

POLYMETAL VARVARINSKOYE MINE, KAZAKHSTAN MINING OPERATIONAL SUMMARY AUDIT REPORT

OCTOBER 2022



Photo from Polymetal Vavarinskoye photo gallery

Prepared by Christine Blackmore (Lead Cyanide Auditor)

WARDELL ARMSTRONG INTERNATIONAL

**Sir Henry Doulton House, Forge Lane, Etruria
Stoke on Trent, Staffordshire, United Kingdom**

www.wardell-armstrong.com



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MINING OPERATIONAL SUMMARY AUDIT REPORT The International Cyanide Management Code (hereinafter "the Code", "Code" or "the Cyanide Code"), this document, and other documents or information sources referenced at www.cyanidecode.org are believed to be reliable and were prepared in good faith from information reasonably available to the drafters. However, no guarantee is made as to the accuracy or completeness of any of these other documents or information sources. No guarantee is made in connection with the application of the Code, the additional documents available or the referenced materials to prevent hazards, accidents, incidents or injury to employees and/or members of the public at any specific site where gold or silver is extracted from ore by the cyanidation process. Compliance with this Code is not intended to and does not replace, contravene or otherwise alter the requirements of any specific national, state or local government statutes, laws, regulations, ordinances, or other requirements regarding the matters included herein. Compliance with this Code is entirely voluntary and is neither intended nor does it create, establish or recognise any legally enforceable obligations or rights on the part of its signatories, supporters or any other parties.

OPERATION GENERAL INFORMATION

Name of Transport Operation: VARVARINSKOYE, KAZAKHSTAN
 Name of Facility Owner: POLYMETAL INTERNATIONAL PLC
 Name of Facility Operator: VAVARINSKOYE, KAZAKHSTAN
 Name of Responsible Manager: Daria Goncharova
 Address: Narodnogo Opolcheniya 2,
 St. Petersburg, 198216
 State/Province:
 Country: Russian Federation
 Telephone: Tel. +7.812.334.3666, +7.812.677.4325
 Fax: +7.812.753.6376
 Email: Daria Goncharova Goncharova@polymetal.ru

OPERATION LOCATION DETAIL AND DESCRIPTION

Varvaraskoye (Varvara) was first discovered in 1981 in the historic hard-rock gold-mining Urals Fold Belt. Open-pit mining commenced in 2006 and the gold circuit of the processing plant became operational in December 2007, with the copper-gold circuit commencing in March 2008.

Varvara is situated close to a well developed industrial area in north-western Kazakhstan, 130 km south-west of the regional centre of Kostanay and 4 km from the Russian border, with major industrial cities of Chelyabinsk and Magnitogorsk nearby. Varvara is accessible by a network of paved roads from Kostanay, and the railway via the Bataly Junction on the main international rail route (15 km away). Figure 1 Kostanay region Kazakhstan in relation to other regions and countries.



Figure 1: Kazakhstan regional map and bordering countries

In 2009, Polymetal's acquired its first operation in Kazakhstan a gold and copper mine with a modern 4.2 Mtpa (Million tons per Annum) processing plant making it an ideal regional processing hub.



Varvara comprises of an open-pit gold mine and the Komarovskoye (Komar) high grade gold deposit which Polymetal acquired in 2016. The feedstock (2 Mt/yr (Million tons per year)) to the mine is transported by rail to Varvara processing plant. See Figure 2 location of Komar and Varvara.



Figure 2: Location of Komar deposit and Varvara processing hub

After Polymetal acquired the asset in 2009, a new strategic plan was undertaken, including the appointment of a new management team and together with Polymetal Engineering, a new mine plan and updated ore reserves estimate. The post-acquisition turnaround plan was successfully completed in 2010. Polymetal made tremendous progress in terms of optimizing the systems and technologies of the extraction process and ore treatment process, resulting in a substantial increase in productivity. Polymetal also implemented a comprehensive system of grade control, which has significantly improved the output quality.

Environmental Setting

Varvara and Komar are located in the Kostanay region of Kazakhstan, the region is characterized by relatively flat terrain and has the primary rivers of Ayat, Ubagan, Ui, Torgai, Saryozen, and Kara. The closest river to the site (7 km) is the Ayat. The Northern part of Kostanay region is a southeast suburb of the West-Siberian lowland, Varvara is located in the northwestern part of Kostanay region. Kostanay Region boasts more than 5 thousand lakes.

Woodland areas in the region cover 2,175 km² (square kilometres) including 1,512 km² natural plantings, undertaken in agreement with the Soviet Virgin Lands Campaign. In northern part of area chernozems and pine forests (Arakaragai, Amankaragai) prevail; in the central part – chestnut ground with pine forest Naurzimkaragai on the basis of which the same reserve is organized; the southern part is dominated by grasslands and shrublands.

The Kostanay Region is rich in minerals, especially iron ore (magnetite), bauxite and gold deposits. In addition there are deposits of silver, nickel, brown coal, asbestos, brick clay, limestone and silica sand.

Kostanay Region's climate is continental and has four distinctive seasons. Average temperatures: January: -18 to -19 °C (Centigrade), July: 19 to 22 °C. In the winter, the temperature can be as cold as -25 to -30 °C. In summer, the temperature can reach 30 °C. Annual amount of precipitation is 300–350 mm in the northern areas and 240 to 280 mm in the south. The growing season is about 150 to 175 days in the north and 180 days in the south.



Processing Gold

The feedstock for Varvara processing hub is from Komar and Vavara open pits. The ore processing is relatively simple, see figure 3 below, the block flow diagram of the gold processing circuit. The process uses cyanide to recover the gold from the ore rock. Cyanide is sourced to site through an accredited supply chain (see further details below). Varvara uses fresh water for cyanide mixing from the river Ayat and also water from the precipitation pond and the open pit. Tailings water is recovered and used in the process plant (milling), this is detoxified water (treatment prior to discharge to TSF) the water is regularly tested and is less than 0.5 mg/L Weak Acid Dissociable (WAD) cyanide. The water is again tested before feeding back into the plant to confirm it is less than 0.5 mg/L WAD cyanide.

