

***INTERNATIONAL CYANIDE
MANAGEMENT INSTITUTE***

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

Summary Audit Report

***Harmony Gold Mines Limited
Doornkop Gold Plant
South Africa***

4th – 8th November 2013



Name of Operation: Doornkop Gold Mine
Name of Operation Owner: Harmony Gold Mines Limited
Name of Operation Operator: Harmony Gold Mines Limited
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Location detail and description of operation:

The Doornkop Gold Plant is situated 15km south of Krugersdorp, next to the R558 road en route to Lenasia and 25 km west of Johannesburg in South Africa.

The gold plant consists of a milling section for grinding of ore, thickeners for dewatering (pulp for leach feed), a leach section for dissolution of gold, using liquid sodium cyanide as one of the reagents, Carbon in Pulp for adsorption of dissolved gold and a recovery section which consists of elution, electro-wining and a smelt house. All tailings are pumped to a Tailings Storage Facility, adjacent to the plant on the northern side.



Auditor's Finding

This operation is

X in full compliance

- in substantial compliance *(see below)
- 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

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Names and Signatures of Other Auditors:

Name : Dawid M. L Viljoen

Signature

 Date: 26/6/2014

Dates of Audit: 4th – 8th November 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.

Doornkop Gold Plant

Facility


Signature of Lead Auditor

Date

26/6/2014

Doornkop Gold Plant


Signature of Lead Auditor

23rd June 2014

Auditor's Findings

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

Standard of Practice 1.1: Purchase cyanide from manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:

There is a 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 the Doornkop 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 Doornkop) 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 Doornkop) 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 Doornkop 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.

Sasol Polymers was responsible for the transport of cyanide until July 2011 when Sasol SiLog and its physical assets were sold to Tanker Services who started transporting Sasol Polymers-produced cyanide from July 2011. Tanker Services became a certified ICMI transporter on 13 December 2011. 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 took over all of the transporter resources of ICMI transport certified 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. Original drawings were satisfactorily reviewed during original certification and are still available. Cyanide off-loading and storage facilities were inspected and approved by the cyanide manufacturer's technical officer and supporting reports were sighted. A report prepared in 2011 by a Professional Engineer concluded that bund walls and floors, concrete plinths and supporting steel structures are in good safe condition. The cyanide dosing system was replaced with a single line dosing system with polypropylene piping and peristaltic pumps. The pipes material specifications indicate a level 1 (Highly resistant) for cyanide and caustic solutions. The structures were designed and located on concrete and away from people, with the control room being the closest area where people are working.-The control room windows are sealed and a fixed HCN gas monitor is installed in the storage area. The structures are also located away from surface waters and incompatible materials, and built with materials appropriate for use with cyanide and high pH conditions. The tankers are parked on a concrete surface sealed with bitumen, equipped with a drain hole draining into the cyanide bund area. The interconnected tanks (placed on solid concrete plinths) are equipped with ultrasonic level measurement with alarms on the PLC. Cyanide is ordered only when the levels are lower than the specified levels (40%). The cyanide storage is located in a fenced plant area with access control and inside a fenced area with gates locked and key control procedure and register in place. The cyanide is stored separately from incompatible materials.

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 73 cyanide specific procedures, covering both operational and engineering tasks. The TSF (Tailings Storage Facility) is operated using the Mandatory Code of Practice (COP) for Harmony Doornkop Plant Residue Deposit and the Harmony Doornkop Plant Tailings Dam Operating and Maintenance Manual and 44 procedures for TSF operations. The procedures identify the assumptions and parameters on which the facility design was based, including freeboard required for safe pond and impoundment operation and the cyanide concentrations in tailings. Routine shiftly, weekly, monthly, quarterly and annual inspection reports, legal inspections, and checklists were sampled for 2011, 2012 and 2013 to check the effectiveness of systems and ensure that proactive and reactive management takes place. The frequency of inspections is deemed sufficient to assure and document that the operation is functioning within design parameters.

