



REPORT

# ICMC INITIAL CERTIFICATION SUMMARY AUDIT REPORT

*Haile Gold Mine, South Carolina, USA*

Submitted to:

**International Cyanide Management Institute (ICMI)**

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Submitted by:

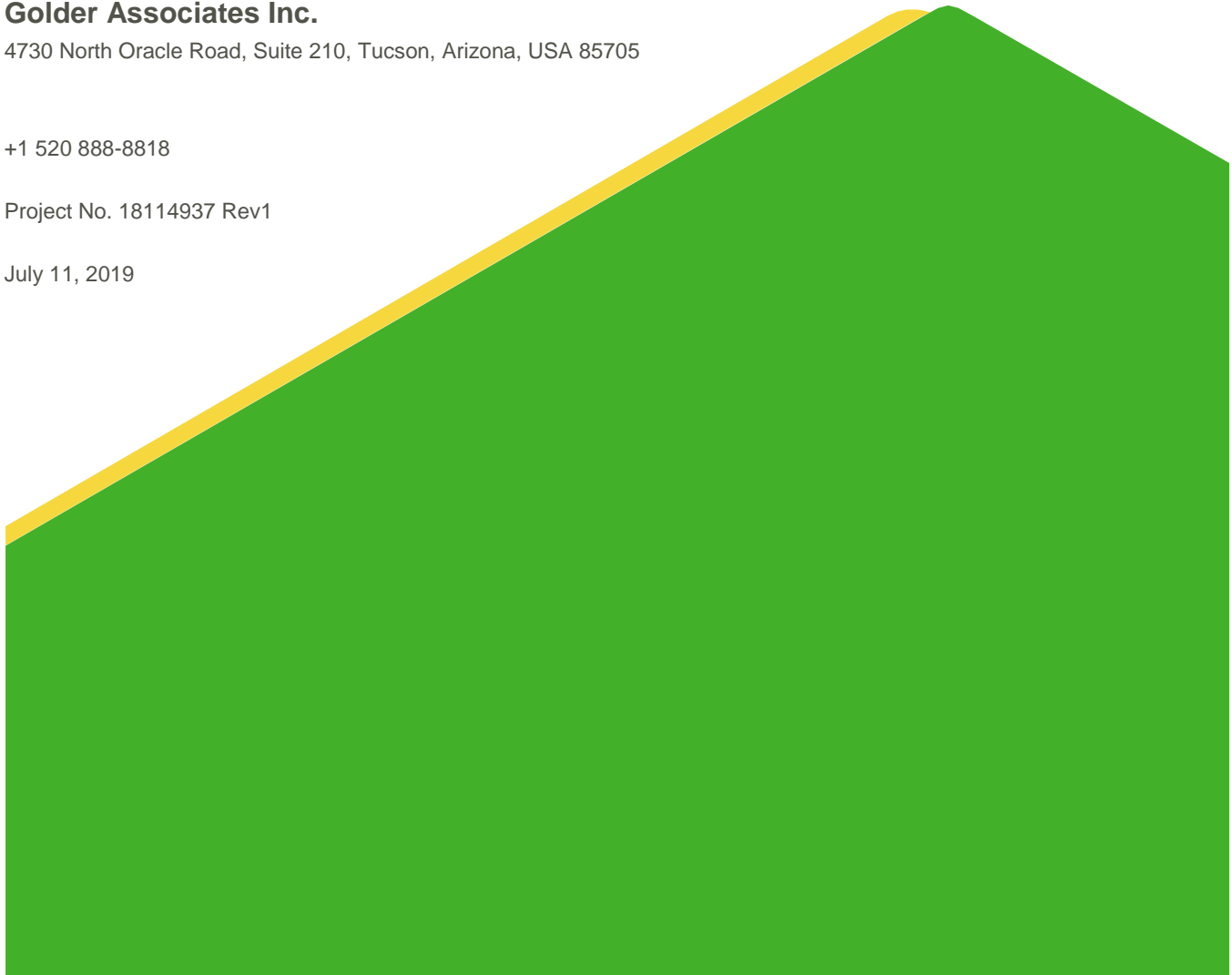
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Project No. 18114937 Rev1

July 11, 2019



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## 1.0 SUMMARY AUDIT REPORT FOR GOLD AND SILVER MINING OPERATIONS

**Name of Mine:** Haile Gold Mine

**Name of Mine Owner:** OceanaGold Corporation

**Name of Mine Operator:** Haile Gold Mine Inc.

**Name of Responsible Manager:** David Thomas, General Manager

**Address:** 6911 Snowy Owl Road  
PO Box 128  
Kershaw, South Carolina 29067

**State/Province:** South Carolina

**Country:** USA

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**E-Mail:** David.Thomas@oceanagold.com

## 2.0 LOCATION DETAIL AND DESCRIPTION OF OPERATION

### 2.1 Mine Location

The Haile Mine (Haile) is in Lancaster County of north-central South Carolina, approximately 3 miles to the northeast of the Town of Kershaw (Figures 1 and 2).

### 2.2 Background

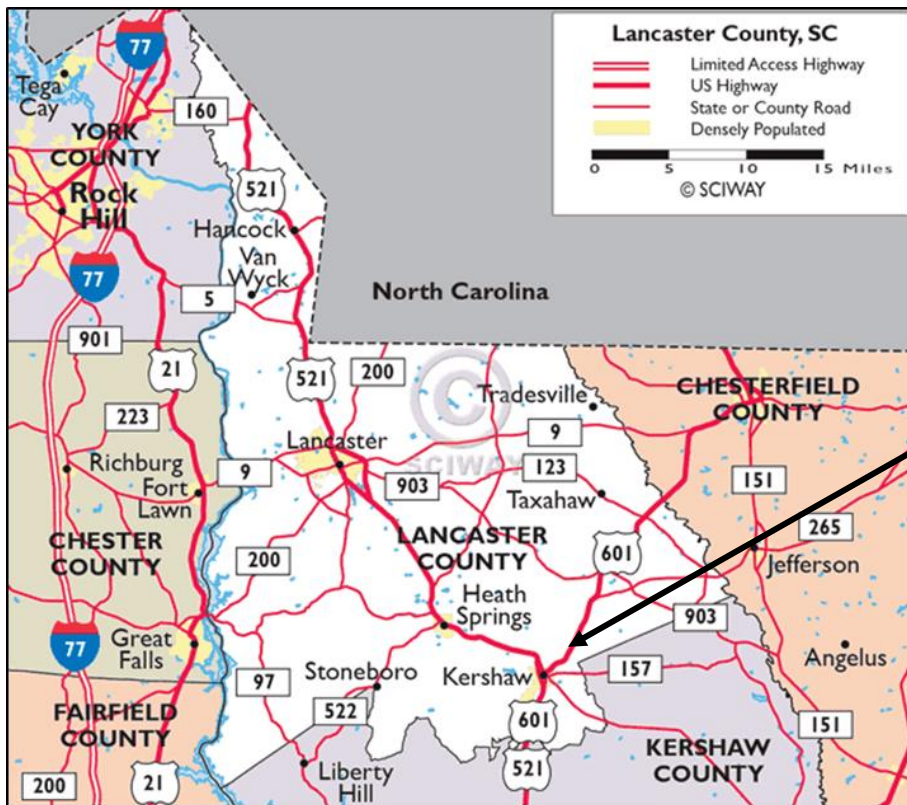
Haile was one of the first operating gold mines in the United States. Established long before the gold rush of California, gold was discovered in 1827 by Benjamin Haile and the mine has been in production on and off for nearly 200 years. In fact, in the late 19th century, Haile was the most productive and profitable gold mine east of the Mississippi River. Haile is in Lancaster County of north-central South Carolina, approximately 3 miles to the northeast of the Town of Kershaw (Figures 1 and 2).

