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Harmony Gold Mining Company Limited

International Cyanide Management Code - Certification Audit Hidden Valley Gold Mine

Summary Audit Report

June 2025

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International Cyanide Management Code -Certification Audit Hidden Valley Gold Mine Summary Audit Report

Harmony Gold Mining Company Limited

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A	13 November 2024	Draft for submission to ICMI
0	31 March 2025	Final for submission to ICMI post Completeness Review
1	19 May 2025	Final for submission to ICMI post Second Completeness Review
2	30 June 2025	Final for public announcement

	Name	Date	Signature
Prepared by:	R. Seebach & L. Sandon	30 June 2025	
Reviewed & Approved by:	E. Clerk	1 July 2025	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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1 Summary Audit Report

1.1 For Operational Gold Mines

Name of Mine:	Hidden Valley Mine (HVM)
Name of Mine Owner:	Harmony Gold Mining Company Limited
Name of Mine Operator:	Harmony Gold Mining Company Limited
Name of Responsible Manager:	Enoch Sio
Address:	Hidden Valley Mine PO Box 4015 Lae, 411 Morobe Province
State/Province:	Morobe
Country:	Papua New Guinea
Telephone:	+675 478 5224
Email:	enoch.sio@harmoneyeasia.com teboho.tlhobo@harmonyseasia.com

1.2 Operation Location Detail and Description

1.2.1 Harmony Gold Mining Company Limited

Harmony Gold Mining Company Limited (Harmony), a gold mining and exploration company, conducts its activities in South Africa, one of the world's best-known gold mining regions, and in Papua New Guinea, one of the world's premier new gold-copper regions. Hidden Valley Mine is owned and operated by Morobe Consolidated Goldfields Limited (MCGL) which is a wholly owned subsidiary of Harmony Gold Mining Company Ltd.

1.2.2 Hidden Valley Gold Mine

The Hidden Valley Gold Mine (HVM) is an open pit gold and silver mine, located in Morobe Province in Papua New Guinea, approximately 210 kilometres northwest of the nation's capital, Port Moresby, and 90 kilometres southwest of the sea port of Lae.
Crushed ore is conveyed from the pit via a 5.5km overland pipe conveyor and treated at the Hidden Valley processing plant using a two-stage crushing circuit followed by a semi-autogenous grinding mill, gravity, counter current decantation/ Merril Crowe circuit for silver and a carbon-in-leach circuit for gold recovery. The HVM facility was last certified against the International Cyanide Management Code (ICMC or the Code) on 11 May 2015. In 2017 HVM became temporarily inactive and its certification expired. In 2024 Harmony engaged WSP to conduct an International Cyanide Management Institute (ICMI) Certification Audit of Harmony's HVM facility. Construction of the Hidden Valley mine began in 2007 and commercial production commenced in September 2010.

HVM's cyanide supplier is Orica Australia Pty Ltd (Orica). Orica manufacture sodium cyanide at a plant in Yarwun, Queensland (Australia) and supply to MCGL through their Papua New Guinea (PNG) business which is headed in Port Moresby. The product is supplied in solid form (briquettes) and a total of between 3,000 and 3,500 tonnes is provided on an annual basis. The cyanide is transported to site in isotainers. The isotainers are the preferred method of transport as the operation does not have the facilities to accept Intermediate Bulk Containers (IBCs).

Both Orica's production facility at Yarwun and the transport supply chain routes to HVM are certified against the Cyanide Code.

1.3 Auditors Findings

The Hidden Valley Gold Mine is:

☒ in full compliance with

☐ in substantial compliance with

☐ not in compliance with

The International Cyanide Management Code

1.4 Auditor Information

Audit Company: WSP Australia Pty Ltd (WSP)

Audit Team Leader: Rudi Seebach (ICMI Lead Auditor)

Email: rudi.seebach@wsp.com

Name and Signature of other Auditors:

Table 1.1

Name	Position	Signature	Date
Ed Clerk	ICMI Technical Specialist		30 June 2025
Lauren Sandon	Lead Auditor		30 June 2025

The HVM facility was last certified against the International Cyanide Management Code (ICMC or the Code) on 11 May 2015. In 2017 HVM became temporarily inactive and its certification expired. In 2024 Harmony engaged WSP to conduct an International Cyanide Management Institute (ICMI) Certification Audit of Harmony's HVM facility.

The Certification Audit site visit was conducted between 19 and 21 March 2024.;

Rudi Seebach initiated and conducted the audit for the Hidden Valley Mine as the Lead Auditor with Ed Clerk as ICMI Technical Specialist. Rudi resigned from WSP before the auidt report was submitted to the ICMI. Rudi did however approve his signature for use on the documentation. Rudi Seebach is an approved International Cyanide Management Institute Lead Auditor for Cyanide Code certification audits.
Lauren Sandon assumed the role of Lead Auditor following the resignation of Rudi Seebach and submitted the finalised audit report on behalf of WSP.
No potential conflicts of interest were anticipated or encountered during the Audit that necessitated the requirement for an independent Auditor.

1.5 Auditor Attestation

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 (ICMI) and that all members of the audit team

Hidden Valley Gold Mine Signature of Lead Auditor: Date: June 2025

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 Certification Audit. I further attest that the Certification Audit was conducted in a professional manner in accordance with the International Cyanide Management Code's *Mining Operations Verification Protocol* (June 2021) and using standard and accepted practices for health, safety, and environmental audits.

Hidden Valley Gold Mine Signature of Lead Auditor: Date: June 2025

2 Principles and Standards of Practice

2.1 Principle 1 – Production and Purchase

2.1.1 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:

HVM is in FULL COMPLIANCE with Standard of Practice 1.1, requiring the intended operation to purchase its cyanide from manufacturers certified as being in compliance with the Code. Orica Australia Pty Ltd (Orica) has historically supplied cyanide to HVM from its Yarwun, Australia, facility, which was certified as being compliant with the ICMC on 17 September 2020. The Yarwun facility was recertified in full compliance on 31 October 2023.

2.2 Principle 2 – Transportation

2.2.1 Standard of Practice 2.1

Require that cyanide is safely managed through the entire transportation and delivery process from the production facility to the mine by use of certified transport with clear lines of responsibility for safety, security, release prevention, training and emergency response.

	☒ **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:

HVM is in FULL COMPLIANCE with Standard of Practice 2.1, requiring that cyanide is safely managed through the entire transportation and delivery process from the production facility to the mine by use of certified transport with clear lines of responsibility for safety, security, release prevention, training and emergency response.

The operation has provided historical chain of custody records identifying all elements of the supply chain that have previously handled the cyanide brought to its site.

The intended supply chain elements are as follows:

— Orica Australia supply the cyanide from its Yarwun facility, where it travels to the Port of Brisbane under the ICMC certified Orica Australia supply chain.

— From the Port of Brisbane, it is then shipped to the Port of Lae in PNG under the ICMC Orica Global Marine Supply Chain.

— From the Port of Lae, it is then transported to the HVM site by the ICMC certified transporter Pacific Cargo Transport (PCT).

