

**AMURSK POX OPERATIONAL SUMMARY  
POLYMETAL INTERNATIONAL PLC**

**APRIL 2019**



Prepared by

**WARDELL ARMSTRONG INTERNATIONAL Sir**

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

[www.wardell-armstrong.com](http://www.wardell-armstrong.com)



# SUMMARY AUDIT REPORT

Name of Mine: Amursk Pox Hub

Name of Mine Owner: JSC Polymetal

Name of Mine Operator: JSC Polymetal

Name of Responsible Manager: CSO: Daria Goncharova

Address: Prospect Narodonogo Poolchenlya 2

State/Province: St Petersburg Country: Russian Federation

Telephone: +7812 334 3666 Fax: +7812 753 6376 E-Mail: pr.polymetal.ru

Location detail and description of operation:

## Location

The AGMK facility is located in Amursk – the city has a population of approximately 43,000 people, located on the northern bank of the Amur river in the Khabarovsk territory of the Russian Federation, 350 km from Khabarovsk and 54 km from the large industrial city of Komsomolsk-on-Amur. See Figures 1.1 and 1.2.



Figure 1.1: Map of Russian Federation

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**Figure 1.2: Location of AGMK**

## 1.1 Background

Amursk Pressure Oxidation (POX) HUB – was secured as the most appropriate technology to treat refractory gold ores. Furthermore, the Amursk area has the availability of highly qualified labour force to operate the plant. The excellent transport infrastructure ensures that reagents and products are easily transported to and from the processing plant. Amursk also benefits from an under subscribed (coal and gas fired) power station, thus ensuring sufficient power for the plant.

## 1.2 Overview

Located in the Russian Far East, the AGMK is the first gold POX plant in Russia. It processes two high-grade refractory gold deposits, from Albazino and Mayskoye mines, and three processing facilities, the Amursk hydrometallurgical plant, the Albazino concentrator and the Mayskoye concentrator. The Amursk hydrometallurgical plant uses (POX) and cyanidation technologies to process refractory concentrates which require pre-treatment oxidation before conventional cyanidation to extract the gold.

Construction of the AGMK facility was completed in December 2011 and the first gold was poured in April 2012. AGMK has a design capacity of c. 225 Ktpa of concentrate resulting in approximately 400 koz of gold produced per annum.

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## 1.3 Description

The POX circuit comprises the following steps:

1. Incoming concentrates are unloaded from 14 tonne large bags in source-specific batches into a bin.
2. Concentrates are fed from the bin by a high-angle conveyor into a ball mill, where material is diluted with water and stored in source-specific agitated tanks.
3. Slurry from various tanks is carefully blended in the feed tank to achieve stable sulphur grade in the autoclave feed.
4. Slurry is acidified to destroy carbonates in the feed and pre-heated with re-circulated process water.
5. Slurry is pumped by two positive-displacement pumps into a five compartment autoclave. Oxygen is produced on-site at the oxygen plant and injected in the autoclave to achieve at least 98% sulphur oxidation. High temperature steam from a special boiler is injected to initiate the chemical reaction during start-ups and fresh water is injected to control the temperature.
6. Oxidised slurry is discharged through a flash vessel, where both temperature and pressure drop. Off-gas from the autoclave is scrubbed from sulphur oxides in the Venturi scrubber. Process heat is recycled in the in stantboiling apparatus.
7. Autoclave discharge is neutralised by the addition of limestone and the slurry's pH is further increased by the additional of lime. Limestone and lime are crushed, milled and diluted with water in separate two-stage crushing and milling sections.
8. pH adjusted slurry is sent to the carbon-in-leach ("CIL") circuit where it undergoes carbon desorption, carbon regeneration, electrowinning and dore smelting.
9. Chemically inert tailings are filtered and dry-stacked in a fully lined tailings storage facility.
10. Filtrate water is washed in a clarifier and sent to a reverse osmosis facility, where deleterious elements are removed with clean water re-circulated to the process.

