INTERNATIONAL CYANIDE MANAGEMENT INSTITUTE

Cyanide Code Compliance Audit Gold Mining Operations

Summary Audit Report

Harmony Gold Mines Limited Harmony One Plant South Africa

25th – 29th January 2010

Name of Operation:	Harmony One Plant
Name of Operation Owner:	Harmony Gold Mines Limited
Name of Operation Operator:	Harmony Gold Mines Limited
Name of Responsible Manager:	Johnny Botha, Plant Manager
Address:	P O Box 1, Glen Harmony 9435
Country:	South Africa
Telephone:	+27 57 904 3000 / +27 72 304 0438
Fax:	+27 57 904 3029
E-Mail:	Johnny.Botha@Harmony.co.za

Location detail and description of operation

The Harmony One plant is located near Bambanani shaft, on the southern edge of the City of Welkom in the Free State Province of South Africa. It is the highest producing gold plant owned and operated by Harmony Gold in the region. One Plant currently processes underground ore from multiple shafts, as well as ore from several surface sources (e.g. dumps). The plant was built in 1986, and the milling, leaching and carbon-in-pulp technology reflects the technology which was current at the time. Plant design capacity is 390,000 tpm (tonnes per month), steady state.

The operations at the Harmony One Plant consist of:- an ore receiving bay (where ore that is railed in is brought to the plant from the various ore sources); a milling plant (using six run-of-mine mills in parallel to grind the ore to the required sizing); thickeners to upgrade the density of the slurry to the density required for leaching and adsorption; three parallel leaching trains(followed by three parallel adsorption trains, where the gold is adsorbed onto activated carbon granules); Carbon elution and regeneration facilities; and Gold recovery and smelting operations.

Ore Reception

The use of parallel processing starts at the ore receive bin, where there are two unloading stations for the railcars that bring the ore in from the various shafts. A unique feature of the plant is the Ore Reception facility, which has been designed to eliminate dead storage space, a serious constraint in railway ore storage bins. Ore is transported by rail to the plant. The railway hoppers discharge individually into one of the two concrete, rail-lined inverted cones, 12m in diameter and 8m deep. The apex of the cone is 57°. The ore is rapidly withdrawn from the apex of the cone via a shuttle belt feed conveyor feeding onto a main conveyor. The twelve ore storage silos are constructed from concrete and are also rail-lined. Each silo has a live storage of approximately 3 000

tons. Ore is delivered onto the mill feed conveyor via a Langlaagte chute. When full, the twelve ore silos provide 60 hours storage for the six Run-of-Mine (ROM) mills.
There are six parallel and independent milling lines with each one having a conveyer running underneath 2 silos and taking the ore up into one of the six run-of-mine (ROM) mills. Generally ore is drawn only from one of the two bins for each mill whilst the other is being filled with ore. Hence, one bin is being drawn and the other recharged.

Milling

The ore is taken up the slow moving conveyers from underneath the bins and discharged directly into the feed chute for the ROM mills. Fully autogenous (FAG) milling is a milling process in which the entire ROM ore stream is fed directly into the mills. The grinding media is generated within the mill from suitably sized pieces of ROM ore itself, supplemented by waste dump material. The feed rate to the mills is 100t/h.
The milling circuit consists of six single stage ROM mills that are controlled on maximum power, utilizing programmable logic controllers (PLCs). Variations in mill load are measured by load cells situated under the outlet trunnion bearings. Each ROM mills is 4.9m diameter by 10m long and powered by 3.3MW motors and grinds the ore to 70 – 73% minus 75 microns.
For control purposes the mill feed belts and the mill discharge pumps both have variable speed drives. Each mill is in closed circuit with a 1200mm primary cyclone with mass flow measurement on the feed. The primary cyclone overflow is screened on an 800um linear screen for the removal of coarse woodchips and tramp steel. This has the purpose of preventing gold losses and carbon contamination in the downstream CIP circuit. Cyclone overflow, which has a low density, is pumped out to the thickeners. The current cyclone overflow size is 70% at -75 microns.

