Hardrock Project

Indigenous Peoples Health Risk Assessment Follow-up Plan

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Abbreviations

COPC	Chemicals of Potential Concern
CAC	Criteria air contaminants
EA	Environmental Assessment
EMMPs	Environmental Management and Monitoring Plans
GGM	Greenstone Gold Mines GP Inc.
HHRA	Human Health Risk Assessment
NO_2	Nitrogen Dioxide
PDA	Project Development Area
$PM_{2.5}$	Particulate Matter 2.5
Project	Hardrock Project
SO_2	Sulfur Dioxide
TBD	Tonnes Per Day
UCLM	Upper Confidence Limit of the Mean
VOC	

1.0 Introduction

Greenstone Gold Mines GP Inc. (GGM) is committed to minimizing environmental effects through the implementation of mitigation measures, monitoring and adaptive management for the Hardrock Project (the Project) within Environmental Management and Monitoring Plans (EMMPs) for construction and operation. This Health of Indigenous Peoples Follow-up Program describes the workplan to verify the accuracy of the environmental assessment (EA) and to determine effectiveness of the mitigation measures as it pertains to environmental effects of the Project on the health of Indigenous Peoples. The monitoring that will provide results to support this program will be carried out as described in other EMMPs for the Project.

1.1 Mine Overview

The Hardrock deposit will be mined as an open pit. The process plant will operate 365 days per year with a Life of Mine of approximately 15 years. Mill throughput will range from 24,000 tonnes per day (tpd) increasing to 30,000 tpd as conditions warrant. The overall Project schedule will consist of the following phases:

- Construction: Years -3 to -1, with early ore stockpiling commencing after the first year of construction
- Operation: Years 1 to 15, with Year 1 representing a transition from construction to operation
- Closure: Years 16 to 20 for Active Closure and Years 21 to 36 for Post-Closure

Key mine components of the Project development area (PDA) are an open pit, waste rock storage areas, overburden storage areas, ore stockpile, ore crushing and mill feed ore storage activities, process plant, water management facilities, tailings management facility, power plant and associated infrastructure, natural gas plant and explosives facility. Ancillary Project components are buildings, service water supply and associated infrastructure, sewage and effluent treatment plants, site roads, watercourse crossings, realignments, and habitat compensation/offsets, onsite pipelines and piping, fuel and hazardous materials storage, aggregate sources, and temporary camp. Existing infrastructure currently located within the PDA will be relocated, including a portion of Highway 11, a Ministry of Transportation Patrol Yard, and Hydro One Networks Inc. facilities.

1.2 Purpose

The Project's EA was approved by the Canadian Environmental Assessment Agency, as outlined in the Decision Statement issued under Section 54 of the *Canadian Environmental Assessment Act, 2012*. This Health of Indigenous Peoples Follow-up Program was developed for the Project based on Condition 5 of the Decision Statement. Under Condition 5 of the Decision Statement, a program is required specifically related to - "*a follow-up program to verify the accuracy of the environmental assessment and to determine the effectiveness of the mitigation measures as it pertains to the adverse environmental effects on the health of Indigenous Peoples*" of a) "*changes to air quality*", b) "*changes in concentrations of contaminants in water and fish*", and c) "*changes in concentrations of contaminants in country foods*".

1.3 Objectives

The objectives of the Health of Indigenous Peoples Follow-up Program are as follows.

- Review of water quality monitoring results from the workplan outlined in the Water Management and Monitoring Plan to identify changes in water quality in Kenogamisis Lake. Changes are identified as increases or decreases in the concentrations of total and dissolved metals in surface water relative to the changes presented in the Human Health Risk Assessment (HHRA) that was completed as part of the EA (HHRA; Stantec 2017).
- Review of fish tissue monitoring results from the workplan outlined in the Aquatic Management and Monitoring Plan to identify changes in the quality of fish in Kenogamisis Lake. Changes are identified as increases or decreases in the concentrations of metals, including methylmercury, in fish tissue relative to the predicted changes presented in the HHRA.
- Review of small mammal tissue monitoring results from the workplan outlined in the Biodiversity Management and Monitoring Plan to identify changes in metal concentrations in tissues relative to the predicted changes presented in the HHRA. The small mammal tissue monitoring program is a surrogate for assessing changes in metal concentrations in larger mammals that may be used as country foods.
- Review of vegetation (forage, browse, berries) monitoring results from the workplan outlined in the Biodiversity Management and Monitoring Plan to identify changes in metal concentrations in vegetation relative to the predicted changes presented in the HHRA.
- Review of air quality monitoring results (SO_2, NO_2, $PM_{2.5}$) from the workplan outlined in the Air Quality Management and Monitoring Plan to identify changes air quality relative to the predicted changes presented in the HHRA.
- Review of co-located soil samples collected during small mammal tissue monitoring and vegetation monitoring, as well as supplemental sampling of soil in locations modelled in the HHRA (locations provided in Appendix A, Table A-11) to identify changes in soil quality relative to the predicted changes presented in the HHRA.

In addition, GGM recognizes that Indigenous communities are interested in participating in a moose health (i.e. tissue sampling) monitoring study in the region. GGM has committed to participating in a regional initiative, should there be any such initiative(s) during construction or operation of the Project.

1.4 Roles and Responsibilities

The roles and responsibilities for implementing the Health of Indigenous Peoples Follow-up Program is provided in Table 1-1.

