REPORT

September 16, 2016

ICMI CERTIFICATION SUMMARY REPORT

Goldcorp Canada Ltd. Musselwhite Mine, Ontario, Canada

Submitted to: International Cyanide Management Institute (ICMI)
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Washington, D.C. 20005
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Distribution:
1 Copy - Goldcorp Canada Ltd.
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1.0 SUMMARY AUDIT REPORT FOR GOLD MINING OPERATIONS

Name of Mine:	Musselwhite Mine
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2.0 LOCATION DETAIL AND DESCRIPTION OF OPERATION

2.1 Mine Location

Musselwhite is operated by Goldcorp Canada Ltd., a wholly-owned subsidiary of Goldcorp, Inc. and is located in the Patricia Mining District within the Skinner and Zeemel Lakes Areas on the south shore of Opapimiskan Lake, in Northwestern Ontario. Musselwhite is a fly in fly out operation and is situated approximately 130 kilometers (km) north of the Town of Pickle Lake and 470 km northwest of Thunder Bay, Ontario (Figure 1). Seven communities, including five First Nation communities, with a combined population of approximately 4,000 are located within the vicinity of the mine. There are approximately 500 people employed at Musselwhite.

Figure 1: Regional Location Map

2.2 Background

Musselwhite is operated by Goldcorp Canada Ltd., a wholly-owned subsidiary of Goldcorp, Inc. and is located in the Patricia Mining District within the Skinner and Zeemel Lakes Areas on the south shore of Opapimiskan Lake, in Northwestern Ontario. Musselwhite is a fly in fly out operation and is situated approximately 130 kilometers (km) north of the Town of Pickle Lake and 470 km northwest of Thunder Bay, Ontario (Figure 1). Seven communities, including five First Nation communities, with a combined population

of approximately 4,000 are located within the vicinity of the mine. The nearest community is Kingfisher Lake, 48 km to the northeast of the site. There are approximately 500 people employed at Musselwhite.

The mine site consists of an airstrip, mine camp, potable water treatment plant, reagent warehouse, crushing plant, mill and tailings complex, tailings thickener facility, groundwater interception system, conveying system, shop/warehouse and other ancillary facilities (Figure 2). Gold production commenced in 1997 at Musselwhite and primarily underground mining methods are employed. The current mine production is 4,000 tonnes/day ore and 2,000 tonnes/day barren rock. The barren rock material is stockpiled then utilized for underground backfill. Tailings are not used for underground backfill.

The milling facility uses two-stage crushing to reduce the ore and conventional gold extraction techniques to concentrate the gold. The tailings from this process is washed with incoming tailings reclaim water in thickeners to recover cyanide. Residual cyanide is treated by an INCO SO_2 cyanide destruct system prior to being pumped to the tailings thickener plant (installed in 2010) which is located in the Tailings Management Area (TMA) approximately 3 km west of the plant site. The mill layout is shown in Figure 3.

Musselwhite receives solid cyanide in box or supersacks and stores them in a designated area in the reagent warehouse. The use of cyanide begins at the grinding area, which uses re-circulated cyanide bearing solution from the counter current decantation (CCD) wash circuit as process water within the grinding mills, Knelson concentrators, Delkor linear screen and pump boxes. The grinding circuit classified product reports to the grinding thickener and thickened underflow slurry is pumped to the leaching circuit. After the slurry reports to the leaching circuit, the control system (via an automatic titrator) adds make-up cyanide to the first of four leach tanks using sodium cyanide solution at approximately 19 w/w%. In rare cases, operators also add make-up cyanide to “leach tank #3” as required. The leach pulp is transferred from tank to tank via gravity with approximately 7.5 hours retention per tank with 4 tanks in series. The purpose of these tanks is for the dissolution of gold. The leached pulp then flows to the carbon-in-pulp (CIP) circuit for gold adsorption using activated carbon. The CIP circuit utilizes six tanks with a nominal retention time of 0.8 hour per tank allowing the slurry to flow by gravity through in-tank or interstage agitated screens. The CIP tails report to an activated carbon safety screen and tails are pumped to the CCD thickeners for cyanide recovery. Interstage screens retain the activated carbon within the CIP tanks, which advances carbon counter current to the slurry via vertical pumps within the tanks, operating on an operator initiated timed basis. Loaded carbon from the first tank (CIP #1) is scalped from the slurry over a screen and forwarded to the elution circuit to remove the gold. This elution step produces a concentrated solution of gold that is sent to the electrowinning circuit for gold recovery. The barren solution from electrowinning is recycled for reuse in the elution circuit. There is however a small bleed of weak cyanide solution from the elution/electrowinning circuit to either the leach tank(s) or alternatively the CIP #4 tank.

The tailings process begins with the washing of CIP tailings slurry in two CCD wash thickeners using water reclaimed from the tailings pond. This water washing recovers a portion of the cyanide from the tailings slurry for re-use in the gold extraction process. At the same time it reduces the cyanide content requiring destruction. The discharge from the CCD wash circuit is pumped to a cyanide destruction reactor where the concentration of cyanide (Weak Acid Dissociable (WAD) cyanide) is removed with the use of sulfur dioxide (SO2), air and/or oxygen and copper sulfate (CuSO4). A process discharge of < 2.0 milligrams per

liter (mg/L) of WAD cyanide is targeted. The reactor discharge is pumped to the tailings thickener about 3 km west of the plant site where the tailings are thickened to approximately 74% solids. The thickened tailings are then conveyed through tailings pipelines where they are spigotted within the tailings management area (TMA) to stack the tailings. Tailings lines are installed such that they are spill protected using ditching and spill containment ponds. The tailing solids settle within the impoundment, or tailings area, while the supernatant is contained as the primary pond. The tailings area consists of a shallow, valley-like depression that is contained by a series of seven engineered, low permeability dams (A-G) flanking the south and east sides of the tailings area. Seepage through dams is collected and contained in a seepage collection pond and pumped back to the tailings area when necessary. Additionally, a groundwater interception system was installed in 2010 to intercept a sulfate plume that is migrating from the toe of dam B of the TMA towards Zeemel Lake. This plume has been tracked over time with the use of groundwater monitoring wells. Approximately 75% of the tailings solution discharged to the tailings pond is returned to the mill process.

