

# **ICMI Cyanide Code Gold Mining Recertification Audit**

## **Summary Audit Report**

**Kinross Gold Corporation,  
Fort Knox Operation  
Alaska, USA**

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

***2018 Audit Cycle***



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FORT KNOX MINE  
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**Mining Operation:** Fort Knox Mine

**Mine Owner:** Kinross Gold Corporation

**Mine Operator:** Fairbanks Gold Mining, Inc. (FGMI)

**Name of Responsible Manager:** Eric Hill, Vice President, General Manager

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**Location and description of the operation**

The Fort Knox Mine is a conventional open-pit gold mine approximately 26 miles northeast of Fairbanks, Alaska. The mine was originally permitted in 1994; Kinross secured a 100% interest in 1998. The mine site is located primarily on lands owned by the State of Alaska and the Mental Health Trust. It is operated by Fairbanks Gold Mining Inc. (FGMI), a wholly owned subsidiary of Kinross Gold. Material moved consists of ore and waste mined from the pit plus ore and waste re-handling. Higher grade ore is processed in a carbon-in-pulp (CIP) mill, typically at a rate of approximately 13.2 Mt/a. Up to 30 Mt/a of lower grade run-of-mine (i.e., uncrushed) ore is processed at a heap leach facility commissioned in 2009.



Figure 1: Project location

Fort Knox operates two ore processing lines: a mill operation consisting of crushing, grinding, agitated cyanide leaching, and a carbon-in-pulp (CIP) circuit; and a run-of mine valley-fill cyanide heap leaching operation where gold is recovered using two parallel carbon-in-column (CIC) circuits. Gold is recovered from solution by electrowinning and poured into doré bars at the mill refinery.

Higher-grade ore from the Fort Knox mine is processed in the CIP mill, which is located near the Fort Knox open pit. The mill processes ore 24 hours per day, 365 days per year at a nominal

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capacity of 36,287 t/d (40,000 short tons per day) of fresh feed. The mill includes a primary crusher, a conventional semi-autogenous mill and 2 ball mills operating in closed circuit with hydro cyclones to control grind size, gravity concentrators to recover coarse gold, cyanide tank leaching, recovery of gold on activated carbon in the CIP circuit, and a carbon elution and carbon regeneration circuit.

In 2008, Kinross initiated the engineering and construction of a heap leach facility and expansion of the open pit mine, which enabled the stockpiling and processing of low grade ore and expansion of the open pit mine, and is expected to extend the life of mine to about 2021 (milling is projected to cease during 2020 and mining operations will cease in 2021). The heap leach pad is a valley fill design, located in a drainage upstream from the tailings storage facility. Pumping stations and pipelines for pregnant and barren solutions were also constructed, and a new Carbon in Column (CIC) plant in the mill complex was constructed in 2009. A second CIC plant was constructed and commissioned in 2013.

The mill was originally designed to incorporate an INCO copper sulfate/ammonium bisulfate detoxification circuit to reduce weak acid dissociable (WAD) cyanide concentrations to acceptable values prior to tailings deposition. However, in 2002 a tailing wash thickener was installed; cyanide is recovered and cycled back into the mineral separation process, substantially reducing WAD concentrations in tailings as well as reducing the amount of cyanide and other reagents required. The detoxification circuit is held in reserve and activated as necessary to address process fluctuations. WAD concentrations in tailings are maintained below a permitted 10 ppm monthly average and a 25 ppm daily maximum.

Tailings are routed to a tailings storage facility, comprised of a deposition area, decant pond, earth-filled containment dam, and a seepage interception, collection, and pump-back system. Water from the decant pond is recycled back to the mill, thereby minimizing the need for fresh makeup water. In June 2008, the remaining capacity of the tailings storage facility (TSF) was about 55 million dry tons based on the deposition plan and facility configuration at the time, which comprised tailing deposition via gravity flow and the originally planned ultimate embankment crest elevation of 1488.0 feet above mean sea level (fmsl). However, in January 2009, the milling reserve for Fort Knox was increased above this as a result of ongoing exploration work. A conceptual site wide tailing storage optimization study completed by Knight Piésold and Co. (Knight Piésold) in 2008 identified the proposed 52.0-foot modified centerline raise to the original TSF embankment to crest elevation 1,540 fmsl as the preferred alternative to provide additional tailing storage. Subsequent to the construction of the first two of three stages of the 52-foot raise, the design of the third stage was revised to allow for an additional 17-foot modified centerline raise to crest elevation 1,557 fmsl. Construction of the additional raise was completed in 2017 and provided a total capacity of approximately 308.5 million dry tons of tailing.

Construction of the modified centerline raise was predicated on the design and construction of a base working platform along the upstream face of the existing embankment, which was permitted under the Alaska Dam Safety Program and successfully completed in the fall of 2009. The second stage of the raise was completed in 2011, bringing the crest elevation to 1515 fmsl. In 2012, a second base working platform was constructed to further support the third stage of the raise from 1515 fmsl to 1540 fmsl, which began construction in the summer of 2014, and was completed in 2015. A third base working platform was constructed in 2015. The 17-foot modified

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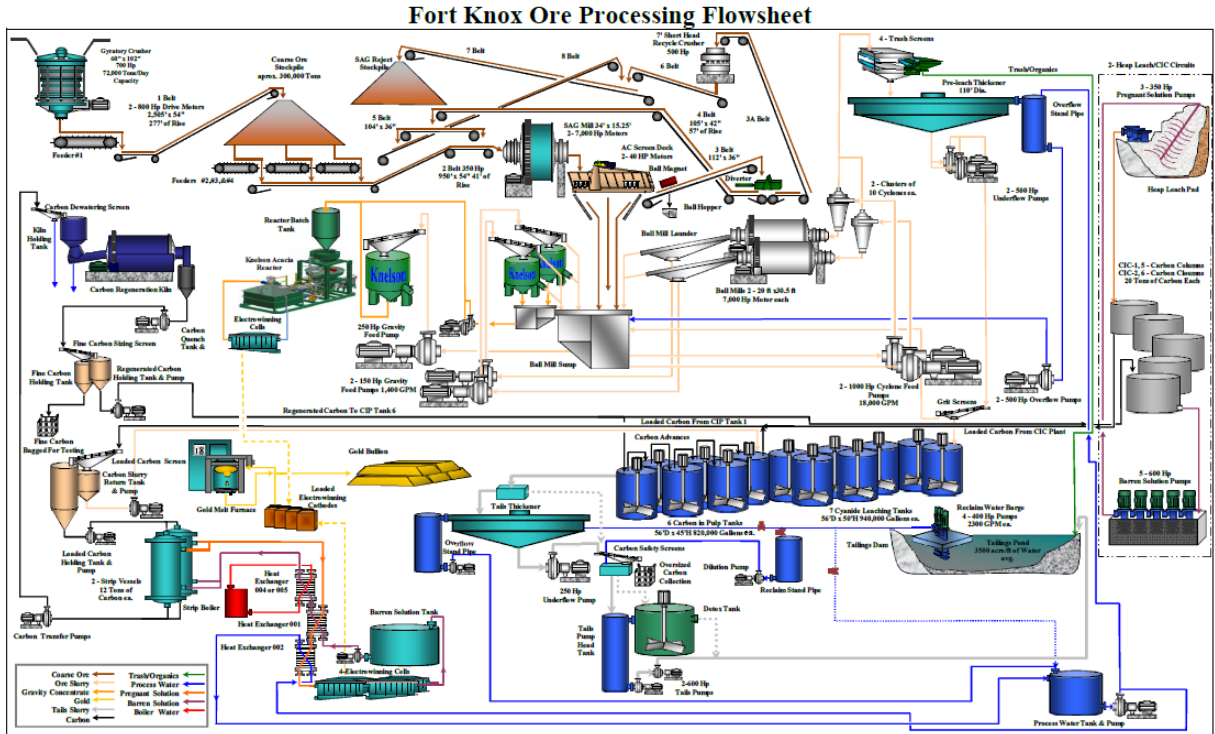
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centerline raise from 1,540 fmsl to 1,557 fmsl was constructed, along with a wider upstream random fill shell, in 2016 and 2017.

The Fort Knox ore processing flowsheet is presented below:





## Auditor's Finding

The ICMI-approved Audit Team verified that the Fort Knox operation is in FULL COMPLIANCE with ICMI Cyanide Code requirements for Gold Mining operations.