Table 1-1: Health of Indigenous Peoples Follow-up Program – Roles and Responsibilities

Title or Position	Key Responsibilities
General Manager	• Approval of the Health of Indigenous Peoples Follow-up Program and associated financial administrative processes.
Director, Environment and Community Relations	• Oversee implementation of the Health of Indigenous Peoples Follow-up Program to facilitate compliance with the plan, regulations, commitments and best practices.
Environmental Superintendent	• Participate in Environmental Advisory Committees and support activities with Indigenous communities. • Share results of follow-up and monitoring programs with Indigenous communities and relevant authorities. • Oversee implementation of water, air quality, and terrestrial and aquatic country foods monitoring programs in accordance with EMMPs.
Risk Assessment Specialist/Other Designate	• Compare the 95% upper confidence limit of the mean (UCLM) concentrations in media from the follow-up sampling programs to predicted concentrations used in the HHRA. If concentrations are below predicted value, no further assessment is required. This result would confirm the predictions in the HHRA are conservative. • Calculate risks based on measured data if measured concentrations exceed predicted concentrations by more than 20%. • Evaluate conclusions of the HHRA.
Indigenous Community Environmental Monitors	• Participate in implementation of water, air quality, and terrestrial and aquatic country foods monitoring programs in accordance with EMMPs. • Review results and conclusions of follow-up and monitoring programs. • Present results and conclusions of follow-up and monitoring programs to communities.
Indigenous Community Environmental Advisory Committees	• Review results and conclusions of follow-up and monitoring programs.

2.0 Follow-up Program

2.1 Background

The HHRA evaluated the potential human health risks associated with exposures to a number of contaminants in air, surface water, fish tissue, and country foods (animal and vegetation) under current or baseline conditions and under predicted future case conditions. The assessment focused on the potential change in human health risk that may occur between baseline and future case conditions over the life of the Project. The HHRA used standard risk assessment procedures, consistent with risk assessment guidance developed by Health Canada and the Ontario Ministry of the Environment, Conservation and Parks, to assess baseline case and future case human health risks. The HHRA included consideration for Indigenous people who may engage in traditional practices, including the harvesting of terrestrial and aquatic country foods.

Baseline human health risks were estimated using contaminant concentrations measured in air, soil, surface water and terrestrial and aquatic country foods. Future case human health risks were estimates using predicted contaminant concentrations in air, surface water, and terrestrial and aquatic country foods.

2.2 Methods

The Health of Indigenous Peoples Follow-up Program is based on comparisons between the predicted contaminant concentrations in environmental media (air, surface water, and terrestrial and aquatic country foods) (provided in Section 2.3) and the contaminant concentrations measured by the ongoing environmental monitoring programs. The following procedure will be carried out once during each phase of the project (construction, operation, closure) and will be used to determine when a more detailed reassessment of Indigenous human health risk is required.

1. If the 95% upper confidence limit of the mean (UCLM) concentrations of contaminants in the stipulated environmental media (air, surface water, fish tissue and terrestrial country foods (both animal and vegetation)) reported by the environmental monitoring programs are lower than, or equal to the contaminant concentrations predicted in the HHRA, potential human health risks for Indigenous peoples would be lower than or equal to those predicted in the HHRA. No further action would be required.

2. If the 95% UCLM concentrations of contaminants in the stipulated environmental media (air, surface water, fish tissue and terrestrial country foods (both animal and vegetation)) reported by the environmental monitoring programs are higher than the contaminant concentrations predicted in the HHRA by more than 20%, a reassessment of potential human health risks for Indigenous people is required. This reassessment will be undertaken using the same assumptions and methods used in the original HHRA but using the new monitoring results to represent contaminant concentrations in environmental media.

2.3 Predicted Concentrations from HHRA

The predicted concentrations for chemicals of potential concern (COPC) in air, soil, surface water, fish tissue, small mammal tissue and vegetation in the HHRA are provided in Appendix A, Table A-1 to Table A-23. These concentrations should be compared to media concentrations from the follow-up sampling programs.

2.4 Adaptive Management

The results of the Health of Indigenous Peoples Follow-up Program will be an integrated component of adaptive management planning, as these results will have a direct tie-in to the Water Management and Monitoring Plan, Air Quality Management and Monitoring Plan, Aquatic Management and Monitoring Plan and Biodiversity Management and Monitoring Plan. The results of the Health of Indigenous Peoples Follow-up Program will be reviewed with Indigenous communities to evaluate the accuracy of the EA predictions, the effectiveness of mitigation measures, and determine whether any modifications to the EMMPs are warranted.

Adaptive management measures, if required, would include development of new or updated technically and economically feasible mitigation measures, or modifications to the monitoring program, in consultation with Indigenous groups

3.0 Reporting and Communications

3.1 Reporting

The form and frequency of follow-up reporting will be determined as the Project progresses through permitting; however, it is anticipated that those elements relevant to this Program will be assembled into a formal report and made available to interested parties on an annual basis during years when the program is carried out.

3.2 Communications

GGM will share the results of the Indigenous Health Follow-up Program with Indigenous communities as described in the Communications Plan and community-specific consultation plans. GGM will communicate the results of any reassessments of Indigenous health risk.