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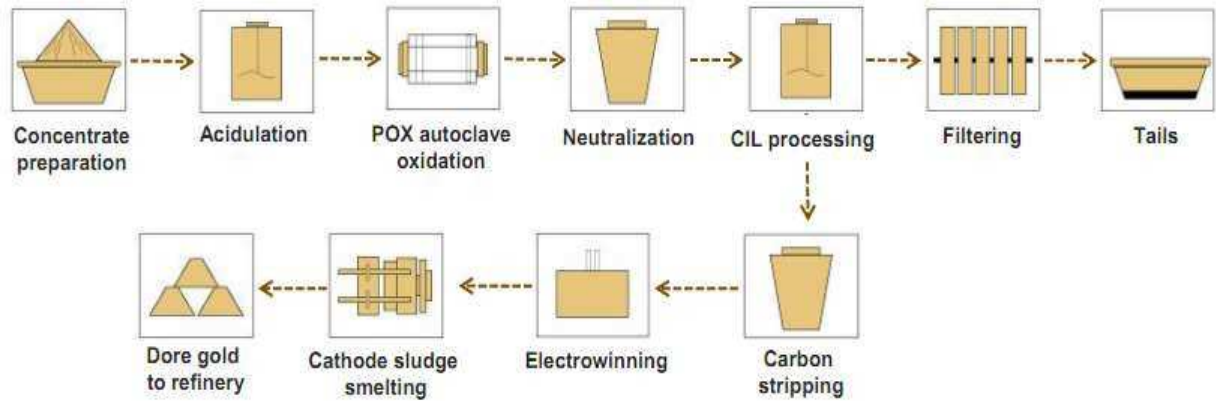


Figure 1: Flowsheet for AGMK

SNC lavalin was responsible for the basic engineering of stages four to seven above and the detailed engineering of stages five to six. All other engineering work was performed by JSC Polymetal Engineering. The facility is fully automated. Figure 1.3 above is a flowsheet for the process plant.

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## *Auditor's Finding*

This operation is

- in full compliance
- in substantial compliance \*(see below)
- not in compliance

with the International Cyanide Management Code.

Audit Company: Wardell Armstrong International

Audit Team Leader: Christine Blackmore

E-mail: [cblackmore@wardell-armstrong.com](mailto:cblackmore@wardell-armstrong.com)

Date(s) of Audit: 6 -11 November 2018

I attest that I meet the criteria for knowledge, experience and conflict of interest for Code Verification Audit Team Leader, established by the International Cyanide Management Institute and that all members of the audit team meet the applicable criteria established by the International Cyanide Management Institute for Code Verification Auditors.

I attest that this Summary Audit Report accurately describes the findings of the verification audit. I further attest that the verification audit was conducted in a professional manner in accordance with the International Cyanide Management Code Verification Protocol for Gold Mine Operations and using standard and accepted practices for health, safety and environmental audits.

AGMK



April 2019

Name of Facility

Signature of Lead Auditor

Date

AGMK



April 2019

## SUMMARY AUDIT REPORT

**1. PRODUCTION:** *Encourage responsible cyanide manufacturing by purchasing from manufacturers who operate in a safe and environmentally protective manner.*

Standard of Practice 1.1: *Purchase cyanide from manufacturers employing appropriate practices and procedures to limit exposure of their workforce to cyanide, and to prevent releases of cyanide to the environment.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 1.1  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

AGMK mine purchases all their cyanide from Tungsuh Petrochemical Corporation Ltd South Korea (Tongsuh) and Hyosung corporation, South Korea (Hyosung) who are both compliant, accredited and signatories to the Cyanide Code. Cyanide is purchased from Tongsuh and/or Hyosung, both are certified by ICMI.

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

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 2.1  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

Transported cyanide complies with the requirements of the UN Recommendations on Dangerous Goods, The International Maritime Dangerous Goods Code and European Agreement Dangerous Goods by Road.

Shipping containers inspected at AGMK during the site visit, have all the relevant signage with regard to cyanide (UN 1689) and marine pollutant. The CSC plate is in place, and compliant with the type of shipping container. The containers inspected were in suitable condition for the transportation of cyanide.

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The Competent Authority (Russian Federation Administration of State Vehicular Control) is responsible for issuing special permits for the movement of dangerous goods and has the responsibility for route selection. All roads in Russia are categorised and the route selection for cyanide is determined on this categorization to ensure the safe delivery of cyanide. The route selection forms part of the permit documentation and issue.

AMMC receive the goods at site and organise the unloading and movement of cyanide on site. AMMC personnel offload the containers from the VTS Vehicles at AGMK AMURSK site. In accordance with the Agreement between DV/VTS and

AMMC storage facility on site (AGMK), and under Agreement the transportation company checks the integrity of containers and seals when receiving the goods.