Surplus water from the mill (from mine dewatering and precipitation inflow) is stored and seasonally discharged to the receiving environment via the polishing pond to maintain a controlled water elevation within the tailings pond. Water discharges by gravity from the polishing pond to the treatment wetland. The decant valve on the polishing pond controls the water discharge rate from the polishing pond into the treatment wetland. The final point of compliance is the wetland outlet, where water is discharged through a flume into a permitted mixing zone in Lake 282 on the Paseminon River.

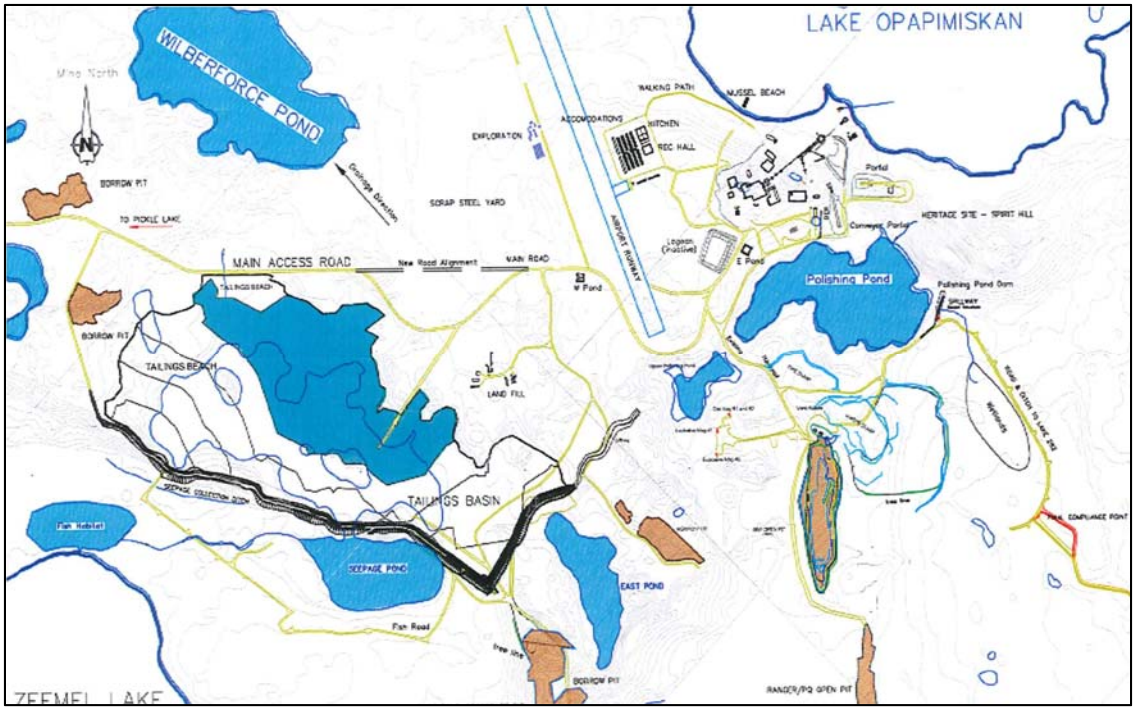

Figure 2: Mine Schematic

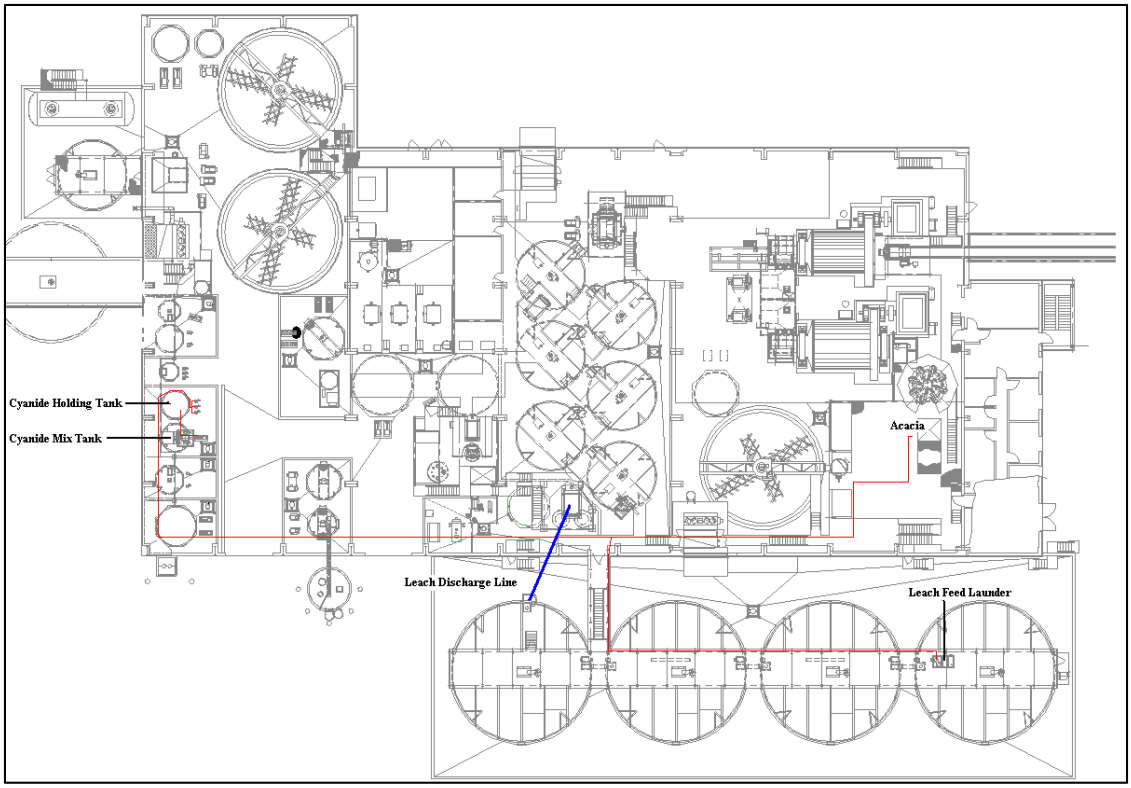

Figure 3: Mill Schematic

SUMMARY AUDIT REPORT

Auditors Findings

Musselwhite is:

- ☒ **in full compliance with**
- ☐ in substantial compliance with
- ☐ not in compliance with

The International Cyanide Management Code

No significant cyanide incidents or cyanide exposure incidents were noted as occurring during the recertification period.

Audit Company: Golder Associates Ltd.