The plant maintenance and inspection schedule includes preventative maintenance inspections on cyanide critical equipment using a Planned Maintenance System (PMS) called the DMS 2000 system which was commissioned in July 2009. 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 the plant operates in a water deficit situation. However, the plant will be stopped temporarily in the case of breakdowns or planned shutdowns using standard plant stopping and starting procedures. The plant was designed with bund areas that should contain all spillages during a power outage. The bund areas are equipped with sump pumps that would return the bund contents to the process following restoration of power. Overtopping of the bunds will flow to the emergency pond, from where spillage could be pumped back to the process. Thus no emergency power is needed. With regard to the TSF, the new 1.6 million m³ return water dam was designed to cover the design storm event (1:100 year, 24 hour storm event) at the TSF and if levels are maintained, will not require any emergency pumping equipment.

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:

Weekly leach profiles and bottle roll tests are conducted on separated mill product thickener streams to determine recovery of the two feed sources consisting of Harmony and Gold One ore (due to toll treatment agreement). The bottle roll results are documented and graphed. Specific cyanide optimisation tests were completed on the different feed ore types. Cyanide consumption vs. grind testing is also carried out. The two ore sources were tested for metallurgical performance and reagent consumption and no changes have occurred in ore sources since the certification audit. Cyanide levels as free cyanide is maintained at standard levels - 180 - 200 g/t as sodium cyanide. Consumption varies based on ore types, and free cyanide is controlled at 200 ppm in the leach feed. Leach agitation efficiency was improved by the installation of baffle plates and upgraded agitators resulting in effective mixing.



Manual sampling and free cyanide titrations are done and used in conjunction with the ratio control and TAC 1000 cyanide analyser. Ratio control on thickener underflow, coupled with the TAC 1000 feed and tailings sample results, are used to control cyanide addition. A WAD analyser is used on the residue. WAD analyser options continue to be considered as a feedback loop.

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 which is updated monthly with actual data. Information is included on rainfall, storm events, and solution deposition. Rainfall data is collected daily on the TSF and via a weather station on the plant. Phreatic surfaces and stability analyses on the TSF are measured and checked quarterly and annually, where TSF COP parameters, including pool levels, are reviewed. The TSF pool levels and freeboard are checked visually on a weekly basis and surveyed monthly. Pond freeboard is measured monthly and formally surveyed annually.

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 online WAD 1000 monitoring results from the tailings tank were reviewed for the three years since certification. In 2011 there was an average of 35 mg/l WAD cyanide. 4 periods of exceedance were noted with investigations at the end of April 2011, end of Aug 2011, and end Oct 2011 which were traced to problems with cyanide dosing system (The system was subsequently replaced.) In 2012, the average was 23 mg/l WAD cyanide with 3 exceedance noted. Investigations in the 3rd week of September and the end of November linked the exceedances to problems with the leach feed pump, and the valve and pipe system which were fixed. In 2013, the average was 35 mg/l WAD cyanide. There were 7 periods of exceedances noted with investigations in mid-April, end of May, beginning July, middle August, and beginning of October. These were related to a management decision to increase addition rate as indicated by bottle roll tests on the

specific ore types received at the time. (This is now back to normal ranges and supported by bottle roll tests). A second reason was breakdowns on the duty leach feed line equipped with the mass flow system which is used as primary cyanide dosage control, The standby pipeline is not equipped with a mass flow system, and when used, results in cyanide control are done by the less efficient TAC 1000 cyanide value outputs to the variable speed pumps. The permanent solution planned is to also install an additional full mass flow system on the standby leach feed line. The TSF Tip point is sampled weekly and results indicate that the WAD cyanide values are less than 50 mg/l for the full period since certification. Penstock sample values are less than 50 mg/l, and the return water dam WAD cyanide levels are below 50 mg/l. Thus no special measures are needed for the protection of wildlife and livestock. Daily wildlife inspections are conducted on the TSF and there have been no wildlife mortalities reported 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:

The Plant is a "no discharge" operation in terms of its legal permits. The Geohydrological study undertaken for the Doornkop tailings facility and the shaft complex concluded that cyanide (total and WAD) were analysed for and not detected and there are thus no concerns with cyanide. No changes occurred since the certification audit.

