

October 2017

## ICMI GOLD MINE RECERTIFICATION AUDIT - SUMMARY AUDIT REPORT

# Harmony Kusasalethu Gold Plant

**Submitted to:**

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

Harmony Kusasalethu Gold Plant  
South Africa

REPORT

**Distribution:**

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

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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### 1.0 SUMMARY AUDIT REPORT FOR GOLD MINING OPERATIONS

<b>Name of Cyanide User Facility:</b>	Harmony Kusasaletu Plant
<b>Name of Cyanide User Facility Owner:</b>	Harmony Gold Mining Company Ltd
<b>Name of Cyanide User Facility Operator:</b>	Harmony Gold Mining Company Ltd
<b>Name of Responsible Manager:</b>	Juan Oosthuizen, Plant Manager
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<b>Country:</b>	South Africa
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### 2.0 LOCATION DETAIL AND DESCRIPTION OF OPERATION

The Harmony Kusasaletu Gold Plant is situated 18 km from Carletonville, Gauteng, South Africa.

The gold plant consists of the Milling section for grinding of ore, Thickeners for dewatering (pulp for leach feed), Leach section for dissolution of gold using liquid sodium cyanide as one of the reagents, Carbon in Pulp for adsorption of dissolved gold and Backfilling for producing support material for underground.

Ore Reception Run of Mine (ROM) is conveyed from underground to the stock pile facility of 28 000 tons capacity. The stock pile material feeds to the three parallel silo bins of 2550 tons live storage capacity, from which ore is drawn from each silo to be taken to the three parallel run of mine mills for grinding to required size. Steel balls are used as grinding media, supplemented by wide range particle size of mill feed. There is a two stage classification for each mill with each primary cyclone overflow combined into a common tank, the secondary cyclone feed tank, for second stage classification by secondary cyclone. The overflow of the secondary cyclone is further screened on a linear screen for the removal of coarse woodchips and tramp steel.

There are three thickeners, two of which are always online, fed from a distribution box of the thickeners feed launder, with the one thickener available as a standby in case of emergency. Calcium oxide (lime) is added at the thickeners for maintaining a level of alkalinity. Flocculant is added to aid with settling of solids. The overflow water of the thickeners gravitates to the two mill return tanks to be reused in the milling process.

The leach circuit consist of 12 tanks, cyanide is automatically added to Leach tank 9 at a concentration necessary for the dissolution of gold. Compressed air is used to agitate the slurry, suspending solids in pulp and raising dissolved oxygen.

The carbon in pulp (CIP) circuit is a carousel system design with eight tanks. A cylindrical screen with is used in every tank to retain the added activated carbon.

The gold depleted slurry 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 TSF, but a portion is also pumped to a backfill plant for the generation of backfill material. The carbon that has been pumped upstream is recovered at the first adsorption tank by pumping the slurry over vibrating carbon screen.

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The elution section processes the carbon from the CIP modules. After the carbon has been stripped it is taken through a regeneration process. Gold is recovered from the elution solution using electrowinning cells. The electrowinning sludge is dried and smelted in the induction furnace and then dispatched to Rand Refinery for refining.

**Backfill** The backfill plant consists of four modules. Each module comprises of a primary, scavenger and cleaner cyclone. All four modules draw feed from the common tank with a level sensor linked to the splitter box for directing flow from CIP. The feed tank level is set at 80% to subject material to classification and material is pumped to the TSF when the feed tank is above 80%. An automatic WAD cyanide analyser is installed at the residue line (feed to the backfill) to sample and analyse WAD cyanide levels for environmental compliances of allowable discharge levels of WAD from mine process circuit in case of spills and water overflows.

The overflow of the cleaner cyclone and the underflow of the scavenger cyclone are recycled to the primary feed tank for reclassification while the overflow of the scavenger gravitates to the reject tank and it is pump to Ultracorp, where flocculent is added to aid in settlement of solids to increase the relative density for tailings deposition. About 0.11ppm of ferrous sulphate is added to neutralise the cyanide concentration of backfill product.

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**ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY  
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**SUMMARY AUDIT REPORT**

**Auditors Findings**

<b>Harmony Kusasaletu Gold Plant is:</b>	<input checked="" type="checkbox"/> in full compliance with  <input type="checkbox"/> in substantial compliance with  <input type="checkbox"/> not in compliance with	<b>The International Cyanide Management Code</b>
<b>Audit Company:</b>	ESC Afrika	
<b>Audit Team Leader:</b>	Ed Perry, Lead Auditor	
<b>Email:</b>	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 4.4 and 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 2 May 2017 and 5 May 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.

<u>Harmony Kusasaletu Gold Plant</u>	 _____	<u>22 October 2017</u>
Name of Facility	Signature of Lead Auditor	Date

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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 Code

The auditors observed: Agreement for the Supply and Delivery of Sodium Cyanide between Randfontein Estates Limited and Sasol Polymers a Division of Sasol Chemical Industries Ltd, signed 31 March 2014.

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.

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**Harmony Kusasaletu Gold Plant**  
Name of Facility

Signature of Lead Auditor

22 October 2017  
Date

## **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).

These agreements designate 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.

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

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**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 - recertified 17 July 2015.

Chain of Custody Records state that Tanker Services delivers liquid Sodium Cyanide from the Sasol manufacturing facility in Sasolburg, South Africa directly to Harmony Kusasalethu Plant, Carltonville, South Africa.

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**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.

