KEMESS UNDERGROUND PROJECT

Air Quality Management Plan

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Air Quality Management Plan

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GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

Air Quality Standards	Objectives for maximum concentrations of air contaminants in the atmosphere developed to ensure long-term protection of public health and the environment.
Ambient Air Quality	The outdoor air quality at a particular site
AQMP	Air Quality Management Plan
AuRico	AuRico Metals Inc.
BC	British Columbia
BC MOE	British Columbia Ministry of Environment
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CEAA	Canadian Environmental Assessment Agency
CEPA	*Canadian Environmental Protection Act, 1999*
Carbon Monoxide (CO)	CO is a gas emitted from combustion engines due to incomplete combustion and is also a by-product of blasting operations. CO is lighter than air and is toxic to humans.
CO_2e	Carbon Dioxide Equivalent
COPC	Contaminant of Potential Concern
CWS	Canada-Wide Standards
Dioxins	Polychlorinated dibenzodioxins (PCDDs), or simply dioxins, are a group of polyhalogenated organic compounds that can act as environmental pollutants. They are commonly referred to as dioxins for simplicity in scientific publications because every PCDD molecule contains a dioxin skeletal structure. Members of the PCDD family have been shown to bioaccumulate in humans and wildlife due to their lipophilic properties.
EAC	Environmental Assessment Certificate (#M17-01)
EAO	BC Environmental Assessment Office
ECCC	Environment & Climate Change Canada
EMA	British Columbia *Environmental Management Act*
EMC	Environmental Management Committee

EMP	Environmental Management Plan
EMPR	BC Ministry of Energy, Mines and Petroleum Resources
EMS	Environmental Management System
ENV	BC Ministry of Environment and Climate Change Strategy
eq/ha/yr	Acid equivalents per hectare per year
FLNRO	BC Ministry of Forests, Lands, Natural Resource Operations & Rural Development
Fugitive Dust	Particulate matter, often sand or mineral dust, released to the atmosphere by mechanical disruption of soil or by wind scouring
Furans	Polychlorinated dibenzofurans (PCDFs), or simply furans, are a group of halogenated organic compounds which are toxic environmental pollutants. PCDFs tend to co-occur with polychlorinated dibenzodioxins (PCDDs). PCDFs can be formed by pyrolysis or incineration at temperatures below 1,200°C of chlorine-containing products such as PVC, PCBs, and other organochlorides, or of non-chlorine containing products in the presence of chlorine donors.
GHG	Greenhouse gas. In British Columbia an industrial operation emitting 10,000 or more tonnes of carbon dioxide equivalent (CO_2e) per year must report their emissions to the provincial government annually. The Government of Canada requires reporting for operations emitting 50,000 or more tonnes CO_2e per year.
IEM	Independent Environmental Monitor
kW	Kilowatt
KLV	Kemess Lake Valley
KS	Kemess South
KUG	Kemess Underground
µg/m³	Micrograms per cubic metre
mg/dm²/day	Milligrams per square decimetre per day
MEM	BC Ministry of Energy and Mines
Mercury	Mercury is a natural and persistent bioaccumulative element which can be transported many kilometers in the atmosphere. Mercury can be deposited to waterbodies from anthropogenic emissions and poses a threat to human and ecosystem health. Mercury also enters the environment through the disposal (e.g., land filling, incineration) of certain products. Products containing mercury include: auto parts, batteries, fluorescent bulbs, medical products, thermometers, and thermostats.
NAAQO	National Ambient Air Quality Objectives

NPRI	National Pollutant Release Inventory
Oxides of Nitrogen (NO_x)	NO_x gas primarily consists of nitrogen oxide (NO) and nitrogen dioxide (NO_2). The gases are emitted with exhaust from combustion engines and are by-products of blasting operations. NO_x can be converted to nitric acid in the atmosphere and thus contribute to acid deposition.
ORAR	Omineca Resource Access Road
PASS	Passive Air Sampling System
PCDD	Polychlorinated dibenzodioxins
Permit	*Environmental Management Act* discharge Permit (#14928)
PM_{10}	Inhalable particulate matter. PM_{10} particles are airborne particles that have a diameter of 10 microns or less and are thus a subset of total suspended particulate. The majority of PM_{10} particles are from fugitive dust sources. PM_{10} can enter the respiratory system and has been linked to respiratory problems.
$PM_{2.5}$	Respirable particulate matter ($PM_{2.5}$) is a subset of PM_{10} and defined as particles with a diameter less than 2.5 microns. These particles are small enough to enter deep into the respiratory system. The majority of particulate matter emitted in diesel engine exhaust is $PM_{2.5}$.
Project	KUG Project
QA/QC	Quality assurance/quality control
SOP	Standard Operating Procedure
Sulphur Dioxide (SO_2)	Fossil fuel contains a small amount of sulphur-containing organic compounds. During fuel combustion, the sulphur is oxidized and emitted as SO_2 gas with the engine exhaust. In the atmosphere, SO_2 can further oxidize to sulphate, which contributes to acid deposition.
t	Tonnes
tpd	Tonnes per day
TSF	Tailings Storage Facility
Total Particulate Matter (TPM)	Total particulate matter (TPM) is airborne particulate matter with an upper-size limit of approximately 100 microns in aerodynamic equivalent diameter.
Total Suspended Particulates (TSP)	Total suspended particulates (TSP) are solid matter or liquid droplets having aerodynamic particle sizes from 0.01 to 100 microns in diameter and are found in smoke, dust, fuel ash, or condensing vapours that can be suspended in the air.
US EPA	United States Environmental Protection Agency. The US EPA has promulgated a variety of guidelines, objectives, emission factors, air dispersion modelling procedures and statutes for the protection of ambient air quality.

1. PURPOSE AND OBJECTIVES

The purpose of the AuRico's Kemess Underground (KUG) Project (Project) AQMP is to identify:

- the legislation, standards, commitments and conditions relevant to air discharges from the Project;
- the environmental protection or mitigation measures that are established to avoid, control, and mitigate air discharge impacts;
- monitoring measures to collect on-site air quality data, as may be required, to meet regulatory requirements and to enable the implementation of adaptive follow-up programs as needed; and
- reporting requirements.

The objective of the AQMP is to establish measures to mitigate emissions from Project activities to meet air quality legislative requirements, commitments and conditions outlined in Section 1.3. The air contaminants included for consideration are nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), suspended particulate matter (total suspended particles [TSP], PM_{10}, and $PM_{2.5}$), and dustfall as well as GHG emissions.

The AQMP was written to comply with guidelines outlined in *Developing a Fugitive Dust Management Plan* (MEM, ENV 2018).

2. COMPLIANCE OBLIGATIONS

2.1 LEGISLATION AND REGULATIONS

The federal government has set National Ambient Air Quality Objectives (NAAQOs) and Canadian Ambient Air Quality Standards (CAAQS) under the *Canadian Environmental Protection Act* (CEPA), 1999 (S.C. 1999, c. 33). Canadian Council of Ministers of the Environment (CCME) CAAQSs are intended to be achievable targets that will reduce health and environmental risks within a specific timeframe, whereas NAAQOs identify benchmark levels of protection for people and the environment. The CAAQS for $PM_{2.5}$ were adopted in British Columbia (BC) in 2013 and are effective from 2015 and 2020. In addition, BC has also developed air quality objectives for a number of contaminants. Federal and Provincial air quality criteria presented below in Table 2.1-1 are not legal compliance requirements but rather objectives and/or targets.

The applicable air quality related standards, objectives, legislation, and regulations relevant to the Project include:

- National Ambient Air Quality Objectives (NAAQOs; CCME 1999);
- Canadian Ambient Air Quality Standards (CAAQS; CCME 2013);
- BC Ministry of Environment (BC MOE) Ambient Air Quality Objectives (AAQOs; BC MOE 2016);

- Canada-wide Standards (CWS) for Dioxins and Furans (CCME 2009);
- CWS for Mercury emissions (CCME 2010);
- Sulphur in Diesel Fuel Regulation (SOR/2002-254); and
- *Environmental Management Act*, SBC. C. 53 and associated regulations:
  - Open Burning Smoke Control Regulation (BC Reg. 145/93);
  - Waste Discharge Regulation (BC Reg. 320/2004); and
  - Code of Practice for the Concrete and Concrete Products Industry (BC Reg. 329/2007).