The intended cyanide transporters are certified under the Code.

Orica Australia's Australian Cyanide Transport Supply Chain has been certified in full compliance with the Code since 4 February 2022. Orica Australia's Global Marine Supply Chain was last certified in full compliance with the Code on 2 December 2024.

2.3 Principle 3 – Handling and Storage

2.3.1 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:

HVM is in FULL COMPLIANCE with Standard of Practice 3.1, requiring that intended cyanide unloading, storage and mixing facilities are designed and constructed consistent with sound, accepted engineering practices, quality control/quality assurance procedures, spill prevention and spill containment measures.

Facilities intended for unloading, storing and mixing cyanide have been designed and constructed in accordance with sound and accepted engineering practices for these facilities, however the Auditor observed some seals missing and cracks in the concrete of the secondary containment at the process plant that have not been properly sealed. An assessment was carried out and some repairs were made, but it's worth noting that the assessment was not conducted by a Civil/Structural or Integrity Engineer.

The deficiency found in the concrete does not present an immediate or substantial risk to employee or community safety, health or the environment. Repairs were visible at the time of audit as well as leak detection testing data confirming no significant leaks were present.

Documented evidence was provided showing a qualified engineer's site-wide assessment and sign off on bund condition and repairs. Hydrostatic tests were documented on each report with no failures noted.

The integrity assessments were completed and signed off and included actions, responsibilities and close out.

Photographic evidence showing any changes to repairs of containment bunds post the site audit were provided in each report.

The cyanide mixing and storage area appeared to be located away from people and surface waters. Based on these distances, the HVM advised that it was not considered necessary to evaluate the potential for releases to surface water and/or human exposure. The Auditor accepted this conclusion.

The cyanide mixing and storage area unloading facility has been designed and constructed such that cyanide is unloaded on a concrete surface.

There are methods in place to prevent the overfilling of cyanide dissolving and storage tanks. Ultrasonic level indicators are used on each of the two storage tanks. An overflow pipe also connects the two tanks. HVM undertake six monthly calibrations of the level sensors for the cyanide storage tanks.

Cyanide mixing and storage tanks are located on concrete surfaces and concrete ring beams that can prevent seepage to the subsurface cyanide. Potential leaks in the base of the tank would be captured by the liner and directed to tell tales in the wall of the ring beam.

The storage tanks are roofed and vented to atmosphere. The cyanide mixing and storage area is located within a locked fenced area within the fenced plant site area and was observed to be stored separately from incompatible materials.

Cyanide ISO containers were also observed to be stored in an unsecured area without fencing or signage. Documented evidence was provided to the auditor that illustrated the Cyanide Storage Area Maintenance Plan has been implemented. A site layout drawing indicated permanent and temporary fencing prevents public access. The area is signposted as a cyanide area, including Caution warnings.

Photographic evidence confirmed the presence of compliant signage being installed and that fencing of the area has been completed.

2.3.2 Standard of Practice 3.2

Operate unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

	☒ **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:

HVM is in FULL COMPLIANCE with Standard of Practice 3.2, requiring the operation of unloading, storage and mixing facilities using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

The isotainers are owned by Orica, remain under the control of Orica and are returned to Orica reuse after each delivery. The Unloading Cyanide Solution Flushing of Equipment procedure requires camlock hoses and hose fittings to be rinsed prior to decoupling and rinsed again after decoupling.

Boxed cyanide is no longer used on site.

The Unloading Cyanide Solution Flushing of Equipment procedure outlines the process for the operation of all valves and couplings for unloading and mixing sparge isotainers. The maintenance of all valves and couplings is addressed in HVM's Cyanide Management Plan (CMP). They fall under a preventative maintenance program that is scheduled and tracked in an online system HVM uses called Pronto.

The Unloading Cyanide Solution Flushing of Equipment procedure requires all hoses and coupling to be washed at the completion of the sparging event, and all residue to be hosed into the sump. The document outlines the requirement for cleaning up spills or process leaks before they contaminate the environment. The Cyanide Emergency Response Management Plan details the steps to be taken for clean-up.

The Unloading Cyanide Solution Flushing of Equipment procedure outlines the steps involved to safely sparge cyanide isotainers. The procedure includes personnel protective equipment (PPE) requirements and notes that HVM operators are to observe the process.

Orice adds dye to a cyanide prior to shipment so there is no need for HVM to add dye.

2.4 Principle 4 – Operation

2.4.1 Standard of Practice 4.1

Implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and preventive 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.1, requiring that the operation implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and preventive maintenance procedures.

Written management and operating plans or procedures have been developed for cyanide facilities including unloading, mixing and storage facilities, leach plants, cyanide treatment and disposal systems.

There are no heap leach operations or cyanide regeneration facilities at HVM.

Reviewed procedures are securely stored on the intranet and controlled by the relevant department as well as the Safety Department. Only designated senior personal has been assigned document control authority.

The operation has plans and procedures that identify the assumptions and parameters on which the facility design was based and any applicable regulatory requirements as necessary to prevent or control cyanide releases and exposures consistent with applicable requirements. The TSF has been designed and constructed to contain or capture 1 in 1000 year rainfall events either within the facility itself or downstream in sumps. The cyanide emergency response plan accounts for storm events impacting the TSF and any associated process solution ponds.

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.

Standard Operating Procedures (SOPs) have been developed to detail what is expected of operators when carrying out their daily duties including sampling and inspections when the plant is operating routinely.

The operation has developed a Cyanide Management Plan (CMP) which outlines a systematic approach for the responsible transport, handling, use and disposal of cyanide and cyanide contaminated equipment (including process streams containing cyanide). The CMP sets the framework for maintaining awareness and compliance with legal and other requirements pertaining to cyanide, assessing the risk of cyanide related activities, and links in with existing emergency response processes, consultation and communication with stakeholders regarding cyanide risks and training and monitoring requirements. The CMP has been guided by the Principles and Standards of Practice of the ICMC to enable HVM to maintain compliance with the Code requirements. The TSF is inspected daily in accordance with the CMP and TSF Operating Manual.

The operation has developed procedures and processes to inspect cyanide facilities on an established frequency sufficient to assure and document that they are functioning within design parameters. Preventive maintenance programmes have

been developed in Pronto for the site and are conducted in accordance with the maintenance schedule. The facility also completes weekly inspections in the cyanide related work areas.

HVM has implemented a Management of Change (MoC) procedure to ensure risks are captured, evaluated, controlled and communicated before changes are implemented.

The MoC system was developed by the operation to initiate and assess changes. The system requires the change initiator to select stakeholders for their consultation and involvement in the proposed change post a risk assessment.

The operation has cyanide management contingency procedures for situations when 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.

Examples of abnormal operating conditions include upsets in loss of power, identified leakages and/or emergency plant shutdowns.

274 Inspections and associated safety equipment inspections are documented, including the date of the inspection, the name of the inspector, and any observed deficiencies. The evidence viewed showed that issues were raised by the inspections, which work requests were raised to address them and that these are then translated to work orders when resources are allocated.