The previous recertification audit observed:

“Design drawings 681-0-7998 cyanide plant foundation reinforcing details 9/6/78 signed by consulting civil and mechanical engineer - tanks on solid base. Tanks are made of mild steel, pipelines are HDPE lines, all valves are made of stainless steel and polyurethane DLM valves and rubber lined Saunders valves - verified during site inspection.”

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 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. Both cyanide storage tanks are fitted with ventilation pipes. The bund area for the liquid cyanide storage tanks is constructed of concrete and sealed to prevent any seepage to subsurface.

The liquid cyanide is unloaded on a concreted bunded surface that minimises seepage to the subsurface. The offloading area has a hump at one end to divert any spills or wash down water into the spillage sump from where it is pumped back in to the bund for the cyanide storage tanks. Spills in the cyanide storage tank bund are pumped to the leach tanks.

An alarm sounds in the tank area and in the Control Room when the tank level reaches 85%. The operator then closes the air valve.

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**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.

Liquid cyanide is delivered in bulk tankers and no containers are used. Any residue from the outside of the tanker is washed off after off-loading and washed into the cyanide spill sump.

The operation has developed and implemented plans or procedures to prevent exposures and releases during cyanide unloading and mixing activities including the following:

ERP 073 Liquid Cyanide Off-loading, Rev 02, 07 November 2016.

The procedure describes the required PPE to be worn by both the Customer Qualified Person (CQP) as well as the driver.

ERP 002 The "Buddy" System, Rev 02, 01 September 2016.

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**Harmony Kusasaletu Gold Plant**  
Name of Facility

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Signature of Lead Auditor

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## **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.

There are 64 Standard Task Procedures, 14 Engineering Tasks and Procedures for the operation of the Plant. Frazer Alexander Tailings has developed 29 Operational Guidelines for the operation of the TSF.

The operation has plans or procedures that identify the assumptions and parameters on which the facility design was based and any applicable regulatory requirements (e.g., freeboard required for safe pond and impoundment operation; the cyanide concentrations in tailings on which the facility's wildlife protection measures were based) as necessary to prevent or control cyanide releases and exposures consistent with applicable requirements including the following:

ERP 015 High Cyanide Levels in Residue Slime, Rev 02, 4 November 2016. WAD cyanide readings not to exceed 50 ppm in the residue slime at all times.

ERP 019 Response to Low pH Level, Rev 02, 08 November 2016. Regular pH monitoring must be conducted to ensure it does not drop below 9.8.

ERP 080 Backfill Operating Procedure, Rev 02, 01 September 2016. Backfill is only sent underground when cyanide is 10 ppm or less.

Tailings Freeboard: Kusasaletu Mine: Quarterly Report 4 - November 2016, conducted by Jones and Wagener Engineering & Environmental Consultants, 03 February 2017, the freeboard trigger levels are calculated as part of the Annual Audit for 2016 from the survey completed in October 2016

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 including the following:

ERP 078 Bund Inspection Operating Procedure, Rev 02, 02 November 2016

ERP 035 Cyanide Facility Inspections, Rev 02, 02 November 2016.

Inspection checklist includes the description of the equipment to be inspected, the item to be checked, criteria, place for check mark and remarks, the name of inspector, date, time, signatures and include the following:

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Daily Inspections - First Aid Room, Antidote Kits, Cyanide Trailer, Cyanide Plant, Oxygen Pack.

Monthly Inspections - Fire Extinguisher, and Fire Hydrant,

Weekly Inspections - Cyanide Plant, Bund Wall Shower, Cyanide Bulk Storage: Pump and Pipeline, Cyanide Bulk Storage: Fence, Cyanide Plant: 2 x Shower opposite lime, Cyanide emergency PPE store, Plant Alarms, Cyanide Shower Leach Top, Cyanide Plant, Fire Extinguisher, Residue Line (flanges, bends and spool pieces, bolts and gaskets),

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. ERP 079 Managerial Directive - Management of Change, Rev 02, 15 November 2016. Document requires the following information about the proposed change; Initiate the Change Request, Evaluate the Change Request, Approve the Change Request. Managerial instruction to identify and control changes associated with the operational activities at Kusasaletu Plant.

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:

ERP 012 Emptying and Repairing and Leaking Cyanide Storage Tank, Rev 02, 03 November 2016.

ERP 015 - High Cyanide Levels in Residue Slime, Rev 02, 04 November 2016.

ERP 023 - Respond to abnormal and emergency conditions, Rev 02, 08 November 2016.

ERP019 - Response to low pH level, Rev 02, 08 November 2016.

ERP 045 - When high storage alarm is sounded, Rev 02, 09 November 2016.

ERP 022 - Starting and stopping a cyanide pump, Rev 02, 09 November 2016.

ERP 098 - Starting and Stopping the Plant, Rev 02, 01 November 2016.

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

The operation undertakes inspections at the unloading, storage, mixing and process areas including the following;

Thickness testing of tanks by Quest Technical Services (Pty) Ltd.

Safety Audit Inspection (Structural) Report K2874, April 2014 and May 2016 by LMV (Pty) Ltd Consulting Engineers.

Daily Inspection - Cyanide Plant including the pumps, valves and bund wall high level alarm.

Weekly Inspection - Cyanide Bulk Storage: Fence, inspection includes: inspect bundwall for signs of cracks or distortion, inspect high level bund indicator.

Daily inspections of TSF by FAT include; rainfall, Pool Level, First Aid Pouch, Delivery Line, Valves, Side Slopes, Penstock, and wildlife mortalities.

Monthly inspections of TSF by FAT include; Penstock, Pool, Walkways, Valves, Side Slopes, Vegetation, Piezometers, Freeboard Poles, Freeboard Complying, Radio.