Thickening

Calcium Oxide (lime) is added to the thickeners as slaked lime with levels of CaO being controlled at between 0.014 and 0.016% CaO. The lime maintains a protective level of alkalinity in the leach section to prevent the generation of poisonous HCN (cyanide) gas in the process. Thickening is carried out in six 60m-diameter cable torque thickeners. Flocculant is added at the rate of approximately 1 to 3 g/t.
Each thickener is equipped with a fixed and variable speed underflow pump. The variable speed pump is used for transferring the thickened slime (± 53% solids) to the leach circuit. The thickener underflow density is controlled by varying the flow of the leach circuit. The fixed speed pump is used in an emergency and for recycling or emptying of a thickener for maintenance purposes. The thickener overflow gravitates to two mill return tanks for re-use in the mill. There are six thickeners operating in three parallel trains, with the two thickeners in each train also working in parallel. The discharge from a pair of mills is combined and taken out to two thickeners that increase the density of the discharge slurry from the mills.

Leach

The leach circuit consists of three streams, each with nine 800m3 mechanically agitated draught tube circular tanks. The nominal residence time of the pulp per stream is approximately 27 hours. The feed to leach is screened for woodchips, using three Mintek circulating tanks fitted with 0.8mm aperture Kambalda screens. The concentrated woodchips are bled from the tank over a vibrating woodchip screen to dewater prior to removal of woodchips to a stockpile.

Low-pressure air is injected under the draught tube impeller for oxygen distribution to the pulp. Cyanide is automatically added to the leach reception tank, with the initial level of the cyanide being controlled between 0.020% and 0.022% NaCN equivalent. The underflow from the thickeners is at the appropriate density for leaching and adsorption and is pumped across to one of the three leaching trains. The concept is that should a reduction in output be required then one train can be shut down whilst the other two are running at full capacity, and hence at optimal efficiency. Each train has 9 tanks.
At the commencement of the leaching train, cyanide and lime are added to the slurry to dissolve the gold and by the time the slurry reaches the last tank in the leach train all of the gold that is going to be dissolved has been. The slurry then passes along to one of the three adsorption trains, each of which has 7 tanks where it passes through the tanks in counter-flow to the carbon, which adsorbs the gold that is in solution.

CIP

The carbon is then taken across to the elution building, where again three separate modules are used to process the carbon from each of the three CIP trains. One elution vessel is used in each of the elution trains and the cycle of water/acid washing, first and second strips are all done in the one vessel by passing the various solutions through the column. The AARL process is used. All three are PLC controlled. The four oil heaters used to provide the heat for the elution process are fired by polyfuel (a diesel equivalent supplied by Sasol) burners which have their fuel provided from a large tank mounted outside of the building.
After the carbon has been stripped it is taken through three regeneration kilns that use electrical resistance heaters mounted around them to provide the heat for regeneration. The eluate from the columns is pumped across to the eluate tanks inside of the smelt house where the gold in solution is recovered by zinc precipitation rather than the usual electro-winning process.
The zinc precipitate is filtered out and then calcined in one of the 9 large ovens and finally the concentrate is smelted into gold bullion in one of three electric arc furnaces.

Auditor's Finding

This operation is

☐ in full compliance

X in substantial compliance *(see below)

☐ not in compliance

with the International Cyanide Management Code.

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

Audit Company: Eagle Environmental

Audit Team Leader: Arend Hoogervorst

E-mail: arend@eagleenv.co.za

Names and Signatures of Other Auditors:

Name : Dawid M. L Viljoen Signature _____ Date: 7/9/2010

Dates of Audit: 25th – 29th January 2010

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.

Harmony One Plant

Facility	Signature of Lead Auditor	Date
		7/9/2010

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 No 1 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

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

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
There is a formal agreement memorandum between SASOL Infrachem and No 1 Gold Plant which covers 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 agreement memorandum between SASOL Infrachem and No 1 Gold Plant requires that transporters be certified under the Code. SASOL Infrachem has been re-certified on 14 January 2010, fully ICMI Code compliant, as a transporter.