HVM inspects the leak detection system monthly. The system monitors the Caustic Holding Tanks, Concentrate Leach Tanks, Carbon in Leave Tanks, Carbon Detoxification Tanks, Starter Eluate Tanks, Strip solutions tanks, the tanks in the Refinery and the Process Water Tank. If any leaks are detected, the solution is sampled for free cyanide. The TSF Contractor Klohn Crippen Berger (KCB) conduct daily checks of the TSF including seepage detection.

Routine inspections are done for all components of the TSF, including the crest, the upstream and downstream slopes, the abutments, the tailings pipeline crossings, the water reclaim system, pipelines, diversion ditches and spillways.

Inspections are documented, including the date of the inspection, the name of the inspector, and any observed deficiencies. The nature and date of corrective actions are also documented, and records are maintained.

Preventive maintenance programs are implemented and activities documented to ensure that equipment and devices function as necessary for safe cyanide management.

There is a comprehensive program of preventive maintenance that includes appropriate coverage of mechanical and instrumented systems particularly that must function effectively for cyanide management. The program includes tanks, vessels, pumps, fans, pipelines, valves, instruments and secondary containments that form part of HVM's cyanide facilities.

The frequencies of activities currently scheduled are daily, weekly, monthly, 6-monthly and annually. Records requested in evidence showed that monthly calibrations on fixed HCN monitors and personal HCN monitors are generally carried out as planned.

Work orders are issued to action the implementation of preventive maintenance tasks and work order numbers are used to track the documents produced as records of inspection works such as condition monitoring assessments that cannot be reported effectively into the computerised maintenance management system.

The operation has the necessary emergency power resources to operate pumps and other equipment to prevent unintentional releases and exposures in the event its primary source of power is interrupted. The emergency power equipment is routinely maintained to ensure functionality during emergencies.

Primary power is supplied from a grid system by the PNG Power Corporation. Prior to the grid power system being connected to the site in 2011, power for the operation was derived from a series of diesel powered generators. These

generators are now the backup system capable or powering the entire site. The generators are on site and are included within the maintenance system for the site.

The switch from mains power to backup power is a semi-automatic process that takes approximately one hour to complete. The loss of power does result in process releases to containment from the grinding area and Carbon In Leach (CIL) area but not the environment.

2.4.2 Standard of Practice 4.2

Introduce management and operating systems to minimize 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.2, requiring that the operation introduce management and operating systems to minimise cyanide use, thereby limiting concentrations of cyanide in mill tailings.
The operation has a programme to determine and evaluate cyanide use to minimise concentrations of cyanide in the tailings, maintain appropriate cyanide addition rates in the mill and evaluate and adjust addition rates as necessary when ore types or processing practices change cyanide requirements.
For new ore bodies or geological anomalies in existing orebodies, the operation conducts geo-metallurgical testing to compare anticipated CN consumption against establish baseline levels and to determine how it will behave within the various sections of the plant such as the flotation and leaching circuits. The most recent being test work on the “big red” anomaly in 2022.
Within the process plant, cyanide is dosed at the following locations and set points:

- Concentrate Leach Tank 1 (with options on Tank 2 and 3) – 2500 parts per million (ppm)
- CIL Tank 1 (with an additional option on CIL Tank 2) – 300 ppm
- ILR – 28,000 to 33,000 ppm per batch.

The cyanide addition to the CIL is largely derived from the CCDs and eluate from the gold room, rather than from the cyanide reagent tank.
The dosing is automatically regulated to set points using online analysers:

- Orica OCM 5500 Free cyanide analyser. This is used to monitor the Concentrate Leach, CIL and INCO feed
- Orica OCM 6500 Weak Acid Dissolvable (WAD) cyanide analyser. This is used to monitor on the INCO discharge (to tailings) and CAROs feed (prior to direct discharge to surface water).

In addition to continuous monitoring with the cyanide analysers, diagnostic bottle roll tests are conducted when gold recoveries decline.
The operation has been engaged in programs to improve recovery rates and lower cyanide consumption.

2.4.3 Standard of Practice 4.3

Implement a comprehensive water management program 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.3, requiring the operation to implement a comprehensive water management programme to protect against unintentional releases.

HVM has developed a comprehensive water balance. The water balance is probabilistic as there is inherent variability and uncertainty in the prediction of precipitation patterns.

The water balance model was developed in GoldSim software as a daily time-step model.

Model simulations are run on a weekly basis time steps over an identified period with one or multiple results. The model is run by Klohn Crippen Berger (KCB) who is a Contractor that manages the Tailings Storage Facility (TSF).

The TSF1 freeboard is designed based on 1 in 1,000 annual exceedance probability (AEP), 30-day rainfall; which results in an environmental flood storage allowance of approximately 1.4M metres cubed (m^3); which will be reviewed during RL2019 detailed design.

The liquids stored at the mill are not a requirement of the Australian and National Committee on Large Dams (ANCOLD) and, consequently, are not included in the KCB water management design basis.

HVM has a water balance that considers the following in a reasonable manner for the facilities and the environment.

a) The following flow inputs are considered:

- Treated tailings to TSF
- Outlet to Pihema River.

b) The model considered a design storm duration and storm return interval that provides a sufficient degree of assurance that overtopping of the TSF can be prevented during the operational life of the facility.

1/1000 years 30 day rainfall event design. Raise current pond by 2 meters. 3 meters free board to be maintained.

c) The model considers actual daily rainfall records and is calibrated with the use of bathymetric data. This catchment data series were based on annual records taken from monitoring stations within the catchment.

d) A daily runoff record was input into the model from synthetic records. Flows from the undisturbed and regenerated land areas will be based on the runoff record of these synthetic data. Flow from surfaces such as cleared areas, hardstand/roads, pits and watercourses are based on a runoff coefficient applied to the daily rainfall record.

e) The effects of potential freezing and thawing conditions are not relevant to the HVM environment.

f) Solution losses, such as evaporation and recycling systems are included in the model. Evaporation is accounted for as initial losses in the rainfall-runoff model that was used to generate the synthetic runoff data sets. Evaporation from the free water surface of the TSF has been estimated applying a pan factor of 0.8. The model includes system outlets of the cyanide facilities. Seepage from the tailings is included in the model.

The ponds and impoundments at HVM are operated with adequate freeboard above the maximum design storage capacity determined to be necessary from water balance calculations. The TSF is designed to have a freeboard of 3.0 m allowing to capture design flood level.

Inspection and monitoring activities are undertaken to implement the existing water balance. Freeboard and seepage are monitored and can be input into the model.

HVM monitors the freeboard of the TSF on a daily basis, against the freeboard as nominated by the CMP (3.0 m above design flood level). The inspection includes a check on dam freeboard in the main dam and saddle dam.

Precipitation is measured on site, and these are compared to design assumptions by Klohn Crippen Berger in a weekly report.

2.4.4 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.4 requiring the intended operation to implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions.

The operation does not have open waters where WAD cyanide exceeds 50 mg/L WAD cyanide. The TSF and Decant Pond is the only open water at HVM that has the potential to contain a cyanide solution in excess of 50 mg/L WAD.