Audit Team Leader: Evan Jones, Lead Auditor

Email: evanjones@golder.com

Name of Other Auditors

Name, Position	Signature
Kent Johnejack, Mining Technical Specialist	
Rick Frechette, Independent Reviewer	

Golder has been involved in the design of the Tailings Management Area at Musselwhite. Therefore, Golder subcontracted to Mr. Rick Frechette of Knight Piesold Inc. to address selected aspects of Standards of Practice 4.1.2, 4.8.1, 4.8.2, and 4.8.4 for the facilities where a conflict of interest exists.

Dates of Audit

The Recertification Audit was undertaken over four days from April 26 to 29, 2016.

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

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

Musselwhite Mine		September 16, 2016
Name of Facility	Signature of Lead Auditor	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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 1.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 1.1, requiring the operation 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.

Musselwhite purchases its sodium cyanide from Chemours (formerly E.I DuPont de Nemours) under a contractual Agreement. Chemours, the cyanide producer, was certified as compliant under the Code on December 1, 2009, and recertified on April 30, 2013.

Musselwhite's only supply of cyanide has been from the Chemours ICMI certified plant in Memphis USA for the period of the recertification audit; no other suppliers were used.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 2.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 2.1, requiring that the operation establish clear lines of responsibility for safety, security, release prevention, training and emergency response in written agreements with producers, distributors and transporters.

Musselwhite has a written cyanide supply agreement with DuPont (now Chemours) which clearly states the responsibilities for safety, security, release prevention, training and emergency response in written agreements with producers, distributors and transporters. This contract extends these responsibilities to any subcontractors and carriers that may be used by DuPont (Chemours).

Chemours subcontracts to Empire Express, Inc. (Empire), for the delivery of cyanide to the site. Empire was certified as Code compliant on October 12, 2010 and recertified on May 7, 2014.

For a period of time in 2013, Empire subcontracted delivery of cyanide to Musselwhite to RSB Logistic Inc. (RSB). RSB was certified as Code compliant on January 24, 2011, and that certification was valid throughout the period of time that RSB delivered cyanide to Musselwhite. In January 2014 RBS stopped subcontracting to Empire and have transported all loads themselves.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 2.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Transportation of cyanide to the Musselwhite is the responsibility of Chemours under the cyanide supply contract. This contract requires that the cyanide is transported by carriers certified and compliant to the Code.

The companies used to transport cyanide to the site during this recertification audit period were Empire and RSB.

Empire was certified as fully compliant with the Code on October 12, 2010 and was recertified to the Code on May 7, 2014. Empire was certified as Code compliant over the period of this recertification audit.

RSB was certified as fully compliant with the Code on January 24, 2011; RSB was not recertified to the Code in 2014. For the period of time prior to 2014 that RSB was used as a subcontractor for delivery of cyanide, RSB was certified as Code compliant.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 3.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 3.1, requiring that cyanide handling and storage facilities are designed and constructed consistent with sound, accepted engineering practices, quality assurance/quality control (QA/QC) procedures, spill prevention and spill containment measures.

Musselwhite has designed and constructed the warehouse and mixing area for solid cyanide in accordance with sound engineering practices. There have been no changes to these facilities since the previous recertification audit in 2013 and the findings are still valid. The cyanide mixing and storage area is located within the mill that was designed in 1996. A summary of the design was available, but the actual designs and specifications were unavailable. Musselwhite commissioned two consultants to independently conduct non-destructive testing (NDT) and inspect the mixing and storage area. These consultants concluded that the cyanide tanks, concrete foundation and containment, and associated piping systems operated per the original engineering design intent and were “satisfactory for continued operations within the operating parameters of standard normal industry practice”.

Musselwhite has located the warehouse and mill away from people and surface water. The warehouse and mill are located away from the nearest surface water, Lake Opapimiskan. The entire processing area also has stormwater controls to reduce the potential for impacted runoff from reaching surface water. There are no offices or places where workers congregate in the vicinity of the warehouse and mixing area. With respect to potential for exposure to the general public, the mine is a fenced secure area and there are no towns or houses in the vicinity.

Musselwhite has installed ultrasonic level sensors with alarms in the cyanide mixing tank and storage tank to prevent overfilling. The auditors observed tank levels on the mill floor panel and the mill control room screen to verify the sensors were functioning and reviewed the maintenance history from the eMESA® software to verify they were maintained throughout the recertification period.

Musselwhite has installed the mixing tank and storage tank within curbed concrete containment to prevent seepage to the subsurface. This cast-in-place reinforced concrete is also a competent barrier to leakage.

This containment has not changed since the 2013 recertification audit. The auditors observed that the containment was in good condition and free of debris.

Musselwhite receives solid cyanide in wooden IBC boxes and supersacks. These boxes and supersacks are stored in the reagent warehouse. The warehouse is adequately ventilated by open segments in two rollup doors to prevent the buildup of HCN gas. The warehouse is a metal building and the solid cyanide is stored on a sloped concrete floor with a grated catch channel at the downslope edge to reduce the potential for contact with water. The warehouse doors are locked with limited distribution of the key to prevent unauthorized access. The solid cyanide is stored separately from incompatible materials such as acids, oxidizers, and explosives. No foods, animal feeds, or tobacco products are stored in the warehouse.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 3.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Practice 3.2 requiring that cyanide handling and storage facilities are operated using inspections, preventive maintenance and contingency plans to prevent or contain releases and control and respond to worker exposures.

Musselwhite burns all empty cyanide containers to prevent them from being reused. Musselwhite also practices “first in/first out” use of the cyanide containers and tracks them by container number on the mixing checklist to ensure that none are misplaced. The cyanide mixing checklists contains staff sign-off that the containers were burned. Musselwhite rinses the empty containers over the hopper at the end of mixing such that the rinse water drains to the mixing tank. Musselwhite does not return cyanide containers to the vendor.

Musselwhite has developed and implemented procedures to prevent exposures and releases during cyanide unloading and mixing. The unloading procedure describes how to handle cyanide containers during transfer from the truck to the warehouse, including temporary barricading and traffic control in the vicinity of the warehouse. The unloading procedure specifies that cyanide containers can be stacked up to three tiers high. The procedures describe measures for clean-up of minor spills and refers to the Spill Prevention, Contingency, and Reporting Plan for larger spills.