**This operation was determined to be in FULL COMPLIANCE with the International Cyanide Management Code.**

Fort Knox Mine has not experienced any significant cyanide incidents or compliance problems during the previous three-year audit cycle.

## Auditor's Attestation

Audit Company:	SmartAccEss Socio Environmental Consulting, LLC
Lead Auditor:	Luis (Tito) Campos E-mail: <a href="mailto:titocampos@smartaccess.us">titocampos@smartaccess.us</a>
Mining Technical Auditor:	Bruno Pizzorni E-mail: <a href="mailto:bpizzorni73@gmail.com">bpizzorni73@gmail.com</a>
Date(s) of Audit:	March 5 <sup>th</sup> – 9 <sup>th</sup> , 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 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 Institute for Mining Operations Verification Protocol and using standard and accepted practices for health, safety and environmental audits.

Fort Knox Mine  
Name of Operations

  
Signature of Lead Auditor

May 28<sup>th</sup>, 2018  
Date

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**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  
 in substantial compliance  
 not in compliance with Standard of Practice 1.1

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

The operation's contract with the cyanide producer requires that the cyanide be produced at a facility that has been certified as following the Code. During the recertification period Fort Knox mine only purchased cyanide from Cyanide Code certified producers. Kinross has a master agreement with the cyanide manufacturer. The certification status of the cyanide producer was verified by review of the ICMI website.

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

**Standards 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  
 in substantial compliance  
 not in compliance with Standard of Practice 2.1

*Discuss the basis for the Finding/Deficiencies Identified:*

Written agreements meeting the Cyanide Code's requirements were in place for both supply contracts (i.e. Chemours and Cyanco) that were in effect during this ICMC audit cycle. The cyanide purchase contracts include cyanide manufacturer's (seller) responsibility on delivering the product to the mine's site.

The seller's transportation supply chain is currently certified under the Cyanide Code. The supply chain includes rail, barge & truck transportation from Houston production plant to Alaska, among other locations.

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The contracts requires appropriate packaging as required by the United Nations for international shipments and by the political jurisdictions the shipment will pass through. Labeling is in English as all transportation takes place within the United States.

The contracts require that the seller must ensure the products are properly secured at the ports of entry, safety marked, documented, and inspected during handling, loading, transporting and delivery. Also, is required evaluation and selection of routes, including community involvement. Seller's responsibility is stated for interim loading, storage prior to shipment, unloading during shipment and transport to the operation.

Safety and maintenance of the means of transportation throughout transport is addressed as seller's responsibility in the contracts, as well for task and safety training and emergency response for transporters and handlers throughout transport.

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  
 in substantial compliance  
 not in compliance with Standard of Practice 2.2

*Discuss the basis for the Finding/Deficiencies Identified:*

The contracts states the sellers is responsible for all aspects of transportation of cyanide to Fort Knox Mine site, as well as cyanide production. The contracts commit the Seller to maintaining ICMC certification and signatory status.

All cyanide transporters to Fort Knox are certified under the Code.

Chemours supplied cyanide to Fort Knox by means of its US/Canada Rail & Barge Supply Chain comprising Rail & Barge movements using the Union Pacific Railroad, Canadian National Railway Alaska Railroad Company and Alaska Marine Lines from the Memphis production plant to the Carlin repackaging facility and to US ports and customer locations in US and Canada. It was first ICMC certified on March 05, 2010 and then recertified on August 18, 2017.

Both supply chains use Alaska West Express Inc. (AWE) trucking company to transport cyanide from Fairbanks to the mine site. AWE is an ICMC certified company which was initially certified on September 14, 2012 and then recertified on June 30, 2016.

The operation has chain of custody shipping records identifying all elements of the supply chain: producer, transporters and storage facilities that handle cyanide brought to the site, all certified in compliance with the Code. Review of sample shipping papers to Fort Knox for the recertification period July 2014 to 2018 indicates that this practice has remained constant since the date of the last recertification audit.

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Upstream chain of custody documentation prior to offloading of intermodal containers in Fairbanks is not provided to Alaska West Express.

### 3. *HANDLING AND STORAGE*: Protect workers and the environment during cyanide handling and storage.

#### **Standards of Practice**

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

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

#### *Discuss the basis for this Finding/Deficiencies Identified:*

The cyanide mixing area and arrangements for mixing remain substantially unchanged from the previous recertification audit, as no new cyanide facilities have been constructed in the last 3 years. The field component of the audit confirmed that the cyanide mixing area was located within the internal structure of the mill on concrete hardstanding maintained in good condition. Mixing tanks were located within containment concrete berms, which are sized to contain at least 110% volume of the largest tank. The storage and mixing areas are also subject to daily inspections at shift start to detect any obvious releases or failure in containment.

The solid cyanide storage area is located in an elevated platform located over competent concrete hardstanding within the tails wash thickener building located inside the process plant area, which is fenced and located far away from communities or surface waters. The area is access controlled with the appropriate cyanide warning signage. The tail wash thickener building is secured from weather and is of large volume with ventilation vents present along the four sidewalls. The internal building structure provides secondary containment for the cyanide storage area. The cyanide storage area and offload facilities are located a safe distance from the public and away from locations where workers may congregate. The storage area is dedicated to sodium cyanide storage only, with no other materials permitted to be stored. No storage of other materials was observed during the field inspection.

Fort Knox has one preparation area for cyanide that includes a mixing tank and a cyanide storage tank. There are level indicators and high-level alarms installed on both tanks. These levels are continuously monitored from the mill control room. Arrangements remain unchanged since the 2014 recertification audit. Cyanide mixing and storage tanks are contained within concrete berms with good condition concrete flooring. The bermed containment areas are sized to contain 110% of the largest tank volume and have been confirmed previously as part of engineering

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specification checks. During the field inspection, the containment area was noted to be in relatively good condition, with no significant damage, spalling or cracking evident.

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  
 in substantial compliance  
 not in compliance with Standard of Practice 3.2

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

Procedures for managing empty cyanide containers are prescribed in Standard Operating Procedure (SOP) OPG 01 - Cyanide Solutions. The auditor observed a cyanide mixing process and disposal of cyanide containers and verified that the SOP was followed at all times.

Sodium cyanide is received onsite in the form of super sacks. SOP OPG 01 specifies measures undertaken to ensure that sacks are managed in such a manner to prevent their use for any other purposes. The SOP specifies that bags and plastic materials are disposed of in the landfill and wood and cardboard go to the burning pit. It also requires that empty cyanide sacks are rinsed a minimum of three times with rinse water directed into the cyanide mixing tank. This process is achieved through the activation of a spray device at the point that the super sack is split for dispensing into the cyanide mixing tank.

The SOP OPG-01 also outlines the requirements for inspection, observation and mixing of cyanide solutions; as well as the operation and function of valves, pumps and various interlocks within the cyanide mixing process. It also includes instructions for the prefill of the cyanide mixing tank with reclaim water and caustic solution and a requirement for immediate clean up any spilled cyanide including placing it in a suitable container and washing / treating the contaminated area with diluted hypochlorite solution to destroy cyanide. No spills related to cyanide mixing were reported since the last recertification audit.

Operators are required to use the appropriate personal protective equipment (PPE) during mixing activities. These include steel-toed boots, rubber gloves, rubber boots, approved respirator, goggles or face shield, rubber rain gear, hardhat, safety glasses and hearing protection. SOP OPG 01 also requires that two workers are present during the mixing activity. Mixing operations and cyanide alarms are also monitored remotely from the Mill Control Room.

A cyanide mixing event was observed during the audit. The review indicated that Fort Knox has appropriate SOPs and practices to handle and prepare cyanide solutions in a safe manner.

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

##### **Standards 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.

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

##### *Discuss the basis for the Finding/Deficiencies Identified:*

Fort Knox has several manuals, plans and SOPs for the safe operation of cyanide facilities. All SOPs include a section related to PPE requirements, considerations of safety hazards and potential impacts on the environment. The operation has identified equipment, personnel, and procedures for cyanide unloading and mixing activities as well as for storage facilities, milling facilities, TSF, heap leach pad (HLP) and all associated piping and pumps as having contact with cyanide. SOPs were reviewed and found to be sufficiently detailed to enable safe operation.