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 only procures liquid cyanide and no mixing of solid cyanide is done on site. Detailed, professionally designed, drawings for the cyanide storage area were sighted which clearly indicated the structures were designed and located on concrete and away from people and surface waters. Reagent strength cyanide storage tanks are placed in their own concrete bund and fenced area. Tank levels are measured using ultrasonic level indicators with digital displays at the storage area and a high level alarm will sound

in the control room if tank levels reach 90%. The operator uses a chart to determine if enough space is available for a full tanker. The liquid cyanide offloading procedure covers normal, abnormal and emergency scenarios. The Cyanide area is fenced and security controlled with adequate controls and separation to prevent mixing with 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:
No solid cyanide in any form is stored or used on site. The liquid cyanide offloading procedure details the operation and sequencing of valves and couplings during offloading and the required PPE to be used. A buddy is present during offloading and emergency cyanide equipment including first aid equipment, medical oxygen, respirators, and antidotes in the first aid room, is readily accessible.

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 Plant has 80 procedures, covering both process and engineering, cyanide-related, tasks and activities, for normal, abnormal and emergency conditions. All procedures were signed off by the Plant Manager, Plant Engineer, Metallurgical Unit Leader, Labour Representative, and the Plant Safety Officer. These were extensively sampled, reviewed and found to be effective. Also reviewed was the TSF operating contractor's procedure

file with 45 procedures in place and including a risk assessment completed by the contractor covering normal abnormal and emergency situations. Appropriate plant cyanide operating and engineering procedures also apply to the TSF. Daily, weekly and monthly inspections for the TSF were sampled and reviewed and found to be effective. The plant has a change management procedure in place and functioning and an example of its implementation was sighted.
The Plant Planned Maintenance System is an Excel spreadsheet-based system. It covers critical cyanide equipment in the plant and on the TSF, including cyanide storage tanks, cyanide pumps, leach and CIP tanks, residue pumps, cyanide bunds, leach bunds, CIP bunds, valves, and pipes. Operational plant daily and monthly inspection reports, legal inspections, and checklists were sampled and employees interviewed to check the effectiveness of systems and ensure that ensure proactive and reactive management.

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:
There are 15 different ore sources fed to the plant and routine bottle roll tests, using standard leach parameters for each ore source, are done to determine cyanide consumption per ore, as well as residual pH. Work done on pH optimisation indicated 10.5 as optimum pH. Bottle roll tests have been done on the effect of oxygen addition on recovery and cyanide reagent consumption.
Leach cyanide control to all modules is in place. Two stage leach addition control was evaluated but found not to be financially feasible. A WAD on-line analyser has been installed on the residue line.

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 comprehensive, complex-wide, probabilistic water balance is in place, which includes the TSF's used by Harmony No 1, Central, and Saaiplaas gold plants. The output of the water balance is used to establish parameters and procedures to manage the TSF's and return water dams to prevent overtopping to the environment. The water balance assumed a water recovery factor from the TSF of 60% which includes losses to evaporation, seepage, and interstitial water (at a density of 1.44 t/m^3). Rainfall is considered in the parameters and the 1:50 year rainfall event is used. Weekly inspections record all water pond levels as well as rainfall data and phreatic levels at the TSF. Procedures and plans are in place to manage normal and emergency conditions. The minimum freeboards and operating capacities of ponds are identified and documented. All relevant procedures, plans and initiatives were reviewed and found to be appropriate in managing to prevent overtopping and unintentional releases.