APPENDIX A
PREDICTED CONCENTRATIONS AND TRIGGER LEVELS FOR CHEMICALS OF POTENTIAL CONCERN (COPC) IN AIR, SOIL, SURFACE WATER, VEGETATION, SMALL MAMMAL TISSUE AND FISH TISSUE IN THE HHRA

Table A-1: 1-hour Concentrations of Criteria Air Contaminants (CAC)

COPC	1-hour Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
SO_2	1.79E+02	2.15E+02	9.84E+01	1.18E+02	6.19E+01	7.43E+01	5.50E+01	6.60E+01	5.60E+01	6.72E+01	6.53E+01	7.84E+01	5.49E+01	6.59E+01	5.68E+01	6.82E+01
NO_2	3.00E+02	3.60E+02	2.71E+02	3.25E+02	2.38E+02	2.86E+02	2.27E+02	2.72E+02	2.54E+02	3.05E+02	2.38E+02	2.86E+02	2.16E+02	2.59E+02	2.40E+02	2.88E+02
CO	2.67E+03	3.20E+03	2.70E+03	3.24E+03	2.16E+03	2.59E+03	1.79E+03	2.15E+03	1.42E+03	1.70E+03	2.50E+03	3.00E+03	1.88E+03	2.26E+03	1.89E+03	2.27E+03

Table A-2: 1-hour Concentrations of Volatile Organic Compounds (VOC)

COPC	1-hour Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
Acrolein	8.76E-02	1.05E-01	6.37E-02	7.64E-02	4.02E-02	4.82E-02	3.22E-02	3.86E-02	5.03E-02	6.04E-02	4.07E-02	4.88E-02	2.48E-02	2.98E-02	3.99E-02	4.79E-02

Table A-3: 24-hour Concentrations of Criteria CAC

COPC	24-hour Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
SO_2	7.52E+01	9.02E+01	3.90E+01	4.68E+01	2.09E+01	2.51E+01	3.44E+01	4.13E+01	1.97E+01	2.36E+01	2.12E+01	2.54E+01	2.96E+01	3.55E+01	2.16E+01	2.59E+01
NO_2	2.17E+02	2.60E+02	2.02E+02	2.42E+02	1.25E+02	1.50E+02	1.92E+02	2.30E+02	1.91E+02	2.29E+02	1.23E+02	1.48E+02	1.72E+02	2.06E+02	1.51E+02	1.81E+02
PM_{10}	1.21E+02	1.45E+02	7.68E+01	9.22E+01	3.70E+01	4.44E+01	7.06E+01	8.47E+01	4.91E+01	5.89E+01	4.38E+01	5.26E+01	6.26E+01	7.51E+01	4.92E+01	5.90E+01
$PM_{2.5}$	1.99E+01	2.39E+01	1.82E+01	2.18E+01	1.45E+01	1.74E+01	1.47E+01	1.76E+01	1.57E+01	1.88E+01	1.53E+01	1.84E+01	1.41E+01	1.69E+01	1.44E+01	1.73E+01

Table A-4: 24-hour Concentrations of Non-metal COPC

COPC	24-hour Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
Hydrogen Cyanide	2.81E+00	3.37E+00	2.29E+00	2.75E+00	1.61E+00	1.93E+00	1.84E+00	2.21E+00	1.13E+00	1.36E+00	1.93E+00	2.32E+00	1.58E+00	1.90E+00	1.07E+00	1.28E+00
Calcium Oxide	3.43E-03	4.12E-03	2.77E-03	3.32E-03	1.52E-03	1.82E-03	1.79E-03	2.15E-03	1.09E-03	1.31E-03	2.12E-03	2.54E-03	1.58E-03	1.90E-03	1.04E-03	1.25E-03
Magnesium Oxide	2.27E-03	2.72E-03	1.83E-03	2.20E-03	1.00E-03	1.20E-03	1.18E-03	1.42E-03	7.24E-04	8.69E-04	1.40E-03	1.68E-03	1.05E-03	1.26E-03	6.86E-04	8.23E-04
Dolomite	5.81E-05	6.97E-05	4.70E-05	5.64E-05	2.58E-05	3.10E-05	3.03E-05	3.64E-05	1.86E-05	2.23E-05	3.60E-05	4.32E-05	2.68E-05	3.22E-05	1.76E-05	2.11E-05

Table A-5: 24-hour Concentrations of VOC

COPC	24-hour Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
1,3-butadiene	5.52E-01	6.62E-01	5.52E-01	6.62E-01	5.50E-01	6.60E-01	5.51E-01	6.61E-01	5.51E-01	6.61E-01	5.51E-01	6.61E-01	5.51E-01	6.61E-01	5.51E-01	6.61E-01
Acetaldehyde	1.27E+00	1.52E+00	1.24E+00	1.49E+00	1.15E+00	1.38E+00	1.16E+00	1.39E+00	1.19E+00	1.43E+00	1.15E+00	1.38E+00	1.15E+00	1.38E+00	1.16E+00	1.39E+00
Acrolein	1.00E-01	1.20E-01	9.57E-02	1.15E-01	8.23E-02	9.88E-02	8.38E-02	1.01E-01	8.80E-02	1.06E-01	8.31E-02	9.97E-02	8.27E-02	9.92E-02	8.43E-02	1.01E-01
Benzene	8.85E-01	1.06E+00	8.79E-01	1.05E+00	8.62E-01	1.03E+00	8.64E-01	1.04E+00	8.70E-01	1.04E+00	8.63E-01	1.04E+00	8.63E-01	1.04E+00	8.65E-01	1.04E+00
Formaldehyde	5.26E-01	6.31E-01	4.25E-01	5.10E-01	1.72E+00	2.06E+00	1.75E+00	2.10E+00	1.84E+00	2.21E+00	1.73E+00	2.08E+00	1.43E-01	1.72E-01	1.76E-01	2.11E-01