Haile receives solid cyanide via isotankers from the Chemours Company (Chemours). Offloading is completed by solid-liquid sparging with closed connections between the isotanker and the dilution tank. Haile is an open pit mine with several pits in operation. Gold is processed as follows (Figures 3 and 4):

- Primary Crushing (Brown) – Ore is crushed to less than 6 inches by the primary crusher.
- Grinding (Semi-Autogenous Grinding [SAG] Mill and Ball Mill) (Blue) – 6-inch rock is ground to the size of a fine powder, about 74 microns in size.
- Flotation (Red) – Ground ore is treated with chemicals to enable the gold-bearing minerals to float to the top of the flotation machines and concentrate as froth. Ore that does not float is pumped to the carbon-in-leach (CIL) circuit.
- Regrind (Red) – Concentrate of gold-bearing minerals from flotation is ground further to about 13 microns in size in regrind mills.
- Carbon-in-Leach (CIL) (Green) – Reground concentrate slurry is oxidized with air in the pre-aeration tank prior to being treated with sodium cyanide in CIL Tank No. 1. Dissolved gold is adsorbed onto activated carbon. The discharge from CIL Tank No. 1 flows by gravity to CIL Tank No. 2, where it combines with the flotation tailing. The combined streams are treated with sodium cyanide, and the dissolved gold is adsorbed onto activated carbon in CIL Tanks No. 2 through No. 8. The gold-bearing activated carbon particles are removed from the slurry prior to the slurry thickening step for processing in carbon stripping circuit. The discharge from CIL Tank No. 8 is thickened and the sodium cyanide is returned for use throughout the CIL circuit.
- Cyanide Destruct (Green) – All thickened slurry is processed in the cyanide destruct process and the cyanide level, measured as weak acid dissociable (WAD), in the effluent to the Tailings Storage Facility (TSF) must be less than 50 milligrams per liter (mg/l).
- Carbon Stripping and Gold Processing (Purple) – Gold-bearing activated carbon is treated with chemicals to strip the gold from the carbon into pregnant solution. The gold is removed from the pregnant solution in the electro-winning cells. In the cells, a gold-bearing “sludge” forms on the electro-winning cathodes.
- After the gold is removed from the carbon, the carbon is thermally reactivated by heating in a kiln to remove impurities. After reactivation, the carbon is returned to the CIL circuit for reuse.
- Gold Refining and Processing (Yellow) – The gold-bearing sludge is smelted to separate the gold from the waste material, poured into a mold, and cooled to form a doré bar. The first gold bar was poured on January 19, 2017.



Figure 1: Regional Location Plan



Haile Gold Mine

Figure 2: Local Location Plan

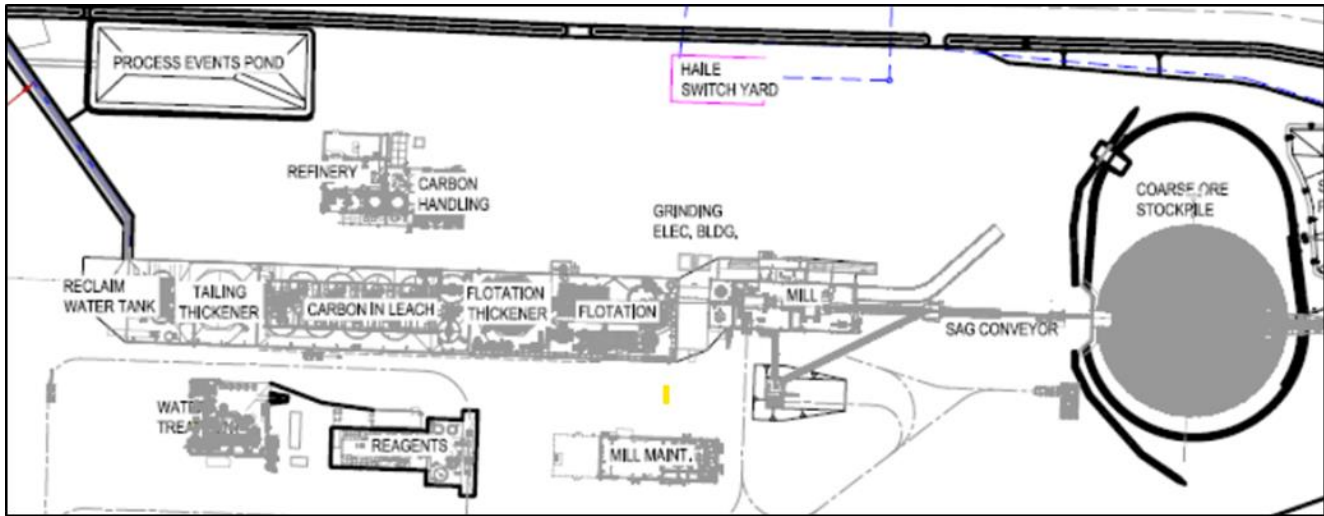


Figure 3: Plant Layout (supplied by Haile)

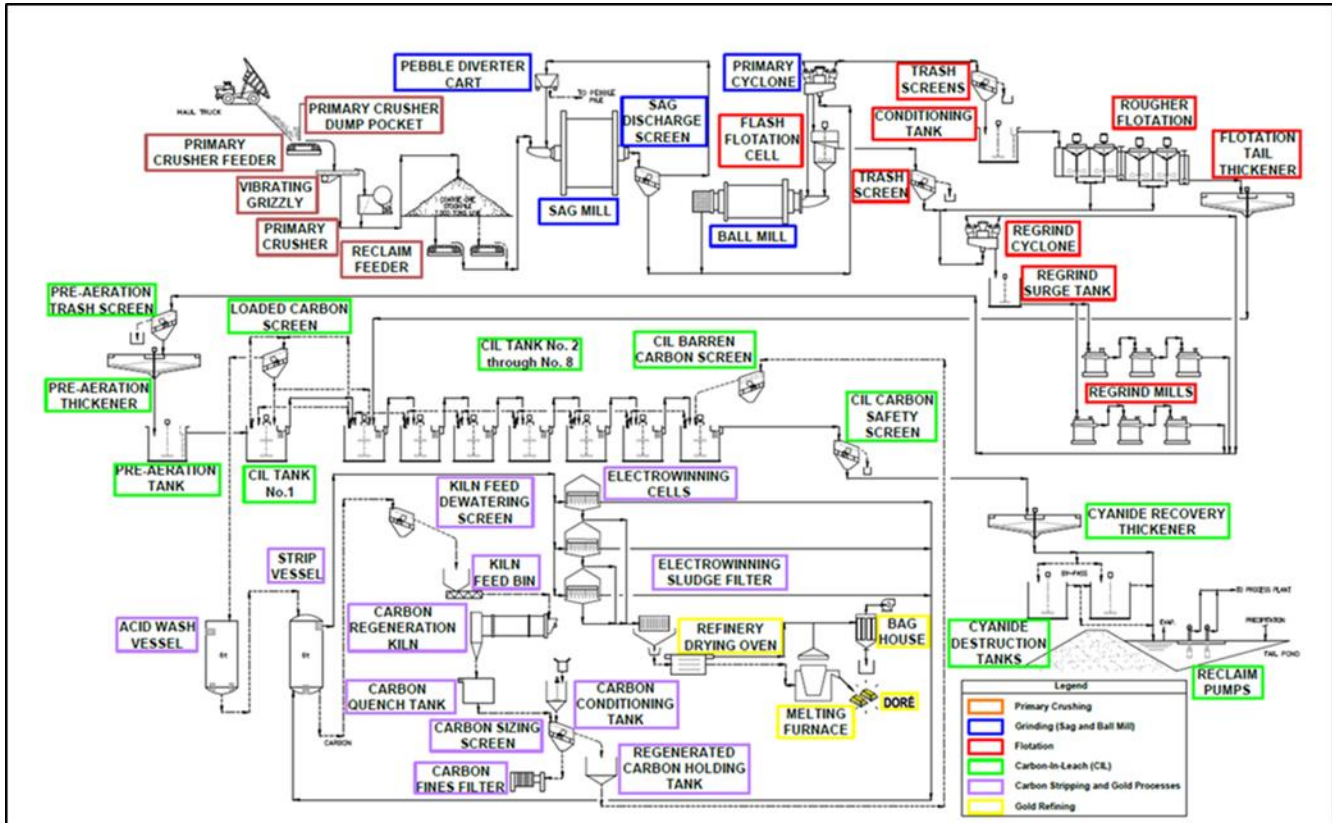


Figure 4: Process Flow Diagram (supplied by Haile Mine)