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

There are no specific beneficial uses identified (i.e. no boreholes and drinking water uses are supplied by surface piped systems), but seepage management practices are in place. The jurisdiction (Department of Water Affairs) has set a general standard of 0.5ppm free CN as the limit for groundwater levels. The TSF is designed with under drains draining to the return water dam. The pool is controlled as per the TSF Code of Practice and a

penstock is used to remove water from the pool and it drains into the return water pond. The return dam wall is equipped with drain pipes and any seepage is returned to the main dam. No scavenging boreholes are used. The return water dam is unlined but reported to be on a clay base.

Monitoring boreholes are in place and sampled six monthly. All samples are analysed for WAD cyanide. The borehole sampling map was reviewed and sample values were checked since certification. The boreholes cover upstream and downstream of the plant and TSF and all values are less than 0.5mg/l WAD CN (all reporting at the limits of detection). The mine does not make 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:

The cyanide storage, leach, CIP, elution and residue tanks are all placed inside concrete bund areas. The CIP tanks are rubber lined and the rubber is inspected on an annual base as per the PMS system. The tank base design is a solid design and not ring beams. The cyanide sump pump returns any spillage to the leach circuit in the leach feed (the pump has a manual start / stop operation), the leach sump pump returns spillage to the leach circuit, the CIP sump pumps return spillage to CIP tanks, the residue sump pump returns spillage to the residue tank, and the trench pump return water to the CIP tanks. All secondary containments are sized to hold a volume greater than that of the largest tank and any piping draining back to the tank and the design storm event. All plant pipelines inside the plant are rubber lined and are placed above a concrete surface, with shiftly inspections being conducted on the pipelines. Reagent strength pipelines are polypropylene lines and are placed inside secondary containment with any leaks draining back to the cyanide bund or leach bund. The residue pipe between the plant and the main valve station to the ring main is located inside an earthen trench. The TSF line is placed on the DMS 2000 planned maintenance system where inspections are scheduled. All TSF pipelines are rubber lined as an additional spillage prevention measure. The TSF contractor inspects the ring main pipeline and valves and reports to plant management, and the Foremen inspects the pipeline weekly, with Security inspecting TSF pipelines after hours. Cyanide tanks and pipelines are manufactured from materials compatible with cyanide and high pH conditions.



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 plant is approximately 27 years old and Quality Control / Quality Assurance documentation was not available. However, "Fit for purpose" inspection reports by a Professional Engineer were sighted. (These inspections were also carried out for the certification audit.) The Professional Engineer indicated that he had completed the inspections concluded that the items: including intake structure, bund walls and floors, concrete plinths and supporting steel structures are in good safe condition and that if normal maintenance were carried out, the plant would be safe and serviceable. Documentation covering funding allocation and expenditure on on-going repairs and maintenance was sighted. It was noted that a formal PMS system has been in place since June 2009.

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:

Procedures for environmental monitoring (including sampling, sample preservation, chain of custody procedures, cyanide species sampling and documenting of sampling conditions) of surface water and borehole water, developed by a competent person, were sighted and checked. There are no discharges to surface water but boreholes are in place up and down stream of the plant. Surface and borehole sampling is done weekly, surface streams are sampled monthly, and wildlife is monitored daily on the TSF for any mortalities. Frequencies are deemed adequate to identify changes.

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 Decommissioning Procedure for cyanide facilities in Doornkop Plant is in place which includes an implementation sequence schedule for decommissioning activities. The decommissioning plan is reviewed annually. The procedure includes a review requirement when operations have changed, when there is a change in closure planning, or every 5 years.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:

