August 2017

ICMI GOLD MINE RECERTIFICATION AUDIT - SUMMARY AUDIT REPORT

Harmony No.1 Gold Plant

Submitted to:
International Cyanide Management Institute,
1400 I Street, NW, Suite 550
Washington, DC 20005,
USA

Harmony No.1 Gold Plant
South Africa

REPORT

Distribution:

1 Copy – Harmony Gold Mining (Pty) Ltd
1 Copy - ICMI

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1.0 SUMMARY AUDIT REPORT FOR GOLD MINING OPERATIONS

Name of Cyanide User Facility:	Harmony No. 1 Plant
Name of Cyanide User Facility Owner:	Harmony Gold Mining Company Ltd
Name of Cyanide User Facility Operator:	Harmony Gold Mining Company Ltd
Name of Responsible Manager:	Johnny Botha, Plant Manager
Address:	PO Box 1, Glen, Harmony 9435
Country:	South Africa
Telephone:	+27 (0)57 904 3000
E-Mail:	johnny.botha@harmony.co.za

2.0 LOCATION DETAIL AND DESCRIPTION OF OPERATION

Harmony One Gold Plant is located near Bambanani shaft, on the southern edge of the City of Welkom in the Free State Province of South Africa. 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 the following.

An ore receiving bay, where ore is brought to the plant by rail from 5 shafts. The railway hoppers discharge individually into one of the two concrete, rail-lined inverted cones. The ore is rapidly withdrawn from the apex of the cone via a shuttle belt feed conveyor feeding onto a main silo feed conveyor. Each silo has a live storage of approximately 3 000 tons. Ore is discharged onto the mill feed conveyor via a pneumatically operated Langlaagte chute.

The ore is taken up the slow-moving conveyers from underneath the silos and discharged directly into the feed hopper for the six fully autogenous mills. For control purposes the mill feed belts and the mill discharge pumps both have variable speed drives. Each mill is a closed circuit with a 1200mm primary cyclone with mass flow measurement on the feed. The primary cyclone overflow is screened on a 600µm linear screen for the removal of coarse woodchips and tramp steel

Calcium Oxide (lime) is added to the 6 thickeners (operating in 3 parallel modules) 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. Flocculent is used to assist the settling rate and 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 leach circuit consists of three modules, each with nine 800m3 mechanically agitated draught tube circular tanks. The feed to leach is screened for woodchips, using three Mintek circulating tanks fitted with 800µm aperture mesh screens. Air is injected under the draught tube impeller for oxygen distribution to the pulp. Liquid cyanide is automatically added to the leach reception tank, with the initial level of the cyanide being controlled by a TAC1000 online automatic sampler. The concept is that should a reduction in output be required then one module can be shut down whilst the other two are running at full capacity.

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The slurry then passes to one of the three adsorption modules, each of which has seven 450m^3 tanks where it passes through the tanks in counter-flow to the carbon movement, which adsorbs the gold that is in solution. The gold depleted slurry from the seventh tank flows over a vibrating carbon safety screens and is pumped to the residue tank. The slurry from the residue tank is sampled by an automatic online WAD cyanide analyser. The majority of residue is pump to the slimes dams, but a portion is also pumped to a backfill plant for the generation of backfill material. The backfill plant is located at the decommissioned Bambanani West shaft site. The carbon that has been pumped upstream is recovered at the first adsorption tank by pumping the slurry over vibrating carbon screen.

The elution section has three separate elution modules that process the carbon from the three CIP modules. One 1.25m diameter elution column 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 column by passing the various solutions through the column. The AARL process is used at 130◦C and 450 kpa. After the carbon has been stripped it is taken through three 9 m length regeneration.

The gold rich eluate from the columns is pumped across to the eluate tanks located inside of the smelt house where the gold in solution is recovered by zinc precipitation. The zinc precipitate is filtered out by rotary vacuum drum filters and then calcined in one of the 9 large ovens at 800◦C to oxidise as much of the base metals as possible. Finally, the concentrate is mixed with silica-borax-Mn flux and smelted into gold bullion in one of three electric arc furnaces.

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SUMMARY AUDIT REPORT

Auditors Findings

	☒ **in full compliance with**	
Harmony No. 1 Gold Plant is:	☐ in substantial compliance with	**The International Cyanide Management Code**
	☐ not in compliance with	

Audit Company:	ESC Afrika
Audit Team Leader:	Ed Perry, Lead Auditor
Email:	escafrika@gmail.com

This operation has experienced compliance problems during the previous three-year audit cycle which are discussed in this report under Standard of Practice 6.2 of the International Cyanide Management Code Verification Protocol for Gold Mine Operations.

Name of Other Auditors

Marie Schlechter, ICMI pre-certified Mine Technical Specialist

Dates of Audit

The Re-certification Audit was undertaken between 3 April 2017 and 6 April 2017.

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.

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PRINCIPLE 1 – PRODUCTION

Encourage Responsible Cyanide Manufacturing by Purchasing from Manufacturers that 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.**

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 1.1 to 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.

The operation's contract with the cyanide manufacturer (Sasol Polymers) requires that the cyanide be produced at a facility that has been certified as being in compliance with the ICMI Cyanide Code

Observed: Memorandum of Agreement for the supply of Sodium Cyanide to all Harmony Gold Plants, CS/09/05/2001, signed 28 January 2010 by Harmony and 18 January 2010 by Sasol.

SASOL Polymers is certified to be fully compliant with the ICMI Cyanide Code. SASOL Polymers re-certification is dated 29 March 2016 with the prior recertification being dated 7 May 2013.

Cyanide is purchased directly from the manufacturer namely Sasol Polymers South Africa.

PRINCIPLE 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.**

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 2.1 to establish clear lines of responsibility for safety, security release prevention, training and emergency response in written agreements with producers, distributors and transporters.

There is a written agreement, between the operation, the cyanide producer (Sasol), and transporter (Tanker Services)

Memorandum of Agreement for the Off-loading of Liquid Sodium Cyanide between Tanker Services Food and Chemicals Division and Harmony Gold Mining Company Limited. Dated: 28 March 2017 (signed by Tanker Services and Harmony).

This agreement designates responsibilities for the following:

a) Packaging as required by the United Nations for international shipments and by the political jurisdiction(s) the shipment will pass through.
b) Labelling in languages necessary to identify the material in the political jurisdiction(s) the shipment will pass through, and as required by these jurisdiction(s) and by the United Nations (for international shipments).
c) Storage prior to shipment.
d) Evaluation and selection of routes, including community involvement.
e) Storage and security at ports of entry.
f) Interim loading, storage and unloading during shipment.
g) Transport to the operation.
h) Unloading at the operation.
i) Safety and maintenance of the means of transportation (e.g. aircraft, vessels, trains, etc.) throughout transport.
j) Task and safety training for transporters and handlers throughout transport.
k) Security throughout transport.
l) Emergency response throughout transport.