### 3.0 SUMMARY AUDIT REPORT

#### Auditors Findings

Haile Gold Mine is:  in full compliance with **The International Cyanide Management Code**

in substantial compliance with

not in compliance with

**Audit Company:** Golder Associates Inc.  
**Audit Team Leader:** Kent R. Johnejack, Lead Auditor and Mining Technical Specialist  
**Email:** kjohnejack@golder.com

#### Name of Other Auditors

Name, Position	Signature
Evan Jones, Mining Technical Specialist	


#### Dates of Audit

The initial certification audit was undertaken within four days from March 4 to 7, 2019.

I attest that I meet the criteria for knowledge, experience and conflict of interest for Code Verification Audit Team Leader, established by the International Cyanide Management Institute (ICMI) and that all members of the audit team meet the applicable criteria established by the ICMI for 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 (ICMC or Code) Mining Operations Verification Protocol and using standard and accepted practices for health, safety and environmental audits.

Haile Gold Mine  
Name of Facility

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

July 11, 2019  
Date



## PRINCIPLE 1 – PRODUCTION

### Encourage Responsible Cyanide Manufacturing by Purchasing from Manufacturers that Operate in a Safe and Environmentally Protective Manner

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 1.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with 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.

Haile has purchased solid cyanide in isotankers only from Chemours who manufactures it at their plant in Memphis, Tennessee. The purchases are made under an agreement between Chemours and Haile that contains language requiring that the cyanide be produced at a facility that has been certified as complying with the Code.

Chemours' production facility and its associated packaging facility are Code certified. Their most recent recertification was obtained in September 2016. No independent distributors have been part of the cyanide supply chain.

The auditors reviewed the cyanide supply agreement and bills of lading to verify compliance.

## PRINCIPLE 2 – TRANSPORTATION

### Protect Communities and the Environment during Cyanide Transport

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 2.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with 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.

Haile has purchased solid cyanide in isotankers from Chemours who manufactures it at their plant in Memphis, Tennessee. The purchases are made under an agreement between Chemours and Haile. According to Clause 11 of the supply agreement, Chemours transportation personnel, distributors, and contract carriers must comply with Code requirements. Haile is in full compliance because the entire Chemours supply chain from their plant in Tennessee to the mine has been certified. Colorant is added to the solid cyanide by Chemours upon loading solid cyanide into isotankers at the Memphis manufacturing plant. The auditors reviewed the supply agreements and supply chain audit reports on the ICMI website to confirm compliance.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 2.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 2.2; require that cyanide transporters implement appropriate emergency response plans and capabilities and employ adequate measures for cyanide management.

Haile has purchased solid cyanide in isotankers from Chemours who manufactures it at their plant in Memphis, Tennessee. The purchases are made under an agreement between Chemours and Haile. According to Clause 11 of the supply agreement, Chemours transportation personnel, distributors, and contract carriers must comply with Code requirements. Empire Express Inc. (Empire) collects the isotankers at Memphis and transports them directly to the Haile facility. Empire is shown on the ICMI website as being certified to the Code most recently in September 2017. The auditors reviewed bills of lading to confirm that Empire has been the only transporter to bring cyanide to the site.

## PRINCIPLE 3 – HANDLING AND STORAGE

### Protect Workers and the Environment during Cyanide Handling and Storage

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 3.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with 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.

Haile has designed and constructed the cyanide mixing area in accordance with sound and accepted engineering practices. The mixing area consists of a truck ramp for offloading isotankers and a secondary containment with a mixing tank and a distribution tank.

Haile has located the cyanide mixing area away from people and surface water. The nearest office is approximately 200 feet away and the nearest surface water is more than a mile away. Nonetheless, Haile has installed two fixed hydrogen cyanide gas (HCN) monitors in the mixing area to protect workers.

Haile receives solid cyanide in isotankers. The isotankers are unloaded on a concrete ramp that minimizes the potential for seepage to the subsurface. This ramp slopes towards a sag that drains to the sump in the adjacent secondary containment. A level sensor automatically operates the sump pump to return leakage to the process circuit.

Haile has installed level sensors in the mixing and distribution tanks to prevent overfilling. The level sensors trigger an audible alarm at 75 percent full and shut down the pumps at 90 percent full. Haile annually conducts preventive maintenance on the instrumentation in the Reagents Area, including testing of the level sensors and interlocks on the high-strength tanks. The auditors observed the tank levels on the local readout and the control room screen to verify they were functional.

Haile has installed the cyanide mixing and distribution tanks within a secondary containment that prevents seepage to the subsurface. The tank bases and secondary containment are concrete and provide a competent barrier to seepage. The auditors observed the concrete containment and tank bases to be in good condition.

The mixing and distribution tanks are closed-top tanks located outside to provide ventilation to prevent the build-up of HCN gas and to minimize the potential for contact of solid cyanide with water. These tanks are within a fenced and locked area. The secondary containment contains no other materials than a lime silo, which is compatible with cyanide. There are no acids, strong oxidisers, explosives, foods, animal feeds, and tobacco products stored nearby such that flow paths might merge.

Haile also has a small day tank for high-strength cyanide on the upper level of the CIL platforms to allow gravity feed to the cyanide addition points. A fixed HCN monitor is nearby. This day tank was properly designed and constructed as part of the CIL area. Secondary containment is provided by the CIL column below. There is a level sensor with an alarm but the piping gravity overflows back to the distribution tank such that an overflow is impossible. The day tank is within the secure mine area with full-time security that prohibits access to the public. The day tank is not located near any incompatible materials.

Haile has an isotanker laydown yard where several empty and/or full isotankers are temporarily stored awaiting offloading or return to the manufacturer. This laydown area is a bermed, gravel surface located away from people and surface water, and as isotankers are intended for outdoor use, and there are no other materials stored in this area, this practice is considered compliant.

**Standard of Practice 3.2: Operate unloading storage and mixing facilities using inspections, preventative maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.**

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 3.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 3.2; operate unloading storage and mixing facilities using inspections, preventative maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

Haile does not manage empty cyanide containers other than to wash the exterior of the isotanker after offloading. Haile also inspects the inside of the isotanker to verify that no briquettes remain, followed by securely closing the hatches for return to the manufacturer.

Haile has developed and implemented a written procedure and offloading checklist to prevent exposures and releases during isotanker offloading. The procedure details how to properly position the isotanker on the concrete offloading ramp, as well as how to operate the isotanker and mixing tank valves and couplings. The procedure also includes measures to clean up spills in a timely manner. The required personal protective equipment (PPE) is standard site PPE plus face shield, chemical gloves, suit, and boots, and portable HCN detector. The procedure also requires that two operators be suited up on top of the isotanker and a third operator observe from ground level with a radio. The cyanide manufacturer has added red dye to the isotankers.