The mixing procedure describes how to transfer the cyanide containers from the warehouse to the mixing area in the mill, as well as how to handle the containers with the crane during mixing. The mixing procedure details the operation of valves, agitators, pumps, exhaust fans, and cranes during mixing and transfer to the storage tank. The mixing procedure specifies that two operators be present. In addition, the control room operator observes mixing via video camera. The mixing procedure specifies standard PPE plus a full

face respirator with N-100 cartridges, Tyvek suits, rubber boots, and gloves, a portable HCN monitor, and radio.

To verify compliance, the auditors reviewed the unloading and mixing procedures, observed a mixing event, visited the burn pit, and reviewed completed unloading and mixing checklists from throughout the recertification period.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Golder Review

The cyanide facilities at Musselwhite are largely unchanged from the previous recertification in 2013 with the exception of modifications to the TMA. The list of cyanide facilities is as follows:

- Reagent warehouse
- Mill, including the following circuits: grinding, leach tanks, carbon-in-pulp (CIP), counter-current decant (CCD) thickeners, barren and pregnant tanks, elution, cyanide destruct, and cyanide mixing and storage
- Tailings thickener
- Tailings management area (TMA), including tailings and reclaim pipelines between the mill and TMA
- Musselwhite seasonally discharges from the TMA to the polishing ponds and wetland treatment area. Seepage also reports to a seepage control pond for return to the TMA. The maximum concentrations of WAD cyanide in these ponds was well below 0.5 mg/L during the recertification period. Similarly, the maximum concentration of WAD cyanide in the groundwater extraction system for the TMA was well below 0.5 mg/L. These facilities are included in the audit for completeness.

Musselwhite operates under the Goldcorp Sustainability Excellence Management System (SEMS). This management system is implemented via a cyanide code steering committee that meets monthly in accordance with a written procedure.

Musselwhite has designs, plans, manuals, and procedures that identify the assumptions and design criteria to prevent or control cyanide releases and exposures. The target concentration of free cyanide is: 100-150

mg/L for the grinding circuit; 2000 mg/L for the Acacia (intensive leach) circuit; and 400 mg/L for the leach tanks. The target pH in the process solutions is 10.8 or greater. HCN gas monitors are set to alert (by sound and visually) operators at 2.0 ppm (preventive) and 4.7 ppm (evacuation), except for the Acacia circuit (intensive leach) where the HCN alarms are set at 2.7 ppm and 4.7 ppm. The target pH in the cyanide destruct circuit (INCO/SO_2) is 8.5 and the destruction target is 1.5 mg/L WAD cyanide. The TMA was designed and operated with 1.5 meters of freeboard. The TMA was designed for an extreme event known as the "Timmins storm" of 193 millimeters in 12 hours. The regulatory effluent limits for total and WAD cyanide are 0.4 and 0.2 mg/L, respectively.

Musselwhite has developed written procedures that describe the practices necessary for the safe and environmentally sound operation of the cyanide facilities, including the specific measures needed for compliance with the Code and regulatory requirements. The procedures discuss the risks involved with each task (including unloading, storage, operations, entry into confined spaces, and equipment decontamination) and describe safe work practices. Each procedure details task specific procedures and personal protective equipment (PPE) requirements.

Musselwhite has developed a written procedure and worksheet specifically for changes related to cyanide management. The implementation measures include modification of procedures, training, scheduling, and responsibilities. The auditors reviewed seven examples of completed worksheets from throughout the recertification period to verify compliance.

Musselwhite has developed contingency procedures and plans. Contingencies include HCN releases, fires, spills, breach of the TMA to the environment, and catastrophic failure of the TMA. The closure plan describes contingency measures for short- and medium-term shutdowns.

Musselwhite inspects the cyanide facilities via operational inspections, planned general inspections (PGIs), and pre-work inspections that are sufficient to ensure the facilities are functioning as intended. Operators inspect the mill and TMA on rounds conducted every 4 hours. Inspections are documented on operating worksheets, log sheets, and forms that include the inspectors name, date/time of the inspection, and comments regarding deficiencies. The inspections cover the grinding circuit; CCD, destruct, and tailings circuits; leach and CIP circuits; strip circuit, and tailings thickeners; TMA; pumpback systems; and tailings/reclaim pipelines. Managers inspect the mill and TMA monthly during PGIs. Hazards are assigned risk ratings, corrective actions, responsible persons, and recommended timeline. Operators also conduct pre-work inspections of the cyanide mixing area before starting a mix and of the reagent warehouse before starting to unload the delivery truck. Specific types of inspections include annual non-destructive testing of the tanks and vessels; monthly geotechnical monitoring; annual tailings surveys; and formal annual inspections of the TMA by the engineer of record. The auditors reviewed examples of inspection forms from throughout the recertification period to verify compliance.

Musselwhite has implemented mechanical, electrical, and instrumentation maintenance programs using the eMESA software. The program includes both proactive (preventative) and reactive (corrective) maintenance. The auditors reviewed eMESA maintenance histories for randomly selected equipment and instruments to verify compliance throughout the recertification period.

Musselwhite receives electricity via commercial powerline from Ear Falls to Pickle Lake and a mine-owned powerline from Pickle Lake to the mine. In the event this line fails, Musselwhite has installed four generators with 5.9 megawatt (MW) total combined capacity, which is sufficient to run the mill. Maintenance staff perform weekly startup tests and a contractor performs annual maintenance. The auditors reviewed completed checklists and service reports from throughout the recertification period to verify compliance.

The TMA was modified during this recertification period with Golder as the engineer of record. This constitutes a conflict of interest under the Code and Golder contracted an independent reviewer to evaluate the assumptions, design criteria, regulatory requirements, operational procedures, monitoring program, and annual reviews by the engineer of record.

Independent Review

The staged raising of the tailings dykes at Musselwhite is defined in the 2013/2014 and 2015 design briefs. Design criteria are indicated to be unchanged from previous stages, which were subject to review as part of the original certification. The dykes are considered interior structures for containment of paste tailings, as opposed to the exterior perimeter dams constructed to store slurried tailings and therefore subject to a higher hazard classification. The exterior dams are unchanged and are not part of this recertification audit process.

The dyke raise designs were evaluated for slope stability with respect to static conditions and also for seismic conditions, and the structures were evaluated for liquefaction potential. The design documents indicate the stability analyses comply with the criteria established by the Canadian Dam Safety Guidelines. The design briefs were sealed by a Canadian Professional Engineer.