In emergency situations the initial response is undertaken by the transporter, who calls the Russian Emergency Services/ Civil Defence (CD) to attend the scene. By law the CD take control of emergency situations and it is then their responsibility to manage the situation. The VTS drivers have ER instructions on board the vehicle and on ER kit. The instructions contain all contact information including Roles and Responsibilities. VTS does not use sub-contractors.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 2.2  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

Polymetal Amursk uses the transport services of VTS and the Port of Nakhodka, Russia. A formal transportation audit has been undertaken and is in full compliance with the ICMI Code.

The operation has a chain of custody documentation identifying the elements of the supply chain that handle the cyanide brought to AGMK site.



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### **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.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 3.1  
 not in compliance with

***Summarize the basis for this Finding/Deficiencies Identified: (Due to the sensitivity of security issues regarding storage of cyanide, no descriptions of substantial or non-compliance with this aspect of the Standard of Practice should be provided.)***

There are two purpose-built cyanide compounds within the fenced site boundary but also have their own individual secure compound. The compounds are secured and AGMK operate a controlled access system. Both storage areas have compacted gravel bases with the container raised off the ground. The cyanide is stored in the shipping containers until required. The containers are raised off the ground on wooden sleepers. Each compound area has 10 feet high fences with steel panels with three string barbed wire on the top. There are steel double gates which are kept locked when the storage area is not being accessed. CCTV is in operation 24/7 at each compound and security patrols are undertaken at site 24/7 which include the cyanide compounds.

The cyanide mixing area has been designed and built in accordance with best practices and approved by the Russian Federation Authority (RFA). The mixing area, located in the process plant, has its own access doors and is constructed of steel with a concrete floor. The double access doors are steel and locked when in use. The process plant is fenced off. Both storage and mixing areas are inspected annually by the RFA.

The nearest dwelling to the site is c 5.5 km and water course (Little Bear Creek) is 820m. The water course has been assessed for site impact and includes culverting in some parts. The site discharges from the detoxification plant into this water course. The water going to the detoxification plant is from surface water run-off. There is also a discharge bypass system to stop any discharge should there be any adverse monitoring results.

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*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.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 3.2  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

Cyanide containers are not allowed to be stored on-site permanently. Temporary storage is allowed in a designated area with containers are only stacked within the shipping container (2 high) as per the container shipment from the manufacturer. No boxes are stored outside the compound area.

Empty cyanide containers, bags and liners are cleaned by being dipped into a solution of ferrous sulphate for one hour, before being taken to a designated landfill. The wooden crates and security banding are dismantled and temporarily stored on-site before a specialist company transports these to a designated landfill.

Before loading solid sodium cyanide into mixing tanks, the floor and wider work area is checked and cleared of debris. A visual inspection of the tank is undertaken and the efficiency of the ventilation system checked. All valves and couplings associated with the cyanide mixing system are checked as per operational check lists.

Safety Instructions have been prepared for the management of any spills during mixing, a copy of these were provided to the Auditor. The instructions describe how the spill should be dealt with and includes how the contaminated rinsing water should be returned to the cyanide closed loop circuit.

Cyanide mixing activities are undertaken by two persons in the actual mixing area. This is observed by the control room via CCTV.

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### **4. OPERATIONS: *Manage cyanide process solutions and waste streams to protect human health and the environment.***

Standard of Practice 4.1: *Implement management and operating systems designed to protect human health and the environment utilizing contingency planning and inspection and preventive maintenance procedures.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.1  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

Management and operating procedures are in place, with all procedures approved by the RFA and are reviewed annually at the RFA inspection.

Operating procedures are in place to identify any changes in operation at the process plant. Contingency plans are also in place to counter act any upset or deviations from the standard operating procedures.

The process plant is inspected daily. Maintenance programmes and downtimes are in place on an established frequency. The whole plant is shut down at least twice a year for full maintenance. The process plant is monitored regularly for compliance with its design parameters. The structural integrity and condition of the secondary containment bunds are checked at the beginning of each shift. Any defects are recorded promptly, and remedial actions undertaken.