The auditors observed an offload and reviewed checklists to verify that the offloading procedure was followed.

## PRINCIPLE 4 – OPERATIONS

### Manage Cyanide Process Solutions and Waste Streams to Protect Human Health and the Environment

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.1**

not in compliance with

#### Summarize the basis for this finding:

The operation is in full compliance with Standard of Practice 4.1; implement management and operating systems designed to protect human health and the environment including contingency planning and inspection and preventative maintenance procedures.

Haile has developed written management plans and procedures for cyanide facilities. Primary among these high-level management plans are the Cyanide Management Plan and the corporate Health, Safety, and Environment (HSE) manual. Other high-level systems include software for HSE training and management, and the Incident-Cause-Analysis Management (ICAM) system for incident evaluation.

The cyanide facilities with WAD cyanide concentrations greater than 0.5 mg/l are:

- Area 450 – CIL
- Area 500 – Stripping
- Area 600 – Detox and Tailings Systems
- Area 800 – Mixing
- TSF
- Tailings and reclaim water pipelines
- TSF underdrain pond
- Process events pond

Two other facilities were considered as cyanide facilities, although they do not contain cyanide solutions:

- TSF perimeter diversion channels
- Isotanker laydown yard

Haile has plans and procedures that identify the facility design criteria, assumptions, and regulatory requirements as necessary to prevent or control cyanide releases and exposures. The plant designer developed a series of design criteria documents. The TSF designers developed design criteria, design reports, and an Operation, Maintenance, and Inspection (OMI) Manual. A consultant prepared a water balance for the TSF. Haile developed an overall plan for monitoring and management, as well as a cyanide management plan. The South

Carolina Department of Health and Environmental Control (DHEC) issued a mine operation permit that contains regulatory requirements.

Haile has prepared standard operating procedures to ensure the safe and environmentally sound operation of the cyanide facilities. The procedures are organized with a common template that covers purpose, scope, responsibilities, safety, required PPE, other equipment, and step-by-step procedures.

Haile has a written procedure to identify changes in processes or operating practices may affect cyanide-related facilities or activities. The auditors reviewed six examples of recent management of change forms that were signed by the HSE Manager.

Haile has developed contingency procedures for upsets and deviations from normal operating conditions for the entire site, the process plant, and the TSF. There are site-wide plans for extreme weather and power outages. For the process plant, there are procedures for non-conforming performance of the cyanide destruction circuit, emergency shutdown due to tailings pipeline failure, and use of the events pond during upsets. For the TSF, there are plans for scenarios including: embankment overtopping, liner rips, sinkholes, embankment cracking, embankment movement, instrumentation readings that deviate from normal conditions, earthquakes, security threats, sabotage, vandalism, extended power outage, extreme rainfall storage, extreme low temperature, excessive supernatant pool volume, and component failure. Sections in the TSF OMI Manual on an extended power outage and the procedure for plant shutdown during a tailings line failure collectively address the measures that would be taken in any temporary cessation of operations.

Haile has implemented an inspection program at frequencies sufficient to ensure and document the cyanide facilities are functioning properly. Depending on the facility or component, frequencies are shift, daily, weekly, monthly, annual, and random. Specific inspections include: daily area inspections for visual signs of corrosion and leakage; and baseline non-destructive testing for tanks; weekly and monthly secondary containment inspections; daily water management inspections of Leak Collection and Recovery System (LCRS) at the TSF underdrain pond; shift area inspections for visual signs of deterioration and leakage; shift TSF inspections for the pipeline corridor from the plant to the TSF; daily water management inspections for pond levels and freeboard; monthly TSF embankment inspections for diversion channels; and quarterly TSF perimeter inspections for diversion channels. Haile has documented and retained their inspection forms, which include the date, inspector's name, and deficiencies as comments. Deficiencies are reported to the maintenance department where the normal workflow process takes over.

Haile has implemented a maintenance program to ensure equipment and devices function as necessary for safe cyanide management. Haile uses a software program with a defined workflow process for corrective and preventive maintenance. The auditors reviewed summaries of completed maintenance and closed work orders to verify compliance. Haile also has installed standby pumps in critical circuits and has conducted a criticality analysis for warehousing of backup units and parts.

Haile has developed a procedure to operate an emergency generator during power outages for preventing releases and exposures. Haile has installed a 1500-kilowatt emergency generator with the capacity to run critical equipment. This generator is routinely inspected and maintained, as well as routinely run- and load-tested.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 4.2; introduce management and operating systems to minimise cyanide use, thereby limiting concentrations of cyanide in mill tailings.

Haile has conducted initial and ongoing programs to determine the appropriate cyanide addition rates. However, the primary measure to limit cyanide in mill tailings is the cyanide destruct circuit. The initial cyanide rate determined by metallurgical testing in 2009 was 540 mg/l based, but kinetic leach testing in 2018 indicated an optimal cyanide addition rate of 600 to 800 mg/l. Haile varies the cyanide addition rate based on ore grade and blends oxide and sulfide ore types from three pits to reduce variation in cyanide usage.

Haile has evaluated and implemented manual and automatic control strategies for cyanide addition rates. Automatic analyzers determine addition rates in CIL Nos. 1, 2, and 8 based on readings every 20 to 30 minutes and adjusts them by proportional gravity-feed valves from the cyanide day tank. Manual checks are conducted every 6 hours. Time series graphs of the automatic analyzer results and manual checks from early 2019 indicated that Haile has added cyanide according to its written control strategy.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.3**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 4.3; implement a comprehensive water management program to protect against unintentional releases.

Haile has developed a comprehensive and probabilistic water balance model for the life of the mine. The water balance is comprehensive in that it includes the TSF and the plant. The water balance is probabilistic in that it was developed in GoldSim, a Monte Carlo simulation model. The model includes scenarios for the wettest year, driest year, and extreme rainfall.

The inputs to the Haile water balance are reasonable and appropriate for the facilities and environment. The tailings production rate is 12,080 tons per day. Extreme precipitation considers the 24-hour Probable Maximum Precipitation (PMP). Precipitation data were obtained from a station operated by the University of South Carolina in Kershaw, approximately 6 miles from the mine. Evaporation data were obtained from the Clemson University Sand Hill Research Station approximately 29 miles away. The TSF is a ring dyke with no run-on. Effects of potential freezing and thawing were not included because low temperatures do not last long enough for the

supernatant pool to freeze. Other solution losses are reclaimed water pumping and tailing pore water draining to the underdrain pond. In the event of a power outage, the underdrain pond was designed for 24 hours of drain down; tailings and reclaim water pumping would simply stop with no effect on the potential for overtopping. There are no discharges to surface water. Although groundwater is shallow, the entire TSF is lined to prevent interactions between the tailings and groundwater.

Haile has developed operating procedures that incorporate monitoring and operation to prevent overtopping of the TSF and the underdrain pond. Haile surveys the supernatant pool level regularly and graphs these data for comparison to the embankment crest level. The procedure for managing the underdrain pond states that the pump is set to automatically maintain a low water level and if the water level rises, then follow-up is required. Water levels in the underdrain pond are recorded daily as part of the water management inspections.

Haile has designed and operated the TSF and underdrain pond with adequate freeboard to prevent overtopping. The TSF is designed for the PMP of approximately 48 inches with 4 feet of freeboard. Haile provided a time series of the supernatant pool elevations that showed a minimum of 7 feet of freeboard in the past 11 months. The underdrain pond is designed for 24 hours of drainage plus the 100-year 24-hour storm of 8.57 inches with minimum 2 feet of freeboard. Daily water management inspections showed water levels were kept well below the minimum freeboard.