Monitoring of the TSF is conducted by the Environment Department on a daily (TSF discharge to river via the cyanide destruct) and weekly basis (inside the TSF) for WAD, total and free cyanide.

Wildlife has been observed in the vicinity of the TSF and consequently the WAD cyanide limit of 50 mg/L has been applied to the TSF spigot discharge.

WAD cyanide data provide for the audit period shows level below the 50 limit with a measure at sampling point and the river discharge point.

Each time the limit is exceeded for consecutive elevated records, an incident report is developed and immediate actions taken to reduce the WAD cyanide concentration. The actions are based on the Trigger Action Response Plan.

HVM has been able to maintain WAD cyanide levels in open waters of less than 50 mg/L.

Monitoring for wildlife is conducted using the Process Plant Weekly Hazard Inspection Checklist, which include monitoring for wildlife and noting the presence or absence of wildlife. No wildlife mortalities have been observed since the inception of monitoring.

The operation does not use a heap leach process.

2.4.5 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.5 requiring the intended operation to implement measures to protect fish and wildlife from direct or indirect discharges of cyanide process solutions to surface water.

The operation has a direct discharge to surface water. Supernatant water from the TSF is pumped to the Process Water Tank. An off-take from the Process Water Tank is directed to the Cyanide destruct plant that is used to decrease the levels of cyanide in TSF decant liquor prior to discharge into Pihema Creek.

When the detox discharge is directed to Pihema Creek, the Environment Department is notified, and they ensure daily samples are taken at sample point. Results show WAD cyanide levels below 0.5 mg/L.

HVM has obtained a wastewater discharge permit that has defined the mixing zone area. Compliance point stated in the Environmental Management Plan (EMP) and also referenced in the Permit Monitoring results indicated that the WAD cyanide concentration was < 0.005 mg/L.

The operation does have an indirect discharge to surface water. This was established through interviews with HVM environmental personnel and confirmed through a review of monitoring results and site observations.

Seepage from the TSF expresses in a rocky depression and enters Pihema creek . HVM has two sampling points. Results observed indicate that free cyanide levels at these points were mostly below the detection limit of <0.004.

2.4.6 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.6 requiring the operation to implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of groundwater.

The Environmental Superintendent advised that the PNG Government has not established a beneficial use for groundwater within the area and groundwater is not used by the operation nor neighbouring villages. Drinking water for villages is provided by surface water flows.

HVM has installed 4 monitoring bores. Bores are located both up and down gradient of the TSF. On a fortnightly basis, HVM conducts groundwater monitoring which is analysed by an independent laboratory.

The operation does not use mill tailings as underground backfill.

As no beneficial use exists or is designated and there is no applicable numerical standard for protection of that use, this question is not applicable.

2.4.7 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.7 requiring spill prevention or containment measures for process tanks and pipelines.

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

A review of as built information confirmed the cyanide tanks have concrete or other impermeable barriers between them and the ground.

For tanks on concrete ring beams with oily sand above a continuous HDPE base, four leak detection pipes were installed during construction. During 2012, leak detection valves were installed on in pipe to prevent back flooding.

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

A cyanide corrective works programme was undertaken during 2012 to address insufficient secondary containment volumes and the integrity of containments. By mid-2013 all cyanide unloading, storage, mixing and process solution tanks are situated within secondary containments that have been sized to contain the largest tank within the containment, any piping draining back to the tank, and a design storm event (1:25 years).

The containment areas are constructed of concrete that are in relatively good repair. There were deficiencies found in the concrete do not present an immediate or substantial risk to employee or community safety, health or the environment. Repairs were visible at the time of audit as well as leak detection testing data confirming no significant leaks were present.

Procedures are not required to prevent discharge to the environment of any cyanide solution or cyanide-contaminated water that is collected in the secondary containment area of the facility. All bund walls have sump pumps that pump process slurry, reagents back into the process tanks for reprocessing or use.

All cyanide process tanks and pipelines are contained within secondary containment areas. Spill prevention or containment measures are provided for all cyanide solution pipelines to collect leaks and prevent releases to the environment.

HVM has ensured that all pipes containing cyanide with a solution greater than 0.5 mg/L are within the plant's bunded area which reports back into the process via sump pumps. The tailings line and return water line is secondarily contained within a lined facility which discharges directly to the TSF should a leak occur.

Cyanide tanks and pipelines appear to be constructed of materials compatible with cyanide and high pH conditions (HDPE, carbon steel, mild steel and stainless steel are used for all pipelines containing cyanide within the site).

2.4.8 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.8 requiring the implementation of quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.

HVM undertook a cyanide corrective civil works programme to gain compliance with the Code. The 2014 audit sighted a report produced by the Morobe Mining Joint Venture (MMJV, Now Morobe Consolidated Goldfields Limited (MCGL)) Civil and Structural Engineer who noted that the programme of works was completed in accordance with the design specifications. Hidden Valley Mine is owned and operated by MCGL which is a wholly owned subsidiary of Harmony Gold Mining Company Ltd.

The operation has not constructed or made any substantial modifications since the last audit in 2014. Quality assurance and quality control documents were available for the minor modifications that were completed in 2021 and 2022.

The 2014 audit noted that a handover package for all modules of the original plant was prepared by Ausenco and accepted by HVM. The Ausenco Commissioning Register showed that construction of the plant was subject to the following checks:

- Construction signoff
- Commissioning signoff
- Mechanical signoff
- Electrical signoff.

These checks included soil compaction for earthworks such as tank foundations and earthen liners and for construction of cyanide storage and process tanks.

The Hamata Tailings Storage Facility - Operation Maintenance and Surveillance Manual provides the construction specifications and testing program for the tailings facility. The Manual states that "*the QA/QC testing program has been updated to reflect observations from fill placement and modifications to the design.*"

QA/QC assurance records have been retained for cyanide facilities (including the TSF facility) and were available for inspection. A handover package for all modules of the original plant was prepared by Ausenco and accepted by HVM.

Appropriately qualified personnel have reviewed cyanide facility construction and provided documentation that the facility has been built as proposed and approved. . For cyanide corrective civil works programme, the works were reviewed the MMJV Civil and Structural Engineer and a report produced that noted that the works were completed in accordance with the design specifications.

2.4.9 Standard of Practice 4.9

Implement monitoring programs to evaluate the effects of cyanide use on wildlife, and 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:

HVM is in FULL COMPLIANCE with Standard of Practice 4.9 requiring the operation to implement monitoring programmes to evaluate the effects of cyanide use on wildlife, surface and groundwater quality.

HVM has developed the below written standard procedures for monitoring activities:

- Hidden Valley Environmental Monitoring and Sampling Manual
- Hidden Valley Environmental Management Plan

The documents include monitoring programs to evaluate the effects of cyanide use on wildlife, and surface and groundwater quality.

The Environmental Superintendent, Carl Hayes, holds a Bachelor of Applied Science and developed the environmental monitoring procedures.