Varvara Block Flow Diagram

(Flotation and Leaching circuits)

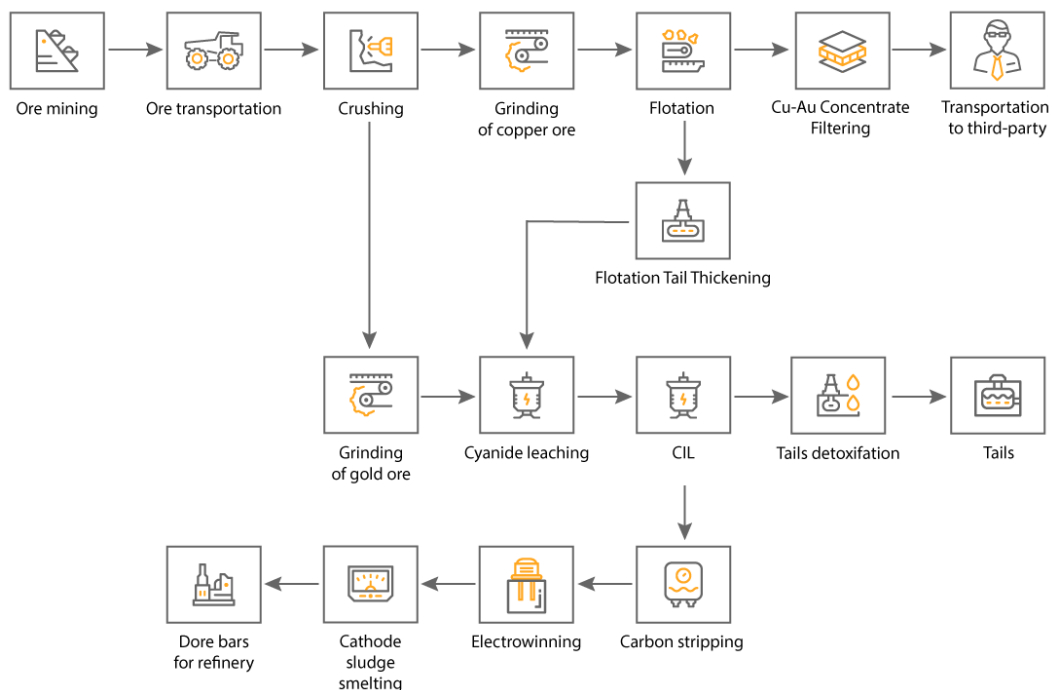


Figure 3: Block flow diagram of Varvara processing hub

Summary of audit activities

The Mining Operations Verification Protocol was undertaken by Christine Blackmore (International Cyanide Management Institute (ICMI) Lead Cyanide Auditor and technical Auditor), no other auditors were in attendance. Translation services were provided by Julia Boiko (sub-contractor to WAI). The Site Visit: 9-14 June 2021. Prior to the visit and in preparation for the audit Varvara supplied a number of documents for review.

Cyanide is supplied in solid form only (briquettes) in steel banded wooden boxes and stored



in purpose built units. Cyanide is only taken out of the storage warehouse when required for the cyanidation process in the processing plant.


The audit was conducted only on features related to the cyanide circuit and process. No visits to the open pit were required. The following is a summarized list of the cyanidation process components visited and audited:

- Cyanide supply chain, including Polymetal rail head and tractor & trailer;
- Dedicated cyanide storage area;
- Process plant: including mixing area, cyanide circuit (including all tanks, pipes, bunds ect), decontamination of packaging/waste;
- Internal cyanide testing laboratory;
- Water treatment facility;
- Tailing Storage Facility (TSF);
- Training department;
- Health and Safety (H&S) department;
- Clinic and Ambulance station;
- Emergency Response department, an emergency response drill was undertaken during the visit;
- Environmental department, including monitoring boreholes and soil sampling areas ect;
- Community liaison unit;
- Procurement and administration offices;
- Discussions with staff and senior management;
- An opening power point discussion to top and senior management with regard to the audit proceedings and Code expectations; and
- A close out meeting with the CEO (Chief Executive Officer) and Process Plant Manager was undertaken.

During the audit a collection of plans, protocols, procedures and certificates (such as calibration, training, external laboratory ect) were collected and reviewed as necessary in support of the Code audit. The documents are stored on Wardell Armstrong International (WAI) server. At all stages a photographic record was made by the auditor and a video of the emergency drill. The Emergency Response (ER) report following the drill was also provided for review and cross checking with the Auditors notes. All information/evidence is available. The information provided in general by the site was in Russian. An independent translator (Julia Boiko) accompanied the Auditor on all occasions and aspect of the visit and the subsequent reviews of the documents provided. During the site visit a photographic record was undertaken and video of the cyanide drill.

Varvara cyanide supply chain

Cyanide is transported to site by rail from St Petersburg container port Russia by Russian rail (RZD) to the border with Kazakhstan at Katalay, the cyanide continues it journey on the rail rolling stock but the locomotive is changed to Kazakhstan rail, where it continues to Bataly station. Polymetal Varvara has its own locomotive which collects the rolling stock for the final part of the journey to Varvara.



Varvara has its own platform with the site. Figure 4 below is a flow diagram of the supply chain process.