The Closure cost assessment for Harmony Gold Mining Company Limited 2013, indicates an allocation of R450 070.60 for third party cyanide decommissioning for Doornkop. Closure cost estimates are updated on an annual basis as per legal requirement and the estimates are reviewed externally every 2 years. The Harmony Gold Environmental Trust fund financial statements for the year ending 30 June 2012 signed by Auditors, PriceWaterhouseCoopers, on 15 May 2013, include a general rehabilitation provision is R48 004 204.97 (which includes cyanide decommissioning) as at 30 Sept 2013. Members of the Trust are Harmony Gold Mining Company Limited, Evander Gold Mines Limited, Kalahari Gold Ridge Mining Company and Randfontein Estates Limited 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 73 cyanide specific procedures, covering both operational and engineering tasks. All procedures include the appropriate use of PPE and required pre-work inspections. The TSF (Tailings Storage Facility) is operated using the Mandatory Code of Practice (COP) for Harmony Doornkop Plant Residue Deposit and the Harmony Doornkop Plant Tailings Dam Operating and Maintenance Manual and 44 procedures for TSF operations. Routine shiftly, weekly, monthly, quarterly and annual inspection reports, legal inspections, and checklists were sampled for 2011, 2012 and 2013 to check the effectiveness of systems and ensure that proactive and reactive health, safety and environmental management takes place.

The plant maintenance and inspection schedule includes preventative maintenance inspections on cyanide critical equipment using a Planned Maintenance System (PMS) called the DMS 2000 system which was commissioned in July 2009. 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.

Worker input is covered through involvement of workers and Safety Representatives in safety meetings, risk assessments, and Planned Task Observations (PTO's). It was confirmed during interviews that there is worker and supervisor involvement in daily and weekly safety meetings where input on safety is obtained.

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:

In the plant, pH is measured on the leach feed and residue and included in daily log sheet. The pH is controlled at 10.5 which is the norm for Witwatersrand ores, and this backed up by lime titrations on shift every 2 hours. Slaked lime is added to the thickener, which has automated pH control, using on-line pH measurements.



Fixed Polytron cyanide gas monitors are installed at the cyanide storage area, the leach dosing point and the CIP. There is one handheld PAC7000 cyanide gas monitor in control room and one PAC7000 cyanide gas monitor in smelt house, one PAC7000 cyanide gas monitor at Engineering, and one PAC7000 cyanide gas monitor at the TSF. Calibration records for fixed and personal monitors were sighted. Hotspot surveys are completed annually by the occupational hygienist and reports for 2010, 2012 and 2013 showed no cyanide hotspots.

Safety showers are located at appropriate places throughout the plant and inspected weekly. The use of dry powder fire extinguishers was confirmed during site inspections. Fire extinguishers are checked monthly and before offloading and 6 monthly by specialist contractors.

The new cyanide dosing secondary containment and piping system is colour coded for cyanide. The direction of flow is clearly indicated. The plant uses a pipe colour coding system and staff is trained on the colour coding. Pipe colour coding boards were noted during site inspections TSF slurry line and return water lines are labelled, warning of poisonous water. During the site inspection, warning signs at the were sighted which included warning that cyanide is present, no eating, drinking, smoking, open fires, and requiring PPE. Eating and drinking is only allowed in designated areas and this is included in the induction and refresher training. MSDSs and cyanide safety and first aid information (in English, the language used on site by the workforce) was sighted during the site inspection. 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:

Potable water, oxygen and antidote kits are available. Emergency communication is done via radio, backed up with a man down alarm (at offloading) sounding in the control room. Emergency Tripac antidote kits are available at offloading, leach, smelthouse, and CIP. An Emergency cabin is equipped only with cyanide emergency equipment. All Tripacks are stored in fridges as per the manufacturer's guidelines. There is a PMS monthly cyanide safety equipment checks and weekly checks of cyanide antidote. The Metallurgy Foreman's weekly inspections include cyanide emergency equipment and antidotes.

The emergency team is trained in the emergency plan and the administering of oxygen. Antidotes are applied only by professional medical staff trained in cyanide first aid. A 911 ambulance is stationed at the mine clinic across the road from the plant and the ambulance paramedic staff are trained in cyanide emergency first aid as well as in cyanide awareness. A service level agreement is in place with nearby

Lenmed Randfontein Private Hospital who, "...shall be obliged to provide the required level 1 trauma emergency preparedness facilities for Harmony Employees requiring medical services for the treatment of cyanide poisoning in compliance with the international cyanide poisoning treatment protocols from time to time as notified to the Parent (*hospital*) in writing from time to time.." and are equipped and trained to treat both cyanide gas and liquid exposure cases. The plant safety officer inspects the hospital cyanide emergency equipment monthly. Full cycle drills conducted from plant to hospital include cyanide spillage during offloading, man down: solution exposure as well as gassing.