Inspection records include all relevant information e.g. date, inspectors name, area and description of observation/defect. The inspection records are kept, from these records any actions required are noted electrically. The Auditor cross checked that the inspection records and corrective actions to sign off were being completed.

AGMK has 2 sources of power from the national grid and also has 2 diesel generators available. The design of the plant is on a closed-circuit and should there be a power outage the solution will stay in the circuit. The generators are tested each week and form part of the Process Managers weekly inspection. The generators are on a rolling maintenance programme.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.2  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

There is an on-site laboratory dedicated to monitoring cyanide solutions both for the processing plant and environmental monitoring. The laboratory undertakes regular sampling of the concentrate received on site (2 sources of concentrate), to optimise the use of cyanide.

A strategy for the addition of cyanide is included in the technical instructions in document “concentrate processing on Amursk POX”.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.3  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

AGMK has undertaken a detailed water balance analysis (water in/water out) which includes, meteorological data, effluent discharge, aquatic cyanide levels, volumes of wastewater pumped into lower storage ponds and total evacuated water from ponds etc. The design of the operations procedures takes into account worse case situations and monitoring wells are in place downstream. Tailings are “dry stacked” and deposited in an HDPE lined TSF. Linked to the TSF is a surface water run-off collection system, which consists of a collection pond, settling pond and overflow pond. The surface water runoff has no direct contact with cyanide. The ponds have been designed to incorporate “freeboard”, freeze/thaw and storm events.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.4  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

Amursk have prepared a “Biodiversity Conservation Procedure”, which contains the environmental management programme aimed at biodiversity conservation. The programme discusses the prevention of free access of wildlife and livestock to the TSF. Fences have been installed.

Amursk operates a dry stack TSF. Surface water run off flows is collected into a small solution ponds (Total CN concentration of (0-5mg/l) before entering the water treatment plant. The water treatment plant discharges into “Medvezhy” (Little Bear Creek).

Amursk have developed a environmental monitoring programme. The surface water run off pond, accumulation tanks and sump are sampled 3 times a month from Spring to Autumn. All of 2018 results have been provided to the Auditor, including a plan of the drainage system for reference. The Programme stipulates visual control of wildlife mortality on the operations territory with records in the Observations Log.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.5  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

The site operates a closed circuit system, therefore there are no direct discharges to surface waters from the process plant. A surface water collection system is in place at the TMF for precipitation and snow melt.

Surface water monitoring is undertaken downstream of the discharge point at ‘Little Bear Creek’, this is undertaken monthly.

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Upstream and downstream monitoring results have been provided to the Auditor for 2018 (monthly reports) which show the average discharge levels of Total Cyanide upstream 0.00 and downstream 0.0083 mg/m<sup>3</sup> (0.000005 – 0.000008.3 mg/l) thus below the Code specified concentration of 0.022 mg/l. The samples are taken at 1000m upstream and 500m downstream.

There are no known sources onsite of indirect discharge. However, there are boreholes across the site which are monitored.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.6  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified*

Amursk have prepared a specific water management plan that discusses ground and surface water protection. Protection measures include, all cyanide tanks and related infrastructure for example pipes are in concrete bunded areas, to collect any leaks. The bunded areas drain to a sump which is linked to the closed circuit.

The TSF is a dry stacking facility, the TSF is lined with a geosynthetic (HDPE), validation records relating to its installation were shown to the Auditor during the site visit. Before the TSF could be used it needed to be approved by the RF.

A total of 11 ground water monitoring boreholes have been installed around the TSF to monitor if there are any seepages. The boreholes are monitored monthly, results for 2018 were provided to the Auditor. The borehole monitoring results demonstrate that the groundwater concentrations  $c < 0.005$  mg/l thus below the RF standard (PND F 14.1:2.45-96) of 0.07 mg/l and in compliance with the Code.

A surface water management system drains to a small collection pond before entering the detoxification treatment plant. Following treatment the water is discharged into “Medvezhy” (Little Bear Creek).

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.7  
 not in compliance with

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*Summarize the basis for this Finding/Deficiencies Identified:*

Spill kits are in place at the site including the process plant and storage facilities. All cyanide tanks and pipe works have secondary containments, these are concrete structures with drainage sump, where by any spills can be collected and pumped back into the circuit. The bunded areas are sized at 110% of the tank capacity. At the storage area spill kits are available for clean-up of solid briquettes.