Haile has measured precipitation at the mine site since 2017. The period of record is too short for meaningful comparison of the results to design assumptions and operating practices. In any case, the precipitation data in the water balance came from the Kershaw station, which has a 77-year period of record and is located sufficiently close to the mine and with comparable topographic conditions.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.4**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 4.4; implement measures to protect birds, other wildlife and livestock from adverse effects of cyanide process solutions.

Haile has implemented measures to restrict access by wildlife to the TSF and the underdrain pond, the only cyanide-related open waters at the mine. The primary measure to protect wildlife is the cyanide destruction circuit for tailings. Secondary measures to restrict wildlife access to the include an 8-foot high fence around the TSF and underdrain pond, as well as a 6-foot high fence around the property boundary.

WAD cyanide is measured by an automatic analyzer in the outflow from each of the two tanks in the cyanide destruction circuit. The outflows commingle equally after the automatic analyzers, meaning the average of the two measurements represents the tailings at the spigots into the TSF. The maximum WAD cyanide concentrations in early 2019 were 42.7 and 57.3 mg/l from the east and west destruct tanks, respectively. However, these maximum values for each destruct tank did not occur on the same day. The 57.3 mg/l value from the east tank on February 2, 2019 was compensated by the 1.1 mg/l value from the west tank on the same day,



meaning the average at the spigots was approximately 29 mg/l on that day. WAD cyanide results from the TSF reclaim pool for both July 2018 and January 2019 were less than 0.1 mg/l. The auditors concluded that Haile has maintained WAD cyanide concentrations at less than 50 mg/l in the several months preceding the initial audit.

Based on random inspections and avian surveys by a professional biologist, Haile has prevented wildlife mortality by maintaining the concentrations of WAD cyanide at less than 50 mg/l in the TSF and underdrain pond. According to the Haile HSE Manager, no wildlife mortalities have been observed in the TSF area since the TSF was commissioned in in 2017.

Ponding and overspray are inapplicable as Haile does not have a heap leach facility.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.5**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 4.5; implement a comprehensive water management program to protect against unintentional releases.

Haile does not have direct discharges from the cyanide facilities to surface water. However, Haile does convey surface water from upstream of the TSF in a pipe under the TSF. This pipe underneath the fully lined TSF and is not connected to the TSF underdrain system. Nonetheless, the South Carolina DHEC requires quarterly surface water monitoring for WAD cyanide at the upstream and downstream ends of the pipe, a well as two stations farther downstream. Results from the 2018 quarterly sampling events were non-detect for WAD cyanide at all four surface water stations.

Haile does not have an established mixing zone.

Haile does not have indirect discharges from the cyanide facilities to surface water.

Haile is not engaged in any remediation of surface water because cyanide concentrations in surface water have not risen above designated levels in the South Carolina DHEC operating permit.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.6**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 4.6; implement measures designed to manage seepage from cyanide facilities to protect the beneficial uses of groundwater.

Haile has implemented water management measures to manage seepage to protect groundwater. These measures are: concrete secondary containments at the process plant; a single high-density polyethylene (HDPE)-lined Events Pond; a single HDPE-lined secondary containment ditch for the tailings and reclaim pipelines; a fully lined TSF with a low permeability soil liner overlain by 60-mil HDPE liner and underdrain piping to direct tailings pore water to the underdrain pond; and a double HDPE lined underdrain pond with an LCRS. The cyanide destruct circuit at the process plant is also an indirect measure to protect groundwater.

Haile has monitored groundwater downgradient of the TSF and plant. However, South Carolina does not designate beneficial uses for groundwater and there are no actual points of use with approximately 2 miles of the mine, as the few offices and buildings within that range use city water provided by Kershaw. According to the South Carolina DHEC permit, WAD cyanide is the designated species for groundwater monitoring and any detection of WAD cyanide in groundwater would be considered a potential exceedance and subject to investigation. Haile has installed nine groundwater monitoring wells for the plant and TSF. Results from the four quarterly sampling events in 2018 were non-detect for WAD cyanide at all monitoring wells.

Haile does not have an underground operation or use mill tailings as underground backfill.

Seepage from the operation has not caused cyanide concentrations in groundwater to rise above levels protective of beneficial use, and therefore the operation is not engaged in groundwater remediation.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.7**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 4.7; Provide spill prevention or containment measures for process tanks and pipelines.

Haile has constructed secondary containments for cyanide-related tanks and vessels that have sufficient volume for the largest tank within the containment and additional capacity for stormwater from the 100-year 24-storm of 8.6 inches. The CIL, cyanide destruct, and reclaim water containments have flow through capability to the Events Pond, which has sufficient volume for all of the tanks and vessels in these areas. The containments in the carbon regeneration and cyanide mixing/storage areas have sufficient capacity for the largest tank within plus stormwater. Haile also provided design drawings showing the rebar patterns for the tank bases, thereby proving tanks were installed with an impermeable surface below them. The auditors observed the secondary containments to be in good condition.

Haile has provided sumps with dedicated pumps for all secondary containments. Procedures to prevent discharge of water in secondary containments to the environment are inapplicable.

Haile has installed all process tanks within with secondary containment. Nonetheless, Haile has developed a procedure for remediating soil affected by cyanide solutions released from secondary containment.

Haile has provided spill containment measures for cyanide-related pipelines to collect leaks and prevent releases to the environment. Pipelines within the mixing area and the plant are located over concrete surfaces. The overhead pipelines from the mixing area to the plant have a steel tray below. The tailings and reclaim water pipelines between the plant and the TSF are contained within a geomembrane lined ditch, culverts, and concrete containment.

Haile does not have any pipelines that present a special risk to surface water.

Haile has constructed tanks and pipelines containing cyanide solutions with materials that are compatible with cyanide and high pH, such as carbon steel, stainless steel, and HDPE.

**Standard of Practice 4.8: Implement quality control/quality assurance procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.**

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 4.8**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with 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.

Haile has implemented Quality Assurance/Quality Control (QA/QC) program during construction of the cyanide facilities. QA/QC was governed by a Quality Plan for Construction. The QA/QC program for the plant addressed materials suitability, earthworks, concrete, liner, piping, pumps, tanks, and vessels. The QA/QC program for the TSF, underdrain pond, and events pond addressed materials suitability, earthworks, liner, and piping. As-built drawings were also included in the Record of Construction Report.

Haile has retained QA/QC records for the cyanide facilities electronically using a document control program "Teambinder" found on the OceanaGold intranet site.

Haile used appropriately qualified personnel to review cyanide facility construction to verify the facilities were suitable for their intended use. For the plant, the Agree-to-Operate (ATO) certificates were signed by the Construction Manager, Commissioning Manager, Process Manager, and Vice-President for Project Execution. For the Events Pond, the Quality Assurance Testing Report was signed by representatives from the engineer, quality assurance firm, contractor, and geosynthetics installer. For the TSF and underdrain pond, the Record of Construction Report was stamped by a licensed engineer in South Carolina.

In lieu of the original QA/QC documentation for the secondary containment ditch for pipelines between the plant and TSF, Haile commissioned a consultant to retroactively test the compacted subgrade and liner. Results were acceptable. An engineer licensed in South Carolina stamped the report, indicating review by qualified personnel.

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

**in full compliance with**

**The operation is**

in substantial compliance with

**Standard of Practice 4.9**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 4.9; implement monitoring programs to evaluate the effects of cyanide use on wildlife, surface and groundwater quality.