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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.

Preventative maintenance programs are implemented and activities documented to ensure that equipment and devices function as necessary for safe cyanide management. The planned maintenance system is computerised using DMS software. 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. Job cards are also raised where ad hoc maintenance is required by the plant inspections or observations from foremen and the control room.

The operation will prevent unintentional releases and exposures in the event its primary source of power is interrupted. A backup generator is available during a power failure. The generator powers the thickeners, rind water board pumps, and security lights. In the event of a power failure, any cyanide inside the dosing pipelines will run back to the storage tank. The generator is maintained as part of the planned maintenance programme and tested on a regular basis. Bund areas and sump pumps are in place to contain and return spillage to the process.

**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.

Mined ore and waste rock is blended into one stream, which stays mainly constant. Weekly Bottle Roll tests are conducted to confirm the cyanide set point. A TAC 1000 is used to control the cyanide addition in Leach Tank 9. Cyanide. The setpoint is 250 ppm cyanide.

A TAC 1000 cyanide addition system is used with automatic valves to control the cyanide addition. A WAD 1000 cyanide analyser on the tailings is used for WAD control and manual feedback parameter setting.

Metallurgical Test Work on Gold Bearing Ore Sample from Harmony: Kusasaletu, conducted by Maelgwyn Mineral Services Africa, Report No. 16-044 Rev 0, 29 July 2016 was commissioned to investigate alternative treatment systems. This has led to the Plant undertaking further investigations to convert 4 leach tanks into a CIL process.

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**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 comprehensive, probabilistic water balance. An excel spreadsheet based water balance has been developed for the operation. The water balance is updated monthly.

The water balance considers the criteria below in a reasonable manner and as appropriate for the facilities and the environment.

The water balance records the Tailings Deposition Rates. The water balance takes into consideration a 1:50 year storm event and a 1:100 year storm event. Rainfall is measured on a daily basis at the TSF and fed into the model. The evaporation rate has been calculated for the area and fed into the model.

There is no surface runoff from the up-gradient watershed as the plant is on top of a hill. The TSF is located on the side of the hill with slopes of the TSF diverting runoff down the side of the TSF.

Freezing, thawing conditions are not applicable as there are no significant snowfalls under normal conditions. The water balance model takes into consideration the water lost from seepage, evaporation from the TSF, interstitial water, and the amount of water returned to the plant.

In the event of a power failure the pumping of tailings to the TSF will cease ensuring that that there is no overtopping of the TSF.

There is no direct discharge to surface water and no treatment, destruction or regeneration systems.

The operating procedures incorporate inspection and monitoring activities to implement the water balance and prevent overtopping of ponds and impoundments and unplanned discharge of cyanide solutions to the environment. The legal freeboard is dictated in the quarterly inspection reports with the actual monitoring and reporting undertaken monthly. The pool level is monitored and reported on in the daily inspections.

The ponds and impoundments are designed and operated with adequate freeboard above the maximum design storage capacity determined to be necessary from water balance calculations.

The operation measures precipitation, compares results to design assumptions and revises operating practices as necessary.

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**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:**

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 are no open waters where WAD cyanide exceeds 50 mg/L WAD cyanide therefore the operation has not needed to implement measures to restrict access by wildlife and livestock.

The operation can demonstrate that the cyanide concentration in open water does not exceed 50 mg/L WAD cyanide.

The compliance point used for the tailings is the feed tank from the CIP to the Backfill tanks. The assumption is that this value is the worst case scenario and all cyanide in solutions at the TSF will be less than this sample value by approximately 15 ppm.

The daily WAD analysis was observed for the period since the previous recertification audit. During September 2015 and March 2016 – July 2016 there were a significant number of exceedances of the 50 mg/l with the highest value being 95.7 mg/l on the 19 May 2016. Since July 2016 there have been 4 exceedances as follows: 16 Feb 2017, 77.5 mg/l; 17 Feb 53.5 mg/l; 14 March 2017; 51.8 mg/l; and 10 April 2017, 57.7 mg/l. Taking into account the reduction in WAD cyanide between the Plant and the TSF by approximately 15 ppm it is likely that of these four exceedances only the one on 16 Feb 2017 would have led to an exceedance at the deposition point.

Monthly surface water samples are taken at the Return Water Dam. The results were observed for 2014, 2015, and 2016. The WAD cyanide measures in all these samples were <0.5 mg/l.

Maintaining a WAD cyanide concentration of 50 mg/l or less in open water is effective in preventing significant wildlife mortality as no wildlife mortalities have been recorded in the last 3 years.

Fraser Alexander Tailings Daily Recordings Point 7 requires the operator to report on wildlife mortalities observed. None were observed.

There is no heap leach currently being operated.

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**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 is no direct discharge to surface water.

An indirect discharge to the Loopspruit is possible during abnormal conditions, from the bottom of the Return Water Dam e.g. failure of return pump. Provision is made for a pump to return seepage and overflow from the RWD, back to the Return Water Dam. The Loopspruit River, the Return Water Dam and Return Water Dam Seepage are sampled monthly downstream of the TSF and analysed for WAD CN - all results were <0.5 mg/l WAD CN.

Indirect discharges from the operation have not caused cyanide concentrations in surface water to rise above levels protective of a designated beneficial use for aquatic life.

It is approximately 6 km from the Return Water Dam to the Loopspruit River.

Eight groundwater boreholes are monitored in the vicinity of the Plant and TSF. Groundwater monitoring is conducted on a quarterly basis. All results were less than 0.5 mg/l.