The Hidden Valley Environmental Monitoring and Sampling Manual and its supporting procedures specify how and where samples should be taken, sample preservation techniques, chain of custody procedures, quality assurance and quality control procedures, shipping, shipping instructions, and cyanide species to be analysed.

The Field Sampling Form contains a column where comments on sampling conditions can be recorded. A review of completed forms noted that the comments column included information on wildlife activity, surface water and reasons as to why a sample was not taken.

Of the parameters formally included within the existing programme, it is considered that the monitoring frequencies are adequate to characterise the medium being monitored and to identify changes in a timely manner.

2.5 Principle 5 – Decommissioning

2.5.1 Standard of Practice 5.1

Plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife, livestock, and the environment.

	☒ **in full compliance with**	
The operation is	☐ in substantial compliance with	Standard of Practice 5.1
	☐ not in compliance with	

Summarise the basis for this Finding/Deficiencies Identified:

HVM is in FULL COMPLIANCE with Standard of Practice 5.1 requiring the operation to plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife and livestock.

HVM has developed written procedures to decommission cyanide facilities at the cessation of operations. The Decommissioning Management Plan details the decommissioning requirements for the cyanide facilities located on the HVM Lease including the organisational team development, the pre and post operations decommissioning plan, a decommissioning budget and schedule and the general safety requirements that will be utilised during the decommissioning process.

The Decommissioning Management Plan also provides an indicative schedule of activities to be conducted regularly during operations to maintain relevance of the plan and leading up to ceasing of operations and upon decommissioning.

The Decommissioning Management Plan has the following supporting procedures:

— Hidden Valley Rehabilitation and Mine Closure Plan

— Cyanide Equipment Decontamination Procedure

— Safe Work Instruction Decontamination & Remediation of Soil Contaminated with Cyanide.

The Decommissioning Management Plan developed for cyanide facilities requires the plan to be reviewed on an annual basis.

2.5.2 Standard of Practice 5.2

Establish a financial 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:

HVM is in FULL COMPLIANCE with Standard of Practice 5.2 requiring the operation to establish an assurance mechanism capable of fully funding cyanide related decommissioning activities.
HVM has developed an estimate of the cost to fully fund third party implementation of the cyanide-related decommissioning measures as identified in its mine closure plan. The estimated closure costs were prepared using Australia's New South Wales Department of Primary Industries Rehabilitation Cost Calculation Tool.

The costs included Third Party Project Management and Contingencies (including Environmental Monitoring). Table 2 in the document contains 2023 closure cost estimate by domain for both short-term and life of mine (LOM) costs.
The operation does review and update the cost estimate at least every five years and when revisions to the plan are made that effect cyanide-related decommissioning activities.
In 1992, the Independent State of Papua revised the Mining Act and associated regulations. Section 150 (security) of the Mining Act 1992 creates a provision for Papua New Guinea Department of Mining to impose a Security for all tenements granted for compliance with the provisions of the Act.
It is understood that at the time of the audit, the Government had not formally requested Security under Section 150 therefore the operation has established a self-guarantee to cover estimated costs of cyanide related decommissioning.
The operation has established self-insurance or self-guarantee as a financial assurance mechanism and the operation has provided a statement by a qualified financial auditor that it has sufficient financial strength to fulfil this obligation as demonstrated by an acceptable financial evaluation methodology.
The independent audit completed by Price Waterhouse Coopers was conducted in accordance with International Accounting Standards with the most recent financial statements that were under a year old and concluded that the statements prepared are a true and fair view of Morobe Consolidated Goldfields Limited financial position and performance.
The estimated decommissioning cost used in the evaluation was based on the company's most recent plan revision, which was the most current version at the time of the audit.

2.6 Principle 6 – Work Safety

2.6.1 Standard of Practice 6.1

Identify potential cyanide exposure scenarios and take measures 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:

HVM is in FULL COMPLIANCE with the Standard of Practice 6.1 requiring the operation to identify potential cyanide exposure scenarios and take measures 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.

HVM uses its IBIS document control system to manage and store documents for use. A comprehensive set of procedures are available for describing how cyanide-related tasks should be conducted to minimize worker exposure cyanide related tasks.

Procedures have been developed and implemented for the following areas that involve cyanide solutions:

- Cyanide unloading and storage facilities
- Grinding and milling
- Leach/CIL
- TSF
- Flotation circuit
- Mill cyclone
- INCO plant
- Caro's Acid plant

Procedures specify standard and additional PPE. The standard PPE for the site is long sleeve shirts, long pants, steel capped boots, safety glasses and hard hat.

Signage at the entry to the cyanide delivery and storage area requires persons to wear personal HCN monitors.

Pre work inspections are required under the Work Instruction section of the procedure which requires an LLB personal risk assessment (Lukaut Long Birua – Look out for Danger) to be completed. The LLB are contained in booklets that are carried by everyone on the plant site.

Interviews with operators verified that the process was used and completed checklists were reviewed by supervisors. During the site inspection permit to work system were observed to be implemented with isolation tags and locks in place.

HVM runs a number of consultation processes on safety issues. Regular meetings are held which have a safety focus:

- Daily Production Morning Meetings
- Daily Superintendent Meeting
- Safety Representative meetings (fortnightly)
- Departmental Safety Meetings (each day)
- Managers' Safety Meetings (fortnightly).
- Senior Leadership Safety Meeting (fortnightly)
- Pre-start meeting for each shift

The operation also has a hazard reporting process where employees can report hazards using their Hazard Report Form booklet to their supervisors and these are entered into the Integrum system for documentation and tracking, ensuring that action owners address the identified hazards.

Interviews confirmed that operation solicits worker input in developing and evaluating health and safety procedures.

2.6.2 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	

Summarise the basis for this Finding/Deficiencies Identified:

HVM is in FULL COMPLIANCE with Standard of Practice 6.2 requiring the operation 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. The pH is monitored through the Distributed Control System (DCS) and maintained through the automatic addition of lime to the CIL area. Observation of the set points in the control room and interviews with operators confirmed that pH in the circuit is maintained between 10.5 and 11.0. The set point at the time of the Audit was 11.

The operation has identified areas and activities where workers may be exposed to elevated hydrogen cyanide gas or cyanide dust levels. Static HCN alarms have been placed at these locations, and they alarm locally and in the control room. For task based activities where there is a risk of HCN exposure, personal HCN monitors are worn. Everyone entering the process plant must wear a HCN monitor but they are not required on the TSF.

The operation has identified areas and activities where workers may be exposed to cyanide in excess of 10 parts per million on an instantaneous basis and 4.7 parts per million continuously over an 8-hour period. Where this occurs, the operation requires the use of PPE and HCN monitors (static and personal). The HCN monitors have set alarm levels with low at 4.7 ppm and high at 10.0 ppm. If the HCN alarms are triggered, full face masks are required to be worn, and it must be reported to the Control Room and Shift Supervisor. If HCN gas levels are reported higher than 10 ppm then all personnel must evacuate the work area immediately and the steps outlined in the Cyanide Management Plan must be followed.