Waste Management Permit No. 2014DB0002 was issued by the State of Alaska, Department of Environmental Conservation; effective from March 28<sup>th</sup> 2014 to March 27<sup>th</sup>, 2019 and describes the applicable regulatory requirements regarding cyanide concentrations on tailings slurry and cyanide concentrations on the under drain system beneath the HLP. Fort Knox does not have direct water discharges to surface water that have been treated for cyanide.

The Heap Leach Pad (HLP) Operation and Maintenance (O&M) Manual and the Tailing Storage Facility O&M Manual include design storm events for solution ponds and impoundments and the required freeboard for safe operation. Fort Knox does not have direct water discharges to surface water that have been treated for cyanide.

Fort Knox has three different mechanisms to identify and evaluate changes in processes or operating practices that could increase the potential for the release of cyanide including The Kinross Authorization For Expenditure (AFE) process, The Kinross Achieving Excellence (AE) Initiative program, and SOP OPG59 - Standard Procedure Generation and Revision. These three mechanisms include a multidisciplinary evaluation of the proposed changes including health, safety and environmental aspects.

Fort Knox has an Emergency Response Plan (ERP) dated February 2018 that includes a tailings impoundment overtopping or failure scenario. Other scenarios covered in the ERP include increments in seepage and earthquake events. Section 5.0 of the Emergency Action Plan (EAP) provides instructions for shutdowns and closures, short term and extended shutdowns, and for closures from one month up to three years. In case of power outages, Fort Knox has SOP E2 - Generator Start Up After Power Loss to run the mill standby generators and SOP 27.01 - Backup Generator to convey the function and operation of the Heap Leach backup generator. The HLP

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has a 24-hour draindown capacity which provides enough time to respond. In case of cyanide concentrations in the tails water thickener that are higher than the design criteria, Fort Knox has SOP 24.11-Starting Reagents and INCO process to run the INCO process and lower cyanide concentrations according to the design criteria.

None of the containment areas has any drains to the adjacent land surface. As noted in the previous recertification audit reports, the CIC containment has been fitted with an emergency overflow sump and a large diameter drain line reporting to the CIP/CIL impoundment. The CIP/CIL area contains 13 large solution tanks and is open to the weather, but drains to additional containment areas beneath the tails thickener and detoxification tanks, in the basement of the detoxification plant building.

Fort Knox has a program to conduct inspections of cyanide facilities with frequencies that varies from daily, weekly, monthly, quarterly and annually. Both the HLP and the TSF are inspected daily for critical aspects including integrity of surface water diversions and available freeboard. Historical freeboard for the last 3 years at both the in-heap pond and tailing facilities were reviewed using the "PI System" data and verified that it was managed according to their design criteria. Records of inspections are retained and were reviewed by the auditor. The inspections are documented and include date of the inspection, the name of the inspector and observed deficiencies. The inspection program also include cyanide unloading, mixing and storage facilities.

The inspection program of cyanide facilities including unloading, mixing and storage activities and frequency of inspections were found to be sufficient to assure that the operation is safe and functioning within design parameters. The auditor reviewed inspections records for the last 3 years and verified that inspections are conducted on a consistent manner.

The auditor conducted a field inspection during the site visit and verified the condition of tanks, secondary containments, pipelines, pumps, valves, water diversions, tailings freeboard and heap leach facilities. These inspections also included cyanide unloading, mixing and storage facilities. Records of the inspections conducted by Fort Knox to cyanide facilities were reviewed by the auditor and were found to be complete.

Fort Knox have two mechanisms to document, track and close corrective actions identified during inspections: Corrective actions identified that are related to maintenance of equipment at the mill, HLP and TSF are managed by the Maintenance area using the Oracle JD Edwards system, where work orders are tracked, prioritized, planned and closed. All other corrective actions not related to maintenance of equipment that are identified through inspections conducted by Management (e.g. Management weekly planned inspections) or other areas (e.g. Environment) are tracked, implemented and followed up until closure.

The Maintenance area has a preventive maintenance program for pumps, pipelines, valves, flow meters, gauges, level sensors, pH meters, sump pumps, filters, hydrogen cyanide (HCN) sensors, tanks and cyanide facilities in general. The preventive maintenance program is used to perform necessary maintenance and inspect the integrity of process equipment, piping and tanks, according to a maintenance program and every time it is needed to keep equipment and installations working properly.

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Fort Knox has five emergency power generators (6.0 Megawatts - MW) on site for backup power, located in a separate dedicated building close to the mill. These generators supply power to the mill, seepage pumping and the administration building (total mine operations require 35 MW). In addition, three small generators (5.5 MW) are in standby for the heap leach facility and CIC circuit. The generators are checked on a monthly basis for fuel level, lighting, heating and are start tested.

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  
 in substantial compliance  
 not in compliance with Standard of Practice 4.2

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

The operation has an online cyanide distribution system which provides cyanide continuously to the process for dissolution of gold contained in the ore, and to the barren solution for carbon stripping. Cyanide concentration of the process solution is dictated by metallurgy and mineralogy. Addition rates vary depending on head grade of material and recovery.

Cyanide is continually monitored and adjusted as required from the control room for each cyanide addition point. This sampling and monitoring program forms the basis for cyanide addition and/or adjustment and includes pH control. The complete system is composed of a sampling system, an analytical system, a cyanide controller and a cyanide addition system. These components work together for the determination of cyanide levels and provide control for the cyanide addition.

Cyanide addition rates are monitored and controlled with an optimum target set for cyanide consumption. Actual monitoring and measurement of cyanide concentrations at various points in the process is conducted by mill personnel via real time titration analysis. Values obtained are entered into the automated control system.

Fort Knox has two major parameters to control cyanide addition: a) The permit issued by the State of Alaska related to a maximum WAD cyanide (WAD CN) at the tailings slurry and b) To have adequate cyanide concentrations in the solution to extract gold from the ore.

The automatized system allows control of cyanide addition, based on cyanide measurements in the solution, by obtaining maximum recoveries using the correct cyanide concentration. The permit requires the operation to control cyanide content in the tailings slurry, which requires to operate the tails thickener and allowing recovery of a large portion of cyanide solution, which is then reused in the process. Results from daily cyanide concentration analyses are continuously used to control cyanide addition. The results are reviewed and, if changes are needed, they are communicated to the process operator.

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4.3 Implement a comprehensive water management program to protect against unintentional releases.

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

*Discuss the basis for the Finding/Deficiencies Identified:*

Fort Knox continues to use a comprehensive, probabilistic water balance using Goldsim software platform. An external consulting company (Knight Piésold) updates climate data on a quarterly bases and calibrates the model. The last calibration report is dated February 2018.

The water balance includes the following factors: solution application rates; tailings deposition rates; precipitation, evaporation and seepage rates; undiverted run-on from upgradient areas; impacts of freezing and thawing; potential power outages; and water treatment capacity (Reverse Osmosis (RO) treatment plant). A description of the water balance model and calculation is described in the Site-wide Water Balance Development and Guidance Document dated August 2015.

Freeboard in the TSF is regularly monitored to meet the design criteria of 3.0 feet above the water elevation associated with the combined maximum normal operations pond volume, maximum volume of pregnant solution in the Walter Creek in-heap pond, and the 100-year/24-hour rain-on-snow storm water volume. The TSF is operated as a zero discharge facility. A reverse osmosis (RO) treatment plant treats water from the pit dewatering wells and discharges into the fresh water reservoir.

Inspection records for both the TSF and HLP were reviewed for the last 3 years and found to be complete. The auditor also reviewed monitoring data for the last 3 years and verified that design freeboard for the TSF (3 ft.) and in-heap pond at the HLP (5 ft.) were maintained at all times.

A weather station is situated at the mine and has collected rainfall data since 1990. This station and the near-site Fairbanks University Experiment Station, located 18.5 miles of the mine site (records from 1904 through present) were analyzed for use in estimating the site design precipitation. The evaporation data is collected from both the weather station operated by the Fairbanks University Experiment Station, and from the on-site Heap Leach Station (records from 2011 through present).

The water balance takes into account percolation of surface water, seepage beneath the TSF and subsequent capture through interceptor wells located at the toe of the TSF embankment, from where intercepted water is pumped back into the TSF. The water balance considers evaporation losses and calculated infiltration rates for both disturbed and undisturbed areas. Ice formation is also measured when conditions allow. The TSF dam is designed with a seepage collection and return system.