Spillway design for the TMA was completed for the exterior embankment Stages 1 through 3. Development of the spillway design was to meet the requirements established for approval of the TMA design. This design aspect would have been the subject of the initial certification audit. No change in design or operating philosophy has been made since this time that would negatively impact the functionality of the spillway, and the interior dyke system and its design and operation serve only to alleviate the demand on the spillway system.

Prevention of dam overtopping has been provided by maintaining adequate spare storage capacity for the design storm event and spillway flow capacity for the runoff from the Probable Maximum Flood. The design provides 1.5 meters of freeboard to accomplish this objective.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 4.2, requiring that the operation limit the use of cyanide to that optimal for economic recovery of gold so that the waste tailings material has as low a cyanide concentration as practical.

The ore at Musselwhite is generally consistent and does not require ongoing testing to re-evaluate the cyanide addition concentration of approximately 400 mg/L. However, Musselwhite commissioned a consultant in 2016 to conduct bottle roll tests on the effect of lead nitrate on the cyanide addition rate and gold recovery.

Given that the cyanide destruction circuit effectively limits concentrations in the tailings, the primary impetus for additional metallurgical testing is to reduce the consumption of cyanide and other reagents. The Ontario Toxic Reduction Act also requires that Musselwhite investigate measures to reduce reagent consumption. Musselwhite has investigated: (1) reducing dilution water to the milling circuit; (2) operating the CCD thickeners at a higher density to increase washing efficiency; and (3) lead nitrate optimization. The first two measures have the potential to reduce cyanide consumption by 2.3% and 2.5%, respectively, while the last measure was inconclusive.

Musselwhite has implemented both automatic and manual strategies to control cyanide additions. An automatic titrator has been installed in the #1 leach tank since 2007. Manual titrations are performed every four hours at the #1 leach tank, #3 leach tank, and the thickener overflow. The auditors reviewed completed examples of daily logsheets that showed adjustments to the cyanide addition flow rate and cyanide concentrations at the addition points to verify compliance throughout the recertification period.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.3**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

For most of the recertification period, Musselwhite used a water balance prepared in Excel with the Crystal Ball add-on. The previous recertification audit found this water balance to be comprehensive and probabilistic, and thus fully compliant. In mid-2015, Musselwhite internally prepared a new water balance in GoldSim. The site visit focussed on the 2015 GoldSim model that is currently in use.

The GoldSim model is both comprehensive and probabilistic. It is comprehensive in that in includes the appropriate facilities and processes. The model focuses on the TMA, but it also includes the seepage control pond, polishing ponds, and wetlands treatment area (even though these latter facilities have very low concentrations of WAD cyanide). Inflows include mine dewatering from the underground workings,

direct precipitation, snowpack accumulation and melting, runoff from the beach, tailings discharge, groundwater interception return inflows, and seepage control pond return flows. Given that the TMA is configured as an elevated ring dyke, there is no run-on. Outflows include evaporation, sublimation, snow blowoff, drainage to the seepage control pond, reclaim pumping to the mill, and excess water pumping to the polishing ponds. Seepage losses to groundwater are not modelled, but this is a conservative assumption with respect to predicting water levels in the decant pool and the potential for overtopping. Potential power outages are not included because Musselwhite has sufficient generator capacity to run the mill, thickeners, and cyanide destruction circuits. The model includes expected downtime for other reasons (e.g., maintenance shutdowns, pump failures) based on historic downtime records. The GoldSim model is probabilistic in that inputs and outputs are distributions rather than single values (deterministic). The model also includes an extreme event known as the "Timmins storm" of 193 millimeters in 12 hours.

To prevent uncontrolled overtopping, Musselwhite has prepared an Operation, Maintenance, and Surveillance (OMS) Manual with procedures for inspection and monitoring of the TMA. Musselwhite has installed level sensors in the decant pool and seepage control pond and operators check a staff gage as backup during daily inspections. Musselwhite annually surveys the tailings accumulation. The auditors reviewed the OMS Manual, spreadsheets, inspection forms, and survey results to verify compliance.

Musselwhite has designed and operated the TMA with adequate freeboard of 1.5 m. The auditors reviewed a time series graph that showed water levels were less than the freeboard elevation throughout the recertification period.

Musselwhite measures precipitation, evaporation, and other meteorological parameters on site. The meteorological station is located at the southeast corner of the TMA and the evaporation pan is located at the wetland treatment area. Musselwhite conducts snow surveys in the winter. The auditors reviewed spreadsheets and confirmed input to the GoldSim model to verify compliance.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.4**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

The open waters at Musselwhite are the decant pool at the TMA, the seepage control pond, the upper/lower polishing pond, and the wetland treatment area. Rather than restrictive measures, Musselwhite has implemented cyanide destruction to protect wildlife from cyanide exposure. The average concentration of WAD cyanide at the tailings thickener discharge was 2.3 mg/L and the maximum concentration of WAD cyanide in the decant pool was 1.34 mg/L during the recertification period. The maximum concentrations

of WAD cyanide in the seepage control pond, lower polishing pond, and wetland treatment area during the recertification period were 0.0041, 0.055, and 0.052 mg/L. Based on daily wildlife inspections at the TMA, there were no cyanide-related mortalities during the recertification period. The issue of overspray is inapplicable because Musselwhite 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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.5**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 4.5, requiring the operation implement measures to protect fish and wildlife from direct or indirect discharges of cyanide process solutions to surface water.

Musselwhite has a direct discharge from May to October annually to Lake 282, which is the end of the flow path from the TMA to the polishing ponds to the wetland treatment area. The maximum concentration of WAD cyanide in the discharge was 0.052 mg/L during the recertification period, well below the Code-required threshold of 0.5 mg/L. Musselwhite has a mixing zone in Lake 282 established by the Ministry of Environment and Climate Change. All results at the monitoring point at the downstream end of the mixing zone were non-detect for WAD cyanide at 0.002 mg/L during the recertification period. The auditors inferred that concentration of free cyanide was also less than 0.022 mg/L because free cyanide is measured as a component of WAD cyanide. Musselwhite does not have any indirect discharges to nearest surface water bodies at either Lake 282 or Zeemel Lake, as evidenced by non-detect concentrations of WAD cyanide at the monitoring points in these water bodies during the recertification period. Musselwhite has not caused cyanide concentrations to rise above standards and is not engaged in surface water remedial actions.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.6**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Musselwhite has implemented measures to protect groundwater. The mill has concrete floors and secondary containments to prevent infiltration to groundwater, as well as secondary containment and spill prevention for the tailings pipelines. The tailings embankments were constructed with clay cores and are underlain by a clay layer and/or glacial till. In addition, three finger drains direct seepage from the tailings to the seepage control pond where the water is recirculated to the decant pool. Musselwhite installed a groundwater extraction system in 2010 for sulfate control along the south perimeter of the TMA to reverse the groundwater gradient towards the TMA and away from Zeemel Lake.