Table A-6: Annual Concentrations of CAC

COPC	Annual Average Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
SO_2	5.30E+00	6.36E+00	4.04E+00	4.85E+00	2.98E+00	3.58E+00	3.23E+00	3.88E+00	3.18E+00	3.82E+00	3.24E+00	3.89E+00	3.03E+00	3.64E+00	3.06E+00	3.67E+00
NO_2	5.31E+01	6.37E+01	3.85E+01	4.62E+01	2.39E+01	2.87E+01	2.66E+01	3.19E+01	3.00E+01	3.60E+01	2.55E+01	3.06E+01	2.48E+01	2.98E+01	2.63E+01	3.16E+01
PM_{10}	2.16E+01	2.59E+01	2.12E+01	2.54E+01	1.58E+01	1.90E+01	1.61E+01	1.93E+01	1.76E+01	2.11E+01	1.61E+01	1.93E+01	1.57E+01	1.88E+01	1.62E+01	1.94E+01
$PM_{2.5}$	9.22E+00	1.11E+01	8.74E+00	1.05E+01	7.16E+00	8.59E+00	7.30E+00	8.76E+00	7.61E+00	9.13E+00	7.29E+00	8.75E+00	7.11E+00	8.53E+00	7.20E+00	8.64E+00

Table A-7: Annual Concentrations of Non-metal COPC

COPC	Annual Average Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
Hydrogen Cyanide	3.32E-01	3.98E-01	2.12E-01	2.54E-01	9.49E-02	1.14E-01	1.24E-01	1.49E-01	1.16E-01	1.39E-01	1.26E-01	1.51E-01	1.02E-01	1.22E-01	1.05E-01	1.26E-01
Calcium Oxide	3.54E-04	4.25E-04	2.07E-04	2.48E-04	8.98E-05	1.08E-04	1.23E-04	1.48E-04	9.81E-05	1.18E-04	1.16E-04	1.39E-04	9.71E-05	1.17E-04	8.50E-05	1.02E-04
Magnesium Oxide	2.83E-04	3.40E-04	1.66E-04	1.99E-04	7.19E-05	8.63E-05	9.86E-05	1.18E-04	7.85E-05	9.42E-05	9.28E-05	1.11E-04	7.76E-05	9.31E-05	6.80E-05	8.16E-05
Dolomite	2.83E-04	3.40E-04	1.66E-04	1.99E-04	7.19E-05	8.63E-05	9.86E-05	1.18E-04	7.85E-05	9.42E-05	9.28E-05	1.11E-04	7.76E-05	9.31E-05	6.80E-05	8.16E-05

Table A-8: Annual Concentrations of VOC

COPC	Annual Average Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
1,3-butadiene	6.71E-02	8.05E-02	6.70E-02	8.04E-02	6.68E-02	8.02E-02	6.68E-02	8.02E-02	6.69E-02	8.03E-02	6.68E-02	8.02E-02	6.68E-02	8.02E-02	6.69E-02	8.03E-02
Acetaldehyde	7.05E-01	8.46E-01	6.99E-01	8.39E-01	6.84E-01	8.21E-01	6.86E-01	8.23E-01	6.90E-01	8.28E-01	6.85E-01	8.22E-01	6.84E-01	8.21E-01	6.87E-01	8.24E-01
Acrolein	4.27E-02	5.12E-02	4.17E-02	5.00E-02	3.96E-02	4.75E-02	3.98E-02	4.78E-02	4.05E-02	4.86E-02	3.97E-02	4.76E-02	3.96E-02	4.75E-02	3.99E-02	4.79E-02
Benzene	5.60E-01	6.72E-01	5.64E-01	6.77E-01	5.56E-01	6.67E-01	5.56E-01	6.67E-01	5.57E-01	6.68E-01	5.56E-01	6.67E-01	5.64E-01	6.77E-01	5.56E-01	6.67E-01
Formaldehyde	1.03E+00	1.24E+00	1.03E+00	1.24E+00	9.86E-01	1.18E+00	9.91E-01	1.19E+00	1.01E+00	1.21E+00	9.88E-01	1.19E+00	9.87E-01	1.18E+00	9.94E-01	1.19E+00