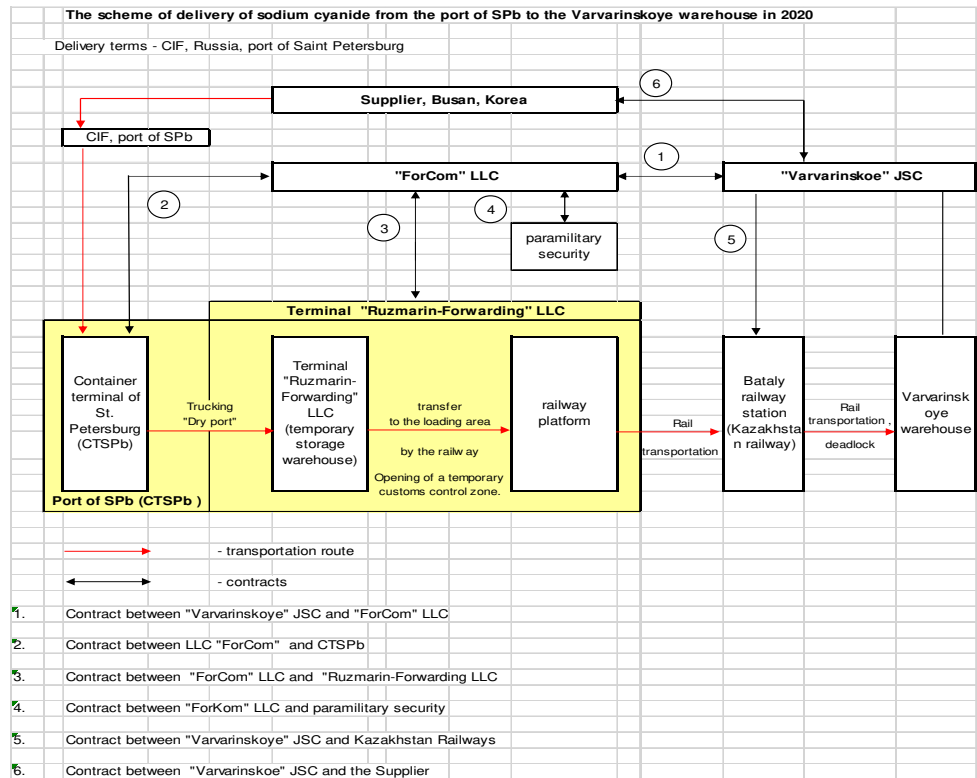


Figure 4: Schematic diagram of the cyanide Supply Chain

On arrival of the cyanide at Varvara platform, the shipping containers are unloaded from the rolling stock and taken to the cyanide storage compound. At no time during the journey from St Petersburg port to Varvara platform are the shipping containers (containing the cyanide boxes) opened or leave the rail rolling stock. Security is provided throughout the journey.

Varvara supply chain for cyanide was certified by the ICMI **11 July 2022**. The summarised audit report can be found on <https://cyanidecode.org/>



Auditor's Finding

This operation is

✓ in full compliance

in substantial compliance *(see below)

not in compliance

Auditor Information

Audit Company: Wardell Armstrong International WAI

Lead Auditor: Christine Blackmore (and Technical Auditor)

Lead Auditor email: cblackmore@wardell-armstrong.com

Dates of Audit: 9-14 June 2021

Auditor Attestation

I attest that I meet the criteria for knowledge, experience and conflict of interest for a Cyanide Code Certification Audit Lead Auditor, as established by the International Cyanide Management Institute.

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 Mining Operations Verification Protocol and using standard and accepted practices for health, safety and environmental audits.

POLYMETAL VARVARINSKOYE


Name of Operation



Signature of Lead Auditor

October 2022

Date



Principles and Standards of Practice

Principle 1 – Production and Purchase

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 certified 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:

Polymetal purchasing procedure stipulates that only accredited ICMI code compliant cyanide producers will be used. A copy of the purchasing procedure was provided to the Auditor.

The cyanide used by Vavara is produced by TONGSUH PETROCHEMICAL CORP. LTD who are registered signatory's of the ICMI (re-certified on 9 March 2020) as indicated on ICMI website. The contract for the purchase of cyanide is between the Korean transportation company Hyosung TNC Corporation, Republic of Korea (Hyosung).

Hyosung became a signatory of the ICMI For Commonwealth of Independent States (CIS) April 2020 and was certified by ICMI 25 July 2022. See extract from ICMI website.

Hyosung TNC Russian Federation and CIS Supply Chain from Tonsuh production facility to the port of St Petersburg has been certified 22 July 2022

Hyosung TNC Russia Federation and CIS Supply Chain	Currently Certified	25-Jul- 22	Summary	Audit	25-Jul- 22	Signatory April 23, 2020	Date:South Korea
			Report				
			Auditor				
			Credentials Report				

Vavara supply chain has been certified by the ICMI 11 July 2022.

Polymetal Varvara Mine Supply Chain	Currently Certified	11-Jul- 22	Summary	Audit	11-Jul- 22	Signatory July 11, 2022	Date: Kazakhstan
			Report				
			Auditor				
			Credentials Form				





The cyanide containers are loaded with the StP to RZD rolling stock and not off loaded until the goods reach Varvara, there is **no interim storage or off-loading during the journey**. RZD are notified in advance when cyanide needs to be transported. RZD determine the most appropriate route to Kartaly (Russian Border with Kazakhstan). The rolling stock has a change of locomotive (KazRail) to Batalay (c. 4km); there are no stations in between. At Batalay the locomotive changes to Polymetal Varvara locomotive for transit within the mine site boundaries.

Information with regard to training, maintenance and emergency response for RZD, KazRail and Polymetal Rail is contained in the supply chain audit.

Vavara supply chain was certified see details on ICMI website <http://cyanidecode.org>

Hyosung TNC Russian Federation and CIS Supply Chain from Tonsuh production facility to the port of St Petersburg has been certified 25 July 2022

Hyosung TNC Russia Federation and CIS Supply Chain			Summary Audit Report		
	Currently Certified	25-Jul-22	Auditor Credentials Report	25-Jul-22	Signatory Date: April 23, 2020
					South Korea

Vavara supply chain has been certified by the ICMI 11 July 2022.

Polymetal Varvara Mine Supply Chain			Summary Audit Report		
	Currently Certified	11-Jul-22	Auditor Credentials Form	11-Jul-22	Signatory Date: July 11, 2022
					Kazakhstan



Principle 3 – Handling and Storage

Protect workers and the environment during cyanide handling and storage.

Standard of Practice 3.1

Design and construct unloading, storage and mixing facilities consistent with sound, accepted engineering practices, quality control/quality assurance procedures, spill prevention and spill containment measures.