Haile has developed written procedures for groundwater, surface water, as well as wildlife monitoring, reporting and response. The groundwater and surface water sampling protocols were developed by registered geologist. Analytical protocols were developed by a laboratory certified in South Carolina. The wildlife monitoring protocols were developed by professional naturalist.

A monitoring plan describes the groundwater sampling locations, along with maps of the locations. An appendix lists WAD cyanide as the species to be analyzed. The procedures for sampling groundwater and surface water describe how samples should be collected and a series of supporting procedures cover cooler and chain-of-custody preparation, among other items.

Haile has documented sampling conditions and sampling procedures in field forms filled out at the time of sampling surface water and groundwater. These forms document weather, sample conditions, and conditions that might affect sample integrity.

Haile monitors for cyanide in surface water downstream and groundwater downgradient of the cyanide facilities. Haile monitors surface water at four stations and nine groundwater wells related to the cyanide facilities.

Haile managers conduct random inspections approximately around the TSF every week or two as part of the management monitoring and review inspection program. In addition, Haile has subcontracted to a professional naturalist to conduct avian surveys six times per year at the TSF. Given that Haile has kept WAD cyanide concentrations in the TSF well below 50 mg/l, the auditors concluded that Haile’s approach to wildlife monitoring was compliant.

Haile has conducted groundwater and surface water monitoring quarterly. These frequencies are adequate to characterize the medium being monitored and to identify changes in a timely manner.

## PRINCIPLE 5 – DECOMMISSIONING

### Protect Communities and the Environment from Cyanide through Development and Implementation of Decommissioning Plans for Cyanide Facilities

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 5.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 5.1; plan and implement procedures for effective decommissioning of cyanide facilities to protect human health, wildlife and livestock.

Haile has developed a cyanide decommissioning plan for the appropriate cyanide facilities and decommissioning activities, including: cyanide stock drawdown; tank cleanout; rinsing/flushing; detoxification of residual cyanide if rinsing was not effective; and verification sampling and analysis. Rinse water will be detoxified in the destruct circuit prior to pumping to the TSF. The plan does not include installation of control measures for cyanide in surface and/or groundwater as none are anticipated. The plan has an implementation schedule of approximately 11 months for cyanide-related decommissioning. The plan includes a requirement to review the decommissioning plan annually; the current version is dated January 2019.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 5.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 5.2; establish an assurance mechanism capable of fully funding cyanide related decommissioning activities.

Haile has developed a decommissioning cost estimate based on third party implementation. Section 9 of the decommissioning plan includes estimated costs for pre-closure, detoxification, and deconstruction activities. Costs were estimated using third-party labor and equipment rates from state and local sources. The cost estimate is current as of 2019 and the decommissioning plan calls for annual review. Haile has established surety bonds with the South Carolina DHEC for overall mine reclamation in an amount that is considerably greater the estimated costs for cyanide-related decommissioning.

## PRINCIPLE 6 – WORKER SAFETY

### Protect Workers’ Health and Safety from Exposure to Cyanide

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 6.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 6.1; identify potential cyanide exposure scenarios and take measure as necessary to eliminate, reduce and control them.

Haile has developed procedures that address cyanide unloading, storage and preparation, plant and leach pad operations, equipment maintenance, confined spaces, decontamination, and other cyanide-related activities. Each procedure covers the work purpose, scope, responsible persons, procedures, and references. The procedures include a discussion of risks and hazards, environmental and safety issues, the necessary tools and equipment, PPE, safety equipment, procedural steps, and emergency procedures. Areas where cyanide is used also have signs listing the PPE requirements. Haile completes Stop and Think cards before every task and completes pre-work inspections using checklists, such as offloading iostankers.

Haile has implemented a procedure and created forms to be used when an operational or process change/modification is proposed. The procedure considers the involvement of process, environmental and safety personnel in the assessment of the proposed changes. The forms describe the change and the controls and must be signed by the initiator of the requested change and the environmental and safety representatives assigned to the change review team. The auditors reviewed completed change management forms including examples of changes to cyanide facilities to verify that Haile is implementing the written procedure.

Haile has created opportunities for supervisors and workers to provide input to develop, evaluate, and improve procedures. Procedures are developed out of a process that includes completion of a Job Hazard Analysis (JHA) with workers and their supervisors. Once developed, the procedures are implemented through a process of pre-shift reviews with workers and trainers. Procedures are reviewed at intervals from 1 to 3 years, and any changes are signed off by the department managers before being reviewed at pre-shift meetings with workers. The auditors reviewed example records of these events to verify compliance.

**Standard of Practice 6.2: Operate and monitor cyanide facilities to protect worker health and safety and periodically evaluate the effectiveness of health and safety measures.**

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 6.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with 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.

Haile has established target pH levels to prevent the formation of HCN gas and has implemented methods to monitor and ensure that pH is higher than the target levels throughout the process. The minimum pH of mix solution prior to mixing is 10.5; in the CIL circuit, the target pH is between 10.2 and 10.5, with a minimum pH of 9.5. The auditors reviewed time series pH readouts in the control room to determine that the target pH levels were being met. The auditor also reviewed records of pH monitoring points throughout the process and the daily CIL report of deviations to verify that target pH levels are achieved. pH probes are calibrated weekly and verified twice per shift by operators.

Haile has installed six fixed HCN monitors in areas of potential exposure to cyanide. In addition, operators use portable HCN meters when working in high exposure areas or anywhere in the CIL, stripping and carbon handling, detox and tailings, and mixing areas. HCN sensor alarms are set at 4.0 parts per million (ppm) and 9.7 ppm. At the first alarm, an operator attends to the area to determine whether actions are required. At the second alarm the area is evacuated. Both portable and fixed HCN monitors are maintained, calibrated, and inspected as recommended by the manufacturer, as verified by calibration and maintenance records.

The auditors observed that warning signs are posted in areas where cyanide is used to alert workers that cyanide is present, that smoking, eating, and drinking are not allowed, and that the necessary cyanide-specific PPE must be worn. Pipes carrying cyanide are marked and the direction of flow is indicated with arrows on the pipe. Tanks containing cyanide solutions are clearly marked. Signage warning of confined spaces in tanks has also been placed.

Chemours adds red dye at the time of loading briquettes into isotankers at the plant in Memphis Tennessee. Haile has therefore adopted the practice of dyeing the cyanide solution for ease of identification.

Showers, low-pressure eye wash stations and dry powder fire extinguishers are located at strategic locations throughout the operation and are maintained, inspected and tested on a regular basis. The auditors randomly inspected showers and eyewash stations to verify they were operational. First aid procedures and Safety Data Sheets (SDS) are available in the workplace and in the control room, as well the medical clinic and online. The instructions are in English, the language of the workforce.

Haile has implemented procedures that require all incidents and accidents involving cyanide exposure be investigated and evaluated to determine if its programs and procedures to protect worker health and safety and to respond to cyanide exposures are adequate or if changes are necessary. This process follows an ICAM methodology for the investigation, records of which are retained in the software program. The auditors reviewed reports from the software program and identified that corrective and preventive actions had been identified and implemented for a potential cyanide exposure incident.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 6.3**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 6.3; develop and implement emergency response plans and procedures to respond to worker exposure to cyanide.

Haile has located cyanide antidote kits (amyl nitrate and cyanokits) at the medical clinic, and oxygen is in the Emergency Response Team (ERT) trailer and in process areas, to respond to worker cyanide exposures. In addition, automated external defibrillators (AEDs) are in process areas and at the medical clinic. Antidotes are stored at the manufacturer's recommended temperature and are within expiration dates. Operators carry a radio, and ERT members carry radios that are also able to communicate with external emergency response agencies. Other means of communication (such as phones and internet) are available in multiple locations. The auditors reviewed examples of inspection records to verify that antidotes and first aid equipment was inspected regularly.