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:
WAD results confirm that the TSF is operated at less than 50 ppm WAD cyanide in the first open waters where birds can drink. The plant uses on line cyanide measurement and control systems to manage WAD cyanide at less than 50 ppm. WAD cyanide measurements and laboratory analyses were started 16 April 2009. On line analyses is done by a WAD 1000 analyser at the residue station at the plant, which is the alarm point, with back-up weekly samples taken at the tip point of the TSF. The weekly back-up samples indicated one exceedance of 55 ppm WAD cyanide. A change to the point of addition of the elution precipitation solution was made, improving cyanide addition control and since the change, no exceedances were observed. Latest results indicate consistent WAD cyanide values below 40 ppm since changes to the precipitation pumping system. The return water dam samples sighted from April 2009 show values are below 0.5ppm WAD cyanide. Wild life mortality inspections are conducted by the TSF daily, and by the environmental department weekly. No mortalities have been observed to date.

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 site has no direct or indirect discharges to surface water.

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

X in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified
The plant is equipped with concrete bunds and extensive paving to reduce any seepage. All spillages are contained in secondary containments and returned to the process via sump pump systems. A borehole down gradient of the plant monitors WAD Cyanide in ground water and the average WAD cyanide level is 0.03ppm. No values exceeded the 0.50 ppm jurisdictional standard. At the TSF, horizontal seepage occurs and boreholes are in place and sampled to monitor for seepage of cyanide in ground water. Return water dams are not lined and boreholes are in place to monitor WAD cyanide, values of which are less than 0.5 ppm. No beneficial users of ground water exist, or are designated by the jurisdiction. The land surrounding the plant and TSF is mine property with no farming activities. Residents in the area use piped water supplied by the local municipality.

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:
Reagent strength cyanide tanks are placed in a concreted bund and are supported by steel legs on plinths and elution reagent tanks and columns are placed in bund areas on solid concrete bases. CIL and Leach tanks are placed on solid concrete bases, draining onto a competent concrete floor into a spillage pump returning spillage to the circuit. The plant floor area is covered by concrete and brick paving and linked to the emergency surge dam by concrete-lined spillage trenches. An emergency surge dam is installed downstream to contain plant spillage, storm water and leach / CIP bund overflow. The

linked emergency containment dam provides sufficient capacity to contain 110% of the volume of the largest tank which is the leach tank. The dam can also accommodate the 1:50 year storm event. In the plant, reagent strength pipelines were risk assessed and secondary containment was installed over the whole length of the pipeline. All slurry pipelines in the plant run across concrete-lined or paved areas, draining to the emergency containment dam via concrete lined trenches. The tailings pipeline is rubber-lined from the tailings pumps to where it crosses the perimeter wall as a preventative measure. Cyanide tanks and pipelines are manufactured from materials compatible with cyanide and high pH conditions. Solutions and liquids in secondary containment are pumped back into the circuit and all secondary containment areas are maintained empty.

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:
No new projects or facilities have been undertaken since signatory to the Cyanide Code. Civil and structural audit reports on the plant by professional engineers highlighted problems which were prioritised, corrected and over-inspected by the Plant Engineer. All high priority tasks were completed. A five year rehabilitation maintenance plan, covering all cyanide facilities, is in place. On the TSF, quarterly inspections by the consultants include a professional consulting civil engineer. An annual TSF Audit is conducted in which the engineer stated that all No 1 Plant dams, "have a factor of safety of above the minimum of 1.30".

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 monitoring program is in place to sample both surface and groundwater for cyanide which was reviewed. Monitoring, sample preservation and custody and chain of custody procedures were developed internally by a competent person and are implemented. Monitoring and inspections (including daily checks for bird mortalities on the TSF) are

guided by appropriate procedures and guidelines. Monitoring frequencies range from daily to weekly to monthly and will be reviewed once a baseline is established. Detail on sample points was reviewed and found adequate for sample point circumstances. The site's Environmental Department monitors wildlife mortalities on a monthly basis.

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 plan is in place to ensure that planning and costing adequately covers cyanide decommissioning and closure. An implementation schedule forms an appendix in the plan. The decommissioning plan 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:
Cyanide decontamination is specified as a line item in the site's Mine Closure Estimate for 2009 / 2010 and supports the detailed, site cyanide decommissioning plan. In terms of the South African Minerals and Petroleum Resources Development Act, a Trust Fund in is in place to fund decommissioning and the presence and currency of this Fund was verified.