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.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.8  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

The cyanide storage and process plant facilities have been constructed and the approval of the facility was undertaken by the RFA who have qualified staff that undertake this work. The facilities by RFA law are inspected every 6 months for integrity and operational procedures.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 4.9  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

A biodiversity management plan has been prepared and implemented which includes monitoring and measurements of environmental performance indicators.

Analytical protocols have been developed and implemented by suitably qualified staff. The results of on-site analysis and reporting, together with additional quality samples, are sent to the RFA for quality checks and approval.

Water sampling and monitoring procedures are in place including sample preservation techniques, chain of custody, testing schedules and so on. Eleven monitoring boreholes upstream and downstream of the process plant monitor the process waters for the TSF. Monitoring is undertaken every 6 months as specified by the RFA.

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

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

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

*Summarize the basis for this Finding/Deficiencies Identified:*

Written procedures are in place to decommission the cyanide facilities at the cessation of operations within the “Hazardous Facilities Decommission Procedure”. The decommissioning procedure is generic, although it does mention cyanide. RFA do not require a detailed decommissioning procedure until approximately 2 years before site closure. The decommissioning procedure is reviewed annually as per the Polymetal management system.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 5.2  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

AGMK have undertaken a cost analysis of the decommissioning and include this in the operation expenditure (opex). The cost estimate is reviewed every 2 years and includes any changes or additional items, the costs are increased in accordance with inflation. AGMK has put in place a financial mechanism as part of their corporate responsibility, but it is not a specific requirement of the RFA.

**6. WORKER SAFETY:** *Protect workers’ health and safety from exposure to cyanide.*

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 6.1  
 not in compliance with



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*Summarize the basis for this Finding/Deficiencies Identified:*

Written instructions are in place for the preparation of the cyanide solution which includes unloading of cyanide, mixing cyanide solution and plant operations including decontamination instructions for equipment. PPE is required to be worn and workers are required to check the integrity of the PPE before wearing it.

There are written instructions for the creation of new documents, incorporating changes and for the superseding of existing documents. Health and safety procedures are developed and amended, as required, through the incorporation of staff feedback questionnaires.

*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.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 6.2  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

The appropriate operational pH for limiting the evolution of hydrogen cyanide gas (HCN) during mixing and production activities has been determined as 10.2-10.5. Personal HCN monitors are not issued, however HCN monitors are located in the process plant. A total of 15 monitors are dedicated to the process plant with a trigger level set at 3ppm. Hand held monitors are used for the opening of shipping containers and when checking empty containers before their return to the shipping companies.

Areas have been identified where the generation of HCN may occur, these areas have appropriate warning signs, an alarm and flashing beacons. The HCN monitors are set at 3ppm and this triggers evacuation. PPE is worn in the process plant at all times with additional PPE worn during mixing times. Calibration of the HCN monitors is undertaken every 12 months. The monitors are sent off site, AGMK have several monitors, so no area is left without a monitor at anytime.

Eye wash stations and showers are located in the cyanide area of the process plant. These are tested at the start of each shift and form part of the daily checks. The fire extinguishers are the responsibility of the H&S Manager, who undertakes an inspection of the facilities. The extinguishers are recorded electronically, with an alert when a due date for exchange is required.

During the H&S Manager walk around he also physically checks the location, details, pressures and for any damage.

Cyanide information is available and includes first aid procedures. MSDS sheets are held at the process plant and cyanide storage areas.

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In accordance with Article 12 of Russian Federal Law on Industrial Safety of Hazardous Production Facilities and the Order of the technical investigation of the causes of accidents, incidents and loss of industrial explosives in the facilities, supervised by the Federal Service for Ecological, Technological and Nuclear Supervision” approved by order of the Federal Service for Ecological Technological and Nuclear Supervision. Article 12 states that the results of technical investigations must set out measures to prevent similar accidents.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 6.3  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

The facility is very well equipped with emergency equipment.

Staff are trained in first aid however the medical support on site is provided by RFA paramedics, who are permanently based on site and forms part of the regional medical staff. All the medical supplies, antidote (Amylnitrite), oxygen resuscitators are the responsibility of the RFA paramedics.

Section 2 of ‘Emergency Response Plan 2016’ outlines the procedures that should be undertaken upon exposure to cyanide and provides details of the companies/organisations that should be contacted and should provide aid in an emergency. Mock emergency drills are conducted at the site.