**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 operation implements specific water management or other measures to manage seepage to protect the beneficial uses(s) of groundwater beneath and/or immediately down-gradient of the operation.

Underdrains has been installed on the Lower TSF. The water from the underdrains report to the solution trench which runs to the Return Water Dam. The Upper Dam is built between the Lower TSF and the side of the hill and was constructed without underdrains.

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Seepage and overflow from the Return Water Dam flows into a trench down to a sump from where it is pumped back to the Return Water Dam.

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.

Eight groundwater boreholes are monitored in the vicinity of the Plant and TSF. Groundwater monitoring is conducted on a quarterly basis. All results were less than 0.5 mg/l.

The operation still uses mill tailings as underground backfill, the potential impacts to worker health and beneficial uses of groundwater have been evaluated and measures have been implemented as necessary to address them.

ERP 080 Backfill Operating Procedure, Rev 02, 01 September 2016. When final product storage tanks are half full, cyanide strength must be checked and if cyanide strength is more than 10 ppm 12,5kg of Ferrous sulphate must be added, cyanide strength must be checked again to make sure that cyanide strength is lower than 10 ppm before being 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.

Spill prevention or containment measures are provided for all cyanide unloading, storage, mixing and process solution tanks.

Cyanide storage tanks are located on concrete plinths.

Off-loading, storage, leach, backfill and residue tanks are all in secondary containment. All bunds are concrete and fitted with sumps and pumps. Any spillage at the off-loading area runs down to a bund spillage sump and pumped to the cyanide storage tank bund from where it is pumped to the leach.

Secondary containments for cyanide storage tanks and CIP are sized to hold a volume greater than that of the largest tank within the containment and any piping draining.

In the event of a major leak from the leach tanks or backfill plant where the capacity of the bunds are insufficient, overflow will enter the drainage trenches for the plant leaving the plant via a concrete pipe and then over an unlined area down the side of the TSF towards the Return Water Dams. In such an event, the procedure ERP 077 Cleaning of Major Leach and Backfill Cyanide Spillage, Rev 02, 14 November 2016 will be used. This states that all clean-up operations will be under the direct supervision of the shift foreman or senior official. It also states that no employee other than a competent person will be permitted to clean liquid cyanide spill.

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Procedures are in place and are being implemented to prevent discharge to the environment or any cyanide solution of cyanide-contaminated water that is collected in the secondary containment area.

For cyanide process tanks without sufficient secondary containment, there are procedures for remediation of any contaminated soil such that adverse impacts on surface or groundwater are prevented.

Spill prevention or containment measures are provided for all cyanide process solution pipelines to collect leaks and prevent releases to the environment.

There are no areas where cyanide pipelines present a risk to surface water and therefore there is no requirement for an evaluation of special protection needs. Cyanide tanks and pipelines are constructed of materials compatible with cyanide and high pH conditions. Tanks are constructed of Mild Steel and the pipelines of steel and HDPE.

**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 initial certification audit found the following:

“No quality control/quality assurance records for the cyanide equipment were available and the plant was visually inspected by specialists who covered the whole plant excluding the reagent strength cyanide storage. The cyanide storage facilities were inspected by the plant engineer, who concluded that the facility was fit for purpose. “

The last recertification audit also did not observe any QA/QC documentation.

The Plant Manager stated that there have been no modifications to the existing facilities or any new facilities since the last recertification audit.

Where there is no available quality control and quality assurance documentation or as-built certification for cyanide facility construction, an appropriately qualified person has inspected those elements of the facility involving cyanide and issued a report concluding that its continued operation within established parameters will protect against cyanide exposures and releases. This includes the following documents observed by the auditors:

Safety Audit Inspection (Structural) Report K2874, April 2014 and May 2016 by LMV (Pty) Ltd Consulting Engineers, signed off by T. Jordaan Pr Eng 920279. The May 2016 report states: Leaching Plant – reinforced concrete, steel structures are in good condition; CIP Plant -general condition of the structural elements of this installation are good; Cyanide Storage Tanks – are also in good condition.

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Thickness testing was done on the TSF pipeline in 2015, since then the pipeline is gradually being replaced with HDPE pipes. Weekly pipeline inspections are done on the TSF pipeline.

Monthly inspections of TSF in undertaken by FAT and include the following; Penstock, Pool, Walkways, Valves, Side Slopes, Vegetation, Piezometers, Freeboard Poles, Freeboard Complying, Radio.

**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 written standard procedures for monitoring activities.

EPR No. 006 - Procedure for Groundwater Sampling and Monitoring, Rev 06, 10 September 2015.

EPR No. 014 - Procedure for Surface Water Monitoring, Rev 05, 10 September 2015.

The procedures specify how and where samples should be taken, sample preservation techniques, chain of custody procedures, shipping instructions, and cyanide species to be analysed.

Sampling and analytical protocols have been developed by appropriately qualified personnel. The Monitoring procedures were developed by the Senior Environmental Officer.

Sampling conditions and procedures are documented in writing. It was observed that sampling conditions (activities, weather, etc) are recorded on the Sampling Record Sheet used by DD Science during sampling.

The operation monitors for cyanide in surface water and groundwater down-gradient of the site.

With the Plant and TSF being located on a hill and at the top of the watershed, ground and surface water monitoring is undertaken down-gradient of the facilities.

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 and the daily inspection records for the Plant. These records were observed for 2013, 2014, and 2015.

The logsheet used by DD Science, during water sampling, makes provision for the recording of wildlife mortality sightings, none recorded.