Table 2.1-1. Summary of the Federal and Provincial Ambient Air Quality Criteria

		Canada			British Columbia
		National Ambient Air Quality Objectives [1]		Canadian Ambient Air Quality Standards [2]	Ambient Air Quality Objectives [3]
Pollutant	Averaging Time	Maximum Desirable	Maximum Acceptable		Objectives
SO_2 (µg/m³)	1-hour	-	-	183/170 [8]	196 [9]
	24-hour	-	-	-	-
	Annual	-	-	13/10.4 [8]	-
NO_2 (µg/m³)	1-hour	-	-	113/79 [8]	188 [9]
	24-hour	-	-	-	-
	Annual	-	-	32/23 [8]	60 [9]
CO (µg/m³)	1-hour	15,000	35,000	-	14,300
	8-hour	6,000	15,000	-	5,500
TSP (µg/m³)	24-hour	-	120	-	-
	Annual	60	70	-	-
PM_{10} (µg/m³)	24-hour	-	-	-	50
$PM_{2.5}$ (µg/m³)	24-hour	-	-	28 [6] (27 [7] in 2020)	25 [4]
	Annual	-	-	10 [7] (8.8 [8] in 2020)	8 [5]

Notes:
(-) dash indicates not applicable; µg/m³ – microgram per cubic metre
[1] Environment Canada (EC; 1999).
[2] CAAQS adopted in 2013 and are in effect from 2015 and 2020 (CCME 2013).
[3] BC MOE 2016.
[4] Based on annual 98th percentile value.
[5] BC objective of 8 µg/m³ and planning goal of 6 µg/m³ was established in 2009.
[6] The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.
[7] The 3-year average of the annual average concentrations.
[8] CAAQS effective 2020/2025.
[9] Interim Provincial Objectives.

Exposure to airborne pollutants in the workplace is regulated by the British Columbia Ministry of Energy and Mines (MEM) under Part 2 of the *Health, Safety and Reclamation Code for Mines in British Columbia* (MEM 2008).

There is currently no national or provincial legislation in place regarding greenhouse gas (GHG) emission limits at the project level. There are, however, provincial and national reporting requirements regarding the emission of GHGs. The provincial and federal legislation driving reporting are the BC Reporting Regulation (BC Reg. 272/2009) and the Environment & Climate Change Canada (ECCC) *Canadian Environmental Protection Act* (CEPA), 1999 (S.C. 1999, c. 33). GHG reporting is discussed further in Section 8.2.2.

2.2 PERMITTING

AuRico was granted an Environmental Assessment Certificate (EAC, #M17-01) on March 15, 2017 that included a series of conditions associated with the EAC. This Air Quality Management Plan (AQMP) partially or completely fulfills Certificate Conditions #2, #25d and #27 and Decision Statement Conditions 2.6 and 5.1 (see subsequent sections of this plan), and are copied below for reference:

EAC Condition #2

Where a condition of this Certificate requires the Holder to develop or update a Document, any such Document must, at a minimum, include the following information:

- *a) purpose and objectives of the Document;*
- *b) roles and responsibilities of the Holder, Project personnel and contractors;*
- *c) names and if applicable, professional certifications and professional stamps/seals, for those responsible for the preparation of the Document;*
- *d) schedule for implementing the Document throughout the relevant Project phases;*
- *e) means by which the effectiveness of the mitigation measures will be evaluated including the schedule for evaluating effectiveness;*
- *f) adaptive management plan to address effects of the Project if those effects:*
  - *i) are not mitigated to the extent contemplated in the Application; or*
  - *ii) are not predicted in the Application;*
- *g) schedules and methods for the submission of reporting to specific agencies, Aboriginal Groups and the public and the required form and content of those reports; and*
- *h) process and timing for updating and revising the Document, including any consultation with agencies and Aboriginal Groups that would occur in connection with such updates and revisions.*

EAC Certificate Condition #25

The Holder must retain a Qualified Professional to update the Wildlife Management and Monitoring Plan in section 24.19 of the Application. The updated plan must be developed in consultation with MEM, FLNRO, ECCC and Aboriginal Groups.

Omineca Resource Access Road (ORAR) Environmental Monitoring and Management Plan

The plan must include at a minimum:

d) Monitoring of road dust on wildlife habitat on the Northern Section of the ORAR and adaptive management of road dust;

EAC Condition #27

The Holder must retain a Qualified Professional to update the Air Quality Management Plan in section 24.3 of the Application. The updated plan must be developed in consultation with ENV, MEM, Northern Health Authority and Aboriginal Groups.

The updated plan must include at a minimum:

a) The means by which the mitigation measures listed in sections 7.1.7 and 24.3.4 of the Application are implemented;

b) Mitigations to reduce potential $PM_{2.5}$ concentrations;

c) Mitigations and monitoring to minimize dust emissions to the satisfaction of a qualified professional;

d) Monitoring of metal contaminants contained in fugitive dust at human health receptor locations (including but not limited to the worker camp) and mitigation to address effects identified by a Qualified Professional; and

e) Comparison of monitoring results to relevant health guidelines including but not limited to other jurisdictions if BC does not have a health guideline for a particular contaminant and implementation of additional monitoring or mitigation if exceedances are observed.

The Holder must provide a draft plan to ENV, MEM, Northern Health Authority, Aboriginal Groups and EAO for review a minimum of 45 days prior to the planned commencement of Construction. The Holder must provide the updated plan to ENV, MEM, Northern Health Authority, Aboriginal Groups and EAO no less than 90 days after commencing Construction.

The plan, and any amendments thereto, must be implemented to the satisfaction of a Qualified Professional throughout Construction, Operations and Closure and to the satisfaction of EAO.

Decision Statement Condition 2.6

2.6 The Proponent shall, where a follow-up program is a requirement of a condition set out in this Decision Statement:

2.6.1 conduct the follow-up program according to the information determined pursuant to condition 2.4;

2.6.2 undertake monitoring and analysis to verify the accuracy of the environmental assessment as it pertains to the particular condition and/or to determine the effectiveness of any mitigation measure(s);

2.6.3 determine whether modified or additional mitigation measures are required based on the monitoring and analysis undertaken pursuant to condition 2.6.2; and

2.6.4 if modified or additional mitigation measures are required pursuant to condition 2.6.3, develop and implement the modified or additional mitigation measures in a timely manner and monitor them pursuant to condition 2.6.2.

Decision Statement Condition 5.1

5.1 The Proponent shall develop, prior to construction and in consultation with Indigenous groups and relevant authorities, a follow-up program to verify the accuracy of the environmental assessment as it pertains to adverse effects on the health of Indigenous Peoples caused by changes in concentrations of contaminants of potential concern identified during the environmental assessment in air, soil, water, and sediment. The Proponent shall implement the follow-up program during construction and operation. As part of the development of the follow-up program, the Proponent shall:

5.1.1 identify levels of environmental change relative to established baseline conditions for contaminants of potential concern that would require the Proponent to implement modified or additional mitigation measure(s) to mitigate increased risks to human health; and

5.1.2 if monitoring results demonstrate that concentration levels for contaminants of potential concern are greater than the identified levels of environmental change, update the human health risk assessment for the consumption of traditional foods exposed to these contaminants and communicate the results of the updated human health risk assessment to Indigenous groups.

AuRico was granted an *Environmental Management Act* discharge Permit (#14928) most recently amended on December 20, 2011 that included air discharge requirements for a refuse incinerator. This AQMP is consistent with section 1.1 of Permit #14928 (see subsequent sections of this plan), and is copied below for reference:

1.1 Refuse Incinerator

This section applies to the discharge of air contaminants from a refuse incinerator. The site reference number for this discharge is E288229.

1.1.1 The maximum authorized rate of discharge is 30 m^3/minute, continuously for 10 hours/day. The volume of the cookhouse waste fed to the incinerator is 1.0 m^3/day.

1.1.2 The characteristics of the contaminants shall not exceed a discharge smoke opacity of 20% except for up to 5% of the operating period when the smoke opacity must not exceed 40%.

1.1.3 The works authorized are two auxiliary-fuelled incinerators, stack and related appurtenances.

1.1.4 The wastes authorized for incineration in the incinerator specified in 1.1.3 are domestic putrescible waste, paper, cardboard and lumber scraps. Putrescible waste must not be discharged in the landfill authorized in sections 1.2 and 1.3 below. Oil, oil filters, or plastics must not be burned in the incinerator.

1.1.5 The ash must be removed from the incinerator to ensure efficient combustion and disposed of in the landfill operation authorized in sections 1.2 and 1.3.

1.1.6 The location of the facilities from which the discharge originates and the point of discharge is Mining Lease 354991; District Lots 7198, 7199, 7201, 7204, 7207, Located in the Cassiar District, Omineca Mining Division; Ref. Maps BCGS 94E007 and 94D097.

3. ROLES AND RESPONSIBILITIES

3.1 HUMAN RESOURCES

AuRico's Executive Management Team will allocate the appropriate human resources to the Environmental Management Plans (EMPs) for the Project. AuRico's Board of Directors has a Technical and Sustainability Committee to assist the Board in overseeing related initiatives and the proper implementation of applicable policies. The Committee periodically reviews sustainability-related policies, programs, and performance.