A similar agreement was in place prior to this dated 12 April 2013.

The agreement between Tanker Services and Harmony does not provide for any of the services to be subcontracted.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 2.2**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 2.2 to require that cyanide transporters implement appropriate emergency response plans and capabilities and employ adequate measures for cyanide management.

The operation's contract with the cyanide transporter requires that the transporter be certified under the Code. Section 6.3 of the contract between Tanker Services and Harmony states that as Harmony Gold is a signatory to the ICMI it is compulsory for Harmony Gold to make use of an ICMI accredited transporter. Tanker Services Specialised Products Division was recertified on 17 July 2015 with the prior certification dated 13 December 2011.

Chain of Custody Records state that Tanker Services delivers liquid Sodium Cyanide from the Sasol manufacturing facility in Sasolburg, South Africa directly to Harmony No.1 Plant, Welkom, South Africa.

PRINCIPLE 3 – HANDLING AND STORAGE

Protect Workers and the Environment during 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.**

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 3.1**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 3.1 to 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.

Sodium Cyanide Bulk Storage Facility Technical Inspection Reports are conducted annually by Sasol Base Chemicals Supply Chain (Cyanide Manufacturer).

The Cyanide unloading and storage areas are located inside the Gold Plant, which has security and access control. The cyanide storage area is also fenced and locked.

Unloading and storage areas are located away from people and surface water. The cyanide storage tanks are located separately from incompatible materials such as acids, strong oxidizers and explosives. The cyanide storage tanks are fitted with ventilation pipes.

The liquid cyanide is unloaded on a concreted bunded surface. The bund is constructed to contain any spilled cyanide. Any spilled cyanide can flow back into the storage bund for the cyanide tanks from where it is pumped to the leach tanks via an automated pump. The storage tanks are constructed on a concrete plinth and sealed to prevent seepage to the subsurface.

An automatic valve has been fitted on the air supply used during offloading that will shut down if the storage tank level reaches 95%. A high level alarm will also sound in the Control Room at 85%.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 3.2**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 3.2 to operate unloading storage and mixing facilities using inspections, preventative maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

Liquid cyanide is delivered in bulk tankers and no containers are used. The pipes and valves are rinsed following the offloading of liquid cyanide.

The operation has developed and implemented procedures to prevent exposures and releases during cyanide unloading and mixing activities including the Procedure 4.4.1.4 - Liquid Cyanide Offloading UN no. 3414, rev 01, 13 May 2015.

The procedure provides instructions on the checking and operation of valves and couplings, in specific sequence, during the off-loading of liquid cyanide and clean up of any spills.

Point 7 of the procedure states the PPE to be worn by the Reagent Handler. Point 5. states that the "buddy" system must be used as soon as the driver arrives at the offloading area. The procedure states that the buddy must be a trained first aider. Point 13 stipulates the PPE to be worn by the Driver.

PRINCIPLE 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 including contingency planning and inspection and preventative maintenance procedures.**

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 4.1**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.1 to implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and preventative maintenance procedures.

The site does not have heap leach facilities or processing ponds. The Plant has the following procedures; 39 cyanide process related procedures, 12 cyanide emergency procedures, 18 cyanide equipment procedures, FS 1-81 Harmony One Plant Emergency Procedures, rev 04, January 2017, and COP 13 Mandatory Code of Practice for Emergency Preparedness and Response, Harmony One Plant, rev 4, Nov 2016.

The Backfill Plant has 37 procedures.

Intersol, the contracted operator for the tailings facility, has 13 Procedures for the operation of the TSFs (FSS2 and FSS8) and an Operating Manual for the TSFs.

The operation has plans or procedures that identify the assumptions and parameters to prevent or control cyanide releases and exposures consistent with applicable requirements. The following were observed:

Procedure 4.2.1.6 - Responding to low pH level Procedure, rev 02, August 2016 - stipulates the pH is maintained above 9.8

Procedure 4.2.1.17 - Reacting to a High Storage Alarm - High level alarm at 85% and High High level alarm with compressed air cut off at 95%.

Procedure 4.2.1.31 - High Cyanide Levels in Residue Slime, rev 02, August 2016 - stipulates that the WAD cyanide levels in the residue should not exceed 50ppm.

Intasol Harmony One Plant Operational Manual, MAN_0001_OPS, 20 November 2017 - The paddocks must be maintained such that a minimum Freeboard of 800mm above the design storm event is available at all times.

Procedure BAM-BP 1.1.19 Cyanide Readings Exceeding 20ppm, which states that if the level of cyanide exceeds 20 ppm ferrous sulphate will be added until it is less than 20 ppm and can safely be pumped underground.

The operation has plans or procedures that describe the standard practices necessary for the safe and environmentally sound operation of the facility including the specific measures needed for compliance with the Code, such as inspections and preventative maintenance activities.

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The following inspection records were observed: Daily Cyanide Inspections, Sodium Cyanide Off Loading Checklist, Vehicle Pre-checklist, Truck Driver Assessment, Safety Shower Inspections for the Leach and Cyanide Storage Areas, PPE and First Aid Equipment in the First Aid Room, Daily Inspections for the Backfill Plant, Weekly Inspections of the Plant, Weekly Pipeline Inspections, and Daily Pipeline Inspections.

The operation has a procedure to identify when changes in a site's processes or operating practices may increase the potential for the release of cyanide and to incorporate the necessary release prevention measures. CP1-01 Change Management Directive, rev 01, September 2102 is used to record Management of Change. The management of change documentation includes a statement of change required, routing document to obtain necessary signatures and approvals, hazard assessment and risk assessment.

The operation has cyanide management contingency procedures for situations where there is an upset in a facility's water balance, when inspections and monitoring identify a deviation from design or standard operating procedures, and/or when a temporary closure or cessation of the operation may be necessary including the following:

Procedure 4.2.1.16 - Starting and Stopping a Cyanide Pump, rev 2, August 2016;

Procedure 4.2.1.31 - High Cyanide Levels in the Residue Slime, rev 2, August 2016;

Procedure 4.2.1.17 - Reacting to a High Storage Alarm, rev 2, August 2016;

Procedure 4.2.1.6 - Response to a low pH level, rev 2, August 2016; and

Procedure 4.4.1 Stopping / Start Procedure for Harmony One Plant, rev 02, 28 August 2015.

The TSF has an Emergency Preparedness Plan ref. 1 dated 01 Dec 2016.

The operation inspects cyanide facilities on an established frequency sufficient to assure and document that they are functioning within design parameters.