Monitoring is conducted at frequencies adequate to characterise the medium being monitored and to identify changes in a timely manner. Surface water sampling is conducted monthly and groundwater sampling quarterly, as per local regulatory requirements.

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**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.**

in full compliance with

**The operation is**  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.

Kusasaletu Gold Plant currently has a Cyanide Decommissioning procedure in place. ERP 038 Cyanide Decommissioning, Rev 01, 23 February 2017.

The Plan includes an implementation schedule for decommissioning activities.

The Decommissioning procedure states the sequence of decommissioning activities once initiated.

A detailed closure schedule will be developed 5 years before planned decommissioning and closure.

The operation reviews its decommissioning procedures for cyanide facilities during the life of the operation and revises them as needed.

The Senior Environmental Officer stated that the Decommissioning procedure is reviewed every 5 years.

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

in full compliance with

**The operation is**  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 Kusasaletu & Deelkraal: GP30/5/1/2/5/07MR, compiled by Digby Wells Environmental, May 2016.

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The Closure Cost Report, compiled by Digby Wells, is 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.

Harmony make provision by means of the Elandsrand and Deelkraal Rehabilitation Trust Fund. The auditors observed the value of the fund, which sufficient to cover the liability of the Plant and TSF.

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## **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 operational procedures stipulate the PPE required to conduct the specific task as well as the identification of hazards and risks (pre-work inspections).

Mini Risk Assessments are undertaken prior to undertaking a job.

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.

ERP 079 Managerial Directive - Management of Change, Rev 02, 15 November 2016. Document requires the following information about the proposed change; Initiate the Change Request, Evaluate the Change Request, Approve the Change Request. Managerial instruction to identify and control changes associated with the operational activities at Kusasalethu Plant.

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

Weekly Health and Safety meetings are held.

**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.

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The operation has determined the appropriate pH for limiting the evolution of HCN gas during mixing and production activities.

ERP 019 - Response to Low pH Level, Rev 02, 8 November 2016.

The procedure stipulates that cyanide must always enter the process stream at a point where the pH is maintained above 9.8 and which is well ventilated. Regular pH monitoring must be conducted to ensure it does not drop below 9.8.

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.

The plant has installed three fixed HCN gas monitoring devices (Polytron). They are located at the following locations: Cyanide storage bund area; Dosing point at No. 9 Leach Tank; and Dosing point at No. 4 Leach Tank.

The Plant currently uses 5 personal monitoring devices. The monitors, personal and fixed, have a first alarm level of 4.7 ppm and a second alarm level of 10 ppm.

In the event that the A1 alarm sounds at 4.7 ppm the individual reports the incident by radio to the control room and can then carry on working to finish the work they are doing on the assumption that this will take less than one hour. In the event that the A2 alarm sounds at 10ppm the area is instantly vacated and the incident reported to the control room. In both cases the control room will report the incident to the shift foreman and the metallurgical manager who will investigate the underlying causes. Nobody will be allowed to enter the area until the appropriate individuals with the correct PPE have declared the HCN levels to be safe.

The operation has identified areas and activities where workers may be exposed to cyanide in excess of 10 ppm on an instantaneous basis and 4.7 ppm continuously over an 8-hour period, and require use of personal protective equipment in these areas or when performing these activities. Cyanide Hotspot Surveys are undertaken. The only area with a recordable HCN level was the cyanide offloading area.

Hydrogen cyanide monitoring equipment are maintained, tested and calibrated as directed by the manufacturer, and records are retained for at least one year.

There have been periods between calibrations that are longer than the 6 month 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 in areas where cyanide is used advising workers that cyanide is present, and that smoking, open flames, and eating and drinking, are not allowed. This was observed during the site visit. PPE requirements are stipulated at all 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. This was observed by the auditors during the site visit.

All cyanide storage tanks and reagent strength pipelines are identified by signage and colour coding (purple, purple with red band). It was observed that the reagent strength pipelines have the flow direction indicated. The tailings pipeline has signage indicating content and flow direction.

MSDS, first aid procedures or other informational materials on cyanide safety is in the language of the workforce and is available in areas where cyanide is managed. The official language for the Plant is English, all interviews were conducted in English.

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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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.

There have been no cyanide incidents since the last recertification audit.

**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 Plant has water, oxygen, a resuscitator, PPE Suits, telephone, emergency telephone list and first aid procedure in the following locations: First Aid Room, Emergency PPE Room adjacent to the cyanide off-loading area, and the Leach Control Room

Antidote kits include Tripac-Cyano and Sodium Thiosulphate solution. Antidote kits are located at the Emergency PPE Room and the Leach Control Room. Man-down alarms are located at strategic locations around the plant including Cyanide Off-loading and the top of the Leach Tanks. The man-down alarms register in the Control Room.

Oxygen is in the Supervisor's vehicle at the TSF. The TSF also has a radio and cell phone with which to communicate with 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.

All antidote kits were stored in fridges and are still within the expiry date. The Plant is aware that new antidote kits needs to be ordered a month before the expiry date as flagged up by the inspections.

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

Kusasaletu Gold Plant Emergency Response Plan COP 13-EP, Rev 3, 06 June 2016; and Fraser Alexander Tailings - Tailings Dam Emergency Situational Logic Model, JET-TS 030 CD Rev 1, 08/09.

The operation has its own on-site capability to provide first aid or medical assistance to workers exposed to cyanide. All of the employees on site undertake cyanide awareness and cyanide first aid training during their induction and annual refresher training. In the event of an emergency any Plant employee can respond. In addition, there is an ambulance based at the shaft together with a paramedic provided through contract with Netcare that can respond in the event of an emergency.