The roles and responsibilities for personnel are listed below and address the need for on-site personnel to communicate ultimately to the Executive Management Team on sustainability management at the Project. The responsibilities will enable effective management of environmental, commitments, and early warning and response to environmental issues, compliance with regulatory and policy requirements, and the evaluation and revision of environmental performance. The responsibilities are ultimately aimed at demonstrating diligence and transparency in AuRico's environmental and sustainability management.

Based on the current construction and operations phases workforce envisaged for the Project, the following is the proposed organizational structure and responsibilities. It should be noted that refinement and confirmation of the organizational structure will emerge as the project progresses. The organizational arrangement of the personnel responsible for environmental-related aspects is as follows:

- Chief Executive Officer (CEO);
- Chief Operating Officer (COO);
- Director Environment;
- General Manager;
- Front Line Supervisors;
- Environmental Superintendent;
- Environmental Technicians;
- Environmental Assistants;
- Aboriginal Group Monitors; and
- Employees and Contractors.

3.1.1 Chief Executive Officer

The CEO will carry the ultimate responsibility for environmental and sustainability management, both in terms of statutory compliance as well as corporate citizenship, and will direct, instruct, and approve the implementation of such management policy on site.

3.1.2 Chief Operating Officer

The COO will ensure that the resources required for developing, applying, and monitoring an effective EMP are available. In this respect, the COO will maintain a reporting-function relationship with the Director Environment and the General Manager.

3.1.3 Director, Environment

The Director, Environment will be responsible for the development, application, and monitoring of an effective Environmental Management System (EMS) and array of relevant EMPs and communications with government and community, including First Nations groups.

3.1.4 General Manager

The on-site General Manager will carry the accountability for the Project's environmental performance, as one of a portfolio of management responsibilities. The General Manager will instruct and approve the on-site systems and resources, by delegation to appropriate line-function personnel and with the support and advice of Mine management and supervision for planning, oversight, monitoring, and reporting.

3.1.5 Management and Supervisors

Management and Supervisors will have the functional responsibility for all matters related to day-to-day environmental management and will ultimately report to the General Manager. They will interact via a supporting role with relevant on-site personnel that have specified environmental management responsibilities.

Management and Supervisors will maintain a scheduled and systematic approach to monitoring of environmental performance and follow approved EMPs and conditions, and include compiling, reviewing, and seeking approval from the General Manager, Environmental Superintendent (or delegate) for environmental management method statements and work instructions.

3.1.6 Environmental Superintendent

The Environmental Superintendent will have the functional responsibility for environmental management matters at the Project and will provide reporting-function accountability to the General Manager and to the Director, Environment. The Environmental Superintendent will interact with and direct on-site Environmental Technicians and Assistants to fulfill environmental management responsibilities and tasks and ensure contractors are compliant with EMP requirements. This includes ensuring programs and procedures to fulfill the EMPs are designed, implemented and reported on for internal sustainability and external permit or regulatory commitments. The Environmental Superintendent will be responsible for communications with government and community, including First Nations groups.

3.1.7 Environmental Technicians and Assistants

Environmental Technicians and Assistants will be responsible for implementing the various EMPs and permit monitoring measures for the Project. They will be under the direction of and will be accountable to the Environmental Superintendent. The Environmental Technicians and Assistants

will complete the day-to-day tasks to fulfill EMP obligations, sample collection, on-site monitoring and reporting. This includes performing environmental monitoring roles during Construction and Operations. Environmental Assistants will complete tasks as directed to support responsibilities of the Environmental Technicians and Environmental Superintendent.

3.1.8 Aboriginal Group Monitors

In accordance with KUG EAC Conditions AuRico must provide opportunities for one full time position of an Aboriginal Monitor from each of the Aboriginal Groups (Tsay Keh Dene, Kwadacha, and Takla) to the satisfaction of the BC Environmental Assessment Office (EAO) during Construction and Operations. Each Aboriginal Monitor reports information directly to their respective Aboriginal Group and is subject to safety requirements established by AuRico, and receives direction for the activities to monitor from the respective Aboriginal Group. AuRico must:

- Provide documents required by the EA Certificate to the Aboriginal Monitors for review consistent with the review timelines identified in the conditions requiring the documents in addition to the other parties identified in each condition requiring documents;
- Provide training opportunities for Aboriginal Monitors so that the Aboriginal Monitors have the ability to support effective participation in monitoring activities; and
- Provide opportunities for the Aboriginal Monitor to conduct environmental monitoring for the Project.

Further details of the role of the Aboriginal Monitor are included in the Terms of Engagement for the Aboriginal Monitors.

3.1.9 Employees and Contractors

An environmental orientation will be developed for AuRico personnel and contractors involved in the Project and will include EMP actions specific to the activities in which they will be involved. A key component of this orientation is a clear explanation of each individual's role and responsibility in the environmental management of the Project.

Contractors' Personnel

Contractors that undertake aspects of the Project will be required to meet the prescribed environmental performance standards set by AuRico's EMPs. Contractors will require designated personnel to ensure compliance. Such personnel will typically provide an environmental oversight role for activities associated with the particular contract being carried out; in addition to other duties and responsibilities. AuRico's Management, Supervisors and Environmental Superintendent will interact closely with the contractor's personnel to identify the environmental requirements. The Contractor's representative(s) will be responsible for ensuring compliance with the environmental requirements including undertaking regular inspections, recording and reporting on inspection findings, initiating corrective actions for non-compliance, and maintaining an acceptable level of training and awareness among the contractor's personnel.

3.2 QUALIFIED PROFESSIONAL

AuRico will retain various qualified professionals to conduct various aspects of the Project's environmental monitoring as specified in various EMPs. A qualified professional is a person who has training, experience and expertise in a discipline relevant to the field of practice set out in the condition or regulation, and who is registered with the appropriate professional organization, is acting under that organization's code of ethics and is subject to disciplinary action by that organization.

3.3 INDEPENDENT ENVIRONMENTAL MONITOR

In accordance with the KUG EA Conditions (Appendix 1-A), AuRico will retain the services of a Qualified Professional to act as an Independent Environmental Monitor (IEM). AuRico will retain the IEM throughout all Project phases. The IEM will:

- Observe and record for, and report to, the EAO on compliance with the Certificate; and
- Provide information to EAO, MEM, ENV, FLNRO and Aboriginal Groups, as directed by EAO. When providing information or reports to EAO, the IEM must not provide such information or reports to AuRico in advance of providing such information or reports to EAO.

Details on the role and responsibilities of the IEM are provided in the Terms of Engagement for the IEM.

3.4 ENVIRONMENTAL MONITORING COMMITTEE

In accordance with the KUG EA Conditions (Appendix 1-A), AuRico must establish and maintain an environmental monitoring committee (EMC) for all phases of the Project.

AuRico must invite participation from Aboriginal Groups, ENV, MEM, FLNRO, EAO, and other agencies where relevant to particular topics being discussed. The purpose of the EMC is to facilitate information sharing and provide advice to AuRico on the ongoing development of the Project and mitigation measures in a coordinated and collaborative manner.

Further details on the role of the EMC are included in the Terms of Reference for the EMC.

3.5 MATERIAL RESOURCES

The implementation of EMPs requires material resources to be allocated for particular actions and procedures. AuRico's Environmental Policy provides for material resources via the mandates contained in the responsibilities for key personnel. Material resources in the form of salaries, equipment, facilities and consumables will be provided for implementing EMPs. Furthermore, budgets, facilities, and materials will be provided for the training of personnel who have the responsibility of meeting environmental performance targets and fulfilling the EMPs.

4. POTENTIAL SOURCES OF AIR EMISSIONS AND FUGITIVE DUST

Air discharges will be generated during the Project's Preconstruction, Construction, Operations, Closure and Post-Closure phases from the following sources/activities. Air discharge locations are shown in Figure 4-1.