Seepage from the TSF is intercepted with dedicated collection wells located at the toe of the TSF embankment, and pumped back into the TSF pond. The interceptor wells maintain a cone of

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depression resulting in a hydraulic gradient towards the wells. Intercepted water is pumped to a tailing seepage sump and subsequently to the tailings impoundment. The volume of water removed during dewatering is also considered in the model.

Precipitation data is used frequently to update the Operating & Maintenance (O&M) manual for the TSF and HLP as they are in constant expansion. The water balance model is updated and calibrated quarterly using recorded water levels, site pumping records, and meteorological records.

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

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

*Discuss the basis for the Finding/Deficiencies Identified:*

During the last 3 years, Fort Knox has been successful at preventing wildlife mortalities related to cyanide facilities.

Fort Knox does not operate ponds, impoundments or other areas of open waters with WAD concentrations above 50 mg/l. Tailings discharge and waste slurry to the TSF must be maintained at a monthly average of no greater than 10 mg/l WAD cyanide and a daily maximum of 25 mg/l WAD cyanide. These limits are also specified within the Waste Management Permit (dated March 28, 2014) issued by the State of Alaska Department of Environmental Conservation. There were no events that exceeded permit conditions during the last three years. A review of monitoring results of the tailings dam decant solution for the last three years indicated a maximum WAD cyanide concentration of 3.86 mg/l.

Surface water locations and groundwater monitoring wells are sampled quarterly to demonstrate compliance with the conditions of the permit. Neither surface water nor groundwater monitoring sites showed evidence of impacts from mining operations or tailings impoundment dam.

Cyanide concentration in the HLP are above 50 mg/l WAD cyanide. Fort Knox personnel interviewed indicated that in the last 3 years there has been no incidents related to ponding in the HLP. The HLP is inspected daily for wildlife mortalities, while the TSF inspections forms do not include this item considering the low WAD cyanide concentrations.

Wildlife mortalities are reported to the US Fish and Wildlife Services (Federal) and two State agencies. These reports include at the top of the form if the mortality was related to WAD cyanide concentrations, and if it is, the carcass will be sent for analysis. The auditor reviewed the TSF wildlife mortalities register and there was no mortalities related to cyanide.

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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  
 in substantial compliance  
 not in compliance with Standard of Practice 4.5

*Discuss the basis for the Finding/Deficiencies Identified:*

Fort Knox does not have direct discharges to surface water from cyanide facilities as of now. Since 2015, Fort Knox started treating and discharging pit dewatering water from a RO plant into the fresh water reservoir, located downgradient of the TSF. This discharge is outside of the scope of the audit.

Fort Knox personnel indicated that there is a plan to start treating seepage water from the TSF and discharge it to surface water with a new RO plant (RO #2), which should be operational in the third quarter of 2018. This new plant will have cyanide destruction capabilities.

Review of surface and groundwater monitoring data confirms no cyanide related impacts have occurred to surface or groundwater receptors.

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  
 in substantial compliance  
 not in compliance with Standard of Practice 4.6

*Discuss the basis for the Finding/Deficiencies Identified:*


The main facilities that may contribute to seepage are the TSF and HLP.

The TSF is unlined and was designed and permitted to be a flow through facility. Seepage from the TSF is intercepted with 15 dedicated collection wells located at the toe of the TSF embankment, and pumped back into the TSF pond. Intercepted water is pumped to a tailing seepage sump and subsequently to the tailings impoundment. In addition, there are 7 monitoring wells (MW1-7) located downgradient of the interceptor wells. Three of them (MW 5, 6 and 7) are for regulatory compliance purposes. The pumped flow from all these wells are directed into the seepage collection sump.

The HLP and its in-heap pond are placed on the top of a composite liner system where: a) the in-heap pond is double-lined and has 36-inch thick overliner drain, that acts as a drain and protects the underlying liner system during ore placement. Since the HLP and pipeline corridor are lined as described previously, there is no contribution to seepage.

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Fort Knox reports on a quarterly basis to the State of Alaska, as required by the waste management permit. The values reported for WAD CN at MW 5, 6 and 7 are all below 0.003 mg/l for the last three years. The WAD CN readings reported for the IW -1 to 11 has an average of 0.02 mg/l WAD CN. All these results were below the permissible limits.

In the case of the HLP, there are 3 groundwater wells downgradient of the facility. According to the waste management permit, WAD cyanide concentrations in the underdrain and groundwater well system may not exceed 0.2 mg/l. Maximum WAD cyanide concentrations reported for the last three years is 0.05 mg/l with an average of 0.005 mg/l.

4.7 Provide spill prevention or containment measures for process tanks and pipelines.

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

*Discuss the basis for the Finding/Deficiencies Identified:*

Spill prevention and containment measures are provided for all cyanide mixing, storage and process solution tanks. All tanks are within an interconnected concrete secondary containment which is in good condition and provides a large containment area. The entire process area is contained within a concrete pad surrounded by curbs and walls, providing a competent barrier to seepage. The concrete floor is sloped to drain to concrete trench drains, where any spills or rainwater will be pumped back to the process.


Secondary containments for cyanide mixing, storage and process tanks are sized to hold a volume greater than that of the largest tank, including the increased size of process tank (CIC-1) performed during this recertification period, within the containment and piping draining back to the tank with additional capacity for the design storm event. Those containments have remained unchanged since last recertification audit; they are linked to provide sufficient containment volume for the largest tank within the linked secondary containment area, pipes that would drain back into the area, plus a significant storm event. The containment system of the cyanide mixing area drains into the milling area. Containment areas have sump pits with dedicated pumps that return collected solutions back into the process circuit.

Fort Knox has several Standard Operation Procedures (SOPs), plans and manuals in place which are implemented to prevent discharge to the environment of any cyanide solution or cyanide-contaminated water that is collected in a secondary containment. The SOPs address management of overflows from the sodium cyanide mix tank, the sodium cyanide storage tank, the caustic soda solution mix tank and any spills flow into the concrete bounded area that directs solution to a sump where a pump works on a sonic level probe pumping any solution collected into the sodium cyanide mix tank or the thickener distribution system.

To prevent discharges of cyanide solutions or cyanide-contaminated water from secondary containments to the environment, Fort Knox has SOPs to minimize downtime and spills, prevent

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thickener from overflowing slurry, to maintain adequate water flow to the plant, during an upset condition and to encourage employees to keep areas clean and maintain a clean and safe mill.

Spill prevention or containment measures are provided for all cyanide process solution pipelines to collect leaks and prevent releases to the environment. All cyanide pipelines at Fort Knox are located within a secondary containment. At the process plant any spill would report into the CIP/CIL flowing to the Detox building where any liquid would be directed back into the system. Cyanide solutions outside of the process plant is circulated through three pipeline systems, none of the pipeline routes have altered since the last recertification audit in 2014 and containment measures remain in place. The tailings deposition pipelines and the reclaim water return line are all positioned so that any leakage would drain to the tailings facility.

As mentioned in previous audit reports, no cyanide pipelines present a direct risk to surface water. The expansion of the pipeline corridor from the HLP to the CIC#2 Plant is also not considered to pose a surface water risk due to the presence of secondary containment, inspection ports, and the routing of any leaks towards the in-heap pond. Other pipelines to and from the TSF remain unchanged and retain the same safety features identified in previous audits. All facilities are far away from areas that may require special protection.

All cyanide mixing, storage and process tanks are constructed of coated carbon steel; solution pipelines are constructed of steel or high density poly-ethylene (HDPE), which is compatible with high pH cyanide solutions. The new booster station pipelines in the HLP are also constructed of coated carbon steel and HDPE

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  
 in substantial compliance  
 not in compliance with Standard of Practice 4.8

*Describe the basis for the Finding/Deficiencies Identified:*

Quality control and quality assurance (QA/QC) programs have been implemented during the construction of cyanide facilities at Fort Knox and modifications to existing facilities. New cyanide facilities built during this recertification period are the Tailings Storage Facility (TSF) expansion performed from 2015 through 2017, the Walter Creek Heap Leach Expansion Areas A, B, C in 2017, and the Barren Solution Booster Pump Station in 2015.

QA/QC programs addressed the suitability of materials and adequacy of soil compaction. The QA/QC reports include soil compaction tests, subgrade and concrete testing, fabrication material certificates and technical specifications for HDPE drainage products, geosynthetics, liners, piping, electrical and mechanical instrumentation. The reports also include non-destructive test logs, destructive test logs, vacuum tests, pre-weld tests, destructive sample tests, and repair controls.