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The operation has developed procedures to transport workers exposed to cyanide to locally available qualified medical facilities. ERP 041 Ambulance Entry in the Event of an Emergency, Rev 02, 01 November 2016. This allows free access to the Plant in the event of an emergency

There is a formal agreement between Harmony Gold Mining Company Ltd and Providence Healthcare Risk Managers PTY Ltd. for the management of healthcare providers. One such provider is Leslie Williams Hospital in Carltonville. Leslie Williams Hospital is approximately 10 minutes from the Plant and are aware of the possibility of treating patients affected by cyanide as demonstrated by their inclusion in the mock drills.

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.

Mock Emergency Drills are undertaken on a quarterly basis.

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## **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.**

**in full compliance with**

**The operation is**

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:

Kusasaletu Gold Plant Emergency Response Plan COP 13-EP, Rev 3, 06 June 2016 (ERP).

Fraser Alexander Tailings - Tailings Dam Emergency Situational Logic Model, JET-TS 030 CD Rev 1, 08/09 (SLM).

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 Plan 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.

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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.**

in full compliance with

**The operation is**

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 following employees are involved in the updating and approving of the ERP: Plant Manager, Safety Officer, Plant Metallurgist, Plant Unit Leader, Cyanide Champion, Medical Station Superintendent, Plant Engineer, Worker H&S Committee Representative.

The ERP was communicated to the employees during the weekly Health and Safety Committee meetings.

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.

Kusasaletu Gold Plant has arranged meetings with the Wedela Community to provide them with information regarding the management of Cyanide at the plant including the following meeting: ICMI Information Session, held 7 October 2015 at the Wedela Community Hall.

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

Leslie Williams Hospital is approximately 10 minutes from the Plant and are aware of the possibility of treating patients affected by cyanide as demonstrated by their inclusion in the mock drills.

The ambulance service, Netcare, are also included in mock drills.

The Cyanide Champion informed the auditors that Sasol undertakes mock drills on an annual basis in the local area / main access road. This involves the liaison with local Police, Fire Station and Ambulance Service.

The operation engages in consultation/ communication with stakeholders to keep the Emergency Response Plan current. Including employees at the weekly Health and Safety Committee meetings. The local committee is not required to undertake any actions in the event of an emergency except to avoid the area. This was communicated to them during the meeting with the Wedela Community.

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**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.

It was observed in the ERP that the Operational Control Centre will be the central co-ordination point of all emergencies. Trained attendants will respond to an emergency call and take down the relevant information on a prescribed questionnaire. The MET Plant OCC controller will contact the relevant persons as per the emergency procedure and emergency telephone list.

The ERP provides a flow diagram with the relevant employees and outside responders (SAPS, Fire Brigade, HAZCHEM Control Reaction, Medical Superintendent, etc.) to be contacted, by the Operations Control Centre, in the event of a specific emergency. The Operations Control Room is manned 24 hours a day by trained employees.

All employees receive Cyanide First Aid Training and can therefore respond to cyanide related emergencies in the plant.

Netcare 911 - Cyanide related training was undertaken in June 2017 (the auditors observed the attendance register).

Leslie Williams Hospital - Cyanide Awareness Training, conducted on 12 July 2016, training presented by Harmony

The Operations Control Centre is manned 24 hour a day. Emergency contact telephone numbers are available in the control room and call out is done in accordance with the flow diagram in the ERP.

The ERP stipulates the responsibilities of the Operations Control Room, as the central co-ordination point of all emergencies. The responsibilities of the responders are stipulated for each identified emergency.

Planned maintenance work order - Emergency PPE Store, 01 June 2016. includes a list of the PPE available in site the store such as PVC suits, canisters, face shields, etc. The equipment is checked on a weekly basis.

Emergency response equipment inspections are undertaken as part of the planned maintenance.

The ERP describes the roles and involvement of outside responders, medical facilities, SAPS / Fire Brigade / Medical Superintendent, in the event of various emergencies

The operation has confirmed that outside entities included in the Emergency Response Plan are aware of their involvement and are included as necessary in mock drills or implementation exercise.

Leslie Williams Hospital is approximately 10 minutes from the Plant and are aware of the possibility of treating patients affected by cyanide as demonstrated by their inclusion in the mock drills. The ambulance service, Netcare, is also included in the drills.

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A full chain mock drill was undertaken 08 September 2015. This included the ambulance and the hospital.

**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 Plan includes procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities of the cyanide emergency including the following:

The ERP stipulates the emergency number for the Operations Control Room as well as Plant Management, outside responders and regulatory agencies (SAPS), and medical facilities (Leslie Williams Hospital, Netcare 911).

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.

It is stated in the ERP that employees will not disclose any information to the press or public. Only the HR Manager in consultation with Senior Management may release information.

In the event that any community needs to be notified, it will be done with the assistance of the SAPS.

**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. This includes the following:

ERP 057 - Liquid Cyanide Spillage, Rev 2, 14 November 2016. Procedure states:

ERP 057 - Liquid Cyanide Spillage, Rev 2, 14 November 2016.

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ERP 048 - Use of Ferrous Sulphate, Rev 02, 9 November 2016. Procedures stipulates the use of ferrous sulphate to decontaminate spilled material.

ERP 086 - Procedure for Cyanide Remediation Measures, Rev 0, 14 10 2013. Stipulates the actions to clean up a spillage such as cyanide spilled onto soil.