✓ 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 cyanide unloading platform, cyanide storage compound (including the warehouse) and mixing areas (part of the process plant) have been designed in accordance with Kazakhstan jurisdictional rules and accepted best engineering practices. The cyanide compound is 5km (kilometres) from the nearest dwelling and 7km from the nearest water course (River Ayat).

The cyanide compound is a secured fenced area with secure double gates and a pedestrian access through a turnstile. Security clearance is required before entering the compound, no unauthorised access is permitted. The compound is staffed 24/7 with 2 armed guards and is monitored by Close Circuit Television (CCTV).

The warehouse is constructed of corrugated coated metal with a concrete platform and is compartmentalised with each compartment having its individual electronic locking device. Drainage channels have been installed that would flow to a collection sump, should there be water ingress. The warehouse has an electrical ventilation system that ventilates each compartment. There is also a secondary ventilation system that is activated in emergencies if the primary breaks down (this is tested on a regular basis).

The cyanide boxes are unloaded from the shipping containers in the secure compound and the boxes are transferred into a designated compartment within the warehouse. The cyanide is received and stored in the compound in solid form (briquettes). No other goods are stored in this warehouse.

The cyanide mixing area forms part of the process plant. The tanks are in a concrete bunded areas (secondary containment), each tank is fitted with fill gauges which are alarmed to prevent overfilling and connected to the control room in the process plant. The alarms are tested routinely as part of the shift change-over inspections (every 12 hours). Calibration certificates are in date and are retained on site.



Before the processing plant and associated infrastructure is operational it is inspected by the Kaz authorities for design, parameters, use ect before a permit is issued. It is against the Kaz law to operate without the appropriate approvals being in place.

The cyanide mixing area is within the process plant but operates as a separate area. The area is well ventilated. No other materials/substances are stored in the mixing area.

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:

No Cyanide containers are stacked. When shipping containers arrive they are emptied and the boxes containing cyanide are unloaded and taken to a designated compartment in the purpose built cyanide warehouse. The compartments are sufficient in size so that no boxes of cyanide are stacked. The cyanide boxes when taken for use to the mixing plant are what will be used that day or mix. No cyanide boxes in the mixing plant are stacked.

Cyanide shipping containers are checked and decontaminated as necessary, before being relocated to another part of Varvara site. A procedure is in place if decontamination is required. The shipping containers are not returned to the supplier. Cyanide shipping containers are not returned to the producer.

The wooden crates containing Cyanide are only taken to the mixing plant when requested for use. Procedures are in place for the safe movement of the cyanide boxes and is also observed by CCTV. The boxes are not stacked in the mixing area. After the cyanide has been used, the plastic bags are placed in a bath of iron sulphate for a minimum of 2 hours before being drip dried. The boxes are dismantled and also dipped in the bath and drip dried. That "bath" area is enclosed to prevent splashing and dripping migration. After drying the bags are stored in a sealed container to await collection by a Kazakhstan licensed carrier for collection. The wood (from the boxes) are burnt on site in the incinerator.

All tanks, pipes, valves and couplings are inspected routinely as part of the shift change-over checks. These are also sequentially tested. Procedures are in place and inspection records maintained. The mixing area is monitored by CCTV in the control room and is also linked to key process engineers on the electronic system.



During the mixing process two specifically trained operatives are in attendance, the mixing is monitored by the control room and can also be observed via video link to other key engineers. Procedures are in place for this task. Specific PPE is worn in this area during mixing times. Spill equipment is available in this area should an incident occur, the operatives are trained in spill procedure and aware of the reaction time required for this task.

A red synthetic dye (carmoisine) is added to the cyanide solution during mixing as a cautionary measure so any spills/leaks can be instantly recognised. Procedures have been prepared for the adding of the dye.

A handwritten signature in purple ink, appearing to be 'SLO'.

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 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:

Procedures have been prepared for the safe management of cyanide at Vavara, which encompasses all elements of the cyanide circuit. The procedures are available as hard copies and also electronically. Each operative in the cyanide circuit has access to the procedures. A protocol is in place should there be a necessity to change any procedure or plan. Contingency plans have also been prepared should there be any non-standard issues, a series of scenarios are discussed in the document to address the relevant situation and conduct inspections to identify any problems. Inspection records are kept and actioned where necessary. Contingency plans are in place for cessation and disruption of operations, including closure plans for the safe management of cyanide and environmental protection.

A Construction Quality Assurance (CQA) validation report was produced following the construction of the TSF, only when this document is approved by the Kazakhstan authorities can the facility be used. The TSF has its own operating manual based on the design parameters and Kazakhstan regulatory requirements. The TSF operates a freeboard of 1.5m as per the design parameters. The design included storm event calculations and the TSF manual contains the actions necessary. Procedures are in place should actions be required. There are dedicated overflow facilities and pipes available should they be needed.

Automated bird scarers are located at the TSF (cannon fire and bird of prey noise). The TSF is inspected routinely at change of shift, this check includes tailings and return water pipelines, pumps, couplings and valves.

Protocols and Procedures are in place for the safe operation and environmental protection for all of the cyanide circuit. The facilities would not be allowed to operate unless these were in place and approved by the Kazakhstan authorities. Inspections by the Kazakhstan authorities are undertaken on a regular basis to ensure adequate procedures are in place. Each operative in the cyanide circuit has access to these procedures. A protocol is also in place should there be a necessity to change any procedure or plan.



The mine is scheduled to operate until circa 2032, with no plans to stop production. Kazakhstan legislation requires a liquidation fund (a physical deposit of money) be provided for the cessation of activities, a liquidation project is being developed and implementation procedures prepared. This project will include measures for the safe disposal of waste containing cyanide, all equipment that has been in contact with cyanide will be dismantled only after it has been neutralized.

There is a procedure for updating/changing documents: For small changes at site there it is discussed at daily shift meeting. For larger changes there is a three step process before a specific change (s) can be made to a procedure and implementation. The three step procedures are notifications to staff and approvals by different levels of staff. Level three includes a final sign off and implementation. Approvals are also sought from H&S and Environmental department managers to ensure that environmental protection and human health are not at risk.