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Fort Knox Mine maintains files with QA/QC reports for the facilities constructed before the last recertification audit in 2014 and for the new cyanide facilities built during this recertification period. The auditor reviewed several documents in electronic versions.

QA/QC reports are signed by qualified personnel from reputable engineering companies and provided documentation that the facilities were built as designed. The auditor reviewed records of construction reports, including as-built drawings for the new cyanide facilities. As-built drawings were properly stamped by a registered engineer.

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  
 in substantial compliance  
 not in compliance with Standard of Practice 4.9

*Describe the basis for the Finding/Deficiencies Identified:*

The Fort Knox Monitoring Plan (updated in September 2015) addresses monitoring requirements related to surface water and groundwater, process fluids, decant water composition, avian and terrestrial wildlife, embankment monitoring, developed wetlands and water supply reservoir, solid waste landfill, potable water supply, and mine closure. The Monitoring Plan was adopted by reference into the Waste Management Permit by the Department of Environmental Conservation, State of Alaska. The plan includes protocols on how and where the samples should be taken, preservation techniques, equipment calibration, quality control, chain of custody procedures, shipping instructions, and cyanide species to be analyzed.

Qualified personnel of Fort Knox's environmental department prepared the monitoring plan. Staff in charge of preparing the monitoring plan are suitably qualified, with more than 20 years of experience in environmental and health and safety management in mining activities.

Fort Knox field data sheets for surface and groundwater samples record in writing the weather conditions, ambient temperature, field parameters (i.e., conductivity, pH, temperature), groundwater levels and quantity of water to purge. Completed monitoring field forms were reviewed by the auditor and verified that these conditions are being registered.

Fort Knox monitors cyanide species (WAD CN, Total CN) for both surface water and groundwater stations located downgradient of the site. During the last 3 years, Fort Knox has been successful at preventing wildlife mortalities related to cyanide facilities. The WAD CN values are well below the recommended value of 50 mg/l. Reported values in the TSF pond have been reported below 5 mg/l.

Wildlife mortalities are reported to the US Fish and Wildlife Services (Federal) and two State agencies. These reports include at the top of the form if the mortality was related to WAD cyanide concentrations, and if it is, the carcass will be send for analysis. The auditor reviewed the TSF wildlife mortality register and there was no mortalities related to cyanide.

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The Fort Knox Monitoring Plan includes frequencies for samples that varies, between twice per day, daily, weekly, monthly, quarterly and annually. Records were available and reviewed by the auditor for all sampling and monitoring activities. The frequencies of the monitoring activities were deemed to be appropriate by the auditor.

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

**Standards 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  
 in substantial compliance  
 not in compliance with Standard of Practice 5.1

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox has developed a conceptual Cyanide Facilities Decommissioning Plan, which was updated in early 2018. This plan has been developed internally, led by the Environmental department with support from other functions of the operation and includes activities such as decontamination of equipment, removal of residual cyanide reagents, rinsing of heap leach pad and water treatment systems. The document considers decommissioning strategies for facilities and treatment systems which may be cyanide-bearing.

After the cyanide leaching phase on the heap leach facility, Fort Knox will properly manage any remnant cyanide reagent. Possible alternatives include selling it to another certified mine / industry or final disposal. Any alternative will consider Cyanide Code Standards and legal contracts, clearly defining practices and responsibilities.

The Cyanide Facilities Decommissioning Plan includes an implementation schedule, which details activities to be conducted starting in year 1 when milling ends until year 11 when the heap leach is regraded and growth media is placed. The sequence of decommissioning activities is presented with reference to years after closure, rather than calendar years. This schedule will be refined as Fort Knox approaches the closure period.

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The 2013 Fort Knox Mine Reclamation and Closure Plan submitted to regulators contains conceptual procedures for decommissioning and closure of all cyanide management facilities. This plan is updated every 5 years.

The Cyanide Facility Decommissioning Plan, which includes more detail than the one included in the Reclamation and Closure Plan, is reviewed and updated every 3 years as indicated in the decommissioning plan. An updated version should be released by 2021.

5.2 Establish an assurance mechanism capable of fully funding cyanide-related decommissioning activities.

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

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

State of Alaska regulations require an annually updated decommissioning and closure cost estimate and a mining reclamation bond. The Kinross Decommissioning Liability (KDL), which is Kinross' asset retirement obligation cost estimation, is updated every year including cyanide facilities decommissioning costs. These costs are calculated in-house using third party rates from Alaska Aggregate Products (AAP), which is an earthworks and construction contractor.

The KDL cost estimation figures are included in the Cyanide Facility Decommissioning Plan. The decommissioning cost included in the plan is US\$ 651,919.00.

The 2013 Fort Knox Mine Reclamation and Closure Plan is updated every 5 years according to Alaskan regulations. As mentioned above, the Cyanide Facility Decommissioning Plan is updated every three years, however, the cost estimate for decommissioning activities are reviewed and updated every year as part of the KDL cost estimation exercise.

Fort Knox has delivered to the State of Alaska an Irrevocable Standby Letter of Credit issued by the Bank of Nova Scotia dated July 17, 2017 for US\$97.65 million. This letter of credit is renewed every year.

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

**Standards of Practice**

6.1 Identify potential cyanide exposure scenarios and take measures as necessary to eliminate, reduce and control them.

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

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox has SOPs, plans and manuals for operations that describe the management and operation of cyanide facilities to help minimize the possibility of worker exposure to cyanide. The SOPs, plans and manuals have been developed for the cyanide storage, preparation area, mill areas, detox circuit, HLP and TSF areas. They provide detailed information for the risks involved with each task (including preparation, plant operations, entry into confined spaces, and equipment decontamination) and adequately describe safe work practices.

The SOPs detail task specific Personal Protective Equipment (PPE) requirements, training requirements to conduct the task and acknowledgment, and consideration of safety and potential physical and chemical hazards associated with the job. Verification of the written procedures included review of the specific task, plans and worker interviews. Fort Knox has developed approximately 50 procedures related to cyanide management. Procedures were reviewed and found to be sufficiently detailed to enable safe operation and to minimize worker exposure.

SOPs require the use of personal protective equipment (PPE) and conduct pre-work inspections for cyanide related tasks. In addition to the use of general PPE, such as hard-hat, steel toes shoes, hearing protection and safety glasses throughout the production area, areas and/or tasks where personnel may come into contact with cyanide have additional PPE requirements. Pre work inspections are completed at the beginning of every shift and recorded using the Area Safety and Housekeeping checklist. The auditor reviewed records of these inspections for the Carbon, Leach and Detox circuits for the last three years and found them to be complete.


Fort Knox has three different mechanisms to identify and evaluate changes in processes or operating practices that could increase the potential for cyanide exposure including The Kinross Authorization For Expenditure (AFE) process, The Kinross Achieving Excellence (AE) Initiative program, and SOP OPG59 - Standard Procedure Generation and Revision. These three mechanisms include a multidisciplinary evaluation of the proposed changes including health, safety and environmental aspects.

Fort Knox considers worker input into the development of health and safety procedures through various mechanisms and implements an open-door policy for employees to provide input into operations including health and safety matters. Workers have direct communication between supervisors and operators during daily tool box meetings.

Individual process tasks undertaken by workers may also be subject to review by peers and supervisors. Where deviations from procedures are noted including those where cyanide handling processes occur, a Field Task Observation may be filled out where improvements to tasks, activities or behavior can be discussed. Health and safety matters are also discussed in daily shift meetings and regular health and safety management meetings.

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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  
 in substantial compliance  
 not in compliance with Standard of Practice 6.2

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox has determined the appropriate pH for limiting the generation of HCN gas during cyanide mix and production activities. The SOP Cyanide Solution requires pH greater than 12 in the cyanide mixing tank and requires a minimum pH of 10 in the process solution. Solutions within the leach circuit and areas where weak cyanide solutions are used, pH is to be maintained at a minimum of 10. Slurry within the leach circuit is maintained at a pH above 10. Observation of the cyanide mixing procedure confirmed that the mix tank pH was checked prior to addition of sodium cyanide briquettes in accordance with SOP.