4.1 SOURCE LIST REVIEW

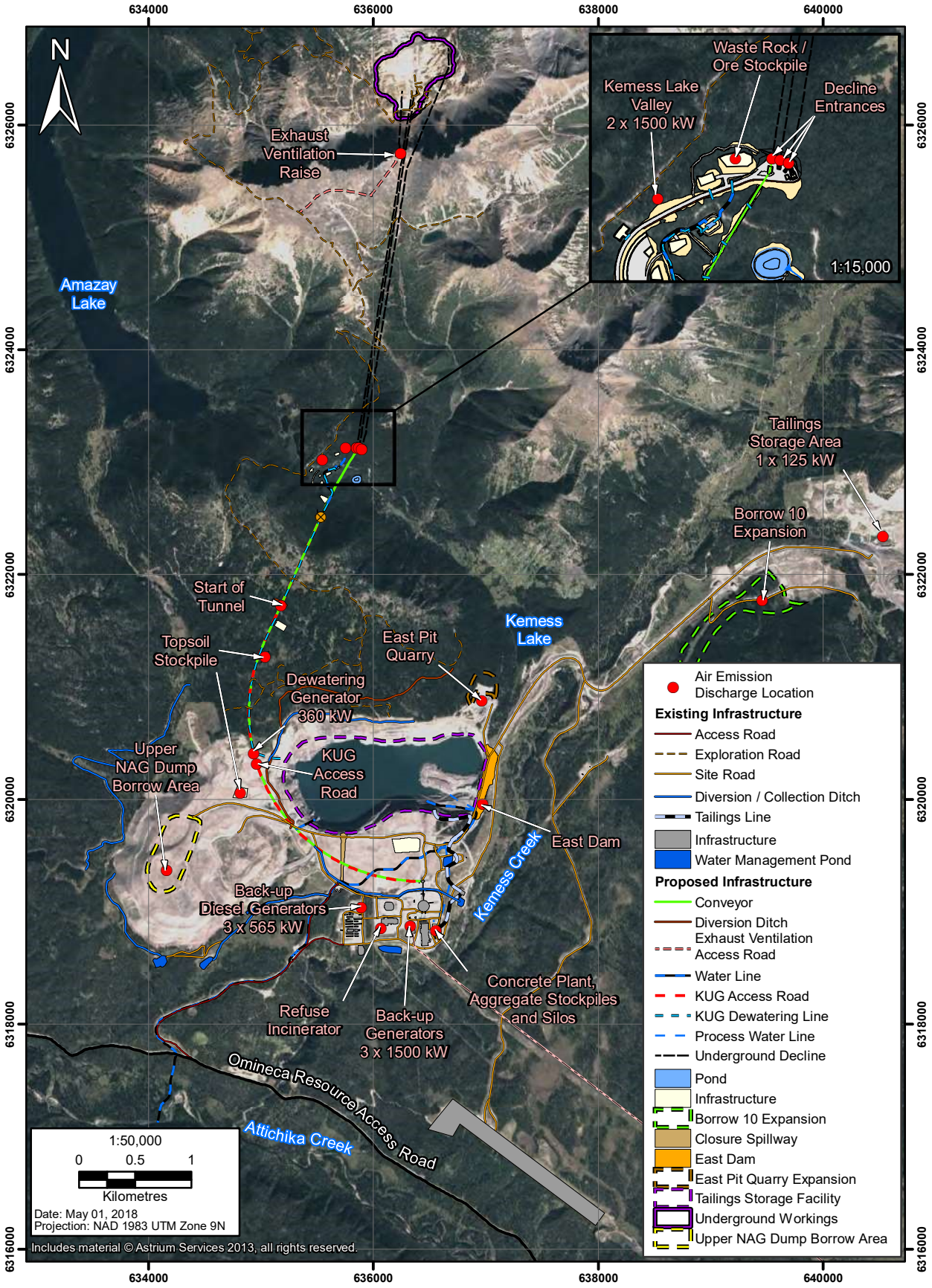
Sources of fugitive dust will be updated annually, if needed, based on changes in mine operations and infrastructure locations. The source list will be updated as part of the annual reporting and using the adaptive management framework described in Section 7.

4.2 FUGITIVE DUST AND EMISSIONS SOURCE LIST

The following is a list of potential sources of air emissions and fugitive dust.

- Diesel exhaust from:
  - mining equipment and vehicles operating both underground and on surface during Preconstruction, Construction, Operations, Closure and Post-Closure;
  - emergency generators: 3 x 1,500 kW at the Main site, 2 x 1,500 kW in the KUG Kemess Lake Valley (KLV) area, 3 x 565 kW at the Camp site and 1 x 125 kW at the KUG Tailing Storage Facility (TSF) as back-up power sources during Construction and Operations; and
  - a dewatering generator (360 kW) to power a water pump at the Kemess South (KS) Pit north wall sump.
- Fugitive dust generated from:
  - surface blasting in the areas of the access tunnel and underground decline portals;
  - earthworks (including land clearing) during Construction;
  - construction of the KUG access road and upgrade of exploration access roads during Construction;
  - underground blasting and mining activities during Construction and Operations;
  - ore handling both underground and at surface during Operations;
  - dust generated from the construction of the East Dam;
  - dust generated from wind erosion of the exposed tailings beach within the KUG TSF;
  - dust generated from material handling at surface portal facilities such as the non-hazardous waste landfill, Borrow 10 expansion, East Pit quarry, upper non-acid generating waste rock dump, waste stockpile, ore stockpile, topsoil stockpiles, conveyor system, and laydown areas;
  - use of unpaved surfaces including the KS and KUG access roads, all-weather gravel airstrip, and service roads during all phases of the Project; and
  - dust from the cement hoppers within the concrete batch plant that will operate during Construction.

Figure 4-1
KUG Project Air Discharge Locations



- Emissions from the process plant (semi autogenous grinding mill and ball mill grinding stages are wet), exploration building and assay laboratory stacks during Operations through various roof vents, three scrubbers in the assay laboratory and a small dust collector in the exploration building; and
- Emissions resulting from incineration of non-hazardous organic wastes (e.g., domestic putrescible waste, paper, cardboard and lumber scraps) during all project phases.

The following sources are to be included in the application for a Waste Discharge Authorization for air emissions:

- a refuse incinerator;
- the KUG TSF beach; and
- a ventilation exhaust raise.

5. FUGITIVE DUST MANAGEMENT

The following section details environmental protection (mitigation) and management measures designed to reduce or eliminate adverse air quality related Project effects. All mitigation and best management practices described in Section 5 will act to inhibit the emissions of all size fractions of particulate matter including total suspended particulate, $PM_{10,}$ and $PM_{2.5}$. Environmental protection measures involve taking a tangible action to avoid, minimize, restore on-site, or offset air quality related Project effects. The general approach for the protection of air quality is:

- the AQMP will be implemented through all Project phases;
- adherence to all permit requirements, conditions, authorizations, and approvals;
- training will be provided on measures consistent with roles and responsibilities in Section 2.1;
- equipment that generate air contaminants will be maintained in good working order and operated in accordance with manufacturer recommendations; and
- standard best practices will be used for fuel conservation and fugitive dust control.

5.1 BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

5.1.1 Mine Equipment and Vehicles

Air contaminants and dust will be generated during all Project phases from the use of mobile and stationary mine equipment and vehicles. Environmental protection measures which will be implemented during all Project phases include:

- purchasing new engines that meet current air contaminant standards or retrofitting of older engines, as required in BC for models manufactured between 1989 and 1993 that weigh over 8,200 kilograms (BC Government 2008);

- use of low-sulphur diesel (< 15 part per million) in all equipment, as required by law (Sulphur in Diesel Fuel Regulations [SOR/2002-254]);
- minimization of vehicle and equipment idling, when not in use, taking account of differing operational requirements in summer and winter;
- regular servicing of all mobile and stationary equipment to maintain efficiency;
- use of electric powered equipment in the underground where practical, reducing the overall volume of exhaust emissions; and
- operating vehicles at designated speeds on site roads.

5.1.2 Refuse Incinerator

The Project will employ an Eco Waste Solutions ECO 1TN1P Incinerator, or similar model. Specific environmental protection measures in place for the operation of incinerators include:

- operate the refuse incinerator according to manufacturer specifications and the ECCC *Technical Document for Batch Waste Incineration* (ECCC 2010) to reduce the amount of dioxins and furans generated;
- properly trained incinerator operators;
- stack testing to determine compliance with standards when required;
- complying with all conditions associated with incinerator operation under discharge permit #14928; and
- manage waste according to the Waste Management Plan by:
  - implementation of a waste reduction program to reduce overall waste incinerated;
  - waste segregation to divert materials that are unsuitable for incineration (e.g., batteries); and
  - waste segregation to reduce the amount of dioxins and furans generated during incineration such as copper (acts as a catalyst) and chloride containing materials such as polyvinyl chloride plastic.

5.1.3 Fugitive Dust

5.1.3.1 Material Handling

The transport of ore and waste rock from underground to the processing plant and KUG TSF will be achieved by a system of conveyors. Dropping material from height and material handling in general will generate fugitive dust. The Project has the following environmental protection measures in place:

- the conveyor drop locations (between conveyors) will be enclosed;
- reducing drop heights wherever practical from the conveyors onto stockpiles;
- using enclosed, negative-pressure housings at conveyor transfer points; and
- enclosing or covering loads carried by vehicles wherever practical based on the loads and type of vehicle.

5.1.3.2 Stockpiles

Fugitive dust emissions may be generated by wind erosion when stockpiled materials have small particle sizes such as in silt and clay. Fugitive dust from stockpile wind erosion will be mitigated by the following environmental protection measures:

- during dry periods, apply dust suppressant, such as water, if visible dust events are observed;
- contour stockpiles to reduce wind erosion potential; and
- cover (with vegetative or material covers) or enclose stockpiles to reduce wind contact with the stockpiles.