Table A-9: Annual Concentrations of Metals

COPC	Annual Average Concentration (µg/m^3)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case A	Trigger Level	Predicted Future Case A	Trigger Level	Predicted Future Case A	Trigger Level	Predicted Future Case A	Trigger Level	Predicted Future Case A	Trigger Level	Predicted Future Case A	Trigger Level	Predicted Future Case A	Trigger Level	Predicted Future Case A	Trigger Level
Antimony	8.14E-03	9.77E-03	8.13E-03	9.76E-03	8.11E-03	9.73E-03	8.11E-03	9.73E-03	8.11E-03	9.73E-03	8.11E-03	9.73E-03	8.11E-03	9.73E-03	8.11E-03	9.73E-03
Arsenic	5.47E-03	6.56E-03	5.02E-03	6.02E-03	4.28E-03	5.14E-03	4.35E-03	5.22E-03	4.46E-03	5.35E-03	4.34E-03	5.21E-03	4.26E-03	5.11E-03	4.31E-03	5.17E-03
Barium	2.12E-02	2.54E-02	2.02E-02	2.42E-02	1.86E-02	2.23E-02	1.87E-02	2.24E-02	1.89E-02	2.27E-02	1.87E-02	2.24E-02	1.85E-02	2.22E-02	1.86E-02	2.23E-02
Beryllium	2.82E-04	3.38E-04	2.79E-04	3.35E-04	2.75E-04	3.30E-04	2.75E-04	3.30E-04	2.76E-04	3.31E-04	2.75E-04	3.30E-04	2.74E-04	3.29E-04	2.75E-04	3.30E-04
Chromium	1.20E-03	1.44E-03	1.03E-03	1.24E-03	6.19E-04	7.43E-04	6.50E-04	7.80E-04	7.18E-04	8.62E-04	6.44E-04	7.73E-04	6.09E-04	7.31E-04	6.38E-04	7.66E-04
Cobalt	4.64E-04	5.57E-04	4.16E-04	4.99E-04	3.02E-04	3.62E-04	3.11E-04	3.73E-04	3.30E-04	3.96E-04	3.09E-04	3.71E-04	3.00E-04	3.60E-04	3.08E-04	3.70E-04
Copper	1.08E-01	1.30E-01	1.08E-01	1.30E-01	1.08E-01	1.30E-01	1.08E-01	1.30E-01	1.08E-01	1.30E-01	1.08E-01	1.30E-01	1.08E-01	1.30E-01	1.08E-01	1.30E-01
Lead	3.25E-03	3.90E-03	2.85E-03	3.42E-03	2.29E-03	2.75E-03	2.34E-03	2.81E-03	2.42E-03	2.90E-03	2.33E-03	2.80E-03	2.28E-03	2.74E-03	2.31E-03	2.77E-03
Manganese	1.46E-02	1.75E-02	1.25E-02	1.50E-02	8.15E-03	9.78E-03	8.49E-03	1.02E-02	9.17E-03	1.10E-02	8.43E-03	1.01E-02	8.04E-03	9.65E-03	8.34E-03	1.00E-02
Mercury	4.05E-04	4.86E-04	2.37E-04	2.84E-04	1.02E-04	1.22E-04	1.42E-04	1.70E-04	1.06E-04	1.27E-04	1.26E-04	1.51E-04	1.09E-04	1.31E-04	8.79E-05	1.05E-04
Nickel	1.30E-03	1.56E-03	1.15E-03	1.38E-03	8.33E-04	1.00E-03	8.57E-04	1.03E-03	9.10E-04	1.09E-03	8.53E-04	1.02E-03	8.24E-04	9.89E-04	8.47E-04	1.02E-03
Selenium	8.07E-04	9.68E-04	8.04E-04	9.65E-04	7.96E-04	9.55E-04	7.96E-04	9.55E-04	7.98E-04	9.58E-04	7.96E-04	9.55E-04	7.95E-04	9.54E-04	7.96E-04	9.55E-04
Thallium	1.34E-03	1.61E-03	1.33E-03	1.60E-03	1.32E-03	1.58E-03	1.32E-03	1.58E-03	1.32E-03	1.58E-03	1.32E-03	1.58E-03	1.32E-03	1.58E-03	1.32E-03	1.58E-03
Uranium	1.01E-04	1.21E-04	9.82E-05	1.18E-04	9.26E-05	1.11E-04	9.31E-05	1.12E-04	9.39E-05	1.13E-04	9.30E-05	1.12E-04	9.25E-05	1.11E-04	9.29E-05	1.11E-04
Vanadium	1.03E-03	1.24E-03	8.77E-04	1.05E-03	5.52E-04	6.62E-04	5.77E-04	6.92E-04	6.29E-04	7.55E-04	5.73E-04	6.88E-04	5.44E-04	6.53E-04	5.66E-04	6.79E-04
Zinc	1.13E-02	1.36E-02	1.09E-02	1.31E-02	1.06E-02	1.27E-02	1.07E-02	1.28E-02	1.07E-02	1.28E-02	1.06E-02	1.27E-02	1.06E-02	1.27E-02	1.06E-02	1.27E-02

Table A-10: Annual Concentrations of $B(a)P_{TPE}$

COPC	Annual Average Concentration (µg/m³)															
	Inside PDA (On-Property) (Golf Course)		Outside PDA (Off-Property)		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store		Geraldton		MacLeod Provincial Park	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
B[a]PTPE	4.09E-07	4.91E-07	2.57E-07	3.08E-07	5.18E-08	6.22E-08	7.31E-08	8.77E-08	1.27E-07	1.52E-07	6.59E-08	7.91E-08	5.10E-08	6.12E-08	7.44E-08	8.93E-08