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 Plant has 80 procedures, covering both process and engineering, cyanide-related, tasks and activities. All procedures were signed off by the Plant Manager, Plant Engineer, Metallurgical Unit Leader, Labour Representative, and the Plant Safety Officer. These were extensively sampled, reviewed and found to be effective. Also reviewed was the TSF operating contractor's procedure file with 45 procedures in place and including a risk assessment completed by the contractor covering normal abnormal and emergency situations. Appropriate plant cyanide operating and engineering procedures also apply to the TSF. Daily, weekly and monthly inspections for the TSF were sampled and reviewed and found to be effective. The plant has a change management procedure in place and functioning and an example of its implementation was sighted.
Appropriate PPE and pre-work inspections are specified in procedures for all cyanide-related tasks. Checks and balances are in place through worker involvement in risk assessments, through consultations in Health & Safety Committee meetings and during shift meetings.

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:
An external MINTEK report indicated that a pH of 10.5 is the optimum for cyanide leach conditions. Currently pH is controlled manually in the thickener to 10.5 and measured using a handheld pH meter. The management of pH is controlled via lime titrations and pH measurement. The plant has a procedure in place to respond to low pH. Hot spots were identified in surveys and appropriate controls have been implemented. Fixed cyanide monitors have been located at all dosing points and at the off-loading area. Ten

portable cyanide monitors are available for use throughout the plant. On-going inspections and checks are also used to monitor and check facilities and emergency response equipment functioning. Safety equipment such as safety showers, low pressure eye wash stations, and fire extinguishers are numerous and adequately signposted. A site wide pipe colour coding system is in operation which includes cyanide pipe colour coding and directional flow signage. Fixed and mobile HCN gas monitors are used on site and are calibrated and maintained according to procedures using manufacturers recommendations. Accident and incident reporting and investigation procedures 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:
The site has oxygen systems, first aid kits with tripacs (antidotes) in the fridge at the offloading area, radios, telephone with emergency numbers, Emergency showers are linked to the control room SCADA with alarms if triggered, and SCBA sets were inspected in cyanide first aid room. Running water is available at the offloading area. Inspection checklists for the emergency trailer, Doctor / Nurse kit, Cyanide antidote box checklists (for the leach, offloading, and trailer) and the cyanide first aid room were reviewed. The plant has a cyanide emergency response plan and dedicated cyanide emergency teams (5 persons per shift) are in place and fully trained. The Harmony owned, Ernest Oppenheimer Hospital is to be able to treat cyanide emergencies. Hospital staff was given cyanide awareness training by the plant training department. Netcare 911 (private ambulance service) carries out patient transport and participates in drills. Mock drills are conducted confirming the hospital's ability to respond to cyanide emergencies. Mock Drill reports were reviewed and found to demonstrate effective feedback including learning points from drills with training officers present at drills.

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 site has used a risk assessment to develop 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. The Plan also links to procedures and resources in other systems (e.g. environmental, TSF Code of Practice and Dam structural failure emergency procedure), should they be required.

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:
Workforce is involved in the emergency planning process through health and safety meetings, training, and mock drills. Representatives of the workforce (employees, Health & Safety Representatives and Union representatives) were involved in the risk assessment to develop the emergency scenarios and response in the emergency response plan and procedures. The emergency planning process and the emergency response plan are also included in the presentations made to stakeholders in the Dialogue process of the Cyanide Code (9.1). Presentation materials and documentation on the communications was sighted. Full cycle drills are used to involve hospital 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 duties, roles and responsibilities for the various emergency scenarios and the Control room operator is the primary response coordinator,

authorised to call ambulance, security, and plant management. Section 8 details the different levels of response and the Plant Manager will then decide and respond appropriately. Emergency equipment lists were 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. Emergency Team members were checked and training records and assessments showed the individuals to be well prepared and well equipped for cyanide emergencies. Periodic full scale 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 full details for appropriate emergency notification and reporting and the call-out procedure and contact information lists which are updated regularly. Media communication is done via a formal procedure.