In the event fugitive dust environmental protection measures mentioned above are shown to have little to no effect, the following contingency measures can be implemented:

- erection of windbreaks around identified problem areas to limit the dust emissions from equipment and stockpiles, and other activities likely to generate windblown or re-entrained dust; and
- installation of a fog/sprinkler system that releases small droplets of water on the stockpile material to supress airborne dust and not cause water seepage.

5.1.3.3 Unpaved Surfaces

Fugitive dust emissions may be generated by vehicle movement on unpaved roads. Environmental protection measures for unpaved roads include vehicle use restrictions, surface improvements, and surface treatment. AuRico will contribute to shared resource road (ORAR) maintenance through road use agreements with other road users. Fugitive dust from unpaved roads will be mitigated by the following environmental protection measures:

- minimize rapid starts and stops;
- adhere to local speed limits;
- regular maintenance of unpaved roads to reduce the silt content;
- application of water to roadways to reduce dust from vehicle traffic linked to periods of prolonged dry weather; and
- operation of vehicles at designated speeds on site roads.

Road watering will occur regularly during periods of dry weather with increased frequency depending on visible dust emissions from mobile equipment. If water alone proves to be ineffective, alternative methods that will be considered for application will include calcium or magnesium chloride, lignin compounds, environmentally friendly oils or clay additives.

5.1.3.4 Tailings Storage Facility

The KUG TSF will be the disposal area where tailings will accumulate over the operational phase of the Project, reaching a maximum capacity at the end of Operations. The tailings and waste rock tonnage to be stored within the KUG TSF will result in an exposed tailings beach through Operations and at Closure which will be susceptible to wind erosion. Fugitive dust generated from use of the

KUG TSF through all Phases of the Project will be managed through the following environmental protection measures related to material movement and vehicle traffic, in addition to the fugitive dust environmental protection measures mentioned above:

- minimizing material movement within the KUG TSF from the use of heavy equipment;
- minimizing vehicle and heavy equipment traffic near the KUG TSF; and
- adding gravel over the KUG TSF roadways to cover any silt.

If these environmental protection measures prove to be ineffective, the following contingency measures will be considered for the KUG TSF beach:

- the application of water as watering increases the moisture content and conglomerates particles, effectively reducing the likelihood of them becoming re-suspended; and
- installation and maintenance of wind fences.

5.1.4 Process Plant, Assay Laboratory, and Exploration Building

Environmental protection measures for stack emissions will include use of emission control systems (e.g., wet scrubbers and filters) on stacks and ventilation systems where appropriate.

5.1.5 Process Plant

Low emission rates are expected from the process plant. The grinding circuit in the process plant consists of a closed circuit SAG mill and ball mill grind (wet grinding). Cyclone overflow then goes to a series of rougher flotation cells which utilize flotation blowers. From there the slurry goes to the regrind circuit and cleaning circuit. From the cleaning circuit the concentrate enters the dewatering circuit which includes the thickener and clarifier units. A copper flotation concentrate containing the gold and silver values will be produced and transported to smelters for processing. Since the process is wet, little dust will be generated inside the process plant and hence no control devices are utilized for the roof vents or stacks which will be properly maintained and kept in good working order for health and safety purposes.

5.1.6 Assay Laboratory

The assay laboratory is equipment with three fume hoods with air scrubbers. Due to their infrequent use and the scrubber control, very low average emission rates are expected from the assay laboratory. Scrubbers will be equipped to these exhaust points in order to mitigate SO_2 emissions. The scrubbers will use industry standard procedures best suited for the Kemess Lab, such as lime solutions or other alkane solutions such as sodium hydroxide (NaOH) or sodium carbonate (Na_2CO_3). The scrubbers will be operated and maintained per manufacturer recommendations.

5.1.7 Exploration Building

A small dust collector in the exploration building will capture dust generated from a bench-scale crusher. Fabric filters used in small dust collectors generally collect particles with sizes ranging from submicron to several hundred microns in diameter at efficiencies in excess of 99% (US EPA 2002). The dust collector will be operated and maintained per manufacturer recommendations.

5.2 ENVIRONMENTAL PROTECTION MEASURES BY PROJECT PHASE

There are two main types of mitigation and management measures that will be put in place in order to reduce air quality impacts associated with the Project: emission reduction measures and fugitive dust reduction measures. The majority of measures will be relevant for all phases of the Project and for all contaminants. The following describe anticipated air discharge sources by project phase which would be addressed by the measures described above.

5.2.1 Construction

Environmental protection or mitigation measures will be in place to reduce NO_2, SO_2, CO, suspended particulate matter and GHG emissions during the Construction Phase of the Project. The following sources of emissions were identified:

- above ground equipment exhaust emissions from vehicles such as dozers, haul trucks, forklifts, graders, and fuel trucks;
- stationary combustion emissions, such as from the incinerator, generators and pumps;
- fugitive dust on unpaved roads from vehicles travelling on site roads; and
- other mine development activities such as earthworks and surface blasting.

5.2.2 Operations

Environmental protection measures will be in place to reduce NO_2, SO_2, CO, suspended particulate matter and GHG emissions during the Operation Phase of the Project. The following sources of emissions were identified:

- above ground and underground equipment exhaust emissions from vehicles such as dozers, haul trucks, forklifts, graders, and fuel trucks;
- material handling fugitive dust emissions;
- fugitive dust from the KUG TSF due to wind erosion and material movement;
- stationary combustion emissions, such as from the incinerator, generators and pumps;
- fugitive dust on unpaved roads from vehicles travelling on site roads; and
- other mine development activities such as earthworks and surface blasting.

5.2.3 Closure

Environmental protection measures will be in place to reduce NO_2, SO_2, CO and suspended particulate matter emissions during the Closure Phase of the Project. Project emissions during the Closure Phase are much lower than the Operations and Construction Phases as mining and processing activities are halted and equipment is removed from the Mine. The following sources of emissions were identified:

- above ground and underground equipment exhaust emissions from vehicles such as dozers, haul trucks, forklifts, graders, and fuel trucks;

- material handling fugitive dust emissions;
- fugitive dust from the KUG TSF due to wind erosion and material movement;
- stationary combustion emissions, such as from the incinerator, generators and pumps;
- fugitive dust on unpaved roads from vehicles travelling on site roads; and
- other mine development activities such as earthworks and surface blasting.

5.2.4 Post-Closure

Environmental protection measures will be in place to reduce NO_2, SO_2, CO and suspended particulate matter emissions during the Post-Closure Phase of the Project. Project emissions during the Post-Closure Phase will be limited to fugitive dust emissions. The following sources of emissions were identified:

- above ground exhaust emissions from vehicles such as light duty vehicles; and
- fugitive dust on unpaved roads from vehicles travelling on site roads.

5.3 EMERGENCY PREPAREDNESS AND RESPONSE

Emergency preparedness and response for the Project are addressed in the *Accidents and Malfunctions Communication Plan*, *Accidents and Malfunction Administration Plan*, and *Environmental Spill Emergency Plan*. No additional information specific to ambient air quality is presented here.

6. PLAN IMPLEMENTATION

6.1 TRAINING

Under the guidance of the Environmental Superintendent, Environmental Technicians and Assistants will be trained on implementing and updating the AQMP. The Environmental Technicians and Assistants will be responsible for making sure all site personnel are aware of the AQMP and are aware of who to contact in the event that they witness a potential dust concern. Training will be arranged for all new employees and contractors and refresher training will occur for all staff when changes are made to the AQMP.

Refuse incinerator operators will be sufficiently trained such that the incinerator is operated in accordance with manufacture recommendations and associated discharge permits.

6.2 MONITORING AND MAINTENANCE

6.2.1 Monitoring and Measurement

The air quality monitoring program is intended to allow:

- assessment of the effectiveness of mitigation and management measures;
- identify Project effects requiring further mitigation efforts; and
- comply with permit, approvals, and regulatory requirements.

The air quality monitoring program will consist of the following components:

- dustfall monitoring of particulates, anions, cations and total metals;
- passive air sampling of NO_2 and SO_2; and
- GHG emission tracking to determine whether reporting is required.

Monitoring will be conducted by qualified personnel. Data are submitted to government authorities in compliance with Permit requirements and are kept and made available to others for review upon request.

Site-specific air quality monitoring consists of dustfall monitoring of particulates, anions, cations and total metals and passive air sampling system (PASS) for NO_2 and SO_2.

AuRico acknowledges the limitations associated with dustfall monitoring as outlined in *Dustfall Monitoring and Pollution Control Objectives*, (Saraswat, 2016). Historically this methodology has been widely used at mine sites in BC and was considered appropriate for assessing impacts of fugitive dust on the environment. The recent dissemination of the ENV memo regarding dustfall has brought into question long-established monitoring techniques and when dustfall sampling is useful. For the Project the main reason for dustfall monitoring is to satisfy EAC Conditions #25 and #27 outlined in Section 1.3 that specifically require dustfall measurements. Comparing dustfall rates over time can be useful when determining trends over time related to mining activity. Dustfall rates are not meant to be used to directly assess human health impacts.