Inspections are documented, including the date of the inspection, the name of the inspector, and any observed deficiencies. Corrective actions are documented either directly or in the form of a work request number. The work request details the nature and date of the corrective action. Records are retained.

The inspections observed all included the date of inspection, name of the inspector, observed deficiencies and records are retained. Any deficiencies that are observed are reported and a job card is created to undertake the work to correct the deficiency.

The planned maintenance system was computerised in 2012. The computerised system was observed by the auditors. This system includes scheduled maintenance for operational equipment. Job cards are automatically issued for the inspections, which are then planned in Monday meetings for the coming week.

The Plant has a standby generator which will power the lights and thickeners in the event of a power outage. The dosing valve will close automatically in the event of a power failure. The pumps for the cyanide dosing are positive displacement pumps so that in the event of a power failure the cyanide reagent will stay in the pipeline. The only tank that will overflow in the event of a power failure is the last adsorption tank due to gravity. If the bund for the adsorption tanks is insufficient this will overflow into the concrete lined trenches that will then flow to the Surge Dam, which will provide adequate containment.

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

☒ **in full compliance with**

The operation is ☐ in substantial compliance with **Standard of Practice 4.2**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.2; introducing management and operating systems to minimise cyanide use, thereby limiting concentrations of cyanide in mill tailings.

A TAC1000 automatic inline analyser and dosing system is used to fix the setpoint at 160 ppm. Manual titrations are undertaken every 2 hours.

Ore samples are sent to SGS to conduct total element analysis to determine cyanide addition rate. This is conducted approximately every 3 years because the ore remains constant. Ore is received from 5 shafts as well as waste rock material.

Leach cyanide consumption is plotted on a weekly graph and any variabilities are discussed by a cross discipline Plant team.

A new control strategy was investigated by proactively controlling cyanide addition based on the tonnage of the ore received by the plant. This was not found to be successful. Therefore, the cyanide is added based on the feedback received by the titrations, and Tac 1000.

Flow meters have been installed on the three cyanide dosing points (i.e. one for each module). The flow meters are used in conjunction with the feed forward ratio control to even out the addition of cyanide reagent preventing sudden spikes in addition.

The TAC 1000 cyanide analyser is used as feedback control for cyanide addition to control cyanide concentration in all three modules. In addition, 2 hourly samples for WAD cyanide titration are taken from the last Leach Tank and Adsorption to ensure that WAD cyanide does not spike in the Residue. Precip solution (solution remaining once the gold has been precipitated) is returned to the leach from the Smelt House. This is used to reduce the quantity of cyanide addition.

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

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.3 to implement a comprehensive water management programme to protect against unintentional releases.

The operation has developed a probabilistic water balance based on historic data. The information is used to predict the possibility of return water dams and plant dam overtopping in the event of a 1:50 year and 1:100 year storm event.

The new water balance was developed by third party consultants, Jones and Wagener, the 'Harmony Gold Free State Operations: Harmony One Plant Operational Water Balance, Report No: JW197/16/F142/07-Rev1'.

The new water balance includes the following:

Output of tailings from the Plant to the TSFs on a monthly basis. Consideration of a 1:50 year and 1:100 year storm event and predict the overflow from the plant storm water dam. Daily precipitation in captured and the monthly figure is included in the water balance. Historical rainfall figures have been obtained from the Odendaalsrus Weather station and this goes back as far as 1906. Runoff from paved areas with high run-off, non-paved areas, clean areas draining to the plant etc. have been calculated for the plant area. Runoff from steep outer side slopes, where significant runoff is expected is recorded for the TSFs. Effects of potential freezing and thawing conditions are not applicable. Historical evaporation data has been included in the model from 1906. The model calculates the seepage from the TSF. There are no discharges to a surface water body. The water balance includes the phreatic level.

The water balance modelled the various rainfall events and the total return water and evaporation pond capacity including the operating levels showing that these are sufficient to prevent overtopping in case of power failures during the rainfall events.

The Surge Dam level is monitored by each shift. The log sheet states that the Surge Dam must not be allowed to overflow at any time. The level is also recorded in the Milling Foreman Report Book.

Harmony 1 Plant Monthly Slimes Dam Meeting minutes details the freeboard on the two TSFs and the Return Water Dam Levels.

Harmony Gold Mining - Free State Operations Quarterly Inspections, conducted by Jones and Wagener. Freeboard is measured and compared against the required legal limit.

Procedure 4.2.3.10 Respond to Abnormal and Emergency Conditions, rev 02, August 2016. The procedure stipulates that the Plant Surge Dam (PCD) should be kept empty and the pump operational at all times in order to prevent the dam from overflowing.

The Return Water Dams are designed so that in the event of storm conditions water is allowed to overflow into a number of evaporation ponds, with the capacity to accommodate a 1 in 100 year storm event.

Rainfall is measured on the TSF and at the Plant. Daily precipitation in captured and the monthly figures are included in the water balance.

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

☒ **in full compliance with**

The operation is ☐ in substantial compliance with **Standard of Practice 4.4**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

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The operation is in full compliance with Standard of Practice 4.4 to implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions

There is no heap leach currently being operated.

No open waters have WAD cyanide levels exceeding 50 mg/l.

Procedure 4.2.1.31 - High Cyanide Levels in Residue Slime, rev 02, August 2016. The procedure states that the responsible person must inform the Senior Person in change at the slime dams in the event of high cyanide levels in the tailings, to ensure that people are aware of the higher concentrations and take the necessary safety precautions.

The monitoring data was observed for the period since the previous recertification audit. The only exceedances of monitoring undertaken were at the deposition point and are as follows: 2 October 2014 – 51 ppm, 18 February 2015 - 2 July 2015, 12 May 2016 - 57.33ppm, 28 July 2016 - 67.03ppm, 13 October 2016 - 59.25ppm.

The Metallurgist conducts an investigation when high WAD levels (>50 mg/l) are recorded in the residue tank. The investigation considers the following factors: incident date, risk loss potential evaluation, type of incident, evidence, immediate cause, root causes, system deficiencies, corrective actions.

The auditors observed bird life and other wildlife on the TSF with no observed mortalities. Wildlife mortality is recorded on the daily TSF inspections. No cyanide related wildlife deaths have been recorded in the past 3 years.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 4.5**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.5 to implement a comprehensive water management programme to protect against unintentional releases.

There are no direct or indirect discharges to surface water.

Groundwater boreholes are sampled for WAD cyanide on a weekly basis.

Levels greater than 0.025 ppm (detection limit) in the groundwater monitoring boreholes were often found to be associated with dead animals in the boreholes.

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

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.6 to implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of groundwater.