Haile has developed a written Emergency Response Plan (ERP) and a procedure for treatment of cyanide exposures. These documents include procedures for emergency response equipment preparation, emergency response procedures, and cleanup of solid and liquid cyanide spills and residuals. The procedure and plan address response measures for cyanide exposures and releases, decontamination procedures, evacuation, emergency contact information, clean-up measures, reporting requirements and others.

Haile has an on-site medical clinic staffed by a nurse on weekdays from 0630 to 1530 to provide first aid or medical assistance to workers exposed to cyanide. Outside of these hours, site security personnel are able to provide first aid. Haile has developed procedures to transport workers exposed to cyanide to a local medical clinic for further treatment. Regional Emergency Management System (EMS) resources are trained in the administration of cyanide antidotes and are equipped with amyl nitrate and cyanokits. The Lancaster Medical Clinic has agreed to accept and treat cyanide exposure patients. Documentation of the acceptance of the ERP, and willingness to treat exposure patients, was reviewed.

Haile has conducted mock drills of cyanide release and exposure exposures in the mixing area, and on top of the CIL columns. The auditors reviewed the mock drill reports to confirm that lessons learned were identified and corrective actions completed to resolve deficiencies.



## PRINCIPLE 7 – EMERGENCY RESPONSE

### Protect Communities and the Environment through the Development of Emergency Response Strategies and Capabilities

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 7.1; prepare detailed emergency response plans for potential cyanide releases.

Haile has developed an ERP that addresses the potential cyanide failure scenarios for the site-specific environmental and operating circumstances. Emergency responses are described for potential emergencies that encompass the cyanide facilities. The ERP considers the following cyanide failure scenarios: catastrophic releases of HCN and liquid sodium cyanide; transportation accidents; releases during mixing and unloading; releases during fires or explosions; pipe, tank, and valve ruptures; pond overtopping; power outages; pump failures; and releases from cyanide destruct facilities.

Haile purchases cyanide under a Sodium Cyanide Supply Contract with Chemours, which states that Chemours is responsible for the transportation supply chain to Haile, including emergency response and remediation and cleanup of any cyanide release during transport.

The ERP and cyanide treatment procedure describe the specific actions to be taken in case of emergency such as the use of cyanide antidotes and first aid measures, first responders, responsibilities, telephone contact lists, call for external help, site evacuation, and recovery after the emergency. The cyanide treatment procedure describes specific response actions for cyanide exposure such as the use of cyanide antidotes and first aid measures.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 7.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 7.2; involve site personnel and stakeholders in the planning process.

Haile has included its workforce and stakeholders, such as potentially affected communities, in cyanide emergency response planning. Workers and supervisors are involved in cyanide emergency preparations and response through training, procedure reviews, and mock drills. The ERP and Emergency Management Control Plan (EMCP) identify external parties that are involved or may be involved in emergency response including the

Lancaster, Kershaw and Flat Creek fire departments, the Lancaster Medical Center, and the Lancaster County EMS. Lancaster County EMS members have participated in Cyanide Awareness training provided by Chemours. These external parties have been provided with copies of the ERP by Haile and have acknowledged their responsibilities in the ERP. The medical center and the EMS also reviewed and approved the decontamination procedures.

Haile has held community meetings at the Depot (a former train station converted into a community presentation and meeting center for Haile) in Lancaster to discuss cyanide management and other operational issues in 2015 and 2016 and has engaged with municipal and county councils. A reverse 911 system would be used to alert community members of emergencies, whereby alerts are made to area phone numbers upon an emergency event.

The auditors reviewed submissions made under the Emergency Planning and Community Right to Know Act, whereby chemical information and emergency contact resources are submitted to state agencies, the Local Emergency Planning Committee and fire departments. Haile has provided information regarding sodium cyanide quantities and SDS through this mechanism.

Haile has engaged in consultation and communication with stakeholders to keep the ERP current, including with staff in pre-shift meetings and mock drill reviews, and with the communities located around the mine through community meetings and sessions with the community emergency response agencies.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 7.3**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 7.3; designate appropriate personnel and commit necessary equipment and resources for emergency response.

Haile’s ERP and EMCP designate primary and alternate emergency response coordinators, including the duties, responsibilities and level of authority of the emergency responders for all the different site emergency scenarios, and call out procedures. The accompanying ERT Register provides related information such as ERT members, their contact information and training requirements, emergency response inventories. The ERP also stipulates monthly and quarterly inspection requirements to ensure the availability of emergency response equipment. External emergency responders are identified in the ERP, along with their contact information.

Haile has contacted local response agencies and medical facilities identified in the ERP. Those agencies have been provided with copies of the ERP and acknowledged their responsibilities in the ERP. Lancaster County EMS members have participated in cyanide awareness training provided by Chemours, as arranged by Haile. The medical center and the EMS also reviewed and approved the decontamination procedures. A mock drill involving the external agencies was conducted in 2017, involving the fire departments and the Lancaster County EMS.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 7.4**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 7.4; develop procedures for internal and external emergency notification and reporting.

Haile has included procedures and contact information for notifying management, regulatory agencies, outside response providers and medical facilities of a cyanide emergency in their ERP and EMCP. These procedures stipulate internal notification and call out requirements for any safety, environmental or production issues. Responsibilities are also designated for all external communication and reporting, including notification to potentially affected communities and local authorities. Contact information for external response agencies is provided in the EMCP. The Incident Controller determines when external agencies should be involved, and the General Manager is responsible for communications with the media. Notification of potentially affected nearby communities of cyanide incidents would make use of the Lancaster County Public Safety Communications Department reverse 911 system, an automated calling system that would call all phone numbers within a specified radius of the incident.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 7.5**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 7.5; incorporate in response plans and remediation measures monitoring elements that account for the additional hazards of using cyanide treatment chemicals.

Haile has specific written remediation measures in the ERP and related procedures that address potential cyanide releases. These procedures include requirements for solid cyanide wastes and cyanide solutions. Decontamination procedures for equipment, soil, and media are described, as well as chemical neutralization procedures for the treatment of materials, soil and other media affected by cyanide spills. Sampling strategies and remediation endpoints would be determined in conjunction with Mine Safety and Health Administration (MSHA) and the South Carolina DHEC. Spill cleanup debris and materials are to be disposed of in the TSF.

Haile has determined that there is a very low potential for impacts to drinking water supplies of nearby communities. The nearest downstream drinking water source is Lake Wateree, approximately 40 miles downstream of Haile. The ERP stipulates that the use of chemicals such as sodium hypochlorite, ferrous sulphate, and hydrogen peroxide to treat cyanide that has reached surface water is prohibited. In addition, Section 4.2 of the procedure for detoxification with ferrous sulfate clearly states that ferrous sulphate shall not be

used to neutralize cyanide spills that have entered surface water. Seepage from the TSF would be detected in the TSF groundwater monitoring program before off-site impacts are experienced.

The Cyanide Detoxification Using Ferrous Sulfate procedure includes sampling methodologies and analytical parameters for monitoring the extent and impacts of cyanide releases. The South Carolina DHEC and the MSHA would be involved and have joint responsibility for determining sampling strategies, sampling locations, and remediation endpoints.

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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 7.6**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 7.6; periodically evaluate response procedures and capabilities and revise them as needed.

Haile reviews and evaluates the ERP and related cyanide emergency response procedures on a regular basis. A record of revisions made during these reviews is maintained in a document revision log. The auditors reviewed the emergency plans and procedures and determined that the information provided had been updated and was current. Haile has conducted mock drills of cyanide-related emergency events and evaluated lessons learned to incorporate into their emergency planning. This includes a major drill that involved external agencies in 2017, a "man down" drill at the mixing area in 2019, and a mock high angle rescue from the top of the CIL columns in 2019. Lessons learned in these drills resulted in updates to Haile's emergency response plans and procedures. While no cyanide-related incidents have occurred, Haile's ERP includes procedures to conduct reviews following actual cyanide-related emergencies, and revise procedures if needed.