Table A-11: COPC Concentrations in Soil

COPC	Soil Exposure Point Concentration (mg/kg-dry weight)															
	Maximum in Geraldton		Maximum in LAA Outside PDA and Off-Property		Maximum on Golf Course		Maximum Predicted in MacLeod Provincial Park		Leased Properties		Rosedale		Residence 300		Commercial Hardware Store	
	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level	Predicted Future Case	Trigger Level
Antimony	2.87E+00	3.44E+00	2.88E+00	3.46E+00	2.89E+00	3.47E+00	2.87E+00	3.44E+00	2.87E+00	3.44E+00	2.87E+00	3.44E+00	2.87E+00	3.44E+00	2.87E+00	3.44E+00
Arsenic	1.03E+02	1.24E+02	1.04E+02	1.25E+02	1.04E+02	1.25E+02	1.03E+02	1.24E+02	1.03E+02	1.24E+02	1.03E+02	1.24E+02	1.03E+02	1.24E+02	1.03E+02	1.24E+02
Barium	4.55E+01	5.46E+01	4.60E+01	5.52E+01	4.69E+01	5.63E+01	4.55E+01	5.46E+01	4.55E+01	5.46E+01	4.55E+01	5.46E+01	4.56E+01	5.47E+01	4.55E+01	5.46E+01
Beryllium	2.20E-01	2.64E-01	2.22E-01	2.66E-01	2.24E-01	2.69E-01	2.20E-01	2.64E-01	2.20E-01	2.64E-01	2.20E-01	2.64E-01	2.21E-01	2.65E-01	2.20E-01	2.64E-01
Chromium	2.09E+01	2.51E+01	2.10E+01	2.52E+01	2.12E+01	2.54E+01	2.09E+01	2.51E+01	2.09E+01	2.51E+01	2.09E+01	2.51E+01	2.09E+01	2.51E+01	2.09E+01	2.51E+01
Cobalt	4.54E+00	5.45E+00	4.57E+00	5.48E+00	4.63E+00	5.56E+00	4.54E+00	5.45E+00	4.54E+00	5.45E+00	4.54E+00	5.45E+00	4.55E+00	5.46E+00	4.54E+00	5.45E+00
Copper	9.88E+00	1.19E+01	9.96E+00	1.20E+01	1.01E+01	1.21E+01	9.88E+00	1.19E+01	9.88E+00	1.19E+01	9.89E+00	1.19E+01	9.91E+00	1.19E+01	9.89E+00	1.19E+01
Lead	1.35E+01	1.62E+01	1.37E+01	1.64E+01	1.40E+01	1.68E+01	1.35E+01	1.62E+01	1.35E+01	1.62E+01	1.36E+01	1.63E+01	1.36E+01	1.63E+01	1.36E+01	1.63E+01
Manganese	1.90E+03	2.28E+03	1.90E+03	2.28E+03	1.90E+03	2.28E+03	1.90E+03	2.28E+03	1.90E+03	2.28E+03	1.90E+03	2.28E+03	1.90E+03	2.28E+03	1.90E+03	2.28E+03
Mercury	1.38E-01	1.66E-01	1.39E-01	1.67E-01	1.42E-01	1.70E-01	1.38E-01	1.66E-01	1.38E-01	1.66E-01	1.39E-01	1.67E-01	1.38E-01	1.66E-01	1.38E-01	1.66E-01
Nickel	9.77E+00	1.17E+01	9.86E+00	1.18E+01	1.00E+01	1.20E+01	9.77E+00	1.17E+01	9.77E+00	1.17E+01	9.78E+00	1.17E+01	9.80E+00	1.18E+01	9.78E+00	1.17E+01
Selenium	5.00E-01	6.00E-01	5.02E-01	6.02E-01	5.07E-01	6.08E-01	5.00E-01	6.00E-01	5.00E-01	6.00E-01	5.00E-01	6.00E-01	5.00E-01	6.00E-01	5.00E-01	6.00E-01
Thallium	6.21E-02	7.45E-02	6.49E-02	7.79E-02	6.99E-02	8.39E-02	6.21E-02	7.45E-02	6.22E-02	7.46E-02	6.25E-02	7.50E-02	6.30E-02	7.56E-02	6.24E-02	7.49E-02
Uranium	4.03E-01	4.84E-01	4.05E-01	4.86E-01	4.08E-01	4.90E-01	4.03E-01	4.84E-01	4.03E-01	4.84E-01	4.04E-01	4.85E-01	4.04E-01	4.85E-01	4.04E-01	4.85E-01
Vanadium	1.97E+01	2.36E+01	1.98E+01	2.38E+01	2.00E+01	2.40E+01	1.97E+01	2.36E+01	1.97E+01	2.36E+01	1.97E+01	2.36E+01	1.97E+01	2.36E+01	1.97E+01	2.36E+01
Zinc	4.30E+01	5.16E+01	4.32E+01	5.18E+01	4.34E+01	5.21E+01	4.30E+01	5.16E+01	4.30E+01	5.16E+01	4.30E+01	5.16E+01	4.31E+01	5.17E+01	4.30E+01	5.16E+01

Table A-12: Mean Concentrations of COPCs in Surface Water-Barton Bay East

COPC	Surface Water Concentration (µg/L)	
	Predicted Future Case [1]	Trigger Value
Antimony	4.34E-01	5.21E-01
Arsenic	1.41E+01	1.69E+01
Barium	6.53E+00	7.84E+00
Beryllium	2.69E-01	3.23E-01
Chromium	5.03E-01	6.04E-01
Cobalt	1.74E-01	2.09E-01
Copper	2.79E+00	3.35E+00
Lead	4.01E-01	4.81E-01
Manganese	1.90E+01	2.28E+01
Mercury	9.11E-03	1.09E-02
Nickel	9.28E-01	1.11E+00
Selenium	2.85E-01	3.42E-01
Thallium	7.66E-02	9.19E-02
Uranium	1.18E+00	1.42E+00
Vanadium	4.95E-01	5.94E-01
Zinc	2.60E+00	3.12E+00