The Surge Dam which provides additional secondary containment for the Plant is concrete lined to prevent seepage.

The TSFs are equipped with under drains, paddocks and solution trenches to divert the water to the RWD system.

There is no numerical standard established by the applicable jurisdiction for WAD cyanide or any other species of cyanide in groundwater, therefore there are no compliance points below or down gradient of the gold plants or tailings facilities.

Backfill current standards limits the free cyanide in the final product sent underground to 20ppm free CN.

Procedure BAM-BP 1.1.19 Cyanide Readings Exceeding 20ppm states that manual titration will be undertaken to determine the level of cyanide as detailed in the procedure BAM-BP 1.1.2 Titration Cyanide and Lime. If the level of cyanide exceeds 20 ppm ferrous sulphate (BAM-BP 1.1.9 Adding Ferrous Sulphate) will be added until it is less than 20 ppm and can safely be pumped underground.

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

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.7 to provide spill prevention or containment measures for process tanks and pipelines.

The following was verified during the site visit, reagent strength cyanide tanks are placed in a concreted bund and are supported by steel legs on plinths, elution reagent tanks and columns placed in bund areas are 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 tanks. The Plant floor area is covered by concrete and brick paving and linked to the emergency surge dam by concrete lined spillage trenches. The surge dam is installed downstream to contain Plant spillage, storm water and leach / CIP bund overflow. The residue tank and pumps are situated on concrete, and the bund drains into the emergency spillage dam via concrete lined trenches.

Cyanide storage tank bund 195m3, tank size 50m3 – three tanks are interlinked to form a total of 150m3.

The surge dam volume is 6049m3. The leach, CIP, Elution, Residue bunds are all linked to the concrete lined trenches leading to the surge dam via an interim weir / pumping arrangement returning the spillage back to

the thickeners. The linked emergency containment dam of 6049m3 provides sufficient capacity to contain 110% of the volume of the largest tank which is the leach tank at 758m3. The dam can further accommodate a 1:50 year storm event. The operating procedure FS1-49 Abnormal and emergency conditions requires the surge dam to be kept empty at all times.

Reagent strength pipelines were risk assessed and launders was installed over the whole length of the pipeline. The launders either drain into the cyanide reagent storage bund or into the cyanide decommissioning area, which is equipped with an automatic sump pump that pumps any liquid into the leach tanks. All slurry pipelines in the Plant run across concrete lined or paved areas draining to the emergency surge 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.

The area where the TSF pipeline runs next to the Witpan (lake) is flanked by earth bunds to contain spillages and protect the surface water. The pipeline is concrete lined as an additional measure to prevent leaks. An additional spillage paddock is in place above the flood line of the Witpan to provide additional protection. The pipeline is also inspected daily for leaks

The cyanide reagent tanks, leach tanks, adsorption tanks and residue tanks are constructed of mild steel. The pipelines within the plant are constructed of mild steel. The TSF pipeline is concrete lined 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.**

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 4.8**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.8 to implement quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications

The original certification audit found a lack of QA/QC documentation for the Plant and therefore there is a reliance on annual structural audits.

The new backfill plant that was in the process of being commissioned during the last recertification audit started operation in Nov 2015. Legal issues with the construction and design contractors prevented the hand-over of the QA/QC documentation for the plant.. A structural assessment was undertaken of the Backfill Plant following its construction in September 2013 by LMV (Pty) Ltd. This stated that all of the structural elements of the Plant were in good condition. This was signed off by T Jordaan Pr Eng. 920279. The as-built drawings, as observed by the auditors, were signed off by P Meiring Pr Eng 20030010 on behalf of Melo Solutions in March 2017.

The new TSF pipeline was constructed by Mining and Contracting Services. A scope of works was observed for the construction of the new pipeline including pressure testing the pipeline with water to 21 bar for 1 hour (dated 3 August 2015). A letter (dated 6 April 2016) was observed subsequent to the construction of the pipeline confirming that the pipeline was constructed in accordance with the scope of works. This letter was signed off by the Director of Mining and Contracting Services, Louis Strydom, qualified as a boilermaker with

39 years experience in the field of manufacturing and installation of steelwork structures and pipeline. The letter was also signed off by Mike Pelliccia the Harmony Plant Engineer as accepting the installation.

Annual structural assessments are undertaken: Safety Audit Investigation, No.1 Shaft, Gold Plant, Welkom - Report K2783 November 2014, 2015 and 2016.

These reports included the cyanide reagent tanks, the leach tanks, the adsorption tanks and the residue tanks. No emergency repairs (i.e. repairs that must be undertaken in the following 12 months) were identified for any of these areas. These reports were signed off by T Jordaan Pr Eng 920279.

The auditors observed reports on thickness testing of tanks from Ultra Sonic Services and Consulting CC dated 31 May 2016 and 6 February 2015. These reports included thickness testing of Cyanide Reagent Storage Tanks, Leach Tanks, Adsorption Tanks, and Residue Tanks.

Quarterly inspections of the TSFs are undertaken by Jones and Wagner (including piezometric levels, Freeboard, deposition rates) May 2014, February and May 2015, February and May 2016, March 2017 reports.

Annual assessments of the TSFs are undertaken by Jones and Wagner (including Stability Assessment, Freeboard Analysis, Life Assessment and Deposition Planning, and Management System)- Annual Audit Report 2015, ref: JW013/16/A280 - rev 0 dated March 2016; Annual Audit Report 2014, ref JW013/15/A280 rev 0 dated January 2015.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 4.9**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 4.9 to implement monitoring programs to evaluate the effects of cyanide use on wildlife, surface and groundwater quality.

The operation has developed the following written standard procedures for monitoring activities, Procedure 5.1.2.3 - Harmony One Plant Cyanide WAD Sampling and Analysis, rev 2, August 2015.

The procedure indicates on google maps the exact location of where each sample should be taken. The procedure stipulates the sampling method for each type of sample. The procedure stipulates the sample preservation for each type of sample. The auditors observed chain of custody stickers that are placed on the sampling bottles.

The sampling procedure was compiled by the analytical laboratory appropriately qualified personnel.

The auditors observed that the person taking the samples records conditions of the surrounding area that could affect the analysis.

The operation does not monitor for cyanide in discharges of process waste to surface water as there are no discharges to surface water.

The operation monitors for cyanide in groundwater down-gradient of the site. The auditors observed the sampling map as part of the procedure and the groundwater monitoring results.

Surface water monitoring is undertaken at open water bodies around the Plant including the Surge Dam, Return Water Dams and solution trenches.

The operation inspects for and records wildlife mortalities related to contact with and ingestion of cyanide solutions. This is done on the daily inspection records for the TSF.