In my opinion: The process plant is well run and meets its obligations to safety and environmental commitments with regard to the safe use and handling of cyanide. The inspection regime in my opinion is on a good regular basis starting with the change of shift (every 12 hours) by the shift manager and also operators are in the plant and the control room has CCTV, so the cyanide process is continually observed.

Inspections of all cyanide facilities/infrastructure are inspected routinely at change of every shift (12 hours), each week by the Process Manager and every two weeks by the Chief Engineer. Inspection checks are recorded (including name, date and any actions required) and records retained. All cyanide equipment and infrastructures are on a "rolling program" of preventative maintenance. Maintenance records are kept for all work undertaken.

The main power source for Varvara is from the national grid, however the process plant has a one megawatt diesel generator that can be switched on immediately if required, this is tested every two weeks and is also on the rolling maintenance program.

Standard of Practice 4.2

Introduce management and operating systems to minimise cyanide use, thereby limiting the 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 cyanide concentration rates have been determined by the blended ore used at site, which ensures a homogenous feedstock, therefore the cyanide usage is stable, nevertheless samples are taken every hours to monitor the concentration. The control room has an automated



reading of the concentration and this is compared to the sample concentration taken. Vavara has its own laboratory on site (within the process plant) that analyses the cyanide. Should any differences occur this is reported immediately to the process plant manager for corrective action.

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:

Varvara has developed a comprehensive probabilistic water balance model. The model addresses water in/water out of the cyanide solution system and considers the deposition rate of tailing into the TSF. Other elements forming the input parameters are climate data (Kazakhstan Hydromat – government agency), consideration the frequency and distribution of precipitation events together with extremes and seasonal variations, potential effects of freeze/thawing, allowances for solution losses and evaporation, which provides a realistic approach. There are no discharges from site to surface water.

Estimated storm duration and storm events are not used in the water balance calculation, however the following information/reasons were provided to the Auditor:

- According to the water balance calculation the "Project (design) for the operation of 5 & 6 stage of the TSFs of the JSC "Vavara" Plant, the calculation will annually result in a water deficit.
- In accordance with the requirements of "Rules for ensuring industrial safety for tailings and sludge facilities of hazardous production facilities" Clause 24, the elevation of the crest of the downstream tailings dam or the elevation of the above-water beach at the upper slope of the dam of upstream tailings embankments above the water level must comply with the design documentation throughout the entire period of operation and provide at least 1.5m.

Thus. the law prohibits overflow above 1.5 m to the level of the dam crest. Based on the calculation Appendix E. "Determination of the reserve above the calculated level" (in the attachment), the height of the wind surge is 0.271 m, which does not exceed 1.5 m margin to the crest of the dam.



There are two overspill ponds which are connected directly to the process plant and also the TSF in cases of emergency which can be activated immediately to divert tailings.

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 TSF is fenced to prevent livestock from entering the TSF area and also bird scarers are in operation. Before the tailings are deposited in the TSF they go through a detoxification treatment process. The results following treatment go direct to the control room for monitoring, for example the results at the time of the site visit June 2021 was 7.8mg/l Weak Acid Dissociable (WAD) Cyanide which is below the ICMI trigger level of 50mg/l WAD cyanide. To date no wildlife mortalities have been recorded.

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:

There are no discharges to surface waters from Varvara. Downstream of the TSF are monitoring boreholes which would intercept any seepages. No recorded seepages have been made.

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:

Vavara TSF and its overflow ponds are HDPE lined. The TSF is managed using a “beaching” systems, to give an equal spread of tailings and water levels are minimised even though return water to the plant is a capability.

Monitoring boreholes have been installed all around the TSF including down gradient of ground water. The Auditor received a copy of the borehole location plan and can confirm boreholes in relevant positions are in place.

The operation monitors for cyanide in groundwater and surface water (River Ayat 7km distant) upstream and downstream in accordance with the monitoring plan. An accredited laboratories in Kazakhstan define cyanide as “total”. Thus, the total Maximum Allowable Concentration (MAC) in drinking water as 0.035 mg/dm³, this trigger level is used for: water courses/bodies and domestic use. Groundwater trigger levels have not been defined, however, Vavara has adopted this level as their working standard.

Varvara cyanide test results reviewed by the Auditor shows a variance range of <0.01 mg/dm³ to 0.015 mg/dm³, which is below the Kazakhstan total trigger level of 0.035 mg/dm³. The results are compliant with the applicable limits (Maximum Allowable Concentrations) established by Kazakhstan.

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:

Provision for the containment of cyanide in case of spills are in place for example: tanks, pipes ect are all in bunded areas. The warehouse is purpose built, to prevent ingress of water. The Auditor inspected the areas for bund and containment integrity during the site visit. All tanks are on concrete foundations within the bunds. All floors are concrete, the Auditor checked all floors both in the bunds, process plant, mixing area and the storage warehouse for degradation. In my opinion the floors were well maintained, and no contamination pathways were noted.

Spill prevention kits are available in the process plant, mixing area and the cyanide storage compound. The cyanide solution tanks and pipes in the process plant are secondary containments (bunds). The bunds have been sized to hold a volume greater than that of the largest tank within that containment and has additional capacity for any pipe drain back.



There are sumps in each bund for the collection of any spills/leaks and this drains back into the system. The cyanide process plant works on a closed loop system.

All tanks are constructed of a steel alloy and HDPE lined, all pipes are HDPE. HDPE and the steel alloy are compatible with cyanide and a high pH level. Tanks are in bunded areas, solution pipes are part of the circuit that is in the bunded area. TSF pipelines are double skinned, pipe within a pipe.

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:

All cyanide facilities: storage compound, process plant and TSF have been constructed under a QA/QC program and have CQA validation reports. The CQA validation reports are submitted to the Kazakhstan authorities for approval. Without the individual approvals the site cannot operate.

The information in the QA/QC documents discussed such as TSF construction including soils compaction, lining system (1mm) HDPE, anchor trenches etc. process plant construction included specification for concrete platforms for cyanide storage and tank platforms.

