Code is mentioned in the Sustainable Development Report, p124 (2012). Information on significant cyanide exposures and releases would be made available, after appropriate investigations, on the company website (www.harmony.co.za) and via the annual Sustainable Development Report.