Monitoring is conducted at frequencies adequate to characterise the medium being monitored and to identify changes in a timely manner. Weekly WAD sampling is done at the boreholes and surface water features.

PRINCIPLE 5 – DECOMMISSIONING

Manage Cyanide Process Solutions and Waste Streams to Protect Human Health and the Environment

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

The operation is

☒ **in full compliance with**

☐ in substantial compliance with **Emergency Response Practice 5.1**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 5.1 to plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife and livestock.

The operation has developed written procedures to decommission cyanide facilities at the cessation of operations. to ensure that the cyanide facilities are decommissioned in accordance with the required legislation and ICMI code: FS1-80 Decommissioning Plan for Harmony One Plant, rev 03, July 2014.

The decommissioning plan includes an implementation schedule for decommissioning activities in Section 7 and Section 8.

The Decommissioning Plan for Harmony One Plant stipulates that it must be reviewed annually or after any significant modifications has been made to the cyanide containing equipment on the plant. However, a new revision is only produced if there is a change to the plan.

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

The operation is

☒ **in full compliance with**

☐ in substantial compliance with **Standard of Practice 5.2**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 5.2 to establish an assurance mechanism capable of fully funding cyanide related decommissioning activities.

The operation has developed an estimate of the cost to fully fund third party implementation of the cyanide-related decommissioning measures as identified in its site decommissioning or closure plan: Harmony Group Environmental Liability Assessment - Closure Cost Report FS30/5/1/2/2/82MR, prepared by Digby Wells Environmental, May 2016.

Section 10 of the report address Cyanide Decontamination. This states the amount that has been set aside in the closure cost for the cleaning and removal of sodium cyanide systems based on a quote from Cyanide Cleaning Specialist.

The Closure Cost Assessment for Harmony Gold Miming is reviewed and updated annually.

The operation has established a financial mechanism approved by the applicable jurisdiction to cover the estimated costs for cyanide-related decommissioning activities as identified in its decommissioning and closure strategy. The trust fund is audited annually by PWC.

Harmony No.1 Gold Plant
Name of Facility

Signature of Lead Auditor

9 August 2017
Date

PRINCIPLE 6 – WORKER SAFETY

Protect Workers' Health and Safety from Exposure to Cyanide

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 6.1**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 6.1 to identify potential cyanide exposure scenarios and take measure as necessary to eliminate, reduce and control them.

The operation has developed procedures describing how cyanide-related tasks such as unloading, mixing plant, operations, entry into confined spaces, and equipment decontamination prior to maintenance should be conducted to minimise worker exposure.

The procedures require, where necessary, the use of personal protective equipment and address pre-work inspections.

The operation implements procedures to review proposed process and operational changes and modifications for their potential impacts on worker health and safety, and incorporates the necessary worker protection measures.

FS1-24 Management of Change Directive, rev 01, June 2015. The directive stipulates the process to follow during a Management of Change assessment. The Procedure provides an eleven point guideline on the steps to follow to complete the management of change. The MOC process includes a risk assessment process.

The operation solicits and actively considers worker input in developing and evaluating health and safety procedures.

The monthly Health and Safety Meetings are held and used to obtain input into procedures and discuss any changes to existing procedures.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 6.2**

☐ not in compliance with

The operation is in full compliance with Standard of Practice 6.2 to operate and monitor cyanide facilities to protect worker health and safety and periodically evaluate the effectiveness of health and safety measures.

The operation has determined the appropriate pH for limiting the evolution of HCN gas during mixing and production activities. 10.5 pH is the level currently being controlled in the Leach Reception Tank through the use of 2 hourly titrations for pH. Lime is automatically added on a time basis on the line before the thickeners.

Procedure 4.2.1.6 Response to Low pH Level, rev 02, August 2016. Discharge points of cyanide must always enter the process where the pH is maintained above 9.8 and which is well ventilated at all times. Procedure stipulates the reporting procedures and actions required in the event that the pH drops below 9.9.

Where the potential exists for significant cyanide exposure, the operation uses personal monitoring devices to confirm that controls are adequate to limit worker exposure to HCN gas and sodium, calcium or potassium cyanide dust to 10 ppm on an instantaneous basis and 4.7 ppm continuously over an 8-hour period, as cyanide. There are 9 fixed cyanide monitors and 13 Pac 7000 hand held units. These units have a first alarm level at 4.7 ppm and a second alarm level at 10 ppm. The cyanide storage area, cyanide dosing points on the leach modules, and the precipitation tank in the Smelt House have been designated at cyanide hotspot areas with personal Pac 7000 HCN monitors required to be worn in these areas. If the alarm sounds the area will be vacated and subsequently tested before being declared safe for re-entry.

Hotspot surveys are conducted every 6 months for 2014, 2015, 2016. These were undertaken at the Cyanide Storage Tanks, the Elution Section, top of the Leach Tanks (various points), the Adsorption Section, the Residue, and the Smelt House. If readings are greater than 3 ppm the area is designated as a cyanide hotspot. The Cyanide Storage Tanks/ Offloading Area, Cyanide Dosing points for the three leach modules and the Precipitation Tank in the Smelt House have been designated as cyanide hotspots.

Hydrogen cyanide monitoring equipment is maintained, tested and calibrated as directed by the manufacturer, and records are retained for at least one year. Since the last recertification audit, there have been periods longer than the 6 months calibration interval specified by the manufacturer. All equipment was calibrated at the time of the audit. The cyanide champion has created a calibration schedule to prevent reoccurrence of this situation.

Warning signs has been placed at areas where cyanide is used advising workers that cyanide is present, and that no smoking, open flames and eating and drinking are not allowed. This was observed during the site visit. PPE requirements are also stipulated at all of these areas.

Showers, low pressure eye wash stations and dry powder or non-acidic sodium bicarbonate fire extinguishers are located at strategic locations throughout the operation and are maintained, inspected and tested on a regular basis.

Unloading, storage, mixing and process tanks and piping containing cyanide are identified to alert workers of their contents, and the direction of cyanide flow in pipes is identified.

MSDS, first aid procedures or other informational materials on cyanide safety in the language of the workforce is available in areas where cyanide is managed.

Procedures are in place and being implemented to investigate and evaluate cyanide exposure incidents to determine if the operation's programs and procedures to protect worker health and safety, and to respond to cyanide exposures, are adequate or in need of revising.

No cyanide exposure incidents occurred in the last 3 years.

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

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 6.3 to develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

The operation has water, oxygen, a resuscitator, antidote kits and a radio, telephone, alarm system or other means of communications or emergency notification readily available for use at cyanide unloading, storage and mixing locations and elsewhere in the plant.

The operation inspects its first aid equipment regularly to ensure that it is available when needed, and materials such as cyanide antidotes are stored as directed by their manufacturer and replaced to ensure that they will be effective when needed.