There is no designated beneficial use for groundwater, nor any points of compliance or actual points of use. The Ontario Provincial Water Quality Board has not established a standard for cyanide in groundwater, although it has established a standard of 0.005 mg/L free cyanide for surface water. Musselwhite has voluntarily adopted a groundwater standard of 5 times the surface water standard (i.e., 0.025 mg/L) for WAD cyanide in groundwater. The auditors observed a spreadsheet showing that the maximum concentration of WAD cyanide measured in the 48 groundwater extraction wells was less than 0.025 mg/L during the recertification period.

Musselwhite does not use tailings as underground backfill.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.7**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 4.7 requiring that the operation provide spill prevention or containment measures for process tanks and pipelines.

Musselwhite has provided secondary containment for all cyanide mixing, storage, and process solution tanks at the mill. There are seven secondary containments related to the cyanide tanks and vessels at the mill. With the exception of the containment for the cyanide destruct tank, all of these containments have sumps. The containment for the cyanide destruct tank has flow through capacity to the adjacent containment for the CCD thickeners. Musselwhite does not discharge from secondary containments to the environment because automatically operated sump pumps return solutions to the process circuit. Musselwhite has also provided secondary containment for the tailings thickener building adjacent to the TMA. The auditors observed the secondary containments and sumps to be in good condition during the site visit.

Musselwhite has sized the secondary containments to hold at least 110% of the volume of the largest tank or vessel within its containment. There have been no changes to these secondary containments since the previous recertification audit in 2013. Therefore, compliance was achieved at that point in time and the

findings of the 2013 recertification audit are still valid. During the site visit, the auditors observed that the secondary containments did not contain debris or extraneous materials that would reduce their capacity.

Musselwhite has provided spill containment and spill prevention measures for all cyanide-related pipelines. The pipelines within the mill and the tailings thickener are located over concrete containment. The pipelines between the mill and TMA are located within containment and equipped with spill prevention measures. The concentrations of WAD cyanide are less than 2 mg/L in these pipelines. The pipelines are located within a ditch lined with compacted clay for most of their route. Flow meters have been installed and are set to alarm in the mill control room if a specified differential pressure lasts for more than 10 minutes. The auditors observed the containment ditch for the tailings and reclaim pipelines to be in good condition during the site visit.

Musselwhite has determined that there are no locations where cyanide pipelines pose an undue risk to surface water. The cyanide facilities are located within the watersheds reporting to the polishing ponds and the TMA.

Musselwhite has constructed process tanks and pipelines of carbon steel, stainless steel, and HDPE. These materials are compatible with cyanide and high pH conditions. The auditors observed these materials during the site visit to verify compliance.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.8**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 4.8 requiring that operations implement QA/QC procedures to confirm that cyanide facilities are constructed according to accepted engineering standards and specifications.

Golder Review

Other than the TMA, there have been no changes to the cyanide facilities since the previous recertification audit in 2013. Therefore, compliance was achieved at that point in time and the findings of the 2013 recertification audit report are still valid. To summarize, the previous audit report found that Musselwhite implemented QA/QC programs during the construction of the cyanide facilities. The content of these QA/QC programs addressed borrow sources, earthen materials, concrete, soil compaction, foundations, and geomembrane liners. Musselwhite used appropriately qualified personnel to review QA/QC records except for the original construction of the cyanide mixing and storage area. For the cyanide mixing and storage area, Musselwhite retained independent reviewers to evaluate the facilities.

Musselwhite has retained QA/QC records. Older documents are stored as hard copies in the central filing system. Newer documents are stored on-line in the Conveyor software. The auditors inspected the central filing and Conveyor systems to verify compliance.

The TMA was modified during this recertification period with Golder as the engineer of record. This constitutes a conflict of interest under the Code and Golder contracted an independent reviewer (see below).

Independent Review

The As-Built Reports for Stage 4 North/Stage 5 South (2013) and Stage 5 North/Stage 6 South (2015) Dyke raises have been provided and reviewed. The As-Built Reports summarize the key design aspects including materials and specifications, and provide a description of the completed construction work. The construction documents indicate that quality control and quality assurance programs have been conducted during the construction.

The provided Construction Quality Assurance (CQA) services address the suitability of construction materials via gradation testing and adequacy of fill compaction via compaction testing for the dyke raise construction. The fill material for these raises was generally limited to a sand and gravel material. Where material specifications were not met, namely in the dyke raise material for 2015, the suitability of the available material was confirmed by the designer.

The CQA work was completed by qualified personnel and under the responsible charge of a qualified Professional Engineer (P. Eng.) involved in the facility design. The CQA reports indicate the work to be in conformance with the design and meeting the relevant specifications. The reports have been signed by this same P. Eng.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 4.9**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Musselwhite has developed written procedures for monitoring surface water, groundwater, and wildlife. The original sampling and analyses protocols were in alignment with Ministry of Environment guidance. The environmental manager, a qualified degreed environmental scientist, has reviewed the procedures at least annually. Samples are analysed by ALS Laboratories, which is certified by the Canadian Association of Laboratory Accreditation.

The groundwater and surface water sampling procedures specify field and laboratory methods: sampling equipment, methods, containerization, preservation, holding times, decontamination, quality assurance, documentation, sampling locations, and sampling frequencies. The cyanide species to be analysed are WAD and total cyanide. There are specific guidelines for filling out chain of custody forms and shipping samples. The auditors reviewed field logbooks to verify that weather, wildlife activity, and other anthropogenic factors that might affect sample integrity were documented throughout the recertification period.

Musselwhite monitors for cyanide in surface water and groundwater at 61 groundwater monitoring wells and 17 surface water stations. Most monitoring wells are downgradient of the TMA. Surface water stations are located along the flow path from the decant pool at the TMA to Lake 282, as well as other flow paths for potential seepage to Zeemel Lake.