Operational procedures detail the PPE that must be worn by the person performing tasks and within specific areas. There are also specific procedures for the use or respirators and HCN monitors.

HCN monitoring equipment is maintained, tested and calibrated as directed by the manufacturer. The fixed monitors are calibrated monthly by the Instrumentation Team using Pronto. The personal monitors are calibrated 3 monthly by the Instrumentation Team using an excel database. Records are retained electronically and retained for at least 3 years.

Warning signs have been placed where cyanide is used. The signs warn workers of the presence of cyanide and prohibit smoking, open flames and eating and drinking. PPE signage is provided at entrances to work areas advising mandatory PPE for the area.

High-strength cyanide solution is dyed for clear identification. This is done by the cyanide manufacture by placing a carmosine in the sparge tank at the time of filling

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

Shower and eye wash stations are inspected 6 monthly by Safety Team using a test and tag process. There are also monthly scheduled preventative maintenances (PMs) conducted by Process Technicians and managed through Pronto. The equipment is also checked during a pre-start inspection and during the 274 weekly inspections.

The fire extinguishers are checked and tagged by the ERT team every 6 months as well as during the weekly 274 inspections. Routine maintenance is also performed during inspections.

A site inspection of the process plant verified that suitable signage is in place that:

— Identifies unloading, storage, mixing and process tanks and piping as containing cyanide (where relevant).

— The direction of flow in pipes containing cyanide.

Safety Data Sheet (SDS) information is provided in English and first aid procedures and informational material on cyanide is provided in English and Pidgin.

SDS information has not been translated into Pidgin due to the imprecise nature of the language rendering the translation of critical information impractical.

First aid information and information on the hazards of cyanide is provided in English and Pidgin. Such information was observed to be displayed around the processing plant and on Notice Boards.

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 need to be revised.

All incidents are managed in accordance with the Incident Notification and investigation Procedure. Incidents are reported on the Incident Notification form. They are then classified into low, medium and high potential incidents. All incidents are investigated to identify the root cause, contributing factors and corrective actions to prevent or mitigate similar occurrence. However, the scale of the investigation varies depending on the incident classification.

All cyanide incidents are investigated and those involving reagent strength solution are classified as high and undergo a detailed investigation.

All corrective actions are assigned to a responsible area and person in Integrum. Due dates are also specified.

There have been no cyanide incidents in the last 12 months. During the audit the incident report register in Integrum (safety & risk management system) was observed confirming the Incident Notification and Investigation Procedure was implemented for non-cyanide related incidents.

2.6.3 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:

HVM is in FULL COMPLIANCE with Standard of Practice 6.3 requiring the operation to develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

The operation has the necessary equipment to respond in the event of a worker's exposure to cyanide.

An adequate water supply was observed for rinsing and cyanide decontamination at numerous showers and eyewash stations located strategically around the site.

An adequate supply of oxygen in the form of Oxy-vivas was observed in the safety boxes strategically placed around the Processing Plant, in the Medical Centre and ambulances. The Emergency Response Team (ERT) also have dedicated equipment that they maintain.

The operation has an onsite Medical Centre staffed by medical officers (doctors), and nurses. Cyanide antidote kits are stored at the Medical Centre.

All staff carry radios and telephones which can both be used to notify of an emergency.

The operation inspects its first aid equipment regularly to ensure that it is available when needed. Antidote kits are located at the onsite medical facility and are stored and handled as per the manufacturer's instructions. These Cyanokits are routinely inspected by the Medical staff.

The operation has developed specific written emergency response plans or procedures to respond to cyanide exposures. The operation has developed and implemented a site-specific Cyanide Emergency Response Plan (CERP) and Medical Emergency Response Procedure (MERP) to respond to cyanide exposures.

The CERP describes the emergency response processes to be implemented in the event of a cyanide-related emergency and describes the resources available for emergency response, including emergency response teams (ERT's) and emergency response equipment, communication processes, training, and post-incident decontamination and monitoring. It details the necessary response for personnel exposed to cyanide through inhalation, absorption or ingestion.

The MERP establishes the framework and explains the methodology that HVM's personnel will implement when responding to, assessing and managing a medical incident or medical emergency. It outlines the planned medical management and patient evacuation from HVM to the appropriate definitive medical care, specifically to the HVM Medical team, Safety, Health, Security and Risk (SHSR) manager and HVM management team.

The operation has developed procedures to transport workers exposed to cyanide to locally available qualified off-site medical facilities. Hydroxocobalamin is contained within the site's Cyanokit and is the preferred use of cyanide antidote.

The operation is confident that the onsite medical facility has adequate, qualified staff, equipment and expertise to respond to cyanide exposures. If required patients can be evacuated to the International SOS Clinic in Lae.

2.7 Principle 7 – Emergency Response capabilities.

2.7.1 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:

HVM is in FULL COMPLIANCE with Standard of Practice 7.1 requiring an operation prepare detailed emergency response plans for potential cyanide releases.

The Operation has developed plans which all have a role in emergency response and address potential accidental releases of cyanide. The plans outline the equipment, personnel and other resources allocated to the HVM emergency response.

The Incident Response Plan (IRMP) is the key emergency response document that details MCGLs response to crises, emergencies and incident management.

The operation also has developed a Cyanide Emergency Response Plan (CERP) which forms part of the IRMP. The CERP describes the emergency response processes to be implemented in the event of a cyanide-related emergency and describes the resources available for emergency response, including emergency response teams (ERT's) and emergency response equipment, communication processes, training, and post-incident decontamination and monitoring.

The operation has identified the scenarios that present the highest risk of a spill or release of cyanide or cyanide bearing material occurring at HVM. These scenarios are:

- 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
- Failure of tailings impoundments and other cyanide facilities

The emergency documentation considers both on-site transportation emergencies and the physical form of cyanide. The site will receive cyanide in Isotainers from Orica.

The emergency documentation details response actions (as appropriate for the anticipated emergency situations) such as clearing site personnel from the area of exposure, use of cyanide antidotes, first aid measures, control or containment of releases; and assessment mitigation and future prevention of releases.

The CERP provides response actions for the first onsite, including evacuation, alerting ERT and incident management. Emergency response procedures describe measures to control cyanide releases at their source and address the containment, assessment, mitigation and prevention of future releases.

2.7.2 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:

HVM is in FULL COMPLIANCE with Standard of Practice 7.2 requiring an operation to Involve site personnel and stakeholders in the planning process.

In 2023, HVM conducted cyanide awareness community training, which included providing descriptions of the emergency response procedures and response capabilities of the ERT. This session detailed that the community should not engage in community response, and in a transport incident the first responders are the Transporter's driver and escorts.

HVM completed a series of workshops with community representatives and stakeholders of three localities; Bulolo, Lae and Mumeng on cyanide awareness. These workshops were conducted in 2023 and provided the opportunity for stakeholders to communicate issues of concern, including emergency response.

Employees are provided with access to emergency response procedures so they may review and make suggestions regarding the content. Further opportunity for comment regarding these procedures is available during emergency drill debriefs and cyanide awareness training.