1: Occurs during Operations Phase

Table A-13: Mean Concentrations of COPCs in Surface Water-Barton Bay West

COPC	Surface Water Concentration (µg/L)	
	Predicted Future Case [1]	Trigger Value
Antimony	4.20E-01	5.04E-01
Arsenic	2.84E+01	3.41E+01
Barium	6.11E+00	7.33E+00
Beryllium	2.90E-01	3.48E-01
Chromium	4.30E-01	5.16E-01
Cobalt	1.69E-01	2.03E-01
Copper	1.65E+00	1.98E+00
Lead	3.98E-01	4.78E-01
Manganese	1.96E+01	2.35E+01
Mercury	1.05E-02	1.26E-02
Nickel	8.98E-01	1.08E+00
Selenium	3.13E-01	3.76E-01
Thallium	8.20E-02	9.84E-02
Uranium	1.26E+00	1.51E+00
Vanadium	4.39E-01	5.27E-01
Zinc	2.40E+00	2.88E+00

1: Occurs during Operations Phase

Table A-14: Mean Concentrations of COPCs in Surface Water-Southwest Arm

COPC	Surface Water Concentration (µg/L)	
	Predicted Future Case [1]	Trigger Value
Antimony	2.48E+00	2.98E+00
Arsenic	2.24E+00	2.69E+00
Barium	1.11E+01	1.33E+01
Beryllium	2.32E-01	2.78E-01
Chromium	3.63E-01	4.36E-01
Cobalt	2.87E-01	3.44E-01
Copper	5.24E-01	6.29E-01
Lead	2.40E-01	2.88E-01
Manganese	1.35E+01	1.62E+01
Mercury	6.93E-03	8.32E-03
Nickel	6.08E-01	7.30E-01
Selenium	2.47E-01	2.96E-01
Thallium	6.29E-02	7.55E-02
Uranium	2.16E+00	2.59E+00
Vanadium	4.13E-01	4.96E-01
Zinc	1.86E+00	2.23E+00

1: Occurs during Operations Phase

Table A-15: Mean Concentrations of COPCs in Surface Water-Central Basin East

COPC	Surface Water Concentration (µg/L)	
	Predicted Future Case [1]	Trigger Value
Antimony	3.26E+00	3.91E+00
Arsenic	6.58E+00	7.90E+00
Barium	9.27E+00	1.11E+01
Beryllium	2.27E-01	2.72E-01
Chromium	3.61E-01	4.33E-01
Cobalt	1.96E-01	2.35E-01
Copper	1.64E+00	1.97E+00
Lead	2.69E-01	3.23E-01
Manganese	1.36E+01	1.63E+01
Mercury	2.90E-02	3.48E-02
Nickel	6.65E-01	7.98E-01
Selenium	2.43E-01	2.92E-01
Thallium	6.07E-02	7.28E-02
Uranium	1.83E+00	2.20E+00
Vanadium	4.08E-01	4.90E-01
Zinc	1.98E+00	2.38E+00

1: Occurs during Operations Phase

Table A-16: Mean Concentrations of COPCs in Surface Water-Central Basin West

COPC	Surface Water Concentration (µg/L)	
	Predicted Future Case [1]	Trigger Value
Antimony	2.61E-01	3.13E-01
Arsenic	6.66E+00	7.99E+00
Barium	8.62E+00	1.03E+01
Beryllium	2.59E-01	3.11E-01
Chromium	4.56E-01	5.47E-01
Cobalt	8.12E-02	9.74E-02
Copper	2.19E+00	2.63E+00
Lead	3.93E-01	4.72E-01
Manganese	1.24E+01	1.49E+01
Mercury	1.03E-02	1.24E-02
Nickel	5.51E-01	6.61E-01
Selenium	2.67E-01	3.20E-01
Thallium	7.44E-02	8.93E-02
Uranium	1.15E+00	1.38E+00
Vanadium	4.60E-01	5.52E-01
Zinc	1.91E+00	2.29E+00

1: Occurs during Operations Phase

Table A-17: Mean Concentrations of COPCs in Surface Water-Outlet Basin

COPC	Surface Water Concentration (µg/L)	
	Predicted Future Case [1]	Trigger Value
Antimony	2.25E+00	2.70E+00
Arsenic	4.42E+00	5.30E+00
Barium	8.88E+00	1.07E+01
Beryllium	2.40E-01	2.88E-01
Chromium	3.51E-01	4.21E-01
Cobalt	1.90E-01	2.28E-01
Copper	1.13E+00	1.36E+00
Lead	2.74E-01	3.29E-01
Manganese	1.49E+01	1.79E+01
Mercury	7.73E-03	9.28E-03
Nickel	5.90E-01	7.08E-01
Selenium	2.59E-01	3.11E-01
Thallium	6.76E-02	8.11E-02
Uranium	1.84E+00	2.21E+00
Vanadium	4.10E-01	4.92E-01
Zinc	1.71E+00	2.05E+00

1: Occurs during Operations Phase

Table A-18: COPC Concentrations in Vegetation (Browse)

COPC	Vegetation (Browse) Exposure Point Concentrations (mg/Kg wet weight)	
	Predicted Future Case	Trigger Value
Antimony	2.05E-02	2.46E-02
Arsenic	1.13E-01	1.36E-01
Barium	2.03E+00	2.44E+00
Beryllium	3.90E-03	4.68E-03
Chromium	2.33E-02	2.80E-02
Cobalt	2.38E-01	2.86E-01
Copper	1.08E+00	1.30E+00
Lead	1.16E-02	1.39E-02
Manganese	3.72E+01	4.46E+01
Mercury	1.92E-02	2.30E-02
Nickel	4.98E-01	5.98E-01
Selenium	2.56E-02	3.07E-02
Thallium	4.49E-03	5.39E-03
Uranium	8.82E-04	1.06E-03
Vanadium	1.11E-02	1.33E-02
Zinc	2.37E+01	2.84E+01