Where the potential exists for significant cyanide exposure, the operation use fixed and portable monitoring devices to confirm that controls are adequate to limit worker exposure to HCN gas levels and sodium cyanide dust to 10 parts per million on an instantaneous basis and 4.7 parts per million continuously over an 8-hour period. The units are fitted with a visual alarm and an audio alarm. HCN levels are displayed at the front of the unit and on monitors within the main control room. The SOP Monitoring Systems requires that in the event of a stationary alarm being triggered at levels above 4.7 ppm, but below 10 ppm, a handheld multi-gas monitor is carried in the area to ensure continuous safe working conditions. Where HCN levels exceed 10 ppm, requires evacuation of the area.

Fort Knox has identified the areas where workers may be exposed to cyanide more than 10 parts per million on an instantaneous basis and 4.7 parts per million continuously over an 8-hour period. Fixed HCN monitors are located at the: mix area, leach circuit and the detoxification tank. SOPs have been developed for all activities in which cyanide management is involved. These procedures include a section where the PPE requirements are listed. Signage listing the PPE requirements to enter a cyanide facility has been installed at appropriate entrances

Hydrogen cyanide monitoring equipment is maintained, tested and calibrated as directed by the manufacturer, and records are retained. The Electrical and Instrumentation group is responsible for the calibration of the fixed HCN monitors in accordance with manufacturer's instructions. The handheld gas monitors are calibrated every 30 days by the Electronic and Instrumentation (E&I) Department as provided by an automated indicator generated by the instrument.

Warning signs are posted in all areas where cyanide is present advising workers that cyanide is present and that smoking, open flames and eating and drinking are not allowed, and that, if necessary, suitable personal protective equipment must be worn. The signs are in English, which is the language of the workforce. The PPE requirements are also posted in each area. Verification was through visual inspection of the signs located in areas where cyanide solution is prepared and used. These areas included cyanide storage, mix, process plant areas and the detox circuit.

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Fort Knox is not using colorant dye on high strength cyanide solutions yet but indicated their willingness to implement this requirement promptly as they recognized it would be beneficial for the operation.

Fort Knox has installed showers, eye wash station and fire extinguishers at strategic locations throughout the operation in all areas where there is a potential for exposure to cyanide which are inspected and tested every shift and prior to beginning a task that has the potential for cyanide exposure (cyanide preparation and opening a pipeline for maintenance). Fire extinguishers are inspected and tested monthly. All extinguishers observed were fitted with inspection tags, which documented monthly inspection checks. During the sodium cyanide mixing process, operators were observed to check the condition and operation of safety showers prior to commencing with a cyanide mix.

The operation has identified all tanks and pipes that contain cyanide solution to alert workers of their contents. Pipes containing cyanide are marked as containing cyanide solution and flow direction is indicated. Cyanide storage and process tanks are marked as containing cyanide. Verification was by visual inspection. Auditors followed the cyanide solution circuit from the cyanide mixing area to the heap leach pad facilities at the mill circuits.

Fort Knox has available Safety Data Sheets (SDS) and first aids procedures in all areas where cyanide is managed. All information relating to cyanide management including SDS information, SOPS and emergency response plans are provided in English, the workforce language at the site. Electronic SD sheets are accessible to all staff from computers located throughout the facility using the online portal and which all staff are trained to use.

Fort Knox has an incident reporting procedure documenting the requirements for incident reporting and investigation to determine the basic causes of the incident, provide remedial action and medical attention and ensure that a similar incident does not reoccur. Reporting is required immediately on occurrence to a supervisor who is then required to complete a written report by shift end. All incidents are investigated in accordance with mine's guideline with root cause analyses completed.

No cyanide related emergencies occurred during this ICMC recertification cycle requiring the implementation of the emergency response procedures.

6.3 Develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

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

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

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Fort Knox has made available antidote kits, water, oxygen, resuscitators, radios, telephones, and alarms in the process plant and clinic. Oxygen bottles, resuscitators, first aid kits and self-breathing apparatus (SCBA) are located throughout all the places at the process plant where cyanide in reagent grade is present. The locations of the emergency equipment were deemed to be appropriate for the operation.

Emergency response equipment is regularly checked by security officers. This includes inspections of cyanide antidote kits, first aid stations and kits, eye wash stations, emergency showers and self-contained breathing apparatus stations. Inspections include checks of expiration dates of cyanide antidote kits and eyewash bottles and notify Safety if replacements are required. Medical personnel periodically inspects the sodium thiosulfate and 3% sodium nitrite kits available in the first aids room.

Fort Knox has an Emergency Response Plan (ERP) specific to their operations. The ERP includes communication roles and responsibilities, evacuation procedures, required notifications, reporting procedures, incident categories and risk assessment. The ERP specifically address emergency response procedures related to cyanide releases and cyanide exposures.

Fort Knox has its own onsite capability to provide first aid and medical assistance to workers exposed to cyanide. The mine has a fully staffed emergency response team (ERT) which comprises 41 members in two shifts, including two paramedics. The ERT has been trained in first aid related to cyanide exposure. The mine has resuscitators (defibrillators or AD) equipment in different places, has a first aid room equipped with cyanide antidote kits, oxygen, first aid kit. Has an ambulance service ready to provide basic Life Support Service and Advance Life Support, and a pick truck with level one trauma kit and rescue kit.

If a cyanide exposure victim requires medical attention beyond the capabilities of the on-site medical facilities, the ambulance maintained at the site will transport the victim(s) to Fairbanks Memorial Hospital (FMH). The ambulance is operated by members of the ERT and in the event of an emergency will act to stabilize the scene, perform rescue, recover and stabilize the patient and will transport the patient to Fairbanks Memorial Hospital (FMH). In the event the Paramedic is not present, the ERT will transport the patient to the end of the mine road for collection by Steese Ambulance Service, Volunteer Fire Department (SAVFD).

Fort Knox has formalized arrangements with local hospital FMH and is confident that FMH has adequate, qualified staff, equipment and expertise to respond to cyanide exposure. In the event of a cyanide exposure emergency and the need to transfer a patient to the hospital, the site will treat the patient on site and then go with the patient to the hospital.

Fort Knox performs emergency mock drills twice a year and holds regular training sessions to the ERT which are expected to attend a minimum of 10 training sessions annually. Where necessary, weaknesses are identified and improvements to the emergency response procedures made. Observations made are recorded using an Emergency Response Critique Tracking Form where observations and opportunities for improvement are tracked and included in subsequent training events.

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

### **Standards of Practice**

#### 7.1 Prepare detailed emergency response plans for potential cyanide releases.

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

#### *Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox has an Emergency Response Plan (ERP) updated in 2018, that sets out emergency response procedures for the entire mine site including cyanide releases. Procedures for initial response, first aid and spill response, and reporting are provided in the ERP. The operation has also an Emergency Action Plan (EAP), which outlines steps and measures that would apply specifically to emergencies related to the Tailings Storage Facility (TSF), Walter Creek Heap Leach Pad (HLP) and the Water Supply Dam and Reservoir (WSR).

The ERP considers different scenarios appropriate to the site-specific circumstances and includes procedures to respond to emergency incidents including cyanide releases. Emergency scenarios considered include releases during loading/unloading, transportation, bomb threats, fires and explosions; pipe, valve and tank ruptures; overtopping of ponds; power outages and pump failures; uncontrolled seepage; failure of cyanide treatment, destruction or recovery systems; and failure of tailings impoundments. The ERP describes the risk control procedures and steps to be put into effect immediately.

Further guidance is provided within the EAP, which considers specific scenarios such as earthquakes, excessive spillway flows, embankment overtopping, seepage from darns, embankment failures and cracking, embankment movement, sinkholes, instrument readings, bomb threats and sabotage or vandalism.

Agreements between Kinross and the cyanide supplier are in place, whereby the supplier and their transporters are responsible for shipping of cyanide to site. This responsibility extends to consideration of transport routes, storage and packaging of sodium cyanide briquettes, the condition of transport vehicles and response in the event of an emergency or release during transport. In the event of an emergency or incident within the mine property, Fort Knox would respond to such an incident.

The ERP describe specific response actions. In the event of an emergency involving cyanide release, the ERP and EAP provides for specific actions to be undertaken such as clearing site personnel and potentially affected communities from the area of exposure, use of cyanide antidotes and first aid measures for cyanide exposure, control of releases at their source, and containment, assessment, mitigation and future prevention of releases. Any emergency that has the potential to affect a community will trigger the notification requirements outlined in the ERP.