Table 4.3 of the CERP identifies the external emergency service providers HVM use in the event of cyanide related emergency scenarios:

- Hevilift Helicopters - Transportation for cyanide poisoning evacuations
- ISOS - Offsite cyanide poisoning causalities
- MCGL - Provision of a 24-hour paramedic and arrangement of transportation for cyanide poisoning evacuations
- Bulolo Police - Police services
- Lae Fire Department - Firefighting and emergency response services

HVM has in place a range of consultation processes that are undertaken with various stakeholders with reference to cyanide management at the site. This is detailed in Section 5.1 of the CMP and the Stakeholder Engagement Management Plan (SEMP). One component of this consultation includes liaising with various stakeholders regarding HVM's planned response in the event of an emergency situation involving cyanide.

The operation has engaged in communication with the stakeholders to keep the CERP current. HVM completed a series of workshops with community representatives and on cyanide awareness. These workshops were conducted in 2023 and provided the opportunity for stakeholders to communicate issues of concern, including emergency response.

2.7.3 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:

HVM is in FULL COMPLIANCE with Standard of Practice 7.3 requiring an operation designate appropriate personnel and commit necessary equipment and resources for emergency response.

The HVM emergency documentation does clearly address the required cyanide related elements.

a. The emergency documentation clearly identifies the Incident Management Team and the responsibilities of each role.

b. The operation has an on-site ERT comprised of full-time personnel. The operation's emergency response plans and procedures identify the ERT members.

c. The CERP describes the training requirements for HVM ERT Personnel. Processing plant personnel training requirements are described in the CMP.

d. The EPM details the emergency reporting procedures for HVM. This includes contact numbers/channels to raise the alarm via radio and internal/external telephones. This information is also replicated in the CERP. The site has radio and mobile coverage and when an emergency call is made this is relayed to the Emergency Response Coordinators and to the ERT via radio and pager.

e. The emergency documentation clearly identifies the Incident Management Team and the responsibilities of each role.

f. The CERP provides a list of emergency response equipment, including the location and quantities. The ERT have checklists for inspection of their equipment including the fire tender, HAZMAT trailer, medical centre and ambulance.

The roles of outside responders and medical facilities have been detailed in the emergency documentation where relevant.

The operation has confirmed that outside entities included in the CERP are aware of their involvement and are included as necessary in mock drills or implementation exercises.

HVM is a remote site that provides a medical centre equipped with relevant resources to respond a medical emergency. The operation has a medical emergency response plan (MERP) to transport workers exposed to cyanide to a qualified, off-site, medical facility. Workers exposed to cyanide will be treated in the first instance by on-site medical practitioners and then transferred to International SOS (ISOS) Clinic as necessary.

The CERP states that external parties, where possible, will be included in mock drills. Given the location of the operation and the travel time to medical assistance, cyanide exposure incidents would be decontaminated and treated on site and then the patient would be sent for ongoing medical care if needed.

2.7.4 Standard of Practice 7.4

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 7.4
	☐ not in compliance with	

Summarise the basis for this Finding/Deficiencies Identified:

HVM is in FULL COMPLIANCE with Standard of Practice 7.4 requiring the development of procedures for internal and external emergency notification and reporting.

HVM's emergency documentation has procedures and contact information for notifying management, regulatory agencies, external response providers, cyanide suppliers, medical officers, and medical facilities of the cyanide emergency. The CERP refers to the Catastrophic Events and Stakeholder Notification procedure for communication with affected communities and other stakeholders.

The CERP refers to the Emergency Information Directory for contact information for potential external emergency service providers. It is the responsibility of the Emergency Response Superintendent to contact the appropriate external agencies.

In addition, HVM completed a series of workshops with community representatives and stakeholders of three villages; Bulolo, Lae and Mumeng on cyanide awareness. These workshops were conducted in 2023 and provided the opportunity for stakeholders to communicate issues of concern, including emergency response.

The HVM CERP states that all significant cyanide incidents as defined in ICMI's Definitions and Acronyms document will be reported to ICMI by the Cyanide Champion or Process Plant Manager.

At the time of auditing, no significant cyanide incidents had occurred at HVM.

2.7.5 Standard of Practice 7.5

Incorporate remediation measures and monitoring elements into response plans and 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:

HVM is in FULL COMPLIANCE with Standard of Practice 7.5, requiring an operation develop procedures for internal and external emergency notification and reporting.

The emergency documentation does address all the required items. The CERP and Safe Work Instruction (SWI) - Decontamination & Remediation of Soil Contaminated with Cyanide covers the use of sodium hypochlorite to neutralise spills to soil by mixing and spraying with water (5% solution). The spill area is then excavated and removed to the crusher which safely disposes of the contamination at their disposal facility (the TSF). The underlying soil is tested using a cyanide test kit and the process is repeated until the cyanide concentration falls below 0.005 ppm cyanide. The sodium hypochlorite is stored at the Processing Plant to facilitate rapid responses.

Should spills occur to or near water, the CERP requires that the Community Affairs Department is notified. This department will notify local communities of any potential effects and will provide alternate drinking water if and when required (including bottled water and tanker water).

The CERP does prohibit the use of chemicals such as sodium hypochlorite, ferrous sulfate and hydrogen peroxide to treat cyanide that has been released into surface water.

Procedures do state that sodium hypochlorite, ferrous sulphate, hydrogen peroxide, sodium sulphate and or sodium metabisulphite must not be attempted in surface waters or where the terrain drains into surface waters.

The CERP provides the following in relation to post emergency monitoring:

"Following a cyanide-related emergency involving exposure or soil and/or water contamination, a post-emergency monitoring plan should be developed, in conjunction with the Environment Department if necessary, and undertaken by competent personnel."

2.7.6 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:

HVM is in FULL COMPLIANCE with Standard of Practice 7.6, requiring an operation periodically evaluate response procedures and capabilities and revise them as needed.

The operation does review and evaluate the cyanide related elements of its emergency response plan for adequacy on a regular basis.

The emergency documentation includes requirements to be reviewed and revised (if required) following all cyanide related emergencies and exercises (in the absence of incidents, review and revision should occur after a cyanide emergency exercise) actions arising from review should be tracked to completion and revision information kept on file.

Evidence was provided that a recent emergency drill was held in 2020, 2023 and 2024 in the field. The scenarios involved the collapse of a worker in a cyanide area; cyanide pipeline leak and worker being sprayed with cyanide solution. The drills involved on-site, and external emergency response teams and they were tested from emergency callout notification through to close-out of the response process.

The CERP is required to be reviewed and updated after a cyanide emergency.

2.8 Principle 8 – Training

2.8.1 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:

HVM is in FULL COMPLIANCE with Standard of Practice 8.1 requiring that an operation trains its workers to understand the hazards associated with cyanide use.

The operation does train all personnel who may encounter cyanide in cyanide hazard recognition.

The operation's Cyanide Awareness Training thoroughly covers cyanide hazards, the health effects of cyanide, symptoms of cyanide exposure, and the procedures to follow in case of exposure. This training consists of both theory and practical components and each section must be successfully completed to be deemed competent.