### **7. EMERGENCY RESPONSE** *Protect communities and the environment through the development of emergency response strategies and capabilities.*

*Standard of Practice 7.1: Prepare detailed emergency response plans for potential cyanide releases.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 7.1  
 not in compliance with

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*Summarize the basis for this Finding/Deficiencies Identified:*

The ERP has been provided to the Auditor. The plan provides information and methodologies for emergency situations, such as clearing the site, procedures for communicating the emergency on site, on site Roles and Responsibilities, informing the RF CD and cyanide exposure. The ERP also contains cyanide related emergency scenarios.

There are trained ER responders working in all areas of the site including areas where cyanide is present. First Aid kits and Antidotes are on site and were checked by the Auditor during the site visit. Trained medical staff are on site who can administer antidotes.

During the Auditors site visit a cyanide drill was activated in order to demonstrate how effective the ER team are. A copy of the report was passed to the Auditor following the drill. Several scenarios for cyanide emergencies are prescribed in the ERP and discusses mitigation. Additional procedures for taking samples of ground/surface water and soils have been prepared and are used if any after care samples are required.

The Emergency Response (Action) Plan (EAP) provides details of the companies/organisations actions to be undertaken by rescuers in the event of a particular substance leak only e.g. sodium cyanide, methane and sodium hydroxide. Additionally, the Action Plan (Emergency management – natural and manmade) describes measures to be undertaken during specific disaster scenarios. The EAP has been provided to the Auditor.

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

The operation is             in full compliance with  
    in substantial compliance with Standard of Practice 7.2  
    not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

The RFA take control of emergency situations and it is their responsibility to deal with the community and the media. Therefore, AGMK ERP planning process did not involve the community. However, it should be noted that the local community are aware that cyanide is used at Amursk.

The medical responders on site are provided by the RFA, (paramedics) and trained to deal with cyanide accidents. The paramedics are in communication with the local hospital and an agreement is in place with regard to cyanide.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 7.3  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

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

In the event of an emergency the ERP plan is activated. The ERP designates the roles and responsibilities who will take responsibility until the CD arrive on site. The Chief Metallurgist and H&S Manager have the authority to provide resources and any additional equipment as needed.

The ERP identifies persons / organisations that are to be contacted in the event of an emergency, it contains all phone numbers the dispatcher needs to alert the ERP and outside responders.

The NERT training log has been provided to the Auditor, the log contains and confirms the certification of the emergency response services, teams, rescue workers, and persons who participate in ERP activities.

The list of ER equipment is included into the "Statute of the Non-professional ER team of Amursk POX" document. This was provided to the Auditor. ER equipment is in permanent readiness and is visually inspected and regularly tested. It is also inspected and audited by external organisations, any defects found are reported and replacements are made. Equipment is inspected at least once a month and after each emergency drill.

Inspections use equipment manuals and check lists to ensure the equipment is competent. Inspection results are recorded in the inspection log (NERT).

In all cases of emergency where cyanide is involved by RFA law the civil defence is notified who would take over and manage the situation. Additionally, these would be supported by DV Spacecenter (specialist team). AGMK have an agreement with DV-Spascenter LLC for ER, this includes having the rights to undertake emergency drills on the Client's hazardous facilities. AGMK "Emergency drills report and plan" file contained identified the plan of joint mock drills of non-professional emergency response team of Amursk POX and professional team of DV- Spascenter.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 7.4  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

AGMK Emergency Response Action Plan contains a list of persons, departments, and organizations which should be immediately notified after an accident has occurred for example: Amur Municipal District. However, it should be noted that the CD by law takes over the responsibility of managing an ER situation and communicating with the local community and media.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 7.5  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

AGMK ERP contains a series of scenarios for emergency including a procedure for eliminating the cases of cyanide leakage from solution tanks, pipelines, depressurisation of the pipelines' isolation valves (sorption leaching unit, and NaCN solution mixing unit). Working instruction are provided for the prevention and mitigation (clean up). All the process plant is inspected at change of shifts (2 times a day), regularly by the Chief Metallurgist and also by the H&S Manager.