ERP 057 - Liquid Cyanide Spillage, Rev 2, 14 November 2016.

ERP 076 - Hosing Spillage Containing Cyanide, Rev 2, 2 November 2016. Hosing of spilled material towards a spillage pump.

ERP 086 - Procedure for Cyanide Remediation Measures, Rev 0, 14 10 2013. Stipulates the actions to clean up a spillage such as cyanide spilled onto soil.

No water bodies are close to plant. Spills will not affect drinking water as this is obtained from the municipal supply.

The Plan prohibits the use 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

In the event of an emergency the EPR No. 014 - Procedure for Surface Water Monitoring, Rev 05, 10 September 2015 will be used.

**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.

The Emergency Response Plan is reviewed every 3 years or in the event of its use.

Mock cyanide drills conducted periodically as part of the Emergency Response Plan evaluation process.

Mock Emergency Drills are undertaken on a quarterly basis. The following procedures apply:

ERP 006 Conducting Cyanide Drills, Rev 02, 02 November 2016

ERP 058 Planning Cyanide Drills, Rev 02, 08 November 2016

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The documentation for the drills included a full description of the drill, deviations from the prescribed procedures, and actions to be undertaken to address the issues raised. There were also attendance registers.

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

No cyanide emergencies have occurred since the last recertification audit. The Plan states in Section 3.5 "after a major event or changes in legislation" Emergency Procedures must be reviewed.

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## **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.

The operation trains all personnel, who may encounter cyanide, in cyanide hazard recognition.

E-Learning is done at the Shaft Training Centre, one of the modules presented is:

MET 117 - Metallurgy Induction, Rev 01, 03 February 2011. Section 11. - Sodium Cyanide NaCN Introduction;

The information is presented on a computer in presentation format, a test is completed afterwards, 100% pass rate is required.

Once E-Learning modules are completed at the Shaft Training Centre, all employees and contractors working on the plant then need to attend training at the Plant. A comprehensive cyanide first aid video is shown to all.

The Training Matrix has a tab providing the training requirements, date of training completed and automatically flags outdated training.

All Plant employees - required to attend E-learning at shaft (with Cyanide Introduction module) and Cyanide Video (Cyanide information and First Aid).

Emergency Team - required to attend E-learning at shaft (with Cyanide Introduction module) and Cyanide Video (Cyanide information and First Aid), First Aid Training, Hazard id, Wearing PPE, Attend Cyanide Drill, Evacuations Chair Training, Drager Gas Monitoring, Basic Cyanide Training (Sasol), Basic Fire Fighting, Emergency Evacuation Drill, Fire Drill.

Permanent Contractors (Frazer Alexander, Minopex) - E-learning at shaft (with Cyanide Introduction module) and Cyanide Video (Cyanide information and First Aid).

Refresher Cyanide Induction Training is conducted annually after employees return from annual leave.

Observed on the Training Matrix that records indicate that the date of training last received as well as due date for next training.

Employees and permanent contractors receives annual refresher training each year after returning from leave.

The training matrix is excel based and the due dates for next training has been conditionally formatted to indicate when next training is due. This will ensure that training scheduled in advance and not become overdue.

Training records are retained for 40 years at the plant after which it is sent to the archive.

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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**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.

All employees must receive the Cyanide and First Aid Induction training prior to being allowed in the plant. The plant works with a card clock system that will not allow a person to go into the plant prior to receiving the initial induction training as well as ex-leave training

The operation trains workers to perform their normal production tasks, including unloading, mixing, production and maintenance, with minimum risk to worker health and safety in a manner that prevents unplanned

KUP 46 - Cyanide Training Matrix Kusasaletu Plant, Rev 1, 02 November 2010. The matrix indicates what group of employees needs to be trained in which procedures relating to unloading, production, maintenance, etc. The groups are: All employees, Cyanide Section Employees, Cyanide Specialist, Maintenance Staff, Emergency Personnel.

Employees are trained on procedures by the Supervisor, thereafter a PTO is conducted and captured in the PTO Matrix (excel sheet).

Appropriately qualified personnel provide task training related to cyanide management activities. Training at the Plant is presented by - Cecilia Ntsoaki Moiloa: their qualifications include the following:

Conduct Outcomes-based Assessment, Colleen Osorio Skills Development Consultancy, 10 April 2017; and

Design and Develop Outcomes-based Assessment, Colleen Osorio Skills Development Consultancy, 10 April 2017.

The operation evaluates the effectiveness of cyanide training by testing, observation or other means.

E-Learning in cyanide hazard recognition is done at the Shaft Training Centre, one of the modules presented is MET 117 - Metallurgy Induction, Rev 01, 03 February 2011. Section 11. - Sodium Cyanide NaCN Introduction. The information is presented on a computer in presentation format, a test is completed afterwards, 100% pass rate is required.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 8.3**

not in compliance with

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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### 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 cyanide unloading, mixing, production and maintenance personnel are trained in the procedures to be followed if cyanide is to be released.

The operation trains all personnel, who may encounter cyanide, in cyanide hazard recognition. E-Learning is done at the Shaft Training Centre, one of the modules presented is:

MET 117 - Metallurgy Induction, Rev 01, 03 February 2011. Section 11. - Sodium Cyanide NaCN Introduction.

The information is presented on a computer in presentation format, a test is completed afterwards, 100% pass rate is required. Once E-Learning modules are completed at the Shaft Training Centre, all employees and contractors working on the plant then need to attend training at the Plant. A comprehensive cyanide first aid video is shown to all.