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7.2 Involve site personnel and stakeholders in the planning process.

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

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox involves its workforce and stakeholders in the cyanide emergency response planning. During training of the ERT and after emergency mock drills, the workforce has opportunity to provide feedback. The mine is in regular communication with stakeholders such as Steese Ambulance Service Volunteer Fire Department (SAVFD) who are kept apprised of Fort Knox's ERP with any updates provided to them on a regular basis. In addition, Fairbanks Memorial Hospital is regularly visited by the mine's health and safety representative who appraise FMH of emergency response planning.

Fort Knox has made potentially affected communities aware of the nature of their risks associated with accidental cyanide releases. The mine is approximately 26 miles northeast of Fairbanks, and 13.54 miles from Fox. Fort Knox interacts with potentially affected communities by regular communications with SAVFD, and periodically summons regulatory authorities, fire department, surrounding communities to a table talk and crisis management exercises.

Periodic meetings are held with Steese Ambulance Service Volunteer Fire Department (SAVFD) to discuss emergency response planning. Any updates on the ERP or any other relevant procedures are provided. In addition, health and safety representatives regularly communicate and meet with Fairbanks Memorial Hospital to review intensive care facilities, hazmat and cyanide treatment capabilities. As for SAVFD, opportunities to participate in mock drills are provided to FMH.

The operation engages in consultation with stakeholders to keep the ERP updated. The ERT has emergency training twice a month and periodic meetings are held with Steese Ambulance Service Volunteer Fire Department (SAVFD) to discuss emergency response planning.

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

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

*Describe the basis for the Finding/Deficiencies Identified:*

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The ERP provides primary and alternate contact details for the emergency management team members, including the General Manager who has authority to ensure that sufficient and adequate resources are allocated to carry out the ERP.

The ERT members are listed and indicate coordinators, team member and corporate coordinators. All members are indicated by name, department, phone number and qualifications as well as key areas in which they are trained. Contact information include call-out procedures and 24-hour contact information

The ERP sets out training requirements for the ERT; functions and responsibilities of the emergency coordinators is detailed in the ERP; emergency response equipment lists including the locations of cyanide antidote kits is provided.

The cyanide emergency response equipment is checked monthly by Security and records are retained for a minimum of 3 years. Equipment is also inspected on daily basis as it used by the ERT and during training sessions. The role of outside responders is defined.

Emergency response planning requirements have been confirmed with Fairbanks Memorial Hospital by means of regular meetings and discussions. In addition, SAVFD is part of the Emergency Response Plan and has been recorded in a Mutual Aid Agreement.

#### 7.4 Develop procedures for internal and external emergency notification and reporting.

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

*Describe the basis for the Finding/Deficiencies Identified:*

The ERP the Plan include procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities of the cyanide emergency The ERP provides a communication and notification tree and procedures in the event of an emergency including requests to SAVFD to respond if necessary. Among other responsibilities, the Emergency Manager is responsible for briefing other emergency team members and notifying Kinross Corporate personnel; the Public Relations Coordinator responds to media enquiries; the Human Resources Coordinator prepares and disseminates information releases and responds to media inquiries; the Health and Safety Coordinator advises when reporting to government agencies is required and when mutual aid assistance is required; the Environmental Coordinator provides technical expertise related to emergencies which may impact the environment and is responsible for notifying the regulators when reporting is required.

The ERP contains procedures for communication including emergency response contact information. In the event of an incident, the Emergency Management Team in consultation with SAVFD contact relevant State and Federal regulators who will in turn notify affected parties in local communities as necessary. Procedures for notifying outside agencies and the media are provided in the ERP, EAP and the Fort Knox Crisis Communication Manual.

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

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

*Describe the basis for the Finding/Deficiencies Identified:*

The ERP provides procedures in the event of cyanide release and addresses cyanide recovery and remediation if necessary. Any cyanide containing solutions spilled within the mill area outside of a contained area is required to be pumped onto a contained area for temporary storage. Any spills of solid cyanide briquettes will be cleaned with brooms/shovels and placed in containers and subsequently recycled through the mill circuit.

Cyanide impacted soils are to be excavated to depth of impact and deposited into the process or tailings storage facility until cyanide levels are below 27 mg/kg as free cyanide.

Drinking water is trucked to the mine from an offsite facility. Frequent testing required by the authority is strictly adhered and Fort Knox complies for a commercial property. Bottled drinking water is available in break rooms throughout the mine site.

The ERP prohibits the use of chemicals such as sodium hypochlorite, ferrous sulfate and hydrogen peroxide to treat any cyanide that would have been released into surface water.

The ERP and SOP Spill Reporting and Sampling outline procedures for validation sampling of any cleanup or remediation measures in the event of a cyanide release.

For process solution spills, is required operators to immediately stop the release of material and notify the Area Supervisor and security. The time of spill is noted; samples are collected and provided to the laboratory for analyses. Guidance for assessing the area of impact on a mill map is provided. A spill report is then generated indicating the type and location of spill/discharge, the cause and the total area affected. Finally resampling of the affected area is specified.

The Fort Knox Monitoring Plan includes an enhanced surface water and groundwater sampling and regulatory reporting program that must be initiated if cyanide is detected downstream of the dam.

7.6 Periodically evaluate response procedures and capabilities and revise them as needed.

- The operation is:  in full compliance  
 in substantial compliance

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not in compliance with Standard of Practice 7.6

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox review annually the cyanide related elements of the ERP to identify any required changes in the risk assessments, the emergency response procedures, and to test and review the adequacy of the Plan with drills and exercises. The Plan requires the General Manager to ensure annual reviews of the Emergency Response Plan are carried out, the Health & Safety (H&S) Manager to conduct a review of all emergency response needs identified by regulatory requirements and ensures that these are included in the Emergency Response Procedures and to, at least annually, conduct a review of emergency response procedures for adequacy.

Emergency response drills including cyanide related responses are undertaken by Fort Knox twice a year. In addition, Kinross operates an EMQnet Crises and Emergency Management System for responding to major incidents, impoundment failures, releases and spills of hazardous materials, among others.

The mock scenarios contained detailed inputs with a detailed review carried out during a debriefing session. Any necessary changes to management systems or new training requirements based on document changes are implemented.

The ERP requires to test and review the adequacy of emergency response procedures with drills and exercises. The Emergency Response and Drill SOP requires to critique emergency preparedness and response procedures during emergency situations or preparatory drills. No cyanide related emergencies occurred during this ICMC recertification cycle requiring the implementation of the emergency response procedures.

The Health and Safety Manager or Environmental Manager is responsible for determining the frequency of reviews and initiating the critique process. Such reviews have been done when necessary during the recertification period, as result of the drills critiques. Events and mock drills were debriefed to identify and document improvement opportunities.

## 8. TRAINING: Train workers and emergency response personnel to manage cyanide in a safe and environmentally protective manner.

### **Standards of Practice**

#### 8.1 Train workers to understand the hazards associated with cyanide use.

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

*Describe the basis for the Finding/Deficiencies Identified:*

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The operation trains all personnel who may encounter cyanide in cyanide hazard recognition. New workers at the mine receive orientation training in accordance with Mine Safety and Health Administration (MSHA) 5023. This comprises 24 hours of orientation training of which 16 hours is dedicated to health and safety training. Cyanide hazard recognition and awareness training is included in these modules.

Cyanide hazard recognition refresher training is conducted annually. Cyanide and environmental modules are provided and completed prior to November of every year to meet MSHA requirements. Additionally, quarterly environmental training sessions are provided mine-wide and consist of 2 hours training per year divided into 30-minute sessions. Training includes properties of cyanide; hazards of cyanide; symptoms of cyanide exposure; emergency response; and first aid, including use of oxygen and amyl-nitrite. The training includes a written test.

Training records, including cyanide hazard training for mill operations are retained by the Mill Maintenance Trainer in the form of hard copies and an electronic version stored in Microsoft Excel spreadsheet format. The Mill Trainer retains annual refresher training provided to all employees including cyanide training schedules and records.

## 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  
 in substantial compliance  
 not in compliance with Standard of Practice 8.2

### *Describe the basis for the Finding/Deficiencies Identified:*

The operation train workers to perform their normal production tasks, including unloading, mixing, production and maintenance, with minimum risk to worker health and safety and in a manner that prevents unplanned cyanide releases. New Mill employees and any worker with cyanide related tasks receives 8 hours of specific Mill Orientation training, which includes elements specific to the use of cyanide in the process. Employees specific training include aspects such as cyanide awareness, response, process information, hydrogen cyanide monitor and alarm operation, and location of cyanide safety equipment.