Musselwhite monitors at frequencies that are adequate to characterize changes in groundwater and surface water quality in a timely manner. The groundwater monitoring frequencies are quarterly, semi-annual, and annual scheduled depending on location. Surface water monitoring frequencies are daily, thrice weekly, weekly, monthly, quarterly, annual, and every two years depending on location and season.

Musselwhite inspects for wildlife mortalities daily in accordance with a written plan. The auditors reviewed completed logsheets and a summary spreadsheet to verify that these inspections were completed throughout the recertification period.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 5.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Musselwhite has planned for effective decommissioning of the cyanide facilities to protect humans, wildlife, and the environment. Musselwhite has developed a mine-wide closure plan with an appendix specifically for cyanide decommissioning. The cyanide decommissioning plan contained the appropriate cyanide-related facilities and activities, including disposition of residual cyanide by use in the process circuit, disposal of cyanide-affected sediment and scale, decontamination by triple rinsing followed by confirmation sampling, and decontamination of the tailings pipelines by triple rinsing with burial in-place or reuse at another mine. The tailings are detoxified and thickened prior to disposal in the TMA and the decommissioning plan stated that the cyanide concentrations are such that they will not have an adverse impact to people, wildlife, or the environment. Table 9.2 of the mine-wide closure plan presented a Gantt chart showing the closure schedule in terms of years after closure. The appendix for cyanide decommissioning was reviewed and updated in April 2016.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 5.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Musselwhite has established a financial assurance mechanism capable of fully funding cyanide decommissioning activities. A table in the 2016 cyanide decommissioning plan summarizes the current decommissioning costs for the appropriate facilities and activities. Musselwhite also provided a cost spreadsheet with a general note stating "equipment and labor rates are assumed to be unionized" as evidence that the decommissioning costs are based upon third-party implementation. Musselwhite has reviewed and updated the decommissioning costs throughout the recertification period as part of Goldcorp's Asset Retirement Obligation (ARO) process at the end of each calendar year. The auditors reviewed annual ARO memorandum to verify compliance. The 2016 ARO memorandum was not yet available at the time of the site visit, but the 2016 version of the decommissioning plan contained a current cost estimate. Musselwhite has established an irrevocable standby letter of credit accepted by the Ontario Ministry of Northern Development and Mines as a financial mechanism. The amount covers mine-wide closure, which is considerably greater than the cost for cyanide decommissioning alone.

3.0 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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 6.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The site is in full compliance with Standard of Practice 6.1 requiring that the site identify potential cyanide exposure scenarios and take measures as necessary to eliminate, reduce and control them.

Musselwhite has developed Operating Procedures for the mill, for maintenance, and for general site safety that specify the working procedures and PPE required to eliminate, reduce and control risks of cyanide exposure. The procedures, and supplemental checklists that accompany some of the procedures, specify the requirements for PPE and pre-work inspections and verify that these precautions are taken.

A change management procedure is in place to ensure the proposed process and procedural changes consider and address worker safety.

Worker input is achieved through various mechanisms including the Cyanide Committee, the Joint Health and Safety Committee (JHSC), and operating procedure reviews and sign-offs.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 6.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 6.2 requiring that the site operate and monitor cyanide facilities to protect worker health and safety and periodically evaluate the effectiveness of health and safety measures.

The site has determined appropriate pH (around 10.8, following mixing) for operating the facility. The site uses both fixed and portable HCN monitors to ensure that worker exposure to HCN gas is less than exposure limits. The monitors are set to alarm when the concentration of HCN reaches 2 ppm, which triggers an investigation for the source of elevated HCN concentration, and again when the HCN concentration reaches 4.7 ppm, which triggers an evacuation and emergency response.

Areas of exposure to concentrations of HCN that could equal or exceed 4.7ppm have been identified and signage has been posted in these areas. Operating and maintenance procedures have been developed that specify the PPE to be worn and gas monitoring to be conducted when performing tasks that could lead to this exposure.

The fixed HCN monitors and portable multi-gas detectors are calibrated in accordance with the manufacturer's recommendations. Portable HCN monitors are bump-tested each time they are used. Records of calibration are kept on site for at least 1 year.

Warning signs have been placed in all areas where cyanide may be encountered, and on all cyanide facilities warning that the tanks and pipes may contain cyanide solutions. Signage also prohibits eating, smoking or drinking in cyanide areas. Purple painting has been applied to the mix tank and cyanide piping where accessible, while all pipping is labelled with contents and direction of flow.

Emergency showers and eye wash stations are located at locations around the plant and in the reagent warehouse where there is a risk of cyanide exposure. These are checked regularly in inspections and through planned maintenance. Type ABC fire extinguishers were located at numerous places around the plant. The inspection records were attached to the fire extinguishers.

MSDS sheets are available at all computers in the workplace, and are posted in cyanide handling areas in English (the language of the workforce) at various locations around the plant site.

Procedures are in place to report and investigate incidents and cyanide exposures, and to modify procedures in the light of any findings from the investigations.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 6.3**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Musselwhite has three CAREvent kits located in cyanide facilities that are inspected and maintained on a regular basis. Workers are trained in the use of CAREvent kits on an annual basis. Musselwhite provides 24 hour coverage onsite with qualified nursing staff that are able to administer oxygen therapy and IV cyanide antidote kits required for treating potential victims of cyanide exposures. First aid equipment is regularly inspected to ensure it will function correctly and remains within it useful life.

Musselwhite has specific written plans for dealing with cyanide exposures, including emergency response and patient transfer. Musselwhite has on site facilities, including occupational nurses and a medical clinic to provide first aid to staff exposed to cyanide.

Musselwhite has a procedure to transport cyanide exposure victims to Thunder Bay Regional Health Sciences Centre, using ORNGE air evacuation services. Musselwhite has retained the services of Dr. Leischman to advise site nurses on cyanide treatment, and to develop a Medical Directive for treatment of cyanide exposures. Musselwhite has an agreement with the Thunder Bay Regional Health Sciences Centre to stock materials required to treat cyanide exposures, and to follow the medical directive when treated patients for cyanide exposure.

Mock drill are performed to test the emergency response procedures developed at site, and to incorporate learning's from these drills into revised procedures.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 7.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 7.1 which requires that the site prepare detailed emergency response plans for potential cyanide releases.

Musselwhite has a set of detailed and comprehensive written emergency response plans and procedures that work together as an overall Emergency Response Plan (ERP) to deal with potential cyanide releases.