The Training Matrix has a tab providing the training requirements, date of training completed and automatically flags outdated training.

All Plant employees - required to attend E-learning at shaft (with Cyanide Introduction module) and Cyanide Video (Cyanide information and First Aid).

Emergency Team - required to attend E-learning at shaft (with Cyanide Introduction module) and Cyanide Video (Cyanide information and First Aid), First Aid Training, Hazard id, Wearing PPE, Attend Cyanide Drill, Evacuations Chair Training, Drager Gas Monitoring, Basic Cyanide Training (Sasol), Basic Fire Fighting, Emergency Evacuation Drill, Fire Drill.

Permanent Contractors (Frazer Alexander, Minopex) - E-learning at shaft (with Cyanide Introduction module) and Cyanide Video (Cyanide information and First Aid).

Refresher Cyanide Induction Training is conducted annually after employees return from annual leave.

The training matrix observed shows that staff are trained in decontamination procedures.

Mock Emergency Drills are undertaken on a quarterly basis. The following procedures apply:

ERP 006 Conducting Cyanide Drills, Rev 02, 02 November 2016

ERP 058 Planning Cyanide Drills, Rev 02, 08 November 2016

The documentation for the drills included a full description of the drill, deviations from the prescribed procedures, and actions to be undertaken to address the issues raised. There were also attendance registers.

Cyanide emergency drills are evaluated from a training perspective to determine if personnel have the knowledge and skills required for effective response. On completion, an Emergency Preparedness Drill Report is compiled detailing the following information: introduction and background of drill conducted; objective of drill; scenario; deviations; recommendations; and pictures from the drill.

The operation 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.

Netcare 911 - Cyanide related training was undertaken in June 2017 (the auditors observed the attendance register).

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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Leslie Williams Hospital - Cyanide Awareness Training, conducted on 12 July 2016, training presented by Harmony Training Moderator Isaac M Makhalema. 17 employees of the Hospital attended the training.

Leslie Williams Hospital is approximately 10 minutes from the Plant and are aware of the possibility of treating patients affected by cyanide as demonstrated by their inclusion in the mock drills.

The ambulance service, Netcare, are also included in mock drills.

The Cyanide Champion informed the auditors that Sasol undertakes mock drills on an annual basis in the local area / main access road. This involves the liaison with local Police, Fire Station and Ambulance Service

Records are retained documenting the cyanide training, including the names of the employee and the trainer, the date of training, the topics covered, and how the employee demonstrated an understanding of the training materials.

Training records are kept for 40 years.

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**Harmony Kusasaletu Gold Plant**  
Name of Facility

\_\_\_\_\_  
Signature of Lead Auditor

22 October 2017  
Date

## **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 provides the opportunity for stakeholders to communicate issues of concern regarding the management of cyanide.

The plant does not have a structure complaints register / system but should someone from the local community raise a complaint at the security gate, it will be referred to the relevant senior management person.

In addition, Kusasaletu Gold Plant arranged a meeting with the Wedela Community to provide them with information regarding the management of Cyanide at the plant and giving them an opportunity to raise issues of concern

ICMI Information Session, held 7 October 2015 at the Wedela Community Hall. 37 people attended the meeting.

**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.

There are opportunities for the operation to interact with stakeholders and provide them with information regarding cyanide management practices and procedures.

Kusasaletu Gold Plant arranged the following meetings with the Wedela Community to provide them with information regarding the management of Cyanide at the plant:

ICMI Information Session, held 7 October 2015 at the Wedela Community Hall.

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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Cyanide Information Session, held on 26 August 2016 at the Wedela Primary School. The primary purpose of the visit was to address the students on the dangers and consequences of playing, swimming and hunting around the slimes dam area and the return water dam.

Cyanide Information Session, held on 22 March 2017 at the Wedela High School. The primary purpose of the visit was to address the students on the dangers and consequences of playing, swimming and hunting around the slimes dam area and the return water dam.

Netcare 911 - Cyanide related training was undertaken in June 2017 (the auditors observed the attendance register).

Leslie Williams Hospital - Cyanide Awareness Training, conducted on 12 July 2016, training presented by Harmony Training Moderator Isaac M Makhalema.

Leslie Williams Hospital is approximately 10 minutes from the Plant and are aware of the possibility of treating patients affected by cyanide as demonstrated by their inclusion in the mock drills. The ambulance service, Netcare, are also included in mock drills.

The Cyanide Champion informed the auditors that Sasol undertakes mock drills on an annual basis in the local area / main access road. This involves the liaison with local Police, Fire Station and ambulances

**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 operation has developed written descriptions of how their activities are conducted and how cyanide is managed. These descriptions are available to communities and other stakeholders.

ICMI Information Session, held 7 October 2015 at the Wedela Community Hall. A hardcopy of the presentation is available on request.

Dangers of Playing on Slimes Dams, is a 3 page information document that were left with teachers of the schools visited (26 August 2016 at the Wedela Primary School, 22 March 2017 at the Wedela High School) to allow them to refer back to it.

The operation has disseminated information on cyanide in verbal form where a significant percentage of the local population is illiterate.

The presentation at the Wedela Community Hall and presentations at the Primary and High Schools were done verbally in the local language to ensure that everyone understands.

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.

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## ICMI CYANIDE RE-CERTIFICATION AUDIT - SUMMARY REPORT

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It is stated in the ERP that employees will not disclose any information to the press or public. Only the HR Manager in consultation with Senior Management may release information.

In the event that any community needs to be notified, it will be done with the assistance of the SAPS.

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: 22 October 2017

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