All personnel working on the Processing Plant are required to complete Cyanide Safety Awareness training as part of their onboarding and inductions.

A sample of training records reviewed identified that Cyanide Awareness is provide to personnel working on the Processing Plant and that refresher training is completed annually. Cyanide training records are retained.

Cyanide hazard awareness training is conducted on an annual basis. The training attendance records are loaded into the IBIS system and refresher participation is manually checked by each supervisor who sends out reminder notices.

2.8.2 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:

HVM is in FULL COMPLIANCE with Standard of Practice 8.2 requiring that an operation trains appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.

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

HVM use a range of administrative and procedural methods to define the risks associated with individual cyanide tasks, minimise hazards arising from cyanide storage, handling and use in operations and ensure worker safety when completing their regular tasks. These include:

— Inductions

— Training manuals

— SOPs

Following the inductions mentioned in 8.1, the training and development is managed by the Process Trainer. Trainees are initially partnered with an experienced operator. The trainee observes the tasks and once they and the supervisor are comfortable the roles are reversed. When the supervisor believes the trainee is appropriately trained, they are formally assessed by the Process Trainer in both a theory and practical test.

Critical training, such as cyanide awareness, is completed prior to the employee being approved for work tasks.

Training is undertaken by qualified personnel.

The operation does train all personnel prior to working with cyanide

All personnel working on the Processing Plant are required to complete Cyanide Safety Awareness training as part of their onboarding and inductions. Cyanide Safety Awareness refresher training is required on an annual basis.

In addition to the Cyanide Awareness Training package, HVM has also provided toolbox training on cyanide management. Interviews with ERT and process personnel confirmed refresher training is conducted.

HVM does evaluate the Cyanide Awareness Training through the use of a written knowledge assessment completed by the participant at the completion of the training session. Personnel training is indicated on their competency card which employees have to keep with them at all times. Competency cards are checked before employees can start work.

Records are retained throughout an individual's employment documenting the training they received. The records include the names of the employee and the trainer, the date of training, the topics covered, and if the employee demonstrated an understanding of the training materials.

The process operator files are maintained in the Process Training Coordinators (Supervisors) office with copies of the evaluations sent to Training Administrators for uploading into the IBIS database.

The auditor observed training files in both hard and electronic copy for a sample of processing, maintenance and emergency personnel.

Records include the names of the employee and the trainer, the date of training, the topics covered, and if the employee demonstrated an understanding of the training material.

2.8.3 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	

Summarise the basis for this Finding/Deficiencies Identified:

HVM is in FULL COMPLIANCE with Standard of Practice 8.3 requiring an operation train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.

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

The operation has developed SOPs for response to cyanide spills and as well as emergency documentation. All personnel working in the processing area complete the cyanide awareness training, followed by further area specific training, which includes information on actions to take if cyanide is released in their work area.

All personnel receive instruction and training on emergency response and raising the alarm. The primary response actions for processing and maintenance personnel are to raise the alarm and evacuate the area.

The ERT are responsible for emergency response, along with the support of experienced personnel in the area of the emergency. The ERT members have completed HAZMAT training in accordance with Australian Training Qualifications Framework.

Site cyanide response personnel, including unloading, mixing, production and maintenance workers, are trained in basic decontamination and first aid procedures and take part in routine drills to test and improve their response skills.

The ERT receive more advanced training in decontamination and first aid and generally facilitate the drills to test and improve skills.

Detailed instructions on, a reagent spill (inside or outside containment), process water spill (outside of containment) or the HCN alarms are contained in the CERP.

The operation has made off-site Emergency Responders, such as community members and medical providers, familiar with those elements of the CERP.

HVM is located in a remote area of the highlands and all emergency response is facilitated by the ERT. There is no capacity within the vicinity of the mine to provide external assistance. As such, the Police and Fire Department have not been assigned a specific role in responding to an emergency. As such, they have not been involved in mock cyanide drills.

Evidence was provided identified that drills were held yearly and included Processing and ERT personnel.

All employees and contractors that work at the HVM undertake Cyanide Awareness training at the commencement of their employment/contract and then annually (as a refresher course). This training is coordinated by the Process Safety Department and includes details with respect to Emergency Response.

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 updated in IBIS. Various training records were sighted during the audit.

2.9 Principle 9 – Dialogue and Disclosure

2.9.1 Standard of Practice 9.1

Promote dialogue with stakeholders regarding cyanide management and responsibly address identified concerns.

	☒ **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:

HVM is in FULL COMPLIANCE with Standard of Practice 9.1 requiring the operation to provide stakeholders the opportunity to communicate issues of concern.
HVM has a programme in place for interaction with the community and for the community to raise concerns. HVM conducts workshops with community representatives and stakeholders in the main townships around the mine namely Bulolo, Watut, Wampar and Mumeng as well as numerous smaller villages along on cyanide awareness. Cyanide awareness has also been rolled out along the cyanide transport road between Bulolo and Lae. Printed copies of cyanide awareness material are distributed during these meetings.

During the stakeholder meetings with stakeholders there is an opportunity for community members to ask questions and raise concerns regarding cyanide management. There is also a grievance mechanism being operations rolled out across HVM operations that will provide local communities a way of voice and resolve concerns.

2.9.2 Standard of Practice 9.2

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 9.2
	☐ not in compliance with	

Summarise the basis for this Finding/Deficiencies Identified:

HVM is in FULL COMPLIANCE with Standard of Practice 9.2 requiring the operation 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, and these descriptions are available to communities and other stakeholders.

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

HVM conducts workshops with community representatives and stakeholders in the main townships around the mine. Printed copies of cyanide awareness material are distributed during these meetings which are provided in Pigdin and English. Community consultation is completed verbally in the language of the community.
The CMP details the requirement for notifying the surrounding communities regarding cyanide and cyanide-related incidents that include:

— incidents of cyanide exposure resulting in hospitalisation or fatality;

— incidents where releases off the mine site required response or remediation;

— incidents where a release on or off the mine site results in significant adverse effects to health or the environment;

— incidents where a release on or off the mine site required reporting under applicable regulations; and

— releases that caused exceedances of applicable limits for cyanide.

HVM is required to report spills and incidents resulting in injury/fatality to the Department Of Environment and Conservation (DEC) and Mineral Resource Authority of Papua New Guinea. HVM operate under the assumption that once information on such events is provided to the regulator, it is publicly available as guided by the provisions in the Constitution.

Harmony produces sustainability reports, and this includes spills and incidents that occur at HVM. The *Harmony Operational Report & Harmony ESG (Environmental, Social and Governance) Report* lists all companywide incidents as a total figure. This report is available on the Harmony website.

3 Important Information

Your attention is drawn to the document titled – "Limitation Statement", which is included in Appendix A of this report. The statements presented in that document are intended to inform a reader of the report about its proper use. There are important limitations as to who can use the report and how it can be used. It is important that a reader of the report understands and has realistic expectations about those matters. The Limitation Statement document does not alter the obligations WSP has under the contract between it and its client.

Appendix A

Limitation Statement

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