Table A-19: COPC Concentrations in Vegetation (Forage)

COPC	Vegetation (Forage) Exposure Point Concentrations (mg/Kg wet weight)	
	Predicted Future Case	Trigger Value
Antimony	1.20E-02	1.44E-02
Arsenic	1.61E-01	1.93E-01
Barium	6.09E+00	7.31E+00
Beryllium	3.90E-03	4.68E-03
Chromium	1.02E-01	1.22E-01
Cobalt	7.31E-03	8.77E-03
Copper	4.27E-01	5.12E-01
Lead	2.14E-02	2.57E-02
Manganese	6.09E+01	7.31E+01
Mercury	1.92E-02	2.30E-02
Nickel	2.09E-01	2.51E-01
Selenium	1.96E-02	2.35E-02
Thallium	2.24E-03	2.69E-03
Uranium	1.28E-03	1.54E-03
Vanadium	5.74E-02	6.89E-02
Zinc	4.57E+00	5.48E+00

Table A-20: COPC Concentrations in Vegetation (Berries)

COPC	Vegetation (Berries) Exposure Point Concentrations (mg/Kg wet weight)	
	Predicted Future Case	Trigger Value
Antimony	3.88E-03	4.66E-03
Arsenic	4.43E-02	5.32E-02
Barium	1.08E+00	1.30E+00
Beryllium	3.90E-03	4.68E-03
Chromium	2.10E-02	2.52E-02
Cobalt	8.56E-03	1.03E-02
Copper	3.58E-01	4.30E-01
Lead	1.84E-02	2.21E-02
Manganese	1.58E+01	1.90E+01
Mercury	1.92E-02	2.30E-02
Nickel	5.32E-02	6.38E-02
Selenium	1.95E-02	2.34E-02
Thallium	3.19E-02	3.83E-02
Uranium	7.80E-04	9.36E-04
Vanadium	3.91E-02	4.69E-02
Zinc	2.70E+00	3.24E+00

Table A-21: COPC Concentrations in Small Mammal Tissue

COPC	Small Mammals Exposure Point Concentrations (mg/Kg wet weight)	
	Predicted Future Case	Trigger Value
Antimony	1.17E-02	1.40E-02
Arsenic	7.56E-01	9.07E-01
Barium	3.67E+00	4.40E+00
Beryllium	2.04E-03	2.45E-03
Chromium	1.61E-01	1.93E-01
Cobalt	4.42E-02	5.30E-02
Copper	3.39E+00	4.07E+00
Lead	6.05E-02	7.26E-02
Manganese	4.79E+00	5.75E+00
Mercury	4.55E-02	5.46E-02
Nickel	2.04E-01	2.45E-01
Selenium	3.07E-01	3.68E-01
Thallium	5.33E-03	6.40E-03
Uranium	6.23E-04	7.48E-04
Vanadium	3.48E-02	4.18E-02
Zinc	2.95E+01	3.54E+01

Table A-22: COPC Concentrations in Fish Tissue-Whole Body (Small fish)

COPC	Fish Tissue (Whole Body) Exposure Point Concentrations (mg/Kg wet weight)	
	Predicted Future Case	Trigger Value
Antimony	2.13E-02	2.56E-02
Arsenic	6.66E-01	7.99E-01
Barium	9.09E-01	1.09E+00
Beryllium	2.00E-03	2.40E-03
Chromium	1.59E-01	1.91E-01
Cobalt	1.69E-02	2.03E-02
Copper	7.06E-01	8.47E-01
Lead	1.33E-02	1.60E-02
Manganese	3.27E+00	3.92E+00
Mercury (assumed as methylmercury)	1.52E-01	1.82E-01
Nickel	9.22E-02	1.11E-01
Selenium	3.39E-01	4.07E-01
Thallium	3.94E-03	4.73E-03
Uranium	1.85E-03	2.22E-03
Vanadium	7.85E-02	9.42E-02
Zinc	4.79E+01	5.75E+01

Table A-23: COPC Concentrations in Fish Tissue-Whole Body-Fillet and Liver (Walleye)

COPC	Fis Tissue (Fillet) Exposure Point Concentrations (mg/Kg wet weight)	
	Predicted Future Case	Trigger Value
Antimony	1.77E-02	2.12E-02
Arsenic	8.28E-02	9.94E-02
Barium	1.71E-02	2.05E-02
Beryllium	2.00E-03	2.40E-03
Chromium	5.83E-02	7.00E-02
Cobalt	1.10E-01	1.32E-01
Copper	7.18E-01	8.62E-01
Lead	1.01E-02	1.21E-02
Manganese	1.09E+00	1.31E+00
Mercury (assumed as methylmercury)	5.86E-01	7.03E-01
Nickel	3.92E-02	4.70E-02
Selenium	5.20E-01	6.24E-01
Thallium	1.41E-02	1.69E-02
Uranium	9.31E-04	1.12E-03
Vanadium	3.75E-02	4.50E-02
Zinc	1.10E+01	1.32E+01