Standard of Practice 4.9

Implement monitoring programmes 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:

Varvara has developed procedures and monitoring activities for boreholes and sampling and locations identified, the Auditor during the visit was shown most of the locations. As part of the monitoring activities, recording/photographing of wildlife is undertaken. Disturbance to wildlife is minimised during sampling procedures. Varvara employs an accredited sampling and analysis



laboratory to undertake environmental monitoring and analysis. The results are sent to Varvara chief ecologist. The laboratory use their own sampling equipment; sample preservation techniques, all samples are logged and taken away by the laboratory for analysis. Total cyanide is tested for, as required by the Kazakhstan authorities. In addition to the sample recording the laboratory record such as weather conditions, fauna activity and any other circumstances related to the sampling.

Boreholes are in place around the site and downstream of the TSF and process plant. Samples are taken as follows:

- Every month
 - Groundwater;
 - Surface water (River Ayat -7km);
 - Air quality;
- Every six months
 - Soils;
 - Snow melt; and
 - Bio diversity observations (same location as soils).

Daily inspections of the TSF and surrounding area, include recording for wildlife mortality. No mortalities have been recorded.

In my opinion: Vavara have a monitoring plan in place for groundwater, surface water, soils and fauna/flora. This is undertaken on a regular basis so identification of any changes can be addressed. I believe that the program of monitoring is adequate.



Principle 5 - Decommissioning

Protect communities and the environment from cyanide through development and implementation of decommissioning plans for cyanide facilities.

Standard of Practice 5.1

Plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife, 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:

Varvara have a decommissioning plan titled "The Liquidation Plan", which was prepared by an external consultancy based on the "Code of the Republic of Kazakhstan" December 2017, No.125-V1 including amendments to the Code in 2018, 2019 and 2020.

The liquidation Plan (section 8) contains a schedule of decommissioning activities. The plan for compliance with legal requirements (Clause 2 Article 17 of the subsoil Code) will be reviewed "not later than three years from the last review or amendment".

Standard of Practice 5.2

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 5.2

not in compliance with


Summarise the basis for this Finding/Deficiencies Identified:

As part (legal requirement) of the liquidation plan a cost estimate for decommissioning has been prepared for third party implementation from 2020 to 2035 using conversion factors. It also makes provision for "unforeseen work and costs of 2%". The cost estimates were "carried out in accordance with industry standards and guidelines and similar work in this area". The estimates are calculated in \$ United States of America Dollars (\$ USD) and have been accepted by the Kazakhstan authorities.

It is a legal requirement that money is set aside for decommissioning, a dedicated account has been opened for the liquidation fund, it can only be accessed for this use. The value of the fund is re-assessed every year and monies added. The cost estimate for decommissioning



is updated every 5 years. The banking agreements between Vavara and the bank have been provided to the Auditor.

A handwritten signature in purple ink, consisting of stylized, overlapping loops and lines.

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 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:

Varvara have prepared procedures for all tasks related to handling, storage and use of cyanide. Access to these procedures was provided during the site visit to confirm that these are in place and are readily available to the staff involved. Each procedure has a designated section on the appropriate PPE and use.

The staff are encouraged to assist and contribute to the evaluation and development of the H&S procedures. Opportunities are available at meetings, discussions with line managers/process plant managers and H&S managers.

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:

Varvara cyanide circuit operates using pH 10.5 + to prevent the generation of cyanide gas. Cyanide monitoring devices have been installed (blue gas monitor A480-HCN-01) and trigger level set at 3.0ppm. The storage tanks are fitted with high level monitoring devices (A80-AHH-LT01) to prevent overfilling and generation of HCN gas. All alarms sound in the process plant and are connected to the control room. The monitors are calibrated annually as specified by the manufacturer and certificates retained on site. During the site visit the certificates were presented and checked.

Cyanide monitoring devices are installed at site "blue gas monitor" (A480-HNC-01). The alarm is triggered if HCN gas is detected at 3.0ppm level.



On hearing the 3.0 ppm trigger –

Cyanide storage tank equipped with high level using device (A80-AHH-LT01) when the tank is full. The alarms while sounding in the process plant are also linked to the control room. Cyanide storage tank equipped with high level using device (A80-AHH-LT01) when the tank is full. All monitoring equipment is calibrated as directed by the manufacturer. Calibration certificates are retained for over 12 month. Calibration certificates were presented to the Auditor for checking during the site visit.

All operatives are monitored during work activities in the cyanide areas using a tracking system. Areas have been identified where cyanide exposure may occur and are noted in the procedures. The procedure also denotes the PPE to be worn. The Auditor was provided with a demonstration of the tracking system.

There are a number of warning signs in the areas where cyanide is handled, stored and used including:

- No smoking;
- No open flames;
- No eating and drinking; and
- PPE instruction signs.

All areas where cyanide is present or used has been identified and marked up to alert workers that cyanide is present. Varvara have painted all cyanide containing equipment (tanks, pipes etc) in the process plant purple for easy recognition. Flow direction arrows are in place.

Material Safety Data Sheets (MSDS) are available and are in both Russian and Kazakhstan languages, these are located adjacent to the first aid boxes in the process plant. A colorant dye (Caromsine) is being used in the process, this is added during the mixing stage.

There are 7 shower and eye bath stations in the process plant including the mixing area, the inspection of these for working order is part of the shift change procedure. The Auditor was taken to the stations for a demonstration.

Dry powder fire extinguishers are in place, in date and checked on a regular basis by the H&S department. The Auditor was taken to these locations to confirm their suitability.

No Exposure incidents have occurred. However, procedures are in place to investigate and evaluate cyanide exposure incidents. Following any incident/accident reports are prepared, and if required updates to policies, plans, protocols and procedures are made as necessary to prevent further incidents.

The scenario of cyanide gas inhalation and incidents form part of the ER drills undertaken at site. During the Auditors visit a drill was undertaken with regard to being overcome by cyanide gas. The Auditor filmed the drill and also received the investigation and drill report that followed. There is a procedure in place where any revisions due to the outcome of the report is implemented.