Chromium concentrations bound to PM_{10} can create health concerns when inhaled and have been identified as a Contaminant of Potential Concern (COPC) in the Human Health Effects Assessment as part of the Kemess Environmental Assessment (AuRico 2016). It is not known what the concentration of metals attached to PM will be in advance of the start of the construction phase therefore, it is not known if any health concerns exist. To determine if there is the possibility of any health effects, parent material will be tested for concentrations of chromium. If the samples indicate there is a risk of elevated chromium levels in PM then a short term monitoring program will be instituted to measure chromium concentration bound to PM_{10}. The results of the measurements will be compared to the Ontario Ministry of the Environment Ambient Air Quality Criteria (24-hour averaging period; Ontario MOE 2012).

Also, metals measurements from dustfall can be used to help assess the impact of metals on soil/vegetation/water and country foods. Alternative methods of directly sampling the media of concern have limitations. Therefore, dustfall deposition rates, with analysis for metals, will be used to calculate metals concentrations in soils by following the US EPA (2005) approach.

Table 6.2-1 provides a schedule of when monitoring activities will occur.

Table 6.2-1. Air Quality Monitoring Schedule

Monitoring Program	Phase	Frequency
Dustfall	Construction, Operations and Closure	During the Summer Months (June, July and August)
PASS	Construction, Operations and Closure	Monthly (12 analyses per year)
Incinerator Stack Testing	Construction, Operations and Closure	Annually, if needed (See Section 6.2.1)

6.2.1.1 Dustfall

In spite of the limitations discussed above, dustfall monitoring will be completed in accordance with sampling method ASTM D1739-98 (ASTM 2010). Each station will monitor consecutive 30 day periods during the summer and early fall (essentially months when temperatures are not below freezing). The dustfall monitoring stations will collect particulates small enough to pass through a one-millimetre screen and large enough to settle by virtue of their own weight. This requires containers of a standard size and shape, which are partially filled with deionised water and algaecide to prevent the growth of algae in the canisters. Each station will consist of two canisters each surrounded by a wind screen and mounted on a 2-metre pole or tripod. Windscreens are erected around the sample containers to improve the dustfall collection efficiency, and bird spikes are used to minimize contamination from bird faeces. One of the canisters will be analyzed for particulates (total, soluble, and insoluble) and anions (sulphate, nitrate, chloride, and ammonia) and the other for total metals and various cations. Dustfall analysis will also include total mass and the combustible fraction. The metal analysis will include total chromium and if the concentration is above the detection limit and if enough sample material was collected, the analysis will include hexavalent chromium. The list of metals to be analyzed (total metals) includes the following (Table 6.2-2).

Table 6.2-2. Dustfall Total Metals Analysis

Metals				
Aluminum	Cadmium	Magnesium	Selenium	Titanium
Antimony	Calcium Chromium	Manganese	Silicon	Uranium
Arsenic	Hexavalent Chromium	Mercury	Silver	Vanadium
Barium	Cobalt	Molybdenum	Sodium	Zinc
Beryllium	Copper	Nickel	Strontium	
Bismuth	Iron	Phosphorus	Thallium	
Boron	Lead Lithium	Potassium	Tin	

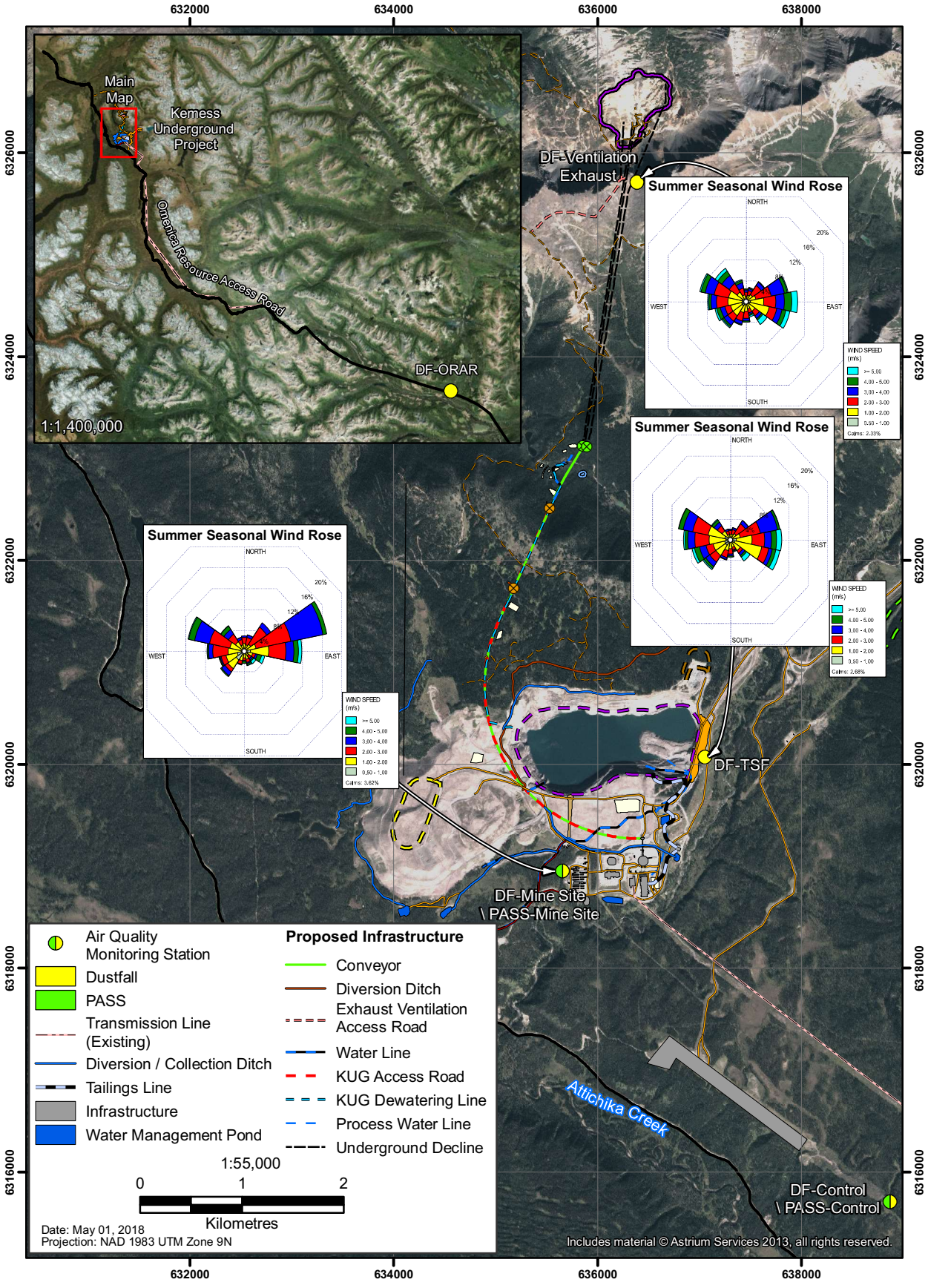
Dustfall monitoring will be conducted through the Construction and Operations phases. Monitoring will be conducted at five (including the control) dustfall monitoring stations (Table 6.2-3): one along the ORAR, one downwind of the ventilation exhaust raise, one located downwind of the KUG TSF, and a non-impact control (see Figure 6.2-1). The control station may be relocated if results indicate influence from road traffic or operations. The ORAR dustfall monitoring station will be placed near ungulate winter range areas along the northern portion of the ORAR.

Table 6.2-3. Dustfall and PASS Station Coordinates

Station	Coordinates (Easting, Northing [m])
DF-ORAR	717552, 6256697
DF-Ventilation Exhaust	636388, 6325715
DF-Mine Site	635656, 6318955
DF-TSF	637054, 6320072
DF-Control	638870, 6315709
PASS-Mine Site	635656, 6318955
PASS-Control	638870, 6315709

Figure 6.2-1

Air Quality Monitoring Stations



6.2.1.2 Passive Air Sampling System

Emissions of NO_2 and SO_2 resulting from fuel combustion will be monitored during Construction, Operations and Closure with a PASS. The PASS monitors gas or vapour pollutants through the process of diffusion through a static air layer or permeation through a membrane. The sample media are installed in the field and exposed in protective shelters that are mounted to a support pole for a period of 30 days. Following the exposure period the sample media are retrieved, replaced, and sent to the laboratory for analysis along with meteorological data including air temperature, wind speed, and relative humidity, to allow the ambient concentration of the compound over the sampling period to be determined.

One PASS will be co-located at the Project with a dustfall station (PASS-Mine Site) and a background station (PASS-Control) will be co-located with the control dustfall station in order to monitor background conditions. However, this station may be relocated farther from the KUG access road if results indicate influence from road traffic. The PASS monitoring stations are shown in Figure 6.2-1.