Standard operating procedures define the steps required to complete a task and the SOP itself is provided as training material with sign off required from both the trainer and the trainee. Training elements required for a task or area is recorded on a training sheet that is maintained by the Supervisor. The Mill Trainer retains signed training records and SOPs.

Training on specific tasks is provided by the Mill Maintenance Trainer, Mill Operations Trainer and Supervisors. Supervisors are considered qualified to provide training based on experience. The Mill Operations Trainer and the Mill Maintenance Trainer are certified MSHA Trainer. This requirement was verified by discussion with the Mill Maintenance Trainer and review of trainer records.

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All employees are trained prior to working with cyanide. Training includes orientation on the process areas, cyanide alarms and monitors, first aid and use of cyanide safety equipment. In addition, employees must complete general and specific task training before being allowed to work alone.

Refresher training on cyanide management is provided to ensure that employees continue to perform their jobs in a safe and environmentally protective manner. Any changes to standard operating procedures, including those to cyanide related tasks, are reviewed and conveyed at shift safety meetings. Employees also undergo training on SOP changes, which is recorded on revision acknowledgment forms, which are retained by the Mill Maintenance Manager.

The area supervisors evaluate the effectiveness of cyanide training by observation of their trainees and tests. Following new hire orientation and cyanide refresher training; employees complete a written exam to demonstrate understanding of the material. Verbal tests of understanding are undertaken for task training as well as signing the relevant standard operating procedure to indicate understanding. Employee activities and task competence is monitored with the use of Cyanide Task Observation Forms with supervisors completing at least one task observation monthly.

Training records are retained throughout employment history. MSHA training records are retained electronically on both the site data server and on a data management system Laserfiche. The Mill Maintenance Trainer retains specific task training records. Training records contains the date, subject covered and is signed by both the trainer and trainee. Written and verbal tests are completed to demonstrate the employees understanding of the training materials.

### 8.3 Train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.

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

*Describe the basis for the Finding/Deficiencies Identified:*

All operators within the Mill, which includes cyanide unloading, mixing, production and maintenance personnel, are provided with site-specific hazard training including cyanide awareness, hydrogen cyanide monitoring, emergency response, recognition of cyanide exposure symptoms, cyanide exposure first aid, the role and operation of rescue equipment, and actions to be taken in the event of a cyanide spill including sampling.

All site cyanide response personnel, including unloading, mixing, production and maintenance workers, are trained in decontamination and first aid procedures. Cyanide awareness training to workers includes actions to take in the event of a cyanide spill. Employees who are actively working with cyanide are trained on SOPs Unloading and Cyanide Storage, Cyanide

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Decontamination and Waste Disposal and Spill Reporting, and Cyanide Solutions, which includes the decontamination steps to be undertaken.

Emergency Response Coordinators and members of the Emergency Response Team (ERT) are trained in the procedures included in the ERP regarding cyanide, including the use of necessary response equipment. Fort Knox has an ERT on site, which is formed by personnel from different areas of the mine. ERT members are trained through participation in mock drill exercises as well as formal training programs. Formal brigades are in place for fire, first aid, spill, and evacuation. Emergency responders are available on all shifts. Fire wardens (emergency coordinators) are also trained on how to react in emergency situations, including cyanide related events.

Fort Knox has communicated the Emergency Response Plan with management of Fairbanks Memorial Hospital (FMH) and regularly visit hospital facilities during which cyanide emergency and response arrangements are discussed. FMH are also invited to take part in regular mock exercises and emergency drills. In addition, the mine has a Mutual Aid Agreement with SAVFD whereby emergency response ambulance services are provided.

Refresher training is provided annually to employees and includes response to cyanide exposures and response to releases. The ERT completes regular monthly training sessions including recognition of cyanide exposure, treatment and first aid.

Fort Knox regularly hold emergency response drills including scenarios for cyanide releases. The drills and scenarios are intended to test the Emergency Response Plan as well as the EMQ Crises and Emergency System. The ERT has been involved with several training exercises since 2014, with two records noted annually for cyanide emergency related drills in 2015, 2016, 2017 and one drill in 2018. In these instances, the drills involved incidents of cyanide release and exposures. Personnel from different areas were involved in the exercises.

Cyanide related emergency drills involving the ERT are carried out monthly with the performance of team members evaluated in accordance with SOP Emergency Response and Drill. The procedures require the operation to review and assess performance during emergency situations or during drill scenarios; to test effectiveness, identify weaknesses, improve the emergency response program, provide tracking for deficiencies and minimize environmental impacts. Observations are recorded on an Emergency Response Critique Tracking Form with opportunities for improvement tracked and included in subsequent training events.

Records are retained documenting the cyanide training, including the names of the employee and the trainer, the date of training, the topics covered, and how the employee demonstrated an understanding of the training materials. Training records are retained by the Health and Safety Data Coordinator and stored on an electronic database Laserfiche, including cyanide training records.

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

### **Standards of Practice**

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9.1 Provide stakeholders the opportunity to communicate issues of concern.

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

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox continued using mechanisms to provide opportunities to stakeholders to communicate their concerns related to cyanide management, including reports, meetings, engagements and tours to the mine site.

Fort Knox develops an Annual Activity Report, which is provided to local, state and federal regulators. This report includes information about mining activities and, among other topics, provides information related to cyanide management and compliance with the International Cyanide Management Code. This report is presented in a public meeting to nearby communities including North Pole, Fox, Chatanika and Fairbanks where stakeholders have the opportunity to raise questions about mine operations and cyanide management.

The community relations department organizes tours for stakeholders to visit the mine, including schools, universities, communities, family members, and tourists.

Fort Knox has a grievance mechanism in place to receive, process, manage and resolve written or verbal complaints and grievances in a timely and consistent manner. The External Affairs manager maintains a complaints and grievance register, which was reviewed by the auditor. There have been no cyanide related complaints or request for information in the last 3 years.

The community relations department maintains a community engagement plan, which includes a schedule of meetings with public officials, agencies and communities. Fort Knox also participates in the Alaska Miner Association weekly meetings, which represents another opportunity for engagement.

9.2 Initiate dialogue describing cyanide management procedures and responsively address identified concerns.

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

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox utilizes the same mechanisms described in 9.1 as opportunities to interact with stakeholders and provide them with information regarding cyanide management practices and procedures.

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Mine tours are open to the public including schools, universities, regulators, communities, and other interested parties. During such tours, mine information including cyanide management is readily made available to tour groups, including a safety video that explains the safe management of cyanide.

Cyanide related information provided to employees includes information booklets and pamphlets including a booklet describing the symptoms of cyanide poisoning. A cyanide application factsheet is also provided to staff and contains details of safeguards, shipping and handling and waste disposal.

The Annual Activity Report, which is provided to local, state and federal regulators includes information about mining activities and, among other topics, provides information related to cyanide management and Fort Knox's compliance with the International Cyanide Management Code. In case of occurrence, this report should include any cyanide incidents related to cyanide management and releases, which is not the case as there were no cyanide related incidents in the last 3 years. During regulator or public visits, this information is made readily available as well as any information requested which pertains to cyanide management at the mine.

9.3 Make appropriate operational and environmental information regarding cyanide available to stakeholders.

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

*Describe the basis for the Finding/Deficiencies Identified:*

Fort Knox has developed written and visual descriptions of how their activities are conducted and how cyanide is managed, and has made these available to communities and other stakeholders, including an institutional video, Fort Knox fact sheets, brochures, the Annual Activity Report and Cyanide Application fact sheet. This information is made available and distributed in different engagement opportunities including fairs, meetings, presentations, conferences, Chamber of Commerce events, among others.


There has been no cyanide exposures or incidents resulting in hospitalization or fatality have occurred prior to or since the mine was first certified.

In the last 3 years there has been no cyanide releases on or off the mine site resulting in significant adverse effects to the environment; no cyanide releases off the mine site requiring response or remediation and no cyanide releases that are or that cause applicable limits for cyanide to be exceeded.

In the last 3 years, four cyanide spills were reported to the State. None of these spills were reportable to the Federal level.

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