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:

First aid equipment is kept in a dedicated sealed storage units in the appropriate locations on site. The first aid equipment is checked once a month, unless anything has been used and needs to be replaced. Varvara has a check list.

Vavara has a procedure for communicating an emergency, the first call is to the dispatcher who then communicates to all required departments and personnel. Vavara has a walkie talkie system, all staff working in a cyanide area are provided with these. There is a dedicated channel for any emergencies.

Emergency response equipment such as resuscitators, oxygen, antidote crystals (Amyl Nitrite) and water can be located in the process plant (mixing plant) and cyanide storage areas. The antidote crystals can be administered as an initial response till paramedics attend the scene. The antidote crystals are refrigerated, and kept in the process plant. They are kept as per the manufacturers` recommendations. The Auditor validated the dates.

The antidote injection fluid (Sodium thiosulphate) is kept at the onsite clinic and stored as per the manufacturers` guidelines, these were also checked for dates. Injections can only be administered by trained medical staff eg paramedics ect. There is an on site clinic, ambulance and 2 trained paramedics. The ambulance is capable of taking any patient to nearby hospitals.

The local hospital is aware that cyanide is used at site and is capable of dealing with any cyanide poisoning incidents. Varvara is confident that the hospital would be capable and has provided the state approved treatment protocol to be used during the cyanide poisoning.



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 ERP was provided to the Auditor for review and can confirm that dedicated scenarios for cyanide incidents/accidents are included. Transport of cyanide is by rail (RZD and KazRail), Varvara has its own locomotive and travels (3km) from Bataly station to the site platform. RZD and KazRail have their own ERP and is discussed in the supply chain audit. Varvara train has its own ERP. No public highways are used in the transportation of cyanide to Varvara. However, scenarios are included for the movement of cyanide on site. Other scenarios include:

- Pipe, valve and tank ruptures;
- Over topping of the TSF;
- Power outages;
- Pump failures; and
- Uncontrolled seepages.

The ERP describes the actions necessary to call the alert, clear site personnel and demarcate the area. The ER team attend the situation and apply first aid if required. The ER team would also initiate any clean up. Aftercare monitoring and testing would be undertaken by the environmental department supported by the external consultancy laboratory.

For any disruption or spill is encountered, a report is undertaken to investigate the issue and actions taken accordingly to prevent recurrence. If any cyanide is spilled the ER team would initiate the clean-up. After care monitoring and testing would be undertaken by the environmental department, supported by ECC if sampling is required.

Standard of Practice 7.2

Involve site personnel and stakeholders in the planning process.

✓ in full compliance with



Summarise the basis for this Finding/Deficiencies Identified:

The ERP discusses roles and responsibilities of outside responders and how the interaction is managed in Varvara's document:

"Distribution of responsibilities between persons participating in the elimination of the accident and the procedure of their action". (From the Russian translation).

Designate appropriate personnel and commit necessary equipment and resources for emergency response.

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 ERP contains the procedure to call the alert and a contact list. The ERP also includes descriptions of the roles and responsibilities of each key person and team. There is provision in the ERP for the nominated controller and deputy of the emergency to authorise additional resources, equipment and PPE.

Sh

The ERP has identified potential cyanide scenario's and discusses equipment required for the task, PPE and location of the equipment. It is the responsibility of the shift manager to check ER equipment from the developed check list.

Roles for outside responders have been discussed in the ERP include:

- GPS – state fire service;
- NPPS – non state fire service;
- PVASS – professional military emergency rescue service;
- Medical service; and
- DFT – voluntary fire service.

The nominated controller at Varvara has the authority to call in any service thought necessary to attend an incident. ER drills have included the outside ER services. In accordance with Kazakhstan Law "On Civil Protection", Inspectors from the Industrial Safety Department who take part in emergency drills. The Inspectors then inform all interested parties as per the notification list, this is an integral part of the accident response plan. Familiarization with the ERP is carried out in December annually.

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 ERP contains a list of contacts and procedure for notifying management, regulatory agencies, outside responders and medical facilities. Any major incidents would be communicated to the local community by the Kazakhstan Civil Defence, who would advise on the actions to be taken. The ERP includes a list of contacts and the procedure for the communicating the information to management, regulatory agencies, outside responders and medical facilities. Communications with the media should a cyanide incident occur will be through the Kazakhstan Civil Defence.

The operation has now been included a procedure for notifying ICMI of any significant cyanide incidents, this is included into the Emergency Response Plan and evidenced by the Auditor. A copy of the ERP was provided to the Auditor. Relevant parts were translated to confirm the inclusion.

No cyanide related incidents have occurred to date.

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:

The ERP contains information for the recovery and/or neutralisation from cyanide spillages and describes the actions for treatment/removal of contaminated media and soils. It is the responsibility of the Chief Ecologist to visit the affected area and assess the environmental impact and aftercare management. The procedure for disposal and disposal location of materials contaminated with cyanide is indicated in the TSF ERP (disposal in the TSF). Residual content of cyanide in the soil is not allowed. The procedure for disposal and disposal location of materials contaminated with cyanide is indicated in the TSF ERP (disposal in the tailings).

If a cyanide solution spill/leakage occurs in the plant (large volume) then it is pumped into the emergency tank, the emergency tank has been constructed on a concrete platform in a bunded area. Once the emergency has been eliminated any residues are neutralized with hydrogen peroxide (details are included in the ERP).

Spillages/contaminated soils: the soils are recovered and taken to the process plant for neutralization (hydrogen peroxide) before being taken to the TSF.

The neutralizing solution is hydrogen peroxide, this is purchased in a "ready made" form and is stored at the process plant and mainly used to neutralize cyanide before tailings go to the TSF.


Aftercare: Soil analysis will be performed to determine that the spill has been completely cleaned up, within the framework of the industrial environmental control, laboratory tests of soils and groundwater are carried out, under an agreement with an accredited laboratory, such mechanism is provided for in the industrial environmental control program (section 14 "information on possible emergency situations") and in the action plan for localization and elimination of accidents (document provided to the auditor).