Sampling frequency will provide a one-month average ground-level concentration for each contaminant.

6.2.1.3 Incinerator Monitoring

Annual monitoring will be conducted to track waste incinerated and on incinerator operating conditions (EC 2010).

In years in which quantities of waste incinerated exceed 26 tonnes (t) incinerator stack testing may be required (BC MOE 2015; Saraswat 2017). Unless identified as a permit condition, stack testing is not required if (i) the annual waste volume burned remains below 26 t and continued "determined efforts" to apply the best available pollution prevention and control techniques remain implemented (CCME 2009) or (ii) previous stack testing results indicate that dioxins, furans and mercury emission concentrations are below the CWS limits (CCME 2009, 2010).

6.2.1.4 Meteorological Monitoring

Meteorological conditions are an important consideration when assessing air quality as they may contribute to windblown dust and will influence the behaviour of emissions following release. Site specific meteorological monitoring is expected to continue throughout the Construction and Operation phases of the Project. Information from the on-site stations will be used in analysis and evaluation of air quality monitoring described above.

6.2.2 Analysis and Evaluation

Results from the monitoring programs will be reviewed annually to determine if any trends are evident and if regulatory criteria are being met. Evaluation of the results will take place during the annual review when looking for meaningful trends.

6.2.2.1 Dustfall

Total dust deposition (dustfall) results will be presented as a monthly average in units of milligrams per square decimetre per day (mg/dm^2/day) taken from the laboratory analysis. There are currently no provincial guidelines for total dustfall; therefore, dustfall results will be compared against the former BC Ambient Air Quality Objective dustfall monthly average of 2.9 mg/dm^2/day.

Nitrate and sulphate anions will be used to calculate the monthly acid deposition rate in acid equivalents per hectare per year (eq/ha/yr) and compared to CCME published calculated critical loads of acid deposition for forest soils for provinces in Canada (Aherne 2008).

Metal deposition results will be presented as a monthly average in units of mg/dm^2/day. There are no CCME or other provincial guidelines for metal concentrations in dustfall; therefore, metals in dustfall will be compared against the annual criteria for metal parameters identified in the Ontario Ministry of the Environment *Ontario's Ambient Air Quality Criteria* (AAQC, OMOE 2012) The metal analysis will include total chromium and if the concentration exceeds the Ontario AAQC for total chromium additional sampling will conducted to analyze for hexavalent chromium.

Metals concentrations in soils will be compared against Canadian Council of Ministers of Environment soil quality guidelines (CCME 2017). The primary metal of interest is chromium with a CCME Soil Quality Guideline of 64 mg/kg.

6.2.2.2 PASS

Laboratory results are provided in parts per billion (ppb) and are converted to micrograms per cubic metre (µg/m^3) using the following factors: 2.61 for SO_2 and 1.88 for NO_2. These factors were calculated using the BC AQO conversion ratio (BC MOE 2016).

The PASS results will be expressed as monthly mean concentrations and will be used to calculate an annual mean which will be compared to the BC AAQOs for SO_2 and NO_2. The BC AAQOs are based on Human Health guidelines.

6.2.2.3 Incinerator

Incinerator stack-emissions testing will be conducted per Section 6.2.1.3 to measure emissions of dioxins, furans and mercury from the domestic waste incinerator. Stack testing will be conducted according to and results compared against thresholds in the CCME CWS for Dioxins and Furans (CCME 2009) and for Mercury Emissions (CCME 2010). AuRico will refer to the ECCC *Technical Document for Batch Waste Incineration* where appropriate (ECCC 2010).

Samples will be collected for dioxins, furans and mercury and sent to a Canadian Association for Laboratory Accreditation accredited laboratory for analysis. During sampling, records are kept to document incinerator operation and maintenance, including, but not limited to, quantities incinerated, burn time, and waste composition.

6.3 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) measures are undertaken at four key stages in monitoring activities:

- during monitor siting and data collection;
- during data entry and analysis;

- through reporting and reassessment of methods as part of the evaluation of the effectiveness of the plan; and
- through the development of standard operating procedures for standard sampling procedures.

The process of data gathering in the field are quality controlled through the use of trained personnel and a system of pre- and post-field checks to ensure that consistent, repeatable data are being gathered. All personnel will have necessary training and accreditation.

6.4 TRIGGER ACTION RESPONSE PLAN

6.4.1 Nonconformity and Corrective Action

A non-conformance is anything that occurs at the Project which is not in alignment with this AQMP. Non-conformities include improper, or lack of, implementation of the measures outlined in this AQMP such as missed reporting deadline, an exceedance of permit discharges, not implementing mitigation or management measures effectively or not conducting sampling appropriately or according to an agreed upon schedule. Non-conformity reporting will be subject to the EAC and the EMA Permit #14928 conditions mentioned in Section 1.3. The need for any corrective actions to reduce on-site emissions or install additional control measures will be determined on a case-by-case basis.

Indications of the need for corrective actions and additional control measures may include:

- monitoring data showing consistent concentrations greater than applicable standards;
- monitoring data showing an increasing trend in contaminant concentrations; and
- issues raised by on-site staff, regulators, or local communities.

6.4.2 Incident Identification

AuRico will take all reasonable measures to prevent incidents, accidents and malfunctions that may result in adverse environmental effects. If emergency or spill incidents occur it will be reported per the requirements of the *Emergency Response Plan*, *Environmental Spill Emergency Plan* and the *Hazardous Materials Handling Plan*. AuRico employees and subcontractors are responsible for complying with all environmental standards and regulations, including work site inspections and accident/incident investigations. Incident(s) will be immediately investigated to determine the cause(s) and effective and immediate preventative and remedial action(s) will be developed.

An air quality incident can be an exceedance of an air quality standard or guideline such as an incinerator stack exceedance. Other air quality incidents can include receipt of air quality complaints from local land users or Aboriginals groups (TKN), air quality related regulatory non-compliances and provincial or federal air quality related orders or notices.

All air quality related incidents in alignment with this AQMP at the Project will be reported as soon as reasonably possible and entered into AuRico's incident management system. Environmental incidents related to air quality will be assigned to the Environmental Superintendent. The Environmental Superintendent will determine if the air quality incident requires an external notice to be submitted to the relevant government department. Incidents that require emergency response will be handled

through the *Emergency Response Plan, Environmental Spill Emergency Plan*, and the *Hazardous Materials Handling Plan*. All other incidents will be investigated and corrective action plans developed.

Local community members, First Nations and stakeholders can provide feedback on Kemess Underground and its operations and activities, through the following channels:

1. Contacting Kemess Underground mine by phone at 778-724-4420;
2. Contacting the Kemess Underground Sustainability and Community Development Dept. by email at communityrelations@centerragold.com; and
3. Speaking to the Kemess Underground Sustainability & Community Development Dept. in-person.

Once feedback has been received by the Sustainability & Community Development Dept., it will be reviewed and either resolved - in the event that the comment is simply a request for information or a question that can be answered easily - or determined to be a formal complaint or grievance.

If a formal complaint or grievance is filed, procedures outlined in Kemess' *Issues Identification/Grievance Management Procedure* document (In Draft) will be followed.

6.4.3 Trigger Action Response Table

Specific triggers and responses are provided in Table 6.4-1.

6.5 RECORD KEEPING

6.5.1 Monitoring Results

Record keeping is conducted by designated personnel. Data are entered into suitable electronic databases, checked for quality control and assurance purposes, and stored. Data are entered in a format and program that allow for comparison over time and storage in a single file format for each type of survey or monitoring activity. Designated personnel will coordinate preparation, review, and distribution of the data and reports required for regulatory purposes.

AuRico will assume the responsibility of data management and record-keeping of monitoring results. Data are entered into suitable electronic databases and have quality control checks completed upon receipt of results. Data are entered in a format and program that allows for comparison between years, and are stored in a single file format for each type of survey or monitoring activity. Monitoring data are stored for the life of the mine and be made available for review upon request.

6.5.2 Continuous Improvement

AuRico is committed to continuous improvement of the ambient air quality program at the Project. Annual reviews of the AQMP will be conducted internally with the mindset of continually improving the program. Continuous improvement measures could include implementing new technology as it become available, streamlining processes and/or any other measure to improve the program.