The plans consider all reasonably foreseeable cyanide failure scenarios, including off site and on site transportation incidents, and sodium cyanide and HCN releases associated with all cyanide facilities.

The plan addresses the potential need for evacuations of both the site and describes procedures to respond to exposures. It specifies procedures for the use of specialised first aid equipment, antidotes and measures to control cyanide releases.

Contact information in the event of an emergency is provided for external agencies, nearby communities, and First Nations.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 7.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Musselwhite does not have any nearby communities that would be affected by cyanide releases at the site; however, Musselwhite does maintain an Environmental Working Committee (EWC) with area First Nations that discusses, among other issues, cyanide risks and use at the site.

Musselwhite maintains on-site capability to respond to cyanide emergencies, without aide from external agencies.

Musselwhite maintains an agreement The Thunder Bay Regional Health Sciences Centre to provide medical treatment for cyanide exposures, following the medical directive developed by Dr. Leischman.

Musselwhite's Spill Prevention, Contingency, and Reporting Plan (SPCRP) provides current contact information for communities, First Nations and regulatory agencies that would be notified in the event of a cyanide incident.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 7.3**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 7.3 which requires that the site designate appropriate personnel and commit necessary equipment and resources for emergency response.

Musselwhite's SPCRP, together with the E2 Plan for Sodium Cyanide and the OMS Manual, defines emergency response roles and responsibilities for personnel including the emergency response team, and identifies training requirements for relevant personnel. Equipment requirements are included in the SCCRP; equipment inspections are described in operational SOPs and the occupational nurse's procedures. Musselwhite maintains sufficient on-site capability to respond to cyanide incidents without the aid of external parties. Musselwhite maintains an agreement with the Thunder Bay Regional Health Sciences Centre to provide treatment for cyanide exposures. Procedures for transport to the Centre, and contact information for the Centre, are included in SOPs and the E2 Plan.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 7.4**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 7.4 which requires that the site develop procedures for internal and external emergency notification and reporting.

Musselwhite has established internal reporting requirements, and the ERP identifies roles, responsibilities and procedures for external communication related to cyanide incidents and emergencies.

The ERP and related documents give details for contacting external parties, and roles, responsibilities and procedures for communications with the media.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 7.5**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

The emergency response plans specify specific remediation measures for solid and liquid cyanide releases. These measures included response procedures, clean-up standards and the disposal of clean-up residuals.

The use of sodium hypochlorite, ferrous sulphate and hydrogen peroxide are specifically prohibited for the neutralisation of cyanide that may enter into surface water.

The emergency response plan gives details of the locations and methodologies of required environmental monitoring and the sampling.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 7.6**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 7.6, which requires that the site periodically evaluate response procedures and capabilities and revise them as needed.

Musselwhite updates the ERP at least annually, and following mock drills or cyanide-related events.

Mock cyanide emergency drills, including cyanide spills and worker exposures, are performed at least annually.

The mine has a system to review the results of emergency responses and mock emergency drills and update procedures accordingly.

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.

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 8.1**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

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

Musselwhite provides cyanide awareness training and related operating procedure training to all relevant workers, and includes an annual refresher training requirement.

Musselwhite has developed a training requirements matrix that identifies the required training for all worker groups, including training in cyanide related procedures.

Musselwhite Safety Department maintains records of training.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 8.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 8.2 which requires that the site train appropriate personnel to operate the facility according to systems and procedures that protect human health, the community and the environment.

Musselwhite trains workers to undertake cyanide related tasks safely with respect to themselves, their colleagues, the community and the environment through induction training, cyanide awareness training, and procedure reviews.

The training materials identify the elements necessary for the safe performance of each job, based on the sites operating procedures.

Appropriately qualified personnel deliver the training.

Employees are trained prior to working with cyanide, with quizzes and “show me” observations to ensure they understand the requirements.

Refresher training is undertaken annually for cyanide awareness and procedure reviews.

Detailed records of training are retained as hard copy records, supported by some records that are also kept in a SAP database.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 8.3**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 8.3 which requires that the site train appropriate workers and personnel to respond to exposures and environmental releases of cyanide.

All mill workers and contractors are trained in the appropriate emergency response for worker exposure and environmental releases of cyanide.

Emergency responders are trained in cyanide decontamination and first aid procedures and participate in mock emergency response drills.

Emergency responders are trained in the procedures included in the emergency response plan concerning cyanide, and in the use of appropriate equipment.

Offsite emergency responders are not required other than the Thunder Bay Health Sciences Centre, which has agreed to abide by the medical directive prepared by Dr. Leischman, including the provision of necessary materials and equipment.

Refresher training in cyanide emergency response is undertaken annually.

Emergency response mock drills are undertaken at least annually.

Emergency response mock drills are evaluated and lesson learned captured and incorporated into the updated procedures.

Emergency response training records are retained in hard copy and on the SAP database system.

PRINCIPLE 9 – DIALOGUE

Engage in Public Consultation and Disclosure

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 9.1**

☐ not in compliance with

Summarise the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 9.1 which requires that the site Provide stakeholders the opportunity to communicate issues of concern.

Musselwhite has maintained an EWC since 2001 that provides regular opportunities for mutual interactions with area First Nations, and enables the First Nations to voice concerns.

Musselwhite has presented to communities on site practices and distributes a quarterly magazine that includes information on cyanide-related activities, and provides opportunities for questions and feedback.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 9.2**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 9.2 which requires that the site initiate dialogue describing cyanide management procedures and actively address identified concerns.

Musselwhite regularly provides information to First Nations and communities regarding cyanide use and management at the site, through the EWC, community presentations, and “The Scoop” quarterly magazine.

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

The operation is

☒ in full compliance with

☐ in substantial compliance with **Standard of Practice 9.3**

☐ not in compliance with

Summarize the basis for this finding/deficiencies identified:

The operation is in full compliance with Standard of Practice 9.3 which requires that the site make appropriate operational and environmental information regarding cyanide available to stakeholders.

Musselwhite makes operational and environmental information regarding cyanide available through community presentations, the EWC, and the quarterly magazine "The Scoop". Some information is also available on the Musselwhite public website.

The majority of the local population is literate and so written information is considered adequate, although the community presentations include verbal and visual communication materials.

Information regarding cyanide releases would be made available through regulatory reports and Goldcorp's annual sustainability report.

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