Examples from the ERP as translated extracts:

"Put on personal protective equipment: 3M full-face mask - 2 pieces, Korund suit - 2 sets. (an emergency PPE kit for ACC is located in the ZliOF administrative center and in the dissolution shop). Check the concentration of hydrocyanic acid vapors on a stationary gas analyzer in the workshop. Organize the neutralization of the spill site of sodium cyanide solution by filling the spill site. Neutralize a section of the pipeline with a 10% solution of ferrous sulfate and prepare for repairs..."

Or TMF dam failure:

"Stop the supply of slurry through the slurry pipelines by turning off pumps 32-PMP-01/02, the supply of recycled water from the tailings and the supply of fresh water from the evaporation pond and notify



the head of the tailings facility about this. In case of damage to the slurry pipeline, dump the slurry into emergency containers.

Organize the transportation of rocky soil to the place of the dam breakthrough with the involvement of a bulldozer, a loader and a dump truck from the quarry. In the southern part of the tailing dump there is a reserve of rocky soil and clayey rock up to 500 m3."

or: "Stop the supply of slurry through the slurry pipelines by turning off pumps 32-PMP-01/02, the supply of recycled water from the tailings and the supply of fresh water from the evaporation pond and notify the head of the tailings facility about this. In case of damage to the slurry pipeline, dump the slurry into emergency containers.

Organize the transportation of rocky soil to the place of the dam breakthrough with the involvement of a bulldozer, loader and dump trucks from the quarry. In the north-eastern part of the tailings there is a reserve of clay rock.

If there are victims, provide first aid, if necessary, make hospitalization to a medical facility"

Scenarios in the ERP describes how contaminated media and soils need to be treated/removed. Scenarios in the ERP describes how contaminated media and soils need to be treated/removed. Regardless of an accidental release of cyanide or its absence, personnel are provided with bottled drinking water on a permanent basis.

Varvara does not discharge any water to local water courses, nor are there opportunities for cyanide spilling during transit from the platform to the cyanide warehouse where cyanide could reach a water course. The nearest water course is 7km away, the River Ayat. Given the hydrogeological assessment this would be an unlikely occurrence. Therefore, it has not been specifically written into the ERP.

Varvara does not discharge any water to local water courses, indeed the nearest water course is the River Ayat 7km distance.

Regardless of an accidental release of cyanide or its absence, personnel are provided with bottled drinking water on a permanent basis. However, should there be any incidents contamination the local water supply Vavara would supply potable water, although it would come under the responsibility by law of Republic of Kazakhstan Civil Protection (article 4 clauses 3 and 5) emergency regime.

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 ERP is reviewed on a regular basis by the H&S and process managers. Cyanide related drills are included 3 times a year as a minimum, for example in 2020/21 the following scenarios were actioned:



- TSF failure – overtopping and dam wall failure;
- Rupture of chloric acid container;
- Rupture of cyanide pipeline between pump and leaching tank;
- Puncture of vehicle tyre carrying cyanide container; and
- Pipeline rupture and worker overcome by cyanide gas.

Reports and evaluations following any ER drills and any incidents are undertaken, this includes any related to cyanide. Procedures are in place for the updating, revising of procedures and implemented as necessary in the appropriate emergency response documents, this also applies to cyanide related incidents. Drill reports were provided to the Auditor for review, the reports included timings, participants etc. Outside responders have been included namely the Kazakhstan fire brigade in cyanide drills.

An ER drill using a cyanide scenario was undertaken during the Auditors site visit.

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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:

Cyanide awareness and specific task training is undertaken by all workers for cyanide related jobs. Each member of the workforce has a training record and are included in a rolling program of cyanide refresher training sessions every three months. A certificate is issued to the worker following completion of a session. Records are kept for a minimum of 5 years.

All employees at site regardless of whether they work in the cyanide areas are made aware of the use of cyanide at site and the associated hazards, including health effects and symptoms, the training discusses the procedures to follow in the event of exposure.

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:

After specific cyanide task training, the worker is further evaluated for two weeks by an experienced operative for competency, should the work fail to meet the standards re-training is undertaken and a further two weeks monitoring is undertaken. This process continues till competency is achieved and satisfactory.

Training materials and procedures are prepared for each task and taught by qualified and experienced staff in that specific area. Refresher training is mandatory every three months. Training records are kept for each employee which document their training.

For each training session a certificate is issued and signatures required from the employee and



counter signed by the trainer.

The Auditor was shown the training records and reviewed several employees certificates to cross check this process.

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:

As part of cyanide training for such as: unloading, mixing, production and maintenance personnel are trained in ERP procedures and decontamination. First Aid training is also provided to all staff at Varvara.

ERP training is provided by a qualified ERP trainer who also specialises in Cyanide incidents/accidents. All site personnel have some ERP training. Additionally, members of the ERP team are work in all locations where cyanide is handled, stored and used.

Before any member of staff is allowed to work on site, cyanide awareness training is provided. Task training is provided depending on the nature of the job, if this includes cyanide additional cyanide training is provided.

Refresher training for anyone working with cyanide is provided on a rolling programme. Competency checking for task performance is on a strict regime before a person is allowed to work alone.

The ER Coordinators and ER Team members are trained in the procedures included in the ERP with regard to cyanide, which also includes the use of necessary response equipment. Refresher training is undertaken every 3 months, which includes cyanide release and exposure scenarios. Emergency response training records are kept for at least 5 years.

Training records retained documenting an employee's cyanide training; the record as a minimum includes 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.

Off site responders are aware of Vavara ERP and have copies. The ERP contains a section dedicated to cyanide.



situation and decide on the need for a general immediate notification of the local population or indicate the incident without consequences in their reporting data. This is described in both DPs (in DP 03-007 - section 4.3, in DP 03-009, paragraph 9.3.3).

Also, information outside the emergency situation Varvara provides information on request from interested parties, incl. associated with cyanides or published in our reporting. Provided by DP 03-007.

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