Table 6.4-1. Fugitive Dust Trigger Levels and Corresponding Action/Response

Location	Normal		Level 1 Alert		Level 2 Alert		Level 3 Alert	
	Trigger	Action/Response	Trigger	Action/Response	Trigger	Action/Response	Trigger	Action/Response
Unpaved Roads	Minor localized dust during normal mine operations	Continue work in accordance with site management procedures	Visible dust above height of haul truck tray for any period of time up to 30 minutes. Visible dust above top of pick up truck for any period of time up to 30 minutes.	Divert watering truck to area of dust generation	Triggers per level 1 but with dust plume extending beyond local area for periods longer than 1 day	Increase frequency of road watering until dust plume subsides	Extensive areas of dust generation with large dust plumes for periods longer than 3 days	Increase frequency of watering and if not successful application of calcium or magnesium chloride, lignin compounds, environmentally friendly oils or clay additives
Tailings Storage Facility	Minor localized dust during normal mine operations	Continue work in accordance with site management procedures	Visible dust plumes rising over 2 metres above the ground for longer than 30 minutes	Minimize material movement within the KUG TSF from the use of heavy equipment	Triggers per level 1 but with dust plume extending beyond local area for periods longer than 1 day	Application of water to KUG TSF roadways	Extensive areas of dust generation with large dust plumes for periods longer than 3 days	Increase frequency of watering and if not successful application of gravel to KUG TSF roadways and investigation into further long term solutions if dust plumes persist
Stockpiles	Minor localized dust during normal mine operations	Continue work in accordance with site management procedures	Visible dust plumes rising over 2 metres above the ground for longer than 30 minutes	Apply dust suppressants to stockpiles	Triggers per level 1 but with dust plume extending beyond local area for periods longer than 1 day	Increase frequency of application of dust suppressants to stockpiles	Extensive areas of dust generation with large dust plumes for periods longer than 3 days	Increase frequency of dust suppressant appliction and if dust plumes persist examine the instlation of fog/sprinkler system and wind breaks

To achieve continual improvement, an iterative process of planning, doing (implementing), checking, and acting is undertaken. Such a management approach is typically applied in the following manner:

- planning – during which objectives are established and processes defined that accord with the company's ethos (represented in the Environmental Policy);
- doing (implementing) – during which the defined processes (or actions) are carried out;
- checking – during which the processes carried out are monitored, measured against the objectives (including legal obligations), and reported; and
- acting – during which additional actions are undertaken, if necessary, to achieve continual improvement in the company's environmental performance (may require revising high-level planning, i.e., policy).

6.5.3 Incident Response Records

Incident response records are stored for a minimum of five years and made available for review upon request.

7. ADAPTIVE MANAGEMENT

Adaptive management means identifying and addressing AQMP components that are shown to be not functioning as intended. This could be as a result of ineffective mitigation measures, practical implementation of plan requirements or in response to changes in requirements or Project conditions. Scenarios related to air quality where adaptive management may be required include:

- reoccurring exceedance of compliance requirements;
- reoccurring and substantive exceedance of ambient standards and objectives;
- significant increasing trend in contaminant concentrations;
- multiple incidents in any given year; or
- substantive regulatory changes and/or technological advances.

Adaptive management can also include additional protection measures mentioned in Sections 5.1 and 5.2. Additionally, adaptive management can include updates to this plan in terms of roles and responsibilities, training and/or supporting documents.

The cycle of mitigation activities, monitoring and evaluation, and instituting new mitigation activities if required, will provide adaptive management of air quality issues identified and arising as a result of the Project.

Monitoring data will also be used to provide feedback to modify the dust management measures implemented at the site, if required. This plan is designed to be adaptive, effective, and achievable in both the short and long term. Components of the AQMP may need to be revised over the life of the Project based on regulatory changes and/or technological advances.

7.1 PLAN REVISION

The AQMP is a "living document" and components of the plan may be revised over the life of the Project. The AQMP will be reviewed annually as part of reporting. Any revisions of AQMP will be implemented following a review by stakeholders and an opportunity for response by AuRico.

AuRico will conduct an annual (or as necessary) evaluation of the efficacy of mitigation and management activities and of monitoring activities. This plan may be updated as frequently as every year, or not at all, if the mine plan and methods for mitigation and monitoring are found to be robust.

7.2 NOTIFICATION AND CONSULTATION REQUIRED UPON PLAN REVISION

Any proposed modifications made to the AQMP will be communicated to the Environmental Monitoring Committee, including member regulatory authorities and First Nations. The Environmental Monitoring Committee will be provided with an opportunity to comment on the proposed revisions before revisions are implemented.

8. REPORTING

Information collected through application of the AQMP will be included in relevant reports prepared annually and as required to meet external and internal needs. Air quality reports may contain the following:

- description of record keeping of monitoring data and analyses (e.g., a description of the analyses that were performed, detection limits used, and QA/QC procedures);
- monitoring results, comparison against applicable air quality objectives and guidelines and interpretation;
- monitoring results, comparison against relevant health guidelines as identified in Chapter 5;
- identification of any emerging negative environmental trends likely attributable to the Project identified by monitoring; and
- description of proposed revisions to the AQMP to address emerging negative trends, or to adjust monitoring programs, if required.

In addition to the AQMP reporting, there may be additional GHG reporting, and National Pollutant Release Inventory (NPRI) reporting if the amounts of pollutant released are above the relevant reporting threshold.

8.1 MONITORING REPORTING

AuRico will assume the responsibility of data management and record-keeping of monitoring results. Data will be entered into suitable electronic databases and have quality control checks completed upon receipt of results. Data will be entered in a format and program that allows for comparison between

years, and will be stored in a single file format for each type of survey or monitoring activity. Monitoring data will be stored for the life of the mine and available for review upon request.

The information gathered during dustfall and PASS monitoring will be summarized annually. Annual reports will be produced and submitted in accordance with the Permit specifications. The report will provide a summary of ambient air monitoring results and an assessment of compliance with the Permit, including a summary of any mitigation actions applied to rectify non-compliances where required. The air quality report will provide results of monitoring described in Section 6.2.1 and analyses described in Section 6.2.2, assessment of any established key performance indicators, and any other pertinent information.

A Qualified Professional with experience in conducting human health risk assessments will provide an analysis of any results that are deemed to have implications on human health, such as elevated metals concentrations.

8.2 COMPLIANCE REPORTING

Information from reporting described in Section 8.1 will be incorporated as needed into other general compliance reports in which AuRico will prepare under various authorizations such as the EAC and Decision Statement.

8.2.1 NPRI Reporting

Under the authority of the *Canadian Environmental Protection Act, 1999*, owners or operators of operating facilities that meet published reporting requirements are required to report to the ECCC NPRI (ECCC 2017a). In addition, the owner/operator must report to the NPRI, regardless of the number of hours worked by employees, if there is:

- non-hazardous solid waste incineration of ≥ 26 t of waste;
- sewage sludge incineration;
- discharge of treated or untreated wastewater from a wastewater collection system at an average of ≥ 10,000 m^3/day into surface waters; or
- operations at pits or quarries where production is ≥ 500,000 t.

Under the authority of the *Canadian Environmental Protection Act* (CEPA), 1999 (S.C. 1999, c. 33), owners or operators of facilities that meet published reporting requirements are required to report to the NPRI. If one or more NPRI substances was manufactured, processed or otherwise used at the facility during the year, and the total number of hours worked at the facility exceeded the 20,000 hour employee threshold (approximately 10 full-time employees), the owner or operator of the facility will need to determine the total amount of each NPRI substance at your facility during that calendar year (ECCC 2017a).

Based on the emission inventory in the EAC Application, reporting to NPRI Part 4 pollutants of NO_x, SO_2, CO, TSP, PM_{10} and $PM_{2.5}$ is anticipated. If the amounts of pollutant released are above the reporting threshold, reporting to the NPRI is required. AuRico will estimate annual emissions for the Project and submit a report to the NPRI if necessary.

Due to the possibility that dioxins and furans will be emitted from the incinerator and the requirements of the NPRI Part 3, AuRico will report on these contaminants if the amount of solid waste incineration exceeds 26 tonnes.

8.2.2 GHG Reporting

Operating facilities emitting over 10,000 t CO2e in BC must report to the BC MOE, and those emitting over 25,000 t CO2e must also have emissions verified by an independent and accredited third party under the BC Reporting Regulation (BC Reg. 272/2009) of the *Greenhouse Gas Reduction (Cap and Trade) Act* (2008).

In support of Canada's GHG mitigation targets, since 2010, operating facilities emitting over 50,000 t CO_2e have been required to report emissions to the ECCC Greenhouse Gas Emissions Reporting Program (ECCC 2017b), under Section 46 of the *Canadian Environmental Protection Act, 1999.*

8.3 INCIDENT REPORTING

Incidents related to air quality identified per Section 6.4, including any air quality related complaints, will be reported internally to the Environmental Superintendent. External reporting will be completed, as required, by the Director, Environment.

9. QUALIFIED PROFESSIONALS

Under the direction of AuRico Metals Inc., a team of consultants have supported preparation of this management plan. This management plan has been prepared and reviewed by, or under the direct supervision of, the following qualified professionals:

Prepared by:

<original signed by>

Andres Soux, M.Sc.
ERM Consultants Canada Ltd.

Reviewed by:

<original signed by>

Greg Norton, M.Sc.
ERM Consultants Canada Ltd.

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Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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Personal Communications

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