The operation has developed specific written emergency response plans and procedures to respond to cyanide exposures including the following:

Procedure 4.2.3.1 Harmony 1 Plant Cyanide Emergency Preparedness, rev 2, February 2017;

Procedure 4.2.3.1 Ambulance Entry in the event of an Emergency, rev 02, August 2016;

Procedure 4.2.3.3 Cyanide-related accidents / Incidents, rev 02, August 2016; and

ITS-EPP Emergency Preparedness Plan, rev 1, 1 December 2016 - includes chemical exposures (cyanide) – for the TSF.

The operation has its own on-site capability to provide first aid or medical assistance to workers exposed to cyanide. All plant personnel and fixed term contractors have been trained in Cyanide First Aid and is therefore able to respond to a cyanide emergency

The operation has developed procedures to transport workers exposed to cyanide to locally available qualified medical facilities. Procedure 4.2.3.1 Ambulance Entry in the event of an Emergency, rev 02, August 2016. describes process to follow during incident to notify ambulance, allow access and accompany patient to hospital;

The operation has made formalised agreements with local hospitals, clinics, etc., so that these providers are aware of the potential to treat patients for cyanide exposure. Agreement between Harmony Gold Mining Company Limited and St Helena Private Hospital (Pty) Ltd, signed December 2014. The operation is confident that the medical facility has adequate, qualified staff, equipment and expertise to respond

Emergency Drills are undertaken twice a year. This includes details of any actions that need to be undertaken as a result of the drill and minutes of follow up meetings. The drill on the 23 October 2014 and 30 April 2015 included the paramedics and the hospital. The drills covered both worker exposure and environmental releases.

A desk based emergency drill was undertaken on 27 February 2017 for the TSF.

PRINCIPLE 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.

The operation is

☒ **in full compliance with**

☐ in substantial compliance with **Standard of Practice 7.1**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 7.1 to prepare detailed emergency response plans for potential cyanide releases.

The operation has developed an Emergency Response Plan to address potential releases of cyanide that may occur on site or may otherwise require response including the following:

Procedure 4.2.3.1 Harmony 1 Plant Cyanide Emergency Preparedness rev 2. February 2017;

FS1-81 Harmony One Plant Emergency Procedures rev 4, January 2017;

CM001, Mandatory Code of Practice for Cyanide Management, rev 6, 9 March 2017; and

Intasol Tailings: ITS-EPP - Emergency Preparedness Plan, rev 01, 1 December 2016.

The Plans consider the potential cyanide failure scenarios appropriate for its site-specific environmental and operating circumstances, including the following, as applicable.

- Catastrophic release of hydrogen cyanide from storage or process facilities;
- Transportation accidents;
- Releases during unloading and mixing;
- Releases during fires and explosions;
- Pipe, valve and tank ruptures;
- Overtopping of ponds and impoundments;
- Power outages and pump failures;
- Uncontrolled seepage;
- Failure of cyanide treatment, destruction or recovery systems (not applicable as no cyanide treatment undertaken); and
- Failure of tailings impoundments, heap leach facilities and other cyanide facilities.

Tanker Services are responsible for transportation related emergencies and are a fully ICMI certified transportation company.

The Plans describe specific response actions (as appropriate for the anticipated emergency situations) such as clearing site personnel and potentially affected communities from the area of exposure, use of cyanide

antidotes and first aid measures for cyanide exposure, control of releases at their source, and containment, assessment, mitigation and future prevention of releases.

In the event of an emergency incident an investigation is undertaken to ensure the prevention of future releases.

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

The operation is

☒ **in full compliance with**

☐ in substantial compliance with **Standard of Practice 7.2**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 7.2 to involving site personnel and stakeholders in the planning process.

The operation has involved its workforce and stakeholders, including potentially affected communities, in the cyanide emergency response planning.

The operation has made potentially affected communities aware of the nature of the risks associated with accidental cyanide releases, and consulted with them directly regarding appropriate communications and response.

The operation has involved local response agencies such as outside responders and medical facilities in the cyanide emergency planning and response process.

The operation engages in consultation/ communication with stakeholders to keep the Emergency Response Plan current

The operation annually invites SAPS, EMS, Africa Health Care, Traffic Department, Buthelezi Ambulances, St Helena Department, Netcare 911, Traffic Department, ER24 to inform them of the following: cyanide truck moving through the area, what emergency numbers to call, only call the St. Helena Hospital, UN number on truck. The Plant provided them with a Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) as well as the Harmony 1 Plant Cyanide Emergency and Response Plan (4.2.3.1), UN number on truck.

Safety Committee Meetings are undertaken once a month and are attended by section foremen, safety representatives, TSF contractors and security. The minutes include a section on cyanide, a section on Plant code practices and a section on emergency preparedness. The minutes dated 22 February 2017 included a comment that FS 81 Environmental Procedures is due for a review.

Harmony Cyanide Awareness Workshop held on 01 March 2017. Worksop was well attended by emergency response personnel.

The Cyanide Champion does a verbal presentation to the local community, at the hall in Boiketlong Village, on the cyanide management at the plant. Prior to the meeting, the Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) is distributed to each house.

Cyanide Champion provide the local cattle herders with the letter in Sotho and English Notice: Community of Boiketlong Village and Livestock Grazing on the Mine Property.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 7.3**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 7.3 to designate appropriate personnel and commit necessary equipment and resources for emergency response.

The cyanide related elements of the Emergency Response Plan designate appropriate personnel and commit necessary equipment and resources including the following.

Procedure 4.2.3.1 Harmony 1 Plant Cyanide Emergency Preparedness, rev 2 February 2017 stipulates in section 4.1 that the Plant Control Room will be the central co-ordination point for all cyanide emergencies. The Plant Manager will be present in the Plant Control Room and they have the explicit authority to commit the resources of plant for any emergency.

A Cyanide Emergency Team has been identified consisting of 8 people. These people cover the 3 shifts. The contact details and photographs of these people are placed on notice boards.

FS1-81 Harmony One Plant Emergency Procedures p15 Cyanide Emergency Training details the training for the Emergency Response Team.

Procedure 4.2.3.1 Harmony 1 Plant Cyanide Emergency Preparedness, rev 2 February 2017 p10 lists the Emergency Telephone Numbers. The duties and responsibilities of the coordinators and team members are specified in the following:

Procedure 4.2.3.4 Emergency Contact Procedure rev 2, 04 August 2016.

FS1-81 Harmony One Plant Emergency Procedures - Appendix A Cyanide Poisoning and First Aid Treatment.