## PRINCIPLE 8 – TRAINING

### Train Workers and Emergency Response Personnel to Manage Cyanide in a Safe and Environmentally Protective Manner

**Standard of Practice 8.1: Train workers to understand the hazards associated with cyanide use.**

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 8.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 8.1; train workers to understand the hazards associated with cyanide use.

Haile has trained workers to understand the hazards associated with cyanide. New employees, including contractors and visitors, are required to attend to general awareness cyanide training before being able to work or visit the mine site. All site personnel who may encounter cyanide receive additional training in cyanide hazard recognition, emergency procedures, and administration of cyanide exposure antidote. A quiz is administered following training. Haile requires all workers to undertake refresher training in the general cyanide awareness annually.

The auditors verified the training delivery through a review of the records of the general cyanide training and examples of its exam results for new hires, contractors, and visitors for a sample of training events from 2018 and 2019. The records showed that Haile tracks the completion of the annual refresher training. For contractors, training records are maintained in hardcopy, and summarized on spreadsheets to enable tracking of refresher requirements.

**Standard of Practice 8.2: Train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.**

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 8.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with 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.

Haile has trained workers to perform their normal production tasks, including unloading, production and maintenance, with minimum risk to worker health and safety in a manner that prevents unplanned cyanide releases. Training includes general cyanide safety awareness, and specific training in cyanide-related procedures. The training content includes the procedure itself, and on-the-job reviews of the procedures. Training is followed by quizzes to verify comprehension. A matrix showing processing procedure training required, by position and group, identifies the training needs for each area.

A cyanide procedure checklist is completed by supervisors for each employee following training to verify and reinforce the core competencies. The checklist includes all important elements of each procedure that address cyanide-related issues.

Appropriately qualified personnel provide task training related to cyanide management activities at Haile. Training programs are led by the Process Trainer, a former operator with many years of operational experience. Crew lead provide on-the-job training for their crew members. Site-wide MSHA training is provided by qualified MSHA instructors

Haile requires all employees to be trained before working with cyanide. Following initial training, area supervisors are responsible for ensuring that on-the-job training and supervision of new workers occurs, and for verifying competency using the cyanide procedure checklists for each procedure undertaken. In addition, over 60 job task observations are conducted weekly.

Haile requires all employees to undertake refresher training annually, in each of the procedures that is relevant to their area and function. Each department is responsible to complete the refresher training over the course of the year.

Haile retains records of employee training throughout the duration of their employment in the training software, supported by hardcopy records of quizzes and cyanide procedure checklists. The records include the names of the employee and trainer, the date of training, and the topics covered, based on the procedures reviewed or presentation materials delivered. To verify compliance, records were reviewed of written quizzes in hardcopy training record files from throughout 2018 and a detailed review of all records was conducted for a sample of individuals.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 8.3**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 8.3; train appropriate workers and personnel to respond to worker exposures and environmental releases of cyanide.

Haile has trained personnel assigned to the cyanide facilities in the procedures to be followed if cyanide is released, including emergency procedures. General cyanide awareness training is delivered to workers and provides an overview of response procedures should a cyanide release occur. For process plant personnel, additional procedure and task training contains responses to environmental releases specific to the task being undertaken. Haile personnel who may be expected to respond to a cyanide response are trained in decontamination and first aid procedures in case of a cyanide emergency, and procedures specific to emergency response for ERT members.

Training is provided to ERT members in accordance with a training matrix included in the ERT Register spreadsheet, and includes cyanide emergency response, fire and confined spaces. The training involves familiarity with the care, use and deployment of emergency response equipment. Refresher training on cyanide

emergency response and treatment of exposures is provided annually to ERT members, and to all employees in general cyanide awareness refresher training.

Haile has provided the ERP to all external emergency response services that are identified in the plan. Each of these services has responded with documented acknowledgement of their acceptance of the ERP.

Haile has conducted mock drills of cyanide-related emergency events for training purposes, and address both worker exposure and environmental releases, and have involved external emergency services providers. Haile has evaluated the results of the mock drill training events to determine if personnel have the knowledge and skills to effectively respond to emergencies. Lessons learned following each drill are evaluated by the ERT and include consideration of training needs.

## PRINCIPLE 9 – DIALOGUE

### Engage in Public Consultation and Disclosure

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 9.1**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 9.1; provide stakeholders with the opportunity to communicate issues of concern.

Haile has provided opportunities for public and stakeholders to communicate issues of concern about cyanide management. These opportunities included public open houses, information meetings and tours, telephone and email submittals, and information posted on the Haile webpage. Haile also operates the Depot, a community center that provides information on Haile operations and serves as a meeting area for public engagement activities. Information related to cyanide management is available at the Depot, or may be requested through any of the email, telephone, or website contacts.

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

in full compliance with

The operation is

in substantial compliance with

**Standard of Practice 9.2**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 9.2; initiate dialogue describing cyanide management procedures and responsively address identified concerns.

Haile has provided opportunities to interact with stakeholders to provide them with information related to cyanide management. The Final Environmental Impact Statement, and the Detailed Project Description for the proposed expansion, describe all environmental and safety aspects of the mine and including cyanide issues, and are publicly available documents. In addition, Haile has held open house and community meetings at the Depot in Kershaw, where information on all the operations and activities at Haile is provided to the public. Chemours pamphlets that describe the uses and risks of cyanide are also available for distribution to the public at the Depot. The Haile website also mentions the use of cyanide at Haile. During public tours of the site, Haile disseminates site information including cyanide management practices. A registry of participants shows a total of 59 groups, comprising 424 individuals, who have taken advantage of these engagement events in the 12 months preceding the site visit for this audit.



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

in full compliance with

**The operation is**

in substantial compliance with

**Standard of Practice 9.3**

not in compliance with

**Summarize the basis for this finding:**

The operation is in full compliance with Standard of Practice 9.3; make appropriate operational and environmental information regarding cyanide available to stakeholders.

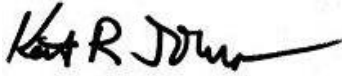
Haile has developed written descriptions of how their activities are conducted and how cyanide is managed. The Final Environmental Impact Statement, including all environmental and safety aspects of the mine and including cyanide issues, is a publicly available document. The Detailed Project Description for the proposed expansion is also a publicly available document that addresses cyanide management at Haile. Chemours pamphlets that describe the uses and risks of cyanide are also available for distribution to the public at the Depot. The Haile website also mentions the use of cyanide at Haile.

While the population is not significantly illiterate, Haile has held open house and community meetings at the Depot in Kershaw, where information on all the operations and activities at Haile is verbally provided to the public. Haile has held community open houses and delivered presentations at the Depot. Haile organizes public tours at the Depot that proceed to the site where they include verbal descriptions of the mine and process plant and disseminate information including on cyanide management. A registry of participants shows a total of 59 groups, comprising 424 individuals, who have taken advantage of these engagement events in the 12 months preceding this review.

The operation has procedures in place to make information publicly available on cyanide releases or exposure incidents. Haile has not had any on- or off-site cyanide spills, releases of cyanide, or incidents of exposure to cyanide requiring response or remediation. However, Haile would make information publicly available as required by the ERP and related procedures. These procedures also address reporting requirement to MSHA in the event of a cyanide exposure or release. This information would then be made available to the public by MSHA.

# Signature Page

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