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

X in full compliance with

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

 not in compliance with

Basis for this Finding/Deficiencies Identified:
The Emergency Preparedness Plan cross-references to detailed and specialised environmental procedures which 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 is prohibited. Sampling procedures also cover remediation issues.

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. Evidence was sighted of learning points emerging from the various cyanide drills undertaken.

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 ECMP TSF contractors) trained in basic cyanide awareness. Refresher is done annually, when employees return from leave, and based on schedules using training shift system (also used for routine update training) with the use of a matrix with a flagging system to ensure all staff is covered. Records retained for 40 years on plant after which the records are sent to central 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.

□ in full compliance with

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

□ not in compliance with

Basis for this Finding/Deficiencies Identified:
The whole training system within the Harmony Group was changed from a historically less formal training structure to a formally structured well planned system, referencing to national unit standards relating to Metallurgy and incorporating more specific compliance to the Cyanide Code. The new training system was implemented and is in the process of training the staff on the revised standards and procedures, which are ICMI code compliant. Implementation is in the early stages and training on critical cyanide related tasks need to be verified for full compliance. A corrective action plan has been developed to achieve the above within 8 months. There is no immediate risk to health, safety or environment as the existing on the job training ensures cyanide competency.
All Trainers are trained and registered as Assessors, and in basic facilitation and presentation skills, and conducting one-on-one training. The Harmony central training establishment is formally accredited in ISO 9001. All employees are trained before being allowed to work on a cyanide section and the clock card to enter to the plant is only issued after cyanide training sign-off. Formal assessments are used to test knowledge and competency. A person is only allowed to perform the job following assessment. Written tests are conducted, and Planned Tasks Observations (PTOs) are used for on-the-job competency evaluation. Records retained for 40 years on plant after which the records are sent to 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 specifies required training for emergency response team. Induction training spells out emergency response for all other plant employees during cyanide releases. Refresher training is done annually on return from leave. Emergency cyanide drills are conducted involving the emergency teams (1 team with 5 members on each shift) as well as plant staff and emergency responders. Mock drills cover full cycle to the hospital, and shift drills. Drill feed back session include learning points. A training official is present at drills and training is revised, if necessary.

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:
Community presentations on cyanide were given at meetings of stakeholders. Separate meetings were held with cattle owners, taxis, food vendors, council members, and schools. Opportunity to raise concerns was given during the meetings which were two way dialogue sessions. Questions from the presentations asked by the attendees included topics such as cyanide toxicity, transport and laboratory testing. Meetings were also held in June 2009 with local authorities, emergency services, councillors, farmers, and co-operatives. August 2009 follow up meetings were also held and SASOL, as the cyanide producer and transporter, was also present at the meetings. Evaluation forms to measure the response to the meeting were completed and indicated a positive response from attendees.

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:
Community presentations on cyanide were given at meetings of stakeholders. Separate meetings were held with cattle owners, taxis, food vendors, council members, and schools. Opportunity to raise concerns was given during the meetings which were two way dialogue sessions. Questions from the presentations asked by the attendees included topics such as cyanide toxicity, transport and laboratory testing. Meetings were also held in June 2009 with local authorities, emergency services, councillors, farmers, and co-operatives. August 2009 follow up meetings were also held and SASOL, as the cyanide producer and transporter, was also present at the meetings. Evaluation forms to measure the response to the meeting were completed and indicated a positive response from attendees.

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:
Owing to literacy problems, most of the presentations have to be given verbally in the local language. 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 public. Similarly, spills and releases must be reported to the Department of Water Affairs and Environment. Transport related incidents and reported by Sasol Infrachem, the transporter, through their own reporting mechanisms.
Annual reports do not include details on cyanide incidents. However, in a letter from the executive: environmental management of the Harmony Gold Mining Company to the ICMI Lead Auditor, it was stated that the Harmony Group communication on cyanide-related significant incidents will be included in its public website, as well as the annual report, should they occur.