List of emergency response equipment is listed in CM001 Mandatory Code of Practice for Cyanide Management, Harmony One Plant rev 6, 9 March 2017, Section 4.8.7.1

The role of outside responders, medical facilities and communities are described in the following:

4.2.3.3 Cyanide First Aid Treatment rev 02, Feb 2017.

FS 1-81 Harmony One Plant Emergency Procedures, rev 04, January 2017.

There is a formal agreement between Harmony Gold Mining Company Ltd and St Helena Private Hospital (Pty) Ltd. In addition, the Plant inspects the hospital on a quarterly basis.

The operation annually invites SAPS, EMS, Africa Health Care, Traffic Department, Buthelezi Ambulances, St Helena Department, Netcare 911, Traffic Department, ER24 to inform them of the following: cyanide truck moving through the area, what emergency numbers to call, only call the St. Helena Hospital, UN number on truck.

Emergency Drills are undertaken twice a year. The drills on the 23 October 2014 and 30 April 2015 included the paramedics and the hospital.

Harmony No.1 Gold Plant
Name of Facility

Signature of Lead Auditor

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Date

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 7.4**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 7.4 to develop procedures for internal and external emergency notification and reporting.

The Plans include procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities of the cyanide emergency including the following:

Procedure 4.2.3.1 Harmony 1 Plant Cyanide Emergency Preparedness, rev 2 February 2017 p10 lists the Emergency Telephone Numbers.

The Plan includes procedures and contact information for notifying potentially affected communities of the cyanide-related incident and any necessary response measures and for communications with the media.

FS 1-81 Harmony One Plant Emergency Procedures, rev 04, January 2017 includes the procedure for communication with the media.

The COP 13 Mandatory Code of Practice for Emergency Preparedness and Response, Harmony One Plant, rev 4, Nov 2016 in section 8.1.2 details communication systems including 8.1.2.2 Communication from the Plant to outside parties.

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.**

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 7.5**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 7.5 to incorporate in response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.

The Plan describes specific remediation measures as appropriate for the likely cyanide release scenarios.

Drinking water is supplied by municipal water distribution network sourced from outside the area and will therefore not be affected by a cyanide spill.

Integrated Emergency Response Manual rev 0, dated 1 June 2011, Section 35 Major Cyanide Spill states that "no cyanide should be washed into areas where they can contaminate the environment as this could lead to harm to nature and contamination of the ground water."

The Environmental Monitoring of Surface Water EPR 001, rev 03, April 2015 was observed. The procedure includes the prohibition of chemicals, such as sodium hypochlorite, ferrous sulphate and hydrogen peroxide to treat cyanide that has been released into surface water.

The Plan addresses the potential need for environmental monitoring to identify the extent and effects of a cyanide release, and include sampling methodologies, parameters and, where practical, possible sampling locations

Environmental Monitoring of Surface water EPR 001, rev 03, April 2015 - states in section 11.0 Emergency Response, that the monitoring should be undertaken at the points listed in section 6.1 Surface Water Monitoring Points and Identification. The procedure also details the sampling methodology and the parameters.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 7.6**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 7.6 to periodically evaluate response procedures and capabilities and revise them as needed.

The operation reviews and evaluates the cyanide-related elements of its Emergency Response Plan for adequacy on a regular basis.

Mock emergency drills are conducted periodically to test response procedures for various cyanide exposure scenarios, and lessons learnt from the drills are incorporated into response planning.

Emergency Drills are undertaken twice a year. Mock drill reports were observed. These include details of any actions that need to be undertaken as a result of the drill and minutes of follow up meetings. The drill on the 23 October 2014 and 30 April 2015 included the paramedics and the hospital. The drills covered both worker exposure and environmental releases. A desk based emergency drill was undertaken on 27 February 2017 for the TSF.

Provisions are in place to evaluate and revise the Emergency Response Plan after any cyanide-related emergency requiring its implementation

Procedure 4.2.3.1 Harmony 1 Plant Cyanide Emergency Preparedness rev 2 Feb 2017, section 3.5 Investigations and Follow Up, cyanide emergency drills states that the "plant safety officer must conduct a review of all cyanide emergency drills to determine the cause of any deviation or shortfall. Existing standard procedures, training manuals, and control measures must be revised where required to address the deviations or shortfall."

PRINCIPLE 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.

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 8.1 to train workers to understand the hazards associated with cyanide use.

Cyanide induction video, which includes cyanide first aid, is presented to all employees and contractors.

A training matrix is used showing all the employees with the dates on when the initial and refresher training was undertaken.

The E-Learning System is used by all employees. It is a computer based system where the employee or contractor will work through the modules until completed. Employees must achieve a 100% pass rate

All employees and contractors undertake the two cyanide related training modules, Handling Cyanide Safety in a Metallurgical Plant, Cyanide First Aid Training.

Refresher Cyanide Induction Training is conducted annually after employees return from annual leave. Training records are retained for 40 years.

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

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 8.2 to train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.

Cyanide induction video, which includes cyanide first aid, is presented to all employees and contractors.

A training matrix is used showing all the employees with the dates on when the initial and refresher training was undertaken.

The E-Learning System is used by all employees. It is a computer based system where the employee or contractor will work through the modules until completed. Must achieve a 100% pass rate

All employees and contractors undertake the two cyanide related training modules, Handling Cyanide Safety in a Metallurgical Plant, Cyanide First Aid Training.

Refresher Cyanide Induction Training is conducted annually after employees return from annual leave and through STP assessments.

In addition, all employees are tested on the Standard Task Procedures (STP) that they use in the course of their work.

Each of the plant procedures (e.g. Procedure 4.4.1.4 - Liquid Cyanide Offloading UN no. 3414, rev 01, 15 June 2016) has been written in a planned task observation format, that the elements necessary for each job have been identified and stipulated and can be assessed during training and observation.

Training is conducted by Dipuo Tlhobo (Training assessor from March 2016). Julia Matseka was the Training Assessor prior to March 2016. Their training qualifications were observed.

The various section foremen are competent to conduct STP assessments due to their experience.

Training records are retained for 40 years documenting the training they receive. The records include the names of the employee and the trainer, the date of training, the topics covered, and if the employee demonstrated and understanding of the training materials.

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

The operation is

☒ **in full compliance with**

☐ in substantial compliance with **Standard of Practice 8.3**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 8.3 to train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.

All employees, and contractors are required to attend the induction program during which a comprehensive video is shown detailing the dangers associated with cyanide as well as the first aid measures in the event of an exposure.

The video was observed and found to be very detailed.

The matrix (Plant Cyanide Procedures 2014 - 2016) indicates all procedures, which are already written in a format to conduct task observations, that require training and assessment as well at the staff required to undergo the assessment. Identified employees are trained on the following two procedures relevant to cyanide spillages during off-loading:

- 4.2.3.7 Liquid cyanide Off-Loading - Accidental Release Measures.