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 induction training, safety meetings, training and emergency drills. 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 Preparedness 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, and cell phone) of internal and external resources for the various scenarios, particularly with detail where external resources and skills might be needed. Also identified are the Emergency Response Team and their training requirements. 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 Preparedness 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, and environmental incident reporting, 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, hypochlorite and hydrogen peroxide in surface water which is prohibited, unless there is a direct threat to human life.

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. Reports on various drills, included a cyanide spill and cyanide related injury were 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 staff entering the plant, including security and contractors, receive cyanide basic training which includes cyanide first aid. The training matrix includes all staff requiring

cyanide training. This was confirmed during interviews with staff. Refresher training is given annually on return from leave. The system flags staff with expired training requiring refresher training. The e-learning system blocks the entry cards to the Plant if refresher training is not completed successfully. The clock system is also linked to the payroll system, resulting in non-payment if the employee has not clocked in. 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, both hard copy and electronic format.

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:

The staff are trained using the Standard Work Procedures (SWPs) during on-the-job training. An updated skills needs analyses includes all names, jobs, unit standards and training requirements per job as well as any outstanding modules. The Training Officer does training on national training unit standards and skills programs in addition to the SWPs. All Trainers are trained and registered as Assessors and the Harmony Metallurgy training establishment is formally ISO 9001 accredited. The training system uses a matrix to ensure that all cyanide personnel are trained prior to starting work in the cyanide areas. All chemical Off-loaders are formally appointed before being allowed to offload cyanide. Metallurgical plant induction is a prerequisite to getting access through the card access control system. Refresher training is driven through the PTO (Planned Task Observation) system, where re-training is given, as required. Records are retained for 40 years, both hard copy and electronic format.

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:

All cyanide section employees are trained in the cyanide emergency procedures, including cyanide release scenarios. This is done during the induction and refresher

courses. All cyanide section employees, cyanide specialists and cyanide maintenance staff are trained in advanced cyanide rescue and first aid. A service level agreement is in place with Lenmed Randfontein Private Hospital, which is equipped to treat both cyanide gas and liquid exposure cases. The plant safety officer inspects the hospital cyanide emergency equipment monthly. Training arrangements with the hospital are in place and Hospital and Netcare 911(ambulance) are involved with the emergency drills to test and confirm arrangements and plans. Community members are not involved in the emergency response plan. 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, both hard copy and electronic format.

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. Communities were involved in meetings and evidence of a meeting on 12th July 2012, attended by 85 people, with the nearby Tsepisong community and the local council, highlighting dangers of cyanide associated with the mine slime and return water dam and emergencies was sighted. A similar meeting on 9 December 2011 with Slovoville and Tsepisong communities was also held. A school visit and presentation to nearby Bottom Primary school, on the 22 August 2013, discussed cyanide dangers, symptoms, exposure mechanisms and uses and dangers of TSF.

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. Communities were involved in meetings and evidence of a meeting on 12th July 2012, attended by 85 people, with the nearby Tsepisong community and the local council, highlighting dangers of cyanide associated with the mine slime and return water dam and emergencies was sighted. A similar meeting on 9 December 2011 with Slovoville and Tsepisong communities was also held. A school visit and presentation to nearby Bottom Primary school, on the 22 August 2013, discussed cyanide dangers, symptoms, exposure mechanisms and uses and dangers of TSF.

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 written leaflet was distributed to community describing facts about cyanide and the ICMI. Copies of PowerPoint presentations given are made available, on request. Owing to literacy problems, most of the cyanide presentations have to be given verbally in the predominant local languages of Xhosa and Tswana, though the presentations are prepared in English.

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.