The process plant works on a closed loop system, with all tanks and piping in secondary containments that are designed to collect any leaks/spills and return it to the system. The basal area is impermeable (concrete). There are no direct discharges of cyanide solution. The tailings go through a filtration plant before being dry stacked in a purpose built lined TSF. Surface water runoff is collected into a collection pond from the dry stack and flows to a water treatment plant before discharge.

Procedure for contaminated water is contained in the ERP. The Plan prohibits neutralisation of surface water and use of NaClO, FeSO<sub>4</sub>, and H<sub>2</sub>O<sub>2</sub> for decontamination of surface water contaminated by cyanide.

## SUMMARY AUDIT REPORT

The document entitled "Industrial Environmental Control Programme for cyanide". The programme is designed to assess environmental impact of cyanide solutions and was approved in early December 2016. It contains general information about cyanide leaching, cyanide hazards and list of the main regulatory documents containing the general requirements for industrial control and local monitoring.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 7.6  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

The ERP and action plan is revised no less than 15 calendar days prior to the expiration of the previous plan and no later than 1 month after any changes such as reconstruction and installation/upgrading of technical equipment.

A rolling programme of emergency response mock drills has been prepared which includes cyanide. During the Auditors visit a mock drill was undertaken and a feedback report prepared. If necessary the ERP is updated, if improvements can be found.

### **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.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 8.1  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

All staff are given labour protection and industrial safety training, this includes cyanide awareness for all workers. The Auditor was presented with training materials and training records. Refresher training is undertaken annually. Further task training is given to all workers dealing with cyanide.

There are training records for each employee are kept, the records detail the training session, name of trainer, dates and the results of testing following the training.

## SUMMARY AUDIT REPORT

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.*

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 8.2  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

Worker training for cyanide tasks is undertaken by the process plant Managers. The Managers are trained externally by RFA lecturers. The Managers are required to pass all the examinations before being able to become trainers on AGMK site. This scenario for training is a legal requirement and also the practice at other Russian mine sites. The certification is renewable every 5 years.

Following the specific task training for cyanide, all workers are monitored and observed for effectiveness of the training and FI&S awareness, before being able to work independently. Training records were provided to the Auditor. The Auditor cross checked these with site personnel. All workers are on a rolling programme of refresher training.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 8.3  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

All staff associated with cyanide have been provided with training in case of cyanide releases/exposures and in first aid and accident prevention. Emergency Response Coordinators are trained in the relevant procedures and included in the scenarios provided in the ERP.

The medical staff at site are RFA paramedics, who are trained in cyanide exposure. The paramedics have access to all local medical facilities. The ER team is trained by both the RFA and onsite FI&S qualified staff. The ER staff in cases of emergency are supported by RFA emergency services. Training is undertaken annually. A rolling programme of emergency response drill has been prepared which includes cyanide incident/accident drills.

The ER team is trained by both the RFA and on site FI&S qualified staff. Drills are undertaken and each drill recorded and assessed for competency and actions are taken to make improvements where necessary. Training records were provided to the Auditor.

## SUMMARY AUDIT REPORT

### **9. DIALOGUE: Engage in public consultation and disclosure.**

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 9.1  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

AMGK has a community office which offers the main point of communications with the site, however other forms of communications are provided for example community noticeboards, website and site telephone numbers. Many of the employees at AMGK live in the area, therefore communications with site is easily achieved. The Auditor visited the community office and met with staff.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 9.2  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

AMGK has provided information on the use of cyanide at the site, and continue to provide further information when requested. Every opportunity is given to the community to raise any concerns.

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

The operation is  in full compliance with  
 in substantial compliance with Standard of Practice 9.3  
 not in compliance with

*Summarize the basis for this Finding/Deficiencies Identified:*

Written information has been prepared and is available to all interested parties. Hard copies of the information can be found in the community office in Amursk. The pamphlet discusses the management and uses of cyanide at site. Included in the pamphlet is the sites contact details, and invites people to contact if they have any questions or concerns.



## SUMMARY AUDIT REPORT

Community meetings are held where the community or interested parties can raise specific topics or questions. Amursk where possibly try to being the appropriate manager or representative of that area can answer the questions or chair the discussion. For example minutes of a meeting were presented to the Auditor to confirm meetings were taking place and to confirm that the top “cyanide” and the environment was being dealt with by the environmental manager.

A handwritten signature in black ink, appearing to be 'SLO', is written over a horizontal line.