- 4.2.3.8 Liquid Cyanide Off-Loading - Emergency in Off-loading Situations.

Intasol also attends the e-learning and inductions video and therefore views the video and need to pass the two cyanide related modules Handling Cyanide Safety in a Metallurgical Plant, and Cyanide First Aid Training the same as all other employees.

Intasol has a Site Specific Induction, which includes a module for Cyanide Exposure.

It was confirmed that all employees complete the Handling Cyanide Safely and Cyanide First Aid Training modules. Required pass rate is 100%.

Emergency Drills are undertaken twice a year. The drill report includes details of any actions that need to be undertaken as a result of the drill and minutes of follow up meetings. The drill on the 23 October 2014 and 30 April 2015 included the paramedics and the hospital. The drills covered both worker exposure and environmental releases.

A desk based emergency drill was undertaken on 27 February 2017 for the TSF. The following was observed: Emergency Scenario Mark Sheet & Feedback, Site: One Plant FSS8W, Cyanide Drill - Desktop based assessment of the Cyanide Drill Procedure. Did not include any actions required.

Each Cyanide drill is evaluated on a form checking each step of the drill and evaluating the actions of the response team against the response requirements. For each step of the drill it is stated whether the action was performed correctly and if any actions should be taken post the drill.

All role players including Netcare and the St Helena Hospital meet in the boardroom post the drill. Any deficiencies are discussed and corrective actions are listed.

Emergency Response Co-ordinators and members of the Emergency Response Team are trained in the procedures included in the Emergency Response Plan regarding cyanide, including the use of necessary response equipment.

The operation has made off-site Emergency Responders, such as community members, local responders and medical providers, familiar with those elements of the Emergency Response Plan related to cyanide

Observed Agreement between Harmony Gold Mining Company Limited and St Helena Private Hospital (Pty) Ltd, signed December 2014. St Helena is equipped to accept serious cyanide patients and the management thereof in accordance with cyanide protocol.

The operation annually invites SAPS, EMS, Africa Health Care, Traffic Department, Buthelezi Ambulances, St Helena Department, Netcare 911, Traffic Department, ER24 to inform them of the following: cyanide truck moving through the area, what emergency numbers to call, only call the St. Helena Hospital, UN number on truck

training records are retained by the training department. Each employee has a file with all the records. The records include the name of the employee, name of the trainer, date of training, the topics covered as well as the assessment percentage achieved.

PRINCIPLE 9 – DIALOGUE

Engage in Public Consultation and Disclosure

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 9.1**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 9.1 to provide stakeholders with the opportunity to communicate issues of concern.

The operation annually invites SAPS, EMS, Africa Health Care, Traffic Department, Buthelezi Ambulances, St Helena Department, Netcare 911, Traffic Department, ER24 to inform them of the following: cyanide truck moving through the area, what emergency numbers to call, only call the St. Helena Hospital, UN number on truck. Observed: invite to Meeting to Discuss the Management of Cyanide

The Plant provides them with a Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) as well as the Harmony 1 Plant Cyanide Emergency and Response Plan (4.2.3.1), UN number on truck.

Safety Committee Meetings are undertaken once a month and are attended by section foremen, safety representatives, TSF contractors and security.

The Cyanide Champion gives a verbal presentation to the local community, at the hall in Boiketlong Village, on the cyanide management at the plant. Prior to the meeting, the Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) is distributed to each house.

The Cyanide Champion provides the local cattle herders with the letter in Sotho and English Notice: Community of Boiketlong Village and Livestock Grazing on the Mine Property.

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

☒ **in full compliance with**

The operation is

☐ in substantial compliance with **Standard of Practice 9.2**

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 9.2 to initiate dialogue describing cyanide management procedures and responsively address identified concerns.

The operation annually invites SAPS, EMS, Africa Health Care, Traffic Department, Buthelezi Ambulances, St Helena Department, Netcare 911, Traffic Department, ER24 to inform them of the following: cyanide truck

moving through the area, what emergency numbers to call, only call the St. Helena Hospital, UN number on truck. Observed: invite to Meeting to Discuss the Management of Cyanide

The Plant provides them with a Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) as well as the Harmony 1 Plant Cyanide Emergency and Response Plan (4.2.3.1), UN number on truck. From Harmony the Plant Manager, Environmental Manager, relevant plant personnel.

Safety Committee Meetings are undertaken once a month and are attended by section foremen, safety representatives, TSF contractors and security.

The Cyanide Champion gives a verbal presentation to the local community, at the hall in Boiketlong Village, on the cyanide management at the plant. Prior to the meeting, the Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) is distributed to each house.

The Cyanide Champion provides the local cattle herders with the letter in Sotho and English Notice: Community of Boiketlong Village and Livestock Grazing on the Mine Property.

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

☒ **in full compliance with**

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

☐ not in compliance with

Summarise the basis for this Finding/Deficiencies Identified:

The operation is in full compliance with Standard of Practice 9.3 to make appropriate operational and environmental information regarding cyanide available to stakeholders.

The Plant provides stakeholders with a Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) as well as the Harmony 1 Plant Cyanide Emergency and Response Plan (4.2.3.1), UN number on truck.

The Cyanide Champion gives a verbal presentation to the local community, at the hall in Boiketlong Village, on the cyanide management at the plant. Prior to the meeting, the Public Communication Flyers detailing Cyanide management at Harmony Plant (detailing the Emergency numbers to be used in the event of an accidental cyanide spill or leak) is distributed to each house.

The Cyanide Champion provides the local cattle herders with the letter in Sotho and English Notice: Community of Boiketlong Village and Livestock Grazing on the Mine Property.

There have been no incidents of cyanide exposure in the last 3 years.

There have been no cyanide releases of the mine site in the past 3 years.

The Harmony 1 Plant Cyanide Emergency Preparedness procedure (4.2.3.1) stipulates that employees will not disclose any information to the press or public during an emergency incident.

Incidents involving cyanide releases or exposure incidents will be handled via Corporate Communications Department. Newsflashes are distributed within the Company via e-mail. Incidents are reported to the

Department of Mineral Resources (DMR) by mine management. The DMR reports selectively on repeated or critical incidents. Information on significant cyanide exposures are made available, after appropriate investigations in the Integrated Annual Report.

Report Signature Page

Ed Perry
Lead Auditor

Marie Schlechter
Gold Mine Auditor

Date: 9 August 2017

Harmony No.1 Gold Plant
Name of Facility

Signature of Lead Auditor

9 August 2017
Date

Report Signature Page

Ed Perry
Lead Auditor

Marie Schlechter
Gold Mine Auditor

Date: 1 June 2017